City of Vermillion

Comprehensive Plan

December 2018

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I. INTRODUCTION

The Metropolitan Council updated its regional plan, *Thrive MSP 2040*, and issued "Systems Statements" to all jurisdictions in the seven-county metropolitan area in 2015. The systems statements identify changes in metropolitan system plans and basic planning issues that must be addressed in local plans.

Cities and Townships have had land use and zoning authority in Dakota County since the 1970s. The majority of rural City and Township comprehensive plans in southern Dakota County were initially completed and adopted in the late 1970's or the early 1980's, having been prepared and approved as a requirement of the Metropolitan Land Planning Act of 1976. All cities and townships implement their own zoning and subdivision ordinances.

The Metropolitan Land Planning Act of 1995 required that a review of local plans be completed every ten years to ensure that local plans are consistent with the regional plans prepared by the Metropolitan Council. A collaborative of 13 townships and five rural cities completed "A Composite Comprehensive Plan Update for Eighteen Cities and Township" in 2000 and was found to be consistent with the Metropolitan Council's Regional Blueprint. A collaborative of 12 townships and four rural cities completed the "Dakota County Rural Collaborative Comprehensive Plan" in 2009 and was found consistent with the *Development Framework* of the Metropolitan Council.

The City of Vermillion participates in the Dakota County Rural Collaborative comprehensive planning effort. This Collaborative comprehensive plan is being updated based on *Thrive MSP 2040 Plan*. Eleven townships and five rural cities adopted joint resolutions in fall 2016 to participate in the joint planning process for the land use plan update and assistance in meeting local water management planning requirements. Participating jurisdictions include:

Castle Rock Township	City of New Trier
City of Coates	Nininger Township
Douglas Township	City of Randolph
Empire Township	Randolph Township
Greenvale Township	Ravenna Township
Hampton Township	Vermillion Township
Marshan Township	City of Vermillion
City of Miesville	Waterford Township

Components of the collaborative plan update include:

- Population, household, and employment trends
- Land use characteristics and agricultural land identification
- Future land use plan
- Solar protection and historic preservation
- Housing
- Parks and Trails
- Transportation
- Water Resources, including
    - Surface water management
    - Subsurface sewage treatment systems (SSTS) management
- Implementation

The City of Vermillion's individual comprehensive plan is prepared in addition to the Rural Collaborative Comprehensive Plan. This individual comprehensive plan contains more details specific to the City, local public utility systems, and other community planning issues.

A. Goals and Policies

Goals and policies are official community positions that provide the basis for strategies to manage growth and change. Goals are general statements that reflect community values regarding the built and natural environments. Policies are more specific, official positions of communities that guide future planning decisions and implementation strategies. The goals for future growth management within the City of Vermillion are outlined below. These are developed in addition to or to further specify the goals and policies outlined in the Dakota County Rural Collaborative 2040 Comprehensive Plan.

General Community Goals

- Preserve the rural, small town atmosphere of the City.
- Enhance the sense of overall community identity and existing community values.
- Preserve the natural function of the Vermillion River and all natural features in the City.
- Protect the compatibility and function of land uses.
- Provide safe and efficient transportation and pedestrian circulation.
- Provide efficient services to the residential and business community.

1. Agricultural Goals

- Protect agriculture as an important land use in the City.
- Encourage the efficient use of farmland in the City.
- Prevent incompatible land uses in the agricultural areas.

Agricultural Policies

- Maintain agriculture as a long term land use in the City.
- Limit residential densities to one home per 40 acres in the agricultural area to minimize the loss of agricultural farmland.
- Support legislative tax reforms and strategies that provide incentives for the continuation of agriculture.
- Require agricultural best management practices for all farming activities to protect natural systems and water resources in the City.

2. Land Use Goals

- Minimize conflicts between commercial and residential land uses.
- Maintain a healthy environment for living and working in Vermillion.
- Maintain and enhance natural features and water resources for future generations to enjoy.
- Improve the habitat and biodiversity of the area.
- Evaluate the potential for mineral extraction of high quality aggregate resources prior to development.

Land Use Policies

- Protect residential neighborhoods from incompatible and offensive uses.
- Prohibit leapfrog or non-contiguous development.
- Promote development concepts that promote the “small town” character of the City.
- Maintain land use regulations compatible with adjacent parks, recreation areas and natural features.
- Require, as part of any proposed subdivision, that the natural drainage system remain intact.
- Require all development to adhere to restrictions and limitations within floodplain areas.
- Require development proposals to include measures for preventing erosion, minimizing site alteration, minimizing and improving the quality of runoff, and addressing view impacts during and after construction.

- Use MPCA's urban "Best Management Practices" for all new or redeveloped land developments.
- Prohibit development on slopes greater than 18%.
- Encourage development to conform to the natural limitation of the topography and soil to create the least potential for soil erosion.
- Enforce standards and regulations restricting the clear cutting of woodland areas.
- Protect access to direct sunlight for solar energy systems
- Proposed extraction operations shall be required to submit permit documentation and land reclamation plans consistent with standards outlined in local ordinances.

3. Residential Goals

- Provide a broad choice of housing types.
- Maintain safe, healthful, and blight-free residences and neighborhoods.

Residential Policies

- Work with the Dakota County Community Development Agency and Minnesota Housing Finance Agency to encourage the revitalization of existing housing in the City as a source of affordable housing.
- Avoid adoption of regulations that create excessive obstacles to the development of affordable housing.
- Allow urban residential development only when adequate public utilities are immediately available.
- Maintain a one home per 40 acre density for residential uses in the agricultural area.
- Single family developments must be located in areas provided with public sewer services.
- Multiple family residential uses shall be allowed only where public sewer and water utilities are available.
- Require all multiple family residential developments to contain adequate amounts of recreational space and social facilities to meet the needs of the residents of the development.

4. Parks and Recreation Goals

- Provide safe and convenient active and passive recreation opportunities.
- Improve parks and recreation facilities as needs and priorities change.

Park and Recreation Policies

- Identify sidewalk and trail opportunities that provide interconnection of park and recreation areas and neighborhoods.
- Design and maintain parks with proper lighting, shelter and landscaping to ensure public and property safety.
- Require dedication of developable parkland or cash in lieu of land in conjunction with any subdivision land.
- Encourage and accept land gifts and forfeitures in areas with potential recreational development opportunities.
- Review and evaluate opportunities to implement the Dakota County Land Conservation Program.
- Coordinate regional trail and Regional Greenway development potential with Dakota County and Vermillion Township.

5. Transportation Goals

- Maintain a safe, efficient and convenient transportation system.
- Develop priorities to improve the existing local transportation system.

- Protect the integrity of the transportation system.
- Provide sufficient off street parking.
- Provide safe and convenient bicycle and pedestrian access within the community.
- Expand pedestrian circulation and safety in the City.

Transportation Policies

- Enforce Dakota County access guidelines and limit new access to County roads in the City by encouraging shared access, frontage roads and appropriate intersection spacing.
- Promote available transit programs and opportunities for residents and businesses, such as park and pool facilities, rideshare programs, and dial-a-ride services.
- Coordinate transportation planning and system improvements with local, county, regional and state jurisdictions.
- Adopt land use development standards that promote safety for both vehicles and pedestrians.
- Work with Dakota County to preserve right-of-way corridors for road improvements and expansion in the City.
- Establish off-street, on-site parking requirements for commercial uses.
- Coordinate trail development opportunities with Dakota County and MnDOT.
- Protect navigable airspace by limiting structure heights consistent with FAA rules.

6. Wastewater, Public Services and Facilities Goals

- Provide safe and adequate water and wastewater services in the City.
- Promote safe neighborhoods and crime prevention in the community.
- Retain the quality of life in the community.
- Provide efficient and responsive services to residents and businesses.
- Support quality of education available to residents.
- Update local ordinances to incorporate amended MPCA Rules Chapters 7080-7083 standards.

Wastewater, Public Services and Facilities Policies

- Update local ordinances to incorporate amended MPCA Rules Chapters 7080-7083 standards
- Require existing individual sewage treatment systems that need to be expanded or replaced to meet the standards of MPCA Rules Chapters 7080-7083, as amended, and Dakota County Ordinance #113 standards and regulations. Only alternative or non-standard systems identified in MPCA Chapter 7080 will be allowed in communities under special circumstances.
- Require existing individual sewage treatment systems that need to be expanded or replaced to meet the standards of MPCA Rules Chapters 7080-7083, as amended, and Dakota County Ordinance #113 standards and regulations. Only alternative or non-standard systems identified in MPCA Chapter 7080 will be allowed in communities under special circumstances.
- Maintain the joint management program for individual sewage treatment systems that includes pump maintenance. Other components are the responsibility of the following
    - Design, construction, and inspection of new systems (responsibility of licensed septic professional);
    - Record keeping of existing systems (responsibility of township);
    - Pumping and inspection of systems every three years (responsibility of township);
    - Repair or replacement of systems found to be an imminent public health threat or failure (responsibility of township).

- Require SSTS inspectors to maintain adequate training and certification regarding updated installation techniques and regulations relating to individual sewage treatment systems.
- Prohibit any private wastewater treatment facilities in the City.

7. Water Resource Goals

- Protect water resources from unnecessary impacts of development activities and normal farm practices.
- Protect the quality and quantity of the City's groundwater supply.
- Cooperate with the Vermilion River Watershed Joint Powers Organization in regulating surface water and groundwater resources.
- Protect surface waters and wetland areas to promote water quality, recreation opportunities, aesthetic qualities, natural habitat areas, and ground water recharge.
- Protect and preserve the natural systems for the collection and dispersion of storm water and runoff.
- Establish a program to investigate and reduce potential sources of inflow/infiltration in the sewer collection system.

Water Resource Policies

- Monitor water quality in municipal wells to insure a continuing safe supply.
- Cooperate and coordinate actions with Dakota County regarding the enforcement of the County Shoreland and Floodplain Management Ordinance and local ordinances.
- Coordinate with the VRWJPO to implement water resources management and ensure that all water resources are protected in the City and land disturbances are regulated appropriately.
- Require subdivision designs to dedicate drainage easements and ponding areas adequate to channel off runoff generated by a 25-year storm of one-hour duration.
- Use the natural drainage system to the extent possible for storage and flow of runoff. Require pre-settling of runoff to discharge to wetlands.
- Use wetlands as natural recharge areas.
- Require temporary storage areas and pre-sedimentation ponds to accommodate peak flows of water runoff. Require newly constructed stormwater sedimentation ponds to meet pond design standards of the Nationwide Urban Runoff Program (NURP).
- Assist in the prevention of agricultural runoff and water quality, including educational programs in cooperation with the Dakota Soil and Water Conservation District, and management standards of the VRWJPO.
- Enforce the Collaborative Water Resources Management Ordinance.
- Consult with the Soil and Water Conservation District regarding possible corrective or preventive measures if erosion is a result from an agricultural operation.
- Enforce provisions of the State Shoreland Management program.
- Work with the Dakota Soil and Water Conservation District to enhance education and programs related to the prevention of agricultural runoff and water quality.
- Enforce provisions of the Wetland Conservation Act.

B. Purpose of the Plan

This Comprehensive Plan responds to the requirements of the Metropolitan Land Planning Act: Minnesota Statutes, Section 473.859. The plan is intended to guide future land use development, redevelopment, and other planning and policy concerns for the City of Vermillion.

C. Process

Descriptive data were gathered through a variety of sources. This data includes existing land use, basic demographics of the area.

- The City of Vermillion held an orientation meeting on February 7, 2017, to review the various issues addressed within the Collaborative Plan.
- The City of Vermillion held an open house on December 5, 2017 to discuss future land use and other components of the plan.
- The City of Vermillion conducted a public hearing on March 6, 2018 to address both the Collaborative and the individual community plan.

D. History

The area that is now Vermillion City was first explored by European immigrants around 1849, when Edmund Brisset ventured into the area. The Sioux people lived in the area during that time and had named the river flowing through this area Vermillion after the reddish hue of the stream. When the Township of Vermillion was established in 1858, this name seemed best to fit the area.

In 1866, a railway was completed between Hastings and Farmington. A platform was placed near the center of the Township on the railroad line to serve its patrons. The City of Vermillion grew around this train stop. The first buildings erected included a blacksmith shop, built in 1873, and a house, which is still standing today. In 1874, many more buildings, such as a post office, a store and saloon, a hotel, a shoe shop, and a general market were constructed. Later a grain elevator was built.

On February 27, 1881, the Village of Vermillion was incorporated. A church was built in 1882, serving the City until 1913, when the present Catholic Church of John the Baptist was built. Most of the residents of the City were, and are, German Roman Catholics. With strong ties to the Catholic religion, the church has played an important part in the development of the City. The Church is on the Minnesota Historical Society's inventory of historical resources. The City's population reached 99 in 1930, and while the railroad ceased to operate shortly thereafter, Vermillion has continued to grow as an agricultural service center in central Dakota County. The City's population peaked in 1990 at 510 people.

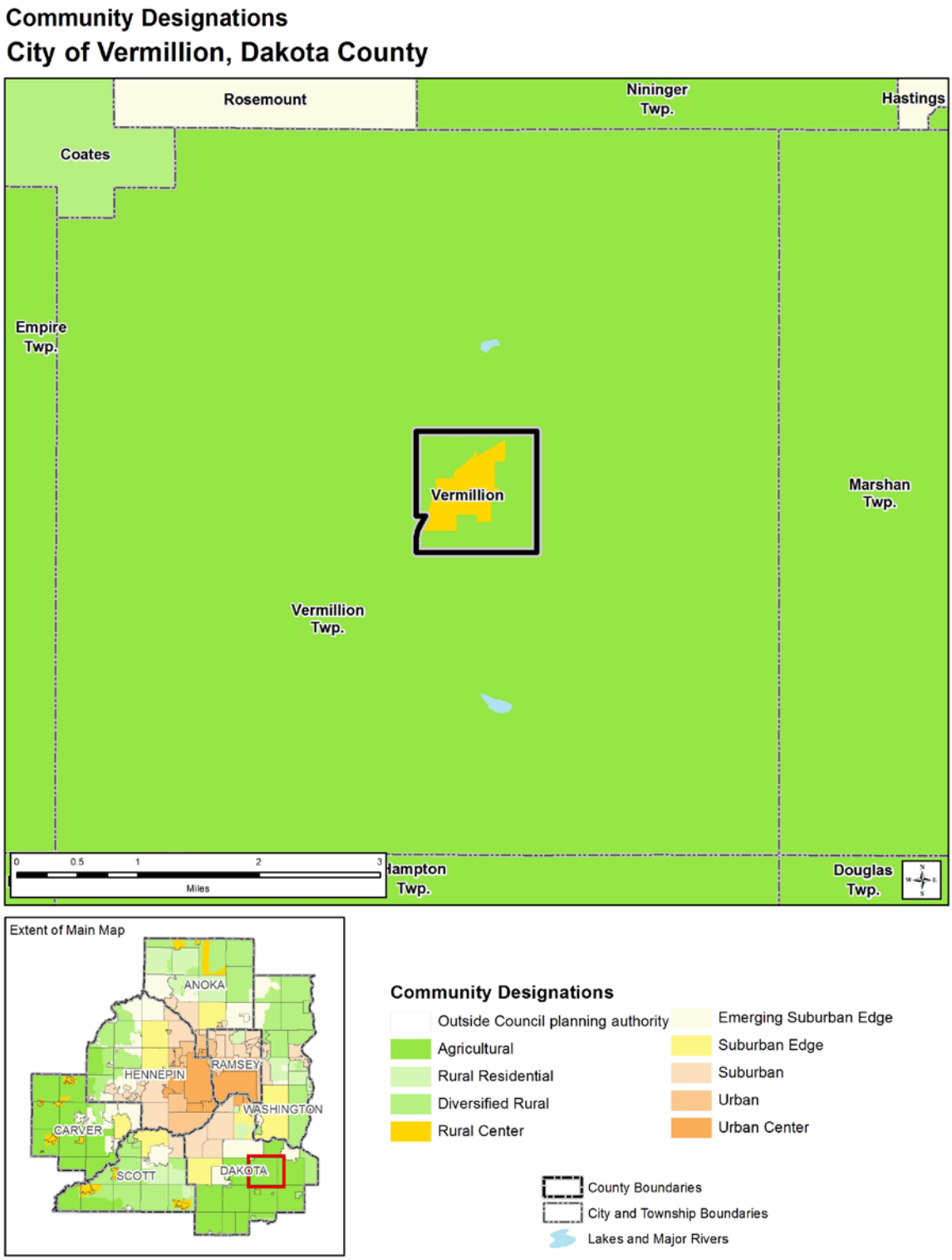
E. Regional Setting

The City of Vermillion is located on one square mile in central Dakota County. The City is fully surrounded by Vermillion Township and is located east of MN Highway 47 and west of US Highway 52. The sewered area in the City of Vermillion is designated by the Metropolitan Council as a Rural Center. Rural Centers are local commercial, employment, and residential activity centers for the region's rural areas. The remainder of land in the City is designated Agricultural by the Metropolitan Council, which allows for future growth areas within the City limits and protection of agricultural resources. The map on the following page identifies the City's community designation. The table identifies the Metropolitan Council expectations for average net density.

Community Designation Density Expectations	
Rural Center	3-5 units/acre minimum
Agricultural	1 unit/40 acres Maximum

Source: Metropolitan Council

Map 1: Community Designation from Metropolitan Council



Source: Metropolitan Council

II. LAND USE

A. Historical Figures

Table 1 identifies the historical population, household, and employment trends in the City of Vermillion from 1970 to 2016. Between 1970 and 1980 there was a significant increase in population (22%). Population increased about 16% between 1980 and 1990 but has been decreasing ever since. Population estimates for 2016 suggest a small increase in the City's population.

Table 1 – Historical Population, Housing & Employment						
Category	**1970**	**1980**	**1990**	**2000**	**2010**	**2016**
Population	359	438	510	437	419	423
Households	81	123	157	160	156	158
Employment	20	100	167	221	93	100

Source: Metropolitan Council

The household growth rate in the City has remained relatively stable since 1990. However, this does not necessarily mean housing development has stalled in the City. Throughout the region, the average number of persons per household has been decreasing, meaning more housing units are needed to accommodate similar population sizes. This may be the case in Vermillion. Projected household trends are discussed in greater detail in Chapter III.

Employment grew steadily in the City from 1970 to 2000. The City was hit hard by the economic recession, noted by the low employment for 2010. Estimates show that the City is recovering from the recession and jobs are returning but have not returned to pre-recession levels.

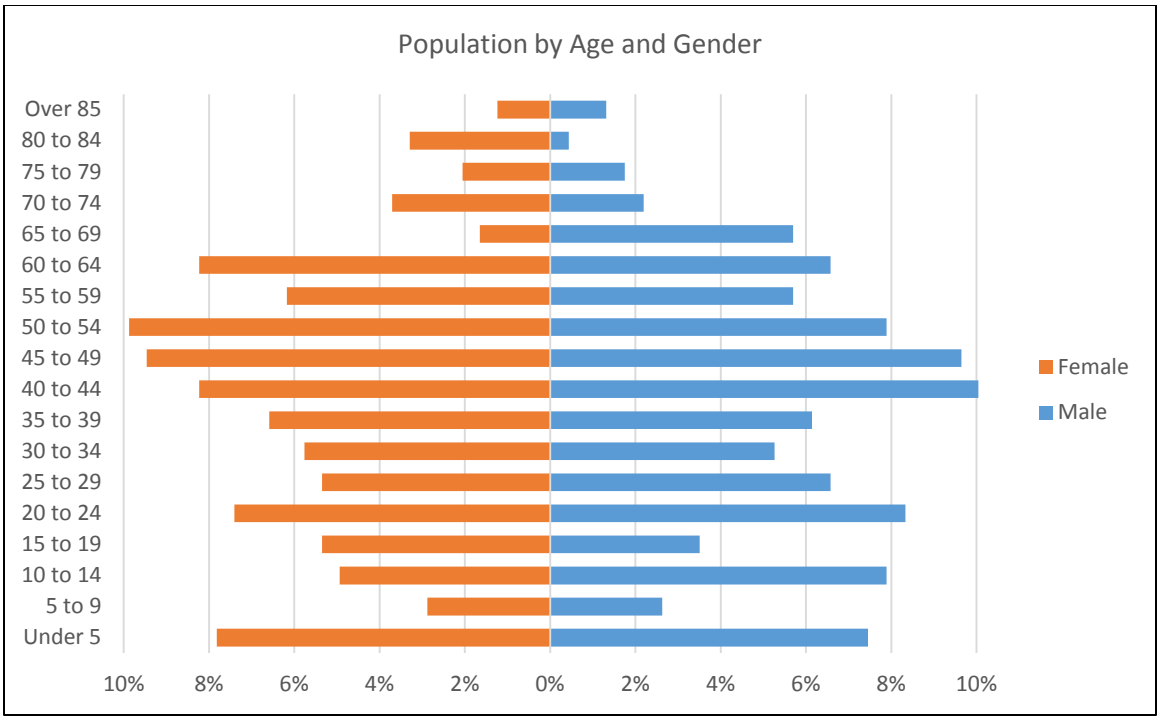
B. Forecasts and Current Demographics

As of 2016, approximately 423 people lived in Vermillion in roughly 158 households. Projected population, household, and employment trends are detailed in Table 2. Population in the City of Vermillion is expected to remain constant between 2010 and 2040. Likewise, the number of households is anticipated to remain constant. Employment, on the other hand, is anticipated to increase and return to levels seen before the economic recession.

Table 2 – Projected Population, Housing & Employment Trends					
Category	**2010**	**2016**	**2020**	**2030**	**2040**
Population	419	423	410	420	420
Households	156	158	160	160	170
Employment	93	100	150	180	200

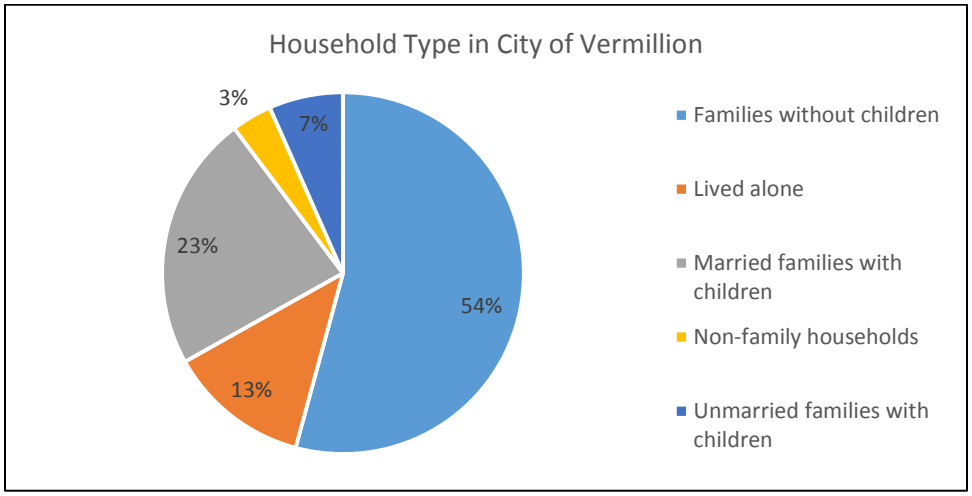
Source: Metropolitan Council

The figure below shows the estimated age and gender composition of the City of Vermillion in 2015. The largest age groups are the two cohorts between 40 and 49 years old, which represents 20% of the City's total population. When compared to Dakota County as a whole, the City's distribution of age and gender is slightly older. The City and County have similar distributions of persons age 40 or older, but the County has more persons under the age of 20 than the City.



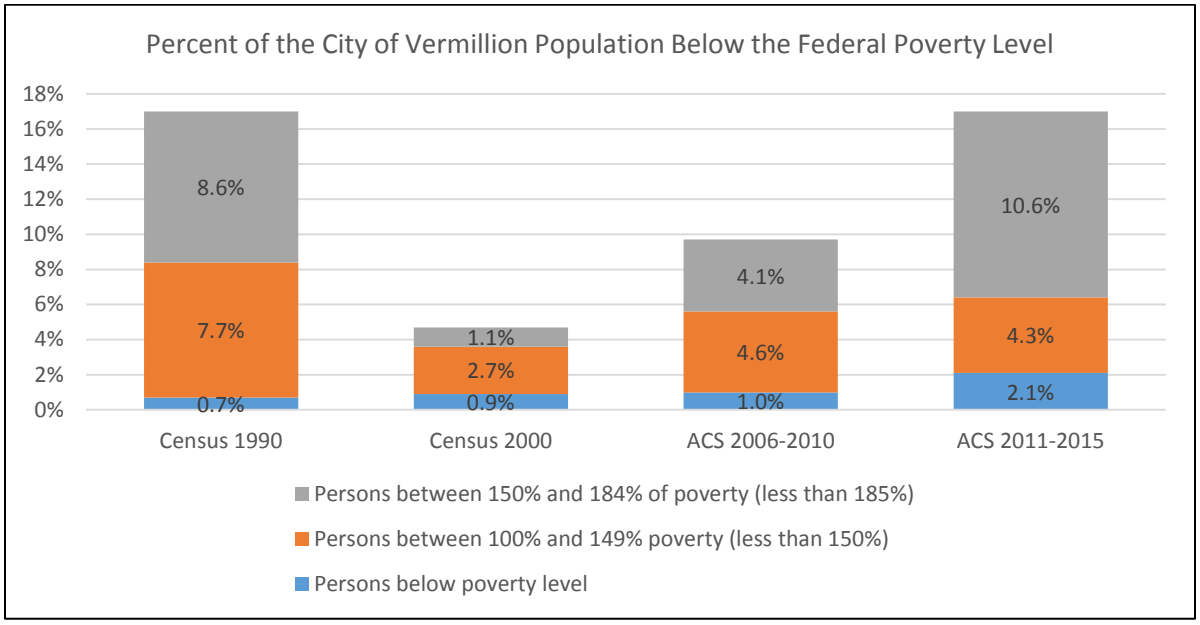
Source: Metropolitan Council Tabulation of American Community Survey Data

Over half of all households (54%) are married families without children. When compared to Dakota County as a whole, there is a significant higher percentage of families without children in Vermillion than Dakota County (35%). The City has significantly fewer 'live alone' households (13%) than Dakota County (24%). About one third of all Vermillion households have children, most of which are with married couples.



Source: Metropolitan Council Tabulation of American Community Survey Data

As shown in the figure below, about 15% of residents are between 100% and 185% of the federal poverty level while roughly 2% of residents are below the federal poverty level. The proportion of residents between 100% and 185% of the federal poverty level is higher in the City of Vermillion than in the whole of Dakota County (10%), but there are fewer residents below the poverty level in Vermillion than in the County (7%).



Source: Metropolitan Council Tabulation of US Census and American Community Survey Data

C. Existing Land Use

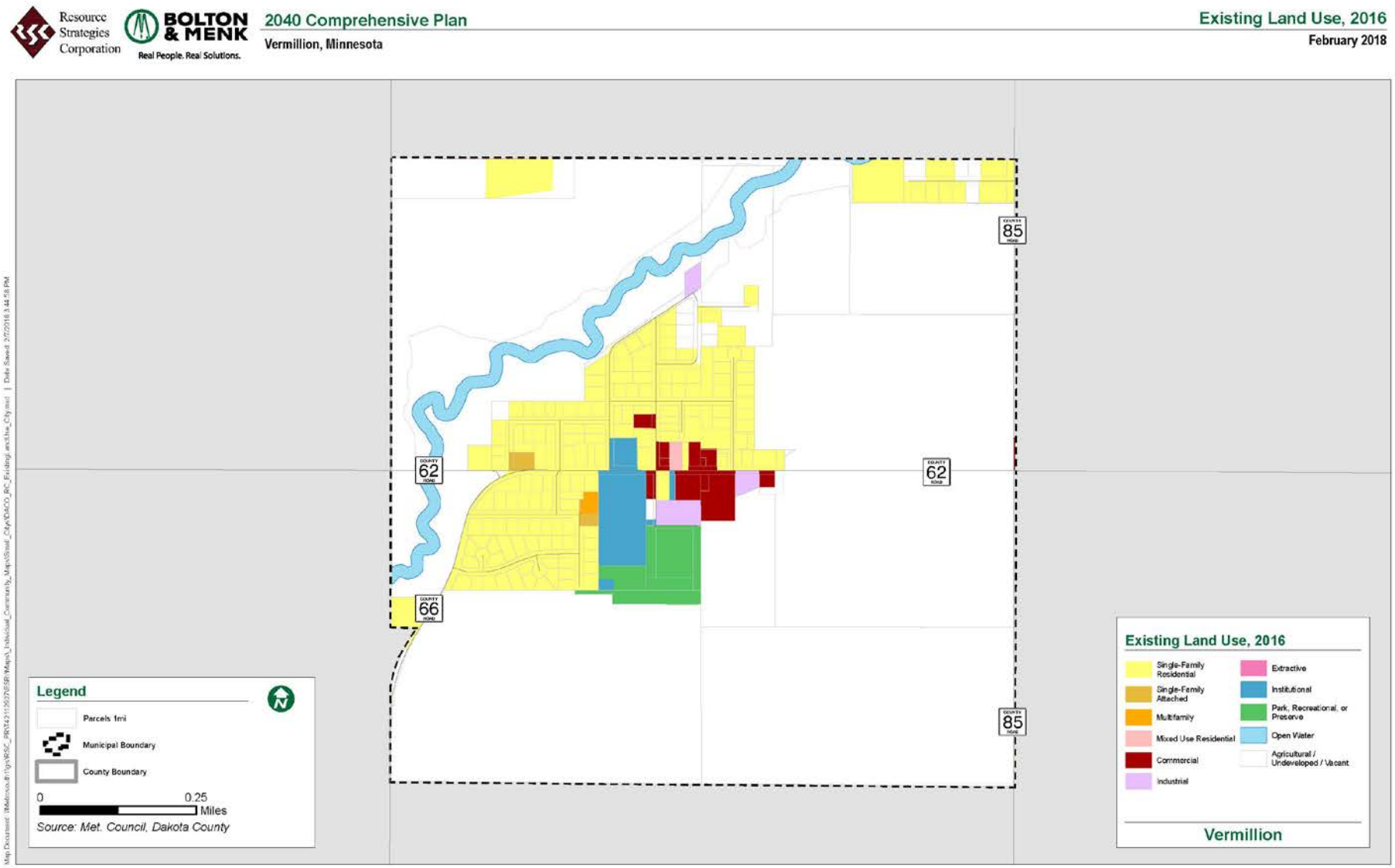
The City of Vermillion is a rural community with a traditional downtown that developed near a major river and former railway corridor. The City has a compact development pattern now centered at the intersection of Main Street (CSAH 62) and Park Avenue. Nearly all of the developed portion of the City lies entirely south of the Vermillion River.

The existing land use in the City of Vermillion is detailed in Table 3. This predominant land use reflects local policies to preserve agricultural land. This is accomplished primarily through implementation of density standards that limit consumption of agricultural land for non-agricultural uses, while still allowing for the ability to provide opportunities for some residential growth. Existing land use is illustrated in the figure on the following page.

Table 3 – Existing Land Use Characteristics

Land Use	Acres	Percent of Total
Agricultural / Undeveloped	501.3	79%
Commercial	7.3	1.2%
Industrial	3.4	0.5%
Institutional	9.6	1.5%
Mixed Use Residential	0.6	0.1%
Multifamily	0.7	0.1%
Open Water	15.7	2.5%
Park, Recreational, or Preserve	9.8	1.5%
Single-Family Attached	1.1	0.2%
Single-Family Residential	85.6	13.5%
Total	**635**	**100%**

Map 2: Existing Land Use



Density Calculations

Housing density is a measure of the number of housing units in an area. It is measured on a per acre basis. Density calculations are based on the existing number and location of units. The land use calculations are based on planned land use categories. Some future land use designations are changing from the existing land use.

Table 4 – Existing Net Residential Density (Based on Future Land Use Categories)

Land Use	Single Family Number of Units	Multi-Family Number of Units	Gross Acres	Undevelopable Acres*	Net Residential Acres	Existing Net Density Units/Acre
Agricultural	2	0	497.6	46.7	451	0.004
High Density Residential	0	11	1.4	0	1.4	8
Rural or Large Lot Residential	7	0	11.3	0	11.3	0.6
Single Family Residential	142	0	79.9	0	79.9	1.8
Total	151	11	590.2	46.7	543.5	0.3

**Undevelopable due to steep slopes, wetlands and water bodies, right-of-way, etc.*

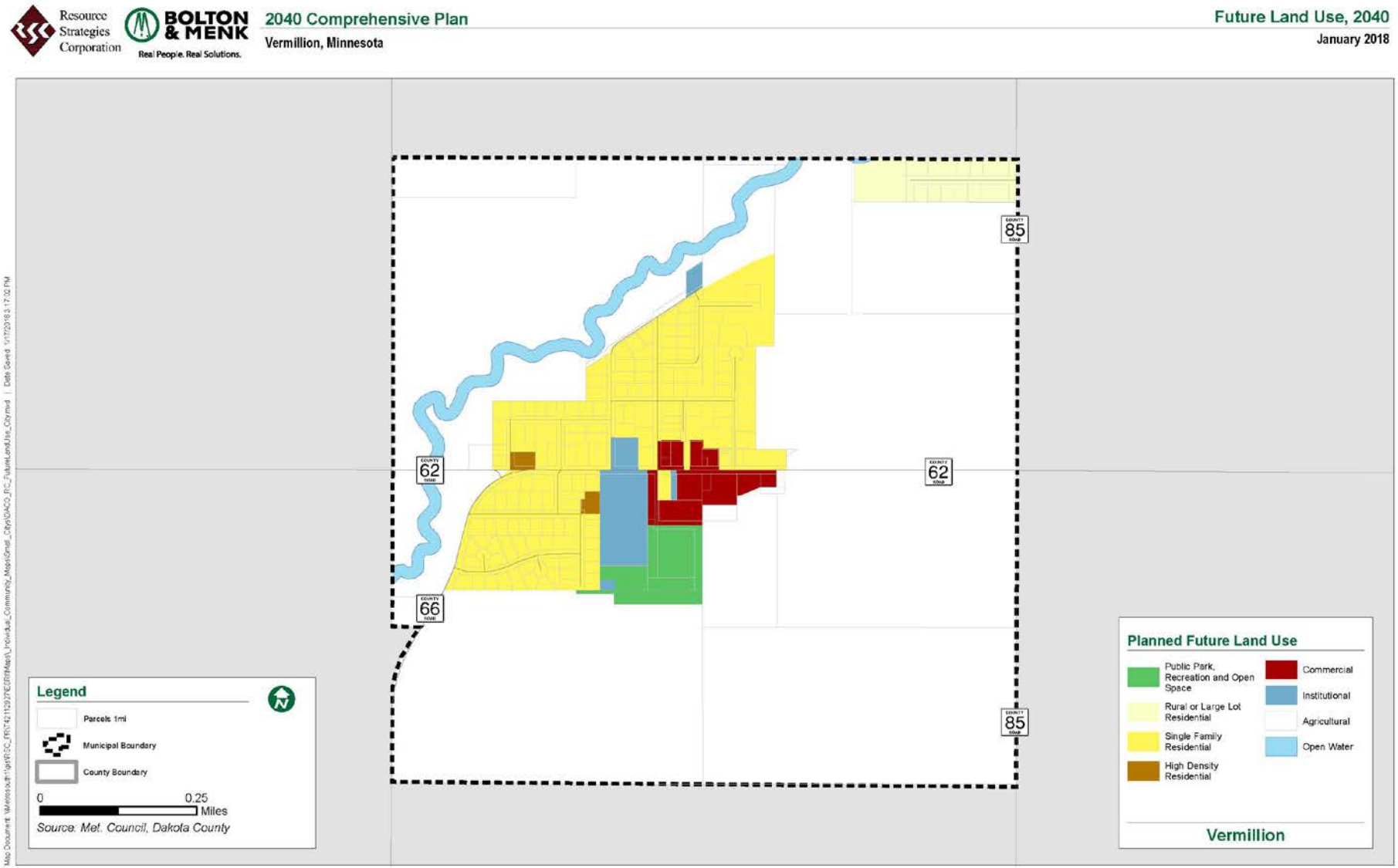
D. Future Land Use

The future land use categories in this section identify the specific rationale for growth management in the City of Vermillion. The land use categories are the framework upon which the official controls, such as the zoning ordinances and subdivision regulations, are based and provide implementation for future growth. The planned future land uses shown on this map reflect previous community planning efforts as well as desired updates identified as part of the 2018 Comprehensive Plan Update process. Agriculture will continue to remain the predominant land use in the City. The development of a rural or large lot residential category will provide additional housing option in the City that is reflective of the rural character. These areas, shown in the following figure, are separated from the rural center of the City and do not have access to municipal sewer services.

Table 5 – Planned Land Use Characteristics

Land Use	Acres	Percent of Total
Agricultural	497.6	78.3%
Commercial	9.6	1.5%
High Density	1.4	0.2%
Institutional	10.2	1.6%
Open Water	15.7	2.5%
Park, Recreational, or Preserve	9.8	1.5%
Rural or Large Lot Residential	11.3	1.8%
Single-Family Residential	79.9	12.6%
Total	**635**	**100%**

Map 3: Future Land Use



Future Land Use Categories

The following land use descriptions will be used for providing the basis for these land use categories. They prescribe the types of uses, density and other performance standards for the purposes of maintaining compatible land uses within the City.

- **Agriculture or Undeveloped**

The City of Vermillion has consciously protected the economic and social value of farmland from the premature conversion of agricultural uses to non-farm uses for the past several decades. The Agricultural area is limited to one home per quarter-quarter section (1:40 zoning). The Agricultural area also includes modest rural residential development areas and limited farm-related service businesses. The City's zoning ordinance allows agricultural support industries, such as elevators, mills, supply centers, and implement sales and service as conditional uses within the agricultural area. Churches, public and private schools, and other public recreation uses are also typical conditional uses within agricultural areas.

- **Rural or Large Lot Residential**

The City has pre-existing smaller lot, higher density residential development without public sewer systems, located in the northeast corner of the City.

- **Single Family Residential**

The Single Family Residential area includes existing single family development within the urban service area. The City's corresponding R-1 Low Density Residential zoning district allows single family detached dwellings on 12,000 square feet lots and duplexes on 15,000 square feet. The allowable density in the R-1 District ranges between 2.5 and 4.3 units per acre.

- **High Density Residential**

The High Density Residential area is limited to existing parcels occupied with multiple family dwellings. Because of the capacity limitations at the Vermillion WTF no new multiple family residential areas have been identified. There are two multiple family zoning districts (R-2 and R-3) which permit medium density attached residences (eight units per acre) and high density multiple family residences (density limited by 4-story maximum height and 60% lot coverage).

- **Commercial**

Commercial areas in Vermillion are limited to existing developed areas. Other commercial and industrial development opportunities are limited to agri-business and service industries, which are allowed in the Agriculture area rather than separate commercial or industrial land use categories. Employment numbers for the commercial land use district is anticipated to be 8 to 12 employees per acre.

- **Institutional**

Institutional land uses are generally defined as land uses developed which serve a community's social, educational, health, cultural and recreational needs. They include government owned and operated facilities. Institutional uses include government facilities, churches, and schools. Employment levels for this land use is anticipated to be 6 to 10 employees per acre.

- **Park, Recreational or Preserve**

Primary land uses for local parks include tot lots, neighborhood parks, community parks, ball fields, public gardens, greenways, and trail corridors.

- **Open Water**

This category includes permanently flooded open water, rivers, streams, wetlands, and periodically flooded areas.

E. Staged Development or Redevelopment

Rural Center communities must include a staging plan to show the sequence of growth and anticipated timing. The goal of the Staging Plan is to manage growth and guide the orderly and cost effective provision of infrastructure at a rate that is consistent with forecasted growth, at the same time responding appropriately to market conditions. Future urban development will be limited to infill of residential lots in existence and the adjacent expansion of existing commercial properties, dependent upon available capacity of the Vermillion WTF. As discussed in the Wastewater Report (See Appendix A), there is sufficient capacity in the existing service area and existing undeveloped lots to meet the City's needs to 2040. Extension of services and subsequent staging will not occur until these lots have been developed and there is market demand for expansion. This is anticipated to occur beyond 2040. Figure 4 details the staging plan for the City.

Based on the future land use plan, residential and commercial land use requirements have been analyzed to help the City of Vermillion plan for and meet Metropolitan Council projections for population, households, and employment. Residential calculations are detailed in Table 6 and 7 and employment calculations are detailed in Table 9.

Residential

Table 6 – Residential Density Ranges

Residential Land Use Category	Density Range (Units/Acre)		Units Needed	Minimum Acres	Maximum Acres
	Minimum	Maximum			
Agricultural	NA	0.025	0	0	0
High Density	4	8	0	0	0
Rural or Large Lot Residential	0.1	0.2	1	5	10
Single Family Residential	3	6	7	1.2	2.3
Total			8	6.2	12.3

Future land use guides properties that have development potential. It is anticipated housing development will be split between the Rural Residential and Single-Family Residential land use districts, both of which have existing vacant lots. The Metropolitan Council projects an increase of 14 households between 2010 and 2040. There is typically no housing vacancy in the City. As such, this staging development plan does not account for a housing vacancy rate; the projected number of households is considered synonymous with projected housing units. There are currently 162 housing units in the City of Vermillion. Assuming growth to 170 households in 2040, the City will only need to add eight more housing units by 2040 to accommodate eight more households.

There is no maximum lot size for agricultural properties, therefore there is no minimum number of dwelling units per acre. Table 7 below shows the amount of developable land in each respective land use district, the number of housing units that are anticipated to be developed in these districts, and the staging

of development anticipated between the periods of 2016-2020, 2020-2030 and 2030-2040. With the exception of the agricultural land use, the minimum density range was used to assure there is enough developable land in each planned land use district that will accommodate housing projections.

Table 7 – Staged Future Land Use – Residential Units

Metropolitan Council Community Designation	Residential Land Uses	Average Density Range Housing Units/Acre		Undeveloped (2015)	Existing Developed (2015)	Staged Development						Undeveloped Acres (2040)
						2020		2030		2040		
		Min	Max	Acres	Acres	Units	Acres	Units	Acres	Units	Acres	Acres
Agricultural	Rural or Large Lot Residential	0.1	0.2	2	9.2	0	0	0	0	1	2	0
Rural Center	Single Family Residential	3	6	9.6	70.2	1	.3	3	1	3	1	7.3
	TOTALS			11.6	79.4	1	.3	3	1	4	3	7.3

All residential development is expected to take place in existing, vacant parcels. This includes the area that will be zoned Rural or Large Lot Residential by 2040. This area of the city contains pre-existing smaller lot, higher density residential development without public sewer systems. There are 12 pre-existing lots in this area of the city with four vacant lots, creating a density of roughly 1.1 unit per acre in this area of the city, should all lots develop. This complies the Metropolitan Council's maximum allowed density for existing in Rural Residential Areas, detailed in Table 8. Municipal sewer staging for residential properties is shown in Figure 4. Parcels in the Rural Center, which are serviced by municipal sewer, will develop at densities of 3 units/acre, consistent with Metropolitan Council policy.

Table 8 – Maximum Allowed Density for Rural Service Areas

Designation	Density
Rural Center	3-5 units/acre minimum
Rural Residential	1-2.5 acre lots existing, 1 unit/10 acres where possible
Diversified Rural	4 units/40 acres
Agricultural	1 unit/40 acres

Employment

The Metropolitan Council has also made projections for employment levels in the City of Vermillion. Employment is anticipated to increase by 42 jobs during this planning period. Given published levels of employment for land use districts and anticipated distribution of employment in each respective land use district, the City of Vermillion is able to identify the inventory of developable land and make certain that land is guided in a manner that will meet the needs of the city going forward.

Employment projections in Vermillion will be met between the Commercial and Institutional land use districts. Job growth is anticipated to be accommodated at existing businesses and services in the City. Overall, businesses, services, and other employment establishments have sufficient acreage in their existing properties to accommodate additional employees. This will increase the density of jobs per acre in the City, making efficient use of resources and services. If there is insufficient land in Commercial and Institutional zoning district to accommodate projected job growth, the Agricultural district permits

specific agriculturally related businesses and some institutional uses; should the market demand job growth outside the capacity of currently identified areas, the City will consider permitted economic uses in the Agricultural zoning district.

Table 9 – Staged Future Land Use – Jobs and Acres

Land Uses	Estimated Employment / Acre		Undeveloped (2015)	Existing Developed (2015)	Staged Development (based on minimum employment/acre)					
	Min	Max	Acres	Acres	2020		2030		2040	
					Jobs	Acres	Jobs	Acres	Jobs	Acres
Commercial	8	12	0.32	9.3	0	0	12	1.5	9	1.1
Institutional	6	10	0	10.2	0	0	10	1.7	11	1.8

Source: Metropolitan Council Local Planning Handbook, Land Use, Density Calculations

The staging plan cannot force development to occur, but can be used as a tool to guide development appropriately. It should be clear that while there are legitimate reasons why communities should stage and time growth in an orderly and contiguous manner, there is nothing about adopting a staged growth plan that forces a private property owner to sell their land before they wish to do so.

Map 4: Staging Plan

F. Natural Resources

Natural resources are beneficial to the social, environmental, and economic vitality of a community. "Natural resources" include undeveloped habitats, surface water and ground water resources, undeveloped open space, significant scenic and scientific areas, and, in some cases, agricultural land. "Natural areas" are areas of natural resources that are largely unaltered by modern human activity, where native vegetation is distributed in naturally occurring patterns. The City of Vermillion has a strong history of commitment to protecting agricultural land and other natural resources in order to preserve the rural character of the area. This longstanding policy has provided an opportunity to further protect natural resources and the rural character of the area. The most notable natural resource in the City is the Vermillion River.

Providing for the protection of natural areas and corridors is directly related to the preservation of the rural character and economy of rural Dakota County. The tools available to protect agricultural land are similar in many respects to those available to protect other natural resource areas. Official controls to limit density of development in order to protect agricultural land. Other tools are also being investigated in various forums, including the possibility of using purchase of development rights (PDR), transfer of development rights (TDR) and conservation easements. These tools are also useful for protection of areas that are sensitive to development, such as wetlands, wooded areas, prairies and unique wildlife areas. The Dakota County Land Conservation Program is a voluntary program in which the county and other partners work with willing landowners to achieve mutual land protection and natural resources stewardship goals through the acquisition of conservation easements or fee title. The major goal of the program is to protect large, contiguous agricultural areas, while protecting water quality and wildlife habitat benefits and to protect, connect, and manage priority natural areas

G. Special Resource Protection

Portions of the City of Vermillion are identified with commercial grade aggregate deposits, shown on the Future Land Use Map. However, there are no mining operations currently located in the City. The City regulates mining operations as part of zoning regulations or separate mining ordinances. The majority of the aggregate reserves in the City is protected for future use by the limited development density allowed in the agricultural zoning area.

There are no sites identified in the National Historic Register within Vermillion. The City supports historic preservation as a part of protecting the rural and small town atmosphere in the area. The modest forecasted growth in the City will aid in the preservation of all cultural resources. It is the policy of the City to work with the Dakota County Historical Society, the State Historic Preservation Office, and the Preservation Alliance of Minnesota, in efforts to preserve cultural heritage.

H. Solar

The Metropolitan Land Planning Act (Minnesota Statues 473.859, Subd. 2) requires local comprehensive plans to include for the protection and development of access to direct sunlight for solar energy systems. The City of Vermillion acknowledges the importance of protecting solar access from potential interference by adjacent structures. Due to the rural, low-density characteristic of the City, it is unlikely that solar energy systems would be precluded by structure interference. Zoning provisions within the City's ordinance also regulate density, height, and structure setback in higher density residential areas and in commercial and industrial areas to provide adequate protection for solar energy access. It is the policy of the City of Vermillion is to protect solar access through adequate zoning standards.

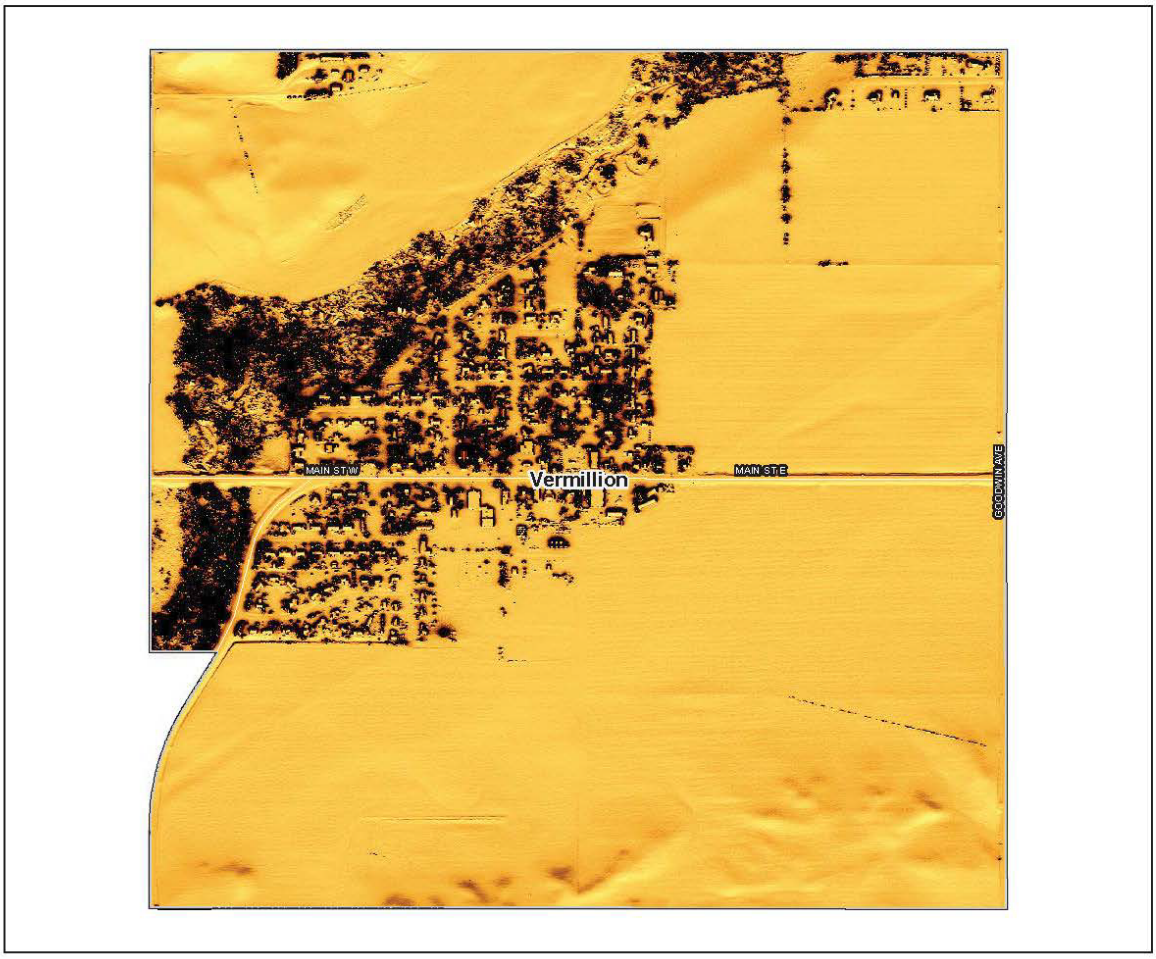
Solar potentials and the solar suitability figure is provided below. The solar potential calculations assume a 10% conversion efficiency and current (2016/17) solar technologies. The solar potential table is for illustrative purposes only and do not represent any planned solar development.

Table 10 - Solar Energy Potential			
Gross Potential (Mwh/yr)	**Rooftop Potential (Mwh/yr)**	**Gross Generation Potential (Mwh/yr^2)**	**Rooftop Generation Potential (Mwh/yr^2)**
2,534,611	28,872	253,461	2,887

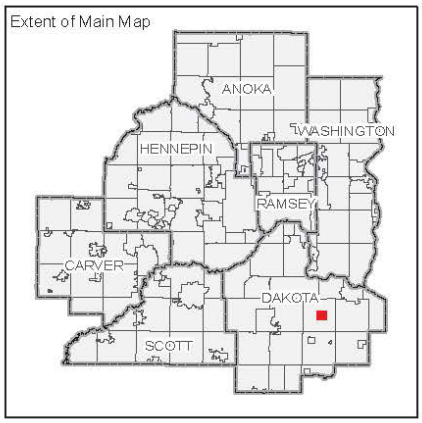
Source: Metropolitan Council

Map 5: Solar Potential

Gross Solar Potential
City of Vermillion, Dakota County



1/11/2017



0 0.125 0.25 0.5
Miles

Gross Solar Potential
(Watt-hours per Year)

High : 1271637

Low : 900002

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.

III. HOUSING

A. Existing Housing

In 2015, the City of Vermillion contained approximately 162 housing units according to the ACS Community Survey. About 93% of units were single family and 7% were multi-family. Most homes are owner occupied (88%), which is a slight decrease from 2000 (91% home ownership). About 84% of homes in the City are affordable to households at or below 80% area median income (AMI). However, about 22% of all households experience cost burden. There are no publically subsidized housing units the City of Vermillion.

Table 11 – Housing Conditions, 2015		
	Number of Units	**Percent of Total**
Total of Housing Units	162	100%
Housing Units		
– Owner Occupied	142	88%
– Rental	20	12%
- Vacant	0	0%
Single Family Homes	151	93%
Multi-family Homes	11	7%
Housing Units affordable to households with incomes at or below 30% Area Median Income (AMI)	0	0%
Housing Units affordable to households with incomes between 31 and 50% Area Median Income (AMI)	20	12%
Housing Units affordable to households with incomes between 51 and 80% Area Median Income (AMI)	117	72%
Households experiencing housing cost burden with incomes below 30% AMI	4	2.5%
Households experiencing housing cost burden with incomes between 31% and 50% AMI	9	5.5%
Households experiencing housing cost burden with incomes between 51% and 80% AMI	10	6%

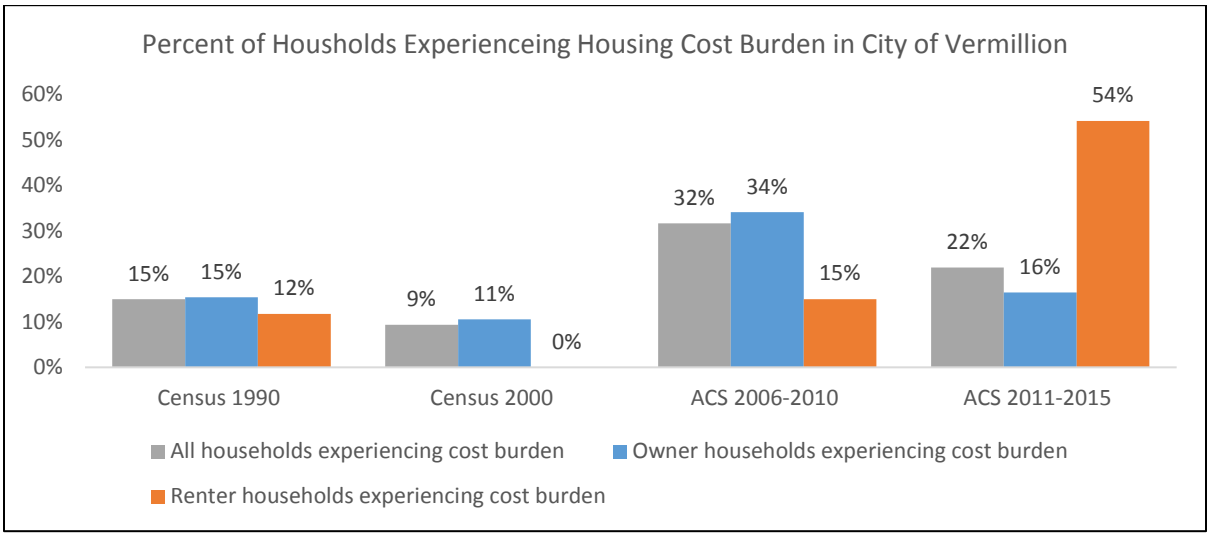
Source: Metropolitan Council Estimates

Table 12 – Total Households Experience Cost Burden		
	Households	**Percent of Total Household Type**
Existing households experiencing housing cost burden	36	22%
Owner households experiencing housing cost burden	23	14%
Renter households experiencing housing cost burden	13	9%

Source: Metropolitan Council

The graphic on the following page details housing cost burden in the City of Vermillion since 1990. Housing cost-burden occurs when households spend 30% or more of their income on housing costs. The percentage of cost-burdened households in the City has fluctuated over the years. While cost burden for owner-occupied units decreased between 2010 and 2015, cost burden for renter households increased nearly 300%. However, the small population size of the City also means there is a higher margin of error in sampling, meaning the percentage of cost burdened renter households may not accurately reflect

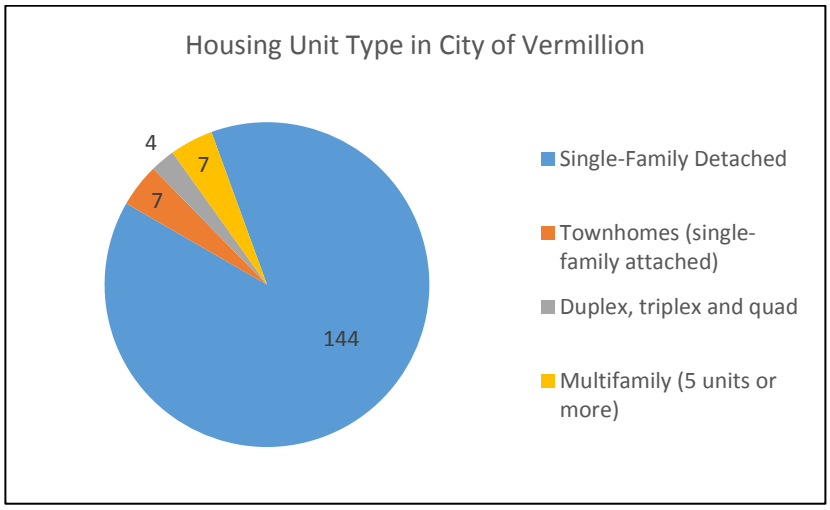
current conditions. Furthermore, the percentage of cost burdened households is still higher than in 2000, before the collapse of the housing market and subsequent recession.



Source: Metropolitan Council Tabulation of American Community Survey Data

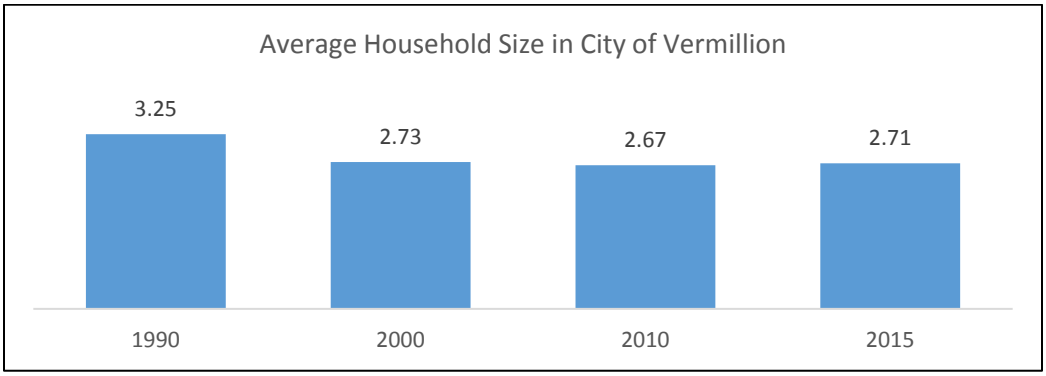
1. Housing Types

As noted above and detailed in the figure below, most housing units in Vermillion are single family, detached units. About 3% of housing units are duplexes, triplexes, or quads.



Source: Metropolitan Council Tabulation of American Community Survey Data

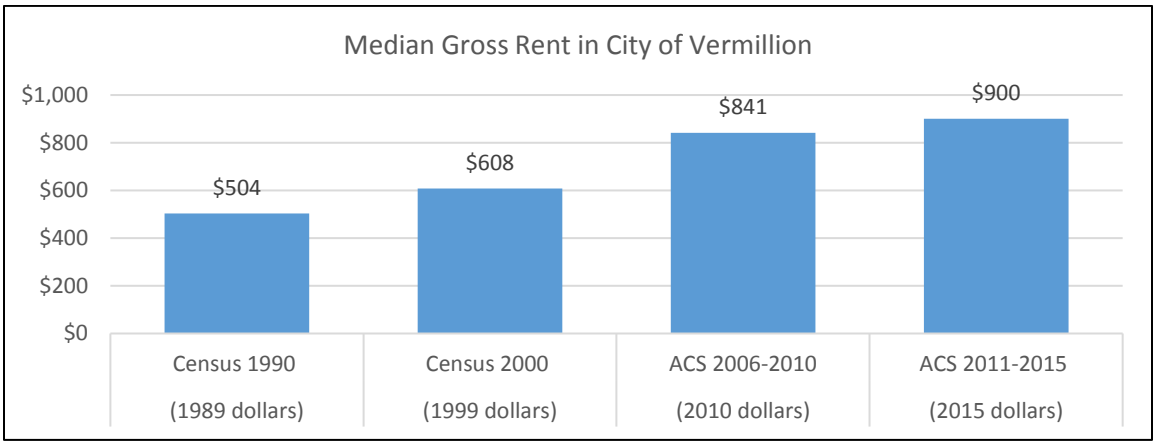
The average household size in the City of Vermillion is 2.71 persons per household, which has decreased from 3.25 in 1990. This trend of decreasing average household size is being noted across the Twin Cities Metropolitan Area. If household sizes continue to decrease, more housing units will be needed to accommodate existing populations and the slight projected population growth.



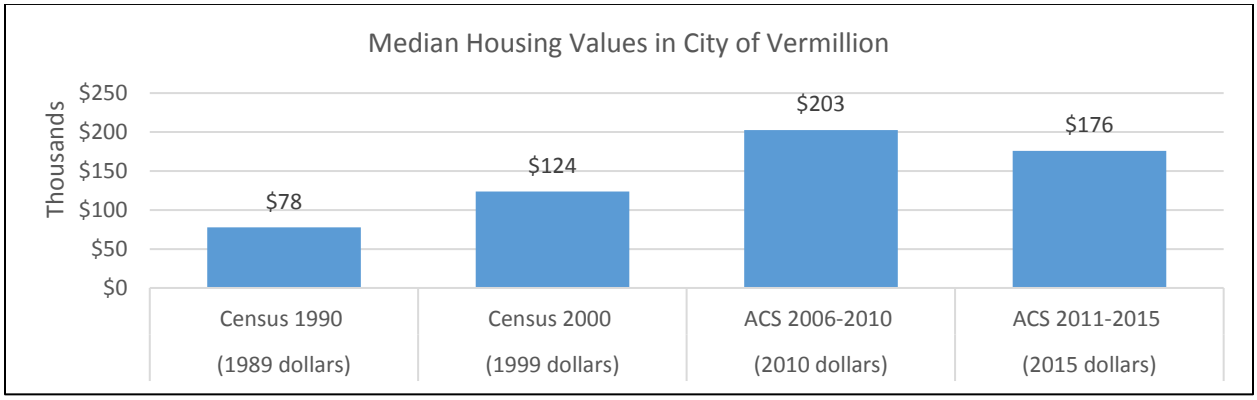
Source: Metropolitan Council Tabulation of US Census and American Community Survey Data

2. Housing Values and Costs

Median rent in Vermillion have continued to rise with the largest increase (38%) occurring between 2000 and 2010. This may be due to the conversion of single family homes from owner to renter occupancy. This increase in rent is likely contributing to housing cost burden among renter households. On the other hand, Vermillion has lower median housing values than Dakota County, which can help keep housing affordable. Historical rent and median housing value trends are shown in the following two figures. Figure 6 (on the next page) shows the values of owner occupied housing units.



Source: Metropolitan Council Tabulation of US Census and American Community Survey Data



Source: Metropolitan Council Tabulation of US Census and American Community Survey Data

Map 6: Owner Occupied Housing Values

B. Projected Housing Needs

Projected household growth from 2010 to 2040 is depicted on Table 13. The City is expected to add about 14 new households in this 30-year period, which is a 9% increase from the number of households in 2010. As the City's population is expected to be fairly stable over the next 30 years, additional housing units will likely accommodate smaller household sizes.

Table 13 – Projected Household Trends

2010	2020	2030	2040
156	160	160	170

Source: Metropolitan Council

C. Affordable Housing Allocation

The City of Vermillion is not within the Metropolitan Urban Service Area (MUSA). As such, the City does not have an Affordable Housing Allocation reflecting the region's forecasted population that will need affordable housing.

D. Housing Implementation Plan

The City of Vermillion will cooperate with the Dakota County Community Development Agency and the Minnesota Housing Finance Agency for home improvement, weatherization grant and loan programs, and homeownership resources. Affordable housing opportunities in rural communities are generally limited to the rehabilitation of and resale of existing homes due to limited sewer and low-density restrictions. The following tools will be considered on a case-by-case basis, as development occurs. The City of Vermillion relies on the county community development authority to implement most of the available housing tools, because they do not have the statutory authority to implement these tools, or they may be cost prohibitive. Table 14 lists programs and resources offered by the Dakota County Community Development Authority.

Table 14– Housing Implementation

Housing Goal/Need	Available Tool	Opportunity and Sequence of Use	Potential Partners
Multi-Generational Community Living	Start-Up Loan Program	Assist first-time homebuyers with financing a home purchase and down payment assistance through a dedicated loan program	Minnesota Housing
	Home Improvement Loans	Assist homeowners in financing home maintenance projects to accommodating a physical disability	Dakota County CDA, Minnesota Housing
	ADU Ordinance	Communities will consider developing an ordinance permitting the construction of accessory dwelling units or guest homes in specific zoning districts	Property Owners
	Program or Framework	Work with groups and stakeholders to develop guiding principles, frameworks, and action plans to consider and incorporate the needs of older residents into development decisions	Senior advocacy groups or networks, residents

Maintaining Existing Housing Units	Home Improvement Loans	Assist homeowners in financing home maintenance projects like roof repair, plumbing and electrical work, accommodating a physical disability, or select energy efficiency improvement projects	Dakota County CDA, Minnesota Housing
	Foreclosure Prevention	Connect homeowners with resources, education, and counseling to prevent foreclosures	Dakota County CDA, Minnesota Housing
	CDBG	Communities may consider using a portion of their total CDBG allocation to develop and maintain a home/property rehab program for low and moderate income households	Dakota County CDA
Housing Affordability (all income levels)	Planned Unit Developments (PUDs)	Communities may consider planned unit developments to meet overall community land use, housing, density goals that may otherwise not be permitted through regular zoning requirements.	Property owners, developers
	Community Land Trust	Communities may consider partnering with relevant agencies to develop a community land trust or bank to create affordable housing options for households at or below 60% AMI	Dakota County CDA, developers, non-profit organizations
	Housing Bonds	Communities may consider issuing housing bonds to support developments including units affordable to households at or below 80% AMI.	Dakota County CDA, Minnesota Housing
	Housing Opportunities Enhancement Program (HOPE)	Dakota County has been providing gap financing to assist in the development and preservation of affordable housing throughout the county. Funding is provided in the form of a deferred loan, and requires a 2:1 match of other public or private funding sources. HOPE funds must be used to provide rental housing opportunities for households at or below 50% of area median income or homeownerships opportunities for households at or below 80% of area median income.	Affordable housing between below 80% AMI; since all Collaborative Communities except Empire Township do not have an affordable housing allocation for this income bracket, this program is unlikely to be utilized.

IV. PARKS AND TRAILS

A. Regional Parks and Trails

1. Parks

There are no regional, state, or federal parks located in the City of Vermillion. There are no plans for regional park facilities in the City at this time. The Dakota Country Rural Collaborative Plan provides information about regional parks in neighboring communities.

2. Trails

There are no regional trails currently located in the City of Vermillion. Future regional trail corridors that have been identified by Dakota County as part of a "Greenways" network are primarily located along the major rivers. The proposed Vermillion River Greenway Trail would run through the City. A search corridor alignment is shown in Figure 7.

- Plans for the Vermillion River Greenway Regional Trail will connect Whitetail Woods Regional Park to Hastings and the Mississippi River Corridor. It is estimated this trail will be about 17 miles long.

B. Local Parks and Trails

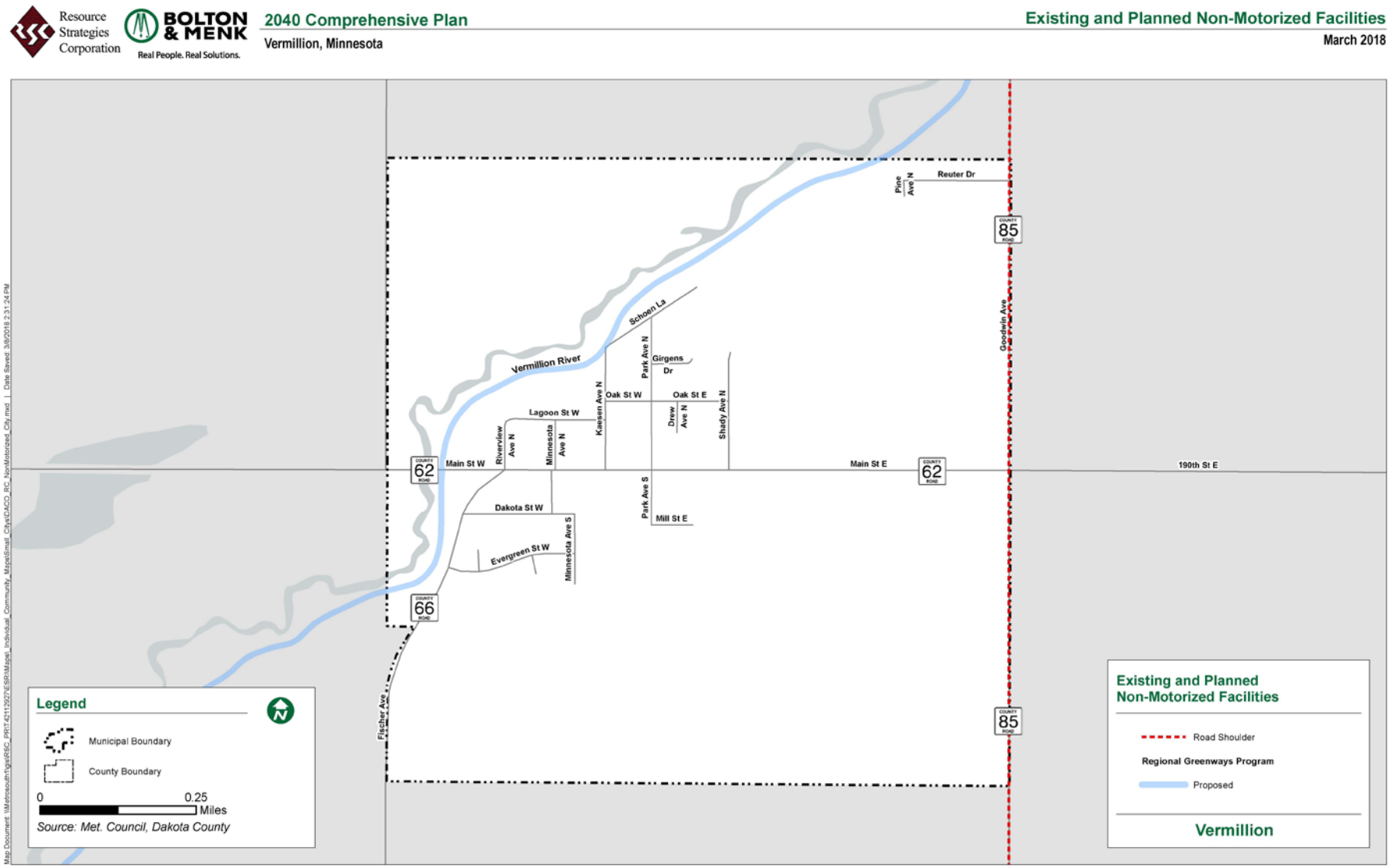
Vermillion Park is an 8.91 acre park, located at the intersection of Park Ave S and Mill S E, south of Main St E (CSAH 62), includes three ball fields, a playground, a picnic shelter, an ice rink, and a gravel parking lot. Amenities are detailed in Table 15.

There are no local trails in the City of Vermillion.

Table 15 – Park Amenities

Park	Park Size (Acres)	Walking/Hiking Trails	Picnic Area	Playground	Ice Skating	Disc Golf	Restroom	Tennis Court	Ballfield	Basketball	Parking
Vermillion Park	8.91			X	X				3		X

Map 7: Existing and Future Trails



V. TRANSPORTATION

A. Overview

The primary purpose of this Transportation chapter is provide guidance to the City of Vermillion residents and elected officials regarding the implementation of effective, integrated transportation facilities and programs through the 2040 planning timeframe. This chapter is consistent with regional requirements for transportation as captured in the Metropolitan Council's *2040 Local Planning Handbook*. The Dakota County Rural Collaborative Comprehensive Plan and the Dakota County 2040 Comprehensive Plan provide additional details regarding the roadway system in adjacent communities.

B. Existing Roadway Conditions

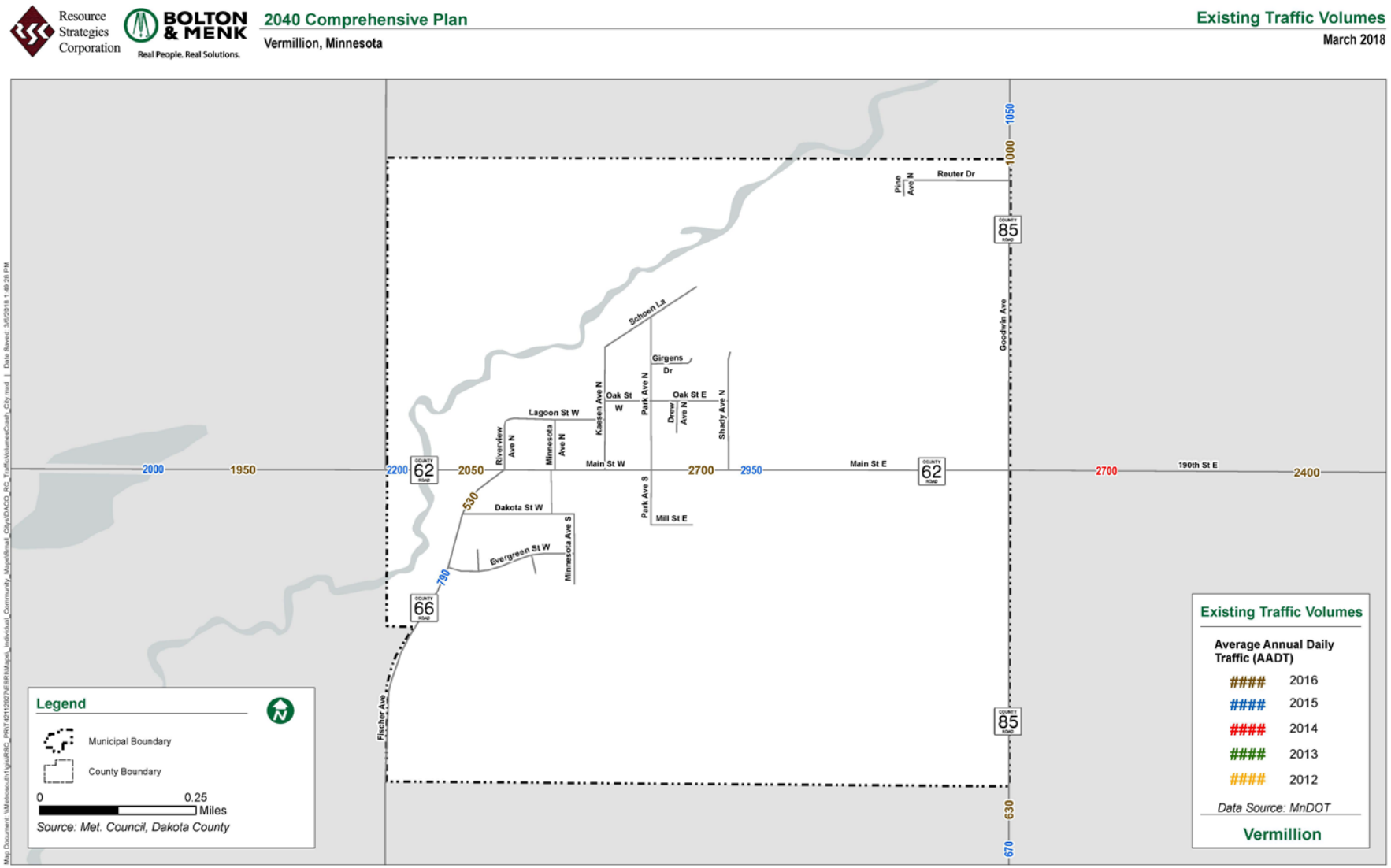
1. Existing Traffic Volumes

The most basic characteristic of a given roadway is the volume of traffic that it carries. Existing traffic volumes, or the most recent volumes available, on roadways in Vermillion are presented in the following figure. These data were obtained from either MnDOT or Dakota County.

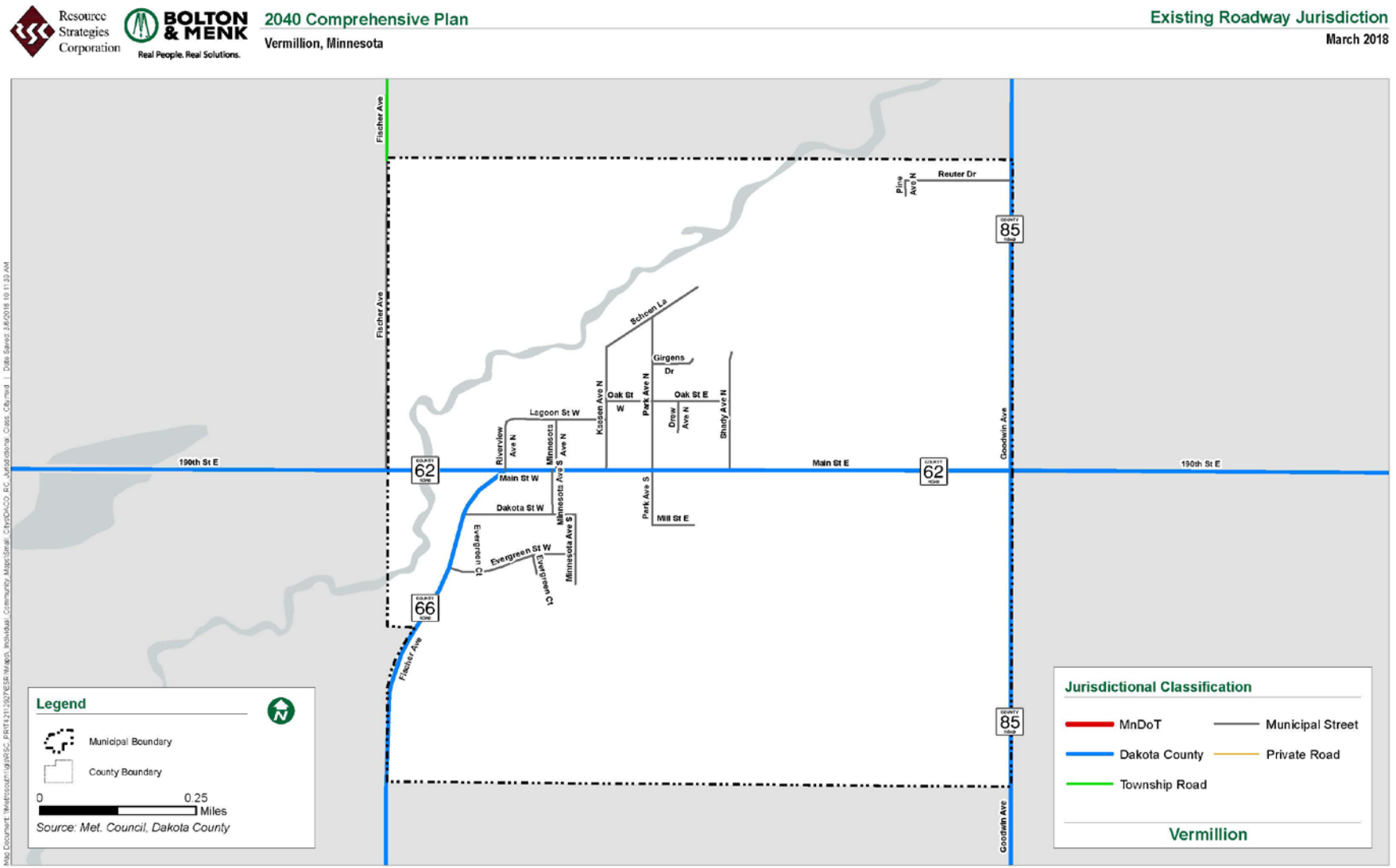
2. Jurisdictional Classification

Roadways are classified on the basis of which level of government has jurisdiction over them. Figure 9 depicts the existing roadway jurisdictional classification system in Vermillion.

Map 8: Existing Traffic Volumes



Map 9: Existing Jurisdictional Classification



3. Functional Classification

Functional classification is a cornerstone of transportation planning. The functional classification system is a roadway network that distributes traffic from neighborhood streets to collector roadways, then to minor arterials, and ultimately the Metropolitan Highway System[1]. Roads are placed into functional categories based on the degree to which they provide **access** to adjacent land uses and lower level roadways versus providing higher-speed **mobility** for "through" traffic. Within this approach, roads are located and designed to perform their designated function.

The current roadway functional classification map for the City of Vermillion as identified by the Metropolitan Council is presented on Figure 10**.** The roadway system in Vermillion presently consists of three functional roadway classifications:

- "A" minor arterial
- Major collector
- Local street

The Metropolitan Council has defined four sub-categories of "A" minor arterials: reliever, expander, connector, and augmenter. These sub-categories have to do primarily with Metropolitan Council's allocation of federal funding roadway improvements but do not translate into specific design characteristics or requirements. In Vermillion, all "A" minor arterials are connectors.

"A" Minor Arterials

These roads connect important locations within Vermillion with access points of the Metropolitan Highway System and with important locations outside the City. These arterials are intended to carry short to medium trips that would otherwise use principal arterials. While "A" minor arterial roadways provide more access than principal arterials, their primary function is also to provide mobility rather than access to lower level roadways or adjacent land uses. The "A" minor arterial roadways in Vermillion are identified in Figure 10 and in Table 16, below:

Table 16 – "A" Minor Arterial Roadways

Roadway	From	To	Number of Travel Lanes
CR/CSAH 66/ 200th Street/ Fischer Ave/ Vermillion River Trail	Vermillion Twp	Farmington	2

Major and Minor Collectors

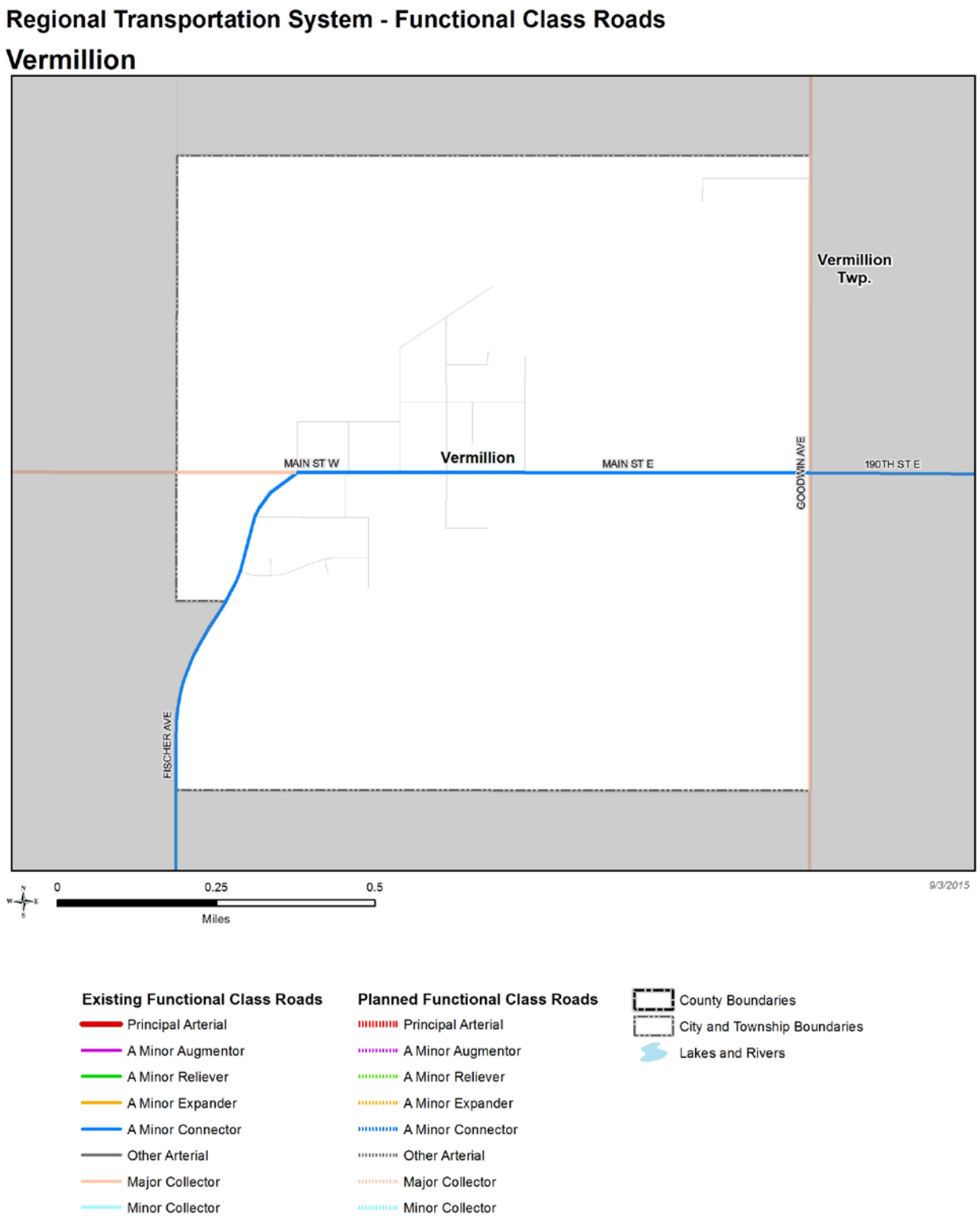
Collector roadways provide a balance of the mobility and land-use access functions discussed above. They generally serve trips that are entirely within a municipality and connect neighborhoods and smaller commercial areas to the arterial network. Minor collectors generally are shorter in length, with lower volumes and lower speeds than major collectors. Current collector roadways are identified in Figure 10 and in Table 17.

Table 17 – Major Collector Roadways

Roadway	From	To	Number of Travel Lanes
CR/CSAH 62/ 190th Street E/ Main Street W	CR/CSAH 47	MN TH 316	2
CR/CSAH 85/ Hogan Avenue/ Goodwin Ave	Northern Randolph Twp boundary	Nininger Twp	2

[1] The Metropolitan Highway System is made up of the region's principal arterials. These roads are part of the National Highway System and are owned and operated by MnDOT and the seven metropolitan counties (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington).

Map 10: Existing Functional Classification



4. Summary of Relevant Transportation Studies and Plans

A summary of transportation studies relevant to Vermillion's roadway system is provided below.

Dakota County Studies and Plans

Dakota County Pedestrian and Bicycle Plan (Current)
Dakota County is developing a pedestrian and bicycle plan to create a comprehensive, cohesive vision for countywide walking and bicycling networks. This plan will analyze existing conditions for walking and biking, develop a countywide pedestrian and bicycle system plan, and provide a toolkit of policies, strategies, and best practices for implantation. This plan will be completed in mid-late 2018.

Dakota County Principal Arterial Study (2018)
The Dakota County Principal Arterial Study studied potential highways in the county for designation as future principal arterials. This is intended to provide a safe and efficient transportation system in the long term and filling transportation needs. Presently, there are no principal arterials running east/west south of CR/CSAH 42, and there are no principal arterials running north/south west of US TH 52 within Dakota County. This limits access and connectivity. Traffic volumes, connections to other principal arterials, and the ability to support freight were considered as part of analysis. This study will be completed in early-mid 2018. While none of the corridors being studied are located in the City of Vermillion, designation changes will impact the full regional transportation network. Corridors recommended for future principal arterial designation within the Dakota County Rural Collaborative area include:

US Highway 61	MN Highway 3
MN Highway 50	County Road 86

Dakota County 2030 Transportation Plan (2012)
Dakota County updated its 2030 Transportation Plan, adopted in 2008, to incorporate updates from the county's 2030 Comprehensive Plan, adopted in 2009, as well as relevant state and regional transportation plans, updated traffic modeling, and completed county and regional transportation studies. The county is in the process of updating its Transportation Plan as part of the county's 2040 Comprehensive Plan.

C. Roadway System Plan

1. Assumed 2040 Roadway Network

The roadway network assumed for the 2040 analysis includes the existing network, plus programmed and/or planned projects. The roadway projects that will enhance the existing network that are anticipated to be in place as part of the 2040 network are summarized below:

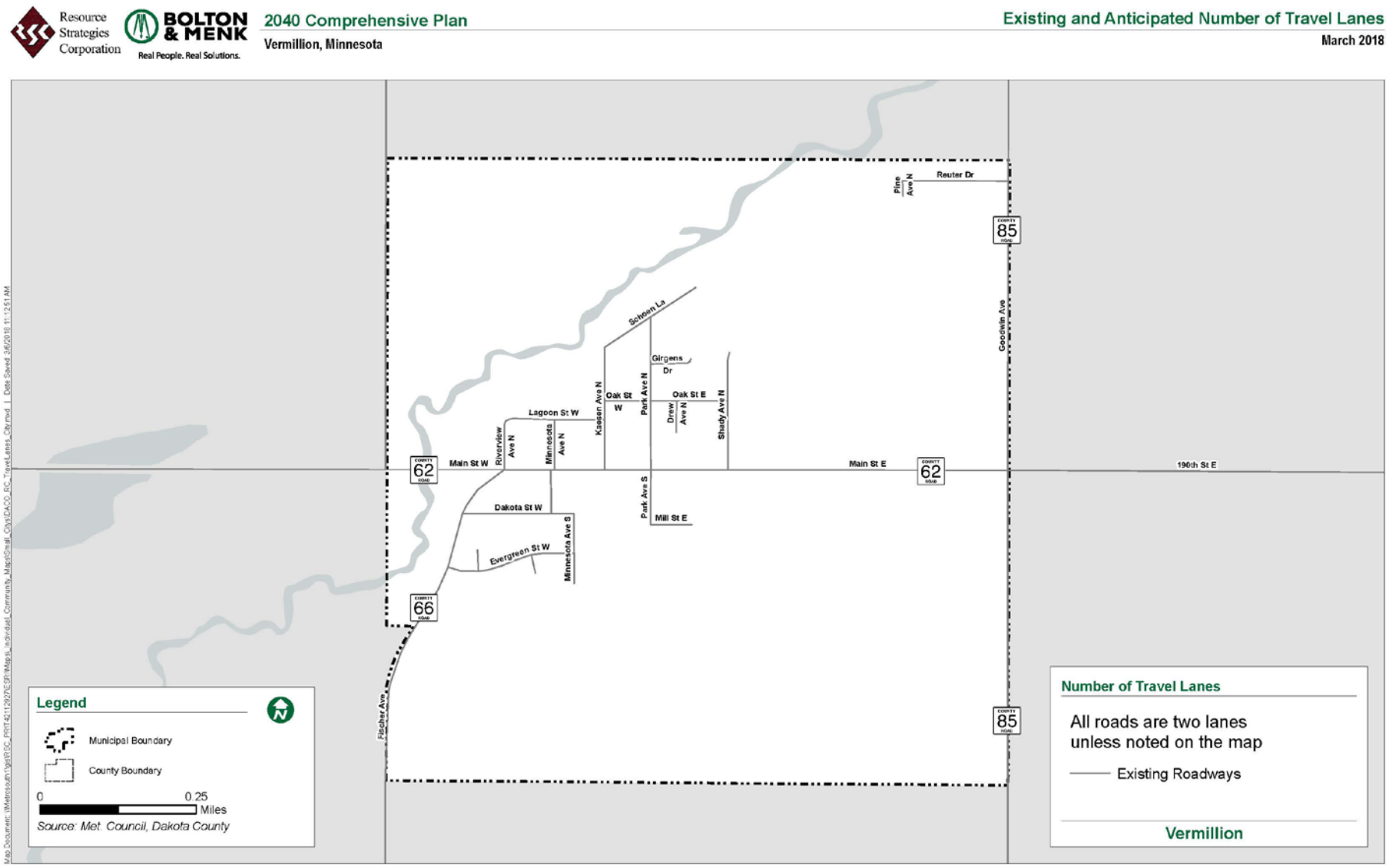
Existing Roadway Improvements

- County Road/CSAH 62 – Realign County Road 62 in Vermillion Township and add turn lanes on CSAH 47 for County Road 62 access. This project is anticipated for 2020. This project is located about one mile east of the city.

Proposed New and Extended Roads
There are no proposed road projects in the City of Vermillion at this time.

Figure 11 depicts existing and anticipated 2040 number of travel lanes on roadways in the City of Vermillion. Since there are no planned roadway projects or improvements in Vermillion, the number of existing travel lanes is also the number of anticipated travel lanes.

Map 11: Existing and Anticipated 2040 Travel Lanes



2. Assumed 2040 Land Use and Transportation Analysis Zone Information

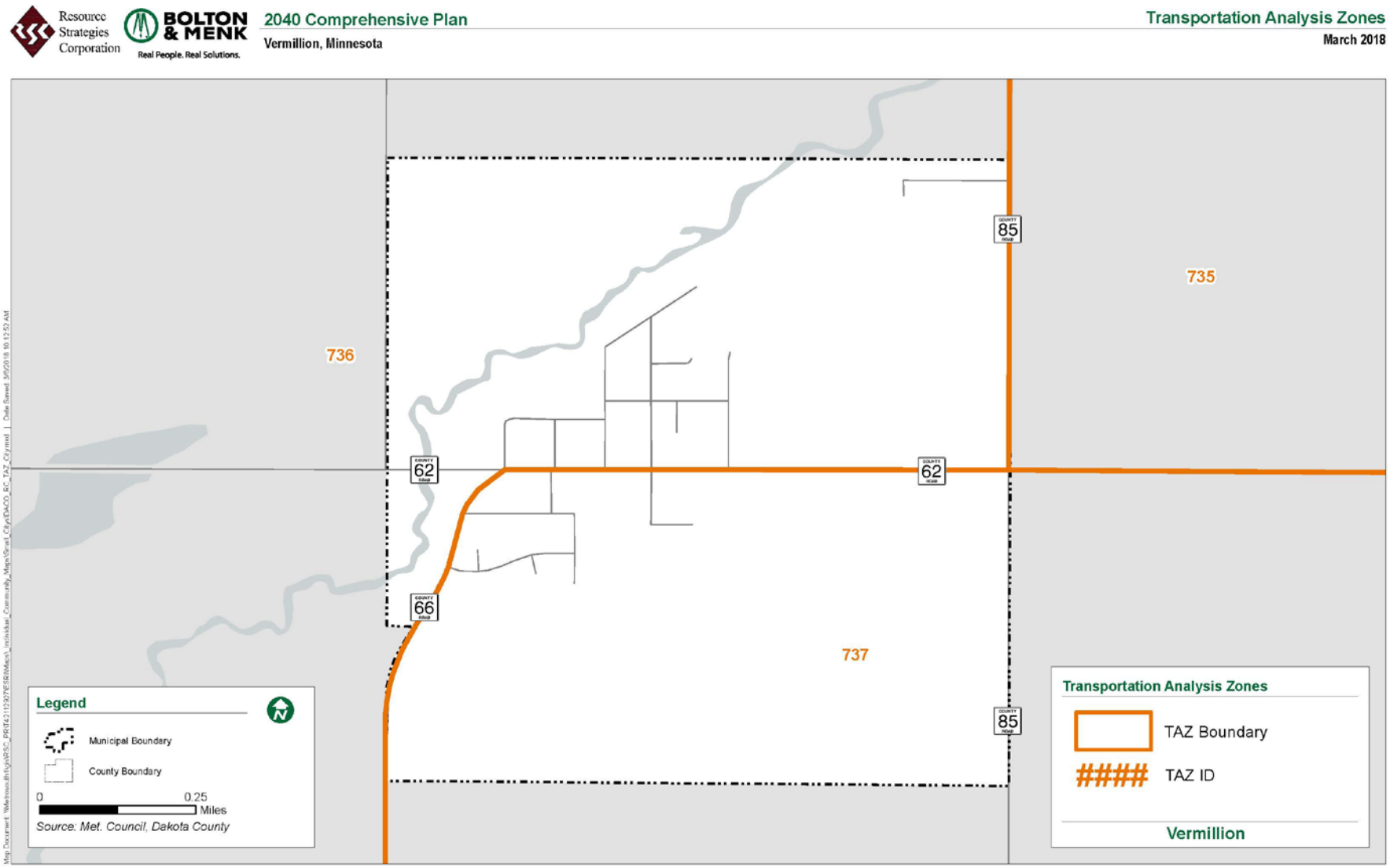
Traffic projections are based on the use of Transportation Analysis Zones (TAZs). The TAZs for the City of Vermillion, as defined by the Metropolitan Council, are presented in the following figure. The anticipated land use patterns discussed in Chapter II of this Comprehensive Plan were assumed for the 2040 transportation projections. The 2040 land use map for the City of Vermillion is presented in that chapter. The TAZ socioeconomic data projected for 2040 conditions are presented in Table 18. These numbers show projections for only the portions of the TAZ area located within the City of Vermillion; both TAZs are split between the City of Vermillion and Vermillion Township. .

Table 18 – City of Vermillion TAZ Data

TAZ	*Year*	*Population*	*Households*	*Retail Jobs*	*Non-Retail Jobs*	*Total Jobs*
736	2010	268	98	10	38	28
	2020	254	101	10	29	39
	2030	260	101	20	30	50
	2040	260	107	23	35	58
737	2010	151	58	65	0	65
	2020	156	59	75	36	111
	2030	160	59	70	60	130
	2040	160	63	70	72	142

Source: Metropolitan Council

Map 12: TAZ Data



3. 2040 Traffic Projections

2040 traffic projections were made using a combination of methods and sources including the following:

- Historic trend analysis for volumes
- Assessment of anticipated local and regional development patterns and associated TAZ information
- Discussion and coordination with Dakota County Transportation staff
- Review of other studies and plans for consistency

The projected 2040 traffic volumes are presented in the Dakota County Rural Collaborative Comprehensive Plan.

4. Future Capacity Deficiencies

A planning-level analysis was performed to identify roadway segments where capacity problems are anticipated to occur by 2040. Based on the projected 2040 traffic volumes and the assumed 2040 roadway network, an analysis of anticipated future congestion conditions was performed. This analysis used the volume-to-capacity method. The volumes were taken from the 2040 projections discussed under the previous heading. The capacity is based on typical capacity levels for different non-freeway types and configurations of roadways present in the City of Vermillion as summarized in Table 19.

Table 19 – Typical Traffic Capacity by Roadway Type/Configuration

Facility Type	Functional Classification	Planning Level Capacity (ADT)
Gravel Road	Local Road	1,000
2-Lane Local/Residential Road		1,700
Rural 2-Lane Highway	Major Collector, Minor Arterial, Principal Arterial	13,000

Based on the above table and projected 2040 traffic volumes, there are no roads at or approaching capacity in Vermillion.

5. Future Functional Classification

There are no planned functional classification changes for roadways within the City of Vermillion. Existing functional classification is presented in Figure 10.

6. Future Jurisdictional Classification

The Dakota County 2030 Transportation Plan identifies existing county roads that are candidates for jurisdictional transfer or turnback to local units of government. Such turnbacks will add responsibilities for additional roadway maintenance to local communities. Roads located in Vermillion that are turnback candidates, as identified in the Dakota County 2030 Transportation Plan, are detailed in Table 20 by county priority.

Table 20 – Proposed County Roadway Turnbacks in Vermillion City

Roadway	Segment	County Priority
CR 62/ 190th Street E/ Main Street W	3.1 miles in Vermillion and Vermillion Township	Moderate, within 10 years of plan adoption

7. Access Management

Access management refers to balancing the need for connections to local land uses (access) with the need for network-level movement (mobility) on the overall roadway system. Arterials generally have limited

access in the form of driveways and low volume side streets because their role in the network is to support relatively long, high speed traffic movements; collectors allow a greater degree of access given their combined mobility/access function, and local streets have relatively few limits on access. Dakota County has identified and adopted guidelines from MnDOT for access locations on all major roadways, provided in the Dakota County Rural Collaborative Comprehensive Plan.

D. Transit Plan

1. Transit Market Area

The Metropolitan Council has defined Transit Market Areas based on the following primary factors:

- Density of population and jobs
- Interconnectedness of the local street system
- Number of autos owned by residents

In general, areas with high density of population and jobs, highly interconnected local streets, and relatively low auto ownership rates will have the greatest demand for transit services and facilities. Transit Market Areas are a tool used to guide transit planning decisions. They help ensure that the types and levels of transit service provided match the anticipated demand for a given community or area.

Based on this analysis, the Metropolitan Council categorizes the City of Vermillion in Transit Market Area V. As identified in Appendix G of the Metropolitan Council's 2040 Transportation Policy Plan (TPP), the characteristics of this category area are as follows:

Transit Market Area V has very low population and employment densities and tends to be primarily rural communities and Agricultural uses. General public dial-a-ride service may be appropriate here, but due to the very low-intensity land uses these areas are not well-suited for fixed-route transit service. Transit Market Index Range (TMI) is less than 32.0.

Also from Appendix G of the 2040 TPP (Table G-2), the typical transit service within this Market Area consists of the lowest potential ridership and is not well-suited for fixed route service. Primary emphasis is on general dial-a-ride service.

2. Current and Planned Service Facilities

The City of Vermillion is outside the Transit Taxing District. There are no existing transit facilities or services and no plans for transit services in the City. The closest regularly scheduled services are in the City of Rosemount at the Rosemount Transit Station (Routes 420, 476, 478, and 484) or the City of Apple Valley at the 157th Street Station (Routes 477 and 479). Dial-a-Ride services provided through Dakota County serve transit needs within Vermillion.

<u>Dial-a-Ride Service</u>

The City of Vermillion is serviced by Transit Link, the dial-a-ride service provided through the Metropolitan Council at the county level. Transit Link provides metro-wide transit connections and access to qualifying rides, such as last mile service, connections between transit stations, or to and from area not serviced by regular bus routes. Any member of the public may reserve a qualifying ride. Upon reservation, each trip is assessed to ensure it does not overlap with regular route bus services. Starting and ending destinations must be more than ¼ mile from regular route transit in winter months (November – March) and more than ½ mile from regular route transit in summer months (April- October). Transit Link Service does not operate on Thanksgiving Day, Christmas Day, and New Year's Day.

Transit Link fares are determined by distance traveled. Trips less than 10 miles are $2.25 one way, trips between 10 and 20 miles are $4.50 one way, and trips more than $20 miles are $6.75 one way. ADA-

certified riders pay a maximum of $4.50 one way regardless of distance traveled. This fare includes transfer to a regular service route except for the Northstar Line or peak hour services.

Transit Link service offered through Dakota County serves all cities and townships in the county. Service is available Monday-Friday from 6:00am – 7:00pm. Transfers between Transfer Link and regular service routes take place at one of the following transit hubs: Signal Hills Shopping Center, Eagan Transit Center, Apple Valley Transit Center, Burnsville Shopping Center, and Burnsville Transit Station. The following stations in Hennepin County are also available for transfer service: Bloomington South Transit Center and Mall of America Transit Center.

E. Non-Motorized Transportation Plan

1. Existing Bicycle Facilities

Existing bicycle trails in Vermillion are primarily on-road (shoulder) bikeways. Existing bikeways include portions of County Road 62 and 85.

In addition, the Metropolitan Council has designated the Regional Bicycle Transportation Network (RBTN). This consists of prioritized alignments and corridors (where alignments have not yet been established) that were adopted in the Metropolitan Council's 2040 Transportation Policy Plan. There are no Tier 2 corridor/alignments in the City, shown in in the Parks and Trails Chapter. Existing bicycle facilities are also depicted in the Parks and Trails Chapter.

2. Planned Bicycle Facilities

As noted in Section C-5, Dakota County is currently in the process of developing a Pedestrian and Bicycle Plan. At present, future trail corridors have been identified by Dakota County as part of a "Greenways" network. These proposed alignments are primarily located along the major rivers in rural areas. These facilities are shown and discussed in detail in the Parks and Trails Chapter.

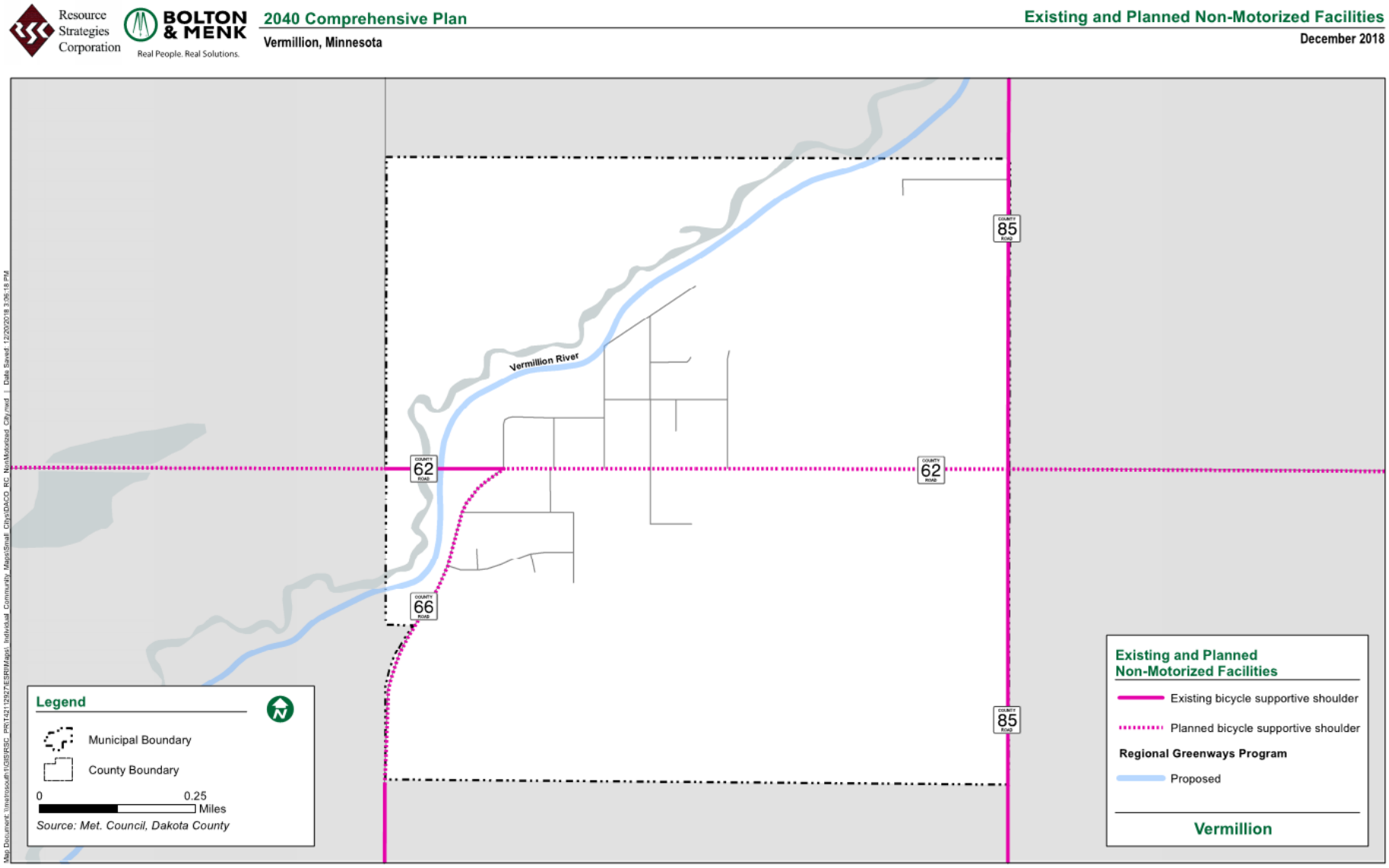
F. Aviation Plan

There are no airports located in the City of Vermillion. The City of Vermillion has a responsibility to identify policies and ordinances that protect regional airspace from obstructions, including meeting any Federal Aviation Administration (FAA) notification requirements. Any applicant who proposes to construct a structure 200 feet above the ground that could affect navigable airspace level must get appropriate approvals. The Federal Aviation Administration and the Minnesota Department of Transportation must be notified at least 30 days in advance in advance of construction, as required by law per MCAR 8800.1200, Subpart 3 and FAA Form 7460-8.

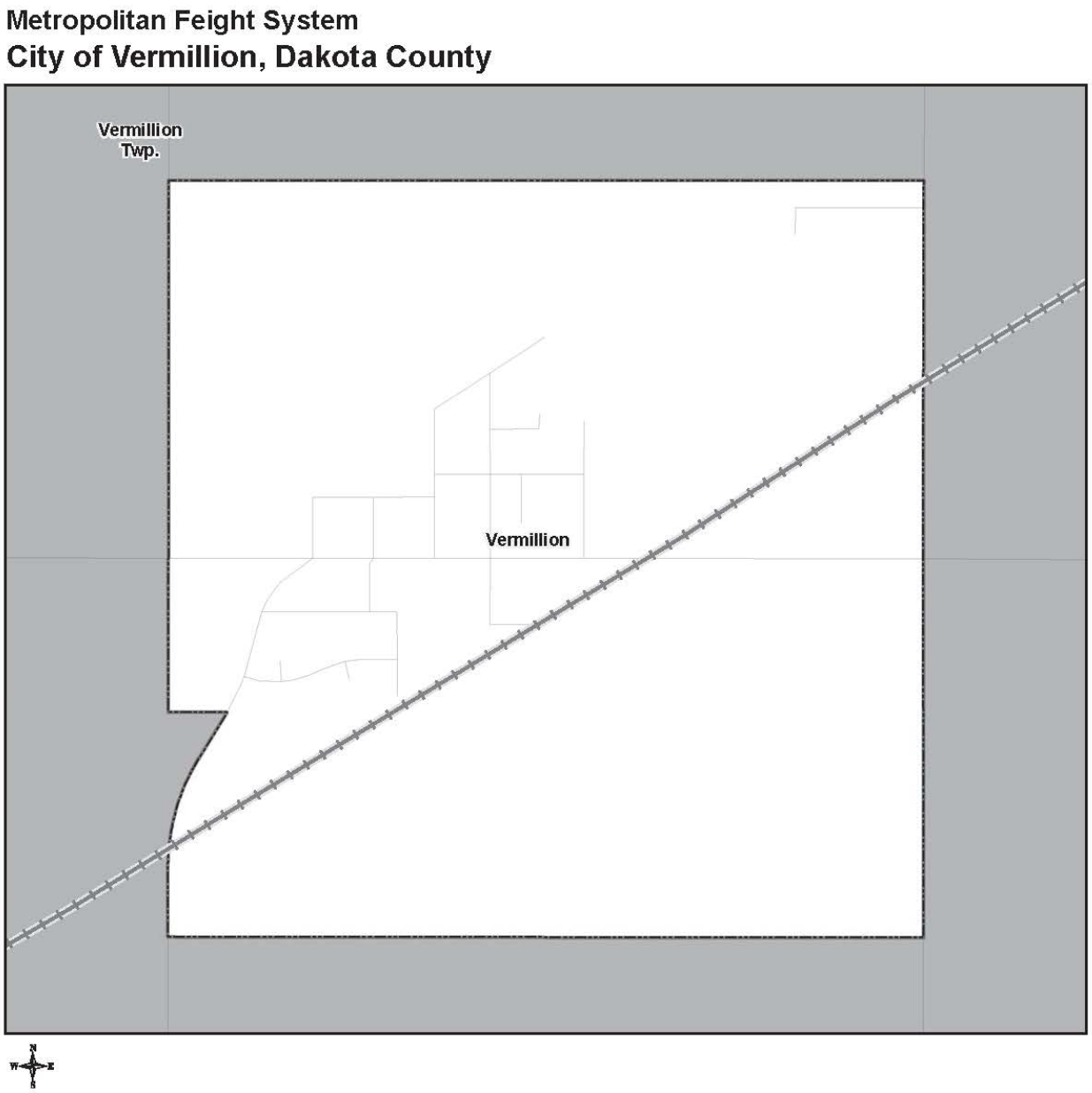
G. Freight Plan

Given the small size of the city and its distance from principal arterials, there is little to no freight movement through the City of Vermillion. The railway line has been abandoned, shown in Figure 14.

Map 13: Sewered Areas in Vermillion



Map 14: Freight



VI. WATER RESOURCES

A. Wastewater

A portion of the City of Vermillion is designated as a Rural Center, shown in Figure 1 in the Introduction. Municipal sewer services are provided to developments within this area, shown in Figure 15. The Wastewater Plan for the City of Vermillion is attached in its entirety in Appendix A, providing specific details regarding the City's systems, policies, and recommendations to address future needs and concerns. The following information provided in the section provides highlights of the City's Wastewater Plan.

According population, household, and employment forecasts, the City of Vermillion will have the following wastewater demands, as detailed in Table 21.

Table 21 – Population, Housing, & Employment Sewer Allocation Forecasts

	Forecast Component	2010	2020	2030	2040
Population	Municipal Sewered	442	410	420	420
	Unsewered	20	20	20	20
Households	Municipal Sewered	150	155	160	160
	Unsewered	6	6	6	6
Employment	Municipal Sewered	93	150	180	200
	Unsewered	0	0	0	0

Most of the sanitary sewer pipe within Vermillion was constructed in 1967 and is made of vitrified clay pipe (VCP). VCP is susceptible to Inflow and Infiltration (I & I), which occurs when storm water and ground water enter the wastewater system. This leads to unnecessary wastewater treatment expenses and reduced pipe capacities. I & I has been a problem within the City. To combat issues with I & I, the City televises the entire system every five years and has begun to line and grout the pipes and manholes that are identified as most problematic.

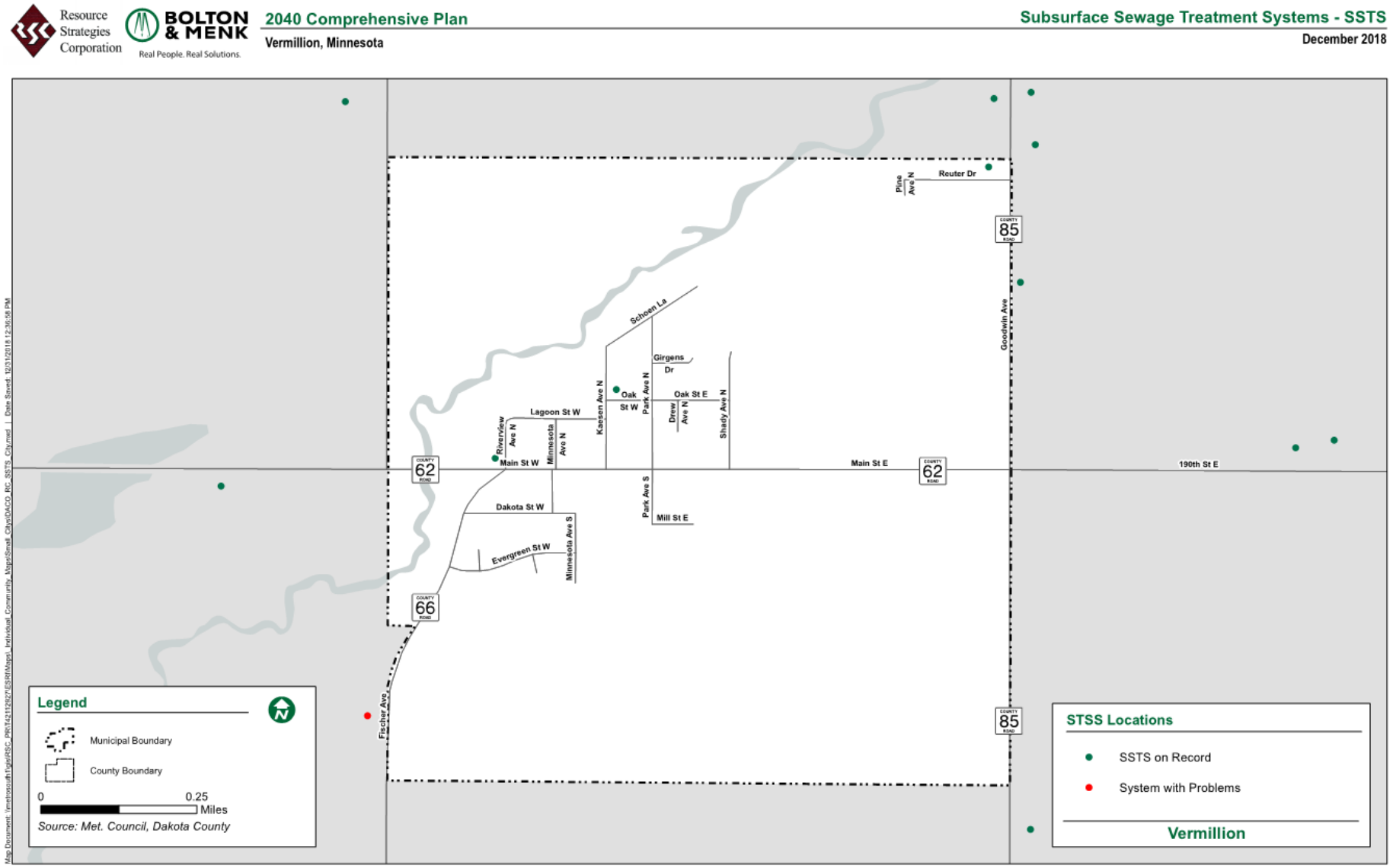
The portions of City of Vermillion that are not served with the municipal sewer system are dependent upon subsurface sewage treatment systems (SSTSs). The City of Vermillion adopted Dakota County Ordinance No. 113 to provide standards for the installation, repair, or alteration of SSTSs. Dakota County is responsible for monitoring SSTSs in Vermillion. By adopting the Dakota County Ordinance, Vermillion became compliant with MPCA Rule Chapter 7080 (now amended to incorporate Chapters 7081-7083) to address SSTSs and require that certain standards be met for all SSTS installers, maintainers, haulers, designers, and inspectors, service providers, as well as administration and enforcement of the Rules. Dakota County Ordinance #113 governs SSTS regulations in areas of its jurisdiction. The ordinance provides standards, guidelines, and regulations for the compliance and enforcement of the proper siting, design, construction, installation, operation, maintenance, repair, reconstruction, inspection, and permanent abandonment of SSTSs.

The City of Vermillion has adopted Ordinance #113 and is responsible for the review, permitting, and inspections of new and existing SSTSs. All SSTS designers, installers, inspectors, and maintainers, and service providers must be licensed by the MPCA. Dakota County maintains authority for permitting and inspections within shoreland and floodplain areas. A cooperative three-year inspection program for SSTS monitoring and maintenance. Approximately one-third of the SSTS owners receive notification of the requirement for the pumping of septic tanks and visual inspection of the system.

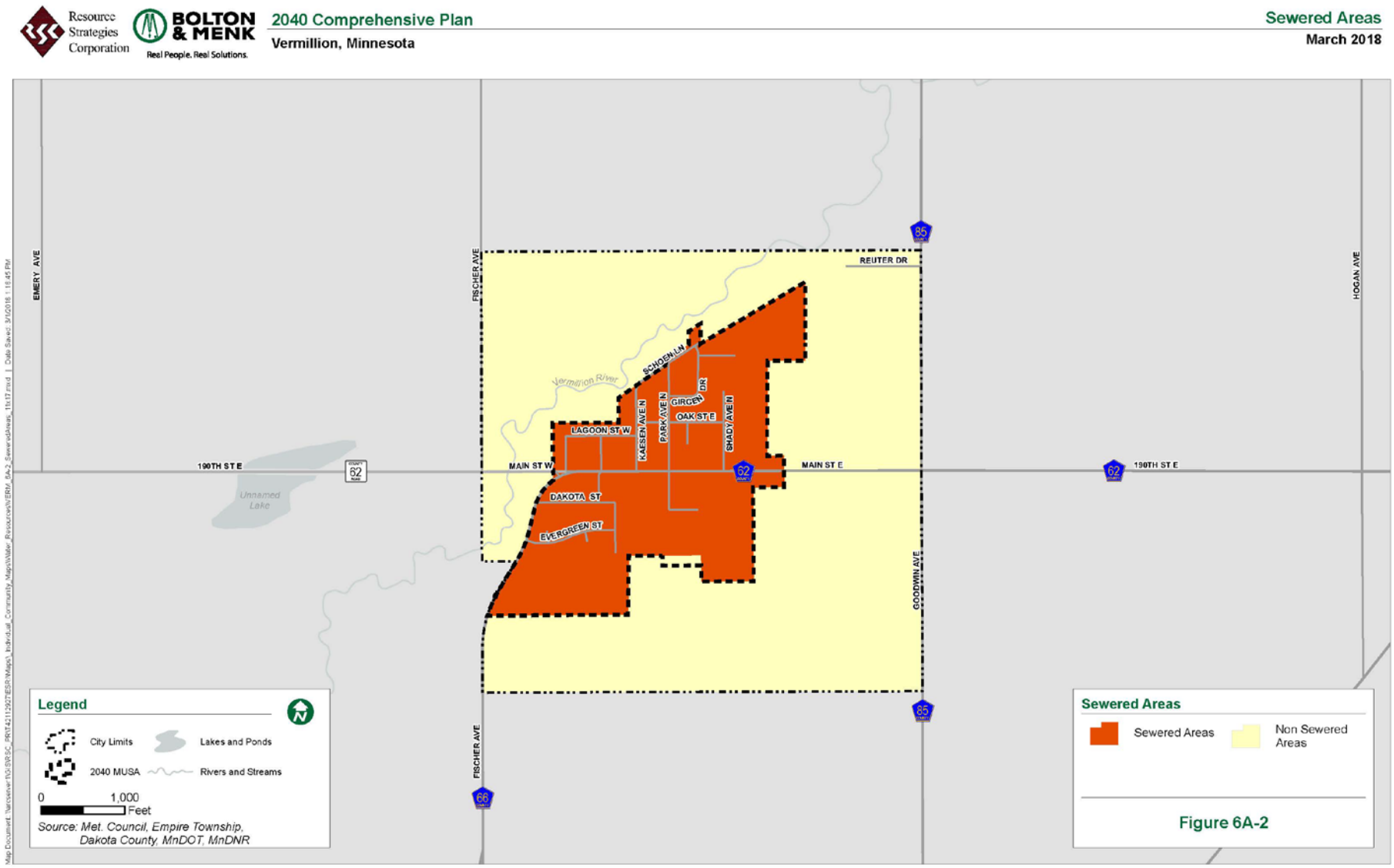
SSTS owners are required to contract with licensed maintainer for the maintenance and inspection program. Mainatiners are required to submit pumping and inspection records to the County. If the inspection reveals necessary or potential repairs to a system the County refers the action to the local unit

for appropriate enforcement. If SSTS owners do not respond to the maintenance and inspection requirement after a third notice, the County refers the matter to the local unit for enforcement. Inspection violations, complaints, and potential repairs are referred to local Building Officials for enforcement. If the Building Official cannot remedy violations and repairs through normal enforcement procedures, the matter is turned over to the Township Attorney or City Attorney for prosecution.

Map 15: Subsurface Sewage Treatment Systems



Map 16: Sewered Areas in Vermillion



B. Surface Water: Local Water Management Plan

1. Executive Summary

This Local Water Management Plan (LWMP) contains the elements needed to be consistent with the requirements Minnesota Statutes 103B and Minnesota Rules 8410. This plan is consistent with the goals and policies of the Metropolitan Council's Water Resources Management Policy Plan and the watershed management organizations having jurisdiction within the planning area. The LWMP includes the following:

- Water Resource Related Agreements
- Physical Environmental and Land Use
- Existing and Potential Water Resource Problems
- Goals and Policies
- Implementation Priorities
- Amendment Procedures

Dakota County has primary responsibility for enforcement of zoning regulations to protect rivers, streams and lakes in the unincorporated townships through administration of the County Shoreland and Floodplain Management Regulations, while the responsibility within incorporated areas lies with each individual city. The County regulations are in conformity with the shoreland and floodplain regulations established by the Department of Natural Resources.

2. Water Resource Related Agreements

A collaborative of eleven townships and five rural cities adopted joint resolutions in fall 2016 to participate in a joint planning process for the land use plan update and assistance in meeting local water management planning requirements. The Rural Collaborative Local Water Management Plan has been prepared independent of the Dakota County Rural Collaborative Comprehensive Plan and is incorporated as part of that Comprehensive Plan. Most local units in southern Dakota County have informal agreements to receive technical assistance from the Dakota County Soil and Water Conservation District. The Water Resources Management Ordinance is implemented by the City of Vermillion to ensure that watershed standards are properly addressed.

The City of Vermillion is located in the Vermillion River Watershed. The Vermillion River Watershed Joint Powers Organization (VRWJPO) spans Scott and Dakota Counties. In June 2016, the Vermillion River Watershed Joint Powers Board, which governs the VRWJPO, adopted the 2016-2025 Vermillion River Watershed Management Plan. The plan includes a range of actions to protect and improve surface water and groundwater quality in the watershed. It also features a great overview of the watershed's physical and biological conditions and water quality. The City of Vermillion has adopted by reference the VRWJPO Watershed Management Plan. In adopting the Vermillion River Watershed Management Plan by reference, the City of Vermillion agrees to submit proposed plans to the VRWJPO for review and comment if plans include the following attributes:

- Variances from local ordinances that affect surface water or impact surface water/groundwater interactions
- Diversions
- Intercommunity flows (to or from)
- Project site size of 40 acres or more
- Activities directly adjacent to the Vermillion River, its tributaries, a lake, or a protected water.

The primary purpose of the watershed organizations is to protect and preserve natural drainage systems, surface water quality, and groundwater quality. The organizations are also responsible for insuring that jurisdictions properly and consistently implement local water management plans, unless permitting jurisdiction has been relinquished to the watershed authority. Where issues concerning more than one

jurisdiction cannot be resolved through efforts at the local level, the JPO and WMO will act to settle such issues at the request of the jurisdictions.

3. Physical Environment and Land Use

The City of Vermillion is located in the Vermillion River Watershed. Surface water features and watershed boundaries in Vermillion are identified in Figure 16. The City of Vermillion implements standards through ordinances. The Water Resources Management Ordinance (2010 Update) is the controlling ordinance for local implementation of the Standards and will be updated to meet the VRWJPO Standards within nine months of the adoption of this comprehensive plan. If the City of Vermillion chooses to relinquish regulatory control, the VRWJPO would implement a permitting program and its Rules in the affected area of the community.

Vermillion River Watershed

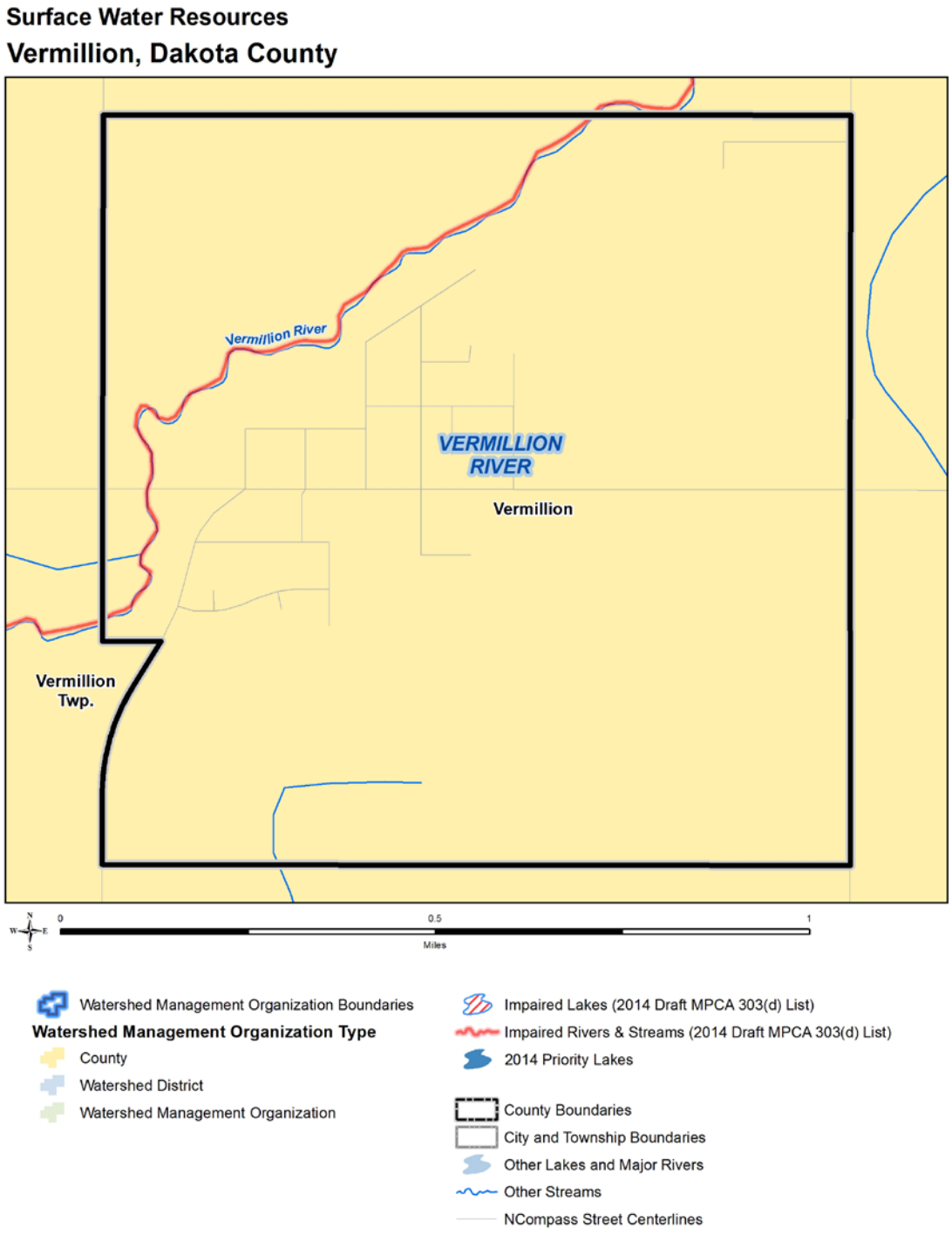
The VRWJPO adopted its Watershed Management Plan in June, 2016. The Standards include a policy statement, basic regulation, and specific criteria to be met for each regulation in the following categories:

- Floodplain Alteration Standards
- Wetland Alteration Standards
- Buffer Standards
- Erosion and Sediment Control Standards
- Stormwater Management Standards
- Drainage Alteration Standards
- Agricultural Standards

The Vermillion River Watershed Management Plan has an extensive inventory of the water resources in the watershed. See this plan for additional information on:

- Topography
- Soils
- Geology
- Groundwater
- Precipitation
- Land Use and Recreation
- Water Quality and Quantity

Map 17: Surface and Impaired Waters



4. Existing and Potential Water Resource Related Problems

The watershed plan identifies issues associated with the Vermillion River. The primary surface water management issues in the study area are summarized below:

- An increase in agricultural field drainage which alters normal stream flow and can lead to streambank erosion, channel cutting, and high turbidity levels.
- Changing climate patterns pose a threat to water quality, wildlife and infrastructure.
- Enforcement of ordinances related to subsurface sewage treatment systems (SSTS)
- Erosion along watercourses due to tree removal and lack of riparian buffers.
- Groundwater consumption increase threatens future supply and health risks due to nitrate in some areas.
- Loss of wetlands due to farming practices, sod farms and some development.
- Loss of wildlife habitat due to an increase in row crops and some development.
- Additional water resource education of watershed residents of the following: buffers, nitrates, innovative practices or latest agricultural best management practices.
- Administrative issues include the need for additional collaboration with agencies and organizations, a concern about overreaching mandates and requirements that unfairly impact watershed residents.

Several water bodies in the VRWMO are impaired for aquatic recreation or aquatic consumption. Impaired waterbodies in Vermillion are detailed in Table 22 and shown in Figure 16. An index of biological integrity (IBI) is a score that compares the types and numbers of fish or plants observed in a lake to what is expected for a healthy lake.

Table 22 – Impaired Waters in Vermillion as of 2012

Water Body	Jurisdiction	Nutrients	Bacteria	Turbidity	Nitrates	Mercury and PCBs	Invert and Fish IBI
Vermillion River 691	Vermillion City					X	X

5. Implementation Priorities

The MPCA has identified impaired waters in the Vermillion River Watershed JPO, which are listed in Table 21. The City of Vermillion will participate in the Total Maximum Daily Load (TMDL) studies of impaired waters as needed, and will implement the TMDL plans on projects as they develop. The City of Vermillion will continue to implement the standards of the Vermillion River Watershed JPO, as they apply.

The City of Vermillion has adopted a Floodplain Management Ordinance to regulate land use within floodplains.

The City of Vermillion will continue to work with the Dakota County SWCD in implementation of the Wetland Conservation Act (WCA), and the SWCD will continue to act as the Local Government Unit (LGU) in administering the WCA.

The City of Vermillion will continue to implement the standards of the Vermillion River Watershed JPO. In adopting the Vermillion River Watershed Plan by reference, the City also adopt the implementation plan and will participate in and/or support projects located within its jurisdiction (see section 7 of the Vermillion River Watershed Management Plan). This implementation plan performed a subwatershed-level analysis to identify priorities and projects on a more local level.

6. Amendment Procedures

The Local Water Management Plan may be amended as needed, following the same procedures that are used to amend the Comprehensive Plan. See the Plan Amendment Process in the Implementation Chapter for additional information about the amendment process.

C. Water Supply

1. Community Public Water System

All public water suppliers in Minnesota that operate a public water distribution system, serve more than 1,000 people and/or all cities in the seven-county metropolitan area, must have a water supply plan approved by the Department of Natural Resources (DNR). Water supply plans must be updated and submitted to the DNR for approval every ten years. This requirement, in place since the 1990s, is designed to encourage communities to deal proactively with providing sustainable drinking water for citizens, businesses, and industry. Vermillion will submit the plan through the Minnesota DNR Permitting and Reporting System (MPARS). This plan is attached in Appendix B. A brief summary of the plan is provided in this section.

Table 23 shows the historic water demand in the City of Vermillion from 2005 through 2016. Per capita water demand has varied some in the past 10 years, from the low of 83.1 gpcd in 2016, up to the high of 133.1 gpcd in 2011. There was no real notable trend within this period, with the demand fluctuating slightly from year to year. Average daily demand has also fluctuated in the recent past, but on the whole has remained steady, right around 40,000 gpd.

Maximum day demand has a decreasing trend over the historical period observed. It peaked in 2007, and has decreased significantly since then. This decrease may be due to a slight drop in population, and ongoing maintenance of the distribution system and repair of leaks.

Table 23 – Historic Water Demand in Vermillion

Year	Pop. Served	Total Connection	Residential Water Delivered (MG)	C/I/I Water Delivered (MG)	Water used for Non-essential	Wholesale Deliveries (MG)	Total Water Delivered (MG)	Total Water Pumped (MG)	Water Supplier Services	Percent Unmetered/ Unaccounted	Average Daily Demand	Max. Daily Demand (MGD)	Date of Max. Demand	Residential Per Capita Demand (GPCD)	Total per capita Demand (GPCD)
2005	510	165	12.6	1.3	0	0	14	15.6	0.00	10.7%	0.0381	0.08	7/17/2005	67.8	83.7
2006	485	169	15.0	0.9	0	0.14	16	18.7	0.00	14.4%	0.0438	0.16	7/7/2006	84.7	105.5
2007	442	162	15.2	1.0	0	0	16	19.2	0.00	15.6%	0.0444	0.22	8/8/2007	94.0	118.9
2008	444	163	13.9	0.9	0	0	15	17.7	0.00	16.1%	0.0406	0.17	7/1/2008	86.1	109.0
2009	442	163	14.5	1.0	0	0	15	17.8	0.00	13.2%	0.0425	0.16	7/13/2009	90.0	110.6
2010	442	163	13.6	0.6	0	0	14	19.6	0.00	27.7%	0.0388	0.14	8/30/2010	84.1	121.3
2011	448	164	12.8	1.9	0	0	15	21.0	0.00	30.0%	0.0402	0.13	6/7/2011	78.1	128.2
2012	450	163	N/A	N/A	0	0	N/A	16.2	0.00	N/A	N/A	N/A	N/A	N/A	98.9
2013	450	163	12.4	1.1	0	0	13	15.7	0.00	14.3%	0.0370	0.10	8/7/2013	75.4	95.9
2014	450	163	11.1	1.2	0	0	12	15.7	0.00	21.7%	0.0337	0.11	8/16/2014	67.5	95.7
2015	450	162	9.3	1.0	0	0	11	18.3	0.50	41.2%	0.0295	0.11	7/16/2015	56.4	111.5
2016	450	163	11.8	0.8	0	0	12	13.1	0.04	3.2%	0.0348	0.11	6/28/2016	72.0	79.8
Avg. 2010-2016	449	163	11.8	1.1	0	0	13	17.1	0.08	23.0%	0.0353	0.11	N/A	72.3	104.5

MG – Million Gallons **MGD –** Million Gallons per Day **GPCD** – Gallons per Capita per Day

The population of Vermillion has not seen significant change in the recent past and is not projected to in the future. Metropolitan Council population projections show the population remaining around 420 up to at least the year 2040. None of these parameters are likely to show significant change in the future, due to the consistency of the population, already discussed. Projected water demand based on Metropolitan Council population estimates is detailed in Table 24.

Table 24 – Projected 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)
2016	424	424	107	0.05	0.16
2017	421	421	107	0.04	0.16
2018	417	417	107	0.04	0.15
2019	414	414	107	0.04	0.15
2020	410	410	107	0.04	0.15
2021	411	411	107	0.04	0.15
2022	412	412	107	0.04	0.15
2023	413	413	107	0.04	0.15
2024	414	414	107	0.04	0.15
2025	415	415	107	0.04	0.15
2030	420	420	107	0.04	0.16
2040	420	420	107	0.04	0.16

GPCD – Gallons per Capita per Day **MGD** – Million Gallons per Day

The City of Vermillion currently has a single storage unit, a 55,000-gal. elevated tower. This is larger than the average current daily demand, which is roughly 35,000 gallons per day. This storage will likely remain adequate through 2040 because the population and daily demand are not expected to significantly change between now and 2040, detailed in Table 25.

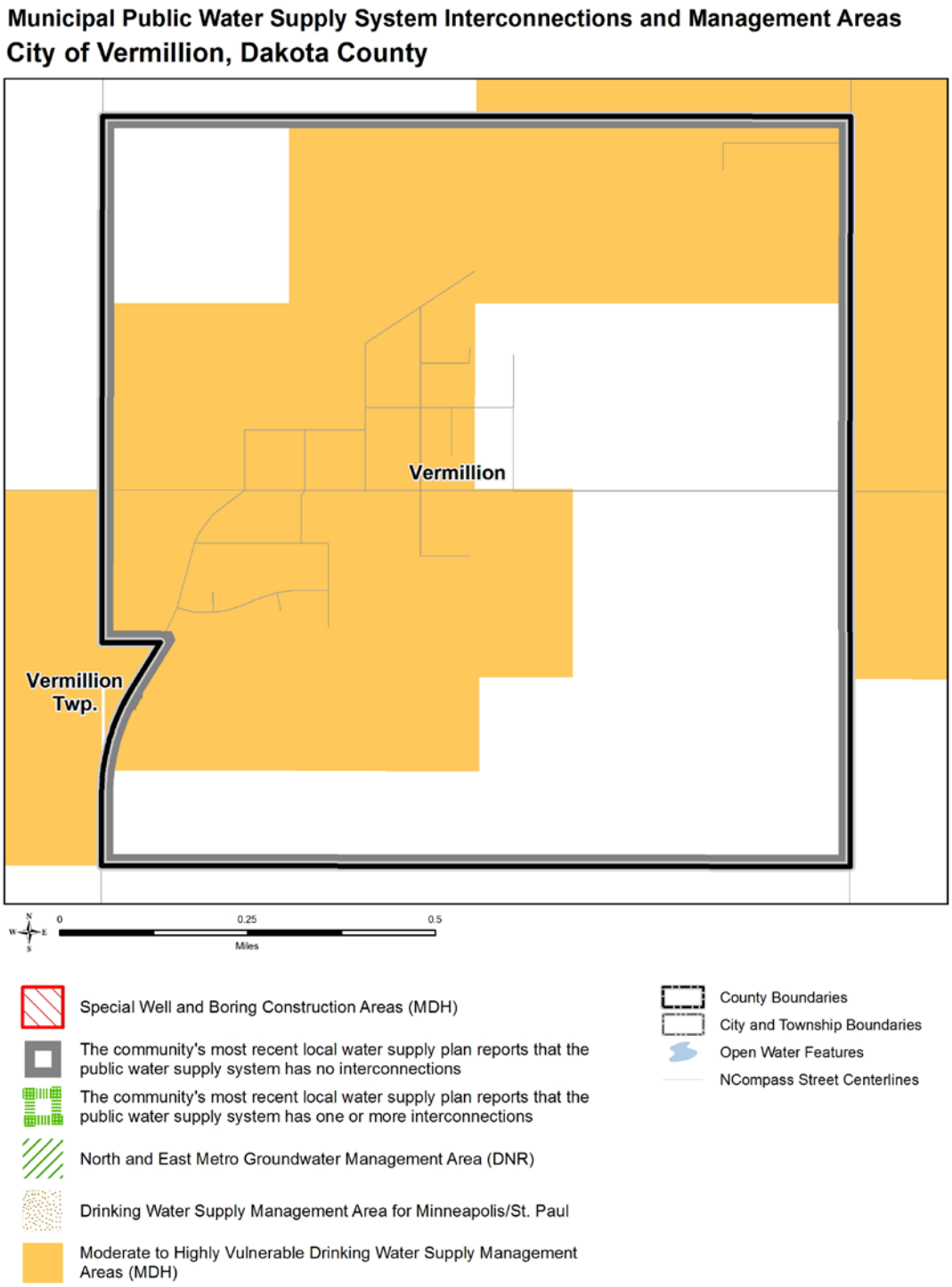
Water Source

Table 25 provides details on the city's water sources and the status of those sources. Well No. 1 is used only in emergency situations. It is the deeper of the two wells and has had past issues with the level of iron in its water. Well No. 2 is used during normal operation. Well No. 1 does not have a dedicated backup power source but could be connected to a generator quickly if needed. A Wellhead Protection Plan was adopted by the City in May 2012, per Minnesota Department of Health requirements. Part of the City of Vermillion is included in the Minnesota Department of Health's Moderate to Highly Vulnerable Drinking Water Supply Management Areas, shown in the figure on the following page.

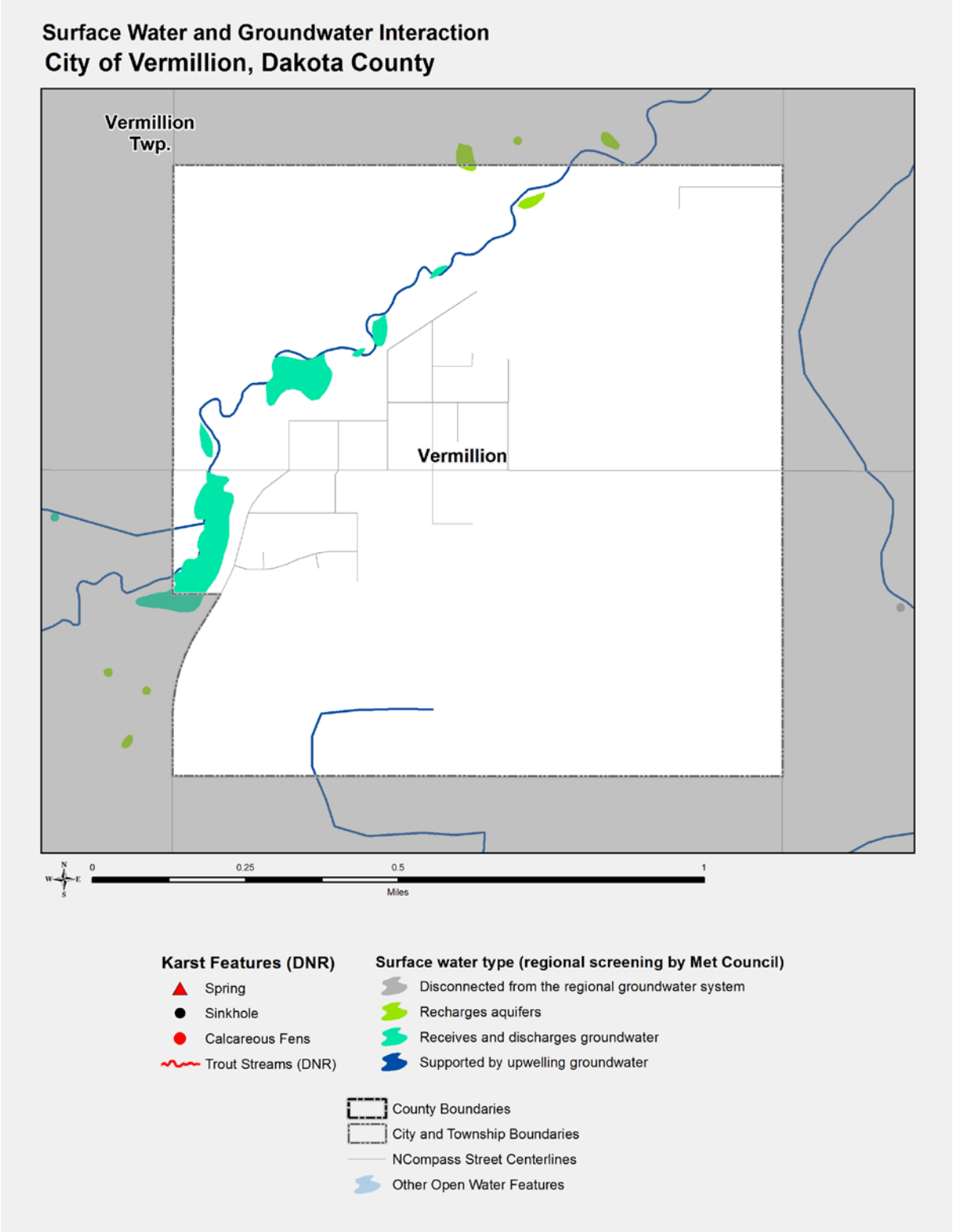
Table 25 – Water Sources and Status

Resource Type	Resource Name	MN Unique Well # or Intake ID	Year Installed	Capacity (Gallons per Minute)	Well Depth (Feet)	Status of Normal and Emergency Operations	Does this Source have a Dedicated Emergency Power Source?
Groundwater	Vermillion 1	502689	1987	280	816	Emergency Only	No
Groundwater	Vermillion 2	534094	1994	325	292	Active	Yes

Map 18: Water Supply Management Area



Map 18: Surface and Ground Water Interaction



VII. IMPLEMENTATION

A. Implementation Plans

The Comprehensive plan creates a vision for the City of Vermillion and guides land use and infrastructure improvements so that the City can meet the needs of the community in the future. The vision of the plan can only be realized if the plan is used. Tools to implement the plan will vary in that some will be reactive, such as zoning and subdivision ordinances that guide private developments, and others will be proactive for undertaking public improvement projects.

1. Official Controls

As part of the planning process, the City will evaluate its land use controls and consider amendments to such that will eliminate any inconsistencies with the Comprehensive Plan, enhance performance standards, protect public and private investments, conform to mandatory State and Federal regulations, and make the Plan a useful document. The typical official controls to be evaluated, possibly updated, and which are routinely used to implement the Comprehensive Plan include the following:

- Zoning Ordinance – see Zoning Map at the end of this chapter.
- Subdivision Ordinance
- Floodplain Management Ordinance
- Subsurface Sewage Treatment System Regulations

The Plan identifies a number of specific actions that need to be considered by the City. Some of these actions or potential ordinance changes include, but are not limited to, the following:

- Consider adopting an ordinance prohibiting sump pump and storm water discharge into the municipal wastewater collection system.
- Maintain the pumping and monitoring program for SSTS management, which meets the requirements of MPCA Rules Chapter 7080, as amended.
- Evaluate possible revisions needed for recent amendments to MPCA Rules Chapter 7080.
- Implement the requirements of the VRWJPO to allow VRWJPO water resources permitting.
- Evaluate shoreland and floodplain management regulations for consistency with state and federal program requirements.
- Cooperate with Dakota County and other agencies in the recreational use and enhancement of the Vermillion River Greenway Corridor.

The City of Vermillion is responsible for the adoption and enforcement of local zoning and subdivision ordinances. Subdivision and platting of land within the townships and cities will be required to conform to provisions of the local zoning and subdivision ordinances. Local zoning ordinances also have performance standards that address development requirements as they relate to densities, lot size, and other dimensional standards.

Dakota County administers Ordinance No. 113, which establishes provisions for SSTS permitting, monitoring, and inspections in the County. The City of Vermillion permits and inspects new SSTSs, while the County assists the communities in a three-year inspection and maintenance program of existing SSTSs. The City is responsible for enforcement, inspection and maintenance. The County also has SSTS permitting and land use management authority within shoreland and floodplain areas. Dakota County amended Ordinance No. 113 for consistency with recent amendments to the Minnesota Pollution Control Agency Rules Chapter 7080, governing SSTSs in 2008.

2. CIP

Capital improvement projects are major projects that benefit the City, including the construction or reconstruction of roads and sidewalks, sewer and water utilities, trails, and park and recreation facilities, as well the purchase of new or replacement equipment and buildings. A capital improvements program (CIP) is a budgeting plan which lists five years of needed capital improvements, their order of priority, and the means of financing.

The City of Coates has few operating expenditures and has no CIP. A CIP will be developed if infrastructure projects make budgeting and prioritizing necessary.

3. Schedule of Changes

To meet the goals of the 2040 Comprehensive Plan update and remove any potential inconsistencies in policy, changes and amendments to the zoning code and ordinances will need to be made. The City of Vermillion will begin review and consideration nine months after the official adoption of the 2040 Comprehensive Plan update.

4. Plan Amendment Process

The provisions of the zoning ordinances will be maintained and preserved through the term of the Comprehensive Plan, unless formally amended. Amendments to the local zoning ordinances will be consistent with the Comprehensive Plan.

When considering amendments to this plan, local units will use the following procedure:

1. Landowners, the Planning Commission, the City Council or other interested parties may initiate amendments.
2. The Planning Commission will conduct a thorough analysis of the proposed amendment.
3. The Planning Commission will prepare a report analyzing the proposed changes, including their findings and recommendations regarding the proposed plan amendment.
4. The Planning Commission will hold a formal public hearing on the proposed amendment.
5. Following the public hearing, the Planning Commission will make a recommendation to the City Council.
6. The City Council will receive the recommendation from the Planning Commission and make a final decision on whether to adopt the amendment.
7. All amendments to the plan will be submitted to adjacent and affected jurisdictions and the Metropolitan Council for review prior to implementation, as required by State law.

5. Zoning

City zoning codes regulate land use to promote the health, safety, order, convenience, and general welfare of all citizens. They regulate location, size, use and height of buildings, the arrangement of buildings on lots, and the density of population within the City. The City's zoning districts effectively guide development in Vermillion.

The City of Vermillion is divided into multiple zoning districts, detailed below and shown in Figure 19. There are permitted and accessory uses in most districts, as well as the other allowed uses under conditional use permit, interim use permits, or administrative permits. The following are descriptions of the current zoning districts in the City:

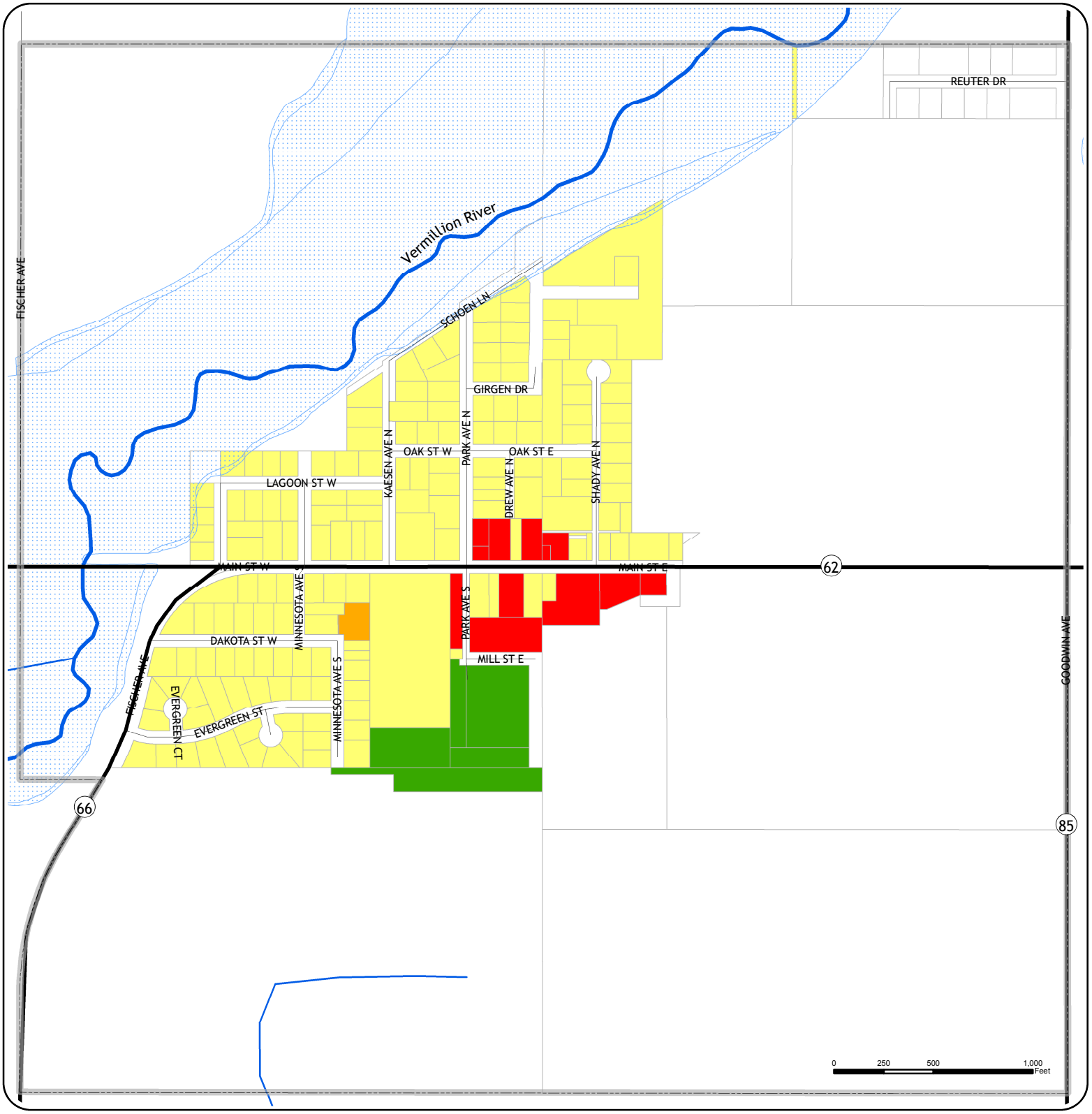
- Agricultural: The Agricultural zoning district limits residential density to one home per 40 acres.
- R-1 Low Density Residential: Allows single family detached dwellings on 12,000 square feet lots and duplexes on 15,000 square feet. The allowable density in the R-1 District ranges between 2.5 and 4.3 units per acre.

- R-2 Medium Density Residential: Permits medium density, attached residences at a maximum density of eight units per acre.
- C-1 General Commercial: Denotes the downtown area of Vermillion. Uses are intended to by compatible with neighboring agricultural and residential uses.
- R-OS: Recreation - Open Space: Primary land uses for local parks include tot lots, neighborhood parks, community parks, ball fields, public gardens, greenways and trails, and passive open space.
- Floodplain Overlay: The Floodplain area is established in those areas subject to severe flooding. Only agriculture, recreation, certain roads, public utility easements and open space uses will be allowed in the floodplain.

To ensure compliance with this 2040 Comprehensive Plan, the following zoning ordinance changes will need to be implemented:

- Updated zoning maps based on the future land use plan
- Reconcile inconsistencies between current zoning ordinances and intended future land uses

Appendix A: Zoning Map



Zoning Map

City of Vermillion

Dakota County, MN

Zoning District

- Agricultural
- R-1 Low Density Residential
- R-2 Medium Density Residential
- C-1 General Commmercial
- R-OS Recreation-Open Space
- Floodplain
- Streams

N

Parcel Source: Dakota County December 2008

Resource Strategies Corporation

Appendix B: Resolution Approving the 2040 Comprehensive Plan

RESOLUTION NO. 2018-05

City of Vermillion
Dakota County, Minnesota

A RESOLUTION APPROVING THE DRAFT DAKOTA COUNTY RURAL COLLABORATIVE 2040 COMPREHENSIVE PLAN FOR AFFECTED JURISDICTION AND METROPOLITAN COUNCIL REVIEW AND AUTHORIZING HOUSEKEEPING AMENDMENTS TO THE PLAN

WHEREAS, the City of Vermillion participated in the preparation of the 16-community Dakota County Rural Collaborative 2040 Comprehensive Plan Update; and

WHEREAS, the Dakota County Rural Collaborative 2040 Comprehensive Plan Update will be forwarded to adjacent communities, area school districts, watershed management organizations, Dakota County, Scott County, Washington County, MN Department of Transportation and MN Department of Natural Resources (affected jurisdictions) for review in May 2018; and

WHEREAS, the mandatory 6-month review by affected jurisdictions may not be completed until November 2018; and

WHEREAS, the Dakota County Rural Collaborative 2040 Comprehensive Plan Update must be forwarded to the Metropolitan Council by December 31, 2018; and

WHEREAS, it is not practical for all collaborative plan member communities to review last minute comments and meet collectively or individually to approve any revisions to the Dakota County Rural Collaborative 2040 Comprehensive Plan Update prior to December 31, 2018; and

WHEREAS, it is unlikely that comments from any affected jurisdictions will require any substantive changes in the Dakota County Rural Collaborative 2040 Comprehensive Plan Update but may require housekeeping amendments or minor clarifications to the plan.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Vermillion approves the Dakota County Rural Collaborative 2040 Comprehensive Plan Update and individual City plan for affected jurisdictions and Metropolitan Council review and authorizes housekeeping amendments and minor clarifications or revisions to the plans.

BE IT FURTHER RESOLVED, the City Council reserves the right to review any substantive revisions to the Dakota County Rural Collaborative 2040 Comprehensive Plan Update but waives any further comments on collaborative member comprehensive plans.

Approved and adopted by the City Council of the City of Vermillion this 3rd day of April 2018.

Mayor

ATTEST:

Clerk

Appendix C: Adoption of Vermillion River Watershed Management Plan

RESOLUTION NO. 2018-06

City of Vermillion
Dakota County, Minnesota

**A RESOLUTION ADOPTING
THE VERMILLION RIVER WATERSHED
JOINT POWERS ORGANIZATION
WATERSHED MANAGEMENT PLAN
AS THE LOCAL WATER MANAGEMENT PLAN
WITHIN THE VERMILLION RIVER WATERSHED**

WHEREAS, the Vermillion River Watershed Joint Powers Organization (VRWJPO) was created in 2002 by joint powers to manage surface waters within the Vermillion River watershed, and

WHEREAS, the VRWJPO consists of ten townships and 10 cities covering approximately 335 square miles in Scott and Dakota counties, and

WHEREAS, the VRWJPO adopted a watershed management plan in 2005 to govern land use activities and establish goals, policies, and standards for the protection of water resources and fish and wildlife habitat, and

WHEREAS, the VRWJPO adopted a second generation watershed management plan in June 2016, and

WHEREAS, Minnesota Statutes require local communities in the seven county metropolitan area, retaining permitting authority for water management activities, to adopt local watershed management plans, and

WHEREAS, the VRWJPO has determined that the Dakota County Rural Collaborative member communities may adopt the 2016 VRWJPO Watershed Management Plan as the local water management plan.

NOW, THEREFORE, BE IT RESOLVED, the City Council of the City of Vermillion hereby adopts the 2016 VRWJPO Watershed Management Plan by reference as the local water management plan for the City within the Vermillion River Watershed.

Adopted this 3rd day of April, 2018.

Mayor

ATTEST:

Clerk

Appendix D: Adjacent Community and Agency Comments

Dakota County Rural Collaborative Comprehensive Plan Comment Tracker

Land Use

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative, Vermillion, New Trier, Miesville, Randolph, Coates	Pg 25: Update reference to the “Dakota County Farmland & Natural Area Program” to Dakota County Land Conservation Program," because the program name has changed since the last comp plan.	Dakota County	Thank you for the correction; the text has been updated.
1.2	Full Collaborative	On pp. 23-24, Tables 11 and Table 12 should be specific for the "stand alone" plans of Empire Township and the City of Vermillion as staged development and redevelopment applies to growth in the communities with wastewater services. Staging of rural development is not needed.	Met Council	We have added tables specific for Empire Township and the City of Vermillion, given their different requirements.
1.3	Full Collaborative	The Plan is incomplete for MRCCA. The Plan has been forwarded on to Minnesota Department of Natural Resources (MDNR) staff for their separate completeness review of the MRCCA element. Council staff will send our comments on this element will be sent directly to the Collaborative under separate cover.	Met Council/ MnDNR	We have received comments about the MRCCA from MnDNR staff and will incorporate their comments into this section/appendix.
1.4	Empire Twp, Vermillion	To meet Emerging Suburban/Rural Center community designation requirements, the stand-alone Plan needs to plan for an average net density of at least 3 units/acre.	Met Council	Thank you for your comment. We have modified tables to clearly show 3 unit/acre minimum densities in sewered portions of the communities.
	Advisory Comment			
Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	Consider updating maps on pg 17 and pg 3-34, to show County Park Conservation areas. County staff will provide a map to show County Park Conservation areas	Dakota County	Thank you for your comment. Your recommendation has been taken under advisement.

Natural Resources/Special Resources/Resilience

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.2	Full Collaborative, ~~Empire~~, ~~Vermillion~~, New Trier, ~~Miesville~~, Randolph, Coates	Solar map inadequate. The individual Solar Suitability Analysis Map for each of the 16 communities should be included in Appendix B for the Plan to be considered complete and consistent for the required Solar Access Protection and Development component of the Plan.	Met Council	The map for the Full Collaborative was obtained through the Metropolitan Council website. Individual community maps will be included as appendices for individual community plans.

Advisory Comment

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative, Empire Twp	Dakota County is working on land protection and management through its Land Conservation Program, and supports this goal [Enviro resources goals, pg 4] and the concept of working together with the Rural Collaborative communities on natural resource protection and management.	Dakota County	Thank you for your comment and support of Rural Collaborative goals.
1.2	Full Collaborative, Empire, Vermillion, New Trier, Miesville, Randolph, Coates	Pg 4. Consider adding protection of wildlife and rare native species to the environmental goal of protecting natural habitat qualities and biodiversity of the area.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
1.3	Full Collaborative, Empire Twp, Vermillion, New Trier, Miesville, Randolph	Recommend adding goals and strategies to address how rare species and plant communities will be protected.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
1.4	Full Collaborative, Empire Twp, Vermillion, New Trier, Miesville, Randolph	Recommend inclusion of maps of MBS Sites of Outstanding or High Biodiversity Significance and DNR plant communities with conservation status ranks of S1, S2, or S3 along with a list of the types of native plants documented within the Collaborative Area.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
1.5	Full Collaborative, Empire Twp, Vermillion, New Trier, Miesville, Randolph	Encourages Collaborative communities to list NHIS rare features and state-listed species found within the collaborative area.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.

1.6	Full Collaborative, Empire Twp, Vermillion, New Trier, Miesville, Randolph	Pg. 5 Grasslands could be added to the list of areas called out in the policy to "enforce provisions in local ordinances that provide for and promote the protection of regionally and locally important natural areas"	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
	Full Collaborative, Empire, Vermillion, New Trier, Miesville, Randolph, Coates	Consider including a community forestry component to help address the threats of emerald ash borer and oak wilt.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
1.3	Full Collaborative, Empire, Vermillion, New Trier, Miesville, Randolph	Council staff recommend enrolling in and/or utilizing the following cost-free programs and resources, which are designed to provide planning, technical, and policy assistance to local Minnesota governments, as additional "solar implementation strategies" in your Plan: • U.S. Dept of Energy's SolSmart Program - Solar Permitting, Zoning, & Development • MN GreenStep Cities Program - Sustainability Best Practices • Xcel Energy's Partners in Energy Program - Energy Action Plan Development	Met Council	Thank you for your comment. Your recommendation has been taken under advisement.

Housing

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	The narrative analysis of existing housing needs must address the components of the existing housing assessment. For example, the lack of any publicly subsidized housing and the number of households that are housing cost burdened are not discussed in the context of housing needs nor are they identified as housing needs in Table 17.	Met Council	In response to your comment, we have added a few sentences about housing affordability in section B and expanded the housing tools detailed in Table 17 that may be considered to support housing development.
1.2	Full Collaborative	Inconsistency in text: Table 14 reflects a total of 914 households experiencing housing cost burden while Table 15 provides a total of 1,304 households experiencing housing cost burden.	Met Council	Table 14 cost burden data is from the Met Council, Table 15 is from 2015 ACS estimates, yielding two different totals. Since table 15 is not required, and may create confusion about current housing conditions in the Rural Collaborative, the table will be deleted.

1.3	Full Collaborative	Inconsistency in text: The tools noted in Table 17 to address housing needs do not include what circumstances and what timing, if applicable, in which they would be deployed. The final document should indicate if Collaborative communities intend to develop an ADU ordinance and provide a timeline when that will occur.	Met Council	Inserted following text on pg 31: *The following tools will be considered by Dakota County Rural Collaborative Communities on a case-by-case basis, as development occurs.*
1.4	Full Collaborative	The final document needs to describe how Collaborative cities and townships will implement the tools mentioned in the text; specific information on how they will administer, apply, refer, or advocate for such programs is needed.	Met Council	We have inserted the following text: *The following tools will be considered by Dakota County Rural Collaborative Communities on a case-by-case basis, as development occurs.*
	Empire Twp	To be consistent with Council policy, the Plan needs to consider all widely accepted tools to address Empire's housing needs. Many widely used tools are not included in the Housing Implementation plan, including: • Housing Bonds • Tax Abatement and Tax Increment Financing • Minnesota Housing's Consolidated RFP, which includes applications for tax credits, preservation of naturally occurring affordable housing, and single family home programs. • Livable Communities Act programs. to which Empire Township could consider becoming a participant. • Dakota County CDA's Housing Opportunities Enhancement Program (HOPE) • Effective referrals • Fair Housing policy (see additional information in the advisory comments) • Rental licensing & inspections • Support for the creation of a Community Land Trust model in Dakota County	Met Council	We have expanded the housing tools detailed in Table 17 that may be considered to support housing development.
1.5	Full Collaborative, Empire Twp	Other tools noted elsewhere, such as PUDs to allow higher densities, do not include the circumstances in which Empire Township would consider its use. This will need to be addressed specifically in the "stand alone" plans that will be submitted. Tools described to address housing needs do not consider Empire Township's allocation within the bands of affordability. Empire Township's allocation is identified within the three levels of affordability, and tools should therefore be addressed within the levels of affordability as well.	Met Council	We have expanded the housing tools detailed in Table 17 that may be considered to support housing development. We have also included the following text: *The following tools will be considered by Dakota County Rural Collaborative Communities on a case-by-case basis, as development occurs. Collaborative Communities do not consider tax increment financing (TIF) for housing development.*

1.4	Full Collaborative	Include a map of owner occupied housing values with a differentiation between those affordable to households earning 80% of AMI or below and those that are not. These maps are available in the Local Planning Handbook within each individual community's Community Page.	Met Council	We included this in Appendix C.
Advisory Comment				
Number	Plan Comment Applies to	Comment	From	Response
1.1	Empire Twp	Local Fair Housing policies do not mean that cities should or can manage or administer Fair Housing complaints. A local fair housing policy rather ensures the city is aware of fair housing requirements with regard to housing decisions and provides sufficient resources to educate and refer residents who feel their fair housing rights have been violated (this can be as simple as having links to resources on the City's website). Met Council will require a local Fair Housing policy as a requirement to draw upon Livable Communities Act (LCA) awards beginning in 2019.	Met Council	Thank you for your comment. Your recommendation has been taken under advisement.

Parks and Trails

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Empire Twp	Page 28 - Parks and Trails, Regional Trails: first paragraph refers to regional trail segments in Empire Township that are part of the Vermillion River Greenway and the "Mississippi River Regional Trail Greenway." The latter should be identified as the Vermillion Highlands Regional Greenway.	Dakota County	Thank you for the correction. The text has been updated.
Advisory Comment				
Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	Page 34: County supports and recommends continued work on connected trails to regional systems and collaboration with the Dakota for a Greenway system	Washington County	Thank you for your comment. Your recommendation has been taken under advisement.
1.2	Full Collaborative	Pages 35-36: Consideration for notes or references to park and trail access that is ADA compliant and/or consider future adaptive playground equipment	Washington County	Thank you for your comment. Your recommendation has been taken under advisement.
1.3	Full Collaborative, Empire,	Could include snowmobile trail inventories to raise awareness of this recreation option; many of these trails are state supported & connect to a larger network.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.

	Vermillion, New Trier, Miesville, Randolph, Coates			
1.4	Full Collaborative	Pg 25. SNAs (Hastings Sand Coulee and Chimney Rock) and trout streams are an appropriate addition to the inventory list.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
1.5	Full Collaborative	Cannon River is a State Water trail managed for canoeing and kayaking and is a Wild and Scenic River	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.

Transportation

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative, Empire Twp	The Metropolitan Council's Functional Classification map identifies the following roadways that are not shown in the Rural Collaborative Plan. Please consider adding the following roads to the Plan's functional classification map: • 190th Street, between TH 3 and Biscayne Avenue, as a future A-Minor Expander roadway in Empire. • Biscayne Avenue, between 190th Street and CSAH 66, as a future A-Minor Expander roadway in Empire.	Dakota County	Our future functional class map shows 190th Street as a Minor Connector. However, the road label has hidden the road; we will edit the map to make this road segment clearer. We will update our future functional class map to show Biscayne Ave as a Minor Connector.
1.2	Full Collaborative, Empire Twp	Dakota County identifies several future county highways within Empire, Nininger, Marshan, and Greenvale Townships based on existing plans and studies. Please consider adding these future County highways to the Rural Collaborative Plan: • Diamond Path (new road between CSAH 46 & 178th) • Hastings Area Roadway System Study identifies a future CSAH 47 alignment on Jacob Ave, between CSAH 47 and TH 55, in Marshan and Nininger Townships • *Northwest Northfield Highway Corridor Study* identifies a new alignment of CSAH 23, between CR 96 and TH 19, in Greenvale Township	Dakota County	CSAH 47/Jacob Ave alignment: We will add roadway to our map. Diamond Path: This roadway is shown on map but cannot tell due to symbology /layer order. We will edit the map to ensure this is visible. The future roads identified in the UMore study are included in our future functional class map. We will review the *Northwest Northfield Highway Corridor Study.*

1.3	Full Collaborative, Empire Twp, Coates	The turnback list includes several road segments that have already been turned back. Please remove the following jurisdictional transfers: • CR 53 N/ Alverno Ave: 1 mile in Castle Rock Township • CR 79/ Blaine Ave: 1 mile in Empire Township • CR 80/ 250th Ave W/ Biscayne Ave: 2 miles in Castle Rock Township • CR 87 / Lock Blvd: 2.2 mile in Nininger Township, to CR 42 intersection • CR 51/ 255th Street W/ Biscayne Ave: 2 miles in Castle Rock Township The list is missing a transfer from the 2012 plan: CR 81 alignment south of Coates in Empire & Vermillion Townships (dependent on new alignment per *Rosemount/UMore/Empire Area Transportation System Study).*	Dakota County	Thank you for your comment. We have updated the turnback table to reflect these updates. The CR 81 turnback is included in the table.
1.4	Full Collaborative	The final submittal must identify policies and ordinances that protect regional airspace from obstructions. Include how communities will notify the FAA of proposed structures.	Met Council	Thank you for your comment. We have inserted text identifying notification requirements.
1.5	Full Collaborative	The Transportation Analysis Zone forecasts in Table 22 are inconsistent with total forecast for Dakota County Rural Collaborative communities. The total for individual TAZ forecasts in Table 22 exceeds forecasts for Dakota County Rural Collaborative communities (shown in the table referenced above). It appears the table includes forecasts for the total area of each TAZ, including areas that fall outside Dakota County Rural Collaborative communities. For completeness, the TAZ forecasts in Table 22 should just include portions of TAZs that are inside the Dakota County Rural Collaborative, and these TAZ forecasts should add up to the total 16 community forecasts used elsewhere in the Plan.	Met Council	We obtained updated data from the Metropolitan Council that divided TAZ by community. We will update the plan with this break-down and ensure they add up to the community forecasts used throughout the plan.
1.6	Full Collaborative	Maps should show streets classified by the community as major and minor collectors and local streets. Changes to classifications should follow criteria found in Appendix D of the 2040 Transportation Policy Plan (TPP). The Plan should also include a map or table highlighting differences between the community map and the regional functional classification map, so the regional map can be updated.	Met Council	Most of the roads within Rural Collaborative Communities are under Dakota County jurisdiction. There are no known changes to functional classification; any changes will be included in the Dakota County Transportation Plan update.
1.7	Full Collaborative	The Plan needs to include a map of current traffic volumes including heavy commercial volumes including both ADT and HCAADT; current traffic volumes are mapped on Figure 5, but HCAADT not included.	Met Council	We include HCAADT in the freight, rail, and commercial corridors figure (Figure 16).
1.8	Full Collaborative	The Plan needs to identify future rights-of-way that need to be preserved. This is not specifically called out, though perhaps implied under "Proposed New and Extended Roads." If there is more information to share about right-of-way preservation, please include it in the Plan.	Met Council	Most of the roads within Rural Collaborative Communities are under Dakota County jurisdiction. Additional information about new and expanded county roads will be included in the

				Dakota County Transportation Plan update.
1.9	Full Collaborative	The Plan needs to include and incorporate access management guidelines from MNDOT or those of Dakota County.	Met Council	This in included in Appendix D.
1.10	Full Collaborative	The Plan needs to show planned trails (as shown in Figure 4 of Parks and Trails chapter) within and connecting to the RBTN Tier 2 corridor along the east edge of Empire Township (shown in Figure 15 of bike/ped chapter).	Met Council	After deliberation, planned greenways and bikeways are shown on two different maps for clarity, as there are several planned trails and bikeways in the Rural Collaborative Area. Detailing all trails on one figure were very messy and confusing to read, making a combined map unusable.
1.11	Full Collaborative	The Plan should describe planned trails as they relate to RBTN under section F.2. on page 70 of Transportation section.	Met Council	Added the following sentence: *Planned greenways (Lake Marion Greenway and an unnamed north/south greenway) loosely align with Tier 2 RBTN search corridors near and in Empire Township.*
1.12	Full Collaborative, Randolph	The Plan needs to identify railways, barge facilities, and truck or intermodal freight terminals within Collaborative, and identify other important nodes that may generate freight movement, such as industrial parks.	Met Council	Added the following text in response to comment: *Given the rural character of the Dakota County Collaborative communities, there is little freight generated within the Collaborative. Based on future land use plans, there is the potential for freight generation in a small industrially planned area in the City of Randolph and Randolph Township. This area, shown in the Future Land Use Map in the Land Use Chapter of this plan, is located off of a branch of the Canadian Pacific Railway and County Roads 86 and 94.*
1.13	Full Collaborative	Identify any local roadway issues or problem areas for goods movement, such as weight-restricted roads or bridges, bridges with insufficient height or width clearances, locations with unprotected road crossings of active rail lines, or intersections with inadequate turning radii.	Met Council	Most of the roads within Rural Collaborative Communities are under Dakota County jurisdiction. Any issues with roads, bridges, or freight movement will be noted in the updated of the Dakota County Transportation Plan.

Advisory Comment				
Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative, Coates, Empire	Please consider adding the following expansions to the "Existing and Anticipated Number of Travel Lanes" Map: • Planned CSAH 23, between CR 96 and Northfield, should be shown as a planned four lane highway in Greenvale Township. • CSAH 46, between Lakeville and Biscayne Ave, should be shown as a planned six lane highway in Empire • CSAH 46, between Biscayne Ave & **TH** 52, should be shown as a planned four lane highway in Empire Township and Coates. • Planned 190th Street (CR 64), between TH 3 and Biscayne Ave, should be shown as a planned four lane highway in Empire Township. • Planned CR 73, between CSAH 46 and CSAH 66 (including portions of Biscayne Ave), should be shown as a planned four lane highway in Empire Township.	Dakota County	Thank you for your comment. Your recommendation has been taken under advisement.
1.2	Full Collaborative	Page 40: County supports and recommends further evaluation of traffic crashes on designated roadways.	Washington County	Thank you for your comment. Your recommendation has been taken under advisement.
1.3	Full Collaborative	Page 70: County supports and recommends continued work with Dakota County on the Bike and Pedestrian plan.	Washington County	Thank you for your comment. Your recommendation has been taken under advisement.
1.4	Full Collaborative	Page 70 - Non-Motorized Transportation Plan. Please consider including the following text: The *Dakota County Draft 2040 Comprehensive Plan* identifies planned bicycle supportive shoulders along County Roads. Shoulder width to support bicycles will be determined based on MnDOT State Aid guidance.	Dakota County	Thank you for your comment. Your recommendation has been taken under advisement.
1.5	Full Collaborative, Empire, Vermillion, New Trier, Miesville, Randolph	Consider consulting DNR's Best Practices for protection of species for mitigation practices when developing design and construction plans for new roads near the Vermillion Wildlife Management Area.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
1.6	Full Collaborative	Regarding seaplane use on surface waters as designated & regulated by MnDOT, both Nininger & Ravenna Townships are on the Mississippi. If not, seaplane use occurs near those Townships, then the plan should state that fact.	Met Council	Thank you for your comment. Your recommendation has been taken under advisement.

1.7	Full Collaborative	The term "B-Minor Arterials" (pages 43 and 66) is no longer used and should be replaced with "Other Arterials."	Met Council	Thank you for your comment. Your recommendation has been taken under advisement.
1.8	Full Collaborative	On page 66, rather than "Metropolitan Council," please consider substituting the text "Transportation Advisory Board" (or Metropolitan Council's Transportation Advisory Board).	Met Council	Thank you for your comment. Your recommendation has been taken under advisement.
1.4	Full Collaborative	Consider mapping and describing existing on and off-road biking facilities and any sidewalks.	Met Council	Thank you for your comment. Your recommendation has been taken under advisement.

Wastewater

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative, New Trier, Randolph	Section VI.A.2: it should be noted that Dakota County regulates individual septic systems in communities that have turned back permitting to the County (City of Randolph, Waterford Twp., etc.), while other communities regulate locally. Please note that Dakota County now has septic inspection responsibility under Ordinance No 113 in Randolph and Waterford Townships and the Cities of New Trier and Randolph.	VRWJPO; Dakota County	We have added a sentence in Section VI.A.2 that reflects this fact. *Dakota County maintains authority for permitting and inspections within shoreland and floodplain areas, as well as regulates individual septic systems in communities that have turned back permitting to Dakota County (Randolph and Waterford Townships and the Cities of New Trier and Randolph).*
1.2	Full Collaborative, Empire, Vermillion, New Trier, Miesville, Randolph, Coates	Discuss with Dakota County Water Resources staff the language about "provisions in Dakota County Ordinance #132" being "more restrictive" than Minnesota Rules on septic systems because many of these provisions are in line with Minnesota Rules. Several items are incorrectly identified in the Rural Collaborative Plan as being more restrictive in Dakota County Ordinance No. 113 than in Minnesota Rules Chapter 7080. Please consider revising the following requirements, which are not more restrictive in County Ordinance No. 113:	VRWJPO; Dakota County	Ordinance 113 has been amended in early 2018. Need to amend or delete sentence. We removed the outdated paragraph stating the Dakota County ordinance was more restrictive than the State Rule. We have also amended the text

		Requirements to submit "as-built" records by local installers: submittal of as-built records by installers is not specifically listed as a requirement in ordinance except for the tax assessment program. **Prohibiting repair or modification of cesspools, seepages pits, and dry wells into septic tanks:** Cesspools, seepage pits, and drywells are prohibited in MN Rule 7080. Minnesota rule requires that septic tanks be water-tight, and these types of tanks, by definition, are not watertight. **Requiring a State-Licensed inspector:** This is a State requirement, not a more restrictive County requirement. The Plan states, "Dakota County is currently working with area building officials to review amendments needed to Ordinance #113 and to develop a local model ordinance that will incorporate new provisions of MPCA Rules Chapters 7080-7083" This may be out of date, since the ordinance has already been updated.		to read like the comments/corrections received.
1.3	Full Collaborative	Subsurface Sewage Policies: The second bullet refers to "alternative systems" allowed under MN Rules 7080-7083. Current Rules refer to non-standard systems rather than "alternative systems". Suggested change: Please consider modifying language about alternative systems, to note that MN Rules 7080 and Dakota County Ordinance No. 113 will only allow non-standard system types, generally types II through V, under special circumstances.	Dakota County	Thank you for your comment. We have edited the text to read "alternative and non-standard" and "under special circumstances."
1.3	Full Collaborative	Need to map SSTS within the Collaborative area, including the location of non-conforming systems or systems with problems.	Met Council	We have reached out to Dakota County Staff and have received "pumped" and "not pumped" reports for each Collaborative Community in 2018. The map provided in this chapter notes recorded and reported SSTS; not all SSTS in the Collaborative area may be represented by these data/this figure. "Systems with problems" only include systems pumped in 2018 that were recorded as leaking or experiencing drainage.
Advisory Comment				
Number	Plan Comment Applies to	Comment	From	Response

1.1	Full Collaborative	Plan refers to a "joint management program" and identifies a range of included services. Please clarify that the County and townships have a Joint Powers Agreement for the pump maintenance program, while inspection, record keeping, and repair or replacement of imminent threats are the responsibilities of the township and township septic inspector, and design and construction are the responsibilities of the licensed septic professional doing work	Dakota County	Text and bullets on pg 7 have been amended to reflect these responsibilities.
1.2	Full Collaborative	The Table 5 Forecasted Collaborative Population, Housing, & Employment estimate for 2015 households of 5225 on page 12 does not compare well with the Table 28 Sewer Allocation Forecasts section data on page 75 for the similar (arithmetically extrapolated) 2015 "Unsewered" household figure of 6713 (6546 + 6880/2). These data would indicate that the estimated number of SSTS serving households and businesses within the Collaborative would be expected to potentially be several hundred systems more than the estimated 5000, indicated in the text on page 75.	Met Council	Table 28 does not contain extrapolated 2015 data. The "Municipal Sewered" and "Unsewered" totals for each category and decade in Table have been updated to reflect the City of Vermillion's sewer data. The totals for population, households, and employment in Table 28 in each decade sum to the forecast totals in Table 5. The population, households, and employment for each community in each forecast year was obtained from each Community Page, as well as the sewer allocations for each decade/category.
1.3	Full Collaborative	State terminology has changed and the term "pumper" has been replaced by "maintainer" and there is a new license category called "service provider." (Similar language is also on pages 75-76.) Suggested changes: consider rewording to say inspectors, designers, installers, maintainers, and service providers must hold a valid license for the work they are performing.	Dakota County	Thank you for your comment. The noted term and category have been included.
1.4	Full Collaborative	Pg 7 - The first bullet refers to updating local ordinances for compliance with MN Rules 7080 - 7083. Suggested change: In addition to MN Rules, please also include a reference to County Ordinance 113.	Dakota County	Thank you for your comment. Your recommendation has been taken under advisement.

Surface Water

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	"Adoption by reference" should be explicitly stated in the Comprehensive Plan, and the Vermillion River Watershed Management Plan should be provided as an appendix or referenced with a hyperlink.	VRWJPO	Thank you for your comment. This is stated both in Chapter VI, Section B2 and Chapter VII, Section AI. A hyperlink to the Vermillion River Watershed Management Plan in Chapter VI, Section B2
	Full Collaborative, Empire Twp, Vermillion, Coates	Section VI.B.2: It should be noted that in adopting the Vermillion River Watershed Management Plan by reference, communities are agreeing to submit proposed plans to the VRWJPO for review and comment if plans include the following attributes: • Variances from local ordinances that affect surface water or impact surface water/groundwater interactions o Diversions o Intercommunity flows (to or from) o Project site size of 40 acres or more o Activities directly adjacent to the Vermillion River, its tributaries, a lake, or a protected water.	VRWJPO	Thank you for your comment. The text has been added.
1.2	Full Collaborative, Empire Twp, Vermillion, Coates	Section VI.B.2: The way local communities implement watershed Standards should be referenced in this section. The plan should note the "Water Resources Management Ordinance" is implemented by Dakota County Rural Collaborative communities to ensure that watershed standards are properly addressed.	VRWJPO	Thank you for your comment. The noted text/clarification has been added in section VI.B.3.
1.3	Full Collaborative	Section VI.B.2: "Water Resources Management Ordinance" was last updated in 2010 and will be updated within six months of adoption of the Comprehensive Plan to bring it into agreement with the more recent watershed plan revision.	VRWJPO	Thank you for your comment. The noted text/clarification has been added in section VI.B.2.
1.4	Full Collaborative	Section VI.B.3: Below the description of the VRWJPO Standards, the plan should note the current arrangement for implementation of the Standards. All rural collaborative communities currently implement the Standards through their own local ordinances. The Water Resources Management Ordinance (2010 Update) for the Dakota County Rural Collaborative is the controlling ordinance for local implementation of the Standards and will be updated to meet the VRWJPO Standards. If a local community is not implementing the ordinance or chooses to relinquish regulatory control, the VRWJPO will implement a permitting program and its Rules in the affected area of the community.	VRWJPO	Thank you for your comment. The noted text has been added.

1.5	Full Collaborative	Table 32: The VRWJPO Watershed Restoration and Protection Strategies (WRAPS) and Total Maximum Daily Load (TMDL) documents were completed in 2015, but the date at the top of the table says "as of 2012". Please verify that the impaired waters list is up-to-date with the WRAPS and TMDL documents and edit the table date if necessary.	VRWJPO	Thank you for your comment. Your recommendation has been taken under advisement.
1.6	Full Collaborative, Empire Twp, Vermillion, Coates	Section VI.B.4: Any references to "VRWMO" should be changed to Vermillion River Watershed Joint Powers Organization or VRWJPO.	VRWJPO	Thank you for your comment. The correction has been made.
1.7	Full Collaborative, New Trier, Miesville, Randolph	Insert paragraph under "Water Resource Related Agreements" about the Cannon River One Watershed, One Plan efforts. *Recommended text in comments, saved in drive*	NCRWMO	Thank you for your comment. The paragraph has been added.
1.8	Full Collaborative, New Trier, Miesville, Randolph	In NCRWMO section, include that the implementation of the 2013 plan will require LGUs to adopt & enforce a number of existence ordinances if they have not already done so. Member LGUs will also be required to comply with & report their actions to complete and enforce the policies of the watershed plan. See NCRWMO 2013 Plan, section 6.5.	NCRWMO	Thank you for your comment. The Sentence has been added.
1.9	Full Collaborative, New Trier, Miesville, Randolph	Add sentence after second sentence in first paragraph of North Cannon section *The NCRWMO may adopt the Comprehensive Watershed Management Plan when it is complete and approved by BWSR. Goals intend to stay the same regardless of which Plan is referenced.*	NCRWMO	Thank you for your comment. The Sentence has been added.
1.10	Full Collaborative	Resolution from communities that municipality has adopted the local watershed management plan by reference.	Met Council	Thank you for your comment. We will include copies of these resolutions.
Advisory Comment				
Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative, Empire Twp, Vermillion	Section VI.B.3: A summary of the environmental and physical descriptions of the Vermillion River Watershed (and the North Cannon watershed) included in the watershed management plan should be included in this section. It is acceptable to the VRWJPO to adopt the plan by reference, but a description of the portions of the watershed that are located in the communities of the rural collaborative should be included here (e.g., the Vermillion River enters Empire Township just upstream of the connection of North Creek to the main channel).	VRWJPO	Thank you for your comment. Your recommendation has been taken under advisement.

1.2	Full Collaborative	Section VI.B.4: There is an item related to groundwater consumption and nitrate among the issues in the study area. Like the Vermillion River Watershed Management Plan, the groundwater consumption/supply issue should be listed as a separate issue as groundwater quality/elevated nitrate levels in drinking water sources.	VRWJPO	Thank you for your comment. Your recommendation has been taken under advisement.
1.3	Full Collaborative	Section VI.B.4: It is acceptable to the VRWJPO to adopt the plan by reference, and the issues selected and listed in the plan are good. Similar to the physical descriptions section, the collaborative should add some specificity in the form of examples of water bodies or subwatersheds that are experiencing the identified problem. The "declining water quality and increased sedimentation in Lake Byllesby" item demonstrates a good level of specificity.	VRWJPO	Thank you for your comment. Your recommendation has been taken under advisement.
1.4	Full Collaborative	Section VI.B.5: Under section VI, "Implementation Plan", the plan should reference the implementation plan in section 7 of the Vermillion River Watershed Management Plan. Specifically, the text should reference the subwatershed-level analysis of the VRWJPO implementation plan and where the local community's subwatersheds fall in the priority list. As noted in the plan, the communities do not have capital improvement plans for stormwater/water resources, so this statement can just generally address how the communities will participate in and/or support cost-share and monitoring projects.	VRWJPO	Thank you for your comment. The following sentences have been added. *In adopting the Vermillion River Watershed Plan by reference, Collaborative communities also adopt the implementation plan and will participate in and/or support projects located within their jurisdiction (see section 7 of the Vermillion River Watershed Management Plan). This implementation plan performed a subwatershed-level analysis to identify priorities and projects on a more local level.*
1.5	Full Collaborative	Highly recommended that (erosion and sediment) ordinance be updated to use and require minimal impact design standards and the use of Atlas 14 in place of Technical Paper 40 for designing stormwater practices and systems.	VRWJPO	Thank you for your comment. Your recommendation has been taken under advisement.
1.1	Full Collaborative	Section VI.B.3: Figure 17 (and Figure 18) referenced by this section do not have labels for the lakes identified in the text and in subsequent tables (e.g., Spring Lake and Lake Byllesby).	VRWJPO	Thank you for your comment. The figures have been updated.
1.5	Full Collaborative	Pg. 5 Trout streams could be added to the list of areas called out in the policy to "enforce provisions in local ordinances that provide for and promote the protection of regionally and locally important natural areas"	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
1.2	Full Collaborative	There is more up-to-date information for trout stream designations.	MnDNR	Thank you for your comment. This information has been taken under consideration.

	Empire Twp	Section VI.B.4: If there are specific reaches of trout stream on the Vermillion River or other high priority resources in the Township, some additional detail could be provided in this section.	MnDNR	Thank you for your comment. Your recommendation has been taken under advisement.
	Vermillion, Coates	The City does not have capital improvement plans for stormwater/water resources, but a statement generally noting how the city will participate in and/or support cost-share projects and monitoring could be added.	VRWJPO	Thank you for your comment. Your recommendation has been taken under advisement.
1.6	Full Collaborative	The Plan incorporates the draft LWMP as a free-standing chapter in the body of the document, consistent with the Council's standard suggestion for Plan content. If completed at the time the Collaborative submits its formal Plan, the Collaborative must provide the final LWMP in the document, incorporating any recommended revisions from the Council and watershed organization reviews of the draft LWMP. If available at the time the formal Plan is submitted, we also request that the Collaborative provide to the Council the dates the watershed organizations approved the LWMP, and the date the Collaborative adopted the final LWMP.	Met Council	Thank you for your comment. We will provide the final LWMP if completed when we submit the formal comprehensive plan. Other adoptions will not be available when we submit the formal comprehensive plan.

Water Supply

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	Paragraph 1 on pg 83 says County Ordinance 114 applies to all wells in the County. It does not apply to community wells. (Suggest adding “except community wells” after second sentence.	Dakota County	Thank you for your comment. The noted text has been added.
1.2	Full Collaborative	State Statute 1031 allows construction of water-supply wells on land that is owned or leased by the individual and is used by the individual for farming or agricultural purposes or as an individual's place of abode. Suggested change to paragraph 2: add "except as allowed by state statute or code." At end of second sentence	Dakota County	Thank you for your comment. The noted text has been added.
1.3	Full Collaborative	Suggested change to paragraph 2, third sentence: "Annual Maintenance Permits are required for all environmental wells (monitoring, remedial, or product recovery) and dewatering wells that have been in use for fourteen months or longer and unused wells." To make sentence technically correct.	Dakota County	Thank you for your comment. The noted text has been added.
1.4	Full Collaborative	The Plan states that well testing results for coliform bacteria and nitrate-nitrogen content for new wells must be approved by the County Environmental Resources Department. While the Ordinance establishes	Dakota County	Thank you for your comment. The noted text has been added.

		acceptable standards for new or reconstructed wells, the County does not approve test results. Suggested change to paragraph 3: "Water tests results from new or reconstructed wells must meet the Acceptance Standards established in the Ordinance."		
1.5	Full Collaborative, Empire, New Trier, Randolph, and Vermillion	The Plan acknowledges that Empire Township and the cities of New Trier, Randolph, and Vermillion will submit local water supply plans through the MN ORN Permitting and Reporting System (MPARS). However, none of these plans have yet been received by Metropolitan Council for review. The final document must include those water supply plans.	Met Council	Thank you for your comment. Empire Township and the Cities of Randolph and Vermillion have completed their local water supply plans. These plans have (or soon will be) submitted to the MPARS system and will be included in the final documents.
Advisory Comment				
Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	Figure 19 illustrates the location of groundwater observation wells but does not include the organization responsible for the wells, and no well identification information is included. Please provide additional information.	Met Council	Thank you for your comment. Your recommendation has been taken under advisement.
1.2	Full Collaborative	Figure 20 illustrates areas designated as Drinking Water Supply Management Areas. However, the preliminary CPU does not discuss how these areas are used to inform how goals will be achieved or policies implemented. Please provide additional context about how this information will be used by communities to shape policy implementation.	Met Council	Thank you for your comment. Your recommendation has been taken under advisement.

Forecasts

Incomplete Comments				
Number	Plan Comment Applies to	Comment	From	Response
Advisory Comment				
Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	Plan needs to include a table with individual household forecasts for each of the 16 communities within the collaborative. Plan provides these tables for population and employment forecasts, but not for households.	Met Council	These forecasts are included in the Housing Chapter as part of the "Projected Needs" section instead of the Land Use Chapter.

1.2	Full Collaborative	The total 2040 employment forecast in Table 5 is shown as 3,660. The total 2040 employment forecast for the 16 communities is slightly higher at 3,670 jobs.	Met Council	Thank you for the correction; the text has been updated.
1.3	Full Collaborative	Table 7 shows projected 2040 employment for each of the communities. The individual employment forecasts are correct, but the subtotal at the bottom is incorrectly shown as 2,890. The correct subtotal is 3,670.	Met Council	Thank you for the correction; the text has been updated.

Implementation

Incomplete Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	Page 87, Paragraph 5 states the Collaborative Communities are responsible for septic inspections. The third sentence could be modified to reflect that Dakota County now has septic inspection responsibility in the Township of Randolph, the Township of Waterford, the City of New Trier, and the City of Randolph.	Dakota County	Thank you for your comment. The noted text has been added.
1.2	Full Collaborative	Last sentence indicates that Dakota County is amending the ordinance. The ordinance was amended in 2008.	Dakota County	Thank you for the correction; the text has been updated.
1.3	Full Collaborative	Define a timeline detailing when actions will be taken to implement plan elements.	Met Council	This is included in Chapter VII, Section A3. *These changes will begin review and consideration nine months after the official adoption of the 2040 Comprehensive Plan update.*
1.4	Full Collaborative	The Plan needs to include a Capital Improvement Program (CIP) for transportation. Please provide the sequence and timing for any local public investments.	Met Council	Most of the roads within Rural Collaborative Communities are under Dakota County jurisdiction. Additional information about funding for county roads, including the CIP, will be included in the Dakota County Transportation Plan update.
1.5	Full Collaborative	Include a schedule for the preparation, adoption, and implementation of needed changes to official controls.	Met Council	This is included in Chapter VII, Section A3. *These changes will begin review and consideration nine months after the official adoption of the 2040 Comprehensive Plan update.*

Advisory Comment

Number	Plan Comment Applies to	Comment	From	Response

1.1	Full Collaborative	Page 8 & Implementation Section VII: These sections mention opportunities for feedback, but could elaborate on the number and type of community responses and if the outcomes of citizen engagement is reflective of the overall community.	Washington County	Thank you for your comment. Your recommendation has been taken under advisement.

General/Other Comments

Number	Plan Comment Applies to	Comment	From	Response
1.1	Full Collaborative	Public Facility Policies & Goals: Please consider adding a goal statement to support that public facilities/parks provide the opportunity to recycle in their operations, consistent with Minn. Stat. §llSA.151 and the adopted Dakota County Solid Waste Master Plan.	Dakota County	Thank you for your comment. Your recommendation has been taken under advisement.
1.2	Full Collaborative	MRCCA Section IV. Public River Corridor Views Plan states that, "The opposite side of the Mississippi River from Nininger Township is the Point Douglas Regional Trail, an important public trail for the area providing valuable views of the river and bluff land with a tree canopy for much of its length. The identified public river corridor view is identified with photographs within this Collaborative Plan." **Please note that no photographs were included in the plan.**	MnDNR	Thank you for your comment. Photos will be included for Nininger Township, taken by Friends of the Mississippi River.
1.3	Full Collaborative	Appendix D of the Empire Township Individual Plan plan will be a Surface Water Management Plan according to the index, so there is somewhat of an understanding that more detail will be available in that plan as well (e.g., maps of stormwater basins, storm sewer, etc.). **Will there be a surface water management plan for the Rural Collaborative as well?**	VRWJPO	Thank you for your question. No, there will not be surface water plans for the Rural Collaborative. The Collaborative communities have adopted the Vermillion River Watershed Plan and/or the North Cannon River Watershed Plan by reference.
1.4	Full Collaborative	No Comment	Scott County	
1.5	Full Collaborative	No Comment	Cannon Falls Township	
1.6	Full Collaborative	No Comment	MnDOT	
1.7	Full Collaborative	No Comment	City of Hampton	
1.8	Full Collaborative	No Comment	ISD 196	
1.9	Full Collaborative	No Comment	City of Cannon Falls	

Appendix E: Access Guidelines

Mn DOT Access Management Guidelines

Chapter 3
Guidelines for Public Street and Driveway Connections

3.1 Overview

For each access category, guidelines have been developed for the spacing of public street connections and the allowance of driveways to the state trunk highway system. The guidelines are summarized in Figures 3.1 and 3.2.

3.2 Public Street Connections

3.2.1 Background and Approach

Guidelines for the spacing of public street connections to the trunk highway system are based on the following principles and technical considerations:

1. Network Connectivity

   To promote the development of a hierarchical network of interconnected roads throughout the state, the guidelines use a tiered approach to access connections. Access is limited and reserved first for primary, full-movement intersections connecting major public streets and highways. The guidelines provide for additional secondary public street intersections at one-half the spacing of full-movement intersections, under certain conditions.

2. Urban Arterials: Balancing Safety and Mobility through Coordinated Signal Progression

   State highways and major arterials extending through urban communities serve two groups of customers with somewhat competing needs: the through-trip drivers, who desire to travel through the community without undue speed reductions and signal delays, and the local-trip drivers, who need to cross or travel on a segment of the highway to get to home, work, and services within the community. To determine the optimal balance between these competing demands, Mn/DOT conducted corridor simulations for 1 mile, ½ mile, and ¼ mile intersection spacing to compare the mobility benefits of signal progression on the mainline with overall network travel time and delays.

   Based on these simulations, the recommended spacing of primary, full-movement intersections is directly related to the spacing of signals and the need to achieve signal progression. This is because every full-movement intersection represents the potential for a traffic signal. When signalized intersections are uniformly and adequately spaced, however, platoons of vehicles can travel in both directions through the corridor at uniform speeds without needing to stop for each signal. This reduces delays for through-movements and increases the carrying capacity of the roadway.

   The intersection spacing guidelines also make allowance for additional unsignalized intersections at one-half the spacing of signalized intersections, but restrict turning movements to right-in/right-out-only on higher-volume, divided roadways. This denser network of intersecting streets may disperse traffic among multiple access points and may actually eliminate or delay the need for signalization at an intersection. The additional street access also can reduce the need for individual driveways by providing a denser supporting road network for the corridor.

3. Rural Areas: Maintaining the Historical Road Network

   Throughout much of rural Minnesota, the Township-Range System and the US Public Land Survey's one-mile section grid have served as the framework for the development of a roadway grid system spaced at 1 mile, ½ mile, and ¼ mile intervals. Over time, some of these roads have assumed a more important function within the network and have been classified as minor arterials and collectors. Typically, the more important roads were about a mile apart and located on the township or range lines. This grid system remains the prevailing factor in the spacing allowance of rural intersections.

4. Rural Areas: Providing Adequate Intersection Geometrics

   The spacing of intersections on state highways in rural areas is also based on providing sufficient area for left-turn lanes. On two-lane rural highways, the distance needed to construct a left-turn lane typically exceeds 1000 feet.

3.2.2 Policy Guidelines for Public Street Connections

The location of new or reconstructed public street connections should conform to the recommended spacing, summarized in Figures 3.1 and 3.2, for the access category assigned to the roadway segment.

Primary Intersections on IRCs and Non-IRCs
Primary intersection allowance, as summarized in Figures 3.1and 3.2, refers to full-movement intersections that may be considered for signalization if the appropriate signal warrants have been met. The spacing of primary intersections is governed by the need to provide uniform spacing for effective signal coordination in urban/urbanizing areas and adequate spacing for left-turn lanes on unsignalized highways in both urban and rural areas.

Secondary Intersections on IRCs and Non-IRCs
Secondary intersection spacing and allowance, as summarized in Figures 3.1 and 3.2, refers to intersections that may be accommodated midway between primary intersections if they do not create a high-risk conflict condition.

1. On **undivided highways**, a secondary intersection may be provided if the analysis of future traffic conditions, per the *Gap Analysis Procedure* (Section 3.2.3), indicates that a low-risk conflict condition can be maintained. If the analysis indicates a high-risk conflict condition is anticipated, the intervening intersection should not be allowed. Where an undivided highway is planned to become a divided highway, the secondary intersection should be analyzed as if it were a divided highway.
2. On **rural divided highways**, a secondary intersection may provide full movement if the analysis of future traffic conditions, per the *Gap Analysis Procedure* (Section 3.2.3), indicates that a low-risk conflict condition can be maintained. A full-movement, intervening secondary intersection may be subject to future conversion to a right-in/right-out or to a ¾ movement (right-in/right-out/left-in-only) intersection if increased traffic growth creates the potential for a high-risk conflict.

   If the analysis indicates that a full-movement intersection on a divided highway would create a high-risk conflict condition, further analysis, per the *Gap Analysis Procedure* (Section 3.2.3), should be conducted to determine whether restricting the intersection to right-in/right-out-only would maintain a low-risk conflict condition. If the analysis indicates that a high-risk conflict condition would still be created, the intervening intersection should not be allowed, or it should be restricted to a right-in-only, if practicable, given the supporting road network.
3. On **urban/urbanizing and urban core divided highways**, the secondary intersection should be limited to right-in/right-out-only. Secondary intersections in urban/urbanizing areas are not conducive to two-way coordinated signal progression, and therefore, should not be signalized. If a secondary intersection meets warrants for a traffic signal, alternatives such as eliminating some turning movements or diverting some traffic should be considered instead of installing a traffic signal.

Figure 3.1 – 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	
1	**High-Priority Interregional Corridors & Interstate System (IRCs)**				
1F	Interstate Freeway	Principal Arterials	Interchange Access Only		⊘
1AF	Non-Interstate Freeway		Interchange Access Only (see Section 3.2.7 for interim spacing)		See Section 3.2.5 for Signalization on Interregional Corridors
1A	Rural		1 mile	1/2 mile	
1B	Urban/ Urbanizing		1/2 mile	1/4 mile	
1C	Urban Core		300-660 feet dependent upon block length		
2	**Medium-Priority Interregional Corridors**				
2AF	Non-Interstate Freeway	Principal Arterials	Interchange Access Only (see Section 3.2.7 for interim spacing)		See Section 3.2.5 for Signalization on Interregional Corridors
2A	Rural		1 mile	1/2 mile	
2B	Urban/ Urbanizing		1/2 mile	1/4 mile	
2C	Urban Core		300-660 feet, dependent upon block length		1/4 mile
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

Figure 3.2 – Summary of Recommended Street Spacing for Non-IRCs

Category	Area or Facility Type	Typical Functional Class	Public Street Spacing		Signal Spacing
			Primary Full-Movement Intersection	Secondary Intersection	
4	**Principal Arterials in the Twin Cities Metropolitan Area and Primary Regional Trade Centers (Non-IRCs)**				
4AF	Non-Interstate Freeway	Principal Arterials	Interchange Access Only (see Section 3.2.7 for interim spacing)		Interim
4A	Rural		1 mile	1/2 mile	See Section 3.2.5
4B	Urban/ Urbanizing		1/2 mile	1/4 mile	1/2 mile
4C	Urban Core		300-660 feet, dependent upon block length		1/4 mile
5	**Minor Arterials**				
5A	Rural	Minor Arterials	1/2 mile	1/4 mile	See Section 3.2.5
5B	Urban/ Urbanizing		1/4 mile	1/8 mile	1/4 mile
5C	Urban Core		300-660 feet, dependent upon block length		1/4 mile
6	**Collectors**				
6A	Rural	Collectors	1/2 mile	1/4 mile	See Section 3.2.5
6B	Urban/ Urbanizing		1/8 mile	Not Applicable	1/4 mile
6C	Urban Core		300-660 feet, dependent upon block length		1/8 mile
7	**Specific Area Access Management Plans**				
7	All	All	By adopted plan		

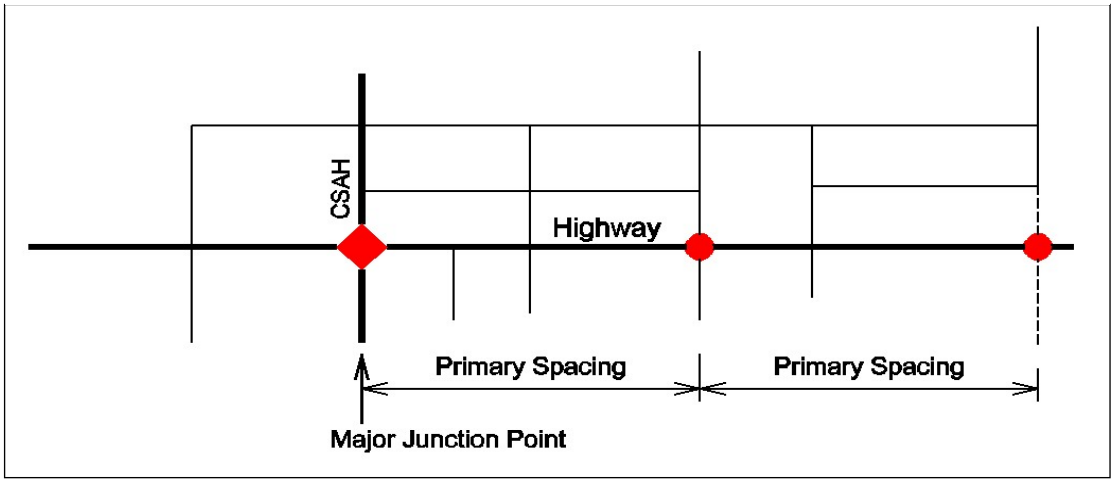
Identifying Primary and Secondary Intersections

Three steps are involved in the spacing of proposed public street intersections, as discussed in the following paragraph.

Step 1. To evaluate the consistency of a proposed public street intersection with the spacing guidelines, the reviewer must first determine the location of existing primary and secondary intersections along the corridor. Typically, a primary intersection is the junction between two major roads, and a secondary intersection is a junction between a major road and a minor road or a local street.

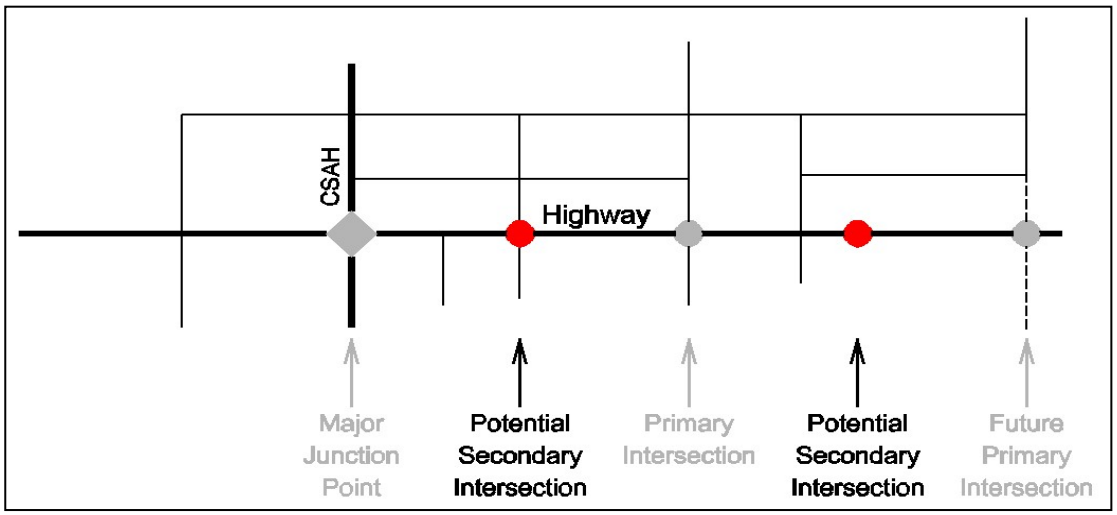
Step 2. Once identified, the major junction point becomes the beginning terminus from which the spacing of conforming intersections along the corridor is determined. In Figure 3.3, the junction of the CSAH and the trunk highway is identified as the major junction point. The primary intersection spacing is measured from that point.

Figure 3.3: Identifying Primary Intersection Spacing



Step 3. After the reviewer has determined the location of the primary and intersections along the corridor, they then identify the potential locations for secondary intersections. As shown in Figure 3.4, secondary intersections are typically located half way between the primary intersections.

Figure 3.4: Identifying Secondary Intersection Spacing



General Guidance for All Public Street Connections
The guidance below applies to all primary and secondary public street connections:

1. A high-volume driveway (Access Type 3) may substitute for an at-grade public street if:

   - The location is consistent with spacing guidelines for a public street connection;
   - The driveway is designed to provide access to a large development area encompassing multiple properties or structures served by a clearly-defined system of internal streets; and,
   - The driveway does not negatively impact the accessibility of adjacent land areas by disrupting the connectivity of the local supporting street network.

2. At-grade public street spacing should be measured from cross-street centerline to cross-street centerline along the primary highway. Minor variance, within 5% of the recommended spacing, constitutes conformance to the spacing guidelines if required to accommodate topographical constraints or connectivity to the established road network. Street spacing within 5% of the recommended distance should, in most cases, provide sufficient space to accommodate turn lanes, weaving maneuvers, and signal progression.

3. Breaks in existing access control to construct a new at-grade public street connection consistent with these guidelines may be considered, if necessary, to provide reasonable access and network connectivity. For Category 1F, 1AF, 2AF, 3AF, and 4AF highways, breaking access control should be considered only for a new interchange (Future chapters in this manual will provided additional guidance).

4. With regard to the impact of public street connections on the safety and operations of the transportation network, the location and design of each public street connection should be consistent not only with the guidance in this section, but also with the guidance provided in Section 3.4.

3.2.3 Secondary Intersections and Gap Analysis Procedure

Secondary Intersections Analysis
A secondary intersection is allowed between two primary intersections (per Section 3.2.2) if the secondary intersection does not create a potential risk to the safety and mobility. The Gap Analysis Procedure as described below and is illustrated with graphs (Figures 3.5 – 3.9) is part of the process of determining the appropriateness of a secondary intersection.

The Gap Analysis Procedure is used to evaluate the ability of vehicles at an access location to find adequate gaps in mainline traffic flows. If there are insufficient gaps, longer queues and delays will be experienced and the potential for greater risk-taking will occur. On low-volume highways, there will be fewer conflicting vehicles and many more gaps available. These low-volume roads allow for easier decision-making and less judgment by the driver. To identify potential high-risk areas where additional access is not advised, a simplified approach to gap analysis has been developed for application to unsignalized corridors.

This approach depends upon a series of risk-conflict graphs (Figures 3.5 – 3.7) that identify high-risk areas along unsignalized corridors, based on roadway configuration. These graphs are presented on the next page.

The gap analysis is intended for use on highways operating under a condition of random arrival. For this reason, the risk-conflict graphs are primarily applicable to unsignalized roadway segments. These unsignalized roadway segments include Category 1A, 2A, 3A, 4A, 5A, and 6A (rural areas) roadways.

Risk-Conflict Graphs

The risk-conflict graphs in Figures 3.5 – 3.7 were developed to be applied to specific roadway designs based on methodology in the *Highway Capacity Manual 2000*. The methodology assumes the following roadway design conditions:

- Side streets are stop-controlled;
- Traffic from nearby intersections does not impact the subject intersection or access point; and,
- Under wide median conditions (Figure 3.7), vehicles entering and crossing the mainline may use a two-step maneuver.

Figures 3.5 – 3.7 represent risk-conflict conditions based on roadway design. To select the appropriate figure to use, the reviewer chooses the graph representing the type of median on the primary roadway that is under consideration.

Figure 3.5 – Undivided Two-Lane Roadways

Figure 3.5 is used for all two-lane undivided roadways. Use this figure if there is no median along the primary highway.

Figure 3.5: Gap Analysis Graph for Undivided Two-Lane Roadways

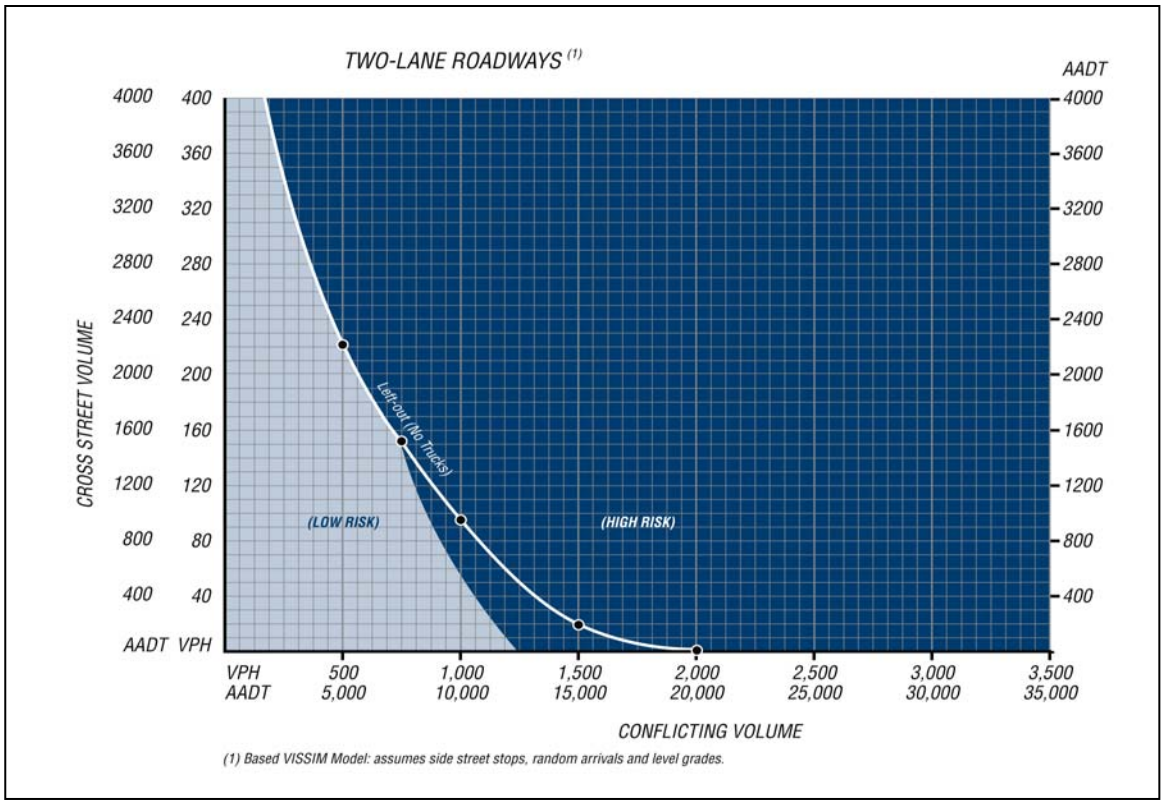


Figure 3.6 – Divided Four-Lane Roadways (with Narrow Medians)
Figure 3.6 is used for divided roadways with narrow medians. A narrow median is defined as having no storage space. Narrow medians require all vehicles crossing or turning left from the cross street to complete the maneuver as a single movement. This figure is also used when looking at right-in/right-out intersections.

Figure 3.6: Gap Analysis Graph for Divided Four-lane roadways with Narrow Medians

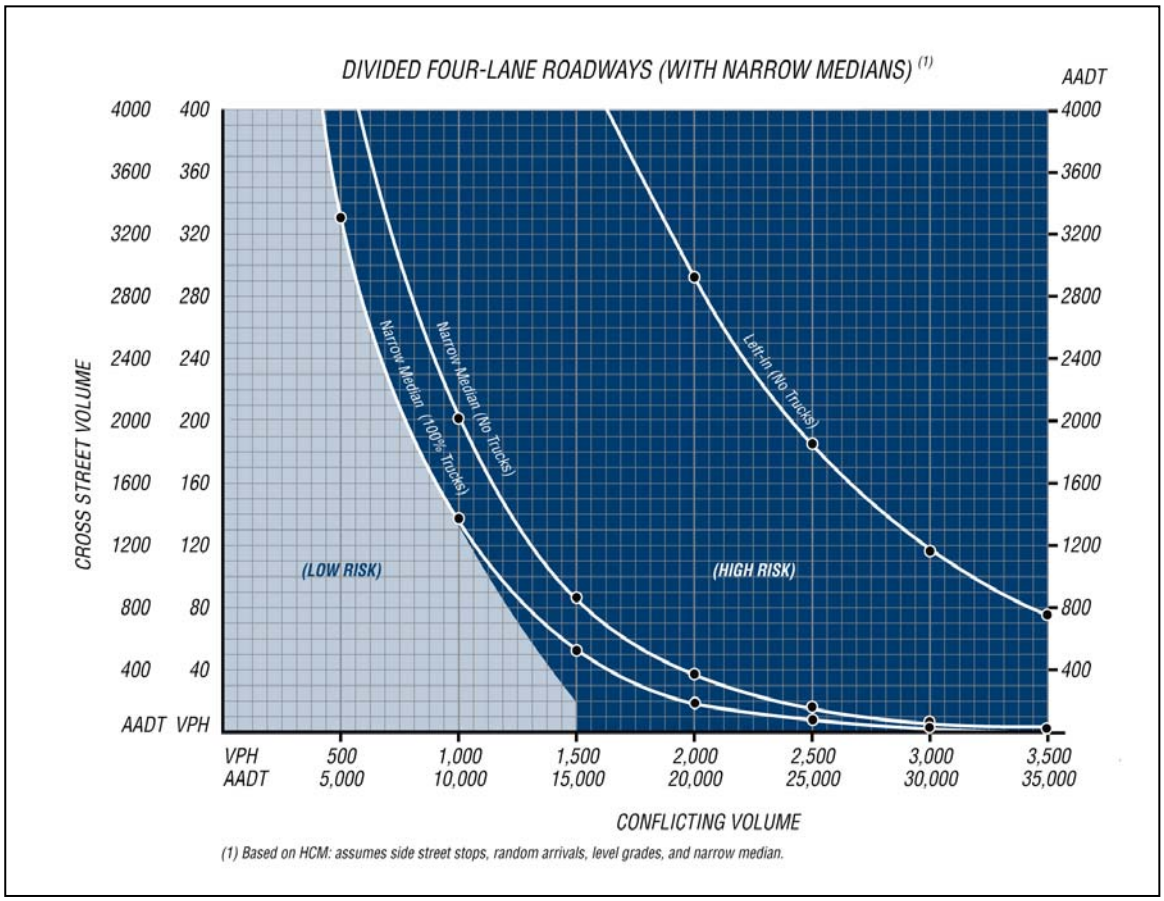
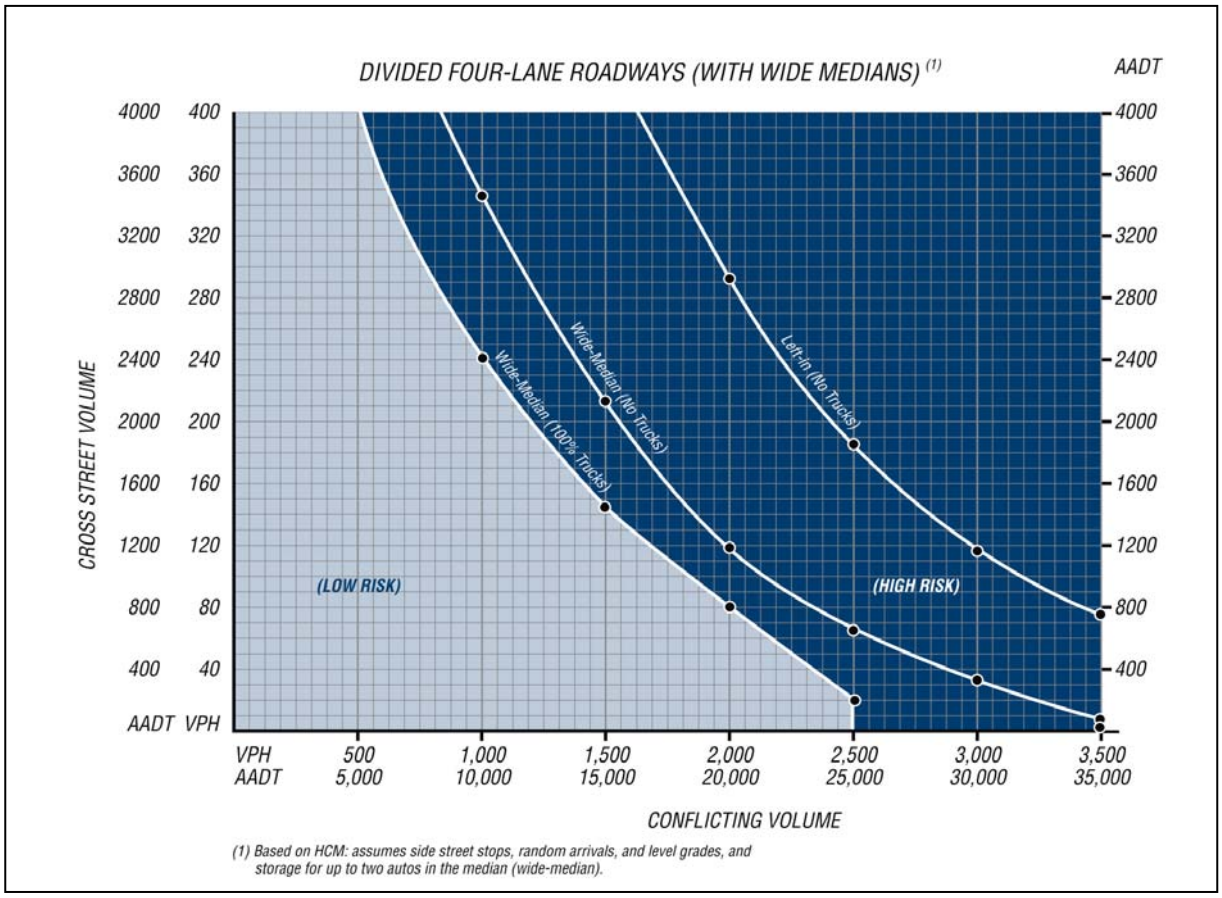


Figure 3.7 – Divided Four-Lane Roadways (with Wide Medians)
Figure 3.7 is used for divided roadways with wide medians. A wide median is defined as having storage for up to two vehicles in the median. This allows vehicles crossing or turning left from a side street to complete the maneuver in two steps.

Figure 3.7: Gap Analysis Graph for Divided Four-lane Roadways with Wide Medians



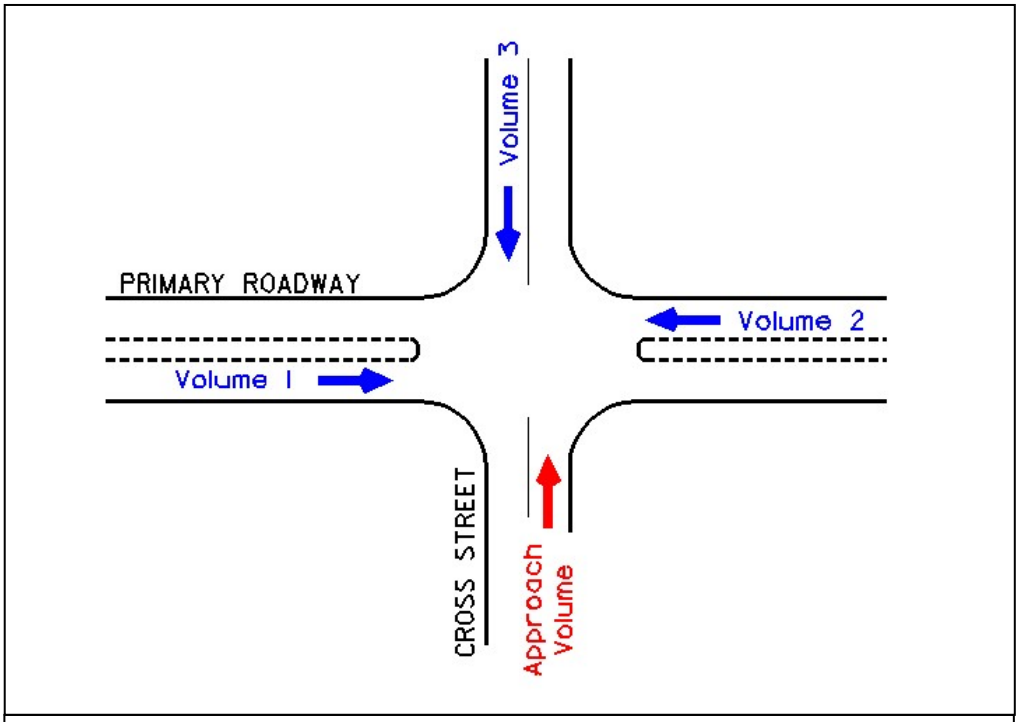
Using the Risk Conflict Graphs
The Risk Conflict Graphs are used to compare the approach volume on the potential secondary intersection with the conflicting volumes on the primary roadway and other legs of the potential intersection. The analysis looks first at whether the secondary intersection would safety operate as a full-movement intersection. If the secondary intersection would not safety operate as a full-movement intersection, it would be analyzed as a right-in/right-out-only intersection to see if would safely operate. If it would not operate safely either as full-movement intersection or a right-in/right-out-only intersection, the intersection should not be allowed. The following sections, and Figures 3.8 and 3.9, explain the calculations for determining the secondary intersection that should be allowed.

Full-movement Intersection Analysis

The following five steps determine whether a full-movement intersection is appropriate,

Step 1. The Conflicting Volume (horizontal axis on Figure 3.5, 3.6, or 3.7) is the estimated 20-year AADT of the primary roadway plus one-half of the 20-year cross street AADT (*in Figure 3.8, the Conflicting Volume is Volume 1 + Volume 2 + Volume 3*). At T-intersections, the horizontal axis of the graphs is only the estimated 20-year AADT of the primary roadway (*in Figure 3.8, the Conflicting Volume is Volume 1 + Volume 2*). The Approach Volume (vertical axis on Figure 3.5, 3.6, or 3.7) is one-half of the estimated 20-year AADT of the cross street or access point. If actual traffic data is available, that data should be used to determine the approach volume and the conflicting volumes.

Figure 3.8: Approach Volume and Conflicting Volumes for a Full-movement Intersection



Calculations:
Volume 1 = One-half of the Primary Roadway AADT
Volume 2 = One-half of the Primary Roadway AADT
Volume 3 = One half of the Cross Street AADT
Approach Volume = One-half of the Cross Street AADT
Conflicting Volume = Volume 1 + Volume 2 + Volume 3

Step 2. Determine which graph (Figure 3.5, 3.6, or 3.7) to use.

Step 3. Compare the Approach Volume (vertical axis) with the Conflicting Volume (horizontal axis) to determine the intersection condition. If the intersection falls within the low-risk conflict condition, a full- movement intersection may be allowed.

Step 4. If the intersection falls within the high-risk conflict condition and is located on a divided roadway, the intersection should be analyzed to determine if a right-in/right-out-only intersection is acceptable (see Right-in/Right-out-only Intersection Analysis below).

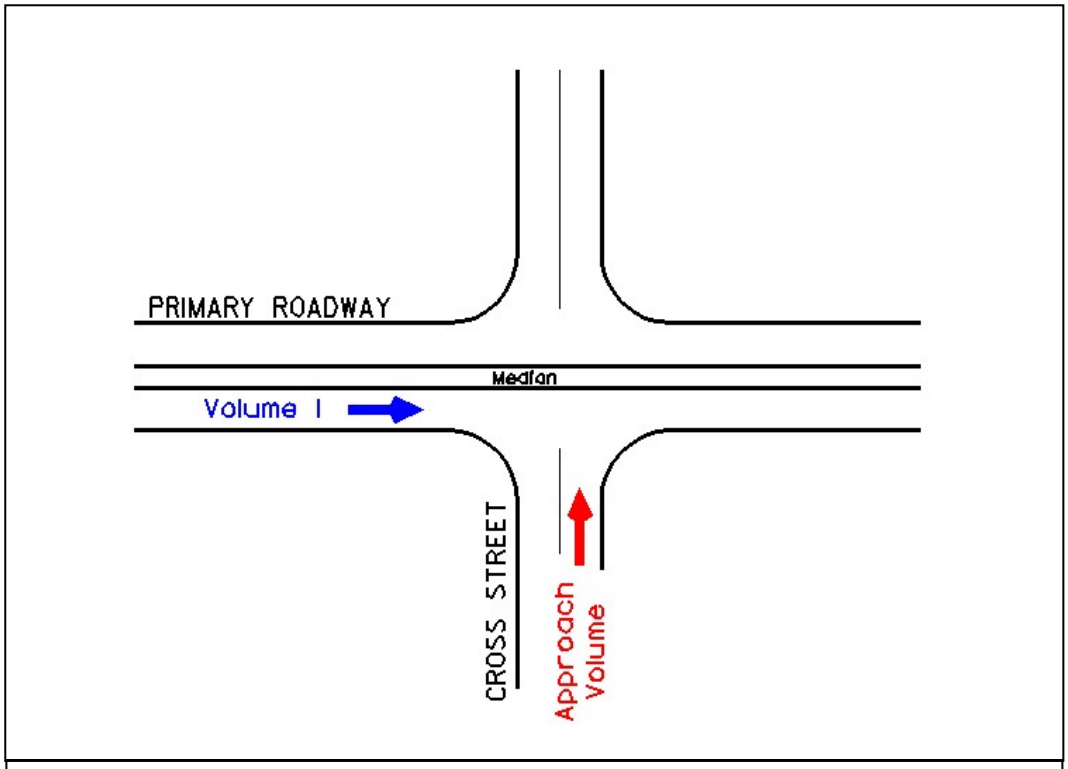
Step 5. If the intersection or access point falls within the high-risk conflict condition and is located on a two-lane undivided roadway, the intersection or access point should not be allowed.

Right-in/Right-out-only Intersection Analysis

The following two steps determine whether a right-in/right-out-only intersection is appropriate,

Step 1. Figure 3.6 represents the risk conflict conditions for right-in/right-out-only intersections. The Conflicting Volume (horizontal axis on Figure 3.6) Is one-half of the estimated 20-year AADT of the primary roadway (*in Figure 3.9, the Conflicting Volume is Volume 1*). The Approach Volume (vertical axis on Figure 3.6) is one-half of the estimated 20-year AADT of the cross street or access point.

Figure 3.9: Approach Volume and Conflicting Volumes for a Right-in/Right-out-only Intersection



Calculations:
Volume 1 = One-half of the Primary Roadway AADT
Approach Volume = One-half of the Cross Street AADT
Conflicting Volume = Volume 1

Step 2. Compare the Approach Volume (vertical axis) with the Conflicting Volume (horizontal axis) on Figure 3.6 to determine the intersection condition. If the intersection falls within the low-risk conflict condition, a right-in/right out only intersection may be allowed. If the intersection falls within the high-risk conflict condition, no intersection should be allowed. Alternatively, a right-in only intersection with a right-turn lane may be considered if connectivity to the supporting street network provides full circulation and return movements.

3.2.4 Guidelines for Supporting Street Connectivity

As communities grow and land is subdivided for development, it is important to promote the continuation and extension of the existing local street system. Dead-end streets, cul-de-sacs, and gated communities force traffic to use major roadways even for short local trips. Fragmented street systems also impede emergency access and increase the length of automobile trips.

A new public street connection to the trunk highway system should also provide direct connections to the existing or planned local street system.

Local subdivision regulations should also promote and support network connectivity.

In some cases, supporting street connectivity may not be feasible or appropriate, such as:

- Where existing topographical constraints or historical street patterns may prevent connectivity with the local street system;
- Where large developments with potential security concerns would warrant fewer access points, such as military bases, parks, airports, ports, and similar facilities; or,
- Where large regional developments would generate primarily long-distance or regional trips and would result in unacceptable traffic volumes on the local street system.

3.2.5 Guidelines for Signalization

Closely- or irregularly-spaced traffic signals result in frequent stops, unnecessary delays, increased fuel consumption, excessive vehicular emissions, and increased highway crash rates. Alternatively, uniform signal spacing facilitates coordinated signal timing plans that can effectively accommodate varying traffic conditions during peak and off-peak periods, and also allows for adaptation of a traffic control system as changes occur over time. Therefore, selecting uniform signalized intersection spacing is an essential element in establishing access spacing standards.

In rural areas, where traffic signals are usually isolated (spacing greater than one mile), this approach does not apply. Traffic signal spacing is most relevant in urban and urbanizing areas where through-traffic mobility and side-street accessibility are typically balanced through the use of signalized intersections.

The following tables (Figures 3.10 and 3.11) outline methods for determining signal spacing.

Figure 3.10: Signal Spacing Guidance for IRCs

Category	Signal Spacing Guidance
Interregional Corridors & Interstate Highways	
The Interregional Corridor system identifies important statewide mobility corridors. On these highways, performance targets have been developed based on overall corridor speed. A traffic signal on one of these corridors represents a delay penalty or a reduction in the corridor speed; therefore, a new traffic signal on an Interregional Corridor should generally be avoided, if possible. When a district is considering a new signal on an Interregional Corridor, the Office of Investment Management is available to assist in calculating the impact of the signal on the overall corridor performance.	
1F	All access to the interstate system is via interchanges. Signal spacing is not applicable.
1AF **2AF**	**Full Access-Controlled Highways:** All access to the highway system is via interchanges. Signal spacing is not applicable. **Transitioning Highways:** On IRC highways transitioning to a full freeway design, new traffic signals should not be considered unless no other economically feasible alternative is available. The new traffic signal should be considered interim, and a plan for its future removal should be developed. Wherever possible, the new traffic signal should be located where a future interchange is planned.
1A **2A**	On rural IRC highways, a new traffic signal may be considered if warranted and if it does not lower the performance of the corridor below the target speed. However, if the signal is warranted and needed for safety, and a cost-effective alternative is not feasible, an interim signal may be considered, even though it would lower the performance of the corridor below the target speed.
1B **2B**	On urban/urbanizing IRC highways, a new traffic signal may be considered if warranted, but it should be both uniformly-spaced and interconnected with other signals along the corridor to minimize delay and to promote platoon flow. • **Category 1B: The recommended signal spacing is one-half mile. The new traffic signal should be considered interim and a plan for its future removal should be developed.** • **Category 2B: The recommended signal spacing is one-half mile**.

Note:
The information provided in this Mn/DOT Access Management Manual does not supersede the Mn/DOT Traffic Engineering Manual or the Mn MUTCD.

Mn/DOT Traffic Engineering Manual:
"Traffic signals should not be installed unless one or more of the signal warrants in the Mn MUTCD are met, but the meeting of a warrant or warrants does not alone justify the installation of a signal."

Figure 3.11: Signal Spacing Guidance for Non-IRCs

Category	Signal Spacing Guidance
Non-IRC Highways	
3AF **4AF**	**Full Access-Controlled Highways:** All access to the highway system is via interchanges. Signal spacing is not applicable. **Transitioning Highways:** On highways transitioning to a full freeway design, new traffic signals should not be considered unless no other economically feasible alternative is available. The new traffic signal should be considered interim, and a plan for its future removal should be developed. Wherever possible, the new traffic signal should be located where a future interchange is planned.
3A **4A** **5A** **6A**	**Rural:** Because traffic signals located in rural areas are generally isolated, they do not directly impact the spacing of at-grade public street connections. In these areas, traffic progression is not an issue and traffic signals are generally installed to address safety concerns. In rare cases, two or more traffic signals may be closely spaced (spacing of one-half mile or less) along an otherwise rural and unsignalized highway. These signals should be interconnected and timing should be coordinated to minimize the impact on the mobility of the through-traffic.
1C **2C** **3B & 3C** **4B & 4C** **5B & 5C** **6B & 6C**	**Urban/Urbanizing and Urban Core:** The public street connection spacing policy is based on providing two-way coordinated traffic progression (or platoon flow) through a series of traffic signals. The policy balances mobility and accessibility and relies on the ability to provide uniform and interconnected traffic signal spacing. • **Categories 3B & 4B: The recommended signal spacing is one-half mile;** • **Categories 5B & 6B: The recommended signal spacing is one-quarter mile;** • **Category 1C: The recommended signal spacing is one-quarter mile. The new traffic signal should be considered an interim solution, and a plan for its future removal should be developed;** • **Categories 2C, 3C, 4C, & 5C: The recommended signal spacing is one-quarter mile;** • **Category 6C: The recommended signal spacing is one-eighth mile.**
7	By adopted plan

Note:
The information provided in this Mn/DOT Access Management Manual does not supersede the Mn/DOT Traffic Engineering Manual or the Mn MUTCD.

Mn/DOT Traffic Engineering Manual:
"Traffic signals should not be installed unless one or more of the signal warrants in the Mn MUTCD are met, but the meeting of a warrant or warrants does not alone justify the installation of a signal."

3.2.6 Guidelines for Other Higher-Level Traffic Control

Other higher-level traffic control, including roundabouts, four-way stop conditions, and continuous flow intersections may impact highway mobility and platoon flow. Where platoon flow is critical, these other traffic control methods need to be thoroughly analyzed with regards to corridor mobility before being considered as alternatives to traffic signals. The use of other higher level traffic control methods should be consistent with primary intersection spacing, as discussed above, in Section 3.2.2.

3.2.7 Interim Spacing on Transitioning Subcategory AF Highways

On subcategory AF highways transitioning to freeways, it is likely that both at-grade intersections and interchanges will be present. All at-grade intersections should be considered interim. The desirable spacing between an at-grade intersection and the merge point of the closest ramp should be a minimum of one-half mile (see Figure 3.35). If one-half mile cannot be attained, a shorter spacing may be considered if analysis shows that the shorter distance would not create unacceptable weaving operations.

The spacing between two at-grade, full-movement intersection spacing on an AF Highway should be one mile.

3.3 Driveway Connections

3.3.1 Background and Approach

Mn/DOT's policy on driveway connections is designed to respect the legal rights of abutting property owners while preserving safety and mobility on the trunk highway system. **Except where Mn/DOT has acquired access rights, abutting property owners are entitled to reasonably convenient and suitable access to the highway.**

Mn/DOT regulates access as an exercise of the police power of the state: the power to impose restraints on private rights as necessary for the general welfare. Regulations or restrictions on access that are legitimate exercises of the police power are generally not compensable. However, if the restriction on access denies a property owner reasonably convenient and suitable access, the denial becomes a taking of a property right, subject to compensation. The policy guidelines for driveway allowance are intended to support Mn/DOT's legitimate exercise of its regulatory authority without creating an unintended compensable taking.

The policy reflects the following considerations regarding driveways and property access:

- Property access via the **local street system**, when available, is generally preferred over direct driveway connections to the trunk highway system, as this is most conducive to safety and mobility. However property access via the local street system must provide reasonably convenient and suitable access.

- Within **urban/urbanizing areas**, Mn/DOT strongly encourages the development of a complete supporting local road network to serve as an alternative to direct driveway access to the trunk highway system. Urban/urbanizing areas offer the greatest opportunity to improve mobility and safety through access management.

- Within **rural areas**, Mn/DOT recognizes that developing a complete supporting road network may not be economically feasible. In many parts of the state, the road network is sparse and trunk highways must provide both mobility and property access. However, to preclude private access to the trunk highway altogether would overly restrict the economic use of the surrounding area.

- Where the combination of high speeds and high traffic volumes precludes the safe accommodation of driveways, Mn/DOT may seek to acquire access control or construct access roads to provide alternative access. On much of the rural trunk highway system, however, this level of investment is not feasible or cost-effective. Nevertheless, with proper consideration for location and design (Section 3.4), a driveway may be accommodated without unduly affecting safety and mobility.

The table that follows (Figure 3.12) provides an overview of Mn/DOT's policy on driveway connections to trunk highways.

Figure 3.12: Summary of Driveway Allowance

Category	Area or Facility Type	Driveway Allowance
1F	Interstate Freeways	• No private driveways are allowed
1AF, 2AF, 3AF & 4AF	Non-Interstate Freeways & High-Priority IRCs	• On facilities transitioning to full access control, driveways should not be permitted if reasonably convenient and suitable alternative access is available. • Where reasonably convenient and suitable alternative access is not available, an interim driveway may be permitted, and if possible, it should be designed so that traffic can be redirected to another road when the facility becomes fully access-controlled.
1A, 2A, 3A, 4A & 5A	Rural (Not planned for full access control)	• If a property retains access rights but no reasonably convenient and suitable alternative access is available, a driveway is permitted. • The driveway should be located and designed to minimize the impact on the safety and operations of the highway. • All driveways (Types 1, 2, and 3) should be spaced in accordance with Figure 3.27.
1B, 2B, 3B, 4B & 5B	Urban/ Urbanizing	• If a property retains access rights but no reasonably convenient and suitable alternative access is available, a driveway is permitted. • It is Mn/DOT's preference to permit public street connections rather than driveways in Urban/Urbanizing areas. Where possible, Mn/DOT should work with local agencies to encourage the development of a supporting road system to serve the property. • High-volume (Type 3) driveways should be spaced in accordance with Figure 3.27. • Driveways should be permitted as interim where a future supporting street system is anticipated.
1C, 2C, 3C, 4C & 5C	Urban Core	• If a property retains access rights but no reasonably convenient and suitable alternative access is available, a driveway is permitted. • The spacing of driveways will vary based on reasonableness of use and driver expectancy.
6A, 6B & 6C	All Collectors	• If a property retains access rights and no reasonably convenient and suitable alternative access is available, a driveway is permitted. • The spacing of driveways will vary based on reasonableness of use and driver expectancy.
7	Specific Access Plan	• The adopted Category 7 Plan should address the allowance and spacing of driveways.

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3.3.2 Policy on Driveway Connections

Policy
Where access rights have been acquired and complete access control established, direct property access is prohibited. At all other locations, driveways are allowed conditionally, subject to the following findings:

1. The property retains access rights (Section 3.3.3); and,
2. Reasonably convenient and suitable alternative access to the property is not otherwise available (Section 3.3.4).

If both of these findings are satisfied, a driveway should be allowed. Generally, only one driveway is allowed unless additional driveways are necessary to provide reasonably convenient and suitable access to the existing or proposed land use.

The location and design of the driveway should be considered after determining whether access is allowed. Considerations regarding the location and design of a driveway are described in Section 3.4.

Note: There may be circumstances where the reviewer determines that even though these two findings are satisfied, and location and design guidance are applied, the driveway connection would significantly impair the safety or mobility of the highway. In these situations, the District Engineer must determine whether investing in acquisition of the property's access rights to prevent the driveway is warranted.

3.3.3 Findings: The Property Retains Access Rights

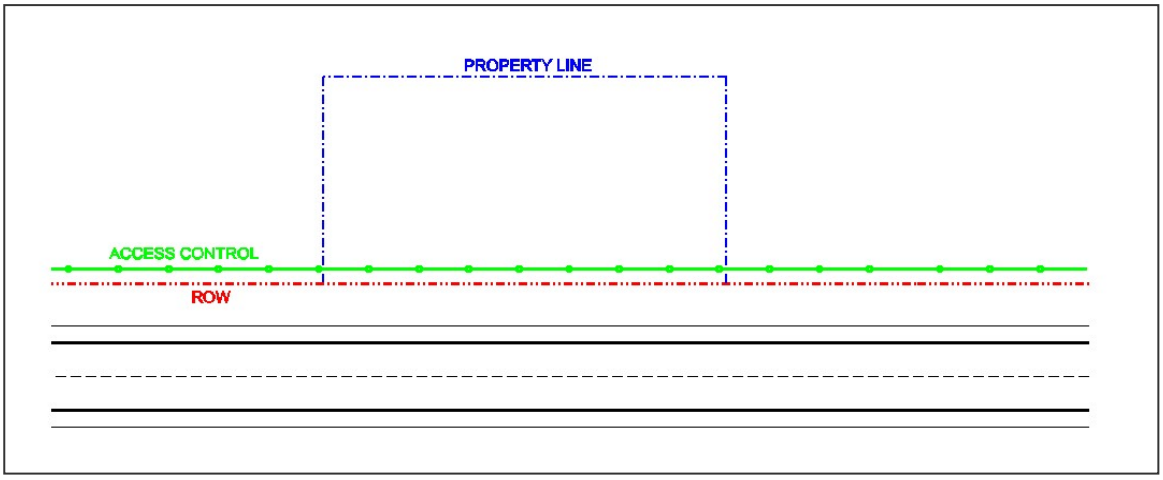
Mn/DOT and local governments have the authority to acquire access rights. The degree to which access rights are acquired will impact how Mn/DOT addresses driveway access.

Full Access Control

Full access control is the condition by which the right of access is acquired along the entire frontage of the property. The right of access may be acquired by Mn/DOT or by a local road authority through purchase, gift, or deed. Once the right of access is acquired along the property's frontage, it is considered Full Access Control, and the property retains **no right of access**.

Where Full Access Control exists, it is Mn/DOT's policy that driveway connections not be allowed.

Figure 3.13: Full Access Control

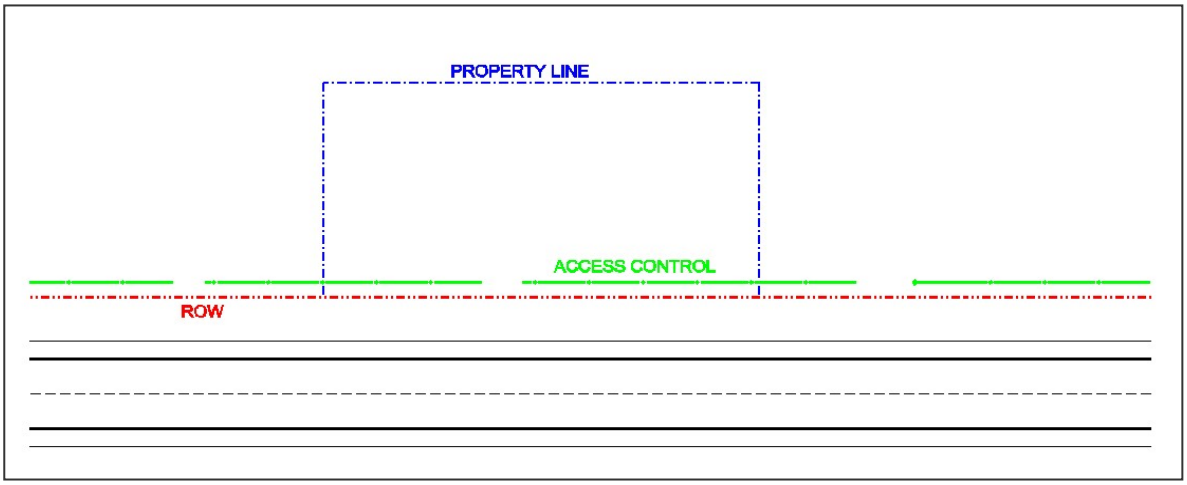


Partial Access Control

Partial Access Control is the condition by which the right of access is acquired along only parts of the property's frontage. The property owner retains the right of reasonably convenient and suitable access at those points or at remaining "openings" in access control where rights have not been acquired.

It is Mn/DOT policy that an opening established through the acquisition of partial access control does not confer an automatic right to a direct driveway connection at that point; rather, it is Mn/DOT's policy that a driveway be allowed at an opening in partial access control, subject to the finding that reasonably convenient and suitable alternate access is not available.

Figure 3.14: Partial Access Control

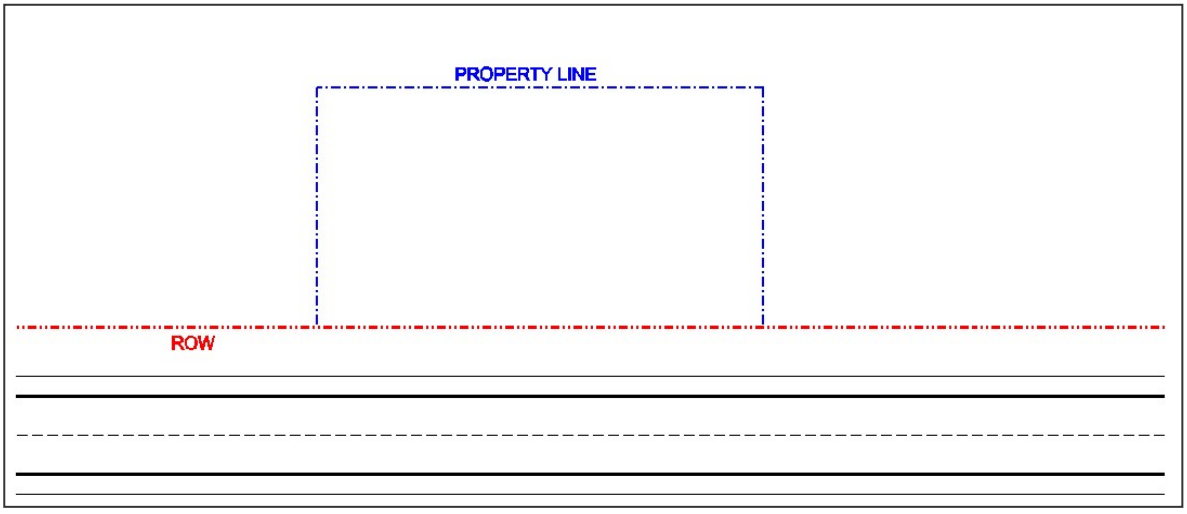


No Access Control

No Access Control is the condition by which the right of access has not been acquired at any point between a parcel and a highway.

It is Mn/DOT policy that a driveway be allowed from a property where Mn/DOT has not acquired any access rights, subject to the finding that reasonably convenient and suitable alternate access is not otherwise available.

Figure 3.15: No Access Control



Easements for Nonabutting Property

Minnesota Statute 160.18, Subdivision 3, provides statutory guidance regarding easements for property abutting a highway, as follows:

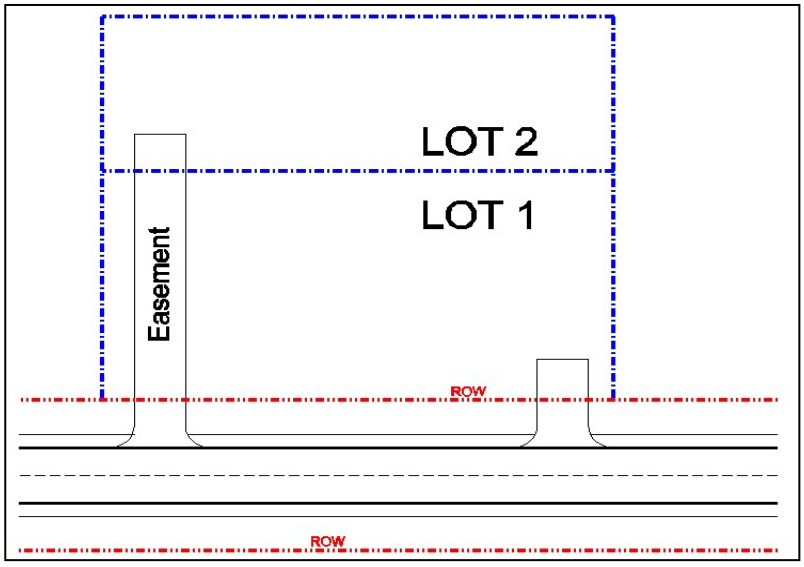
"The owner or occupant of property abutting upon a public highway, having a right of direct private access thereto, may provide such other or additional means of ingress from and egress to the highway as will facilitate the efficient use of the property for a particular lawful purpose, subject to reasonable regulation by and permit from the road authority as is necessary to prevent interference with the construction, maintenance and safe use of the highway and its appurtenances and the public use thereof."

Generally, only property abutting a highway has a right of access to the highway; therefore, it is Mn/DOT policy that a nonabutting parcel or lot does not have a right of access, unless all of the following findings are met:

- The nonabutting parcel or lot has a legal and documented easement; and,
- The easement represents the only reasonably convenient and suitable access to the nonabutting parcel or lot.

In Figure 3.16, Lot 2 is a nonabutting lot with an easement through Lot 1. If Lot 2 is landlocked and has no reasonably convenient and suitable alternative access, Lot 2 has a right to access to the highway, subject to the reasonable regulation as described in Section 3.4.

Figure 3.16: Access to Nonabutting Lot



An easement for a nonabutting parcel or lot is an unusual circumstance. Normally the local land use authority will not allow such a subdivision.

3.3.4 Findings: Reasonably Convenient and Suitable Alternative Access

Definition
The definition of "reasonably convenient and suitable alternative access" will vary depending on the specific circumstances of the property. It will also vary depending on the importance and function of the highway.

It is generally accepted that reasonably convenient and suitable access entitles the landowner access from the property to only the near lane of travel. On divided highways, the landowner is not legally entitled to a median opening.

What is reasonably convenient and suitable not only guides the location and design of a driveway, but also guides the determination of the number of driveways necessary to reasonably serve the property. In most cases, one driveway per parcel is sufficient to provide reasonably convenient and suitable access. In rare cases, though, multiple driveways may be necessary if the property cannot otherwise be developed or utilized using a single driveway.

In addition, Mn/DOT may recommend multiple driveways as an alternative to a single driveway where multiple driveways would lessen the impact on the safety and operations of the highway.

Guidance
While the ultimate decision on what is reasonably convenient and suitable alternative access can only be established through the judicial system, Mn/DOT staff must exercise administrative judgment when reviewing permits or designing projects. The following questions are provided as a guide to evaluating whether the potential alternative access is reasonably convenient and suitable:

- Are the existing or proposed structures and parking areas situated to allow use of the potential alternative access?
- Are there any environmental, topographic, or other physical constraints or easements associated with the property or surrounding area that would prevent reasonable use of the potential alternative access?
- Does the potential alternative access provide sufficient on-site circulation for the anticipated type of customer and delivery vehicles?
- Will the potential alternative access to the property be consistent or comparable with similar properties on the corridor?
- Are the potential alternative street routes functionally suitable and structurally capable of carrying the anticipated traffic volumes and vehicle types?
- Will the anticipated traffic volumes and vehicle types be compatible with the surrounding neighborhood?
- Is the functional classification of the potential alternative street route equal to or lower than that of the directly-abutting highway?
- Can the potential alternative access be constructed to meet design criteria, such as sight distance?
- Is the site adequately and safely served by a single access point?

3.4 Location and Design Considerations

The location and design of a public street connection or driveway should minimize the impact on the safety and operations of the transportation network to the greatest extent possible while still providing reasonably convenient and suitable access.

This section provides guidance and examples of access-related elements that should be considered when designating the location and design of a public street connection or driveway:

- Number of Driveways;
- Sight Distance;
- Spacing between Driveways;
- Corner Clearance and Access within the Functional Area of an Intersection;
- Offset Driveways and Streets;
- Restricted Movements and Median Openings;
- Shared Driveways;
- Interim Access; and
- Auxiliary or Turn Lanes.

3.4.1 Number of Driveways

Definitions
A **lot** is a designated tract or area of land established by plat, subdivision, or as otherwise permitted by law, to be separately owned, used, developed, or built upon.

A **parcel** is any contiguous quantity of land in the possession of, owned by, or recorded as the property of the same owner. A parcel may encompass one or more lots.

Guidance and Examples
The need for multiple driveways serving the same lot should be reviewed on a case-by-case basis.

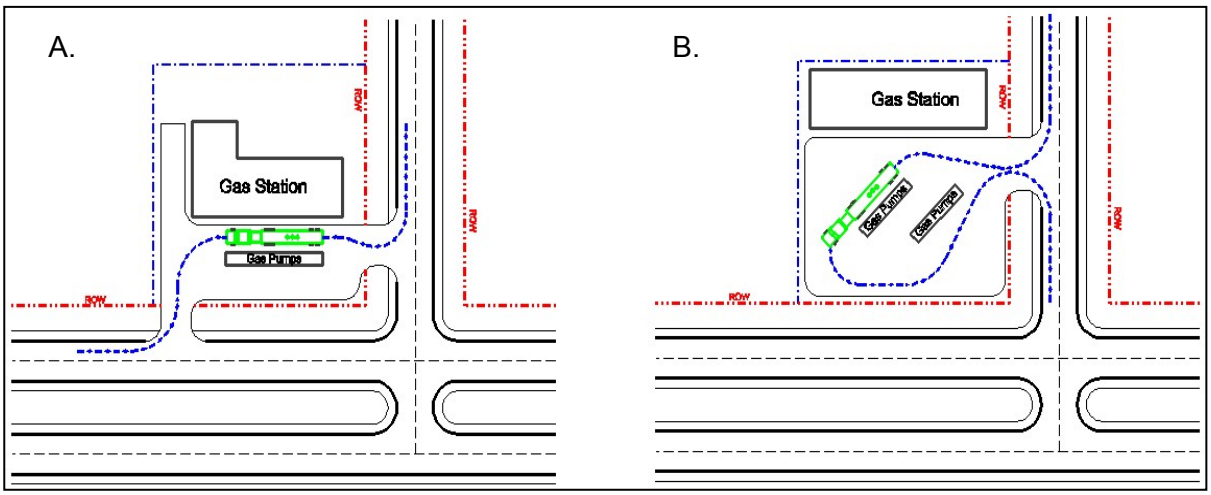
In most cases, one driveway per parcel is sufficient to provide reasonably convenient and suitable access. In rare cases, though, multiple driveways may be necessary if the property cannot otherwise be developed or utilized using a single driveway. Figure 3.17 demonstrates how the layout of a parcel can affect the number of driveways. In Figure 3.17A the location of the building and small pump area prevents a delivery truck from using a single driveway (without backing into the street). In Figure 3.17B the building is located back further and the pump area is larger, therefore a delivery truck would be able to enter and exit the property through a single driveway.

Examples of when an additional driveway may be considered include the situations cited below, as illustrated on the next few pages:

- A small parcel or lot where large delivery trucks are unable to safely maneuver and circulate on-site;

- A small parcel or lot serving highly-directional, highway-oriented traffic movements (such as service stations or drive-through banks, as shown in Figure 3.17) where the logical flow of traffic would be safely directed into the parcel at one driveway and out of the parcel at another driveway.

Figure 3.17: Multiple Driveways for Small Parcels



- A parcel or lot to separate incompatible vehicle uses (see Figure 3.18). *Examples of incompatible vehicle uses include: farms where one driveway would serve the house and another would serve an agribusiness; large commercial businesses where one driveway would serve employees and customers and another driveway would serve delivery trucks.*

Figure 3.18: Multiple Driveways for Incompatible Vehicle Uses

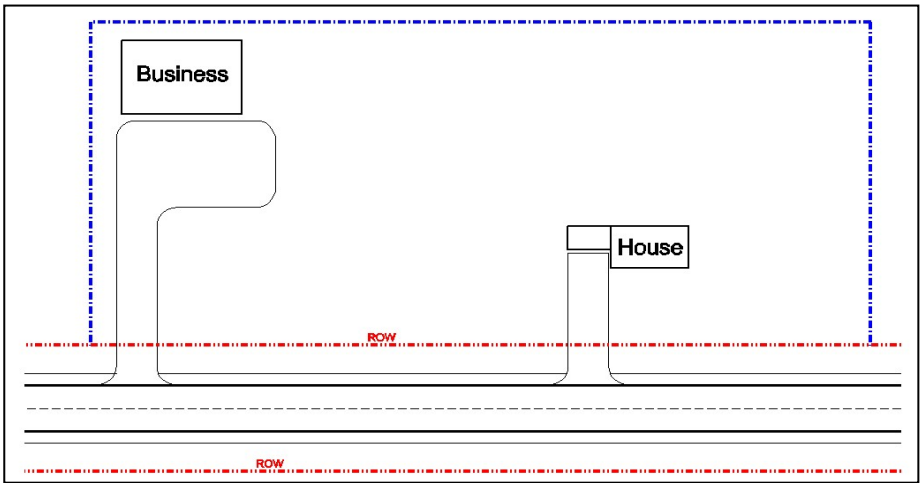
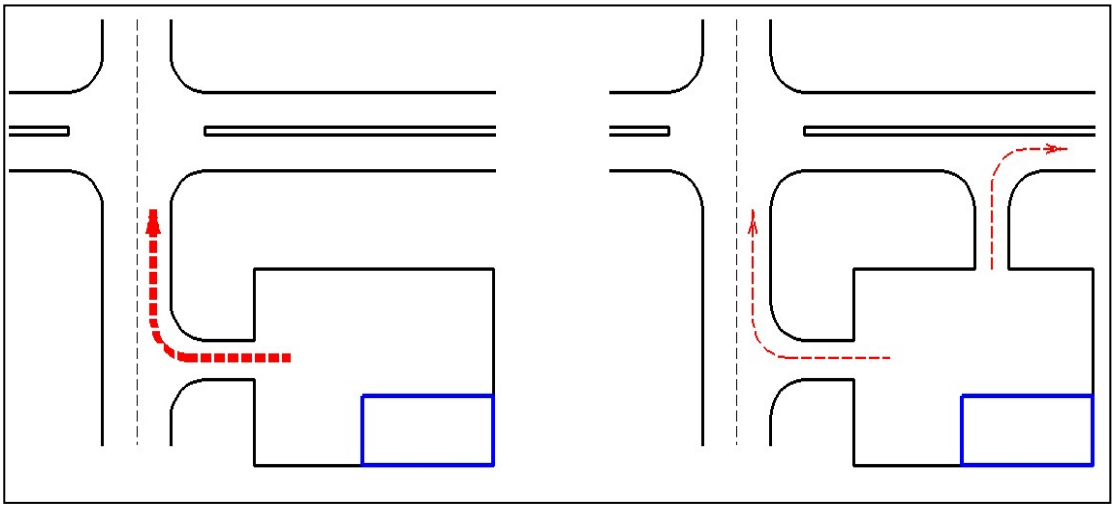


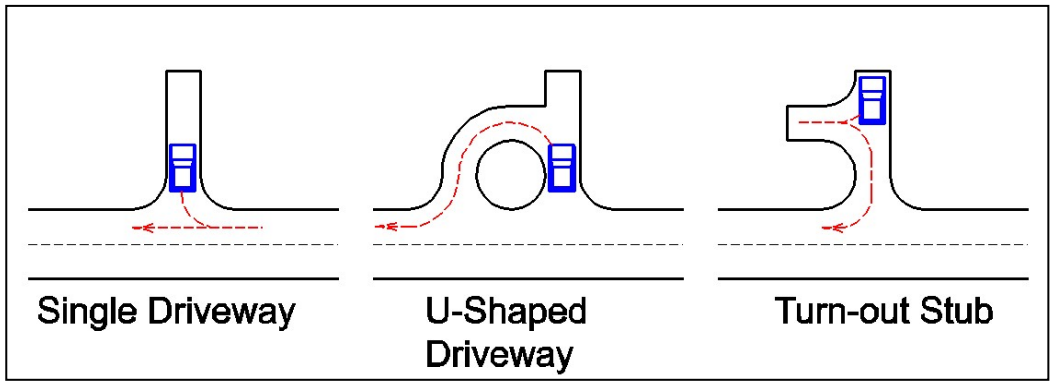
Figure 3.19: Multiple Driveways to Redirect Traffic



- A parcel or lot where there is a significant safety or congestion problem at one driveway or at a nearby public intersection. An additional driveway may be beneficial if the additional driveway would improve the travel patterns (see Figure 3.19). In some cases, an additional driveway may alleviate the immediate need for a traffic signal. *Example: if a public intersection serving a large development is overloaded, an additional driveway serving only the development may be considered to redirect traffic and relieve the traffic conditions at the public intersection. This approach may be more cost-effective than reconstructing the intersection.*

- A parcel or lot may be a candidate for a U-shaped driveway where exiting traffic would otherwise have to back up onto the highway, but where a turn-out stub is not practical. Generally, this is only applicable where having only one access point would greatly impact the safety of the highway, such as having large trucks or farm equipment backing up onto the highway. This is normally not the case with residential driveways.

Figure 3.20: U-Shaped Driveways & Turn-out Stubs

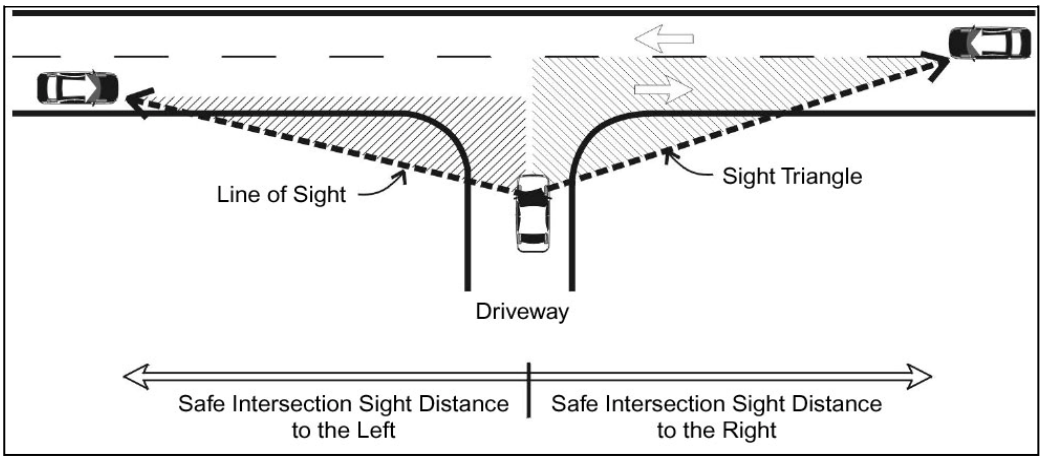


3.4.2 Sight Distance

Definitions

Intersection Sight Distance (ISD), as illustrated in Figure 3.21, allows vehicles entering a highway to turn into the through-lane and get up to running speed without adversely slowing down through-traffic. The *Mn/DOT Road Design Manual*, Section 5-2.02, provides a detailed description of Intersection Sight Distance.

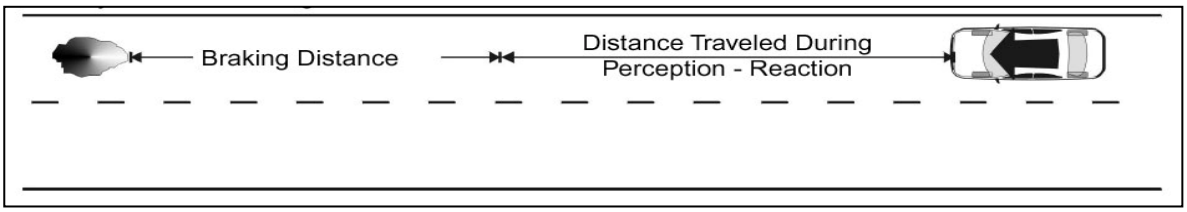
Figure 3.21: Intersection Sight Distance



Decision Sight Distance, also known as the Ten-Second Decision Sight Distance, allows a driver adequate time to react to a situation on the highway and maneuver, whether to stop or change lanes. Possible applications of Decision Sight Distance, including its application to driveways, are provided in the *Mn/DOT Road Design Manual*, Section 2-5.09.04. *As a rule of thumb, the Decision Sight Distance is determined by the distance at which an approaching vehicle has ten seconds from the moment it is within the driver's sight-line until the moment it reaches the access point.*

Stopping Sight Distance (SSD), shown in Figure 3.22, allows through-traffic adequate time and distance to stop in order to avoid a collision with a vehicle entering the highway from a driveway.

Figure 3.22: Stopping Sight Distance



Guidance and Examples

All public street connections and driveways should have adequate sight distance. This ensures that a vehicle entering the highway from a street or driveway can safely perform the maneuver while having a minimal impact on through-traffic. Adequate sight distance will vary, depending on the intensity of traffic at the access point. The recommended sight distance that should be applied, based on the access type, is shown in Figure 3.23.

Figure 3.23: Sight Distance Based on Access Type

Access Type		Recommended Sight Distance
1	Residential/Field Entrance	Decision Sight Distance
2	Low-volume Commercial	Decision Sight Distance
3	High-volume Commercial	Intersection Sight Distance
4	Public Intersections	Intersection Sight Distance

Sources:
Intersection Sight Distance (Mn/DOT Road Design Manual Section 5-2.02)
Decision Sight Distance (Mn/DOT Road Design Manual Section 2-5.09.04)

Figure 3.24: Stopping Sight Distance [(1)]

Design Speed (mph)	Stopping Sight Distance (feet) [(2)(3)]
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

(1) Stopping Sight Distance based on AASHTO Green Book, 5th Ed. 2004 and Mn/DOT Road Design Manual, Table 2-5.09A.

(2) The values shown in this table may be superceded to avoid the functional area (see Section 3.4.4) of adjacent intersections and driveways, or to accommodate turn lanes for the proposed access.

(3) Stopping Sight Distance is based on a level roadway without any horizontal curvature. In areas with vertical and horizontal curves, additional distance may be needed. See Mn/DOT Road Design Manual Table 2-5.09B.

When the recommended sight distance, as shown in Figure 3.23, cannot be met, the street connection or driveway should be located where the best possible sight distance can be achieved. Additional efforts to obtain the recommended sight distance may include the following:

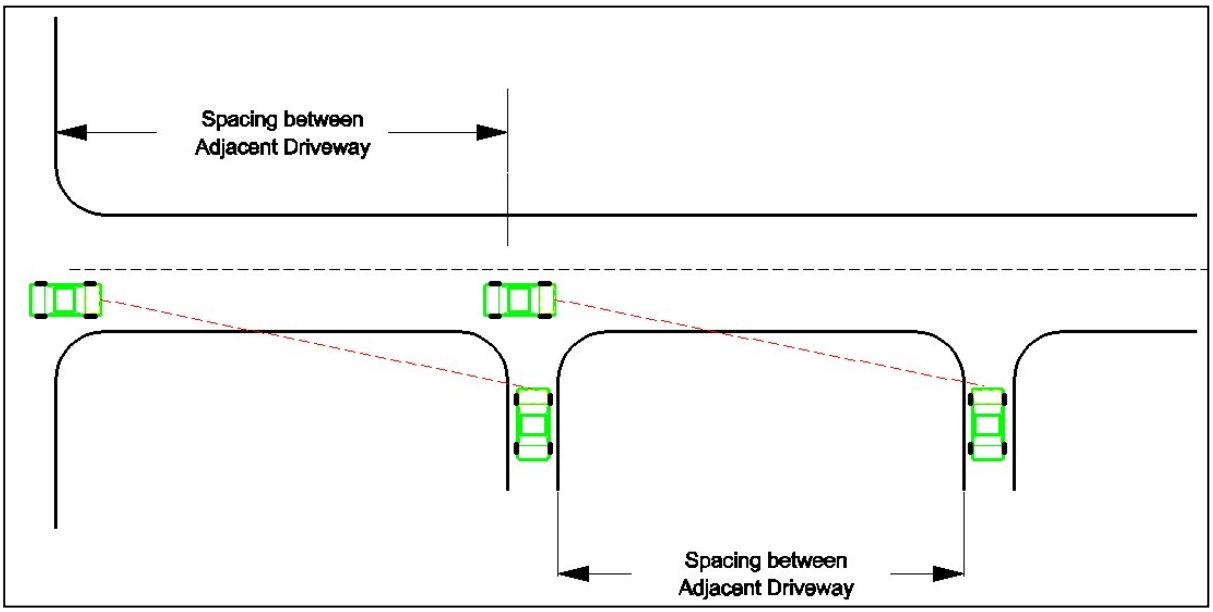
- Grading the slope or clearing a sight triangle to improve the sight distance;
- Installing warning signs along the highway;
- Recommending the construction of a turn lane (See Section 3.4.9); and,
- Developing a shared driveway with an adjacent parcel at a location where adequate sight distance exists (see Section 3.4.7). *(This condition cannot be required as a permit condition.)*

3.4.3 Spacing between Driveways

Definitions

The **Spacing between Driveways** is the spacing between adjacent driveways as measured from the near edges of each driveway (see Figure 3.25). The driveways may be on the same side of the highway or on opposing sides of the highway.

Figure 3.25: Spacing between Adjacent Driveways



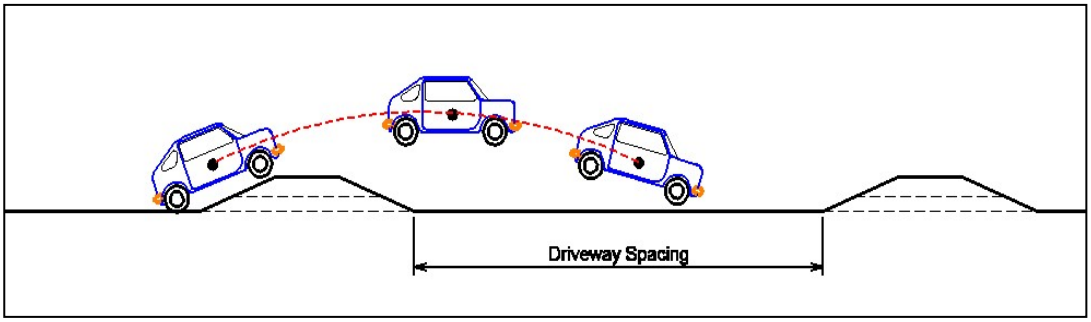
Guidance and Examples

The spacing between two driveways affects the safety and operations of a highway differently, depending on the design of the driveway and the volume of traffic using the driveway.

- The spacing of high-volume (Type 3) driveways along a high-speed highway has the potential to affect the safety and operations of the highway. The potential impact occurs when vehicles queuing at one driveway block the sight distance at an adjacent driveway. This generally is a concern only at high-volume driveways where vehicle queuing may take place. At low-volume (Types 1 and 2) driveways, vehicle queuing is unlikely, and the likelihood of vehicles entering the highway from adjacent driveways at the same time is also small. Spacing between high-volume driveways is also important in order to reduce the potential for overlapping right-turn lanes, should two adjacent high-volume driveways require turn lanes.

- The spacing of all types of rural design driveways (Types 1, 2, and 3) has the potential to affect the safety of the highway. The potential impact occurs when a vehicle runs off the road and hits the driveway side slope. To minimize the severity of the crash, all driveways should be designed in accordance with the *Mn/DOT Road Design Manual*. The spacing between the driveways is based on providing a clear landing area beyond a driveway for errant vehicles to safely land if they are launched over a driveway (see Figure 3.26).

Figure 3.26: Rural Driveway Spacing



- In rural areas (Subcategories AF and A), the spacing between low-volume (Types 1 and 2) driveways should provide a safe landing area for errant vehicles. Figure 3.27 lists the spacing needed to provide an adequate and safe landing area. The spacing is applicable for the following:

    - For two driveways serving the same parcel or adjacent parcels; and,
    - For two driveways on the same side of the highway.

- In rural and urban/urbanizing areas (Subcategories AF, A and B), the spacing between high-volume (Type 3) driveways should provide adequate stopping sight distance for the posted speed of the highway, as shown in Figure 3.27. This spacing is applicable for the following:

    - For two driveways serving the same parcel or adjacent parcels; and,
    - For two driveways on the same side of a highway or on opposing sides of an undivided highway.

- In urban core areas (Subcategory C), highway speeds are generally low and parcels are generally small. Using the Spacing between Adjacent Driveways as the basis for the spacing of adjacent driveways generally is not practical.

Figure 3.27: Spacing between Adjacent Driveways

Posted Speed Limit (mph)	Rural (Types 1 & 2) Spacing between Adjacent Driveways (feet) [2][4]	Rural & Urban/Urbanizing (Type 3) Spacing between Adjacent Driveways (feet) [1][2][3]
40	--	305
45	50	360
50	75	425
55	100	495
60	100	570
65	--	645

(1) The Spacing between Adjacent High-Volume Driveways is based on the Stopping Sight Distance described in the AASHTO Green Book 2001 and the Mn/DOT Road Design Manual, Table 2-5.09A, but uses the posted speed of the highway instead of the design speed.

(2) The values shown in this table may be superceded to avoid the functional area (see Section 3.4.4) of adjacent intersections and driveways, or to accommodate turn lanes for the proposed access.

(3) The spacing between adjacent driveways is based on a level roadway without any horizontal curvature. In areas with vertical and horizontal curves, additional distance may be needed.

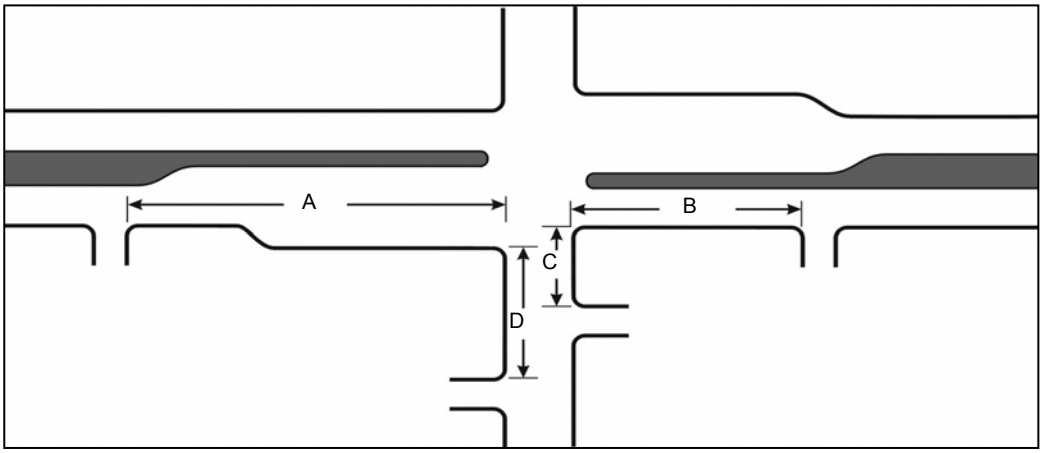
(4) Spacing based on the Texas Transportation Institute "Safety of Driveways in Close Proximity to Each Other." The spacing was modeled for speeds between 45 mph and 60 mph. No data is available for posted speeds below 45 mph or above 60 mph.

3.4.4 Access within the Functional Area of an Intersection

Definitions

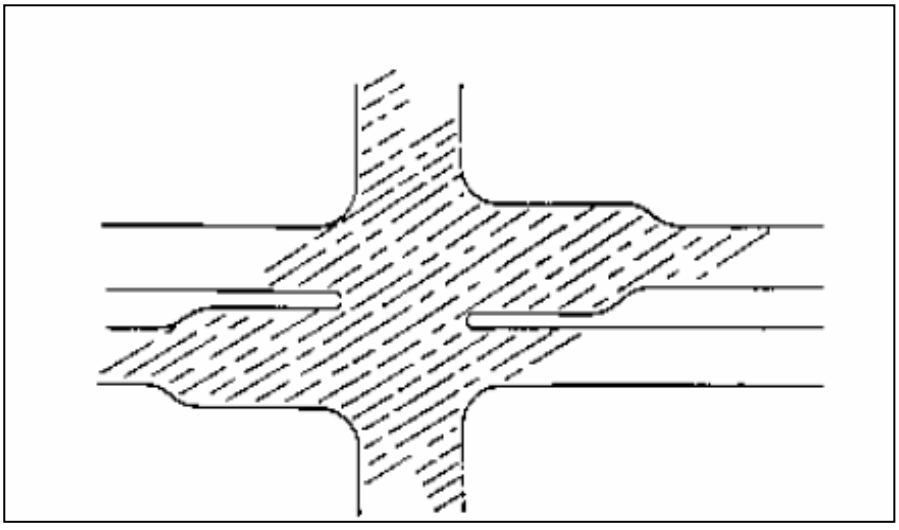
Corner Clearance – Mn/DOT defines corner clearance as the distance between the nearest edge of a driveway located next to an intersection and the nearest edge of the driving lane parallel to the driveway. The corner clearance may vary, depending on intersection geometrics, whether the driveway is located upstream or downstream of the intersection, and the priority of the intersection leg. In Figure 3.28, the distances "A," "B," "C," and "D" represent various corner clearances.

Figure 3.28: Corner Clearance



Functional Area –The functional area of an intersection, as shown in Figure 3.29, is the area beyond the physical intersection of intersecting roads that comprises decision and maneuvers distance, plus any required vehicle storage length. This area is protected through corner clearance standards and connection spacing standards.

Figure 3.29: General Intersection Functional Area

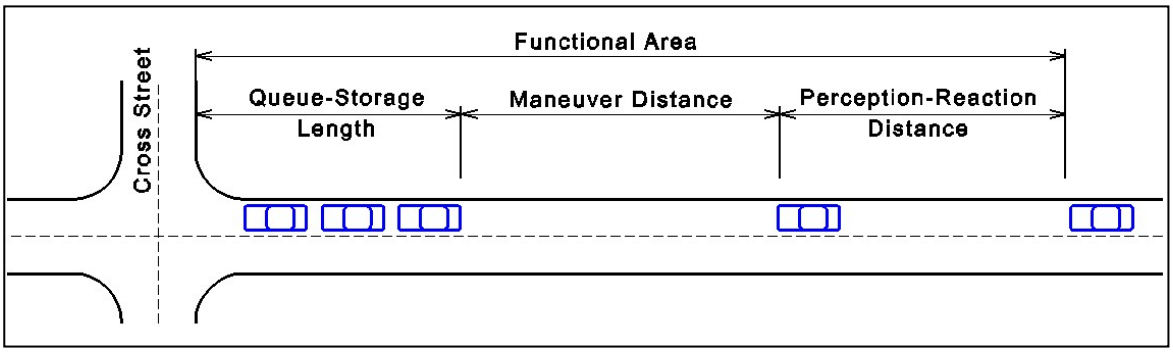


The functional area for each approach leg of an intersection consists of the three basic elements identified in Figure 3.30: perception-reaction distance, maneuver distance, and queue-storage length.

- The perception-reaction distance is the distance traveled during the perception-reaction time. The distance will depend upon vehicle speed, driver alertness, and driver familiarity with the location;
- The maneuver distance is the distance needed for both braking and lane changing (when a turn lane is present). In the absence of a turn lane, the maneuver distance is the braking distance required to make a comfortable stop; and,
- The queue-storage length is the distance needed to accommodate the longest queue that is expected most of the time, either in the turn lane or at the stop bar.

If no turn lane exists, the functional area of an intersection consists of only the perception-reaction distance and the maneuver distance and is considered the same as the Stopping Sight Distance (SSD) for the design speed on the highway (see Figure 3.24).

Figure 3.30: Basic Elements of Intersection Functional Area



Guidance and Examples

Mn/DOT delineates the functional area of an intersection by recommending corner clearance on each leg of an intersection. No access should be located within the corner clearance on a trunk highway. On non-trunk highway cross streets, the corner clearance is a recommendation to the local governmental unit.

Corner Clearance on Main Thoroughfares (Figure 3.28, "A" and "B")

In most cases, the main thoroughfare will be a trunk highway. The corner clearance on the main thoroughfare will vary, depending on the posted speed of the highway and whether a turn lane is present or planned. If a turn lane is present,

- On roadways with posted speeds of 45 mph or greater, the upstream corner clearance (distance "A" in Figure 3.28) is 650 feet; and,
- On roadways with posted speeds of less than 45 mph, the upstream corner clearance (distance "A" in Figure 3.28) is 435 feet.

If a turn lane is not present or planned on the highway, the upstream corner clearance is considered the same as the Stopping Sight Distance (SSD) for the design speed on the highway (see Figure 3.24).

On undivided roadways, the downstream corner clearance (distance "B" in Figure 3.28) is the same as the upstream corner clearance.

On divided roadways, the downstream corner clearance (distance "B" in Figure 3.28) is the greater of the following:

- If an acceleration lane is present or planned (including free-right turn merge areas): the length of the acceleration lane, or
- Stopping Sight Distance (Figure 3.24).

Corner Clearance on Cross Streets (Figure 3.28 "C" and "D")

The corner clearance on a cross street will vary, depending on the street's traffic volume:

- Major Cross Streets (Signalized Intersections) – On cross streets with an AADT greater than or equal to 2500, the upstream corner clearance (distance "C" in Figure 3.28) should be 225 feet;
- Minor Cross Streets – On cross streets with an AADT between 1000 and 2500, the upstream corner clearance (distance "C" in Figure 3.28) should be 125 feet;
- Local Cross Streets – On low-volume, low-speed local streets (AADT less than 1000), the upstream corner clearance (distances "C" in Figure 3.28) should be 75 feet; and,
- On all cross streets with existing or planned turn lanes, the access should be located outside the turn lane, if possible.

On undivided roadways, the downstream corner clearance (distance "D" in Figure 3.28) is the same as the upstream corner clearance (distance "C" in Figure 3.28).

On divided roadways, the downstream corner clearance (distance "D" in Figure 3.28) should be at least 75 feet.

When Corner Clearance Cannot Be Met

In some cases, no alternative access will be available, and an access will have to be provided. To minimize the impacts in these cases, the following options should be considered:

- The driveway should be located as far as possible on the parcel or lot from the intersection. A shared driveway with an adjacent parcel should be used to provide even greater clearance from the intersection (see Section 3.4.7);
- If a single driveway is being provided to a corner parcel, the driveway should be located on the cross street; and,
- A median may be installed on the approach legs to an intersection, or the driveway may be designed to prevent left-turn movements from crossing turn lanes.

3.4.5 Offset Driveways and Streets

Definitions
Figure 3.31, below, illustrates the varied configurations of aligned, offset**,** and overlapping driveways.

Guidance and Examples
On undivided highways, high-volume (Type 3) driveways and public street connections (Type 4) on opposite sides of a highway should be aligned with one another to the extent practicable, or they should be offset to minimize overlapping left turns and other maneuvers that could result in safety or operational problems.

High-volume (Type 3) Driveways

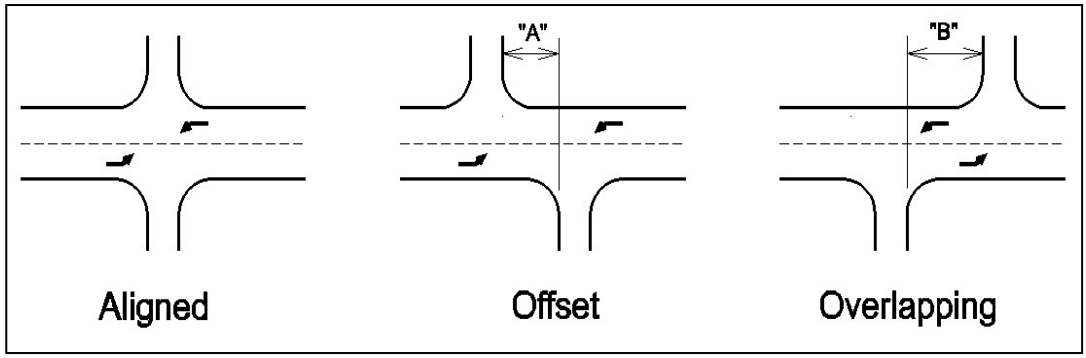
Aligned and Offset

High-volume (Type 3) driveways should be aligned to prevent opposing left-turning vehicles from blocking each other, as shown in Figure 3.31. The aligned and offset driveways allow opposing left-turn movements to occur at the same time. Offset driveways should be separated by at least the Spacing between Adjacent Driveways (Figure 3.27), as shown as distance “A” in Figure 3.31.

Overlapping

Overlapping driveways should be avoided, unless the access points can be separated by sufficient distance to allow back-to-back left-turn lanes (distance “B” in Figure 3.31).

Figure 3.31: Overlapping Driveways

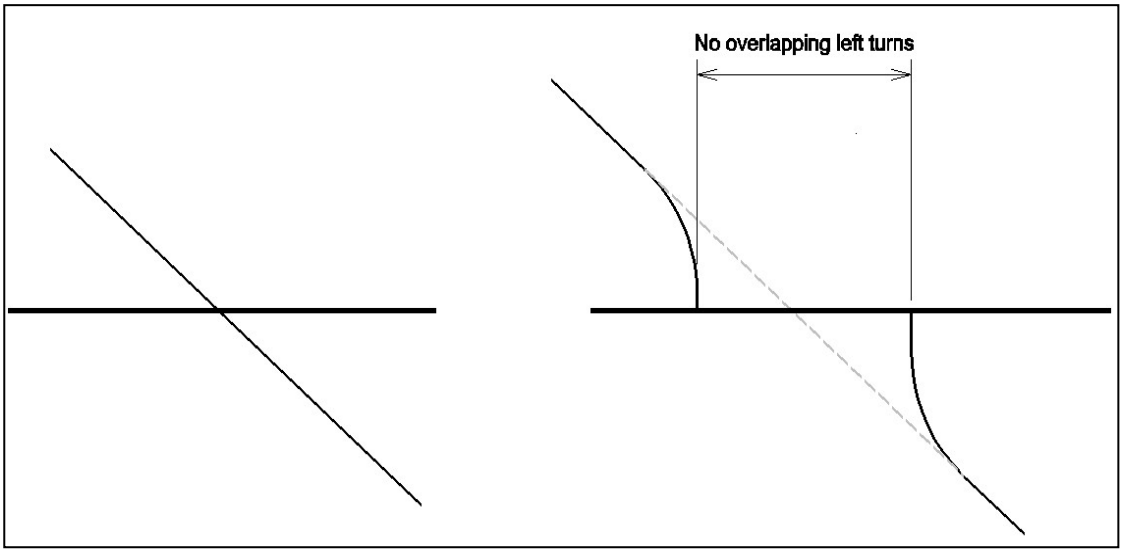


Public Street Connections (Type 4)

In some cases, an aligned four-legged intersection with a history of right-angle crashes or an intersection with an undesirable skew angle may be replaced with two “T” intersections. In these cases, left-turn movements should be carefully considered.

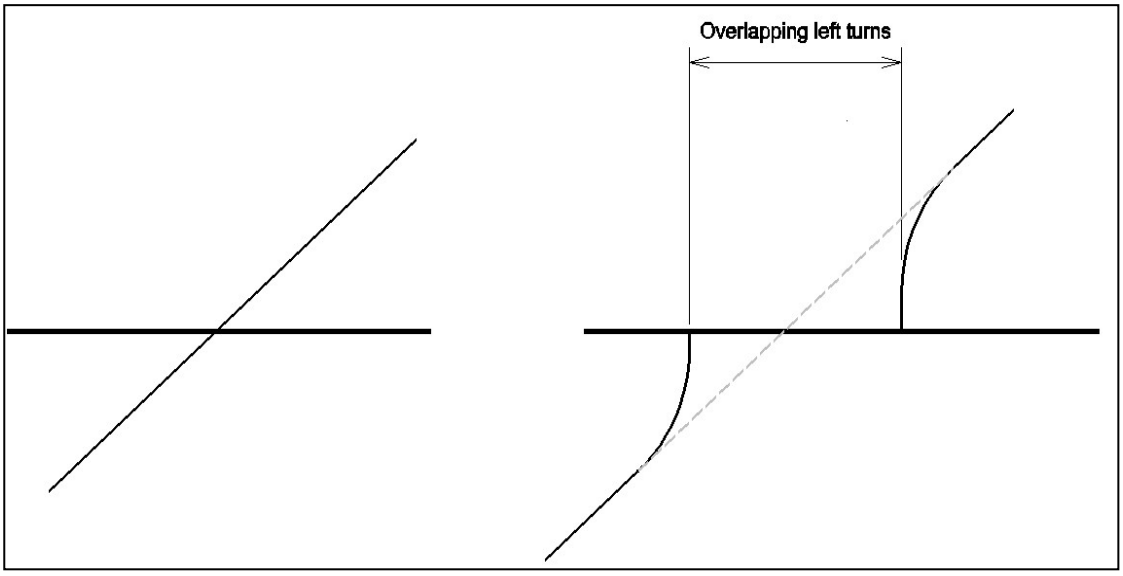
In Figure 3.32, left-turn movements are separated and do not overlap. The distance between the two “T” intersections should be at least the Spacing between Adjacent Driveways (Figure 3.27).

Figure 3.32: No Overlapping Left-turn Movements



In Figure 3.33, left-turn movements overlap, and the distance between the two "T" intersections should be sufficient of construct back-to-back turn lanes.

Figure 3.33: Overlapping Left-turn Movements



3.4.6 Restricted Movements and Median Openings

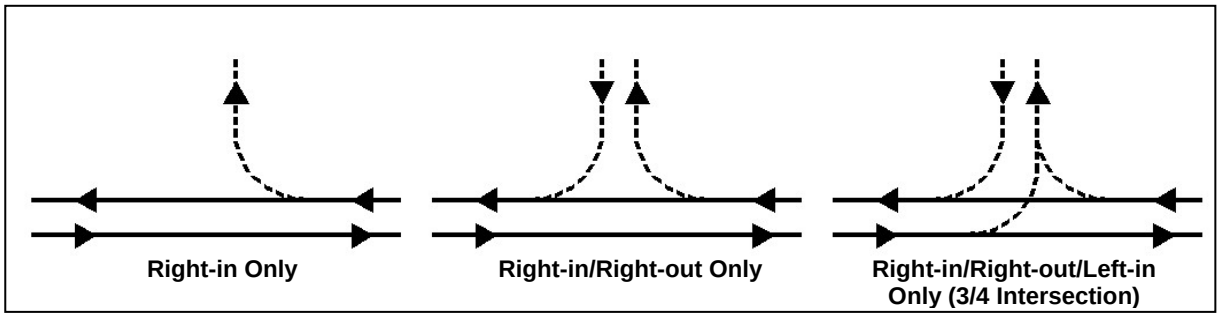
Definitions

Right-in-only permits access from the highway to a parcel or lot via a right-turn movement. Traffic leaving the parcel or lot cannot return to the highway using the same access.

Right-in/Right-out-only (RIRO) permits access between the highway and a parcel or lot via right-turn movements only. Left-turn movements are not permitted.

Right-in/Right-out/Left-in-only (3/4 Intersection) permits access between the highway and a parcel or lot via right-turn movements, and allows the left-turn movement from the highway into the parcel or lot. The left-turn movement returning to the highway is not permitted.

Figure 3.34: Restricted Turning Movement Definitions



Guidance and Examples

Turning and crossing movements at a public street connection or driveway may be restricted to address safety and operational concerns. Restricted movements are typically accomplished by the following methods:

- Closing a median opening on a divided highway;
- Constructing a median on an undivided highway; or
- Modifying the design of the driveway or intersection.

Restrictive signing and pavement markings may also be used but tend to be less effective where no physical barrier (median or traffic island) exists.

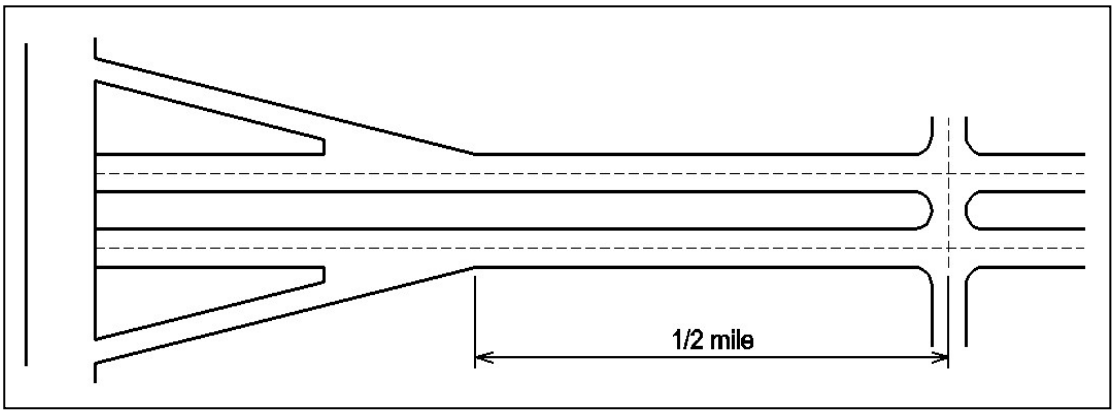
Restricting Movements using Medians
New median openings accommodating all turning movements should be provided only at public street connections, in accordance with Section 3.2.2.

New median openings should not be provided for driveways.

Existing, non-conforming median openings at either a public street connection or a driveway may be closed as a part of a construction project if the closure is considered necessary to address a safety or operational concern. Generally, a safety or operational concern includes any of the following:

- The median opening represents a high-risk conflict condition, as determined using the *Gap Analysis Procedure* (Section 3.2.3);
- The highway corridor has existing or planned signal coordination;
- There is a history of crashes of a type suitable to correction by closing the median (typically three or more left-turn crashes or right-angle crashes in one year) or where adequate trial of other remedies has failed to reduce the crash frequency;
- The median opening does not meet the intersection sight distance, and achieving adequate intersection sight distance is not economically feasible;
- The median opening is located within the functional area of an adjacent intersection and allows vehicles to cross through the turn lanes of the adjacent intersection;
- The median opening does not have a left-turn lane, and it would not be financially feasible to construct a turn lane to accommodate left-turn movements and U-turns;
- The median closure is part of a project converting a highway to a freeway;
- The median opening is located in an area transitioning from rural to urbanizing, and the closure is a part of a proactive and cost-effective plan to manage the transition; or,
- The median opening is located less than one-half mile from the merge point of an interchange ramp (as shown in Figure 3.35).

Figure 3.35: Spacing from Interchange Merge Point



Restricting Movements by Modifying the Access Point

Restricting movements by modifying the design of a driveway or intersection requires a combination of traffic islands, signing, and striping to be effective. This approach may be used both on undivided highways as well as in conjunction with medians on divided highways to address situations where the spacing guidance cannot be met. The design and approach will vary depending on the movements to be restricted. Some typical restrictions include the following:

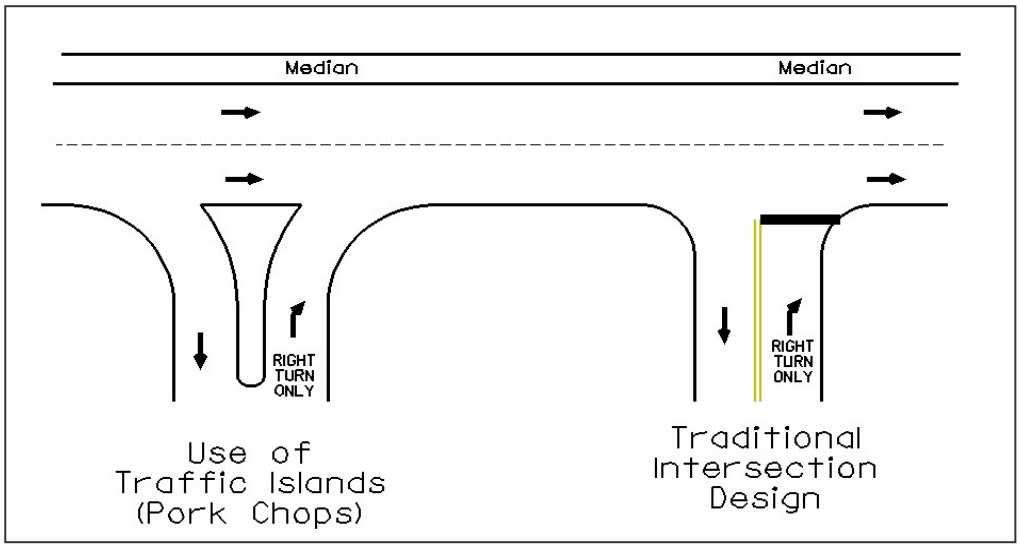
- When high traffic volumes result in a lack gaps for entering and exiting traffic to safely cross, left-turn movement and crossing movements may be restricted;
- When a driveway and an intersection are closely spaced such that a vehicle following a turning vehicle cannot anticipate where the lead vehicle will turn, right-in movements may be restricted;
- When an access is located where it may be blocked by queuing traffic from a nearby intersection, left-turn movements, crossing movements and right-out movements may be restricted;
- Where an access is needed for a specific movement such as a one-way driveway, the driveway may be limited to right-in-only or right-out-only;
- On a divided highway where a lack of gaps prevent entering traffic from safely weaving across multiple lanes to make a left-turn or U-turn, and a reasonably convenient and suitable alternative route is available, right-out movements may be restricted; or
- Where adequate sight distance does not exist for a specific movement, that movement may be restricted.

Considerations when Restricting Turning Movements

The impacts of restricting turning movements can extend beyond the immediate access point. The following issues should be considered before closing a median or restricting turning movements:

- Reasonably Convenient and Suitable Access – Restrictions on turning movements at a driveway cannot prevent reasonably convenient and suitable access for the existing or proposed land use;
- Redirection of Traffic – Restricting turn movements reduces the number of conflict points at the access by redirecting the traffic movements to other locations; it does not reduce the number of trips being generated by a development or along a cross street;
- Access Design – The design of the access point will vary depending of the characteristics of the access point and the highway (see Figure 3.36).
    - The use of traffic islands (pork chops) provides good directional guidance, thereby reducing illegal or wrong way maneuvers. Traffic islands also allow entering and exiting traffic to merge with through traffic, but the design of the islands may reduce the weaving distances to adjacent intersections and require acceleration and deceleration lanes.
    - The traditional intersection design requires entering traffic to stop and wait for a gap in through traffic, thereby eliminating weaving maneuvers. The traditional intersection also does a better job of accommodating the geometric issues associated with closely spaced access points, through additional signing and markings may be required to prevent wrong way movements. This design is ineffective on undivided highways because it does not provide a physical barrier to restrict movements.

Figure 3.36: Right-in/Right-out-only Examples



- Distance to Next Median Opening – The distance to adjacent median openings should allow reasonably convenient and suitable access for the users of the closed median opening. This distance generally should not exceed the recommended spacing of public intersections, per the Mn/DOT Access Management Policy;
- U-turn Operations at Next Opening – Adjacent median openings must facilitate u-turns for the design vehicle likely to make u-turns;
- Traffic Operations at Next Opening – Adjacent median openings should be analyzed to determine that the additional turning and u-turning traffic does not adversely affect safety and operations. This is critical at adjacent median openings with high traffic volumes or signalization;
- Impact to Local Street Network – The impact to cross-street traffic, adjacent neighborhoods, and the local street system should be reviewed with the local road authorities. The closure of a median opening should not redirect traffic to local streets not designed to accommodate the additional traffic or change in vehicle types (e.g., redirecting heavy truck traffic to residential streets).
- Pedestrians and Bikes – At median openings with measurable pedestrian and non-motorized vehicle traffic, the needs of non-motorized traffic must be reviewed by the local community. The closure of a median opening should not decrease the safety of non-motorized traffic or result in an unreasonable increase in the length of the trip. The Mn/DOT Bicycle Facility Design Guidelines provide additional guidance to address bicycle and pedestrian traffic;
- Emergency Vehicles – The median opening may be used by local emergency vehicles, the highway patrol, and maintenance vehicles. The local emergency services, highway patrol, and Mn/DOT District Maintenance staff should be contacted to determine if the median closure would have an adverse impact on their effectiveness.
- Trucks and Farm Equipment – At median openings that accommodate heavy truck and farm equipment traffic, the impacts of having heavy equipment crossing the highway compared to performing a u-turn movement should be reviewed. In some cases, the exposure time of heavy equipment to highway through-traffic has a greater impact on highway safety and operations during a u-turn maneuver than during a crossing maneuver; or,
- Coordination with Alternative Access – On highways transitioning to freeways, median closures should be coordinated with the construction of alternative access (such as frontage roads, service roads, or the redirecting of access to the local street system).

3.4.7 Shared Driveways

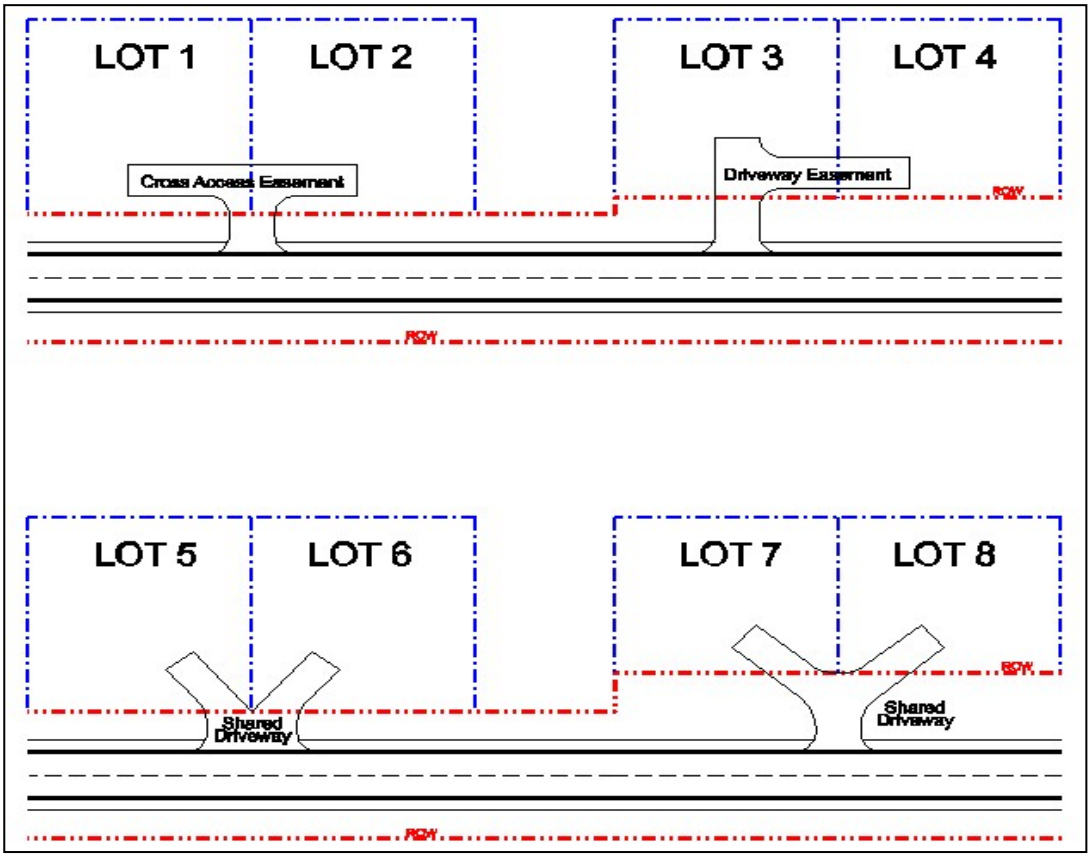
Definitions

A **Cross-Access Easement** allows two or more property owners to cross into each other's property for the purpose of accessing a public road. In Figure 3.37, lots 1 and 2 would require cross-access easements to share the driveway.

A **Driveway Easement** allows a property owner to cross through another parcel for the purpose of accessing a public road. In Figure 3.37, lot 4 is accessed via a driveway easement through lot 3.

A **Shared Driveway** is a single connection serving multiple lots or parcels. A shared driveway, in itself, does not allow property owners the right to use the portion of the driveway owned by another property owner. In Figure 3.37, lots 5 and 6, and lots 7 and 8 are served by shared driveways designed so property owners do not trespass.

Figure 3.37: Share Driveways, Cross-Access Easements & Driveway Easements



Guidance and Examples

A shared driveway, driveway easement, or cross-access easement may be considered to address the following safety or operational needs when:

- A driveway or private street connection is located within an existing turn lane or within the functional area of a public intersection without turn lanes;
- A driveway or private street connection does not have adequate stopping sight distance (Figure 3.24); or,
- Combining driveways would trigger the need for and construction of turn lanes and other geometric features.

For residential driveways, field entrances, and other low-volume driveways (Access Types 1 and 2), the combining of two driveways should be recommended for the purpose of removing a driveway from the functional area of an intersection, or for meeting stopping sight distance. This last solution should be considered only where sufficient right-of-way exists so that a cross-access easement would not be necessary.

The greatest advantage of a shared driveway is where ten or more low-volume driveways or multiple high-volume commercial driveways (Access Type 3) can be combined so that the shared driveway meets turn-lane warrants and turn lanes are constructed (see Section 3.4.9).

Additional guidance regarding driveways located within a turn lane or within the functional area of an intersection is found in Section 3.4.4.

Note: In all cases, a survey should be completed to determine exactly where the property line is before finalizing the location of the driveway. If a cross easement is provided, it should be legally recorded.

3.4.8 Interim Access

Definitions

An **Interim Access** is a public street agreement or driveway permit of limited duration. The agreement or permit specifies the time frame or conditions under which removal is required, requirements for the restoration of the right-of-way, and the location and design of any future access.

Guidance and Examples

An interim access may be considered if no reasonably convenient and suitable alternative access currently exists, but will exist in the future.

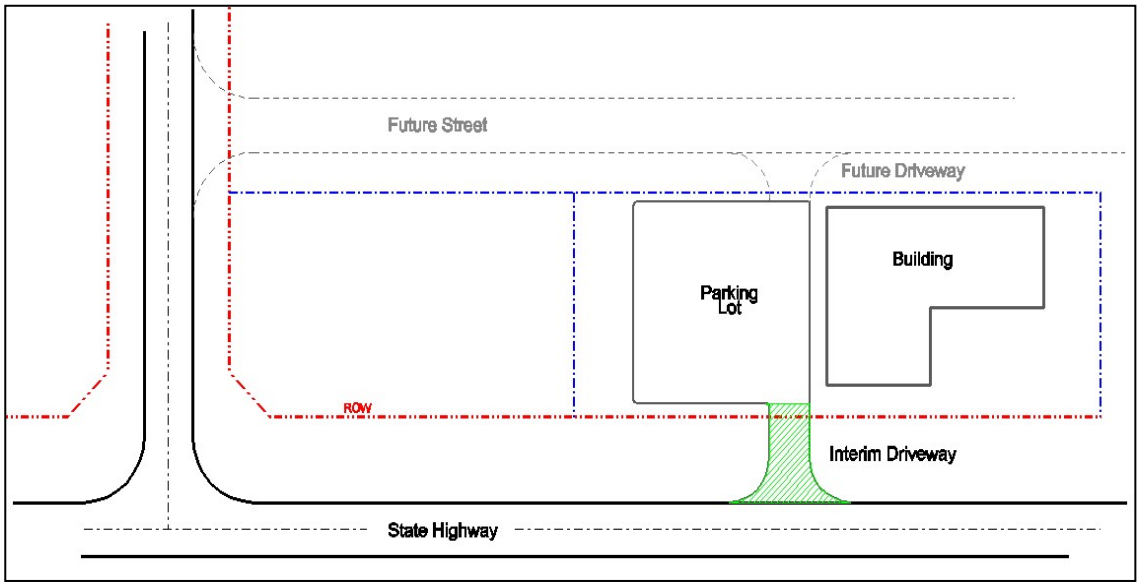
Improvements to the highway and local street system do not always occur in conjunction with the development or redevelopment of adjacent parcels. When parcels develop or redevelop before the road system does, it is preferable to have the parcel develop in a way that will function with any proposed changes to the highway. In this way, when the road system is improved, the impact on the development will be minimal. This can reduce the right-of-way costs and cost-to-cure damages due to the road improvements, and can limit disruption to the property.

Mitigation related to location

When a driveway cannot be located per the guidance shown in Section 3.4, an interim access may be necessary until a permanent solution is available.

Example: In Figure 3.38, a new development is constructed before the local street is constructed. An interim driveway is permitted, but when the future street is constructed, the interim driveway will be closed, and access will be provided from the future street. The proposed building and parking lot should be oriented to the future street.

Figure 3.38: Interim Access



Subcategory AF

Mn/DOT has categorized some highways as AF, indicating that they are either major mobility corridors with access only at interchanges, or they are moving towards having access only at interchanges. The transition to a fully access-controlled highway may take many years. Until that time, driveways may still be provided direct access with the understanding that some time in the future, alternative access will be required. Therefore, on subcategory AF highways, all new driveways should be considered interim. Where possible, these driveways should be designed to switch access to the local street system as the highway is converted to a fully access-controlled facility. The frontage of the building should be designed to take advantage of the future road system, and the parking lot should be constructed to provide circulation from the future access point.

3.4.9 Turn Lanes

Definitions

A **Turn Lane** is an auxiliary lane designed to separate turning vehicles from through-traffic. Turn lanes may be used on both divided and undivided highways (see Figure 3.39).

A **Right-Turn Treatment** is a modification to the roadway shoulder to accommodate right-turning vehicles (see Figure 3.39). A right-turn treatment may be used on divided or undivided highways and includes all of the following modifications to the outside shoulder:

- Widening the paved shoulder;
- Removing conflicting striping and shoulder rumble strips;
- Prohibiting on-street parking on the widened shoulder; and,
- Adding pavement thickness on the shoulder.

A **Bypass Lane** is an auxiliary lane on a two-lane undivided highway designed to guide through-traffic around left-turning vehicles stopped in the through-lane (see Figure 3.39).

Guidance and Examples

Turn lanes should be provided at public street connections and driveways in accordance with the Mn*/DOT Road Design Manual*, Section 5-3, and the guidance below.

Divided Highways

Left-Turn Lanes – A left-turn lane should be provided at all public street connections. For driveways, left-turn movements are generally not allowed; therefore, no left-turn lanes are needed. If a median opening is permitted, a left-turn lane should be provided.

Right-Turn Lanes – A right-turn lane should be provided at all public street connections, at all residential driveways serving more than five (5) units, and at all other driveways generating 50 or more trips per day.

Right-Turn Treatments – A right-turn treatment should be considered at all field entrances, residential driveways serving five (5) or fewer units, and all other driveways generating fewer than 50 trips per day.

Undivided Highways

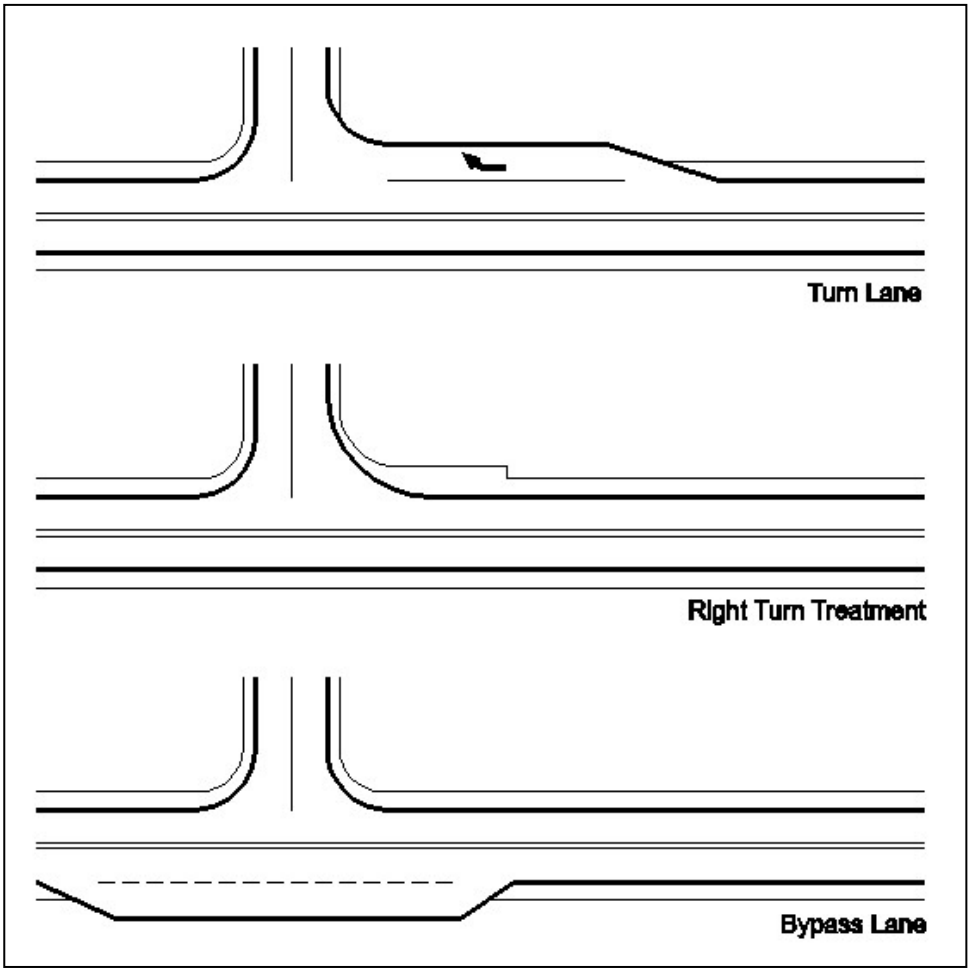
Left-Turn Lanes – A left-turn lane should be provided when there is a site-specific geometric or safety concern, as indicated by Turn-Lane Warrants 1 through 8 (shown below), or if the traffic volume levels meet Warrant 9, as shown in Figure 3.40.

Right-Turn Lanes – A right-turn lane should be provided when there is a site-specific geometric or safety concern, as indicated by Turn-Lane Warrants 1 through 8 (shown below), or if the traffic volume levels meet Warrant 9, as shown in Figure 3.41.

Bypass Lanes – A left-turn bypass lane may be considered when a left-turn lane is warranted but where its construction is not practical (due to limited right of way, steep terrain, existing structures, wetlands, or other protected features,). The bypass lane is for use at “T” intersections where no other public street connection or driveway will be located in the bypass lane or corresponding tapers.

Right-turn/bypass lanes at four-legged intersections should be used only after all other solutions have been found impractical and where the cross-street volume is low.

Figure 3.39: Right-turn Treatments & Bypass Lanes



Turn-Lane Warrants for Undivided Highways

The Turn-Lane Warrants for Undivided Highways are shown below. These warrants apply to both left-turn lanes and right-turn lanes.

- Warrant 1: Passing Lane/Climbing Lane – At high-volume driveways (> 100 trips per day) and all public street connections located on highway segments where passing lanes or climbing lanes are present in the approach direction.
- Warrant 2: Limited Sight Distance/Terrain – At all driveways and public street connections with inadequate stopping sight distance or located on short vertical curves or steep grades. Designers may consider alternative options, such as access relocation, vegetation removal, and spot grading as alternatives to building turn lanes.
- Warrant 3: Railroad Crossings – At high-volume driveways (> 100 trips per day) and all public street connections where a railroad is parallel to the highway and where the potential exists for vehicles delayed by a train to back up into the through-lanes of the highway, creating both safety and operational problems. At these locations, the queuing of traffic caused by train movements should be considered. If the cross street between the railroad and the highway does not provide adequate storage, then a turn lane or turn-lane treatment should be considered on the highway to provide the additional storage needed.

- Warrant 4: Signalized Intersections – At all signalized public street connections and driveways.
- Warrant 5: Heavy-Vehicle Traffic – At all driveways and public street connections on high-speed highways (posted speed ≥ 45 mph) where the heavy-vehicle turning volume is 15 or more vehicles per hour for at least eight hours a day for four months or more per year. Examples of this include gravel operations, large grain elevators, or large distribution centers.
- Warrant 6: School Entrances – At public and private school driveways on high-speed highways (posted speed ≥ 45 mph) used by school traffic.
- Warrant 7: Crash History – At high-volume driveways (>100 trips per day) and all public street connections that demonstrate a history of crashes of the type suitable to correction by a turn lane or turn-lane treatment (typically three or more correctable crashes in one year), or where adequate trial of other remedies has failed to reduce the crash frequency.
- Warrant 8: Corridor Crash Experience – On highway corridors that demonstrate a history of similar crash types suitable to correction by providing corridor-wide consistency in turn-lane use.
- Warrant 9: Vehicular Volume Warrant – At high-volume driveways (>100 trips per day) and all public street connections on high-speed highways (posted speed ≥ 45 mph) that satisfy the criteria in Figures 3.40 and 3.41 below.

Figure 3.40: Warrant 9 for Left-Turn Lanes

2-Lane Highway AADT	4-Lane Highway AADT	Cross Street or Driveway ADT	Turn Lane Requirement
1500 to 2999	3000 to 5999	> 1500	Left-turn lane warranted
3000 to 3999	6000 to 7999	> 1200	Left-turn lane warranted
4000 to 4999	8000 to 9999	> 1000	Left-turn lane warranted
5000 to 6499	10,000 to 12,999	> 800	Left-turn lane warranted
≥ 6500 AADT	≥ 13,000 AADT	101 to 400 > 400	Left-turn lane or bypass lane Left-turn lane warranted

Highway AADT one year after opening
Posted speed 45 mph or greater

Figure 3.41: Warrant 9 for Right-Turn Lanes

2-Lane Highway AADT	4-Lane Highway AADT	Cross Street or Driveway ADT	Turn Lane Requirement
≥ 1500 AADT	≥ 3000 AADT	> 100	Right-turn lane warranted

Highway AADT one year after opening
Posted speed 45 mph or greater

Appendix F: Water Supply Plan

Local Water Supply Plan Vermillion, MN
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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Table of contents

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)	**1992-6105**
Ownership	☒ Public or ☐ Private
Metropolitan Council Area	☒ Yes or ☐ No (and county name)
Street Address	**105 Main Street East**
City, State, Zip	**Vermillion, MN 55085**
Contact Person Name	Mark Peine
Title	Water Superintendent
Phone Number	651-248-3108
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:

N/A

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)	Water used for Non-essential	Wholesale Deliveries (MG)	Total Water Delivered (MG)	Total Water Pumped (MG)	Water Supplier Services	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	510	165	12.6	1.3	0	0	14	15.6	0.00	10.7%	0.0381	0.08	7/17/2005	67.8	83.7
2006	485	169	15.0	0.9	0	0.14	16	18.7	0.00	14.4%	0.0438	0.16	7/7/2006	84.7	105.5
2007	442	162	15.2	1.0	0	0	16	19.2	0.00	15.6%	0.0444	0.22	8/8/2007	94.0	118.9
2008	444	163	13.9	0.9	0	0	15	17.7	0.00	16.1%	0.0406	0.17	7/1/2008	86.1	109.0
2009	442	163	14.5	1.0	0	0	15	17.8	0.00	13.2%	0.0425	0.16	7/13/2009	90.0	110.6
2010	442	163	13.6	0.6	0	0	14	19.6	0.00	27.7%	0.0388	0.14	8/30/2010	84.1	121.3
2011	448	164	12.8	1.9	0	0	15	21.0	0.00	30.0%	0.0402	0.13	6/7/2011	78.1	128.2
2012	450	163	N/A	N/A	0	0	N/A	16.2	0.00	N/A	N/A	N/A	N/A	N/A	98.9
2013	450	163	12.4	1.1	0	0	13	15.7	0.00	14.3%	0.0370	0.10	8/7/2013	75.4	95.9
2014	450	163	11.1	1.2	0	0	12	15.7	0.00	21.7%	0.0337	0.11	8/16/2014	67.5	95.7
2015	450	162	9.3	1.0	0	0	11	18.3	0.50	41.2%	0.0295	0.11	7/16/2015	56.4	111.5
2016	450	163	11.8	0.8	0	0	12	13.1	0.04	3.2%	0.0348	0.11	6/28/2016	72.0	79.8
Avg. 2010-2016	449	163	11.8	1.1	0	0	13	17.1	0.08	23.0%	0.0353	0.11	N/A	72.3	104.5

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. STEVE NIELSEN	Residential	228,855	1.9%	Unknown
2. VERMILLION PUMP & MARKET	Commercial	173,740	1.5%	Unknown
3. VERN THELEN	Residential	124,465	1.0%	Unknown
4. JOANIE SWANSON	Residential	105,850	0.9%	Unknown
5. VERMILLION STATE BANK	Commercial	93,258	0.8%	Unknown
6. STEINHAUS	Commercial	85,958	0.7%	Unknown
7. MARY KING	Residential	78,840	0.7%	Unknown
8. TRAVIS JOHN	Residential	68,438	0.6%	Unknown
9. DAVID ROUTE	Residential	60,225	0.5%	Unknown
10. WARREN VOUGHT	Residential	50,005	0.4%	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 House #1	1992	726,000	Chemical	Chlorine/Fluoride	N/A	N/A	N/A
Total	N/A	726,200	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)
Water Tower	Elevated storage	1986	Steel	55,000
Total	N/A	N/A	N/A	55,000

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 of Vermillion currently has a single storage unit, a 55,000-gal. elevated tower. This is larger than the average current daily demand of roughly 35,000 gallons per day (see Table 2.). This storage will likely remain adequate, because the population and daily demand are not expected to significantly change between now and 2040 (see Table 7.).

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	Vermillion 1	502689	1987	280	816	Emergency Only	No
Groundwater	Vermillion 2	534094	1994	325	292	Active	Yes

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.

Well No. 1 is used only in emergency situations. It is the deeper of the two wells and has had past issues with the level of iron in its water. During normal operation Well No. 2 is used. Well No. 1 does not have a dedicated backup power source, but could be connected to a generator quickly if needed.

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?

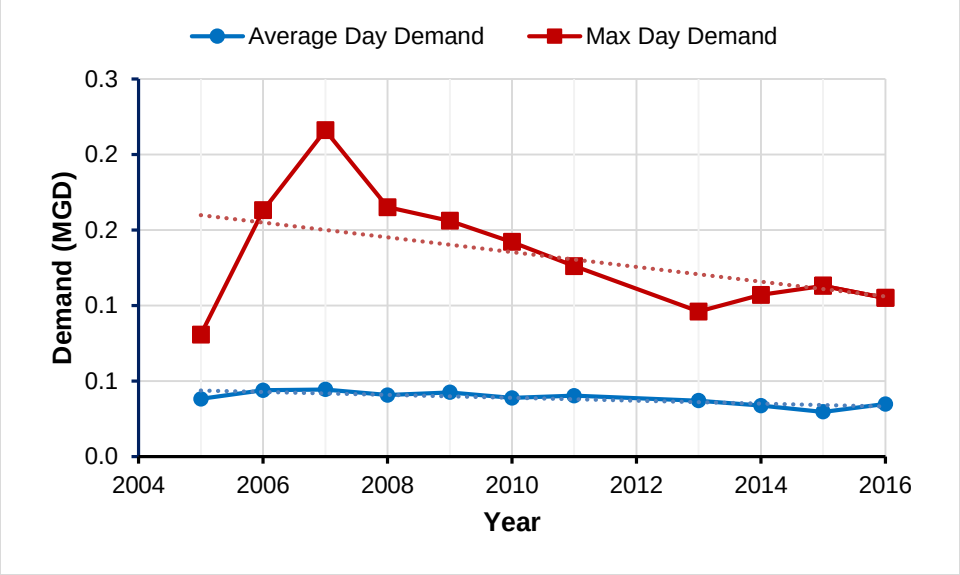
The population of Vermillion has not seen significant change in the recent past, and is not projected to in the future. Metropolitan Council population projections show the population remaining at around 420 up to at least the year 2040.

Per capita water demand has varied some in the past 10 years, from the low of 83.1 gpcd in 2016, up to the high of 133.1 gpcd in 2011. There was no real notable trend within this period, with the demand fluctuating slightly from year to year.

Average daily demand has also fluctuated in the recent past, but on the whole has remained steady, right around 40,000 gpd.

Maximum day demand has a decreasing trend over the historical period observed. It peaked in 2007, and has decreased significantly since then. This decrease may be due to a slight drop in population, and ongoing maintenance of the distribution system and repair of leaks.

None of these parameters are likely to show significant change in the future, due to the consistency of the population, already discussed.



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)
2016	424	424	107	0.05	0.16
2017	421	421	107	0.04	0.16
2018	417	417	107	0.04	0.15
2019	414	414	107	0.04	0.15
2020	410	410	107	0.04	0.15
2021	411	411	107	0.04	0.15
2022	412	412	107	0.04	0.15
2023	413	413	107	0.04	0.15
2024	414	414	107	0.04	0.15
2025	415	415	107	0.04	0.15
2030	420	420	107	0.04	0.16
2040	420	420	107	0.04	0.16

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:

Water demand projections were based on historical trends and future population projections. The Metropolitan Council population projections were used for the population projections through the year 2040. It was assumed that the projected service population will roughly equal the projected total population.

The historical per capita water demand from 2007 to 2016 averaged 107 gpcd, and this same amount was used to make water use projections through 2040. The per capita usage has declined somewhat in the most recent years, with only 2015 as an outlier at 112 gpcd. Therefore, 107 gpcd was projected for future use, though the Met Council Master WSP projections show 126 gpcd. Currently no water conservation measures are being implemented in Vermillion, and there are no plans to implement any major measures in the foreseeable future. Neither is there expected to be significant business or industry growth associated with the town, so C/I/I water sold will not probably significantly change.

The projected average day demand was calculated by multiplying the projected total per capita demand of 107 gpcd by the projected service area population. This demand remains steady through 2040 because neither the population nor the per capita demand is expected to change much. Based on slight population fluctuations, average daily demand could also fluctuate slightly.

The projected maximum day demand was calculated by multiplying the average day demand by a peaking factor. The peaking factor used to calculate it is the average historical peaking factor from 2005 to 2016 of 3.47. This was

used to project maximum day demands up to 2040. Like the average day demand, the max. day demand is not expected to change considerably, but this could depend on whether predictions in future population are correct.

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
502689 (Vermillion 1)	☐ production well ☐ observation well ☐ source water intake ☐ source water reservoir ☒ emergency only	☐ routine MDH sampling ☐ routine water utility sampling ☒ other	☐ continuous ☐ hourly ☐ daily ☐ monthly ☐ quarterly ☐ annually	☐ SCADA ☐ grab sampling ☒ steel tape ☐ stream gauge
534094 (Vermillion 2)	☒ 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
502689 (Vermillion 1)	Mt. Simon Red Clastics	Because levels are measured at most annually, seasonal variations are unknown.	☐ Falling ☐ Stable ☐ Rising	MM/DD/YY: 2001
534094 (Vermillion 2)	Quaternary Buried Artesian		☐ Falling ☐ Stable ☐ Rising	MM/DD/YY: 2002

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		☒ 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		☒ 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		☒ 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: _____ ☐ 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		☒ 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		☒ 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		☐ 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: Evaluation of well water level data	☐ 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: _____
No trout streams or calcareous fens have been identified within the vicinity of the City of Vermillion. The trout stream designation of a portion of the westerly portion of the Vermillion River begins roughly 1.5 miles west of the City. There are few known wetlands in or around the City. No negative impacts on the river or any other feature have been observed from the existing well pumping activities. Observation of water levels will continue to ensure no negative impacts occur, and mitigation measures will be developed if negative impacts should arise in the future.						

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	May 2012	May 2022
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	N/A	N/A
Water Storage Facilities	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition	N/A	N/A
Water Treatment Facilities	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition	N/A	N/A

System Component	Planned action	Anticipated Construction Year	Notes
Distribution Systems (Pipes, valves, etc.)	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition	As needed	Repair and replace watermains throughout City.
Pressure Zones	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition	N/A	N/A
Other:	☐ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition	N/A	N/A

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	None	None	None	None	None
Surface Water	None	None	None	None	None
Interconnection to another supplier	None	None	None	None	None

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	N/A	N/A	N/A	N/A	N/A
☐ Surface Water	N/A	N/A	N/A	N/A	N/A	N/A
☐ Reclaimed stormwater	N/A	N/A	N/A	N/A	N/A	N/A
☐ Reclaimed wastewater	N/A	N/A	N/A	N/A	N/A	N/A
☐ Interconnection to another supplier	N/A	N/A	N/A	N/A	N/A	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? _____2016_____

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	Mayor Brian Mann	651-437-9533	N/A
Alternate Emergency Response Lead	Mark Peine	651-437-5712	mpeine@hastingsmn.gov
The City participates in the Dakota County *All Hazard Mitigation Plan*, 2016			

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
Insert name of water supplier here	N/A	N/A	N/A
Add rows as needed	N/A	N/A	N/A

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
None	N/A	N/A	N/A	N/A

If not covered above, describe additional emergency measures for providing water (obtaining bottled water, or steps to obtain National Guard services, etc.)

Obtain bottled water.

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 (GPD)	Short-Term Emergency Demand Reduction Potential (GPD)
Residential	1	30,100	9,800
Commercial/Institutional/Industrial	2	2,700	860
Non-Essential	3	0	0
TOTAL	NA	32,800	10,660

GPD – Gallons per Day

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
☒ Contamination ☒ Loss of production ☒ Infrastructure failure ☒ Executive order by Governor ☐ Other: _____	☐ Supply augmentation through ____ ☒ 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____ ☐ Meet with large water users to discuss their contingency plan.	☐ Supply augmentation through ____ ☒ 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____ ☐ 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 ☒ As needed	None
☒ 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 ☒ As needed	None
☒ Governor's critical water deficiency declared	☐ Website ☐ Email list serve ☐ Social media (e.g. Twitter, Facebook)	☐ Daily ☐ Weekly ☐ Monthly ☐ Annually	None

Notification Trigger(s)	Methods (select all that apply)	Update Frequency	Partners
	☒ Direct customer mailing, ☒ Press release (TV, radio, newspaper), ☐ Meeting with large water users (> 10% of total city use) ☐ Other: _____	☒ As needed	

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 ☐

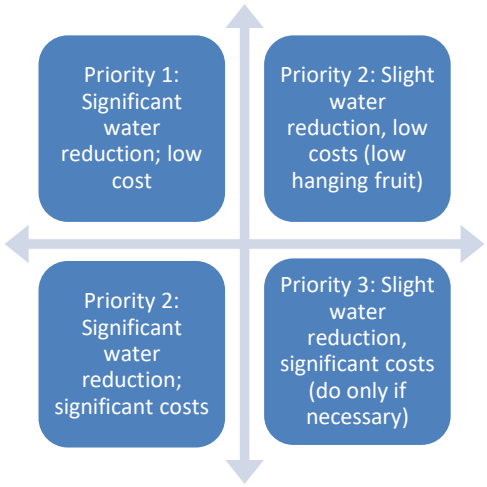
If yes, cite the regulatory authority reference: Mayor and City Council**.**

If no, who has authority to implement water use restrictions in an emergency?

N/A

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.

N/A

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?

Results not specifically measured in any way, but overall reduction in per capita water usage in the past 5 years, and reduction in Max Day Demand.

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: _____

Objective	Triggers	Actions
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 ____ ☐ Water allocation through____ ☐ 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: _____	☒ 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	☒ Per capita demand is increasing and there is limited water supply. Water supply wells cannot meet peak day demands.	☒ Enforce water restriction ordinances and restrict non-essential water usage if possible.

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)

Leak detection is done on an as-needed basis. Water usage is monitored monthly and unexpectedly large usages can alert city staff to the presence of a leak. The system is small enough that the leak can then normally be detected and fixed.

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: Unknown

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

Some of the high loss percentages in recent years have come as a result of significant leaks in the distribution system. Comparatively, 2016 appeared to have a loss percentage of just 3.2%. In the future, leaks in the system will continue to be addressed as they are discovered/identified, with the goal of keeping annual water loss below 10%.

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	155	155	155	As needed	11 / As needed

Customer Category	Number of Customers	Number of Metered Connections	Number of Automated Meter Readers	Meter testing intervals (years)	Average age/meter replacement schedule (years
C/I/I	7	7	7	As needed	11 / As needed
Water Supplier Services	1	1	1	As needed	11 / As needed
TOTALS	163	163	163	N/A	N/A

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.

N/A

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)	2	As needed	2	20 / 20
Treatment plant	N/A	N/A	N/A	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 2010-2015 residential per capita water demand in Table 2 more than 75? Yes ☐ No ☒

What was your 2010 – 2015 five-year average residential per capita water demand? 72.3 g/person/day

Describe the water use trend over that timeframe:

Generally speaking, per capita residential water usage declined during 2010-2015. Although fluctuated up and down from year to year, it has declined from being in the mid-80s in 2010 down to below 70 gpcd, even dropping to 56.4 in 2015. This could be attributed to fixing leaks in the system and the replacement of the system's water meters, which allows for more accurate measurement of water usage. Industry does not play a significant role in the city, so most usage is residential.

It should be noted that the population estimate remains at 450 from 2012-2015, because actual population numbers are not available. It is possible that the population has declined slightly, causing water usage to decline and the per capita water usage to appear smaller. In a community of Vermillion's size, a small change in population can cause a significant change in population.

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.	
☐ 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	
☐ Revise ordinances to limit irrigation. Describe the restricted irrigation 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	As needed to improve distribution system efficiency and repair leaks.
☐ 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.)	
☐ 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.)	
☐ Identify supplemental Water Resources	
☐ Conduct audience-appropriate water conservation education and outreach.	
☐ 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 use 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	
☐ Install enhanced meters capable of automated readings to detect spikes in consumption	
☐ 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	
☒ Repair leaking system components (e.g., pipes, valves)	As identified/ongoing
☐ 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	
☐ 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.

Total water demand is generally showing a slightly decreasing trend, going from the high of 128 gpcd in 2011 down to 79.8 gpcd in 2016, although there was some fluctuation in the years before and between. The decrease in water use can likely be attributed to leakage repair in the system and more efficient water use.

Residential use follows an even more dramatic decreasing trend than overall demand. Most water usage in Vermillion is residential. It peaked in 2007, at 94 gpcd, and dipped to as low as 56, in 2015, a drop of over 40%. As with overall demand, the drop could be attributed to the fixing of leaks and some more efficient use. It could also in part be caused by a slight decrease in population, which was not recorded. The population used from 2012-2016 was the Metropolitan Council projection of 450.

Per capita Commercial/Institutional/Industrial water demand has remained stable for the past 10 years, with only slight fluctuations from year to year. Mostly the same businesses and institutions have been present in the City over this time period, and this trend is expected to continue into the next decade. Overall, over the past 10 years the daily per capita C/I/I demand represents only about 6% of the total demand for the community.

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: 3.48

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: 1,000 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: 1/1/18

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 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 ☐ Odd/even day watering	☐ Service charge based on water volume ☐ Declining block ☐ Flat ☐ 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 intend 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)
☐	Adopt a water use restriction ordinance (lawn irrigation, car washing, pools, etc.)
☐	Adopt an 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)
☐	Implement a water conservation outreach program
☐	Hire a water conservation coordinator (part-time)
☐	Implement 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?

Monitor per capita and peak day demands to determine use trends.

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
☐ 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 ☐ 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
☐ 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.):

N/A

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	N/A	Occasional	☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies

Education Methods	General summary of topics	#/Year	Frequency
Consumer Confidence Reports			☐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
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

Education Methods	General summary of topics	#/Year	Frequency
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			☐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
Community events (children's water festivals, environmental fairs)			☐Ongoing ☐Seasonal ☐Only during declared emergencies
Community education classes			☐Ongoing ☐Seasonal ☐Only during declared emergencies

Education Methods	General summary of topics	#/Year	Frequency
Water week promotions			☐Ongoing ☐Seasonal ☐Only during declared emergencies
Website (include address:)			☐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	N/A	As needed	☐ 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:

City plans to send out some water conservation information included with the water bills occasionally.

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		
☐ 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

502689

County Dakota
Quad Vermillion
Quad ID 87B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/26/1992
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
VERMILLION 1	114	18	W	22	BACACD

Elevation 843 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 310 EVERGREEN ST VERMILLION MN 55085
Well PARK AV VERMILLION MN 55085

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	1	BLACK	
SAND	1	53	BROWN	
SAND	53	100	GRAY	
SAND W/CLAY LENSES	100	104	GRAY	
SANDY CLAY/SMALL	104	135	BLUE	
SAND & GRAVEL W/	135	149	VARIED	
SAND & GRAVEL LOST	149	155	VARIED	
CLEAN & DIRTY FINE	155	165	GRAY	
SANDY CLAY W/ DIRTY	165	173	GRAY	
SANDY CLAY	173	179	BLUE	
DIRTY SAND	179	186	GRAY	
SILTY CLAY	186	215	GRAY	
ROCK W/ GRAVEL &	215	228	VARIED	
DIRTY SAND	228	256	VARIED	
STICKY CLAY	256	263	GRAY	
SANDY CLAY	263	287	GRAY	
SAND	287	306	GRAY	
ROCK	306	309	GRAY	SOFT
LENSES SOFT ROCK &	309	325	GRAY	SOFT
ROCK	325	328		SOFT
ROCK	328	337	GRN/WHT	SOFT
SANDSTONE OR SOFT	337	382	GRN/WHT	HARD
ROCK	337	385	GRAY	
SANDSTONE	385	408	GREEN	
SANDSTONE	408	416	GREEN	
SANDSTONE	416	424	GRN/GRY	
SANDSTONE W/ DIRTY	424	466	GRN/GRY	
SANDSTONE W/	466	469	GRY/WHT	
SANDY CLAY W/	469	492	GRAY	
SANDY CLAY	492	504	GRAY	
SANDY SHALE OR	504	554	GRAY	
SANDY SHALE OR	554	569	GRAY	
ROCK	569	572	GRAY	SOFT
SANDY CLAY	572	586	GRAY	
SANDY SHALE	586	599	GRN/GRY	
DIRTY SANDSTONE	599	606	GRN/GRY	
SANDSTONE	606	629	GRN/GRY	
SANDSTONE	629	644	GRAY	
DIRTY SANDSTONE	644	648	VARIED	
SANDY CLAY	648	666		
DIRTY SANDSTONE &	666	680	GRAY	HARD
SANDSTONE	680	684	GRAY	
SANDY CLAY W/	684	706		
SANDSTONE W/	706	720	GRAY	
SANDSTONE	720	760	GRAY	
SANDY CLAY W/	760	795	WHT/GRN	
SANDY CLAY W/	795	799	WHT/GRN	
SHALE OR CLAY	799	808	RED/GRY	
SANDY SHALE	808	816	RED/GRY	

Remarks
TESTHOLE TO NOF WATER TOWER.
GAMMA LOGGED TESTHOLE 10-8-1986. M.G.S. NO. 2618.
TESTHOLE REAMED OUT TO BECOME MUNICIPAL WELL.
GAMMA LOGGED BY MINNESOTA DOWNHOLE SERVICES.

Well Depth 816 ft. **Depth Completed** 816 ft. **Date Well Completed** 01/28/1987

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

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	Hole Diameter
24 in. To 40 ft.	94.6 lbs./ft.	30 in. To 40 ft.
12 in. To 656 ft.	49.5 lbs./ft.	24 in. To 182 ft.
18 in. To 182 ft.	70.5 lbs./ft.	18 in. To 656 ft.

Open Hole From 656 ft. To 816 ft.

Screen? ☐ **Type** **Make**

Static Water Level
135 ft. land surface Measure 01/26/1987

Pumping Level (below land surface)
214. ft. 25 hrs. Pumping at 350 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR 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	37 Cubic yards	8 ft.	656 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 08/26/1987
Manufacturer's name BERKELEY
Model Number 652AM-8 HP 30 Volt 230
Length of drop pipe 240 ft Capacity 250 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 Tunnel CIty/Lone Rock Fm Aquifer Mt.Simon-Red
Last Strat Solor Church Formation Depth to Bedrock 328 ft
Located by Minnesota Department of Health
Locate Method GPS SA On (averaged)
System UTM - NAD83, Zone 15, Meters X 502576 Y 4946403
Unique Number Verification Input Date 06/15/1999

Angled Drill Hole

Well Contractor
Ltp Enterprises 91353 HEJTMANEK, D
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well No.

502689

County Dakota
Quad Vermillion
Quad ID 87B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date 06/26/1992
Update
Received Date 08/18/2014

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
VERMILLION 1	114	18	W	22	BACACD	community supply	A	816 ft.	816 ft.	01/28/1987	91353

Elevation 843 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** Mt.Simon-Red **Depth to Bedrock** 328 ft **Open Hole** 656 - 816 ft **Static Water Level** 135 ft

Field Located By Minnesota Department of
Unique No. Verified
Geological Interpretation John Mossler
Agency (Interpretation)

Locate Method GPS SA On (averaged)
Input Source Minnesota Department of Health
Input Date 06/15/1999

Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -
UTM Easting (X) 502576
UTM Northing (Y) 494640
Interpretaion Method Cuttings + geophysical log

			Depth (ft.)			Elevation (ft.)					
Geological Material	**Color**	**Hardness**	**From**	**To**	**Thickness**	**From**	**To**	**Stratigraphy**	**Primary Lithology**	**Secondary**	**Minor Lithology**
TOP SOIL	BLACK		0	1	1	843	842	Recent deposit-black	soil	organic deposits	
SAND	BROWN		1	53	52	842	790	sand-brown	sand		
SAND	GRAY		53	100	47	790	743	sand-gray	sand		
SAND W/CLAY LENSES	GRAY		100	104	4	743	739	clay+sand-gray	sand	clay	
SANDY CLAY/SMALL LENSES	BLUE		104	135	31	739	708	cly/snd/slt-no peb.-	clay	sand	silt
SAND & GRAVEL W/ ROCK	VARIED		135	149	14	708	694	sand +larger	sand	gravel	cobble
SAND & GRAVEL LOST	VARIED		149	155	6	694	688	sand +larger	sand	gravel	
CLEAN & DIRTY FINE SAND	GRAY		155	165	10	688	678	sand+silt	sand	silt	
SANDY CLAY W/ DIRTY	GRAY		165	173	8	678	670	cly/snd/slt-no peb.-	clay	sand	silt
SANDY CLAY	BLUE		173	179	6	670	664	clay+sand-gray	clay	sand	
DIRTY SAND	GRAY		179	186	7	664	657	sand+silt-gray	sand	silt	
SILTY CLAY	GRAY		186	215	29	657	628	silt+clay-gray	clay	silt	
ROCK W/ GRAVEL & SAND	VARIED		215	228	13	628	615	sand +larger	cobble	gravel	sand
DIRTY SAND	VARIED		228	256	28	615	587	sand+silt	sand	silt	
STICKY CLAY	GRAY		256	263	7	587	580	clay-gray	clay		
SANDY CLAY	GRAY		263	287	24	580	556	clay+sand-gray	clay	sand	
SAND	GRAY		287	306	19	556	537	sand-gray	sand		
ROCK	GRAY	SOFT	306	309	3	537	534	boulder or boulders-	boulder		
LENSES SOFT ROCK &	GRAY	SOFT	309	325	16	534	518	pebbly sand/silt/clay-	cobble	sand	silt
ROCK		SOFT	325	328	3	518	515	Quaternary deposit	cobble		
ROCK	GRN/WHT	SOFT	328	337	9	515	506	Tunnel CIty/Lone	sandstone		
SANDSTONE OR SOFT ROCK	GRN/WHT	HARD	337	382	45	506	461	Tunnel CIty/Lone	sandstone		
ROCK	GRAY		337	385	48	506	458	Tunnel CIty/Lone	sandstone	dolomite	
SANDSTONE	GREEN		385	408	23	458	435	Tunnel CIty/Lone	sandstone		
SANDSTONE	GREEN		408	416	8	435	427	Wonewoc Sandstone	sandstone		
SANDSTONE	GRN/GRY		416	424	8	427	419	Wonewoc Sandstone	sandstone		
SANDSTONE W/ DIRTY	GRN/GRY		424	466	42	419	377	Wonewoc Sandstone	sandstone		
SANDSTONE W/ SANDY	GRY/WHT		466	469	3	377	374	Eau Claire Formation	sandstone	shale	
SANDY CLAY W/	GRAY		469	492	23	374	351	Eau Claire Formation	shale	sandstone	
SANDY CLAY	GRAY		492	504	12	351	339	Eau Claire Formation	shale	sandstone	
SANDY SHALE OR CLAY	GRAY		504	554	50	339	289	Eau Claire Formation	shale		
SANDY SHALE OR CLAY	GRAY		554	569	15	289	274	Mt.Simon Sandstone	shale		
ROCK	GRAY	SOFT	569	572	3	274	271	Mt.Simon Sandstone	sandstone		

			Depth (ft.)			Elevation (ft.)					
Geological Material	**Color**	**Hardness**	**From**	**To**	**Thickness**	**From**	**To**	**Stratigraphy**	**Primary Lithology**	**Secondary**	**Minor Lithology**
SANDY CLAY	GRAY		572	586	14	271	257	Mt.Simon Sandstone	shale	sandstone	
SANDY SHALE	GRN/GRY		586	599	13	257	244	Mt.Simon Sandstone	shale	sandstone	
DIRTY SANDSTONE	GRN/GRY		599	606	7	244	237	Mt.Simon Sandstone	sandstone		
SANDSTONE	GRN/GRY		606	629	23	237	214	Mt.Simon Sandstone	sandstone		
SANDSTONE	GRAY		629	644	15	214	199	Mt.Simon Sandstone	sandstone		
DIRTY SANDSTONE	VARIED		644	648	4	199	195	Mt.Simon Sandstone	sandstone		
SANDY CLAY			648	666	18	195	177	Mt.Simon Sandstone	shale	sandstone	
DIRTY SANDSTONE &	GRAY	HARD	666	680	14	177	163	Mt.Simon Sandstone	sandstone	shale	
SANDSTONE	GRAY		680	684	4	163	159	Mt.Simon Sandstone	sandstone		
SANDY CLAY W/			684	706	22	159	137	Mt.Simon Sandstone	shale	sandstone	
SANDSTONE W/ LENSES OF	GRAY		706	720	14	137	123	Mt.Simon Sandstone	sandstone	shale	
SANDSTONE	GRAY		720	760	40	123	83	Mt.Simon Sandstone	sandstone		
SANDY CLAY W/	WHT/GRN		760	795	35	83	48	Mt.Simon Sandstone	shale	sandstone	
SANDY CLAY W/	WHT/GRN		795	799	4	48	44	Solor Church	shale	sandstone	
SHALE OR CLAY	RED/GRY		799	808	9	44	35	Solor Church	shale		
SANDY SHALE	RED/GRY		808	816	8	35	27	Solor Church	shale	sandstone	

STATE OF MINNESOTA DEPARTMENT OF HEALTH

WATER WELL RECORD

Minnesota Statutes 156A.01-.08

MINNESOTA UNIQUE WELL NO. W.L. *for Water Sample* I 002689

1. LOCATION OF WELL

County Name: Dakota

Township Name: Vermillion | Township Number: 114 N | Range Number: 18 W | Section No.: 22 | Fraction: NW¼

Numerical Street Address and City of Well Location or Distance from Road Intersection.

Show exact location of well in section grid with "X." (N, W, E, S; ½ mi.; 1 mile) — X marked in NW portion

Addition Name / Block Number / Lot Number

Sketch map of well location.

M.D.H. PWS 1190028501

No. 1

M.G.S. #3618

2. PROPERTY OWNER'S NAME

City of Vermillion
Vermillion, MN.

Mailing Address if different than property address indicated above. P.A. 92-61051

3. FORMATION LOG

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Log attached				

114-18-22 bac ~~a~~ cd

elev. 843±5'

87-B

Testhole later became Well

Gamma logged 10-8-86

0-328 Drift

328-408 CFRN

408-465 CIGL

465-554 CECR

554-796 CMTS

796-815 PCSC

4. WELL DEPTH (completed): 816 ft. Date of Completion: 1-28-87

5. DRILLING METHOD

☐ Cable Tool ☐ Reverse ☐ Driven ☐ Dug
☐ Hollow Rod ☐ Air ☐ Bored ☐
☒ Rotary ☐ Jetted ☐ Power Auger

6. DRILLING FLUID Bentonite

7. USE

☐ Domestic ☐ Monitoring ☐ Heat Pump
☐ Irrigation ☐ Public ☐ Industry
☐ Test Well ☒ Municipal ☐ Commercial
☐ Air Conditioning ☐

8. CASING

☒ Black ☐ Threaded
☐ Galv. ☒ Welded
☐ Plastic ☐

HEIGHT: (Above)/Below Surface 2 ft.

Drive Shoe? Yes ___ No ☒

Casing	Weight	HOLE DIAM.
24 in. to 40 ft.	94.62 lbs./ft.	30 in. to 40 ft.
18 in. to 182 ft.	70.59 lbs./ft.	24 in. to 182 ft.
12 in. to 656 ft.	49.56 lbs./ft.	18 in. to 656

9. SCREEN

Make: None | Or open hole from 656 ft. to 816 ft.

Type ___ Diam. ___

Slot/Gauze ___ Length ___ FITTINGS:

Set between ___ ft. and ___ ft.

10. STATIC WATER LEVEL 135 ft. ☒ below ☐ above land surface — Date Measured 1-26-87

11. PUMPING LEVEL (below land surface)

214.61 ft. after 24 3/4 hrs. pumping 350 g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

12. HEAD WELL COMPLETION

☒ Pitless adapter manufacturer Monitor Model ___

☐ Basement offset ☐ At least 12" above ground

☐ Plastic casing protection

13. WELL GROUTED? ☒ Yes ☐ No

☒ Neat Cement ☐ Bentonite ☐

Grout material Neat Cement from 8 to 656 ft. cu. yds. 37

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION

___ feet ___ direction ___ type

Well disinfected upon completion? ☒ Yes ☐ No

15. PUMP

Date installed 8-26-87 ☐ Not installed

Manufacturer's name Berkeley

Model number 652AM-8 HP 30 Volts 230

Length of drop pipe 240 ft. Capacity 250 g.p.m.

Material of drop pipe Black Steel

Type: ☒ Submersible ☐ L.S. Turbine ☐ Reciprocating
☐ Jet ☐ Centrifugal ☐

16. ABANDONED WELLS

Unused well on property? ☐ Yes ☒ No

Sealed ☐ Permanent ☐ Temporary ☐ Not sealed

17. REMARKS, ELEVATION, SOURCE OF DATA, Etc.

Use a second sheet, if needed

CODED

LOCATED BY
1 - ☐ Address Mapping
2 - ☐ Name on Mailbox
3 - ☐ Lot-Block
4 - ☐ Plat Book
5 - ☒ Info. From Owner
6 - ☐ Info. From Neighbor
7 - ☒ Other M.D.H. Robyn Hoerr
☐ Can't Locate State Why

STEINHAUS

#408231

18. WATER WELL CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

LTP Enterprise Dr. — Licensee Business Name — License No. 353

Address PO Box 9035 Fargo, ND 58106

Signed [signature] Authorized Representative Date 8/31/89

Don Hejtmanek — Name of Driller Date 8/31/89

MINN. DEPT. OF HEALTH COPY 002689

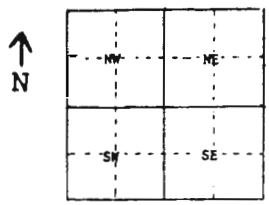
5/74 30M
7/76 30M
7/78 30M
2/82 10M

LTP Enterprises, Inc.
Leonard T. Pulkrabek

Box 9035
Fargo, ND 58106

Phone (701) 232-8928

Sec ____



WELL DRILLING
PUMP SALES & SERVICE

DRILLERS LOG

Drilled for City of Vermillion, MN by Fargo Office

Location of property see specs

Test hole No 1-86-B Location of test hole 75'N of water tower Well No. ____

Size of test hole 6 3/4 Date started 10-1-86 Date completed ____ Total Hours ____

FORMATIONS DRILLED

TYPE OF FORMATION	COLOR OF FORMATION	STARTED AT WHAT DEPT	ENDED AT WHAT DEPT	THICKNESS OF FORMATION
Top soil	black	G.L.	1'	1'
sand	brown	1'	53'	52'
sand	grey	53'	100'	47'
sand w/lenses of clay	grey	100'	104'	41'
sandy clay w/small lenses of dirty sand	blue	104'	134½'	30½'
sand & gravel w/rock	colored	134½'	149'	14½'
Lost circulation		149'		
sand & gravel	colored	149'	155'	6'
lenses of clean & dirty fine sand	grey	155'	165'	10'
sandy clay w/lenses of dirty sand	grey	165'	173'	8'
sandy clay	blue	173'	179'	6'
dirty sand	grey	179'	186'	7'
silty clay	grey	186'	215'	29'
rock w/lenses of gravel and sand	colored	215'	228'	13'
dirty sand	colored	228'	256'	28'
sticky clay	grey	256'	263'	7'
sandy clay	grey	263'	287'	24'
sand	grey	287'	306'	19'
soft rock	grey	306'	309'	3'
lenses of soft rock and dirty sand	grey	309'	325'	16'
started taking mud				
soft rock	green, white	325'	337'	12'
hard sandstone or soft rock	green/white	337'	382'	45'
rock	grey	382'	385'	3'

Signed Don L. Hejtmanek Driller

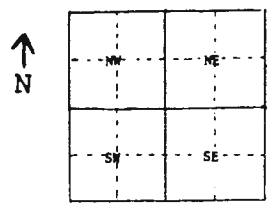
form #30

LTP Enterprises, Inc.
Leonard T. Pulkrabek

Box 9035
Fargo, ND 58106

Phone (701) 232-8928

Sec ____



WELL DRILLING
PUMP SALES & SERVICE

DRILLERS LOG

Drilled for City of Vermillion,MN by _____ Office

Location of property see specs

Test hole No 1-86B Location of test hole _____ Well No. _____

Size of test hole 6 3/4 Date started 10-1-86 Date completed _____ Total Hours _____

FORMATIONS DRILLED

TYPE OF FORMATION	COLOR OF FORMATION	STARTED AT WHAT DEPT	ENDED AT WHAT DEPT	THICKNESS OF FORMATION
sandstone	green	385'	416'	31'
sandstone	gree-gray	416'	424'	8'
sand stone w/lenses of dirty sandston	green-gray	424'	466'	42'
lost circulation				
sandstone w/lenses of sandy clay	gray-white	466'	469'	3'
sandy clay w/leses of sandstone	gray	469'	492'	23'
sandy clay	gray	492'	504'	12'
sandy shale or clay	gray	504'	569'	65'
soft rock	gray	569'	572'	3'
sandy clay	gray	572'	586'	14'
sandy shale	green-gray	586'	599'	13'
dirty sandstone	green-gray	599'	606'	7'
lost circulation	green-gray			
sandtone		606'	629'	23'
sandstone	gray	629'	644'	15'
thinned out lost circulation	reddish/green white	644'		
dirty sandstone		644'	648'	4'
sandy clay		648'	666'	18'
lenses of dirty sandstone & hard sandy	clay gray	666'	680'	14'
sandstone	gray	680'	684'	4'
sandy clay w/small lenses of sandstone	gray	688'	706'	22'
sandstone w/lenses of clay	gray	706'	720'	14'
sandstone	gray	720'	760'	40'
sandy clay w/small lenses of sandstone	white-green	760'	799'	

Signed _____ Driller

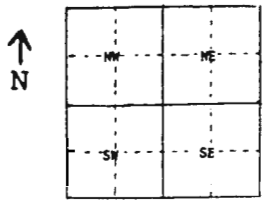
form #30

LTP Enterprises, Inc.
Leonard T. Pulkrabek

Box 9035
Fargo, ND 58106

Phone (701) 232-8928

Sec_____



WELL DRILLING
PUMP SALES & SERVICE

DRILLERS LOG

Drilled for City of Vermillion,MN by_____ Office

Location of property see specs

Test hole No 1-86B Location of test hole_____ Well No._____

Size of test hole 6 3/4 Date started 10-1-86 Date completed_____ Total Hours_____

FORMATIONS DRILLED

TYPE OF FORMATION	COLOR OF FORMATION	STARTED AT WHAT DEPT	ENDED AT WHAT DEPT	THICKNESS OF FORMATION
shale or clay	red,gray	799'	808'	9'
sandy shale	red,gray	808'	816'	8'

Signed Don L. Hejtmanek Driller

form #30

Minnesota Unique Well Number

534094

County Dakota
Quad Vermillion
Quad ID 87B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/15/1993
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
VERMILLION 2	114	18	W	22	BAAAD

Elevation 844 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W VERMILLION MN 55085

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOPSOIL	0	2	BLACK	SOFT
SANDY CLAY	2	5	BROWN	SOFT
SAND	5	57	BROWN	SOFT
SANDY CLAY	57	98	GRAY	SOFT
CLAY & SAND	98	120	GRAY	MEDIUM
SAND & GRAVEL	120	155	BROWN	MEDIUM
SANDY CLAY &	155	228	GRAY	MEDIUM
CLAY, SAND, &	228	247	GRAY	MEDIUM
SAND & GRAVEL	247	293	BROWN	MEDIUM

Remarks

Well Depth 293 ft. **Depth Completed** 292 ft. **Date Well Completed** 10/15/1993

Drill Method Cable Tool **Drill Fluid** Bentonite

Use community supply(municipal) **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 0 ft.

Casing Diameter		Weight
10 in. To	267 ft.	lbs./ft.
16 in. To	260 ft.	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
10 in.		25 ft.	267 ft.	292 ft.

Static Water Level
13 ft. land surface Measure 10/14/1993

Pumping Level (below land surface)
43 ft. hrs. Pumping at 400 g.p.m.

Wellhead Completion
Pitless adapter manufacturer M-B 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
100 feet East Direction Barnyard Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/00/1993
Manufacturer's name BERKLEY
Model Number 7-T-350 HP 20 Volt 230
Length of drop pipe 60 ft Capacity 400 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 Aquifer Quat. buried
Last Strat sand +larger-brown Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method GPS SA On (averaged)
System UTM - NAD83, Zone 15, Meters X 502794 Y 4946539
Unique Number Verification Information from Input Date 06/15/1999

Angled Drill Hole

Well Contractor

Traut M.J. Well Co.	71536	POHLKAMP, D.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well No.

534094

County Dakota
Quad Vermillion
Quad ID 87B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date 12/15/1993
Update
Received Date 03/10/2014

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
VERMILLION 2	114	18	W	22	BAAAD	community supply	A	293 ft.	292 ft.	10/15/1993	71536

Elevation 844 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** Quat. buried artes. **Depth to Bedrock** ft **Open Hole** - ft **Static Water Level** 13 ft

Field Located By Minnesota Department of
Unique No. Verified Information from owner
Geological Interpretation Bruce Bloomgren
Agency (Interpretation)

Locate Method GPS SA On (averaged)
Input Source Minnesota Department of Health
Input Date 06/15/1999

Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -
UTM Easting (X) 502794
UTM Northing (Y) 494653
Interpretaion Method Geologic study 1:24k to 1:100k

			Depth (ft.)			Elevation (ft.)					
Geological Material	**Color**	**Hardness**	**From**	**To**	**Thickness**	**From**	**To**	**Stratigraphy**	**Primary Lithology**	**Secondary**	**Minor Lithology**
TOPSOIL	BLACK	SOFT	0	2	2	844	842	Recent deposit-black	soil	organic deposits	
SANDY CLAY	BROWN	SOFT	2	5	3	842	839	clay+sand-brown	clay	sand	
SAND	BROWN	SOFT	5	57	52	839	787	sand-brown	sand		
SANDY CLAY	GRAY	SOFT	57	98	41	787	746	clay+sand-gray	clay	sand	
CLAY & SAND	GRAY	MEDIUM	98	120	22	746	724	clay+sand-gray	clay	sand	
SAND & GRAVEL	BROWN	MEDIUM	120	155	35	724	689	sand +larger-brown	sand	gravel	
SANDY CLAY & GRAVEL	GRAY	MEDIUM	155	228	73	689	616	pebbly sand/silt/clay-	clay	gravel	sand
CLAY, SAND, & GRAVEL	GRAY	MEDIUM	228	247	19	616	597	pebbly sand/silt/clay-	clay	sand	gravel
SAND & GRAVEL	BROWN	MEDIUM	247	293	46	597	551	sand +larger-brown	sand	gravel	

MINNESOTA DEPARTMENT OF HEALTH
WELL RECORD
Minnesota Statutes Chapter 103I

W.L. I

MINNESOTA UNIQUE WELL NO. 534094

WELL LOCATION

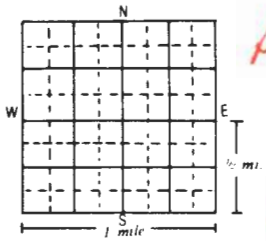
County Name: Dakota

Township Name	Township No.	Range No.	Section No.	Fraction
Vermillian	114	18	22	

Numerical Street Address and City of Well Location: Mill & Park Av

or Fire Number:

Show exact location of well in section and with "X". Sketch map of well location. Showing property lines, roads and buildings.



M.D.H.
PWS 1190028502

Well No. 2

P.A. 92-6105-2

3-A 84

PROPERTY OWNER'S NAME: City of Vermillion

Mailing address if different than property address indicated above.

310 Evergreen St
Vermillion, MN 55085

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
Top Soil RUUK	Blk	S	0	2
Sandy Clay QLUB	Brn	S	2	5
Sand QFCB	Brn	S	5	57
Sandy Clay QLUG	Gray	S	57	98
Clay & Sand QLUU	Gray	M	98	120
Sand & Gravel QFUB	Brn	M	120	155
Sandy Cy & Grav QFUG	Gray	M	155	228
Clay, Sand Grav QFUU	Gray	M	2	247
Sand & Gravel QHCB	Brn	M	247	293
Ag. QBAA				
114-18-22 BAA DDB (illegible)				
elev. 844±5'				
87-B				

Use a second sheet, if needed

REMARKS, ELEVATION, SOURCE OF DATA, etc.

DEC 1993 RECEIVED WELL MGT.

CODED

MINN. DEPT. OF HEALTH COPY 534094

WELL DEPTH (completed): 292 ft. Date Work Completed: 10/15/93

DRILLING METHOD: [X] Cable Tool [ ] Driven [ ] Dug [ ] Auger [ ] Rotary [ ] Jetted [ ]

DRILLING FLUID: Bentonite

USE: [ ] Domestic [ ] Monitoring [ ] Heating/Cooling [ ] Irrigation [X] Public [ ] Industry/Commercial [ ] Test Well [ ] Dewatering [ ] Remedial [ ]

CASING: [X] Steel [ ] Plastic; Drive Shoe? [X] Yes [ ] No; [ ] Threaded [X] Welded

HOLE DIAM.

CASING DIAMETER / WEIGHT

16 in. to 260 ft.			in. to ft.
10 in. to 267 ft.	screen & leader	lbs./ft.	in. to ft.
in. to ft.		lbs./ft.	in. to ft.

SCREEN: Make Johnson; Type SS; Slot/Gauze 30 & 40; Set between 267 ft. and 292 ft. FITTINGS: K-packer

OPEN HOLE: from ft. to ft.

Diam. 10"; Length 25'

STATIC WATER LEVEL: 13 ft. [X] below [ ] above land surface Date measured 10/14/93

PUMPING LEVEL (below land surface): 43 ft. after 24 hrs. pumping 400+ g.p.m.

WELL HEAD COMPLETION: [X] Pitless adapter manufacturer M-B Model 16x18x6; [ ] Casing Protection; [ ] 12 in. above grade

GROUTING INFORMATION: Well grouted? [ ] Yes [X] No; Grout Material [ ] Neat cement [ ] Bentonite

from to ft. yds. bags

from to ft. yds. bags

from to ft. yds. bags

NEAREST KNOWN SOURCE OF CONTAMINATION: 100 feet E direction farm land type

Well disinfected upon completion? [X] Yes [ ] No

PUMP: [ ] Not installed; Date installed 11/93

Manufacturer's name Berkley

Model number 7-T-350 HP 20 Volts 230

Length of drop pipe 60 Capacity 400 g.p.m.

Pressure Tank Capacity

Type: [X] Submersible [ ] L.S. Turbine [ ] Reciprocating [ ] Jet [ ]

LOCATED BY
1. [ ] Address Verification
2. [ ] Name on Mailbox
3. [ ] Lot Block
4. [ ] Plat Book
5. [X] Info. From Owner
6. [ ] Info. From Neighbor
7. [X] Other Can't Locate State Why

ABANDONED WELLS: Does property have any not in use and not sealed well(s)? [ ] Yes [X] No

WELL CONTRACTOR CERTIFICATION

This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

M.D.H. Roby W Hoerr

Mark J. Traut Wells, Inc. 71536

Licensee Business Name / Lic. or Reg. No.

Mark J Traut 11-3-93

Authorized Representative Signature / Date

Dan Pohlkamp

Name of Driller / Date

HE-01205-04 (Rev. 5/93)

Appendix 2

Water Level Monitoring Plan

(Not available)

Appendix 3

Water Level Graphs for Each Water Supply Well

(Not available)

Appendix 4

Capital Improvement Plan

(Not available)

Appendix 5

Emergency Telephone List

Attachment 5
Vermillion, MN
Emergency Telephone List

Emergency Response Team	Name	Work Telephone	Alternate Telephone
Emergency Response Lead	Mark Peine	651-248-3108	
Alternate Emergency Response Lead			
Water Operator	Mark Peine	651-248-3108	
Alternate Water Operator			
Public Communications			

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			
National Guard	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
Mayor/Board Chair	Brian Mann	651-437-9533	
Fire Chief	Mike Schutt	651-480-6154	
Sheriff	Tim Leslie	651-438-4710	
Police Chief	Bryan Schafer	651-480-2306	
Ambulance			
Hospital			
Doctor or Medical Facility			

State and Local Agencies	Name	Work Telephone	Alternate Telephone
MDH District Engineer	Simon McCormack	651-201-5180	651-336-0101
MDH	Drinking Water Protection	651-201-4700	
State Testing Laboratory	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
MPCA	Cara Omana	651-757-2891	
DNR Area Hydrologist	Jennie Skanke	651-259-5790	
County Water Planner			

Utilities	Name	Work Telephone	Alternate Telephone
Electric Company			
Gas Company			
Telephone Company			
Gopher State One Call	Utility Locations	800-252-1166	651-454-0002
Highway Department			

Technical/Contracted Services/Supplies	Name	Work Telephone	Alternate Telephone
MRWA Technical Services	MN Rural Water Association	800-367-6792	
Well Driller/Repair			
Pump Repair			
Electrician			
Plumber			
Backhoe			
Chemical Feed			
Meter Repair			
Generator			
Valves			
Pipe & Fittings			
Water Storage			

Laboratory			
Engineering firm			

Communications	Name	Work Telephone	Alternate Telephone
News Paper			
Radio Station			
School Superintendent			
Property & Casualty Insurance			

Critical Water Users	Name	Work Telephone	Alternate Telephone
Hospital Critical Use:			
Nursing Home Critical Use:			
Public Shelter Critical Use:			

Appendix 6

Cooperative Agreements for Emergency Services

(Vermillion does not have any cooperative agreements with other water utilities)

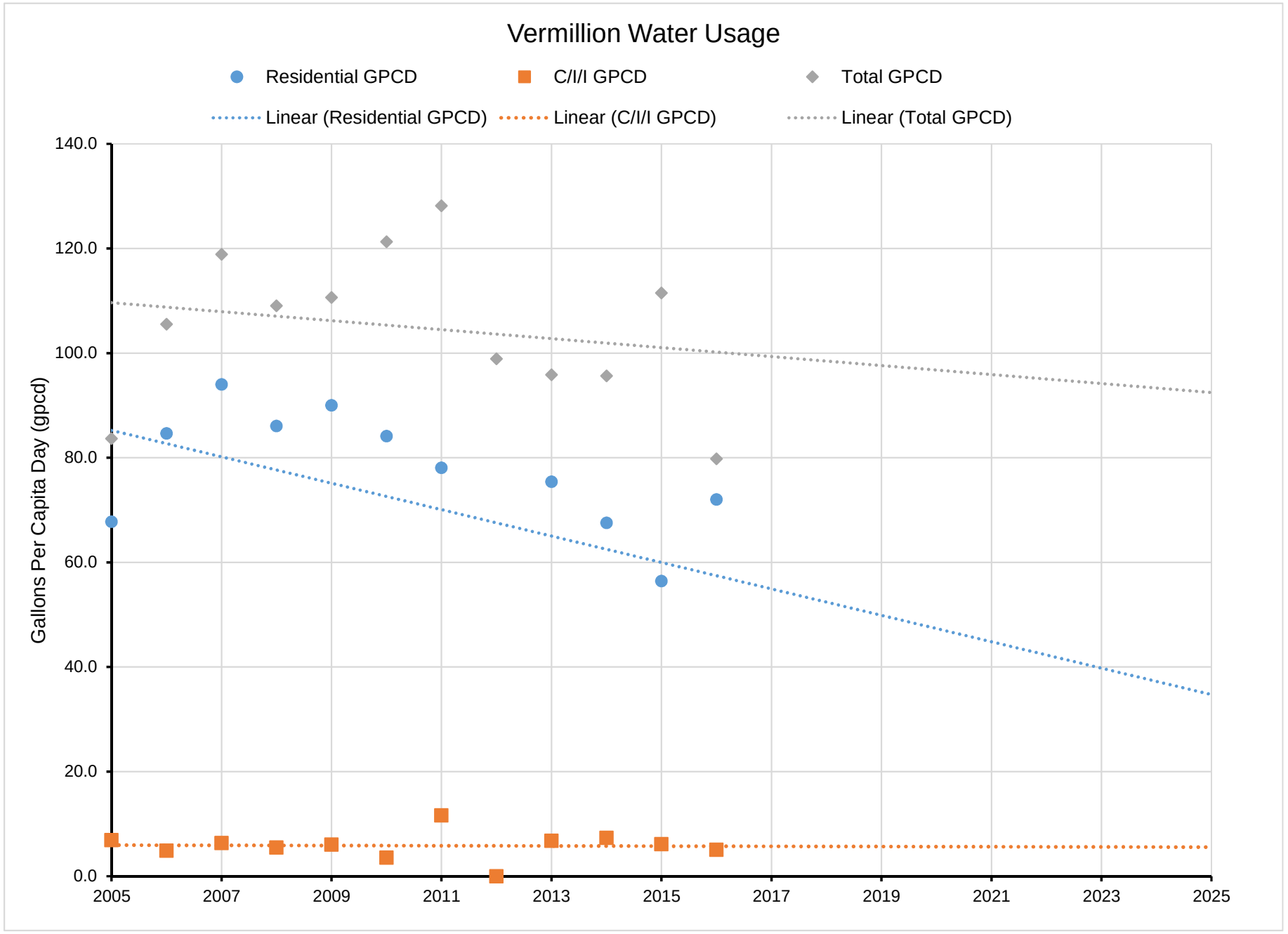
Appendix 7

Municipal Critical Water Deficiency Ordinance

(Not available)

Appendix 8

Graph of Ten Years of Annual Per Capita Water Demand for Each Customer Category


Vermillion Water Usage
Residential GPCD
C/I/I GPCD
Total GPCD
Linear (Residential GPCD)
Linear (C/I/I GPCD)
Linear (Total GPCD)
Gallons Per Capita Day (gpcd)
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023
2025

Appendix 9

Water Rate Structure

The rate structure for the City of Vermillion is broken down in the table below. The rates do not deviate for commercial or residential use.

Base Rate	Additional Charges as of 1/1/18
$40.50	$2.00/1000 gallons

Appendix 10

Ordinances or Regulations Related to Water Use

(Not available)

Appendix 11

Implementation Checklist

The City of Vermillion intends to continue to improve their system with the goal of reducing both residential and total water demands. This will be done in the ways described in the table below.

Activity Implemented	Activity or Action Item	Timeframe
X	Repair leaks and make water system infrastructure improvements	Ongoing
	Provide information to customers about water conservation	Future, periodic

Appendix 12

Sources of Information for Table 10

Vermillion Water Supply Profile

Overview of water system and use in the community

The community owns and operates their own water supply system.

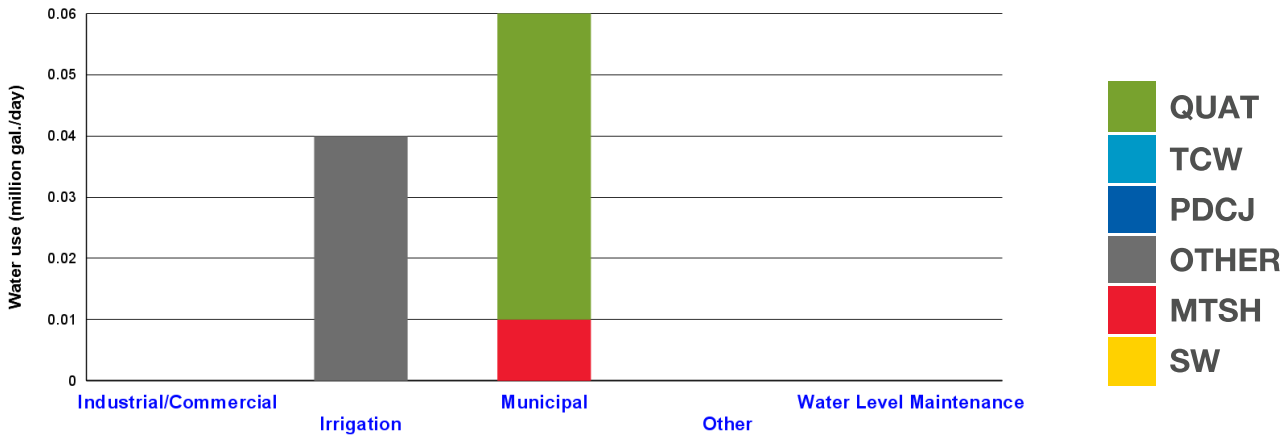
Available approaches to meet current and future demand

1. Conservation
2. Groundwater sources
3. Stormwater reuse
4. Reclaimed wastewater
5. Enhanced recharge
6. Surface water sources

Number of active public and private DNR-permitted wells and surface water intakes that provide water to residents and businesses in the community

Source	Municipal Wells or intakes in the community	Non-Municipal Wells or intakes in the community	Municipal Wells or intakes outside the community
Mt. Simon-Hinckley (MTSH)	1	0	0
Prairie du Chien-Jordan (PDCJ)	0	1	0
Quaternary (QUAT)	1	0	0
Tunnel City-Wonewoc (TCW)	0	0	0
Multi-aquifer (MULTI)	0	1	0
Surface Water (SW)	0	1	0

Amount of water used, on average, by water appropriation permit holders in key water use categories (chart will be blank if no DNR-permitted wells or intakes provide water in the community)



Municipal Water Use

Municipal water treatment: Disinfection, Fluoride

Rate structure: Flat

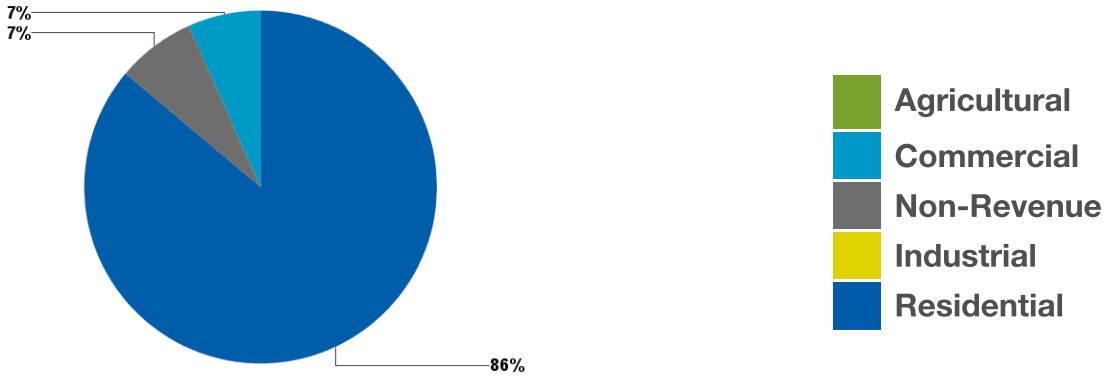
Permitted amount in 2012: 25 (million gallons/year)

Reported use in 2012: 16 (million gallons/year) 0.04 (million gallons/day)

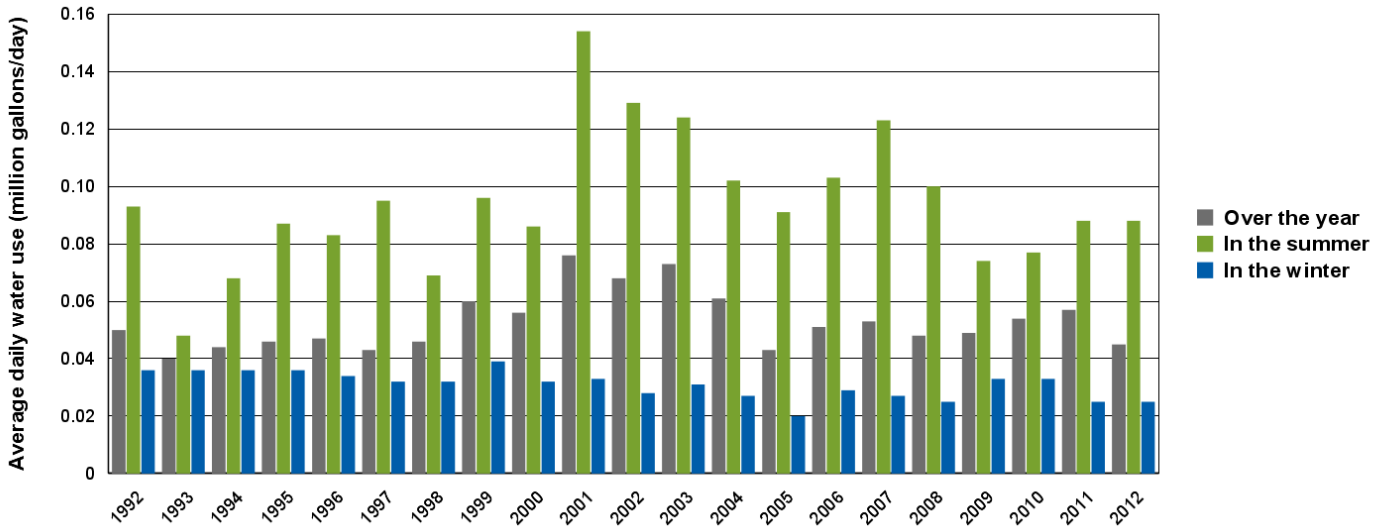
Note: this may be higher than permitted amount if, for example, water is purchased from a neighbor

Residential water use per person in 2012: 90 gallons per person per day

Water use by major categories in 2012



Historical municipal water use in the community



Projected municipal water use

	2020	2030	2040
Population Served	410	420	420
Total Population	410	420	420
Projected Average Daily Water Use (Million Gal./Day), Plus or Minus 20%	0.05	0.05	0.05
Total Per Capita Water Use (Gal./Person/Day)	126	126	126
What per capita water use would be, if population grew without changing total water use:	108	106	106

Water resource plans and permits that address the following issues support more sustainable water supplies

- State and federal requirements, such as Safe Drinking Water Act standards, conditions identified on water appropriation permits issued by the DNR, water quality permits issued by the MPCA and others
- Potential for water use conflicts and well interference
  - Due to the pervasiveness of private wells in the metro area, there exists a potential water use conflict and well interference of all appropriators
- Potential for impacts of groundwater pumping on surface water features and ecosystems
  - A state-designated trout stream has been mapped nearby
  - Surface waters in this area may be directly connected to regional groundwater system
- Significant vulnerability to contamination
  - A vulnerable Drinking Water Supply Management Area has been designated in the area
  - Travel time from land surface to bedrock aquifers is estimated to be less than 50 years
- Significant uncertainty about aquifer productivity and extent
  - The county geologic atlas is more than twenty years old

Note: Local studies may be underway or completed to provide more information about these issues.

The Metropolitan Council's Local Planning Handbook contains interactive maps of all of these issues, and they are also summarized in Chapter 5 of this Master Water Supply Plan.

As appropriate, incorporate the following actions into plans and programs, consistent with your organization's roles and responsibilities

- Acknowledge the issues above and support partnerships to address them in local water supply plans and water appropriation permit applications.
- Explore and support water demand (water conservation) programs such as incentives, ordinances, education and outreach, rates and other approaches. The Metropolitan Council Water Conservation Toolbox can support these efforts.
- Promote the evaluation of water conflict and well interface as part of the water appropriation permit request and review process. Before requesting water appropriations, water users in this areas should evaluate the need to address water conflict and well interference including a) an inventory of all active domestic and public water supply wells near proposed well locations and b) an analysis of existing water level/water withdrawal data to identify where future drawdowns could affect domestic wells.
- Work with partners to evaluate relationships between aquifer withdrawals and surface water features. If a connection is likely, management plans should include aquifer testing, monitoring water levels and pumping rates and surface water flow, triggers and actions to protect aquifer levels, a schedule for periodic

analysis of data to identify the need for action to mitigate impacts, and a schedule for periodic and timely reporting to DNR.

- Collaborate with partners, including MDH, to support local actions that prevent the spread of contamination. This may include implementation of source-water protection plan measures to mitigate public health risks. Where significant contamination exists, MDH will continue enhanced monitoring, and public water suppliers in the area may need to implement treatment processes to meet Safe Drinking Water Act requirements and manage pumping to better control the extent and magnitude of contaminant plumes.
- Work with partners to identify opportunities for sharing information, reducing duplicate work, and partnering on projects that improve understanding about aquifer productivity and extent.
- Support collaborative efforts to periodically review local water supply risks and potential alternatives to mitigate those risks. Technical advances, regulatory adjustments and sub-regional developments can present new opportunities for local water suppliers to enhance the resiliency, sustainability, and affordability of their water supplies.
- Continue to work with local, state and federal agencies, as required.

Note: The actions listed above may be underway or completed, and information may be available from local public water suppliers, planners, or water resource managers.

Additional information and guidance is provided in the Local Planning Handbook. Metropolitan Council staff can also provide technical and planning assistance.

Figure 2. Surface Water Resources

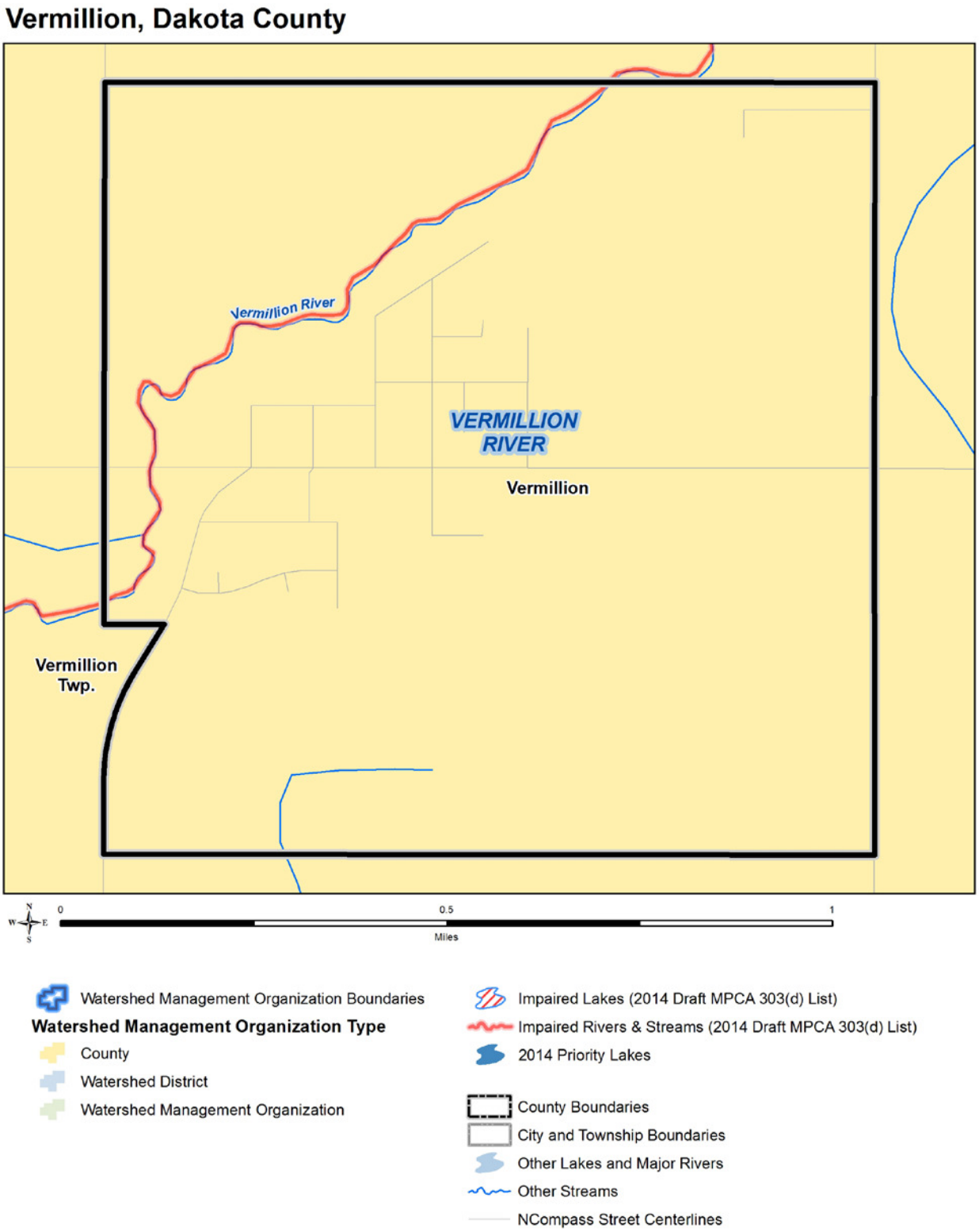


Figure 3. Surface water features and interaction with the regional groundwater system, and state-protected surface water features

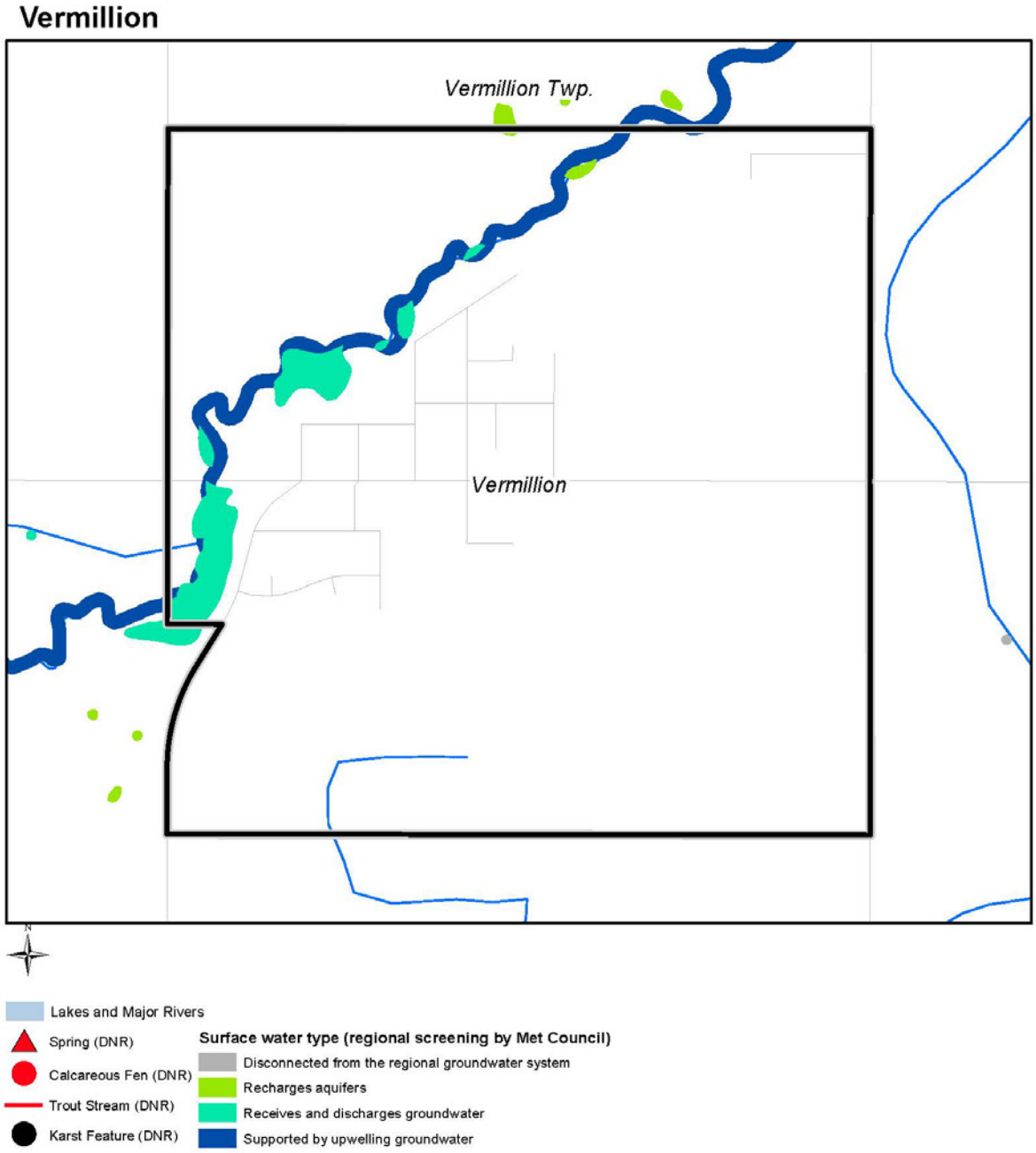


Figure 4. Availability of MN Department of Natural Resources groundwater level and MN Department of Health aquifer test data

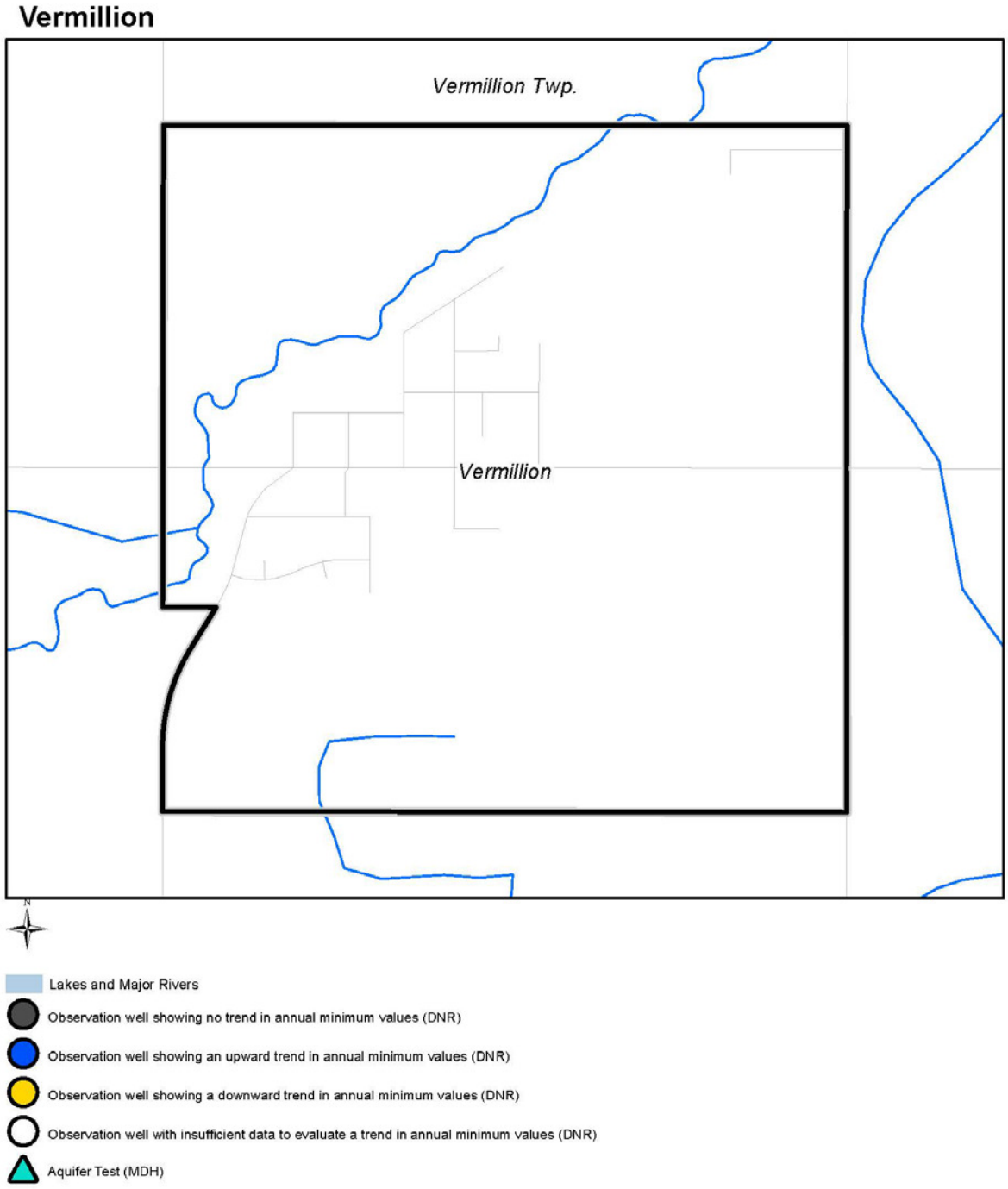


Figure 5. Municipal public water supply system interconnections and regulatory management areas