

Draft Water Supply Service Area Plan



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October 2, 2025

PREPARED FOR:

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I. INTRODUCTION

In June of 2024, Wisconsin Administrative Code NR 854 was published, requiring many public water utilities to each create a Water Supply Service Area Plan (Plan). This requirement applies to public water systems that withdraw from the waters of the state and that serve a population of 10,000 or more. Water systems are required to have a Plan prepared before the end of the year 2025. In addition to preparing a plan, water systems are required to obtain approval from the Wisconsin Department of Natural Resources (WDNR) if a general or individual permit is needed under s. 281.346 (4s) and (5) of the Wisconsin State Statutes, or if the water system is requesting a new or increased diversion of Great Lakes water under s. 291.346 (4).

The Racine Water Utility (RWU) serves a retail population of approximately 110,500, as of 2024, and is required to prepare a Plan. RWU is required to prepare this Plan to comply with NR 854; however, RWU is not required to submit the Plan for WDNR approval because it is not requesting a general or individual permit, and it is not requesting new or increased diversion of Great Lakes water.

A. Planning Period

This Plan uses a 20-year planning period and expires in the year 2045. This Plan is required to be reviewed at least every 5 years and updated as necessary (NR 854.05). Current and future water needs were evaluated over a 20-year planning period with consideration given to projected future water needs extending to the year 2045.

B. Scope

RWU completed a Comprehensive Water System Study in 2017 (2017 Study). An update to the 2017 Study was completed in 2018 (2018 Update) to account for additional planned development in the Village of Mount Pleasant. Many of the requirements listed in NR 854 are satisfied by the 2017 Study, and this Plan is prepared as a supplement to the 2017 Study. This Plan is not a comprehensive update to the 2017 Study and only makes updates as necessary to meet requirements listed in NR 854. The following features within the 2017 Study are updated in this Plan:

- Chapter 2: Descriptions of existing water system facilities with new facilities that have been constructed or modified and removes facilities that have been decommissioned.
- Chapter 3: Population and community growth projections.
- Chapter 4: Water sales and pumpage projections.
- Chapter 5: Supply and storage analysis for the water system as a whole. Booster station and storage capacity of individual pressure zones are not analyzed in this Plan.

C. Service Area

The existing service area is illustrated in Figure I-1. RWU provides retail water service to the following municipalities:

- City of Racine
- Village of Mount Pleasant
- Village of Elmwood Park
- Village of North Bay
- Village of Somers (30 customers)
- Village of Sturtevant

RWU also provides wholesale water service to the southern portion of the Village of Caledonia. The Village of Caledonia provides wholesale water service to the Village of Wind Point. Since the 2107 Study and 2018 Update was completed, the Village of Raymond has asked for an evaluation to expand the RWU water service area to provide water service to serve parts of the Village of Raymond.

D. Study Limitations and Assumptions

The following limitations and assumptions underlie the work elements of this Plan:

1. The primary purpose of this Plan is to develop a system plan to guide the extension of adequate water supply services by RWU to existing and probable future development within the service area. The Plan identifies water system infrastructure needed.
2. The Plan produced is to provide a sound basis for future facility planning. To this end, the Plan reviews the size and capacity supply sources and storage facilities.
3. The Plan is to be based upon previously developed land use, population information, and water studies provided to Ruekert & Mielke, Inc. The Plan is designed to serve and support anticipated community needs based upon the current land use and population projections.
4. Recommendations resulting from the planning efforts are to be consistent with current federal, state and local regulations regarding facility design.
5. The investigation is limited to a review of existing available water quality data and does not include any sampling, laboratory work, or pilot testing.

R:\CLIENTS DATA\8022 Racine\10064-101 Water Supply\Study_Area.aprx - Fig I-1 Layout

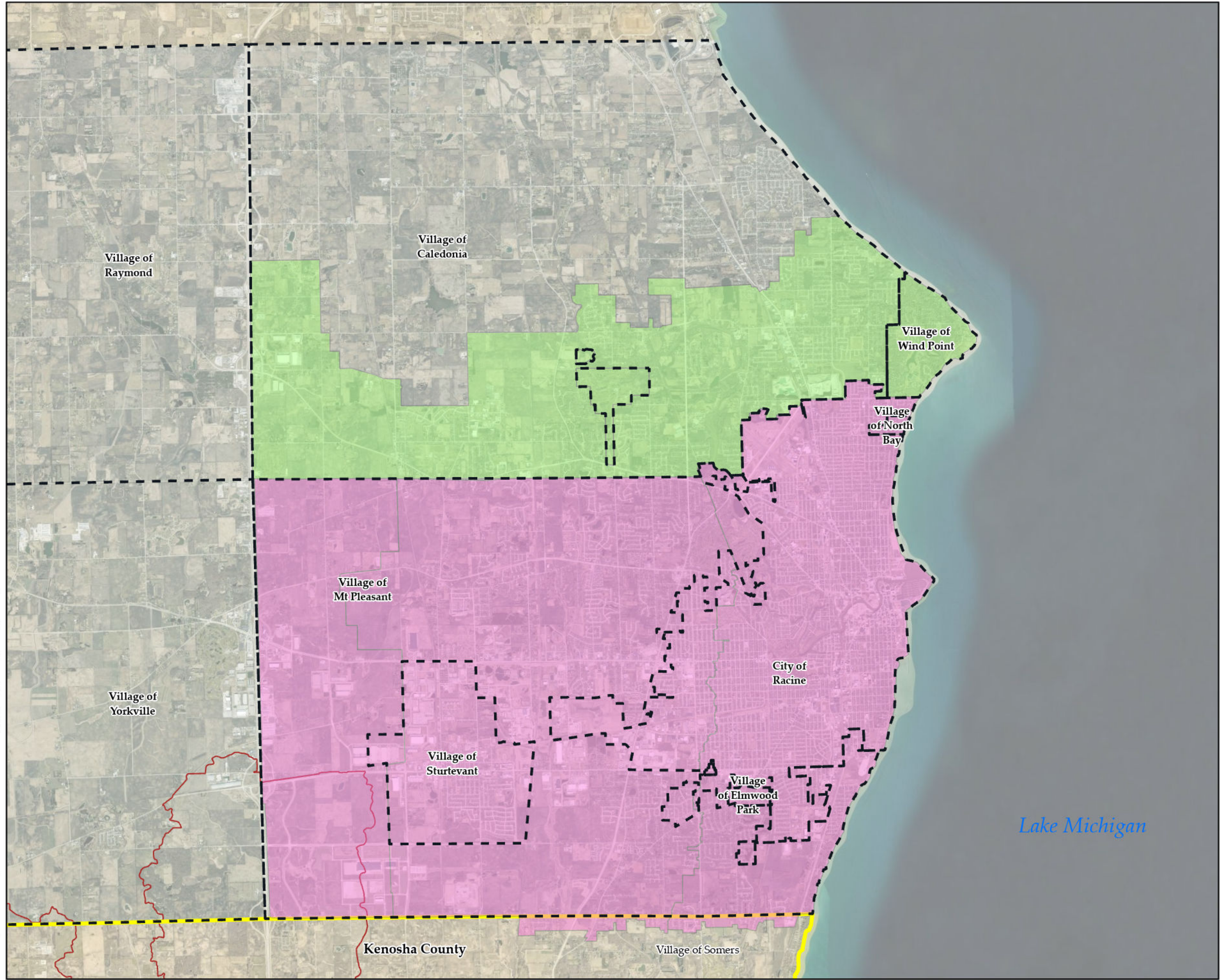
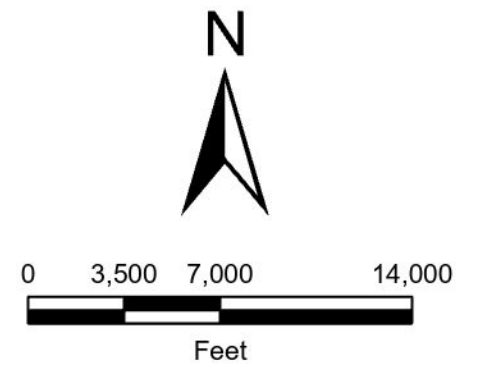


Figure I-1
Existing Service Area

Racine Water Utility
Racine County, Wisconsin

- Existing Wholesale Service Area
- Existing Retail Service Area
- Subcontinental Divide
- Civil Division
- Kenosha County



Date: 9/17/2025

II. EXISTING WATER SYSTEM FACILITIES

Chapter 2 of the 2017 Study describes existing water system facilities in detail; however, there have been several substantial changes to the facilities since the 2017 Study. The major modifications are summarized below:

- The 862 pressure zone was absorbed into the 875 pressure zone.
- The Regency Mall elevated storage tank (EST) in the 862 pressure zone was abandoned.
- The 1.25 million gallon (MG) Louis Sorenson EST was constructed in the 933 pressure zone.
- The Braun Road booster station was constructed to supply water to the 933 pressure zone.

RWU has also made other improvements to the distribution system including several water main replacements, construction of transmission water mains, and the partial construction of a 42-inch transmission main which is planned to be completed in late 2026. Distribution system needs and improvements are not listed here in detail here. Updated water system facilities are shown in Figure II-1 and Figure II-2. Updated pressure zone boundaries are shown in Figure II-3.

A. Water Supply and Treatment

1. Surface Water Intakes

RWU has three surface water intakes in Lake Michigan. The three intakes were constructed in 1886, 1928, and 1971. The intakes are described in Table II-1. The total permitted capacity for the intakes is 60 MGD. Water pumpage is metered for all intakes combined, not for each individual intake. Annual pumpage from 2015 to 2024 is shown in Table II-2 in million gallons per year (MGY).

Table II-1: Lake Michigan Surface Water Intakes

Intake Characteristic	Intake 1	Intake 2	Intake 3
Year Constructed	1886	1928	1971
Depth Below Surface	39 ft	29 ft	23 ft
Diameter	24 in	36 in	54 in
Distance from Shore	6,000 ft	6,400 ft	4,100 ft
Approved Capacity	60 MGD (41,666 gpm)		

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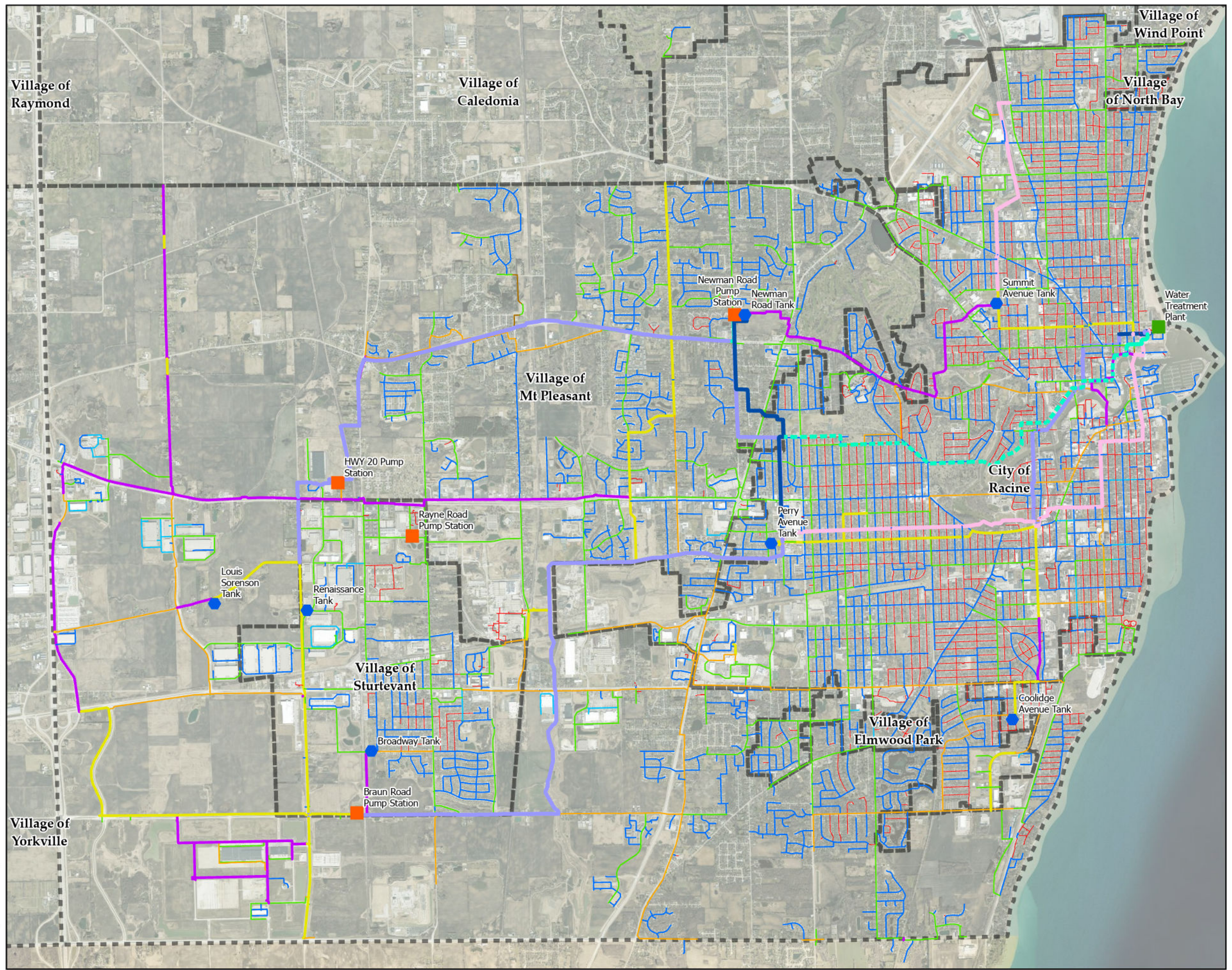
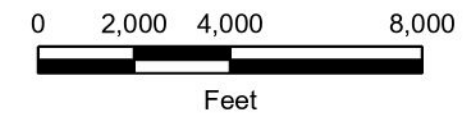


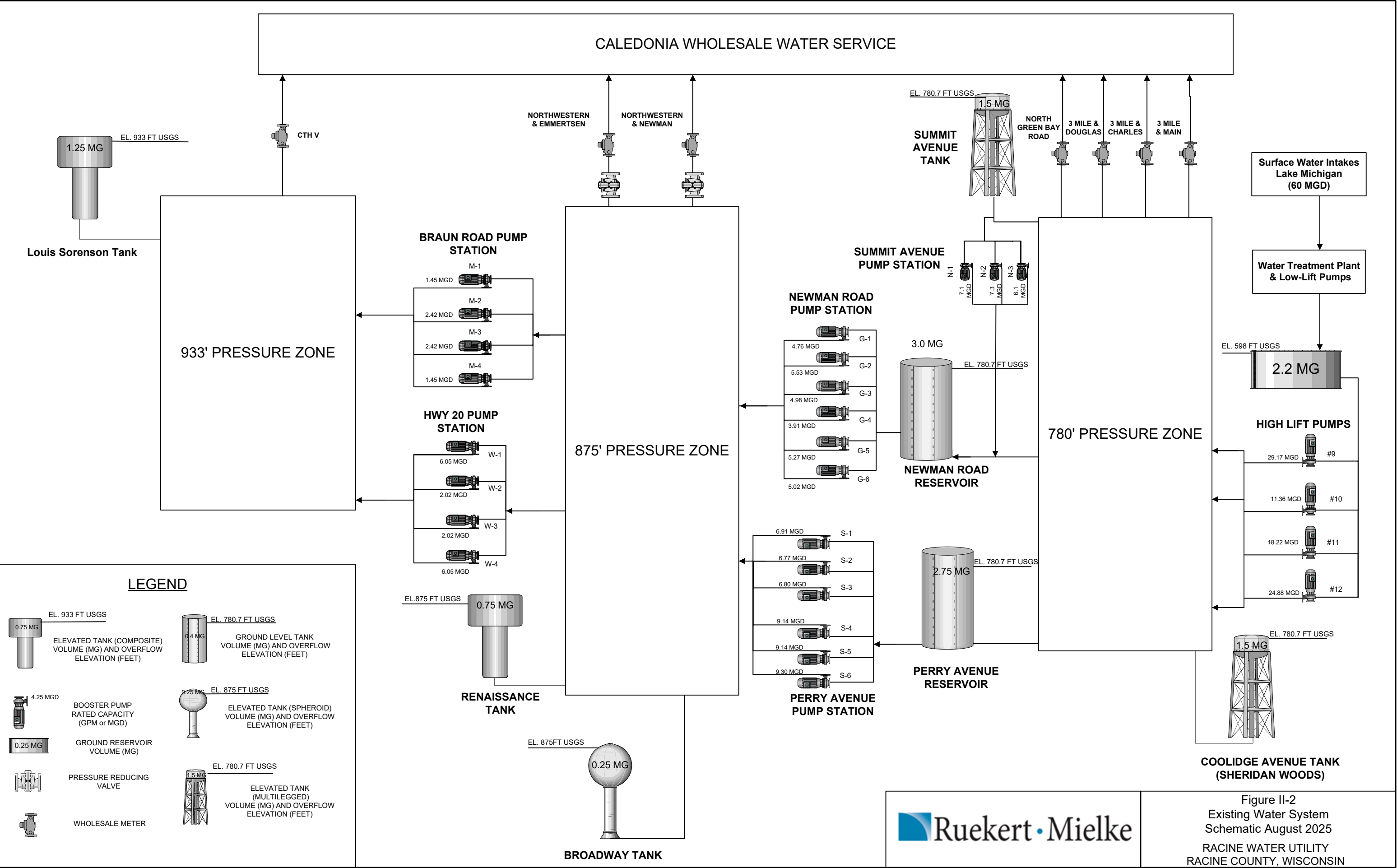
Figure II-1
Existing Water System

Racine Water Utility
Racine County, Wisconsin

- Water Treatment Plant
- Water Storage Tank
- Pump Stations
- - - Proposed 42" Water Main
- Water Main
 - 6" and Less
 - 8"
 - 10"
 - 12"
 - 14"
 - 16"
 - 20"
 - 24"
 - 30"
 - 36"
 - 42"
 - 48"
- - - Civil Division



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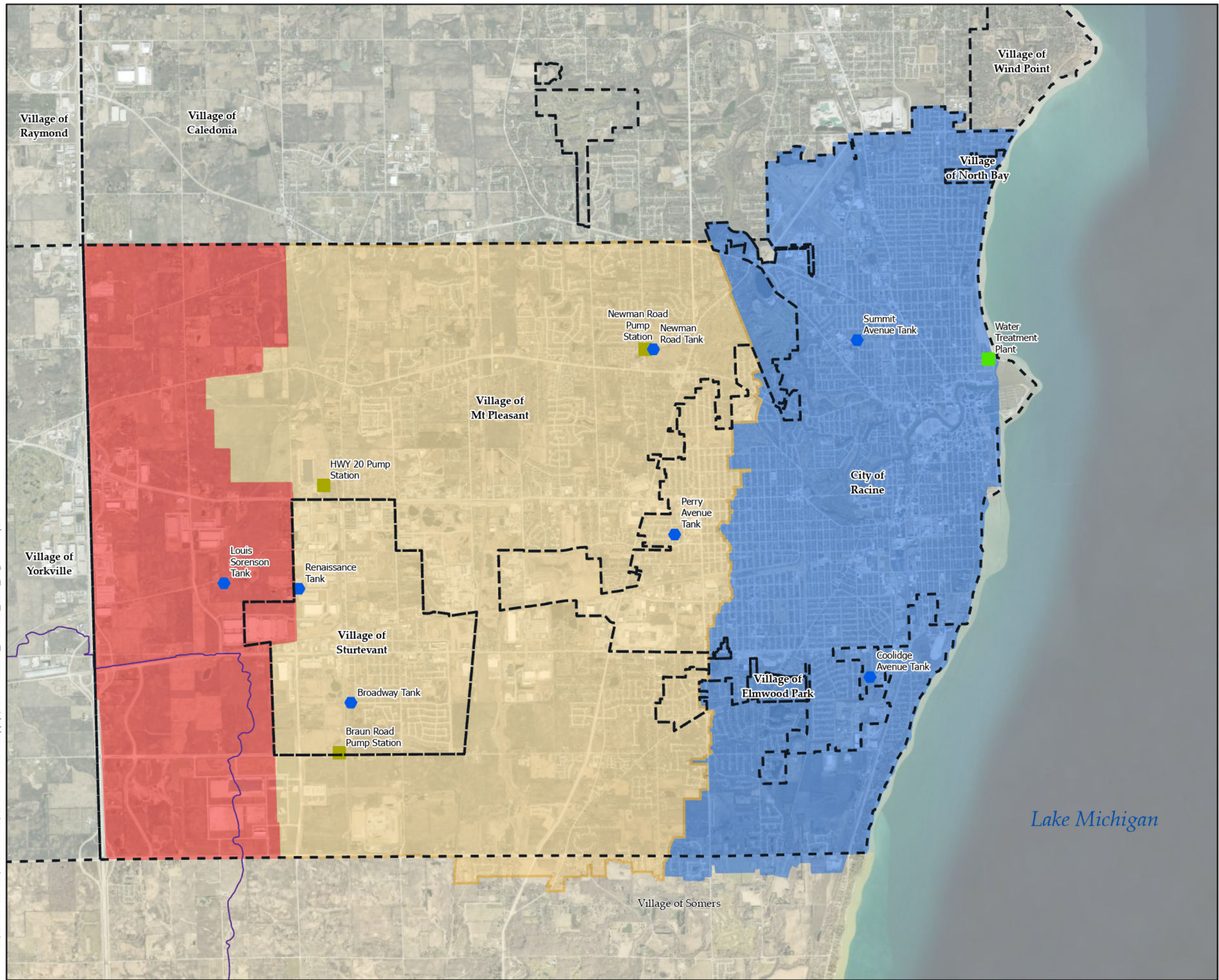
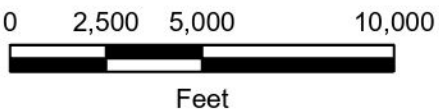


Figure II-3
Existing Pressure
Zones

Racine Water Utility
Racine County, Wisconsin

Pressure Zones

- 780.7 Retail
- 875 Retail
- 933 Retail
- Water Treatment Plant
- Water Storage Tank
- Pump Stations
- Subcontinental Divide
- Civil Division



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Table II-2: Annual Pumpage

Year	Annual Pumpage (MGY)
2015	5,879.6
2016	6,151.7
2017	6,052.6
2018	5,930.5
2019	5,656.2
2020	5,575.4
2021	5,700.6
2022	5,482.7
2023	5,531.5
2024	5,517.9

B. Water Treatment Plant and Facilities

RWU's treatment facilities have a rated capacity of 60 MGD, per the 2017 Study. The treatment processes include:

- Flocculation/sedimentation
- Permanganate injection
- Application of powdered activated carbon
- Sand filtration
- Membrane filtration
- Gas chlorine disinfection
- Orthophosphate injection
- Fluoridation

The treatment plant also includes clearwells, ground storage reservoirs and pumps, as described in Section 2.3.1 of the 2017 Study. Treatment effectiveness is not analyzed in detail in this Plan.

C. Water Storage Facilities

RWU has several storage facilities which are located throughout the water distribution system in each pressure zone, including several ESTs and standpipes. The 2017 Study has information on each of the ESTs except for the Louis Sorenson EST which was constructed in 2019. Additionally, the Regency Mall EST that is discussed in the 2017 Study is no longer in service. The combined storage capacity is 11 MG. RWU's storage facilities are listed below. The 1.25 MG Louis Sorenson EST was constructed in 2019, after the 2017 Study. This tank is described in Table II-3.

- **Sheridan Woods (Coolidge):** 1.50 MG EST, 780 zone, see Table 2-4 of 2017 Study
- **Newman Road:** 3.00 MG Standpipe, 780 zone, see Table 2-10 of 2017 Study
- **Perry Ave:** 2.75 MG Standpipe, 780 zone, see Table 2-9 of 2017 Study
- **Renaissance:** 0.75 MG EST, 780 zone, see Table 2-7 of 2017 Study
- **Summit Ave:** 1.50 MG EST, 780 zone, see Table 2-5 of 2017 Study
- **Broadway:** 0.25 MG EST, 875 zone, see Table 2-8 of 2017 Study
- **Louis Sorenson:** 1.25 MG EST, 933 zone, see Table II-3 of this Plan

Table II-3: Louis Sorenson EST

Louis Sorenson EST	
Capacity	1,250,00 gallons
Year constructed	2019
Type	Composite
Construction material	Steel/concrete
Overflow elevation	933 feet
Diameter	Varies
Head range	40'
Height to overflow	180 ft



D. Booster Pumping Facilities

RWU operates and maintains five booster pumping facilities that supply water to the 875 and 933 pressure zones. The booster stations are discussed in Chapter 2.3.3 of the 2017 Study; however, the Rayne Road pump station that is discussed has been removed from service and a new pump station, the Braun Road booster station, has been constructed to feed the 933 pressure zone. Additionally, pump replacements and station upgrades to the Perry Avenue and to the Highway 20 pump stations were completed within the past few years. A detailed analysis of the booster station capacities is not provided in this Plan.

E. Inventory of Alternative Sources

RWU currently owns and operates three surface water intakes that withdraw from Lake Michigan and there are no plans to seek an alternative supply. In the unlikely scenario that RWU is required to develop an alternative drinking water source, the most feasible option would be to construct one or more new surface water intakes in Lake Michigan. This would be the most feasible option because RWU already has surface water treatment facilities that treat water from Lake Michigan.

Other less feasible alternative sources include construction of new wells or wholesale water purchase from another water system. Construction of new wells is possible, but the quantity of water that is needed to supply RWU and its wholesale customers would require the construction of several high production wells and corresponding groundwater treatment facilities. This alternative is feasible but would pose a large financial burden to RWU. The last option for an alternative water source would be wholesale purchase from another large water system such as Kenosha or Oak Creek. This alternative would likely require the construction of miles of large transmission mains and the feasibility would depend on the supplying utility's ability to accommodate the additional water demands that are currently supplied by RWU. This option is most likely not feasible.

F. Existing Diversion of Great Lakes Water

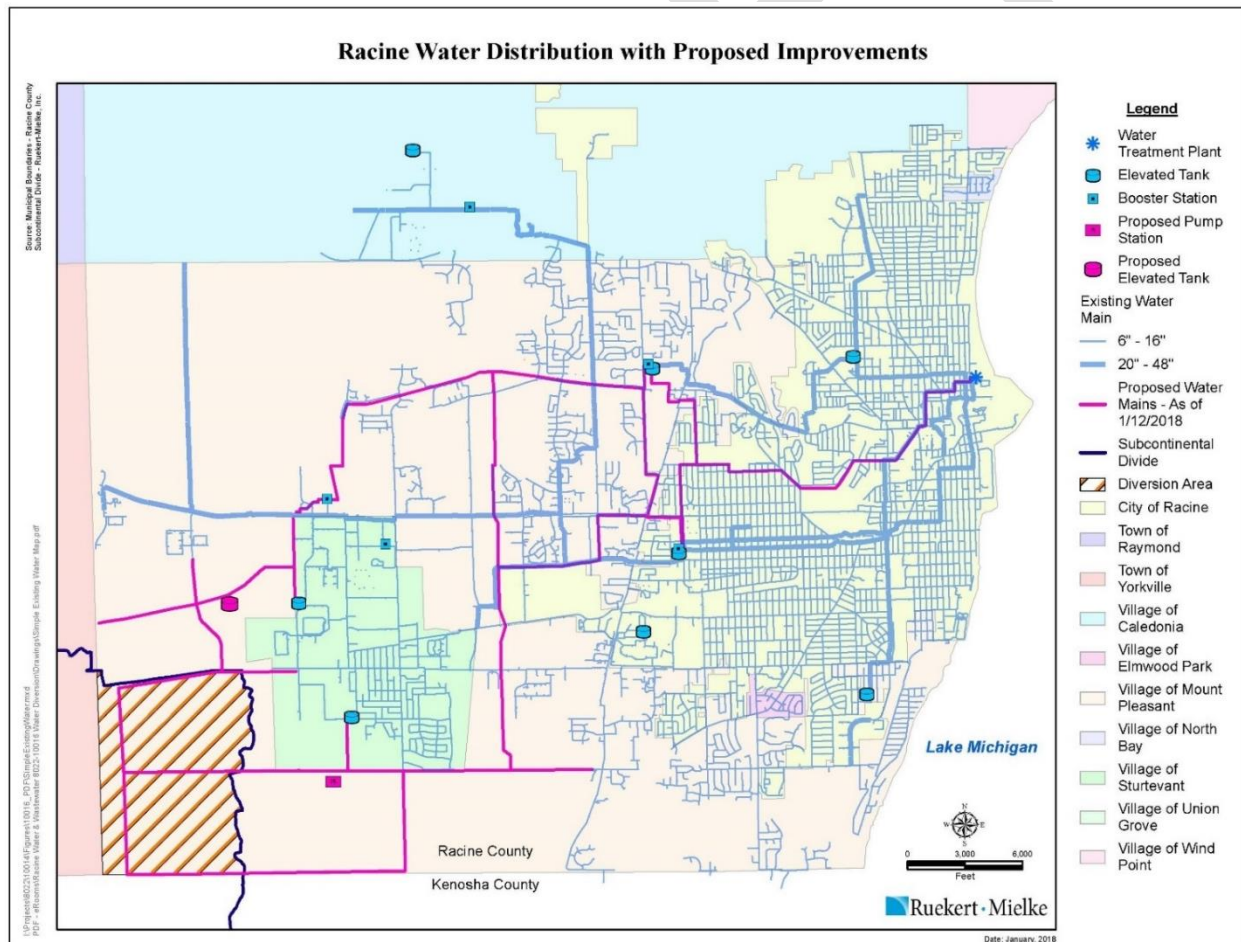
RWU diverts some of its water from the Great Lakes Basin to the Mississippi River Basin. The divide between the Great Lakes Basin and the Mississippi River Basin runs through the southwestern portion of the Village of Mount Pleasant. A diversion application was submitted in 2018, requesting to increase diverted Great Lakes water to an estimated 7 MGD as shown in Table II-4. There are no plans to further increase the approved diversion amount at this time.

Figure II-4, which is taken from the 2018 Diversion Application, shows the diversion area. The diversion application notes that RWU would use metered water sales and sewer flow metering to estimate quantities of water diverted and quantity of return flow.

Table II-4: Forecasted Diversion Amounts at Full Buildout (Taken from 2018 Diversion Application)

Diversion	Return Flow	Consumptive Use
7.0 MGD	4.3 MGD	2.7 MGD

Figure II-4: Existing Diversion Area (Taken from 2018 Diversion Application)



III. POPULATION AND COMMUNITY GROWTH

Chapter 3 of the 2017 Study provides historical and projected population and community growth within the RWU water service area. These projections are updated and revised in this Plan. The population and community growth discussed here will be used as the basis for the service area water requirement projections presented in Chapter IV of this Plan.

A. Service Population

Estimates for the service population are made in Section 3.1.2 of the 2017 Study. These population estimates are updated as part of this Plan. Table III-1 shows the updated historical and projected populations for all the communities that are retail or wholesale customers of RWU. The population estimates are taken from the Wisconsin Department of Administration (DOA) historical estimates from the year 2000 and projected population up to the year 2050.

Table III-2 shows the estimated population that is served by RWU. The Village of Mount Pleasant, up until recently, was only partially served by RWU. In the 2017 Study, it was estimated that about 50% of the population of the Village of Mount Pleasant was served by RWU. This number was based on the number of services and household size. It was also estimated that 100% of the population of Mount Pleasant would be supplied drinking water from RWU by the year 2035. Since then, water service in Mount Pleasant has expanded and RWU now provides water to more than 90% of the population. In this Plan, projected water demands to the Village of Mount Pleasant assume that RWU provides water to 100% of the population.

The Village of Caledonia purchases wholesale water from both RWU and the Oak Creek Water and Sewer Utility (OCWSU). The Village of Wind Point purchases wholesale water from the Village of Caledonia. As is discussed in Section IV of this Plan, the quantity of water that is supplied to Caledonia by RWU compared to OCWSU has varied, but on average is about 75%. Therefore, for projecting the population that is served water by RWU, a factor of 75% is applied to the populations of Caledonia.

1. Planned Service Area Expansion

Within the planning period, there are plans to expand the service area of RWU to serve parts of the Village of Raymond. This planned expansion is shown in Figure III-1 and associated water demand projections are discussed further in Chapter IV of this Plan.

B. Projected Growth Areas

Section 3.4 of the 2017 Study discusses future growth areas within RWU service area; however, this Plan does not estimate growth in each individual pressure zone. Nearly all of the planned growth areas in the retail service areas are located in the undeveloped areas in the Village of Mount Pleasant since the City of Racine and the Village of Sturtevant are mostly developed. While redevelopment in the City of Racine and the Village of Sturtevant will likely occur, the impacts to the water demands for redevelopment is not accounted for in this Plan. The Village of Mount Pleasant has several areas of planned development that are expected to occur during the planning period of this Plan.

The 2018 Update included significant water demands for proposed developments within the Village of Mount Pleasant TID No. 5 area. To date, the significant water demands for the proposed developments within the Village of Mount Pleasant TID No. 5 have not been realized. This Plan revisits the information used in the 2018 Update and revises the projected growth and water demands within the Village of Mount Pleasant.

Staff from the Village of Mount Pleasant provided GIS data titled “2035 Proposed Development”, which represents future land use. After reviewing the GIS data, approximately 7,000 acres of currently undeveloped land that is planned for future development were identified. In a discussion with the Village’s planning staff, they noted that, given the current rate of development, the undeveloped areas will likely not reach full buildout until at least 2050 rather than 2035. The proposed land use within the Village of Mount Pleasant is shown in Figure III-2. Planned acreage for each land use type is used in water demand projections and are discussed further in Chapter IV.

Despite the large amount of planned development, the DOA population projections predict a net population decrease for the service area. The water demand projections in Chapter IV account for this by using population increase/decrease as the basis for water sales to existing development while using future land use acreage as the basis for water sales to future development.

Table III-1: Historical and Projected Populations

Municipality ¹	Historical Population				Projected Population		
	2000	2010	2020	2024	2030	2040	2050
Retail Customers:							
Village of Elmwood Park	474	497	510	502	485	452	412
Village of Mount Pleasant ²	23,142	26,197	27,732	28,526	28,373	28,445	27,766
Village of North Bay	260	241	209	205	184	158	130
Village of Sturtevant	5,287	6,970	6,919	6,904	6,485	5,965	5,347
City of Racine	81,855	78,860	77,816	77,293	73,020	67,248	60,371
Wholesale Customers:							
Village of Caledonia ³	23,614	25,200	25,361	25,428	24,876	23,971	22,541
Village of Wind Point ³	1,853	1,723	1,676	1,629	1,533	1,396	1,239
Total	136,485	139,688	140,223	140,487	134,956	127,635	117,806
Change in Population		3,203	535	264	- 5,531	- 7,321	- 9,829
Percent Change		2.3%	0.4%	0.2%	-3.9%	-5.4%	-7.7%

Notes

1. Not shown in the table above, RWU also serves 30 customers in the Town of Somers (Kenosha County).
2. The Town of Mount Pleasant incorporated in 2003 to become the Village of Mount Pleasant.
3. The Village of Caledonia purchases wholesale water from both RWU and the Oak Creek Water Utility and provides wholesale water to the Village of Wind Point.

Source: Wisconsin Department of Administration and U.S. Census Bureau

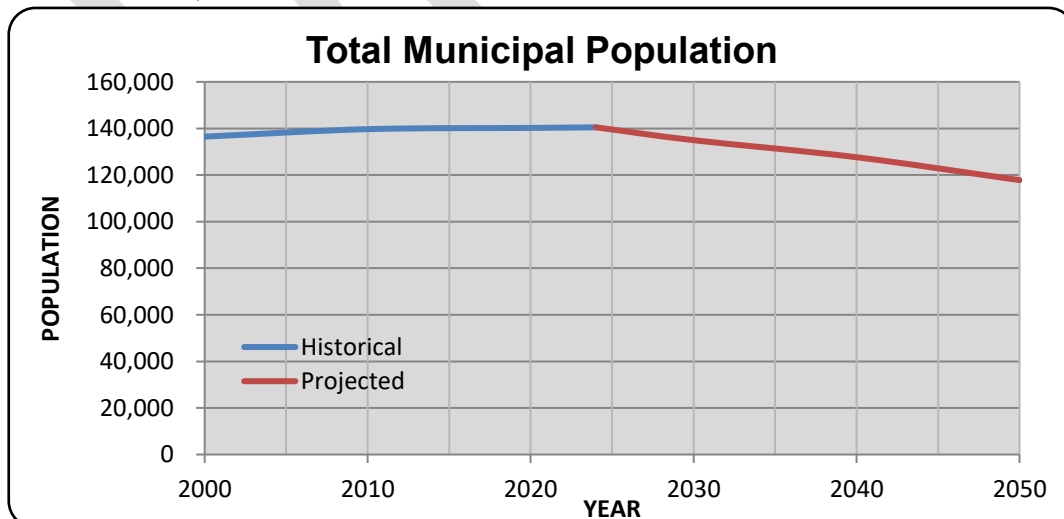


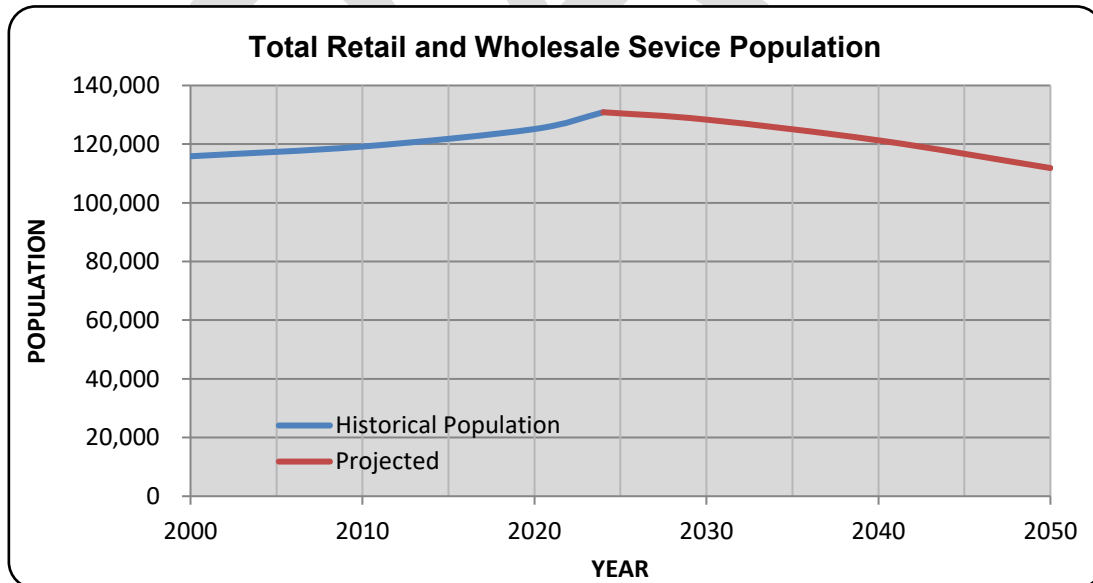
Table III-2: Estimated Water Service Population

Municipality ¹	Historical Population				Projected Population		
	2000	2010	2020	2024	2030	2040	2050
Retail Customers:							
Village of Elmwood Park	474	497	510	502	485	452	412
Village of Mount Pleasant ^{2,3}	8,887	12,428	19,412	25,673	28,373	28,445	27,766
Village of North Bay	260	241	209	205	184	158	130
Village of Sturtevant	5,287	6,970	6,919	6,904	6,485	5,965	5,347
City of Racine	81,855	78,860	77,816	77,293	73,020	67,248	60,371
Total Retail Population:	96,763	98,996	104,866	110,577	108,547	102,268	94,026
Wholesale Customers:							
Village of Caledonia ⁴	17,711	18,900	19,021	19,071	18,657	17,978	16,906
Village of Wind Point ⁴	1,390	1,292	1,257	1,222	1,150	1,047	929
Total Wholesale Population:	19,100	20,192	20,278	20,293	19,807	19,025	17,835
Total Service Population	115,863	119,188	125,144	130,870	128,354	121,293	111,861
Change in Population		3,325	3,410	5,726	- 2,516	- 7,061	- 9,432
Percent Change		2.9%	2.8%	4.6%	-1.9%	-5.5%	-7.8%

Notes

1. Not shown in the table above, RWU also serves 30 customers in the Town of Somers (Kenosha County).
2. The Town of Mount Pleasant incorporated in 2003 to become the Village of Mount Pleasant.
3. About 90% of the Village of Mount Pleasant is currently served by RWU. For future years, it is assumed that 100% of Mount Pleasant is served by RWU.
4. The Village of Caledonia, which also supplies wholesale water to the Village of Wind Point, purchases about 75% of its wholesale water from RWU. A factor of 75% is applied to the population of Caledonia and to Wind Point to estimate the service population.

Source: Wisconsin Department of Administration and U.S. Census Bureau.



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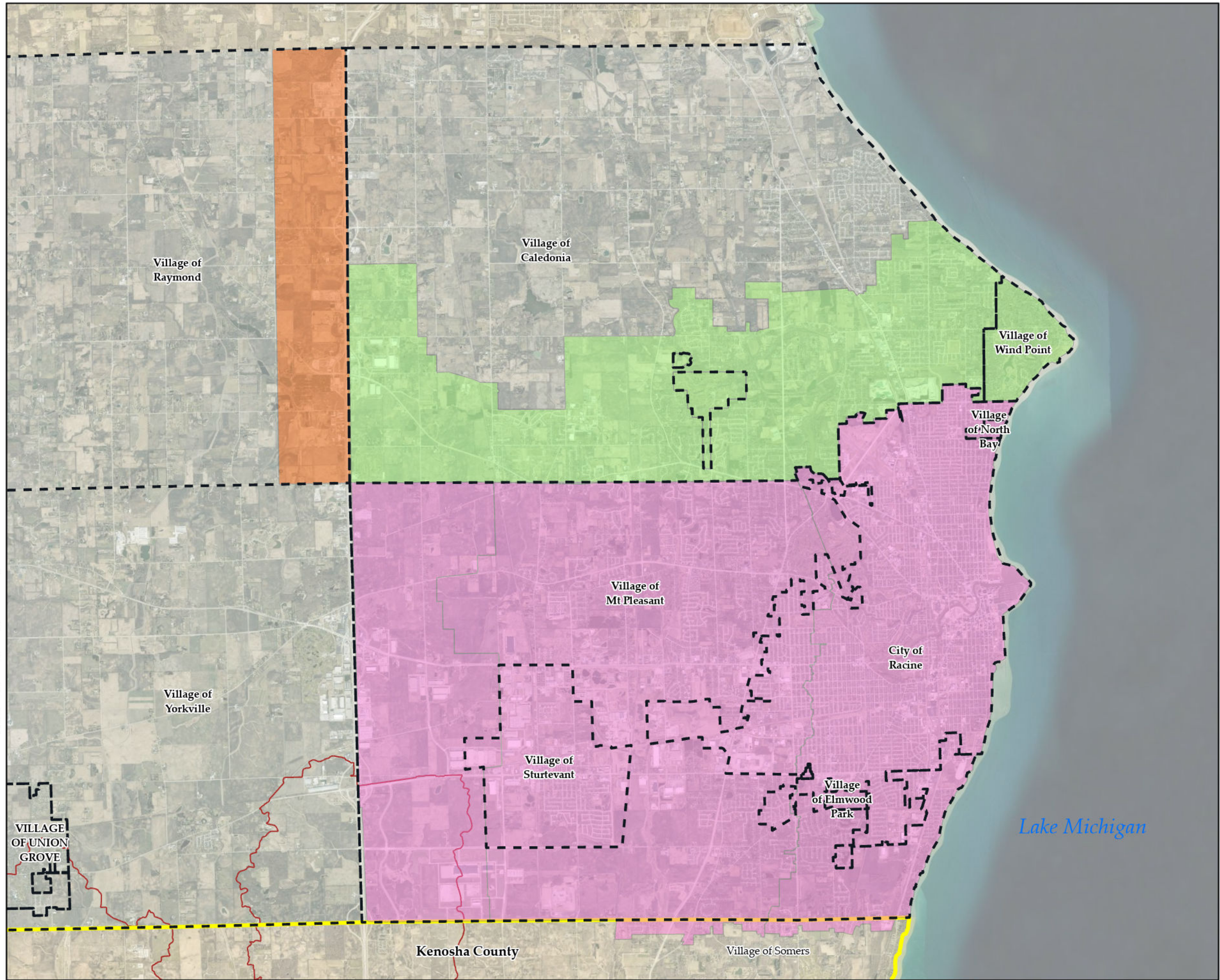
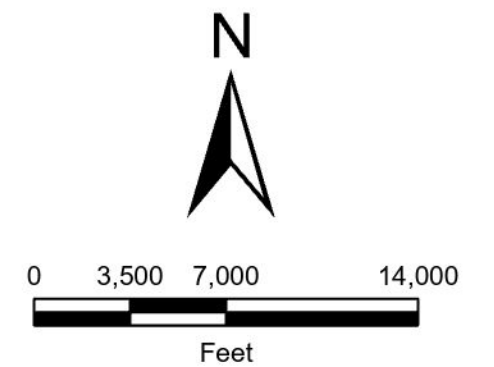


Figure III-1
Planned Service Area

Racine Water Utility
Racine County, Wisconsin

- Future Wholesale Service Area (Village of Raymond)
- Existing Wholesale Service Area
- Existing Retail Service Area
- Subcontential Divide
- Civil Division
- Kenosha County



Date: 9/17/2025

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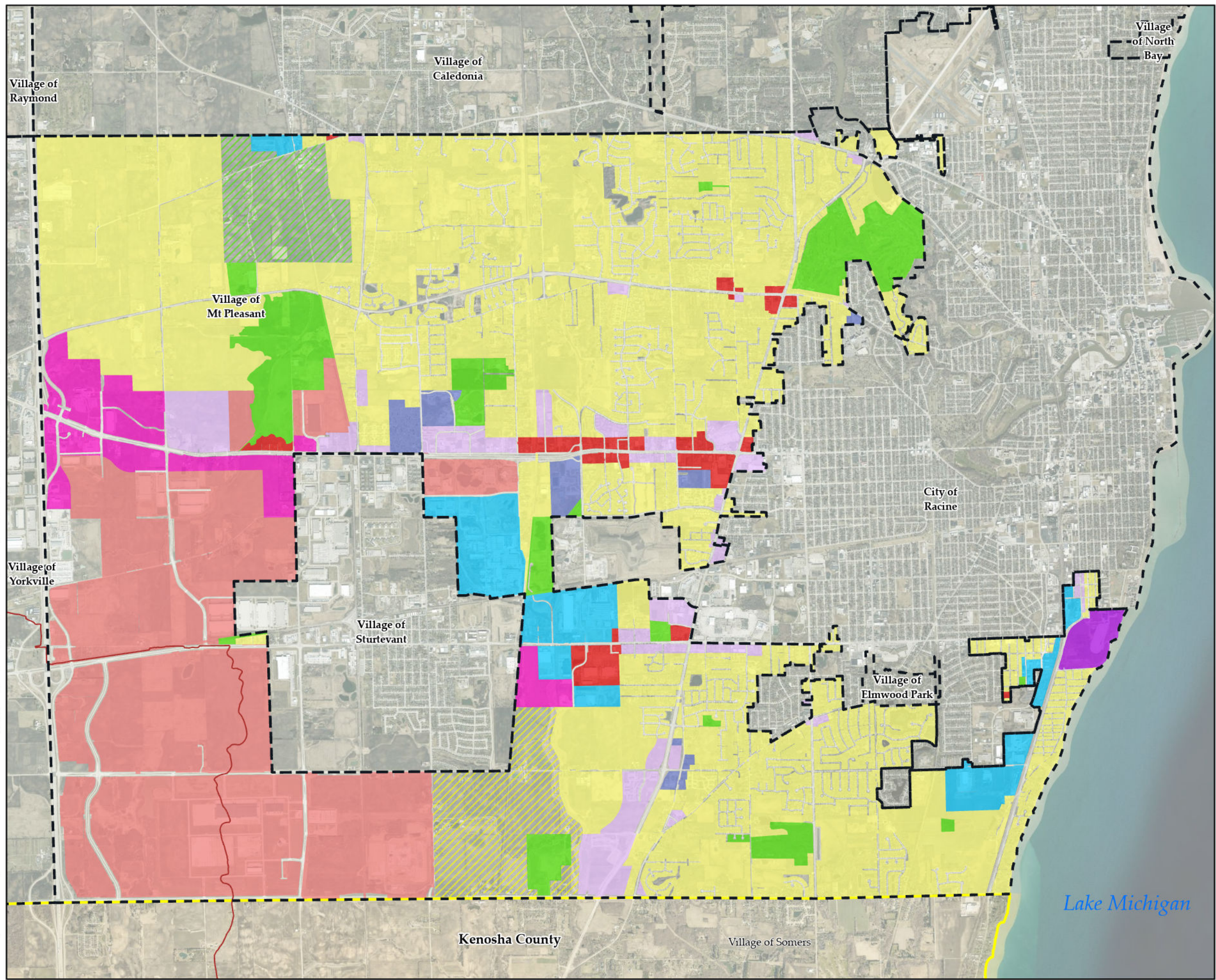
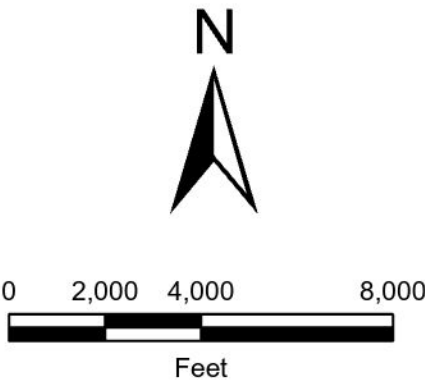


Figure III-2
Mount Pleasant Future Land Use
2035 Proposed Development

Racine Water Utility
Racine County, Wisconsin

- Park, Recreation, Natural Areas
- Prime Agricultural Area
- Prime Agricultural Land, Future Residential
- Residential Areas - Incl. Churches, Multi-Family
- Institution, School, Government
- Industrial
- Business
- Commercial & Services
- Mixed-Use Residential/Commercial
- Mixed-Use Residential/Business
- Mixed-Use Business/Commercial
- Subcontinental Divide
- Civil Division



Date: 9/15/2025

IV. WATER REQUIREMENTS

Projections of customer demands serve as the basis for capital improvements planning. Several standard methods were used in this Plan to project water supply and storage needs based on estimates of population and planned growth within the RWU service area. This chapter summarizes the methodology used and the results of those projections. The 2017 Study and 2018 Update included water demands and projections which are updated in this chapter.

A. Water Consumption History

Water consumption history from 1996 to 2015 is summarized in Table 4-1 of the 2017 Study. The consumption history from 2015 to 2024 is shown in Table IV-1 of this Plan. The 2017 Study shows a downward trend of annual water pumpage from about 9 billion gallons in the early 2000's to 5.9 billion gallons in 2015. Since then, the annual pumpage has remained stable and was approximately 5.5 billion gallons in 2024.

Tables 4-2 and 4-3 from the 2017 Study show the number of customer types and sales to each customer type. These tables are updated in Tables IV-2 and IV-3 in this Plan, respectively, with the most recent billing data up to the year 2024. From 2015 to 2024, the overall number of water customers served by RWU in the retail service area remained between 34,000 and 35,000. Industrial water sales, which saw a significant decrease starting in the late 2000's, remained steady between 2015 and 2024.

B. Per Capita Water Usage

The water usage per capita from the 2017 Study is updated with water usage up to 2024. Table IV-4 in this Plan provides updated water usage per capita for each customer type, updating Table 4-4 from the 2017 Study. The resulting per-capita water usage did not change significantly from what was used in the 2017 Study.

C. Top 10 Largest Water Customers

A list of the ten largest water customers is shown in Table IV-5. The largest water customer, according to billing data from July 2023 to June 2024, is the industrial manufacturer SC Johnson. SC Johnson has two locations that, combined, account for about 3.5 MGD of water demand on average or about 26% of total water sales.

Table IV-1: Historical Water Pumpage and Sales

Year	Estimated Total Service Population ¹	Total Pumpage (MG)	Total Sales (MG)	Pumpage Metered (%)	Non-Revenue		Average Day		Maximum Day		Ratio of Maximum to Average Day Pumpage
					(MG)	(%)	MGD	GPCD	MGD	Date	
2015	119,195	5,880	5,054	86%	825	14%	16.108	135.1	25.532	Jul 06	1.58
2016	120,053	6,152	5,243	85%	908	15%	16.854	140.4	28.308	Jul 13	1.68
2017	120,695	6,053	5,049	83%	1,004	17%	16.583	137.4	26.315	Jul 31	1.59
2018	121,327	5,930	4,857	82%	1,073	18%	16.248	133.9	25.819	Jul 31	1.59
2019	121,734	5,656	4,646	82%	1,011	18%	15.497	127.3	24.359	Jul 15	1.57
2020	125,144	5,575	4,686	84%	889	16%	15.275	122.1	23.380	Jul 07	1.53
2021	124,950	5,701	4,855	85%	846	15%	15.618	125.0	24.952	Jul 26	1.60
2022	127,654	5,483	4,764	87%	719	13%	15.021	117.7	24.924	Jul 19	1.66
2023	128,553	5,532	4,850	88%	682	12%	15.155	117.9	23.344	Aug 11	1.54
2024	130,870	5,518	4,880	88%	638	12%	15.118	115.5	23.316	Aug 27	1.54

Notes:

1. Includes both retail and wholesale service population which are approximately 110,577 and 20,293, respectively, for 2024.

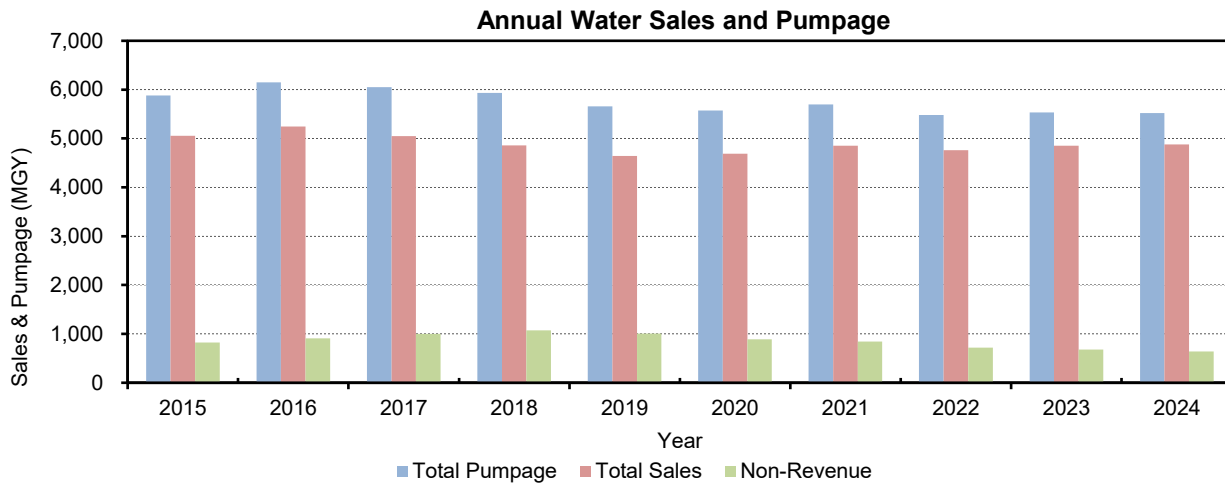


Table IV-2: Historical Customer Summary

Year	Number of Customers						Total
	Residential	Commercial ¹	Industrial	Public	Multi-Family ¹	Wholesale	
2015	30,519	2,393	305	157	777	1	34,152
2016	30,425	2,308	302	153	848	1	34,037
2017	30,375	2,282	301	156	855	1	33,970
2018	30,669	2,272	298	160	858	1	34,258
2019	30,565	2,259	299	158	856	1	34,138
2020	31,017	2,298	298	156	869	1	34,639
2021	31,020	2,296	298	154	876	1	34,645
2022	31,089	2,297	298	155	879	1	34,719
2023	31,170	2,307	299	156	879	1	34,812
2024	31,173	2,289	298	156	889	1	34,806

Note:

1. Commercial and multi-family water usage are shown separately in this table, however, in the 2017 Study, multi-family water sales were lumped with commercial sales.

2024 Customer Summary

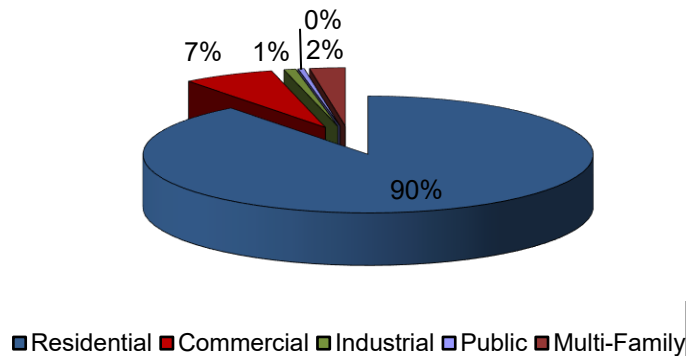


Table IV-3: Water Consumption History

Year	Annual Water Sales (MGY)						Total Sales (MGY)	Total Pumpage (MGY)	% Pumpage Sold
	Residential	Commercial ¹	Industrial	Public	Multi-Family ¹	Wholesale			
2015	1,667.4	528.0	1,580.5	255.9	337.7	358.6	4,728.0	5,879.6	80.4%
2016	1,686.7	533.5	1,860.1	277.5	374.2	378.8	5,110.9	6,151.7	83.1%
2017	1,625.2	510.4	1,645.5	277.0	363.7	499.0	4,920.8	6,052.6	81.3%
2018	1,664.4	523.1	1,441.9	293.3	374.2	431.9	4,728.8	5,930.5	79.7%
2019	1,599.8	487.5	1,343.7	280.8	372.8	435.1	4,519.8	5,656.2	79.9%
2020	1,674.2	461.0	1,329.0	265.2	396.8	461.2	4,587.3	5,575.4	82.3%
2021	1,694.6	506.1	1,409.0	268.1	389.0	500.3	4,767.2	5,700.6	83.6%
2022	1,623.2	502.7	1,395.9	247.3	386.9	535.8	4,691.8	5,482.7	85.6%
2023	1,614.6	516.8	1,508.3	250.4	397.0	482.8	4,769.9	5,531.5	86.2%
2024	1,568.5	516.6	1,585.9	260.7	386.9	463.0	4,781.6	5,517.9	86.7%

Note:

1. Commercial and Multi-Family water usage is shown separately in this table, however, in the 2017 Study, multi-family water sales were lumped with commercial sales.

2024 Water Consumption

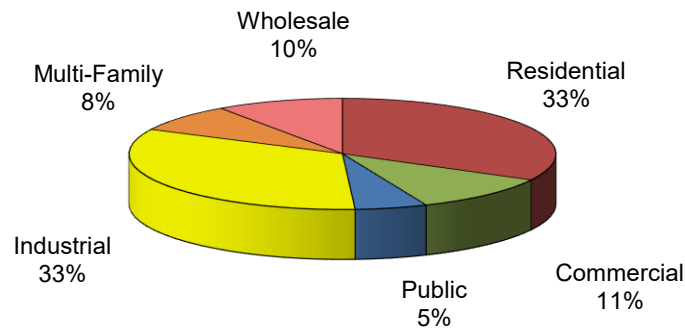


Table IV-4: Historical Capita Usage

Year	Estimated Retail Population	Gallons per Capita per Day					
		Residential	Commercial ¹	Industrial	Public	Multi-Family ¹	Total Retail Sales ²
2015	99,229	46.0	14.6	43.6	7.1	9.3	120.6
2016	100,094	46.2	14.6	50.9	7.6	10.2	129.5
2017	100,815	44.2	13.9	44.7	7.5	9.9	120.2
2018	101,294	45.0	14.1	39.0	7.9	10.1	116.2
2019	101,560	43.2	13.2	36.2	7.6	10.1	110.2
2020	104,866	43.7	12.0	34.7	6.9	10.4	107.8
2021	104,639	44.4	13.3	36.9	7.0	10.2	111.7
2022	107,313	41.4	12.8	35.6	6.3	9.9	106.1
2023	108,299	40.8	13.1	38.2	6.3	10.0	108.5
2024	110,577	38.9	12.8	39.3	6.5	9.6	107.0
Average:		43.4	13.4	39.9	7.1	10.0	113.8

Notes:

1. Commercial and Multi-Family water usage is shown separately in this table, however, in the 2017 Study, multi-family water sales were lumped with commercial sales.
2. Does not include sales to wholesale customers.

Per Capita Consumption

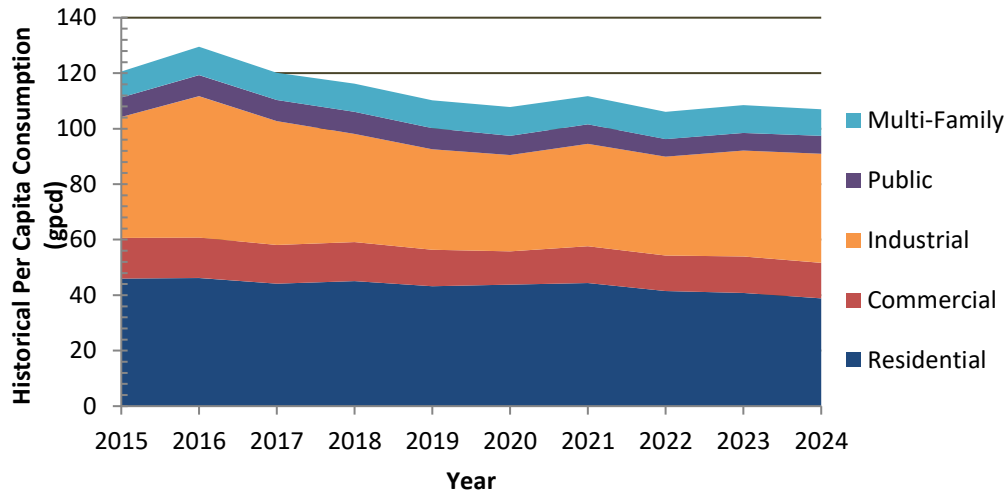


Table IV-5: Top Ten Largest Water Customers

Rank	Customer Name	Billing Classification	Average Water Use (GPD) ¹
1	SC Johnson (Willow Rd)	Industrial	2,656,037
2	SC Johnson (Howe St)	Industrial	909,675
3	Racine Wastewater Treatment Plant	Public Authority	237,401
4	Ascension All Saints Hospital	Commercial	155,803
5	Case Equipment Corp	Industrial	124,709
6	Twin Disc	Industrial	80,497
7	Racine Correctional Institution (South Meter)	Public Authority	79,132
8	Racine Correctional Institution (North Meter)	Public Authority	70,578
9	BRP US, Inc.	Industrial	53,852
10	Racine Public Library	Public Authority	48,567

Notes:

1. Based upon billing records from July 2023 through June 2024.

D. Non-revenue Water and Unaccounted for Water

A discussion of non-revenue and unaccounted for water, or water losses, is given in Section 4.4 of the 2017 Study. From the years 2015 to 2024, the water losses ranged from 11% to 24%, but average at 17%. The 2017 Study recommended that water pumpage projections assume a total of 15% for water losses, which is also used in this Plan for pumpage projections.

E. Variations in Customer Demands and Pumpage

Section 4.5 of the 2017 Study discusses seasonal and daily fluctuations of water consumption. As a part of this Plan, the maximum daily flow estimates are updated in this section.

Maximum day flow from years 2005 to 2024 are shown in Table IV-6. The 2017 Study used a peaking factor of 1.90 times the average demand to estimate maximum day flows. Since the 2017 Study, maximum day flows have generally decreased, with the highest peaking factor of 1.68 occurring in 2016. For projecting future maximum day flows, a peaking factor of 1.68 is used in this Plan.

F. Hourly Demand Fluctuations

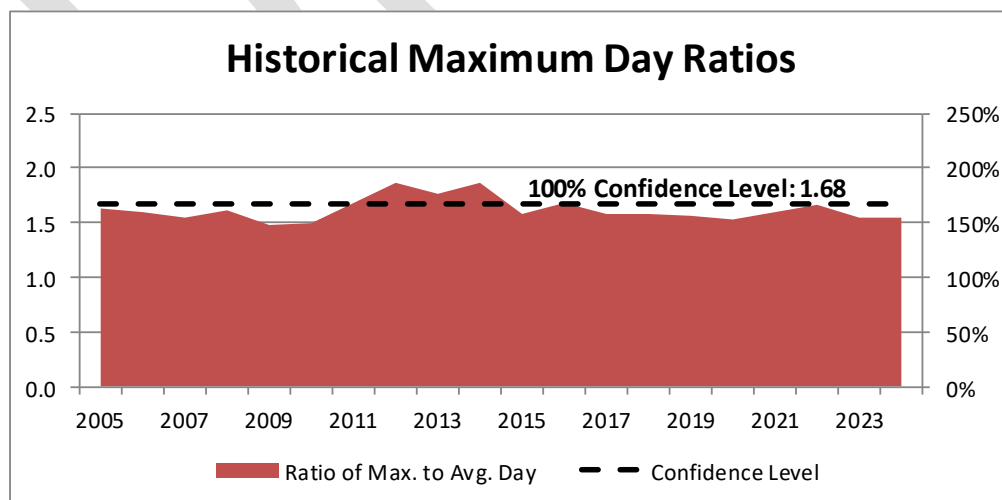
Section 4.6 of the 2017 Study discusses peak hour demand and used a peak hourly factor 1.5 times the maximum day demand. A review of SCADA data from Summer 2023 confirms that 1.5 is still an accurate peak hour factor.

Table IV-6: Maximum Daily Flows

Year	Avg . Day Pumpage (MGD)	Max. Day Pumpage (MGD)	Date of Max. Day	Ratio of Max. to Avg. Day	Year	Avg . Day Pumpage (MGD)	Max. Day Pumpage (MGD)	Date of Max. Day	Ratio of Max. to Avg. Day
2005	22.782	37.31	Aug 02	1.64	2015	16.108	25.53	Jul 06	1.58
2006	22.377	35.85	Aug 15	1.60	2016	16.854	28.30	Jul 13	1.68
2007	23.039	35.83	Aug 01	1.56	2017	16.583	26.31	Jul 31	1.59
2008	22.093	35.64	Aug 01	1.61	2018	16.248	25.81	Jul 31	1.59
2009	20.876	30.91	Jul 28	1.48	2019	15.497	24.35	Jul 15	1.57
2010	18.745	27.99	Aug 30	1.49	2020	15.275	23.38	Jul 07	1.53
2011	19.172	32.14	Jul 21	1.68	2021	15.618	24.95	Jul 26	1.60
2012	18.849	35.04	Jul 12	1.86	2022	15.021	24.92	Jul 19	1.66
2013	17.151	30.38	Sep 10	1.77	2023	15.155	23.34	Aug 11	1.54
2014	17.100	31.87	Aug 25	1.86	2024	15.118	23.31	Aug 27	1.54

Statistical Analysis

	2015-2024	2005-2024
Number of years of Data	10	20
Maximum Ratio - Max. to Avg. Day Pumpage	1.68	1.86
Minimum Ratio - Max. to Avg. Day Pumpage	1.53	1.48
Average Ratio Max. to Avg. Day Pumpage	1.59	1.62
	Ratio of Max. to Avg. Day	
Confidence Level (%)	2015-2024	2005-2024
80%	1.61	1.68
85%	1.64	1.69
90%	1.66	1.78
95%	1.67	1.86
98%	1.68	1.86
100%	1.68	1.86



G. Planned Developments and Service Area Expansion

The majority of anticipated planned developments will be located within the 875 and 933 pressure zone service areas. There has also been a request to expand RWU's wholesale service area to include parts of the Village of Raymond to provide water service to planned developments along the I-94 corridor. Planned developments within the Village of Caledonia are also anticipated. Projected water demands from new developments in the Village of Mount Pleasant and projected total wholesale water demands for the Village of Raymond and the Village of Caledonia are shown in Table IV-7.

1. Village of Mount Pleasant

As discussed in Chapter III of this Plan, the DOA predicts population decline within the Village of Mount Pleasant; however, up to 7,000 acres of planned and future developments have been identified from information provided by the Village's planning staff.

Although the overall population is projected to decline by the DOA, water sales projections to proposed developments were included to ensure that RWU has enough supply capacity. Water sales to existing development are based on DOA population projections while sales to the planned developments are based on land use acreages.

The projected water demands from these proposed developments are estimated in this Plan by applying an approximate water demand per acre, or gallons per acre per day (GPAD). The GPAD factors for each land use type used in this Plan are comparable to the values used in previous RWU water, as shown in Table IV-7.

After discussion with the Village of Mount Pleasant planning staff about the rate of development, the planned developments will likely not reach full buildout until at least the year 2050. To ensure that RWU has enough supply capacity for all proposed developments, this Plan assumes a more rapid rate of development where Mount Pleasant reaches full buildout by the end of the planning period in 2045. The estimated water demands from the planned developments within the Village of Mount Pleasant are assumed to increase linearly until the year 2045.

2. Village of Raymond

The Village of Raymond, which borders the Village of Caledonia to the west, has plans to develop the I-94 corridor along the east region of the Village boundary, as described in the "Preliminary Water Supply Study" prepared by Foth Infrastructure and Environment, LLC (Foth) in 2024. The planned developments will include water service connections to both RWU and OCWSU.

The 2024 Foth study divides the I-94 corridor into several development phases and notes that planned development will start in the north and progress toward the south. The 2024 Foth study does not estimate how much water will be needed from the OCWSU versus RWU. In this Plan, it is assumed that the southern development phases, Future Service Areas 2 and 3 from the 2024 Foth study, will be supplied by RWU. The total water demand for Future Services Areas 2 and 3 is anticipated to be 536 MGY, or 1.47 MGD. Full buildout of the I-94 corridor is anticipated to take at least 20 years. Water demand projections provided by RWU to the I-94 corridor in the Village of Raymond are assumed to increase linearly until full buildout in the year 2045.

3. Village of Caledonia

The Village of Caledonia's water supply is purchased wholesale from both RWU and OCWSU. Caledonia also provides wholesale water to the Village of Wind Point. A water study for the Village of Caledonia, titled "High Pressure Zone Water System Study", was conducted by Foth in 2023 to estimate demands to the proposed developments along the I-94 corridor. The 2023 Foth study concludes that the initial demand from the new development will be 1.11 MGD and that the ultimate demand will be 1.51 MGD. Table 3-16 of the 2023 Foth study also includes total water demand projections for the Village of Caledonia after development of the I-94 corridor. The ultimate average day water demand for the Village of Caledonia is projected to be 4.55 MGD, of which 3.35 MGD will be supplied by RWU.

After discussing the anticipated rate of development with the Village of Caledonia, the Village mentioned that the ultimate buildout of the I-94 corridor will likely take 20-40 years to develop. However, to ensure that RWU has enough capacity to serve all planned developments at full buildout, this Plan assumes a rapid rate of development and that the proposed developments will reach the full buildout by 2045. The projected wholesale water demand to Caledonia is assumed to increase linearly until full buildout in the year 2045.

It should be noted that contractual wholesale water agreement, between RWU and the Village of Caledonia, requires RWU to have the capacity to provide an average day delivery volume of 5.83 MGD and a maximum day delivery volume of 10.22 MGD.

For the purposes of estimating reasonable demand projections, the ultimate average day water demand for the Village of Caledonia of 3.35 MGD provided in the 2023 Foth Study will be used in this plan. However, the contractual wholesale delivery volumes are considered for the comparison of the projected demands from the 2017 Study and 2018 Update as well as the supply and storage analysis discussed in Chapter V.

H. Water Consumption and Pumpage Projections

Future sales and pumpage projections are based on assumptions of water demand, coupled with estimates of future population and community growth presented in Chapter III. Sales to existing developments are estimated based on DOA population projections. Sales to new developments in the Villages of Mount Pleasant are estimated based on proposed land use as detailed in Table IV-7. Wholesale water sales to the Villages of Caledonia and Raymond are based on water demand projections that were completed in other studies, as discussed previously.

Table IV-7: Water Demands from Planned Developments

Development Type	Acres	Projected Water Demand		
		GPAD ⁶	MGD	MGY
Village of Mount Pleasant¹				
Commercial ²	258	550	0.14	52
Industrial/Business Park	2,546	1,100	2.80	1,022
Multi-Family ³	229	550	0.13	46
Park/Rec	388	100	0.04	14
Residential	3,606	660	2.38	869
Mount Pleasant Total:	7,028		5.49	2,003
Village of Raymond: I-94 Corridor⁴			1.47	536
Village of Caledonia⁵			3.35	1,223
Total Demands from Proposed Developments:			10.31	3,762

Notes:

1. GIS files of the future 2035 land use were provided by the Village of Mount Pleasant. The acreage of each development type is the approximate number of acres that have not yet been developed as of Summer 2024.
2. Commercial land use includes the following land use types Mount Pleasant's GIS data: "Commercial" and "Mixed BP/Comm".
3. Multi-Family land use includes "Mixed Residential/Commer" from Mount Pleasant's GIS Data
4. Projected water demands are taken from the "Preliminary Water Supply Study" completed by Foth in 2024. It is assumed that water demands from Future Service Areas 2 and 3 in the study are supplied by RWU.
5. A total of 3.35 MGD of water demand from RWU to Caledonia is estimated in the "High Pressure Zone Water System Study" done by Foth in 2023.
6. Gallons per acre per day. The GPAD values for each land use type used are comparable to values used in previous RWU water studies.

I. Summary of Total Demands and Pumpage Requirements

The projected total water sales and pumpage projections summarized in Table IV-8 are based on a summation of water sales projections for each major customer classification. An allowance was also made for unmetered miscellaneous water usage and losses (non-revenue water) to arrive at total pumpage projections.

Table IV-9 summarizes projections of future water needs for average day, maximum day, and peak hour demands. Total annual pumpage is projected to increase from approximately 5,518 MGY (15.12 MGD) to approximately 10,037 MGY (27.50 MGD) by the year 2045. Table IV-9 also illustrates the projected water sales and pumpage through the planning period.

Table IV-8: Water Sales and Pumpage Projections

Customer Classification	Actual 2024	Projected 2030	Projected 2035	Projected 2040	Projected 2045
<i>Retail Service Population¹</i>	110,577	108,547	105,408	102,268	98,147
Retail Water Sales					
<i>Per Capita Sales (gpcd)</i>					
Residential Sales	38.9	50.0	50.0	50.0	50.0
Commercial Sales	12.8	15.0	15.0	15.0	15.0
Industrial Sales	39.3	50.0	50.0	50.0	50.0
Public Sales	6.5	8.0	8.0	8.0	8.0
Multi-Family	9.6	10.0	10.0	10.0	10.0
<i>Annual Sales to Existing Development (MGY)</i>					
Residential Sales	1,569	1,980	1,920	1,870	1,790
Commercial Sales	517	590	580	560	540
Industrial Sales	1,586	1,980	1,920	1,870	1,790
Public Sales	261	320	310	300	290
Multi-Family	387	400	380	370	360
<i>Retail Sales to New Developments (MGY)²</i>					
Village of Mount Pleasant	0	501	1,002	1,502	2,003
Total Retail Sales (MGY)	4,319	5,771	6,112	6,472	6,773
Wholesale Water Sales					
<i>Wholesale Water Sales (MGY)</i>					
Village of Caledonia	463	653	843	1,033	1,223
Village of Raymond (I-94 Corridor) ²	0	134	268	402	536
Total Wholesale Sales (MGY)	463	787	1,111	1,435	1,759
Total Water Sales and Pumpage					
Total Sales (MGY)	4,782	6,558	7,222	7,907	8,532
Non-revenue Water (MGY) ³	736	1,157	1,275	1,395	1,506
Total Pumpage (MGY)	5,518	7,715	8,497	9,302	10,037

Notes:

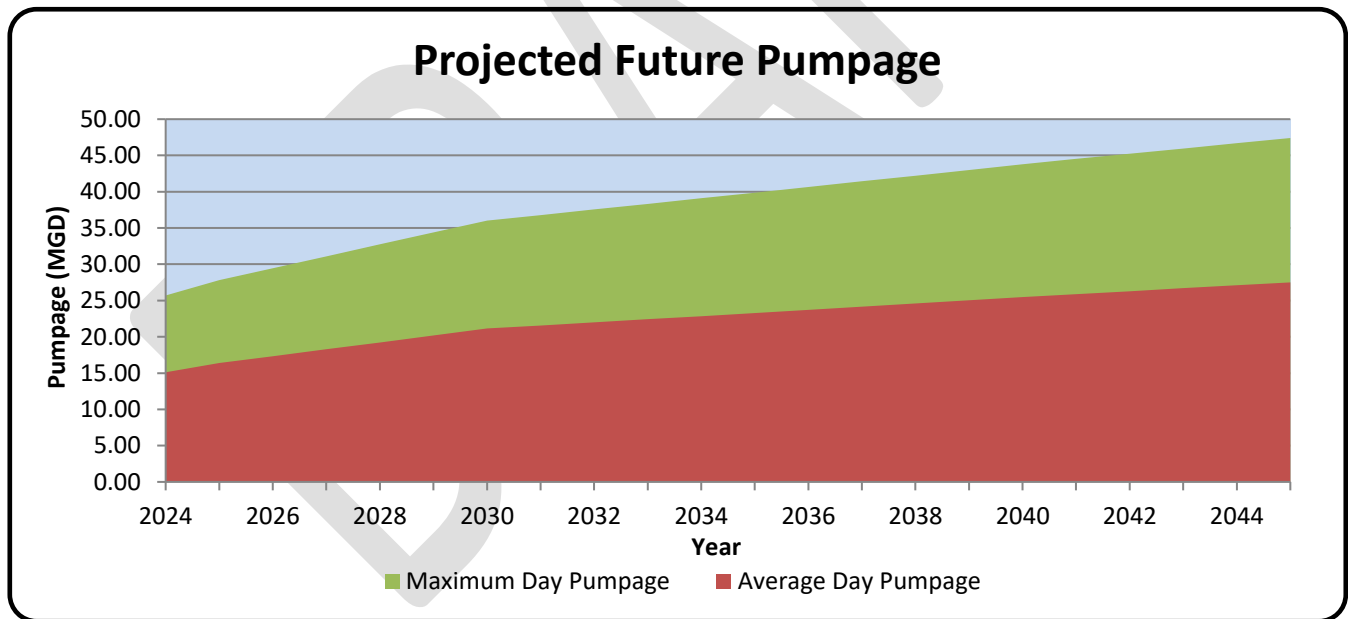
1. Projected populations are based on WDOA projections and may not include population increases from planned residential developments that are included in Table IV-7.
2. See Table IV-7. Demands from proposed developments in Table IV-7 are assumed to grow linearly until 2045. The actual rate of development will vary.
3. Non-revenue water was projected at 15% of total pumpage for future years.

Table IV-9: Future Pumpage Projections

Criteria	Actual 2024	Projected 2030	Projected 2035	Projected 2040	Projected 2045
Total Annual Retail Sales (MGY)	4,319	5,771	6,112	6,472	6,773
Caledonia Total Annual Wholesale Sales (MGY)	463	653	843	1,033	1,223
Raymond Total Annual Wholesale Sales (MGY)	0	134	268	402	536
Non-Revenue Water (MGY)	736	1,157	1,275	1,395	1,506
Total Annual Pumpage (MGY)	5,518	7,715	8,497	9,302	10,037
Average Day Pumpage (MGD)	15.12	21.14	23.28	25.49	27.50
Maximum Day Pumpage (MGD) ¹	23.31	36.02	39.85	43.79	47.41
Peak Hour Demand (MGD) ²	39.72	55.84	62.19	68.70	74.72

Notes:

1. Projected design maximum day pumpage projections were estimated using a ratio of maximum to average day pumpage ratios of 1.68 for the retail service area, 1.9 for the Caledonia wholesale service area, and 2.0 for the Raymond wholesale service area.
2. Projected peak hour demand projections were estimated using a peak hour to maximum day ratios of 1.5 for the retail service area, 2.0 for the Caledonia wholesale service area, and 1.646 for the Raymond wholesale service area.



J. Future Pumpage Projection Comparisons

A comparison of future pumpage projections from previously completed studies is summarized in Table IV-10. The water demand projections made in the 2017 Study and 2018 Update included the contractual wholesale agreement delivery volumes for the Village of Caledonia but did not include demands for the Village of Raymond. For comparison, the projections in this Plan are shown with both the Village of Caledonia ultimate water demands, from the 2023 Foth study, and the contractual wholesale agreement delivery volumes.

The projected 2035 average day demand (23.28 MGD) decreased slightly in this Plan, using the Village of Caledonia ultimate water demands from the 2023 Foth study, when compared with the 2017 Study projection (24.71 MGD). When using the wholesale agreement delivery volumes, the projected 2035 average day demand (26.89 MGD) increased slightly in this Plan when compared with the 2017 Study projection (24.71 MGD). The projected 2035 average day demand decreased in this Plan when compared with the 2018 Update projection (31.39 MGD). This is primarily due to the 2018 Update including significant water demands for proposed development within the Village of Mount Pleasant TID No. 5, which to date have not been realized.

The projected 2035 maximum day demand (39.85 MGD) decreased in this Plan, using the Village of Caledonia ultimate water demands from the 2023 Foth study, when compared with the 2017 Study projection (47.46 MGD). The maximum day to average day peaking factor in the 2017 Study was 1.90 but was reduced to 1.68 in this Plan based on recent trends. When using the wholesale agreement delivery volumes, the projected 2035 maximum day demand (46.60 MGD) decreased slightly in this Plan when compared with the 2017 Study projection (47.46 MGD).

The projected 2035 maximum day demand decreased significantly in this Plan when compared with the 2018 Update projection (54.90 MGD). This is again due to the 2018 Update including significant water demands for proposed industrial development within the Village of Mount Pleasant TID No. 5 and reduced maximum day to average day peaking factor used in this plan. However, since the estimated water demands from the planned developments have been assumed to increase linearly until the year 2045, the projected 2045 maximum day demands in this Plan which include the contractual wholesale delivery volumes are comparable to the 2035 maximum day demand projected in the 2018 Update.

Table IV-10: Future Pumpage Projection Comparison

Source	2035 Avg. Day Pumpage (MGD)	2035 Max. Day Pumpage (MGD)	2045 Avg. Day Pumpage (MGD)	2045 Max. Day Pumpage (MGD)
2017 Water System Study ¹	24.71	47.46	N/A	N/A
2018 Update to the 2017 Water System Study ¹	31.39	54.90	N/A	N/A
2025 Water Supply Service Area Plan ²	23.28	39.85	27.50	47.41
2025 Water Supply Service Area Plan (Contractual Wholesale) ¹	26.89	46.60	29.89	51.87

Notes:

1. Includes Village of Caledonia contractual wholesale agreement delivery volumes of 5.83 MGD for average day and 10.22 MGD for maximum day.
2. See Table IV-9. Includes Caledonia total water demands of 3.35 MGD for average day and 6.37 MGD for maximum day as estimated in the "High Pressure Zone Water System Study" done by Foth in 2023.

V. SUPPLY AND STORAGE ANALYSIS

The 2017 Study includes a detailed analysis of the supply and storage facilities in each pressure zone that is not repeated in full detail as part of this Plan. Some general updates to the supply and storage analysis are included in this Plan; however, these updates only include an analysis of the water system as a whole. The updates do not include an analysis of each pressure zone as was included in the 2017 Study.

A. Water Supply Analysis

Table 5-1 from the 2017 Study included an approximation of the existing reliable supply capacity for each pressure zone. Updates to this table are shown in Table V-1, except that only the surface water intakes and the supply pumps are shown; individual pressure zones are not analyzed in this Plan.

Table V-1: Existing Reliable Supply Capacity

<u>Supply Facilities</u>	<u>Source Capacity</u>	
	(gpm)	(MGD)
Lake Michigan Surface Water Intakes¹	41,700	60
<u>High Lift Pumps:</u>		
HLP # 9	20,300	29.2
HLP # 10	7,900	11.4
HLP # 11	12,700	18.2
HLP # 12	17,300	24.9
Subtotal Supply Capacity	58,200	84
Reliable Supply²	25,000	36.0

Notes:

1. The RWU has three surface intakes. The combined allowable withdrawal rate is 60 MGD.
2. According to the distribution system model, the maximum flow rate that could be pumped without causing high pressures (≥ 80 psi) throughout the adjacent distribution system was approximately 25,000 gpm under existing conditions and about 35,000 gpm once the construction of the 42-inch transmission main is complete.

Although the total capacity of the surface water intakes is approved to a maximum flow rate of 60 MGD, the pumping station does not have the capacity to pump at that rate. To approximate the reliable supply capacity of the supply pumping station, RWU's distribution system model was analyzed using the software WaterGEMS by Bentley. According to the model, the maximum flow rate that could be pumped to distribution without causing excess pressures was approximately 25,000 gpm or 36.0 MGD. Flow rates higher than this may cause excess pressures in the adjacent distribution system. However, there is a 42-inch transmission main that is currently under construction within the 780 pressure zone. Once this transmission main is completed, the maximum flow rate from the high lift pump station will be about 35,000 gpm or 50.4 MGD. This transmission main is projected to be completed within the next few years; therefore, for water supply capacity projections, a value of 35,000 gpm is used.

1. Existing Reliable Supply Capacity

Table 5-2 from the 2017 Study shows the recommended reliable supply capacity and was updated as shown here in Table V-2. In 2024, the maximum day pumpage was 23.31 MGD; therefore, there was an excess of supply capacity of about 12.69 MGD.

Table V-2: Existing Recommended Reliable Supply Capacity

Supply Requirements	Water System 2024	
	GPM	MGD
Average Day Pumpage	10,498	15.12
Maximum Day Pumpage ¹	16,187	23.31
Reliable Supply Capacity	<u>25,000</u>	<u>36.00</u>
Reliable Supply Capacity Excess or (Deficiency)	8,813	12.69

Note:

1. See Table IV-9.

2. Effective Storage Volumes

The 2017 Study defines effective storage volumes and provides an approximation of the total effective storage volume throughout the water system in Table 5-3. This table is updated here to include the Louis Sorenson elevated storage tank, which was constructed in the 933 pressure zone, as shown in Table V-3.

B. Supply and Storage Results

The supply and storage analysis given in the 2017 Study is updated here to include updated storage facilities and the updated water demand projections made in this Plan; however, the water system was analyzed as a whole rather than by individual pressure zones. The results show that RWU's existing supply capacity is sufficient to meet all water demands to the year 2045 as projected in this Plan. Table V-4 summarizes the projected optimum supply and storage requirements for the water system.

1. Contractual Wholesale Water Sales to Caledonia

As previously mentioned, RWU has a contractual wholesale agreement with the Village of Caledonia that requires RWU to have the capacity to provide an average day delivery volume of 5.83 MGD and a maximum day delivery volume of 10.22 MGD. As discussed in Section IV, the water sales to the Village of Caledonia are projected to reach an average day demand of 3.35 MGD by 2045, which is much less than what is required by the contractual agreement.

If the Village of Caledonia were to use the contractual wholesale maximum day delivery volume, it is estimated that there would be an increased need of reliable supply capacity by 2045 and an increase of storage capacity needed by 2040.

Table V-3: Effective Storage Volumes

Storage Criteria	Sheridan Woods (Coolidge)	Summit	Perry Avenue	Newman Road	Renaissance	Broadway	Louis Sorenson
Pressure Zone	780	780	780	780	875	875	933
Design Volume (gallons)	1,500,000	1,500,000	2,750,000	3,000,000	750,000	250,000	1,250,000
Diameter (feet)	Varies	Varies	85.0	98.0	Varies	Varies	Varies
Head Range (feet)	35.0	35.0	65.0	53.0	40.0	31.25	40.00
Storage Volume per foot (gallons)	Varies	Varies	42,308	56,604	Varies	Varies	Varies
Overflow elevation (feet USGS)	780.0	780.0	780.0	780.0	875.0	875.0	933.0
Approximate Highest Elevation Served in Pressure Zone (feet USGS)	687	687	687	687	750	750	778
Approximate Hydraulic Grade Elevation needed to provide minimum 35 psi to all areas	768	768	768	768	831	831	859
Maximum Effective Peak Hour Storage Volume (gallons) ¹	570,500	570,500	514,000	688,000	750,000	250,000	1,250,000
Approximate Hydraulic Grade Elevation needed to provide minimum 20 psi to all areas	733	733	733	733	796	796	824
Additional Effective Fire Protection and Emergency Storage Volume (gallons) ²	929,500	929,500	1,470,000	1,960,000	0	0	0
Total Effective Storage Volume (gallons)	1,500,000	1,500,000	1,984,000	2,648,000	750,000	250,000	1,250,000

Notes:

1. Effective peak hour storage is considered the volume available which will continue to maintain adequate pressures in the distribution system at a minimum of 35 psi (under static conditions.) Volumes derived from storage tank volume gauging tables.

2. Effective fire protection and emergency storage is considered the volume available which will continue to maintain pressures in the distribution system at a minimum of 20 psi (under static conditions.) Volumes derived from storage tank gauging tables.

Table V-4: Existing and Projected Supply and Storage Requirements

<u>SUPPLY REQUIREMENTS</u>	Existing 2024	Projected 2030	Projected 2035	Projected 2040	Projected 2045
Design Average Day Demand (gpm)	10,498	14,680	16,170	17,710	19,100
Design Maximum Day Demand (gpm)	16,187	25,020	27,680	30,410	32,930
Design Peak Hour Demand (gpm)	27,600	38,800	43,200	47,700	51,900
Effective Reliable Supply Capacity (gpm) ²	25,000	35,000	35,000	35,000	35,000
Reliable Supply Capacity Excess or (Deficiency) (gpm)	8,813	9,980	7,320	4,590	2,070
<u>STORAGE REQUIREMENTS</u>					
	Existing 2024	Projected 2030	Projected 2035	Projected 2040	Projected 2045
Peak Hour Equalizing Requirements (gallons) ³	2,210,000	3,415,000	3,778,000	4,151,000	4,494,000
Optimum Fire Protection Needs (gallons) ⁴	1,890,000	1,890,000	1,890,000	1,890,000	1,890,000
Reserve Storage (gallons; 15% of Total) ⁵	724,000	937,000	1,001,000	1,067,000	1,127,000
Subtotal Optimum Storage Requirements (gallons)	4,824,000	6,242,000	6,669,000	7,108,000	7,511,000
Available Effective Storage Capacity (gallons):					
Summit Tower (570,500 gallons peak hour; 929,500 gallons fire flow)	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Sheridan Woods (Coolidge) Tower (570,000 gallons peak hour; 929,500 gallons fire flow)	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Perry Ave Res (514,000 gallons peak hour; 1,470,000 gallons fire flow)	1,984,000	1,984,000	1,984,000	1,984,000	1,984,000
Newman Rd Res (688,000 gallons peak hour; 1,960,000 gallons fire flow)	2,648,000	2,648,000	2,648,000	2,648,000	2,648,000
Renaissance Tower (750,000 gallons peak hour)	750,000	750,000	750,000	750,000	750,000
Broadway Tower (250,000 gallons peak hour)	250,000	250,000	250,000	250,000	250,000
Louis Sorenson Tower (1,250,000 gallons peak hour)	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Total Effective Storage Capacity (gallons)⁶	6,483,000	6,483,000	6,483,000	6,483,000	6,483,000
Subtotal Additional Capacity Required (gallons)	None	None	186,000	625,000	1,028,000
Less: Excess Supply Capacity Available for Peak Hour Equalization (gallons) ⁷	2,210,000	3,379,000	3,515,000	3,189,000	1,629,000
Less: Excess Supply Capacity Available for Fire Protection (gallons) ⁸	None	None	None	None	None
Total Storage Capacity Excess or (Deficiency) (gallons)	3,869,000	3,620,000	3,329,000	2,564,000	601,000

Notes:

1. Reliable Supply Capacities taken from Table V-1.
2. According to the distribution system model, the maximum flow rate that could be pumped without causing high pressures (>80 psi) throughout the adjacent distribution system was approximately 25,000 gpm under existing conditions and about 35,000 gpm once the construction of the 42-inch transmission main is complete.
3. Peak hour storage is storage required to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
4. Optimum fire protection based on 3,500 gpm for 180 minutes or 630,000 gallons. This storage capacity is needed in each of the three pressure zones; therefore, a total of 1,890,000 gallons of fire storage is needed.
5. Reserve storage is storage required to provide a start/stop range for pump operation and an emergency reserve storage supply.
6. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage as calculated from Table V-3.
7. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
8. Supply Capacity Credit cannot exceed Fire Protection Need and is calculated as the reliable supply capacity in excess of Peak Hour Demand x 180 min.

C. Summary

This section summarizes the findings from the supply and storage evaluation of RWU's water system. RWU's supply capacity will be about 35,000 gpm (50.4 MGD) upon completion of the 42-inch transmission main that is currently under construction. The maximum day demand, using the Village of Caledonia ultimate water demands from the 2023 Foth study, is projected to be 32,930 gpm (47.41 MGD) by the year 2045. Therefore, the reliable supply capacity is capable of meeting maximum day demands for the entire planning period. The peak hour demand is projected to reach 51,900 gpm (74.72 MGD) by 2045, which is greater than the supply capacity; however, there is enough elevated storage capacity to equalize peak hour demands and to meet fire storage needs.

This Plan only evaluated the supply and storage capacities within the system as a whole and not within individual pressure zones.

As demands in the RWU service area increase, developments with large water usage occur, or if the Village of Caledonia nears the contractual wholesale maximum day delivery volumes, it is recommended that additional analysis be completed to ensure that there is sufficient supply and storage capacity in each pressure zone.

VI. CONCLUSION AND RECOMMENDATIONS

A. Key Findings and Recommendations

1. Population Projections

The total service population, including wholesale customers, is projected to decrease from about 130,870 in 2024 to about 111,861 by the year 2050, according to DOA projections.

2. Water Demands

The existing average and maximum day water demands from 2024 pumpage are 15.1 MGD and 23.3 MGD, respectively. The total average and maximum day water demands are projected to increase to 27.5 MGD and 47.4 MGD by 2045, respectively. These projections are based on population change, the per acre sales of water by customer type, and water demand projections taken from other water studies for the Villages of Raymond and Caledonia. It is important to note that these projections assume a rapid rate of development in order to ensure that RWU has enough capacity to supply water to all proposed developments.

3. Supply

RWU has three surface water intakes in Lake Michigan with a total approved capacity of 60 MGD. The total reliable capacity of the supply pumps is estimated to be 36 MGD. However, the completion of the 42-inch transmission main will allow for a maximum pump rate of about 50 MGD, which is sufficient to meet projected demands through the year 2045.

4. Storage

RWU currently has a total of 11 MG of elevated storage, which for the water system as a whole is sufficient for projected demands until at least the year 2045.

B. Consistency With Other Plans and Agreements

The Southeastern Wisconsin Regional Planning Commission (SEWRPC) prepared "A Regional Water Supply Plan for Southeastern Wisconsin" that was adopted in 2010. This regional plan includes water demand projections up to the year 2035. The water demand projections that were estimated in the SEWRPC's regional plan are more than the projections made in this Plan. For the year 2035, the SEWRPC estimated an average day pumpage of 29.2 MGD and a maximum day pumpage of 44.2 MGD. However, in this Plan, we estimated that the 2035 average and maximum day pumpage rates will be 19.4 MGD and 32.6 MGD, respectively.

SEWRPC also prepared "A Multi-Jurisdictional Comprehensive Plan for Racine County: 2035" which was adopted in 2009. This comprehensive plan predicted a combined population of about 152,000 for all the communities within the water service area; however, the DOA population projections predict a population of about 135,000 by the 2030 with a decreasing trend (see Table III-1). This may be largely the result of a population decrease in the City of Racine that was larger than what was predicted in the 2009 regional plan.

Water demand projections from other water system studies for the Villages of Caledonia and Raymond were incorporated into the water demand projections made in this Plan, as discussed previously.

C. Plan Implementation

There are no immediate steps required to implement this Plan. As demands in the RWU service area increase, developments with large water usage occur, or if the Village of Caledonia nears the contractual wholesale maximum day delivery volumes, it is recommended that additional analysis be completed to ensure that there is sufficient supply and storage capacity in each pressure zone.

D. Public Participation

Per NR 854.08, this Plan is required to go through a public participation process, providing an opportunity for public comment. It is recommended that this Plan be discussed at a future Waterworks Commission Meeting. At this meeting, public comments will be encouraged. After the meeting, a draft of this Plan will be posted on RWU website for two weeks for public comments.

E. Updates to Plan

This Plan is required to be reviewed every five years and updated as necessary. A new Plan will need to be created by 2045 before the end of the planning period.