Engineering Report

Water System Evaluation & Plan

Prepared For The

VILLAGE OF LITTLE CHUTE
OUTAGAMIE COUNTY | WISCONSIN

DECEMBER 14, 2017
McM. No. L0001-9-17-00157.00

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I. INTRODUCTION

The Village of Little Chute is located in the Heart of the Valley area of the Fox Cities in northeastern Wisconsin. The community of approximately 11,000 residents is experiencing steady growth and a Water System Plan is needed to respond to and support future development.

For many years, the Village was predominately a residential community consisting of single-family homes. Recent development has included industrial development both south and north of I-41 and multi-family development north of I-41.

II. WATER SYSTEM DESCRIPTION

A. General

The Village of Little Chute water system consists of the following components:

- Three (3) Wells – Well #1, Well #3 & Well #4
- Three (3) Softening Treatment Plants
- Three (3) Ground Level Water Storage Reservoirs – 250,000, 300,000 & 500,000-gallon
- Two (2) Elevated Water Towers – 250,000 & 300,000-gallon
- Water Distribution System

A schematic of the operation of water system is provided on Figure #1. A description of each of these facilities is provided in the following sections. A map of the distribution system and the system components is presented on Figure #2.

B. Water System Facilities

1. Well House #1 – Doyle Park:

The Well #1 Pumphouse is located in Doyle Park at the southern area of the Village. The Pumphouse houses Well #1, the ion exchange softening system, a 300,000-gallon ground level water storage reservoir and two (2) booster pumps. The Well construction information is summarized in Table #1 and the Construction Log for Well #1 is provided in Appendix #1. Well #1 is a 12-inch diameter well, originally constructed in 1923 and later deepened to 724-feet in 1950. The capacity of the booster pumping equipment is presented in Table #2. Softener facility data is provided in Table #3.

An extensive improvement project was completed at the Well #1 Pumphouse in 2017. In general, the project included:

a. Replacement of the softeners to increase the efficiencies and decrease salt use/chloride discharges. Salt saving resin has been utilized instead of conventional resin.

b. Discharging the softener brine cycle, slow rinse and fast rinse wastewaters to the sanitary sewers.

c. Increase the reliability of the Pumphouse water supply capabilities. A new 300 kW diesel generator with an automatic transfer switch has been installed.

d. Rehabilitation of the well pumping equipment and replacement of the booster pump motors.

2. Pumphouse #2 (Jefferson Street) & Well #3 (Washington Street):

Pumphouse #2 is located at the north end of Jefferson Street at the railroad tracks. Well #2 was abandoned, but the softener and booster pumping equipment is still housed in the Pumphouse. Well #3 is located approximately 2,000-feet west of Pumphouse #2. This 12-inch well was originally constructed in 1973. Raw water from Well #3 is pumped to Pumphouse #2 for treatment and distribution to the system. Treated water is stored in the 250,000-gallon ground reservoir prior to distribution by the two (2) booster pumps.

3. Well House #4 – Evergreen Drive:

Located on the north side of I-41, Well House #4 was constructed in 2000. The Pumphouse houses Well #4, three (3) softener shells and two (2) booster pumps. There is also a 500,000-gallon ground storage tank at this location.

4. System Storage:

The storage facilities in the Little Chute system include both elevated storage and ground storage reservoirs. A summary table of the storage facilities is provided in Table #4. Elevated storage services two (2) purposes in a water system: 1) Maintains system pressure; and 2) Provides reserve capacity for fire protection supply and for peak demands. There are two (2) elevated water towers in the system:

a. Stephen Street - Elevated Tower #1 300,000-gallon

b. Pumphouse #2 - Jefferson Street - Elevated Tower #2 250,000-gallon

The ground storage reservoirs are located at each Pump Station, as previously mentioned. Treated water is discharged to each reservoir and then pumped into the system via the booster pumps.

C. Water Distribution System

The Village of Little Chute water distribution system consists of approximately 58-miles of water main, ranging in size from 4-inch to 16-inch. A summary of the pipe diameters and lengths is summarized in Table #5. A map of the distribution system is provided on Figure #2. The transmission system consists of the larger diameter water mains that convey the majority of water through the distribution system, and should connect the supply and storage components of the system. The Little Chute transmission system consists of 10, 12 and 16-inch diameter water mains and is highlighted on Figure #2.

The Village of Little Chute and the City of Appleton water distribution systems are connected for emergency purposes at the intersection of Evergreen Drive and French Road. Currently, the connection consists of two (2) gate valves, which are operated manually in the event of an emergency. There are no metering facilities on the connection. The hydraulic grade line of the Appleton system is 914 and the grade line of the Little Chute system is 884. Therefore, the Appleton system can provide water to the Little Chute system without pumping.

There is also an emergency connection to the Kaukauna Utilities water system at East Main Street at Hayes Street. The connection is the same as the connection to the Appleton system, in that valves are operated manually to open the connection and there are no metering facilities. The hydraulic grade line of the Kaukauna system is 865, which is 19-feet

lower than the Little Chute system. Therefore, the Kaukauna system cannot provide water to Little Chute without pumping.

D. System Operation

The main controls for the water system are housed at the Well #4 Pumphouse. Booster pumps are called to operate based on the water level in the Stevens Street tank. The system can be controlled by the water level in the Jefferson Street tank, but that is not done normally because the tank operation is influenced by the close proximity to Pumphouse #2. The controls are set so that only one (1) booster pump at each Station runs at a time. If demand cannot be met with one (1) pump, then a second pump at a different Station is automatically started. If additional demand was needed, a third pump at still another Station would be started. All boosters are operated alternately, so each booster is used regularly. All of the booster pumps are operated at the same rate, so the supply is consistent. In the high demand summer period, there is often at least one (1) pump running 24-hours, 7-days a week.

The operation of the well pumps is regulated by the water level in the respective reservoir. The regeneration of the softeners does not cause a bottleneck at any of the plants.

III. FUTURE NEEDS

A. Water System Service Area

The Village of Little Chute is in a desirable location with easy access to I-41. The community has experienced both residential and non-residential growth recently, and it is anticipated that the growth will continue. The distribution system is already well developed in the southeastern portion of the service area. The future water service area for the system is highlighted on Figure #3 and is located as follows:

- South Boundary – Fox River
- West Boundary – French Road & HWY 441
- North Boundary – CTH JJ & Gardenia Drive
- East Boundary – CTH CC, Rosehill Road & Hayes Street

A Comprehensive Plan 2016 - 2036 was completed for the Village by Martenson & Eisele in July 2016. The Plan presents anticipated growth and land use projected for the community. A copy of the Future Land Use Map is presented on Figure #4. As stated in the Comprehensive Plan, the strongest opportunities for commercial development are on both sides of I-41. Industrial development should be promoted in the Little Chute Industrial Park and on the south side of North Avenue (CTH OO), across from the Outagamie Recycling & Solid Waste Facility. There are relatively few limitations on development in the planning area caused by natural resources, such as steep slopes, soil conditions or large bodies of surface water. The following land needs projection is presented in the Comprehensive Plan:

"Based on historical ratios of the number of residents per acre of a specific land use, by 2025 the Village will need an additional 120-acres for residential development, 7-acres for commercial development and-7 acres for industrial development. However, due to the Village's location along I-41, demand is far exceeding the ratios."

Population projections are developed for the State of Wisconsin by the Department of Administration (DOA). These same projections, developed in 2013, were reported in the Comprehensive Plan and are summarized below:

- 2000 Census 10,476
- 2010 Census 10,449
- 2020 10,740
- 2025 10,950
- 2030 11,100

An updated population estimate dated January 1, 2017 by the DOA is 10,987, which is greater than the 2020 projection developed in 2013. This confirms that the Village is experiencing significant growth.

The potential water distribution system pressures were calculated throughout the Service Area outlined on Figure #3. System pressures are maintained by the height of the water in the elevated water towers and the ground elevation. The height of the water in the towers is the hydraulic grade line of the system. Wisconsin Administrative Code NR 811.70(4) establishes the following requirements for a municipal water system:

Static Pressure at Ground Level

- Minimum 35 psi
- Maximum 100 psi

Experience indicates that if pressures fall below 45 psi, customer complaints result because of the low pressure.

The hydraulic grade line of the Little Chute system is 884. A value of 874 was used for this analysis to account for operational changes in the water levels and friction losses in the distribution system. The results provided give general information regarding the water system pressures that could be provided. A network of water mains of sufficient size would need to be extended in the future service area to provide service. The calculated system pressures for the future development area are identified on Figure #3. The existing system can provide pressures greater than 60 psi throughout the planning area.

1. Water System Demands:

a. Water Demand History

Historical water system demand is presented in Table #6 and presented graphically on Figure #5. Average Day Demand has remained fairly

constant over the last 5-years, even though the number of customers has increased. The Maximum Day Demand fluctuates depending on system conditions and the weather, but generally, the Maximum Day Demand has decreased in recent years. Nationally and locally, here in Wisconsin, customers are using less water. Residential customers are installing water saving plumbing fixtures and industrial customers are evaluating water efficiency methods. This trend will likely continue. The following values are of note with regard to the Little Chute system demands:

- Total Water Usage Per Person 119 gpcd
- Residential Water Usage Per Person 39 gpcd
- Average Day Demand (2012 – 2016) 1,265,000 gpd
- Maximum Day Demand (2012 – 2016) 1,958,600 gpd

The System Operators monitor the total volume of water that is delivered into the distribution system and accounts for the water that is sold (Revenue Water) and water that is not sold (Non-Revenue Water). Non-Revenue Water includes water used to flush water mains, water used for fire protection, and water lost due to identified system leaks or breaks. During the year, an effort is made to tract non-revenue water and to estimate the quantity of non-revenue water. The amount that cannot be accounted for is reviewed and monitored on an annual basis because this represents lost revenue for the system. Prior to 2010, this amount was reported as the percentage of Unaccounted For Water on the Annual Report to the Public Service Commission (PSC). The current term used by the PSC is Real and Apparent Losses.

The historical percentage of system losses is listed in Table #6. The PSC recommends system losses be maintained below 15%. If the losses exceed 15%, the PSC may require that actions be taken to reduce water loss. Actions that may be taken include:

- Verify the accuracy of master and customer meters.
- Reviewing and improving, as appropriate, the system used to document the unmetered usage.
- Identify unmetered usage.
- Implement a leak detection program for the distribution system.

b. Projected Future Demand

Water demand parameters are proposed based on the historical averages presented in Table #6 and common engineering standards. The following demand parameters will be used to project future demands, and to analyze the capacity of the water supply and storage facilities.

- Total Pumpage Gallon per Capita Per Day (gpcd) 120 gpcd
- Maximum Day Demand to Average Day Demand Ratio 1.55

Future water demands based on projected population growth are summarized in Table #6. The System Operators also requested future demands with 500,000 gpd added be evaluated. This additional demand was developed to evaluate conditions if a large customer wanted to locate in the Village or if one of the existing customers expanded. The future demands are as follows:

	Average Day Demand (gpd)	Maximum Day Demand (gpd)
▪ Population Growth (11,100 people)	1,332,000	2,065,000
▪ Population Growth + 0.5 mgd	1,832,000	2,840,000

B. Water System Analysis

1. System Standards:

The Village of Little Chute water supply, storage and distribution systems must be designed and operated to meet Wisconsin Administrative Code requirements. There are also a number of standard engineering designing recommendations that should be used when evaluating and designing a water system. The State requirements and industry standard design criteria are summarized in Table #7. These standards will be referred to in the following sections of this Engineering Report.

2. Supply System Capacity Analysis:

The adequacy of a water system is evaluated on the basis of the Maximum Day Demand requirements. As a minimum, the supply required to maintain the Maximum Day Demand or Peak Day Demand will need to be supplied from the entire water supply over a 24-hour period. It is important to analyze the supply system capacity before looking at the storage system capacity, because sufficient supply is needed to maintain the storage capacity. If all sources of supply are available, the supply system can produce 4,536,000 gpd of water.

The reliability of the supply system can be analyzed under a variety of conditions. The following conditions have been analyzed and are listed in Table #8.

- **Condition A:** This condition assumes all systems are operational. This condition would provide a supply of 3,150 gpm or 4,536,000 gpd.

- **Condition B:** This condition assumes that the largest source of supply, Well #1, is out of service. The available supply would be 2,100 gpm or 3,024,000 gpd.

- **Condition C:** This condition evaluates the system capacity operating under standby power. There is no standby power at Well #3 / Pumphouse #2, so those facilities would not be available. The

available supply would be 2,100 gpm or 3,024,000 gpd; the same as Condition B.

3. Supply System Capacity Analysis Results:

The results of the supply system capacity analysis are presented in Table #8. Three (3) different projections of Maximum Day Demand were used for the analysis, including: 1) Existing Maximum Day Demand (5-year average); 2) Projected Maximum Day Demand, based on population projections; and 3) Projected Maximum Day Demand based on growth plus an additional 0.5 mgd.

Wisconsin Administrative Code requires the supply system should meet the Maximum Day Demand. The analysis summarized in Table #8 indicates the existing supply facilities have sufficient reliable capacity to meet the various operational conditions and Maximum Day Demands. The safe, reliable supply is what the system can provide with the largest source of supply out of service. This quantity is 3,024,000 gpd, as illustrated in Table #8. Therefore, as the Maximum Day Demand approaches 3,000,000 gpd, additional supply capacity should be considered for the Village. This would be an increase of approximately 1,000,000 gpd.

4. Storage System Capacity Analysis:

The Insurance Service Office (ISO) recommends the combined capacity of the water supply and system storage should equal the Maximum Day Demand, plus fire protection supply requirements. The storage system Capacity Analysis will be conducted using a fire flow requirement of 3,500 gpm for 3-hours. The same available supply conditions used to analyze the supply system capacity will be utilized to analyze the storage system capacity. It was assumed that only 75% of the elevated storage capacity would be available. The volume of ground storage available is equal to the amount that the booster pumps can provide.

The results of the Storage Capacity Analysis are presented in Tables #9 and #10. The recommended storage capacity for the various conditions is less than the current storage system capacity; therefore, the system has sufficient storage capacity to meet existing and future needs of the community.

5. Water Distribution System Layout:

A map of the Water Distribution System with recommended improvements is provided on Figure #6. The larger diameter transmission mains are also highlighted on the map. Generally, the system has developed in a well-connected grid. The three (3) Pumphouses and two (2) elevated water towers are located throughout the system and not in close proximity to each other. This helps distribute the strength of the system across the service area.

The system is bisected by railroad tracks in the southern one-third of the system and I-41 in the northern part of the system. Often, these types of features are barriers to adequate water system development. There are seven (7) water mains crossing the railroad tracks, and five (5) of those mains are 10-inch or larger. Therefore, there is sufficient transmission across the tracks. Currently, there are three (3) water mains that cross I-41. The 10-inch main crossing south of Randolph Drive is scheduled to be abandoned due to frequent water main breaks, leaving only two (2) crossings. It is recommended that a new I-41 crossing be constructed to replace the abandoned main. With only two (2) crossings, if one (1) of those mains is out of service, that leaves only one (1) main to convey water to and from the northern section of the system. A third water main crossing provides system redundancy, which will be more important as development occurs north of I-41.

The capacity, reliability and water quality of a distribution system is maximized when the system develops in a grid. Dead-end water mains should be avoided and/or eliminated, when possible. There are a number of cul-du-sacs that are served by dead-end mains, but in most cases, these are not exceptionally long dead-end water mains.

There are several areas in the system where longer dead-end water mains exist and areas are only served by a single main. In most cases, the reliability of these areas will be improved as development occurs adjacent to these areas. The water quality of dead-end mains will need to be monitored to maintain good water quality. The areas of note are listed below:

- West Main Street (HWY 96), west of Washington Street to French Road
- Cherryvale Avenue, north of Gardenia Drive
- North Freedom Road (CTH N), north of Maple Drive
- Rosehill Road, north of East North Avenue (HWY 96)

The System Operators conducted fire flow tests in the field throughout the distribution system. The data collected from these tests is used by Engineers, Fire Departments and Insurance Agencies in evaluating the strength of a distribution system. Typical fire flow requirements are listed on Table #11. The available fire flow is dependent on the size and the interior condition of the mains and the system layout. The fire flow data indicates that the minimum 500 gpm at 20 psi DNR requirement is met throughout the system. The available fire flow exceeds 1,000 psi throughout the community, with the exception of two (2) locations that are served with a dead-end main.

6. Future Elevated Water Tower Site:

The Storage Capacity Analysis indicates that additional storage capacity is not needed at this time. Additional storage could be added at Pumphouse #2 to improve the operation and flexibility of this facility. In the future, an elevated

water tower should be considered on the north side of I-41. This future water tower would improve the system reliability, as service is extended north of I-41. The Village may want to consider purchasing property for a future tower before the area is fully developed. Table #12 provides a summary of issues to consider when siting a new elevated tower.

7. Conclusions:

The Little Chute water system is well operated and maintained. In general, the system provides good service for its customers. Planning is needed to continue to provide that service for many years. A summary of the conclusions of the Water System Evaluation are as follows:

a. Future water system demands were developed to evaluate the capacity of the existing supply and storage facilities. Water demands were projected based on population growth and an additional 0.5 mgd was added to account for a potential large water user customer.

b. Capacity of the water supply facilities is sufficient to meet current and future demands. The existing water supply wells have adequate safe, reliable capacity to meet the projected future demands, even with one (1) well out of service. Currently, the Maximum Day Demand is approximately 2.0 mgd. As the Maximum Day Demand approaches 3.0 mgd, additional supply capacity should be considered. The water system capacity analysis is presented in Table #8.

c. The capacity of the existing storage facilities is sufficient to meet the existing and future needs of the community. As demands increase, ground storage capacity could be added at Pumphouse #2 to improve operational flexibility. The Village should start planning to locate an elevated water tower on the north side of I-41. A potential location for a new tower could be along Holland Road, north of Evergreen Drive. The results of the supply System Capacity Analysis are presented in Tables #9 and #10.

d. The water distribution system is generally a well-developed grid network and adequate fire flow capacities are provided throughout the system. There are several areas that are served by single, rather long, dead-end mains. As development occurs, additional mains will be developed and the system should be developed with connecting water mains.

e. Various water system improvements are identified on Figure #6 and in Table #13. The improvements include eliminating gaps in the transmission system and replacing mains that have a history of frequent main breaks. An Opinion of Probable Cost for the improvements is also summarized in Table #13. Probable cost information is provided in Appendix #2.

Disclaimer: The Opinion Of Probable Cost was prepared for use by the Owner in planning for future costs of the project. In providing Opinions Of Probable Cost, the Owner understands the Design Professional has no control over costs or the price of labor, equipment or materials, or over Construction Professionals' method of pricing, and that the Opinions Of Probable Cost provided herewith are made on the basis of the Design Professional's qualifications and experience. It is not intended to reflect actual costs, and is subject to change with the normal rise and fall of the local area's economy. This Opinion must be revised after every change made to the project or after every 30-day lapse in time from the original submittal by the Design Professional.

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Table #1

WELL CONSTRUCTION & WELL PUMP DATA
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

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		Well Depth	Casing Data	Type Of Pump Install Data / Motor	Design Capacity	Pump Setting	Motor	Auxiliary Power
Well #1		734-feet	12-inch: 0 - 102-feet	Aurora	1,240 gpm	280-feet	200-HP	Diesel Generator
BG 582				Pump - 2017 / Goulds 12 CHC 6-Stage	Typical Operating Capacity: 1,050 gpm			
Constructed	1950			Motor - 2009 / Aurora				
Static Water Level	130							
Well #3		805-feet	18-inch: 0 - 48-feet	Pump - 2010 / Goulds 12 CHC 7-Stage	1,200 gpm	430-feet	200-HP	None
BG 584			12-inch: 2 - 320-feet		Typical Operating Capacity: 1,050 gpm			
Constructed	1974							
Well #4		750-feet	20-inch: 0 - 47-feet	Pump - 2009 / Goulds 12 CHC 6-Stage	1,240 gpm	430-feet	200-HP	Diesel Generator
NG 591			16-inch: 0 - 449-feet	Motor - 2009 / GE Electric	Typical Operating Capacity: 1,050 gpm			
Constructed	1999							

Table #2

BOOSTER PUMPING EQUIPMENT
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
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	Location	Motor	Motor Mfg.	VFD/Soft	Installed/Built	Design Capacity	Typical Capacity	TDH	Auxiliary Power
Booster # 1	Well House # 1 - 100 VanBuren Street	100-HP	US Motor	VFD	2017	1,100 gpm	1,000 gpm	196	Diesel Generator
Booster # 2	Well House # 1 - 100 VanBuren Street	100-HP	US Motor	VFD	2017	1,100 gpm	1,000 gpm	196	Diesel Generator
Booster # 3	Pump House # 2 - 1118 Jefferson Street	75-HP	US Motor	VFD	1992	1,100 gpm	1,000 gpm	154	None
Booster # 4	Pump House # 2 - 1118 Jefferson Street	75-HP	US Motor	VFD	2013	1,100 gpm	1,000 gpm	154	None
Booster # 5	Well House # 4 - 625 E Evergreen	100-HP	US Motor	Soft	2001	1,200 gpm	950 gpm	174	Diesel Generator
Booster # 6	Well House # 4 - 625 E Evergreen	100-HP	US Motor	Soft	2001	1,200 gpm	1,100 gpm	174	Diesel Generator

Table #3

SOFTENER FACILITIES
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
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ID Tag	Location	Year Installed / Built	Design Resin (cu.ft.)	Actual Resin (cu.ft.)	Resin Removal	Hardness	Design Regeneration Setpoint	Actual Regeneration Setpoint
Well #1 - Shell #1	Well House # 1	2017	230	230	19,000	24	182,083	154,000
Well #1 - Shell #2	Well House # 1	2017	230	230	19,000	24	182,083	154,000
Well #1 - Shell #3	Well House # 1	2017	230	230	19,000	24	182,083	154,000
Pump #2 - Shell #1	Pumphouse # 2	1992	260	260	20,000	22	236,364	180,000
Pump #2 - Shell #2	Pumphouse # 2	1992	260	260	20,000	22	236,364	180,000
Pump #2 - Shell #3	Pumphouse #2	1950 / Rehab 2002	260	260	20,000	22	236,364	180,000
Well #4 - Shell #1	Well House #4	2001	320	320	20,000	34	188,235	150,000
Well #4 - Shell #2	Well House #4	2001	320	320	20,000	34	188,235	150,000
Well #4 - Shell #3	Well House #4	2001	320	320	20,000	34	188,235	150,000

Table #4

SUMMARY OF WATER STORAGE FACILITIES
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Location	Capacity	Year Constructed
ELEVATED TANKS		
Tank #1 - Stephen Street	300,000-gal	2002
Tank #2 - Jefferson Street	250,000-gal	1967
GROUND RESERVOIRS		
Reservoir #1 - Well #1	300,000-gal	1979
Reservoir #2 - Pumphouse #2	250,000-gal	1952
Reservoir #3 - Well #4	500,000-gal	2001

Table #5

WATER MAIN DATA
Feet Of Main / Age Of Main
Water System Evaluation & Plan
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Pipe Size	1920-1940	1941-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010	2011-2020	Total
	feet	feet	feet	feet	feet	feet	feet	feet	feet
4-inch	290	306				68			664
6-inch	3,071	5,752	7,247	13,462	1,287	2,136	1,222	1,678	35,855
8-inch	3,447	9,972	10,543	35,406	16,731	18,010	42,003	21,973	158,085
10-inch	1,621	4,522		4,890	3,079	1,832	7,474	336	23,754
12-inch	70		3,283	11,884	13,276	15,140	24,468	12,580	80,701
16-inch				4,534	677	1,663	331		7,205
TOTAL	8,499	20,552	21,073	70,176	35,050	38,849	75,498	36,567	**306,264**
									58-miles

Table #6

HISTORICAL & PROJECTED WATER USAGE
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

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Customer Classification	2012		2013		2014		2015		2016		Average		Projection Parameters
	No. of Customers	Annual Water Sales Gallons	No. of Customers	Annual Water Sales Gallons	No. of Customers	Annual Water Sales Gallons	No. of Customers	Annual Water Sales Gallons	No. of Customers	Annual Water Sales Gallons	No. of Customers	Annual Water Sales Gallons	gpcd
Residential	3,672	154,892,000	3,688	146,281,000	3,816	144,558,000	3,947	147,804,000	3,982	150,235,000			
Commercial	301	45,480,000	304	45,617,000	289	29,001,000	309	32,882,000	341	31,092,000			
Industrial	29	144,987,000	29	142,215,000	29	140,685,000	29	146,672,000	33	152,197,000			
Public Authority	24	11,193,000	24	7,222,000	24	7,049,000	24	8,428,000	24	9,298,000			
Multifamily Residential *					33	18,644,000	26	20,333,000	27	20,008,000			
Totals	4,026	356,552,000	4,045	341,335,000	4,191	339,937,000	4,335	356,119,000	4,407	362,830,000			
Population		10,432		10,462		10,539		10,778		10,976		10,637	11,100
Annual Pumpage, gallons		465,057,000		483,710,000		464,432,000		445,275,000		450,187,000		461,732,200	
Average Day, gpd		1,274,000		1,325,000		1,272,000		1,220,000		1,233,000		1,265,000	
Total GPCD		122		127		121		113		112		119	120
Residential GPCD		41		38		38		38		38		38	
Maximum Day, gpd		2,221,000		2,125,000		1,789,000		1,845,000		1,813,000		1,958,600	
Cause Of Max		Water Main Break		Peak Summer Usage plus Main Break		2 Water Main Breaks on Same Day		Summer Peak		Summer Peak			
Max Day Ratio		1.74		1.60		1.41		1.51		1.47		1.55	1.55
Minimum Day, gpd		890,000		964,000		727,000		773,000		819,000		834,600	
Real & Apparent Losses:		12%		19%		12%		16%		9%			

* Multifamily Residential is a new Classification in 2014. Previously Multifamily Residential was classified as Commercial Customer.

Population Data Obtained from Demographic Services Center, Wisconsin Department of Administration

Projected Water Use	**Avg Day Demand**	**Max Day Demand**
Parameter	gpd	gpd
2030 Population = 11,100	1,332,000 (11,100 x 120 gpd)	2,065,000 (1.332 mgd x 1.55)
Add 0.5 mgd (Avg. Day Demand)	500,000	775,000
Projected Water Demand With Population Growth + 0.5 mgd	1,832,000	2,840,000

Table #7

SYSTEM STANDARDS
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

December 2017
McM No. L0001-9-17-00157.00

Supply System Should Meet Maximum Day Demand
Wisconsin Administrative Code NR 811

Storage Capacity Recommendatios - Insurance Underwriting / Grading Service
Supply + Storage = Maximum Day Demand + Basic Fire Flow

Design Facilities For Maximum Day Demand
Wisconsin Administrative Code NR 811

Minimum Requirements:

35 psi System Pressure	Wisconsin Administrative Code NR 810.10
30 psi Static Pressure at Corporation Stop	Wisconsin Public Service (PSC) Code 185.82
20 psi Residual Pressure at Meter Outlet	Wisconsin PSC Code 185.82

Maximum Pressure At Meter Outlet:

125 psi For Existing Systems	Wisconsin Administrative Code PSC 185.82
100 psi Maximum Pressure at Meter Outlet For New Systems & Major Additions To Existing Systems	

Table #8

SUPPLY CAPACITY ANALYSIS
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

December 2017
McM No. L0001-9-17-00157.00

Supply Capacity = Maximum Day Demand
Reliability Analysis: Evaluate system with the largest source of supply out of service

Supply Source	Well Capacity	Condition A	Condition B	Condition C
	gpm	gpm	gpm	gpm
Well #1	1,050	1,050	N/A	1,050
Well #3	1,050	1,050	1,050	N/A
Well #4	1,050	1,050	1,050	1,050
Available Supply	3,150	3,150	2,100	2,100
Available Supply, gpd	4,536,000	4,536,000	3,024,000	3,024,000

Existing Max Day, gpd (5-year average) =	1,928,000
Existing Max Day, gpm (5-year average) =	1,340
Projected Max Day, gpd =	2,065,000
Projected Max Day, gpm =	1,430
Population Growth + 0.5 mgd Demand	
Projected Max Day, gpd =	2,840,000
Projected Max Day, gpm =	1,970

The existing supply system has sufficient capacity to meet both the existing and projected Maximum Day Demand for the operating conditions that were considered.
If Maximum day demand approaches 3 MGD additional supply capacity should be considered.

Condition B evaluates the safe, reliable supply with the largest source of supply out of service
Condition C evaluates the system operating under standby power. (There is no Standby power at Well #3/Pumphouse #2)

Table #9

STORAGE CAPACITY ANALYSIS - EXISTING DEMAND
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

December 2017
McM No. L0001-9-17-00157.00

Fire Flow + Maximum Day = Supply + Storage — Maximum Day Demand = 1,928,000 gpd

Fire Flow	3,500	gpm x	3	Hours =	630,000 gallons
Existing Maximum Day Demand (3 hour period) =					241,000 gallons

ELEVATED STORAGE

Jefferson Street Tank - Tank #2	250,000 gallons
Stephen Street Tank - Tank #3	300,000 gallons

Supply Available	**Booster Pump Capacity** gpm	**Condition A** gpm	**Condition B** gpm	**Condition C** gpm
Well #1	1,000	1,000	1,000	1,000
Gallons, 3-hour period	180,000	180,000	180,000	180,000
Pumphouse #2 (Supplied by Well #3)	1,000	1,000	1,000	N/A
Gallons, 3-hour period	180,000	180,000	180,000	
Well #4	1,100	1,100	N/A	1,100
Gallons, 3-hour period	198,000	198,000		198,000
Total Supply Available (gallons, 3-hour period)	558,000	558,000	360,000	378,000

GROUND STORAGE AVAILABLE / 3-Hour Period **Supply Available From Ground Storage**	**Booster Pump Capacity** gpm	**Condition A** gpm	**Condition B** gpm	**Condition C** gpm
Well #1	1,000	1,000	1,000	1,000
Gallons, 3-hour period	180,000	180,000	180,000	180,000
Pumphouse #2 (Supplied by Well #3)	1,000	1,000	1,000	N/A
Gallons, 3-hour period	180,000	180,000	180,000	
Well #4	1,100	1,100	N/A	1,100
Gallons, 3-hour period	198,000	198,000		198,000
Total Supply Available (gallons, 3-hour period)	558,000	558,000	360,000	378,000

EXISTING SYSTEM ANALYSIS / Gallons	**Condition A** gpm	**Condition B** gpm	**Condition C** gpm
Fire Flow (3-Hours)	630,000	630,000	630,000
Maximum Day (3-Hours)	241,000	241,000	241,000
Less Available Supply (3-Hours)	-558,000	-360,000	-378,000
Recommended Storage Capacity	313,000	511,000	493,000
Elevated Storage Available (75% Full)	412,500	412,500	412,500
Ground Storage	558,000	360,000	378,000
Total Storage Available	970,500	772,500	790,500

Available Storage exceeds the recommended storage capacity. Therefore, there is sufficient storage capacity in the system to meet the existing demands.

Condition B evaluates the safe, reliable supply with the largest source of supply out of service.
Condition C evaluates the system operating under standby power. (There is no Standby power at Well #3/Pumphouse #2)

Table #10

STORAGE CAPACITY ANALYSIS - POPULATION GROWTH + 0.5 mgd DEMAND
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

December 2017
McM No. L0001-9-17-00157.00

Fire Flow + Maximum Day = Supply + Storage Maximum Day Demand = 2,840,000 gpd

Fire Flow	3,500	gpm x	3	Hours =	630,000 gallons
Existing Maximum Day Demand (3 hour period) =					258,000 gallons

ELEVATED STORAGE

Jefferson Street Tank - Tank #2	250,000 gallons
Stephen Street Tank - Tank #3	300,000 gallons

Supply Available	**Booster Pump Capacity** gpm	**Condition A** gpm	**Condition B** gpm	**Condition C** gpm
Well #1	1,000	1,000	1,000	1,000
Gallons, 3-hour period	180,000	180,000	180,000	180,000
Pumphouse #2 (Supplied by Well #3)	1,000	1,000	1,000	N/A
Gallons, 3-hour period	180,000	180,000	180,000	
Well #4	1,100	1,100	N/A	1,100
Gallons, 3-hour period	198,000	198,000		198,000
Total Supply Available (gallons, 3-hour period)	558,000	558,000	360,000	378,000

GROUND STORAGE AVAILABLE / 3-Hour Period **Supply Available From Ground Storage**	**Booster Pump Capacity** gpm	**Condition A** gpm	**Condition B** gpm	**Condition C** gpm
Well #1	1,000	1,000	1,000	1,000
Gallons, 3-hour period	180,000	180,000	180,000	180,000
Pumphouse #2 (Supplied by Well #3)	1,000	1,000	1,000	N/A
Gallons, 3-hour period	180,000	180,000	180,000	
Well #4	1,100	1,100	N/A	1,100
Gallons, 3-hour period	198,000	198,000		198,000
Total Supply Available (gallons, 3-hour period)	558,000	558,000	360,000	378,000

FUTURE SYSTEM ANALYSIS, gallons	**Condition A** gpm	**Condition B** gpm	**Condition C** gpm
Fire Flow (3-Hours)	630,000	630,000	630,000
Maximum Day (3-Hours)	258,000	258,000	258,000
Less Available Supply (3-Hours)	-558,000	-360,000	-378,000
Recommended Storage Capacity	330,000	528,000	510,000
Elevated Storage Available (75% Full)	412,500	412,500	412,500
Ground Storage	558,000	360,000	378,000
Total Storage Available	970,500	772,500	790,500

Available Storage exceeds the recommended storage capacity. Therefore, there is sufficient storage capacity in the system to meet the existing demands.

Condition B evaluates the save, reliable supply with the largest source of supply out of service.
Condition C evaluates the system operating under standby power. (There is no Standby power at Well #3/Pumphouse #2)

Table #11

FIRE FLOW INFORMATION
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

December 2017
McM No. L0001-9-17-00157.00

TYPICAL FIRE FLOW REQUIREMENTS

Land Use	Range Of Needed Fire Flow @ 20 psi Residual Pressure
Single & Two-Family	
Over 100-feet Building Separation	50 gpm
31 to 100-feet Building Separation	750 gpm
11 to 30-feet Building Separation	1,000 gpm
10-feet or Less Building Separation	1,500 gpm
Multiple Family Residential Complexes	2,000 to 3,000+ gpm
Average Density Commercial	1,500 to 2,500+ gpm
High Value Commercial	2,500 to 3,500+ gpm
Light Industrial	2,000 to 3,500+ gpm
Heavy Industrial	2,500 to 3,400+ gpm
Other Commercial, Industrial & Public Buildings	Up to 12,000 gpm

Wisconsin Administrative Code NR 811.70(6):
500 gpm @ 20 psi Residual Pressure
Flow Requirement For Water Mains Serving Fire Hydrants

Table #12

ELEVATED TOWER SITE CONSIDERATIONS
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

December 2017
McM No. L0001-9-17-00157.00

Site Conditions
- Availability
- Size
- Ground Elevation
- Soil Conditions
- Topography
- Current & Future Surrounding Land Use
- Clearance From Other Utilities
- Access

Hydraulic Considerations
- Proximity To Water Transmission System
- Proximity To Other Storage & Supply Facilities
- Proximity To Major Consumers / Fire Protection
- Need For System Improvements

Tower Maintenance Considerations
- Provide 30-feet on Both Sides Of Bowl
  (500,000-gal tower bowl diameter = 55-feet)

Costs

Table #13

CAPITAL IMPROVEMENT PLAN
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

December 2017
McM No. L0001-9-17-00157.00

		Opinion Of Probable Cost [1]
Main Street:	Section of 8-inch water main, east of Washington Street. Replace section of 8-inch main with 12-inch main.	$141,000
Moasis Drive:	Between Freedom Road and Kelly Street Replace with 12-inch water main.	$59,000
Randolph Drive:	To be replaced with 12-ich water main. Bad main.	$546,000
Bohm Drive:	To be replaced with 12-inch water main. Bad main.	$215,450
Well #3:	Transmission main. To be replaced with 12-inch water main.	$273,000
Other:	Maintain water system maps.	
Additional Storage:	The Storage Capacity Analysis indicates that additional storage capacity is not needed at this time. Additional storage could be added at Pumphouse #2 to improve the operation and flexibility of this facility.	
	In the future, an elevated tower should be considered on the north side of I-41. The Village may want to consider purchasing property at this time.	
	The probable cost includes Engineering and Contingencies	
I-41 Crossing:	Maintain three (3) highway crossing mains, specially as development expands and a new elevated water tower is constructed north of I-41.	

[1] The Opinion Of Probable Cost was prepared for use by the Owner in planning for future costs of the project. In providing Opinions Of Probable Cost, the Owner understands that the Design Professional has no control over costs or the price of labor, equipment or materials, or over Construction Professionals' method of pricing, and that the Opinions Of Probable Cost provided herewith are made on the basis of the Design Professional's qualifications and experience. It is not intended to reflect actual costs, and is subject to change with the normal rise and fall of the local area's economy. This Opinion must be revised after every change made to the project or after every 30-day lapse in time from the original submittal by the Design Professional.

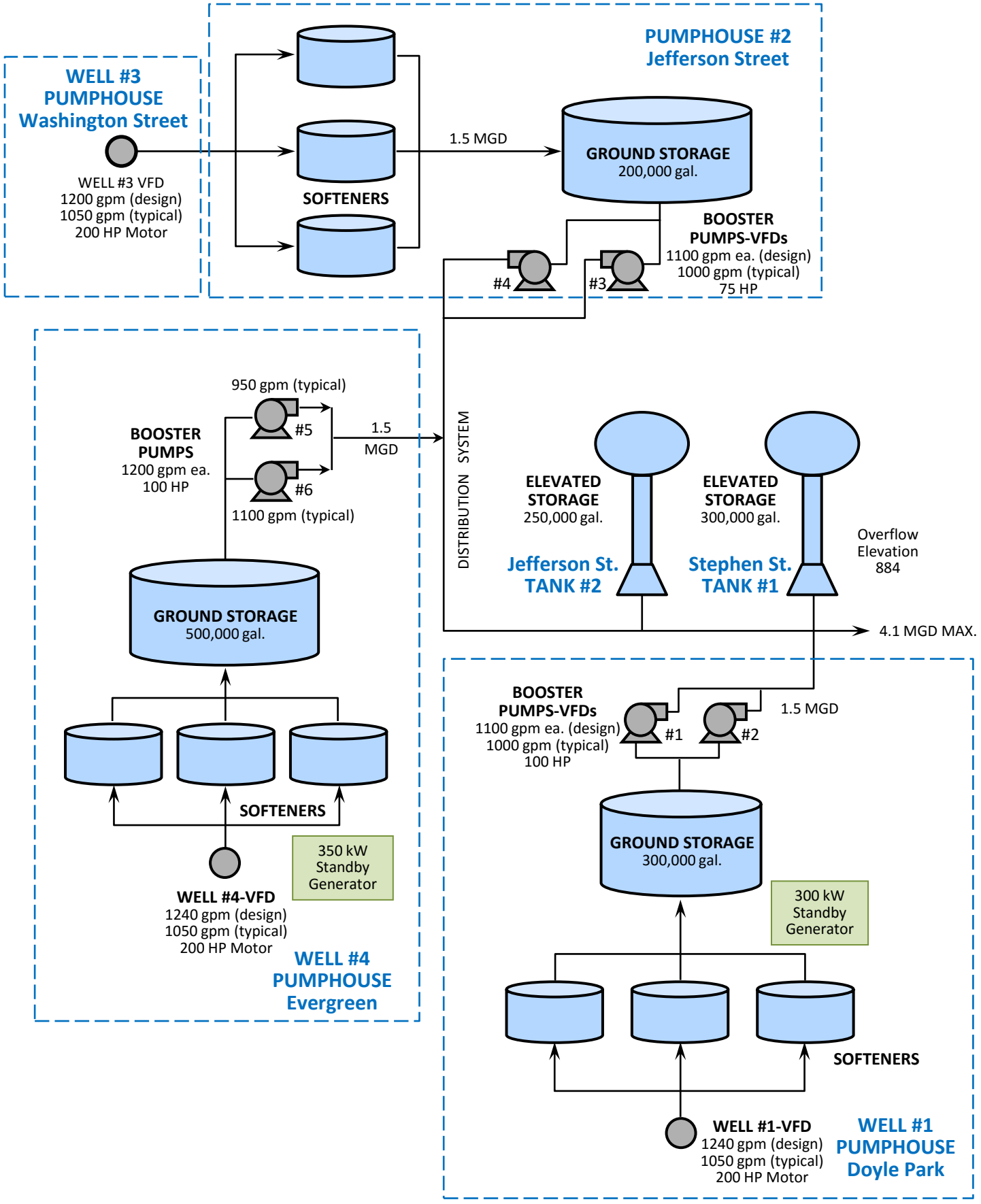


FIGURE #1

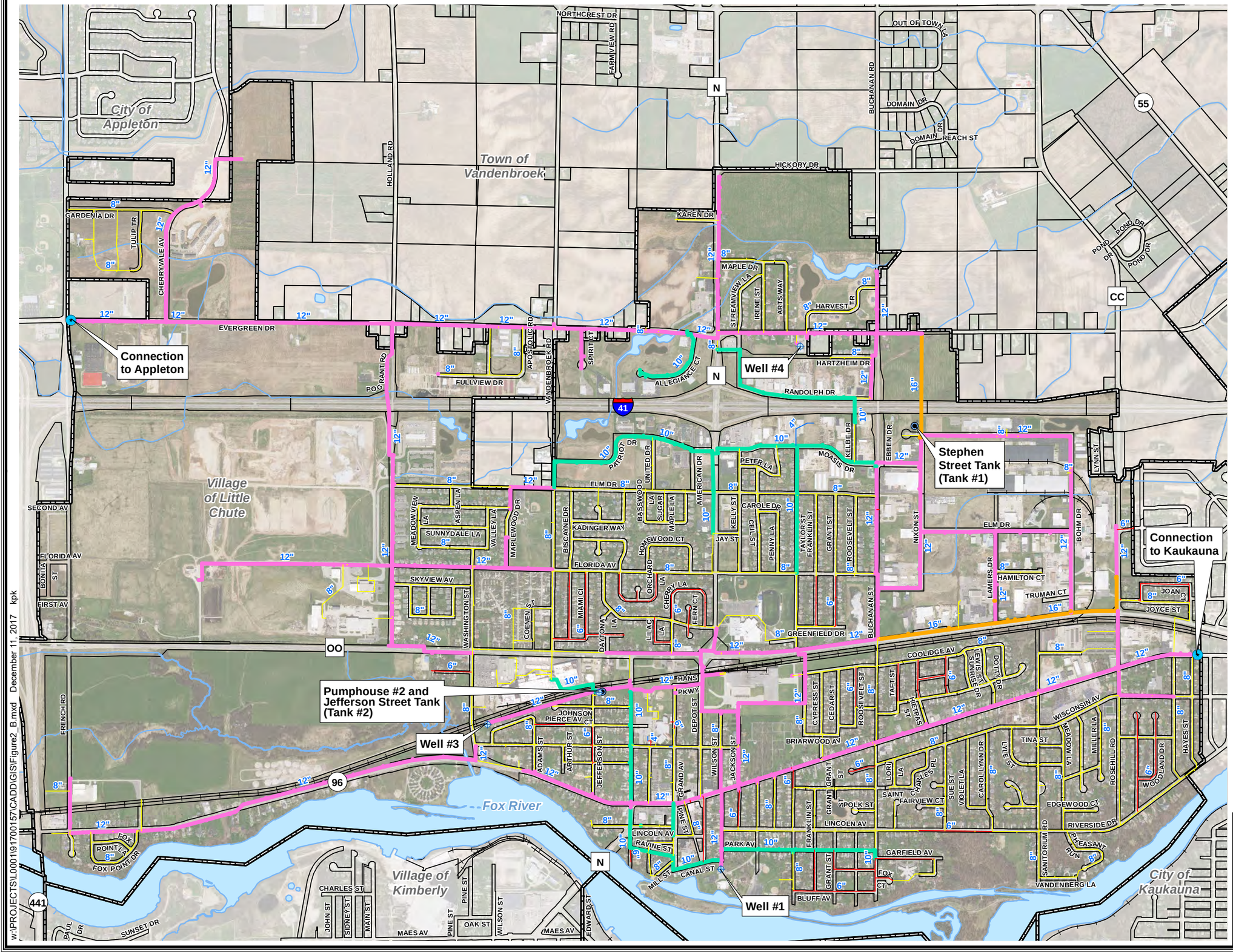
WATER SYSTEM SCHEMATIC

VILLAGE OF LITTLE CHUTE, WISCONSIN

McM #L0001-91700157.00 9/13/2017

ID:PPT\2017\MCM WIS\LITTLE CHUTE WATER SYSTEM SCHEMATIC.PPTX AJV:

McMAHON ENGINEERS ARCHITECTS



Water Distribution System (By Diameter)

- 4 inch
- 6 inch
- 8 inch
- 10 inch
- 12 inch
- 16 inch

Other Mapped Features

- Connection Point
- Elevated Tank
- Well
- Municipal Boundary
- Parcel or Right-of-Way Line
- Railroad Centerline
- Stream
- Surface Water

Source: Outagamie County, 2014-17.

0 1,500 3,000 Feet

McMAHON ENGINEERS ARCHITECTS
McMAHON ASSOCIATES, INC.

FIGURE 2
WATER DISTRIBUTION SYSTEM BY DIAMETER
WATER SYSTEM EVALUATION
VILLAGE OF LITTLE CHUTE
OUTAGAMIE COUNTY, WISCONSIN

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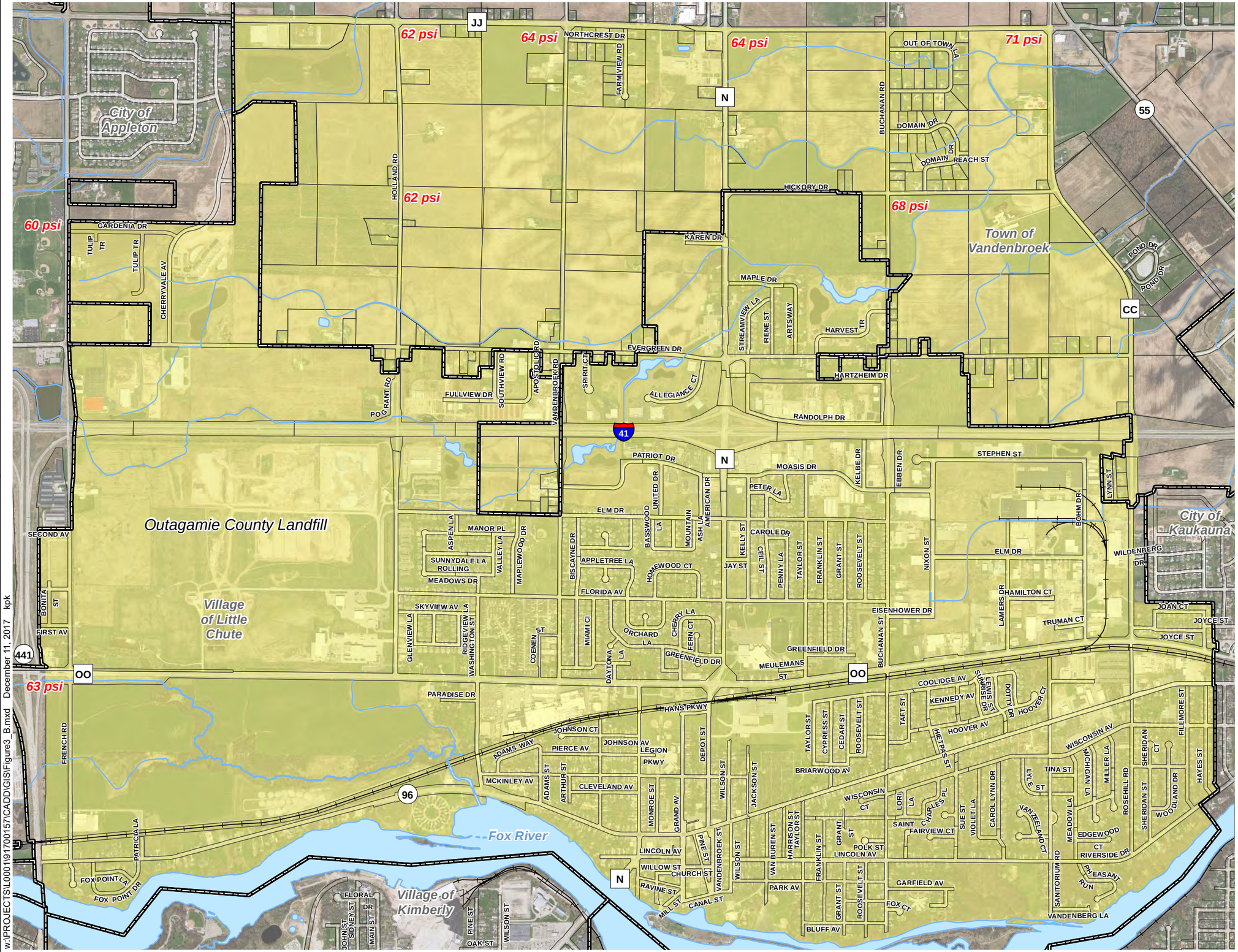

Water System Service Area

Other Mapped Features

- 62 psi — Projected Static Pressure
- Municipal Boundary
- Parcel or Right-of-Way Line
- Railroad Centerline
- Stream
- Surface Water

Note: System Hydraulic Grade Line - 884

Source: Outagamie County, 2014-17.

N

0 1,500 3,000 Feet

McMAHON ENGINEERS ARCHITECTS
McMAHON ASSOCIATES, INC.

FIGURE 3
WATER SYSTEM SERVICE AREA
WATER SYSTEM EVALUATION
VILLAGE OF LITTLE CHUTE
OUTAGAMIE COUNTY, WISCONSIN

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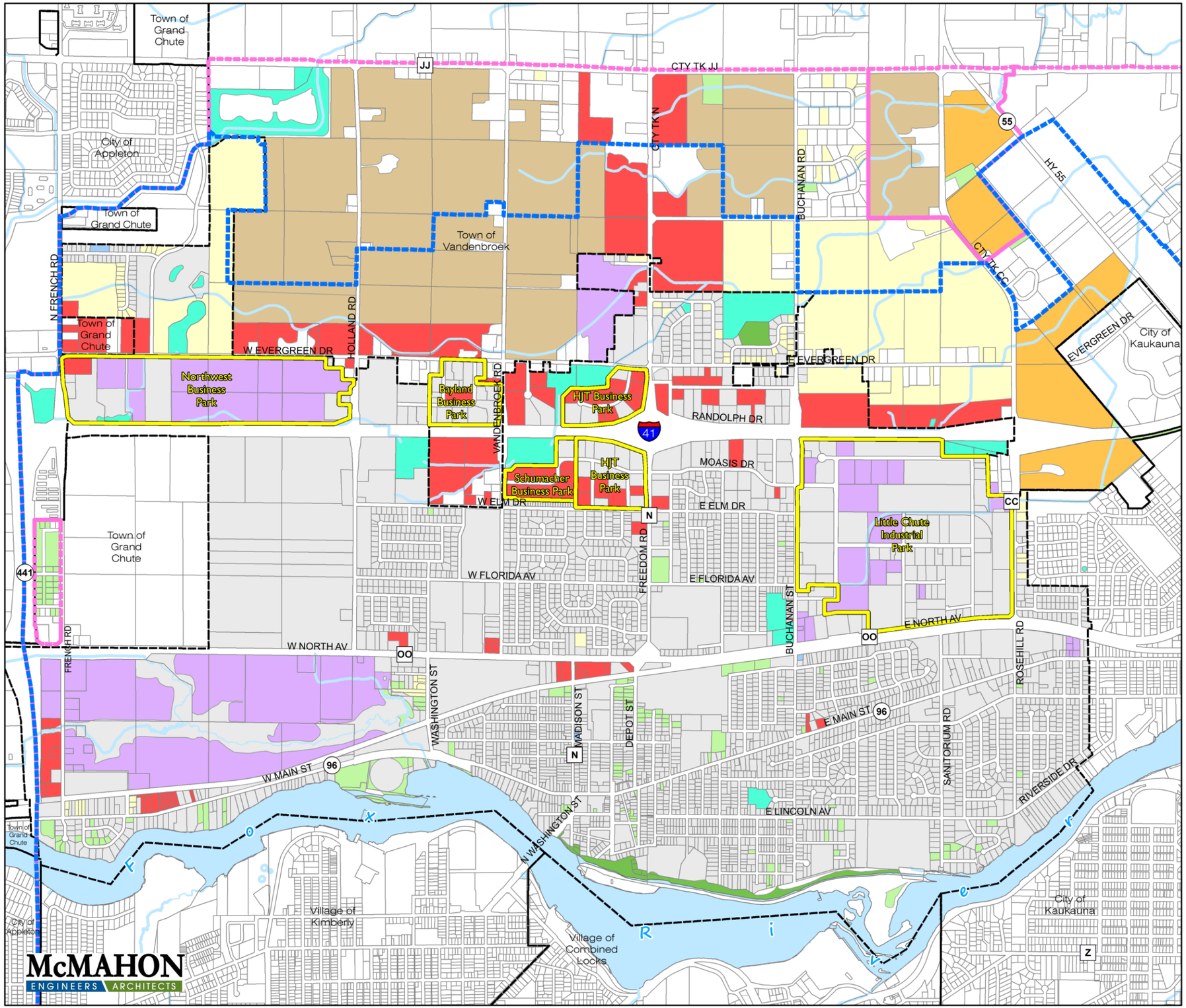


MAP 1

Future Land Use

Village of Little Chute
Comprehensive Plan

- Commercial
- Currently Developed
  Redevelopment on these parcels shall follow current zoning.
- Industrial
- Non-irrigated Cropland
- Other Open Land
  Development on these parcels shall follow current zoning.
- Public Institution
- Recreation
- Residential
- Rural Preservation
- Stormwater Management Facility
- Industrial & Business Parks
- Sewer Service Area 2030
- Sewer Service Area 2050
- Municipal Boundary

Sources: Outagamie County, Village of Little Chute, East Central Regional Planning Commission, and Wisconsin Department of Natural Resources. April 2016.

NORTH

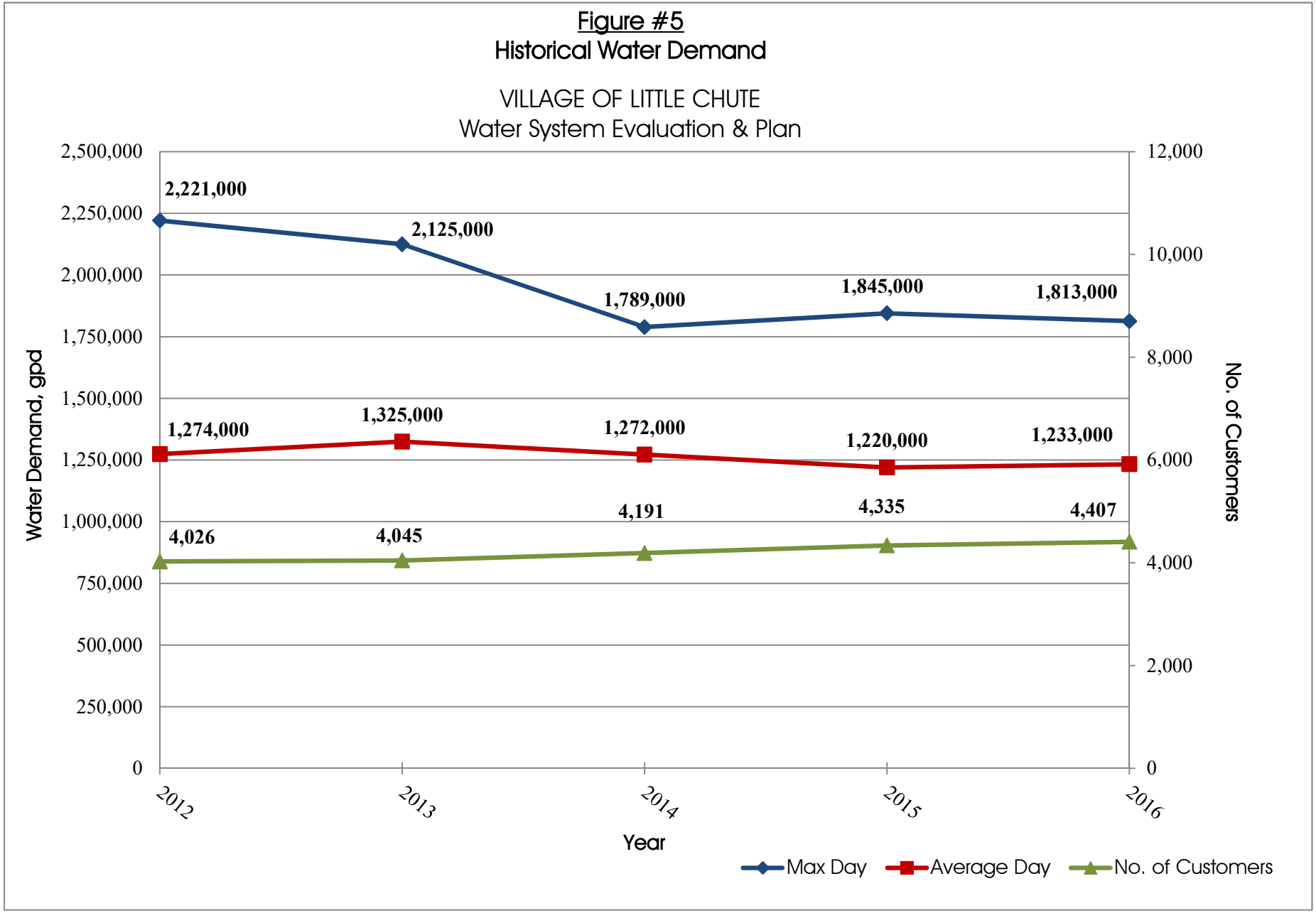
0 0.25 0.5 1 Miles

FIGURE #4

FUTURE LAND USE

WATER SYSTEM EVALUATION
VILLAGE OF LITTLE CHUTE, WISCONSIN
McM #L0001-91700157.00 12/8/2017
ID:PPT\2017\MCM WIS\LITTLE CHUTE WATER SYSTEM EVALUATION FIGS.PPTX AJV:jmk

Figure #5
Historical Water Demand



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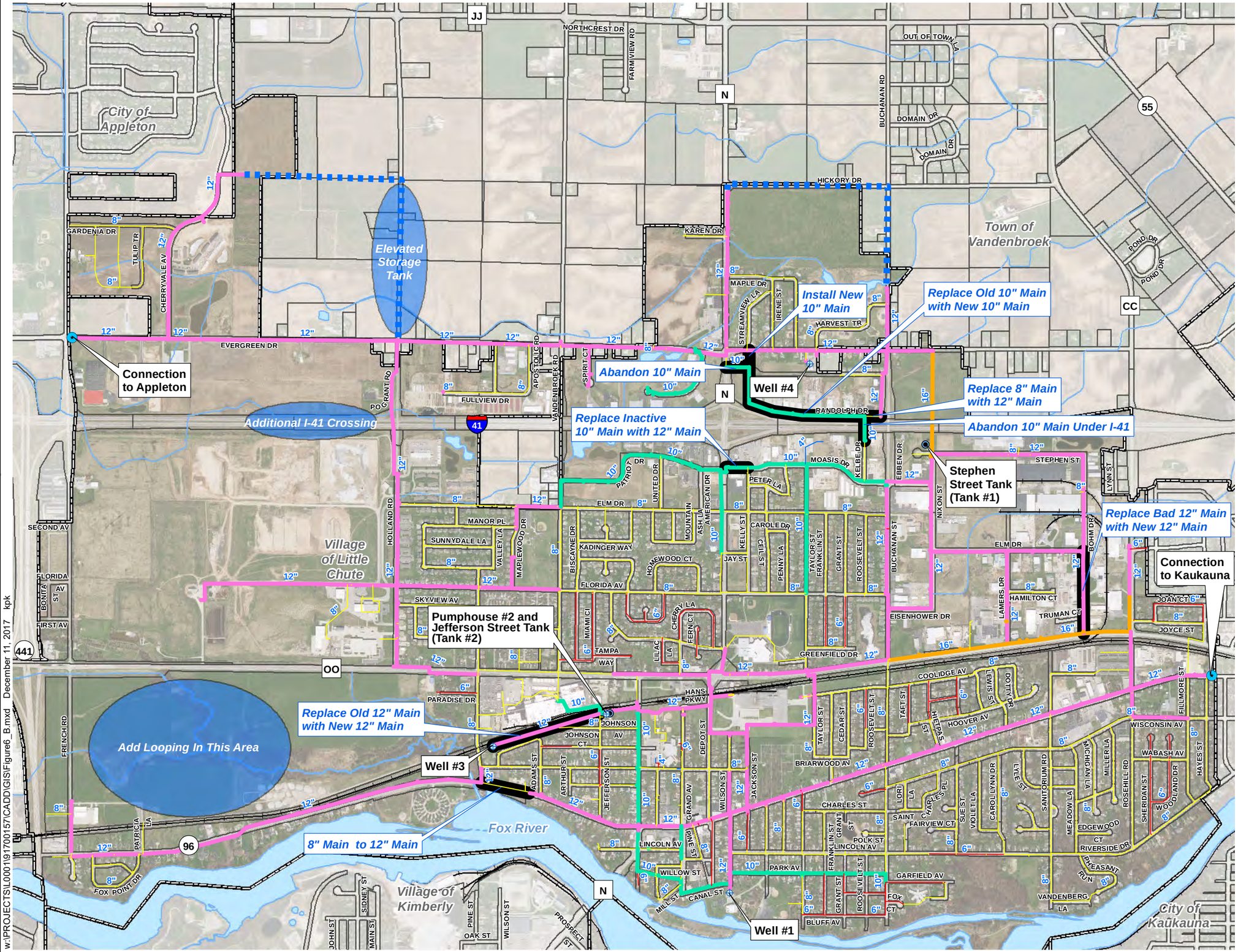

Water Distribution System (By Diameter)

- 4 inch
- 6 inch
- 8 inch
- 10 inch
- 12 inch
- 16 inch
- Proposed Improvement
- Future 12"

Other Mapped Features

- Connection Point
- Elevated Tank
- Well
- Potential System Improvement Area
- Municipal Boundary
- Parcel or Right-of-Way Line
- Railroad Centerline
- Stream
- Surface Water

Source: Outagamie County, 2014-17.

0 1,500 3,000 Feet

McMAHON ENGINEERS ARCHITECTS
McMAHON ASSOCIATES, INC.

FIGURE 6
WATER SYSTEM IMPROVEMENTS
WATER SYSTEM EVALUATION
VILLAGE OF LITTLE CHUTE
OUTAGAMIE COUNTY, WISCONSIN

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Appendix #1

WELL CONSTRUCTION LOGS

WISCONSIN UNIQUE WELL NUMBER **BG582**

Source: SWAP PROJECT KEYED

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 02/02)bw

Depth 734 FT

Property Owner: LITTLE CHUTE, VILLAGE OF		Telephone Number: 414-788-7398	
Mailing Address: 108 W MAIN ST			
City: LITTLE CHUTE	State: WI	Zip Code: 54140	
County of Well Location: 45 OUTAGAMIE	Co Well Permit No: W	Well Completion Date: January 1, 1950	

1. Well Location

T=Town C=City V=Village: V of LITTLE CHUTE

Fire#:

Street Address or Road Name and Number: 100 VAN BUREN ST #1

Subdivision Name: | Lot#: | Block #:

Gov't Lot **or** NE 1/4 of SE 1/4 of Section 21 T 21 N;R 18 E

Latitude Deg. 44 Min. 16.6222

Longitude Deg 88 Min. 18.7554

Well Constructor: LAYNE CHRISTENSEN COMPANY	License #: 582	Facility ID (Public): 445033820	
Address: W229 N5005 DUPLAINVI		Public Well Plan Approval#:	
City: PEWAUKEE	State: WI	Zip Code: 53072	Date Of Approval: 07/20/1923
Hicap Permanent Well #: 83482	Common Well #: 001		Specific Capacity: 56.5 gpm/ft

2. Well Type 3 (See item 12 below)

1=New 2=Replacement 3=Reconstruction

of previous unique well # _____ constructed in 1923

Reason for replaced or reconstructed Well?

Lat/Long Method: GPS004

3. Well Serves M # of homes and or (eg: barn, restaurant, church, school, industry, etc.)

M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole

High Capacity: Well? Property?

1 1=Drilled 2=Driven Point 3=Jetted 4=Other

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties?

Well located in floodplain?

Distance in feet from well to nearest: (including proposed)

1. Landfill
2. Building Overhang
3. 1=Septic 2= Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
15.0	surface	102
12.0	102	734

Upper Enlarged Drillhole
-- 1. Rotary - Mud Circulation
-- 2. Rotary - Air
-- 3. Rotary - Air and Foam
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
-- 6. Cable-tool Bit _ n. dia
-- 7. Temp. Outer Casing _ in. dia. _____ depth ft. Removed ?
Other

Lower Open Bedrock

6. Casing Liner Screen Material, Weight, Specification Manufacturer & Method of Assembly

Dia. (in.)	Material, Weight, Specification, Manufacturer & Method of Assembly	From (ft.)	To (ft.)
12.0		surface	102

Dia.(in.)	Screen type, material & slot size	From	To

7. Grout or Other Sealing Material

Method / Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
GROUT	surface	102.0	

Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
_C_	CLAY	0	5
_L_	DOLOMITE GALENA PLATTEVILLE	5	151
_NL	SANDSTONE LOWER MAGNESIUM	151	189
G_LR	DOLOMITE LOWER MAGNESIUM	189	229
_NNL	SANDSTONE LOWER MAGNESIUM	229	237
G_L_	DOLOMITE LOWER MAGNESIUM	237	329
_NNL	SANDSTONE LOWER MAGNESIUM	329	335
_LS	DOLOMITE	335	345
_NL	SANDSTONE TREMPEALEAU	345	382
_NL	SANDSTONE FRANCONIAN	382	490
_N_	SANDSTONE DRESBACH	490	730
P_Q_	GRANITE PRECAMBRIAN	730	734

9. Static Water Level

38.0 feet B ground surface
A=Above B=Below

10. Pump Test

Pumping level 44.0 ft. below surface

Pumping at 339.0 GP M 8.0 Hrs

11. Well Is: 0 in. Grade (A=Above B=Below)

Developed?

Disinfected?

Capped?

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?

If no, explain

13. Initials of Well Constructor or Supervisory Driller | Date Signed

Initials of Drill Rig Operator (Mandatory unless same as above) | Date Signed

Additonal Comments? Y Variance Issued?

Owner Sent Label? Y More Geology?

Batch 548

WISCONSIN UNIQUE WELL NUMBER
SOURCE: SWAP PROJECT KEYED **BG584**

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 12/00)

Property Owner: LITTLE CHUTE, VILLAGE OF
Telephone Number: 414 – 788 – 7398
Depth 805 FT

Mailing Address: 108 W MAIN ST

City: LITTLE CHUTE | State: WI | Zip Code: 54140

County of Well Location: 45 OUTAGAMIE | Co Well Permit No W: NE | Well Completion Date: February 1, 1974

Well Constructor: LAYNE CHRISTENSEN | License #: 582 | Facility ID (Public): 445033820

Address: W229 N5005 DUPLAINVI | Public Well Plan Approval#: 730121

City: PEWAUKEE | State: WI | Zip Code: 53072 | Date Of Approval: 02/26/1973

Hicap Permanent Well #: 83484 | Common Well #: 003 | 4.2 gpm/ft

1. Well Location
V T=Town C=City V=Village of LITTLE CHUTE | Fire#

Street Address or Road Name and Number: 920 WASHINGTON ST #3

Subdivision Name | Lot# | Block #

Gov't Lot or SE 1/4 of NW 1/4 of Section 21 T 21 N R 18 E

Latitude Deg. 44 Min. 17.0071
Longitude Deg 88 Min. 19.6573

2. Well Type 1 (1=New, 2=Replacement, 3=Reconstruction) (See item 12 below) | Lat/Long Method

of previous unique well # _____ constructed in 0

Reason for replaced or reconstructed Well?

3. Well Serves M (M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole) # of homes and or (eg: barn, restaurant, church, school, industry, etc.)

High Capacity: Well? Property?

1 (1=Drilled 2=Driven Point 3=Jetted 4=Other)

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties?

Well located in floodplain?

Distance in feet from well to nearest: (including proposed)

1. Landfill
2. Building Overhang
3. 1=Septic 2= Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
18.0	surface	48
17.0	47	795
12.0	795	805

Upper Enlarged Drillhole — Lower Open Bedrock
-- 1. Rotary - Mud Circulation
-- 2. Rotary - Air
-- 3. Rotary - Air and Foam
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
-- 6. Cable-tool Bit _____ in. dia
-- 7. Temp. Outer Casing _____ in. dia. _____ depth ft. Removed ?
Other

6. Casing Liner Screen Material, Weight, Specification Manufacturer & Method of Assembly

Dia. (in.)		From (ft.)	To (ft.)
18.0	A53B WELDED 0375 WALL	surface	48
12.0	A53B 0375 WALL WELDED	2	320

Dia.(in.)	Screen type, material & slot size	From	To

7. Grout or Other Sealing Material

Method / Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
NEAT CEMENT	surface	320.0	

Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
R_C_	CLAY	0	45
_LL_	DOLOMITE SINNIPEE	45	175
_NL_	DOLOMITE @ SANDSTONE STP	175	185
E_HS	SHALE STP	185	195
__L_	DOLOMITE PDC	195	250
G_N_	SANDSTONE PDC	250	270
__LR	DOLOMITE PDC	270	365
P_L_	DOLOMITE COON VALLEY	365	375
R_NL	SANDSTONE COON VALLEY	375	380
O_N_	SANDSTONE VAN OSER	380	395
P_N_	SANDSTONE NORWALK	395	405
__N_	SANDSTONE TUN CITY	405	525

9. Static Water Level
129.0 feet B ground surface A=Above B=Below

11. Well Is: Grade
0 in. A=Above B=Below
Developed?
Disinfected?
Capped?

10. Pump Test
Pumping level 319.0ft. below surface
Pumping at 790.0GPM 9.00Hrs

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?
If no, explain

13. Initials of Well Constructor or Supervisory Driller | Date Signed

Initials of Drill Rig Operator (Mandatory unless same as above) | Date Signed

BG584

Geology Codes	Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
R_C_	CLAY	0	45
_LL_	DOLOMITE SINNIPEE	45	175
_NL_	DOLOMITE @ SANDSTONE STP	175	185
E_HS	SHALE STP	185	195
__L_	DOLOMITE PDC	195	250
G_N_	SANDSTONE PDC	250	270
__LR	DOLOMITE PDC	270	365
P_L_	DOLOMITE COON VALLEY	365	375
R_NL	SANDSTONE COON VALLEY	375	380
O_N_	SANDSTONE VAN OSER	380	395
P_N_	SANDSTONE NORWALK	395	405
__N_	SANDSTONE TUN CITY	405	525
I_N_	SANDSTONE ELK MOUND	525	715
P_N_	SANDSTONE ELK MOUND	715	795
R_Q_	SYENITE PC	795	805

WISCONSIN UNIQUE WELL NUMBER
SOURCE: WELL CONSTRUCTION **NG591**

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 12/00)

Property Owner: LITTLE CHUTE, VILLAGE OF | Telephone Number: 920 – 788 – 7380

Mailing Address: 108 W MAIN ST

City: LITTLE CHUTE | State: WI | Zip Code: 54140

County of Well Location: 45 OUTAGAMIE | NE | Co Well Permit No W | Well Completion Date: January 18, 1999

Well Constructor: SAMS ROTARY | License #: 370 | Facility ID (Public): 445033820

Address: PO BOX 150 | Public Well Plan Approval#: 98-1023

City: RANDOLPH | State: WI | Zip Code: 53956 | Date Of Approval: 08/04/1998

Hicap Well #: | Common Well #: 004 | 25.6 gpm/ft

1. Well Location
T | T=Town C=City V=Village
of LITTLE CHUTE | Fire#:

Street Address or Road Name and Number: EVER GREEN DR

Subdivision Name: | Lot#: | Block #:

Gov't Lot: | or NW 1/4 of NW 1/4 of
Section 15 T 21 N R 18 E

Latitude Deg. 44 Min. 18.0329
Longitude Deg 88 Min. 18.4465

Depth 750 FT

2. Well Type 1 (1=New, See item 12 below)
2=Replacement
3=Reconstruction
of previous unique well # _____ constructed in _____
Reason for replaced or reconstructed Well? NQ265

Lat/Long Method: GPS004

HICAP # 2877. FILE # 45-9-5.

1 (1=Drilled 2=Driven Point 3=Jetted 4=Other)

3. Well Serves: M (M=Municipal O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole) # of homes and or **MUNICIPALITY WELL #4** (eg: barn, restaurant, church, school, industry, etc.)

High Capacity: Well? Y Property? Y

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? Y

Well located in floodplain? N

Distance in feet from well to nearest: (including proposed)

1. Landfill
2. Building Overhang
3. 1=Septic 2= Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
19.0	surface	449
15.0	449	750

Upper Enlarged Drillhole — Lower Open Bedrock
-- 1. Rotary - Mud Circulation
X -- 2. Rotary - Air
-- 3. Rotary - Air and Foam
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
-- 6. Cable-tool Bit _____ in. dia
-- 7. Temp. Outer Casing _____ in. dia. _____ depth ft. Removed ?
Other

6. Casing Liner Screen Material, Weight, Specification Manufacturer & Method of Assembly

Dia. (in.)		From (ft.)	To (ft.)
16.0	STD BLK PIPE .375 WALL WELD JTS GENEVA	surface	449
20.0	STD BLK PIPE .375 WELL WELD JTS A53 SAWHILL - BARBER RIG	0	47

Dia.(in.)	Screen type, material & slot size	From	To

7. Grout or Other Sealing Material From # (ft.)

8. Geology

Geology Codes	Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
_C_	CLAY	0	6
_Z_	CLAY W/GRAVEL	6	45
_BL_	BROKEN LIMEROCK	45	50
_L_	LIMEROCK	50	380
_LH	SHALEY LIMEROCK	380	395
_L_	LIMEROCK	395	405
_LH	SHALEY LIMEROCK	405	435
_L_	LIMEROCK	435	490
_N_	SANDROCK	490	530
_N_	SANDROCK	490	530
_NH	SHALEY SANDROCK	530	540
_N_	SANDROCK	540	640

9. Static Water Level
155.0 feet B ground surface A=Above B=Below

10. Pump Test
Pumping level 205.8ft. below surface
Pumping at 1300GPM 12.0Hrs

11. Well Is: A Grade
24 in. A=Above B=Below
Developed? Y
Disinfected? Y
Capped? Y

12. Did you notify the owner of the need to permanently abandon and fill all

Method BRADENHEAD/TREMIE Kind of Sealing Material	From (ft.)	To (ft.)	Sacks Cement
CEMENT (TREMIE)	surface	50.0	75 S
(BRAEDONHEAD)	50.0	449.0	325 S

unused wells on this property?

If no, explain

13. Initials of Well Constructor or Supervisory Driller SVJ — Date Signed 8/13/99

Initials of Drill Rig Operator (Mandatory unless same as above) RH — Date Signed 8/13/99

Additonal Comments? Y Variance Issued?

Owner Sent Label? Y More Geology?

Batch 714

NG591

Geology Codes	Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
__C_	CLAY	0	6
__Z_	CLAY W/GRAVEL	6	45
_BL_	BROKEN LIMEROCK	45	50
__L_	LIMEROCK	50	380
__LH	SHALEY LIMEROCK	380	395
__L_	LIMEROCK	395	405
__LH	SHALEY LIMEROCK	405	435
__L_	LIMEROCK	435	490
__N_	SANDROCK	490	530
__N_	SANDROCK	490	530
__NH	SHALEY SANDROCK	530	540
__N_	SANDROCK	540	640
_SN_	SOFT SANDROCK	640	680
__N_	SANDROCK	680	690
R_N_	RED SANDROCK	690	735
__N_	SANDROCK	735	750

Appendix #2

OPINION OF PROBABLE COST INFORMATION

Appendix #2

CAPITAL IMPROVEMENTS - OPINION OF PROBABLE COST
Water System Evaluation & Plan
VILLAGE OF LITTLE CHUTE
Outagamie County, Wisconsin

December 2017
McM No. L0001-9-17-00157.00

Main Street - Replace 8-inch main east of Washington Street with 12-inch main

Item	Qty	Unit	Description	Unit Price	Total
1	1	L.S.	Mobilization/Administration	$3,500	$3,500
2	1	L.S.	Traffic Control	$3,500	$3,500
3	1	L.S.	Temporary Water - per block	$1,000	$1,000
4	800	L.F.	12 Inch Water Main	$60	$48,000
5	3	EA	12 Inch Water Main Valve	$3,650	$10,950
6	2	EA	Hydrant, lead, gate valve	$5,500	$11,000
7	1	L.S.	Connection to development	$1,000	$1,000
8	800	S.Y.	Asphalt patching - 4"	$30	$24,000
9	711	S.Y.	Seeding Restoration	$2	$1,422
			SUB TOTAL		**$104,372**
			Add 15% Contingencies		$15,660
			Add 20% fiscal, legal, admin., engineering		$20,870
			Total Opinion of Probable Cost		**$140,902**
				USE	**$141,000**

Moasis Drive - Replace 12-inch main with 12-inch main

Item	Qty	Unit	Description	Unit Price	Total
1	1	L.S.	Mobilization/Administration	$3,500	$3,500
2	1	L.S.	Traffic Control	$3,500	$3,500
3	400	L.F.	12 Inch Water Main	$60	$24,000
4	2	EA	12 Inch Water Main Valve	$3,650	$7,300
5	1	EA	Hydrant, lead, gate valve	$5,500	$5,500
6	400	S.Y.	Asphalt patching - 4"	$30	$12,000
7	356	S.Y.	Seeding Restoration	$2	$711
			SUB TOTAL		**$43,800**
			Add 15% Contingencies		$6,570
			Add 20% fiscal, legal, admin., engineering		$8,760
			Total Opinion of Probable Cost		**$59,130**
				USE	**$59,000**

Randolph Drive - Replace Existing WM Along (Water Main Cost Only - Does not include Roadway reconstruction)

Item	Qty	Unit	Description	Unit Price	Total
1	1	LS	CTH N Traffic Control & Paving	$7,500	$7,500
2	490	LF	12 Inch Water Main	$60	$29,400
3	3,280	LF	10 Inch Water Main	$60	$196,800
4	160	LF	6 Inch Water Main	$65	$10,400
5	5	EA	12 Inch Water Main Valve	$1,800	$9,000
6	7	EA	10 Inch Water Main Valve	$1,600	$11,200
7	2	EA	6 Inch Water Main Valve	$1,100	$2,200
8	8	EA	Hydrant	$2,850	$22,800
9	462	LF	1 Inch Water Service - Open Cut	$28	$12,936
10	14	EA	1 Inch Corporation Stop, Curb Stop and Curb Stop Box	$375	$5,250
11	16	EA	Reset Driveway Culverts	$2,800	$44,800
12	10,472	SY	Restoration (Topsoil, Seed, Fertilizer, and Mulch)	$5	$52,360
			SUB TOTAL		$404,646
			Add 15% Contingencies		$60,700
			Add 20% fiscal, legal, admin., engineering		$80,930
			Total Opinion of Probable Cost		**$546,276**
				USE	**$546,000**

Bohm Drive - Replace 12-Main north of North Avenue with 12-inch main

Item	Qty	Unit	Description	Unit Price	Total
1	1	L.S.	Mobilization/Administration	$3,500	$3,500
2	1	L.S.	Traffic Control	$3,500	$3,500
3	1	L.S.	Temporary Water - per block	$1,000	$1,000
4	1,350	L.F.	12 Inch Water Main	$60	$81,000
5	3	EA	12 Inch Water Main Valve	$3,650	$10,950
6	2	EA	Hydrant, lead, gate valve	$5,500	$11,000
7	1	L.S.	Land of Lakes Water Service - Open Cut Inc. valve	$2,500	$2,500
8	6	L.F.	1-1/2 Inch Water Service - Open Cut	$40	$240
9	6	EA	1-1/2 Inch Corporation Stop, Curb Stop and Curb Stop Box	$500	$3,000
10	1,350	S.Y.	Asphalt patching - 4"	$30	$40,500
11	1,200	S.Y.	Seeding Restoration	$2	$2,400
			SUB TOTAL		**$159,590**
			Add 15% Contingencies		$23,940
			Add 20% fiscal, legal, admin., engineering		$31,920
			Total Opinion of Probable Cost		**$215,450**

Well #3 Transmission Main - Replace with 12-inch Main

Item	Qty	Unit	Description	Unit Price	Total
1	1,760	LF	Directional Drill 12-inch main	$70	$123,200
2	1,760	LF	12-inch Certalok Pipe	28	$49,280
3	1	L.S.	Connections to existing main	30000	$30,000
			SUB TOTAL		**$202,480**
			Add 15% Contingencies		$30,370
			Add 20% fiscal, legal, admin., engineering		$40,500
			Total Opinion of Probable Cost		**$273,350**
				USE	**$273,000**

The Opinion of Probable Cost was prepared for use by the Owner in planning for future costs of the project. In providing Opinions of Probable Cost, the Owner understands the Design Professional has no control over costs or the price of labor, equipment or materials, or over Construction Professionals' method of pricing, and that the Opinions of Probable Costs provided herewith are made on the basis of the Design Professional's qualifications and experience. It is not intended to reflect actual costs and is subject to change with the normal rise and fall of the local area's economy. This Opinion must be revised after every change made to the project or after every 30-day lapse in time from the original submittal by the Design Professional.