



Regular Village Board Meeting Agenda

July 19, 2022 – 7:00 pm
Village Hall, 235 Hickory Street, Pewaukee, WI 53072

1. Call to Order, Pledge of Allegiance, Moment of Silence and Roll Call.
2. Public Hearings/Presentations.
3. Approval of Minutes of Previous Meeting.
 - Minutes of the Regular Village Board Meeting – July 5, 2022
4. Citizen Comments. – *This is an opportunity for citizens to share their opinions with Board Members on any topic they choose. However, due to Wisconsin Open Meeting laws, the Board is not able to answer questions or respond to your comments. All comments should be directed to the Board. Comments are limited to 3 minutes per speaker. Speakers are asked to use the podium and state their name and address.*
5. Ordinances.
 - a. Possible Action on Ordinance No. 2022-09, Ordinance to Amend Section 86.119.5(c) of the Municipal Code of the Village of Pewaukee
 - b. Possible Action on Ordinance No. 2022-10, Ordinance Prohibiting Sale of Cats, Dogs and Rabbits
6. Resolutions. – None.
7. Old Business.
 - a. Discussion Regarding Strategic Plan Implementation Progress
 - b. Discussion and Possible Action Regarding Parking in the Downtown Area Along the Lakefront and Safety Concerns
8. New Business.
 - a. Presentation, Discussion and Possible Acceptance Regarding Water System Master Plan Draft Report
 - b. Discussion and Possible Action on Rescheduling August 2, 2022 Village Board Meeting Due to National Night Out Event
 - c. Discussion and Review of Draft Equipment Replacement and Capital Improvement Plan
 - d. Discussion and Possible Action on Committee Appointments
 1. Plan Commission – 3 Members (full 3 year terms);
 2. Zoning Board of Appeals – 1 Member (full 3 year terms); 1 Alternate (term to expire 4/30/24)
 3. Historic Preservation Commission – 1 Plan Commission Member and 1 Member Architect (full 3 year term to expire 4/30/24)
 - e. License Approvals and Vendor Permits
 1. Premise Amendment
 2. Temporary Retailer License
 - f. Monthly Approval of Checks and Invoices for all funds – June 2022



Regular Village Board Meeting Agenda

9. Citizen Comments. – *This is an opportunity for citizens to share their opinions with Board Members on any topic they choose. However, due to Wisconsin Open Meeting laws, the Board is not able to answer questions or respond to your comments. All comments should be directed to the Board. Comments are limited to 3 minutes per speaker. Speakers are asked to use the podium and state their name and address.*
10. Closed Session. – The Village Board of the Village of Pewaukee will enter into closed session pursuant to Wis. Statute Section 19.85(1)(e) for the purpose of deliberating or negotiating the purchasing of public properties, the investing of public funds, or conducting other specified public business, whenever competitive or bargaining reasons require a closed session, specifically regarding Riverside Preserve Developers Agreement, and pursuant to Wis. Statute Section 19.85(1)(g) for the purpose of conferring with legal counsel for the governmental body who is rendering oral or written advice concerning strategy to be adopted by the body with respect to litigation in which it is or is likely to become involved, specifically regarding 460 Park Avenue; Anna Heise Trust; and Wisconsin Department of Natural Resources.
11. Reconvene Into Open Session.
12. Adjournment.

Note: Notice is hereby given that a quorum of a Village Committee and/or Commission may be present at the Village Board meeting, and if so, this meeting shall be considered an informational meeting of that Committee or Commission and no formal action of that Committee or Commission shall occur. Upon reasonable notice, efforts will be made to accommodate the needs of disabled individuals through appropriate aids and services. To request such assistance, contact the Village Clerk at 262-691-5660.

Posted July 15, 2022



7/5/2022 Village Board Meeting

Meeting Minutes

VILLAGE BOARD REGULAR MEETING MINUTES

June 21, 2022 – 7:00 pm

DRAFT-DRAFT-DRAFT-DRAFT-DRAFT-DRAFT

1. Call to Order, Pledge of Allegiance, Moment of Silence and Roll Call

President Knutson called the meeting to order at approximately 7:00 p.m.

Village Board members present: Trustee Ed Hill, Trustee Bob Rohde, Trustee Kelli Belt, Trustee Chris Krasovich, Trustee Jim Grabowski, Trustee Craig Roberts, and President Jeff Knutson.

Also Present: Village Attorney, Matt Gralinski; Administrator, Scott Gosse; Village Planner, Mary Censky; and Village Clerk, Casandra Smith

2. Public Hearings/Presentations

a. Public hearing on Ordinance No. 2022-07, Ordinance to Amend Chapter 40, Article VI, Division 18.5, Section 40.367.7, Setbacks and Yards, of the Municipal Code of the Village of Pewaukee Regarding Residential Infill-Redevelopment Overlay District

No comments were made.

3. Approval of Minutes of Previous Meeting

• **Minutes of the Regular Village Board Meeting – June 21, 2022**

Trustee Hill motioned, seconded by Trustee Rohde to approve the June 21, 2022 minutes of the Regular Village Board Meeting as presented.

Motion carried 7-0.

4. Citizen Comments

Zach Stephens @ 161 W Wisconsin Ave - Mr. Stevens stated he is the co-owner of Beach Bum Bakery. Closing the downtown to traffic would be detrimental to their business. He stated that during special events their revenue is decreased by 30-50% and closing the parking or stopping traffic would create more revenue decreases. If their customers are buying cakes people do not want to walk a long distance.

Mark Grabowski @ 244 Park Ave - Mr. Grabowski thanked everyone who helped to fundraise and plan the Fourth of July events. He expressed his desire for the proposed ordinance to be approved regarding puppies, kittens, and rabbits. He would like to see responsible breeding and not allow businesses in the Village that support puppy mills.

Rachel Goedheer @ 309 Park Ave - Ms. Goedheer stated she is actively involved in rescuing and fostering animals and she supports the proposed ordinance.

5. Ordinances

a. Possible Action on Ordinance No. 2022-07, Ordinance to Amend Chapter 40, Article VI, Division 18.5, Section 40.367.7, Setbacks and Yards, of the Municipal Code of the Village of Pewaukee Regarding Residential Infill-Redevelopment Overlay District

Planner Censky stated that the Residential Infill-Redevelopment Overlay District was created for properties that would allow for smaller lot sizes. The developer at the Glen of Pewaukee has

started selling lots and the buyers are wanting rear decks but some lots do not have the option of a 20' offset in the rear yard to include a deck. The Plan Commission reviewed the request and favored the modification for select lots where the lot line is not abutting over 25% outside the current development. If the Village Board approved this Ordinance the developer would come back to the Plan Commission to approve the specific lots. Trustee Roberts stated that if the owner would like a concrete patio it would be allowed (if the green space calculation was met) but a deck is different as the code doesn't allow a rear offset of less than 20'. Discussion followed regarding open space and the implications of updating the code.

Trustee Roberts motioned, seconded by Trustee Grabowski to approve Ordinance No. 2022-07 to amend Chapter 40, Article VI, Division 18.5, Section 40.367.7, Setbacks and Yards, of the Municipal Code of the Village of Pewaukee regarding the Residential Infill-Redevelopment Overlay District as presented.

Motion carried 6-1, Trustee Hill voted nay.

b. Possible Action on Ordinance No. 2022-08, Ordinance to Repeal and Recreate Chapter 86, Article III, Division 3, Section 86.114(e) of the Village of Pewaukee Code of Ordinances Regarding No Parking Designation

Trustee Hill stated that this is the third review of this ordinance. The Public Works and Safety Committee has agreed that the south side of Oakton from the River to the alleyway by 4Keeps should be posted no parking because of the tight corner. Trustee Grabowski added that this design should have less impact on businesses.

Trustee Grabowski motioned, seconded by Trustee Hill to approve Ordinance No. 2022-08 to repeal and recreate Chapter 86, Article III, Division 3, Section 86.114(e) of the Village of Pewaukee Code of Ordinances Regarding No Parking Designation on the north side of Oakton Ave as presented.

Motion carried 7-0.

6. Resolutions – None.

7. Old Business

a. Discussion and Possible Action Regarding Parking in the Downtown Area Along the Lakefront

Administrator Gosse stated that staff researched different styles of barricades as presented in the agenda packet. Discussion followed regarding steel fencing, water, and concrete barricades and what would update could increase safety. The Village Board discussed options as to what solutions may work. The consensus was to continue exploring possible solutions with Trustees Belt and Grabowski volunteering to meet with business owners regarding blocking off parking. The consensus was made to order the speed humps to slow traffic and increase safety in the area.

Trustee Grabowski motioned, seconded by Trustee Hill to approve an amendment to increase the cost for the speed humps not to exceed \$3,000 in an effort to reduce speed and create a safer downtown.

Motion carried 7-0.

8. New Business

a. Discussion and Possible Action on Appointment of Village Board Member to Proposed Pewaukee Lake Management Plan Committee

President Knutson stated that Tom Koepp, manager of the Lake Pewaukee Sanitary District, proposed that each municipality on Pewaukee Lake appoint a representative to work on the Lake Management Plan for Pewaukee Lake. President Knutson recommended Trustee Hill.

Trustee Rohde motioned, seconded by Trustee Krasovich to approve Trustee Hill as the Lake Management Plan Committee.

Motion carried 6-0-1; Trustee Hill abstained.

b. Discussion and Direction Regarding Possible Ordinance Prohibiting Sale of Cats, Dogs and Rabbits

Trustee Grabowski stated that the City of Waukesha adopted the attached ordinance to prohibit the retail sale of cats, dogs, and rabbits. This would be consumer protection for the Village

residents because large companies do not ethically breed animals. No current pet stores in the Village would be affected. Discussion followed regarding what 'ethical' is defined as and the Board questioned business owner's rights. The consensus was to direct Attorney Gralinski to draft an Ordinance to be brought back to the Village at the next meeting.

c. Discussion and Possible Action Regarding 323 Park Avenue

Trustee Grabowski presented the improvements made to 323 Park Ave and gave a list of what has been improved. The cottage was removed and the boathouse is currently being remodeled. Work is still in progress but it should be able to be completed before August 31, 2022. An update will be brought back to the Village Board at that time.

d. Discussion and Possible Action on Committee Appointments

1. Plan Commission – 3 Members (full 3 year terms);

No Action was taken.

2. Zoning Board of Appeals –1Member (full 3 year terms); 1 Alternate (term to expire 4/30/24)

No Action was taken.

3. Historic Preservation Commission – 1 Plan Commission Member; 1 Member (term to expire 4/30/25); and 1 Member Architect (full 3 year term to expire 4/30/25)

Trustee Roberts motioned, seconded by Trustee Rohde to appoint Heather Gergen as a member of the Historic Preservation Commission for the term ending 4/30/2025.

Motion carried 7-0.

e. License Approvals and Vendor Permits

1. Food Vendor Permits

Trustee Hill motioned, seconded by Trustee Krasovich to approve food vendor permits as presented for the Taste of Lake Country Event on July 29-30, 2022 for Beach House Bistro, Albanese's Roadhouse, Caca Tequila Restaurant, Golden Mast, Revere's Well Street Tavern, Le Macaron Brookfield and Wauwatosa, Park Avenue Pizza Company and Sobelman's Waukesha.

Motion carried 7-0.

2. Temporary Alcohol License

Trustee Rohde questioned if the verification was received from the Pewaukee Muskies Amateur Baseball Team for liability insurance. Clerk Smith stated that she would check with Director Phalin at Parks and Recreation Department.

Trustee Hill motioned, seconded by Trustee Grabowski to approve the Temporary Class "B" Beer Retailer's License for the Pewaukee Muskies Amateur Baseball Team July 17, 24, and 31, 2022, contingent on the verification of insurance requirements.

Motion carried 7-0.

3. Mobile Home License

Trustee Roberts motioned, seconded by Trustee Krasovich to approve the Mobile Home/Trailer Park License for Pewaukee Lake Estates located at 630 W Wisconsin Ave contingent upon Building Services approval for the 2022-2023 license year.

Motion carried 7-0.

9. Citizen Comments

Zach Stephens @ 161 W Wisconsin Ave - Mr. Stevens stated he is not concerned with some businesses having parking lot seating but most businesses downtown have a rear entrance and their building does not. He is concerned that he didn't hear anything regarding the proposed traffic and parking changes until now.

Sarah Stephens @ 161 W Wisconsin Ave - Ms. Stevens expressed her concern regarding the

crosswalks and suggested putting up barriers on the lakeside which may be more advantageous. She would have liked to be asked her opinion.

10. Closed Session – The Village Board of the Village of Pewaukee will enter into closed session pursuant to Wis. Statute Section 19.85(1)(e) for the purpose of deliberating or negotiating the purchasing of public properties, the investing of public funds, or conducting other specified public business, whenever competitive or bargaining reasons require a closed session, specifically regarding Riverside Preserve Developers Agreement; and pursuant to Wis. Statute Section 19.85(1)(g) for the purpose of conferring with legal counsel for the governmental body who is rendering oral or written advice concerning strategy to be adopted by the body with respect to litigation in which it is or is likely to become involved, specifically Terry Foster regarding a disallowance of the claim.

Trustee Hill motioned, seconded by Trustee Rohde to move into closed session at approximately 9:05 p.m.

Motion carried unanimously by roll call vote.

11. Reconvene Into Open Session

Trustee Krasovich motioned, seconded by Trustee Grabowski to move into closed session at approximately 9:09 p.m.

Motion carried unanimously by roll call vote.

a. Possible Action on Terry Foster's Claim

Trustee Krasovich motioned, seconded by Trustee Rohde to approve the disallowance claim as recommended by Statewide Insurance Services regarding the claim submitted by Terry Foster.

Motion carried 7-0.

12. Adjournment

Trustee Grabowski motioned, seconded by Trustee Hill to adjourn the June 21, 2022, Regular Village Board meeting at approximately 9:10 p.m.

Motion carried 7-0.

Respectfully submitted,

Cassandra Smith
Village Clerk

ORDINANCE NO. 2022-09

ORDINANCE TO AMEND SECTION 86.119.5(C) OF THE MUNICIPAL CODE OF THE VILLAGE OF PEWAUKEE

The Village Board of the Village of Pewaukee, Waukesha County, Wisconsin, do ordain as follows:

SECTION ONE: Section 86.119.5(c) of the Municipal Code of the Village of Pewaukee is amended to read as follows:

Section 86.119.5(c): TRAFFIC AND VEHICLES, SUBDIVISION VII – RESTRICTED PARKING;

(c) No person shall park any vehicle, or permit any vehicle to be parked, or to remain parked, for more than fifteen (15) minutes on the east side of West Wisconsin Avenue in the ~~southern~~northern two parking stalls of the twelve stall grouping to the ~~south~~north of the grass island located approximately ~~440~~508 feet north of the intersection of West Wisconsin Avenue and Oakton Avenue.

SECTION TWO: The several sections of this Ordinance are declared to be severable. If any section, sub-section or paragraph of this Ordinance shall be declared by a decision of a Court of Competent Jurisdiction to be invalid, such decision shall not affect the validity of other provisions of this Ordinance or the section of which the invalid portion or paragraph may be a part.

SECTION THREE: This Ordinance shall take effect immediately upon passage and publication as provided by law.

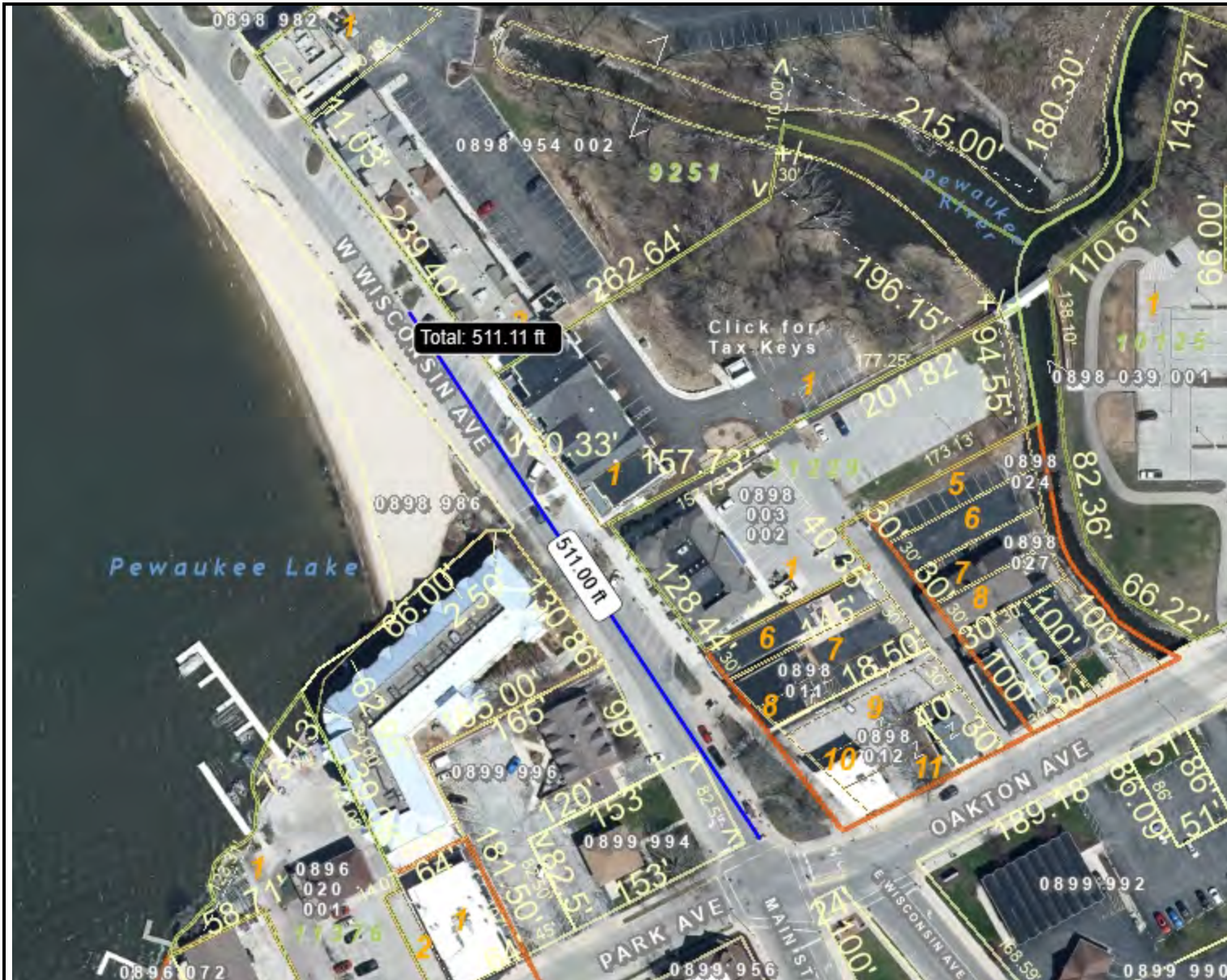
Passed and adopted this _____ day off _____ 2022.

APPROVED:

Jeff Knutson, Village of Pewaukee President

Countersigned:

Cassie Smith, Village of Pewaukee Clerk



Legend

- Municipal Boundary_2K
- Parcel_Dimension_2K
- Note_Text_2K
- Lots_2K
 - Lot
 - Unit
 - General Common Element
 - Outlot
- SimultaneousConveyance
 - Assessor Plat
 - CSM
 - Condominium
 - Subdivision
- Cartoline_2K
 - EA-Easement_Line
 - PL-DA
 - PL-Extended_Tie_line
 - PL-Meander_Line
 - PL-Note
 - PL-Tie
 - PL-Tie_Line
 - <all other values>
- Railroad_2K

0 125.48 Feet

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Notes:

Printed: 7/5/2022



720 Clinton Street
P.O. Box 766
Waukesha, WI 53187-0766

Hippenmeyer, Reilly,
Blum, Schmitzer,
Fabian & English S.C.

Memo

To: Pewaukee Village Board
From: Attorney Matthew R. Gralinski
Date: July 14, 2022
Re: Ordinance to Create Chapter 10 Article III of the Municipal Code of the Village of Pewaukee Regarding the Prohibition of the Sale of Cats, Dogs, and Rabbits

Dear Trustees:

Enclosed with this memorandum, please find for the Board's consideration a draft Ordinance to Create Chapter 10 Article III of the Municipal Code of the Village of Pewaukee Regarding the Prohibition of the Sale of Cats, Dogs, and Rabbits. The enclosed was prepared by our office under the direction of the Board, given at its meeting of July 5, 2022. The direction to our office gleaned from the Board's discussion of the topic was to prepare this Ordinance with alternative options as to the scope of individuals or entities to which it would cover. The enclosed Ordinance reflects the version as adopted by the City of Waukesha, with some stylistic modifications to the recitals therein, which was presented in the Board's packet at the July 5th meeting.

Any alternative version of the Ordinance would involve modifying the definition of which particular purveyors of animals are covered by this Ordinance. Concerns were expressed by some Board members that the Ordinance either painted too broad a brush or, alternatively, did not address purveyors of animals who may not necessarily qualify as a retailer under the Ordinance, but nevertheless engaged in unethical practices. After discussion, we believe the most logical way of including purveyors who may not necessarily qualify as retailers, but nevertheless engage in large-scale breeding, would be to define breeders by the volume of animals they breed in a given year. For example, the Ordinance could include a definition of "breeder", which mirrors the definition of larger scale breeders found in Wisconsin State Statute Section 173.41(c), in that a breeder is a "person who sells 25 or more dogs in a year that the person has bred and raised, except that dog breeder does not include a person who sells 25 or more dogs in a year that the person has bred and raised if all of those dogs are from no more than three litters." Including an additional definition of breeder, along with a definition of retailer, could satisfy concerns that the Ordinance as proposed did not address the issue of large-scale breeding of animals with the

limited definition of retailer. The enclosed draft could be modified to include a definition of “breeder”, and include both “breeder” and “retailer” in the proposed Section 10.122.

That being said, this office would renew its concerns as expressed at the previous Village Board meeting. Direct regulation of these breeding concerns is predominantly a state and county health regulation. Understanding the possible desire of the Board to also contribute to this matter, nevertheless this would not change the fact that regulation and licensing of these large-scale breeding, and unethical breeding practices are and remain predominantly a matter of statewide concern and regulation. Further distinction based on sourcing of animals would necessarily involve additional staff time to investigate and intrudes on an area of regulation already within state and county purview.

Additionally, this office has concerns with the differentiation being made by this Ordinance between large-volume and small-volume breeders, and that differentiation being presumably the sole rationale for this Ordinance. In other words, the Ordinance does make a broad declaration that these large-scale commercial breeders are, by virtue of their volume alone, more likely to engage in these unethical practices, more so than small-scale breeders. Making this distinction on volume alone, and adopting a regulation scheme based on volume alone, could prove difficult to rationalize without further specific evidence to support it. Practically speaking, actual enforcement of the ordinance prohibition itself could prove difficult in the event of challenge by a large-scale breeder or pet store chain, for the reasons stated in this paragraph.

While the direction the Board wishes to take is ultimately a decision of policy on which this office does not opine, we do want to ensure our thoughts and concerns with this Ordinance and its alternatives are clearly brought before the Board in its deliberations.

Thank you for your attention to the above and enclosed.

Respectfully submitted,

/s/: Matthew R. Gralinski

Attorney Matthew R. Gralinski

MRG/ma

ORDINANCE NO. 2022-10**Ordinance to Create Chapter 10 – Article III of the
Municipal Code of the Village of Pewaukee
Regarding the Prohibition of the Sale of Cats, Dogs, and Rabbits**

WHEREAS, most puppies, kittens, and rabbits sold in pet stores come from large-scale, commercial breeding facilities where the health and welfare of the animals is disregarded in order to maximize profits, practices which are referred to as “mills” for the respective animals. According to the Human Society of the United States, an estimated 10,000 puppy mills produce more than 2 million puppies per year in the United States; and

WHEREAS, the documented abuses endemic to puppy, kitten, and rabbit mills include overbreeding; inbreeding; minimal veterinary care; lack of adequate food, water and shelter; lack of socialization, exercise and enrichment; lack of sanitation; and

WHEREAS, puppies, kittens, and rabbits sold in pet stores are often sick and have behavioral problems due to the substandard conditions they were born into including being taken from their mothers and being transported in trucks filled with other animals or placed in cages with other animals who are often sick; and

WHEREAS, retailers can mislead consumers as to the source of puppies, kittens, and rabbits in their stores and make misleading or false health and behavior guarantees; and

WHEREAS, according to the United States Centers for Disease Control and Prevention, pet store puppies have been linked to the spread of an antibiotic-resistant *Campylobacter* infection; and

WHEREAS, current federal and state regulations do not adequately address the animal welfare and consumer protection problems that the sale of large scale, commercially bred dogs, cats, and rabbits pose; and

WHEREAS, prohibiting retail stores from selling, dogs, cats, and rabbits, is likely to decrease the demand for puppies, kittens and rabbits bred by large scale, commercial breeding facilities where the health and welfare of the animals is disregarded in order to maximize profits, and decrease the burden that such animals would place on local agencies and taxpayers by ending up in animal shelters; and

WHEREAS, the majority of pet stores, both large chain and small and family-owned stores, are in compliance with this proposed ordinance as they do not directly sell cats, dogs, or rabbits but rather sell pet products and services and, in some cases, collaborate with local animal shelters and rescues to host adoption events; and

WHEREAS, the ordinance shall not affect the ability of animal rescues, shelters, or breeders who sell directly to the public to provide dogs, cats, or rabbits to the public, nor shall it affect the ability of individuals to obtain a cat, dog, or rabbit from an animal rescue, shelter, or breeder who sells directly

to the public; and

WHEREAS, the Village Board finds it is in the best interest of the Village of Pewaukee to prohibit activities and practices that promote the unethical, inhumane, and cruel treatment of animals; to protect citizens who may purchase cats, dogs, or rabbits that may be the product of unethical, large scale commercial breeders; to promote community awareness of animal welfare; and to foster a more humane environment in the Village of Pewaukee;

NOW, THEREFORE, the Village Board of the Village of Pewaukee, Waukesha County, Wisconsin, do ordain as follows:

SECTION I

Chapter 10, Article III of the Municipal Code of the Village of Pewaukee is hereby created to read as follows:

Chapter 10 – Article III Sale of Cats, Dogs, and Rabbits Prohibited

Section 10.120. – Intent. The purpose of this section is to protect the health and well-being of animals, and to discourage large-scale commercial breeding and the unethical treatment of animals that occurs in large-scale commercial breeding facilities.

Section 10.121. – Definitions. For purposes of this Section, the capitalized terms shall have the following meanings:

- a) **Animal Care Facility** means an animal control center or animal shelter, maintained by or under contract with any state, county, or municipality, whose mission and practice is, in whole, or significant part, the rescue and placement of animals in permanent homes or Animal Rescue Organizations.
- b) **Animal Rescue Organization** means any not-for-profit organization which has tax exempt status under Section 501(c)(3) of the United States Internal Revenue Code, whose mission and practice is, in whole or in significant part, the rescue and placement of animals in permanent homes.
- c) **Cat** means a member of the species of domestic cat, *Felis catus*.
- d) **Dog** means a member of the species of domestic dog, *Canis familiaris*.
- e) **Rabbit** means a member of the species of domestic rabbit, *Oryctolagus cuniculus domesticus*
- f) **Retailer** means any individual or entity holding a seller’s permit issued by the Wisconsin Department of Revenue. It does not include any Animal Care Facility or Animal Rescue Organization.
- g) **Sale or Sell** means to convey possession or ownership for consideration, or to offer to the general public to do so. Consideration includes, but is not limited to, money and any other legal tender, including virtual currency; bartered goods; credit

exchanges; and exchanges for any other animals or tangible personal property; but does not include fees for vaccinations, microchipping, neutering or spaying, provided those fees are at cost and do not include any profit.

Section 10.122. – Prohibition of the Sale of Cats, Dogs, and Rabbits

No Retailer shall Sell Cats, Dogs, or Rabbits in the Village of Pewaukee. This Section does not prohibit a Retailer from displaying and offering Cats, Dogs, or Rabbits provided by an Animal Care Facility or Animal Rescue Organization for adoption for no consideration.

Section 10.123. – Penalty. Any individual or entity that violates any provision of this Section shall, upon conviction, be subject to section 1.102. Each animal offered for sale in violation of this Section shall constitute a separate violation.

SECTION II

All Ordinances or parts of Ordinances contravening the terms and conditions of this Ordinance are hereby to that extent repealed.

SECTION III

The several sections of this Ordinance shall be considered severable. If any section shall be considered by a court of competent jurisdiction to be invalid, such decision shall not affect the validity of the other portions of the Ordinance.

SECTION IV

This Ordinance shall take effect upon passage and publication as approved by law, and the Village Clerk shall so amend the Code of Ordinances of the Village of Pewaukee, and shall indicate the date and number of this amending Ordinance therein.

Passed and adopted this _____ day of _____ 2022 by the Village Board of the Village of Pewaukee.

APPROVED:

Jeff Knutson, Village President

Countersigned:

Cassie Smith, Village Clerk



To: Jeff Knutson, President
Village Board

From: Scott A. Gosse
Village Administrator

Date: July 6, 2022

Re: Agenda Item 8a, Presentation, Discussion and Possible Acceptance Regarding Water System Master Plan Draft Report

BACKGROUND

The draft Water System Master Plan was presented to the Public Works & Safety Committee at its June meeting and was forwarded to the Village Board with a recommendation to accept/adopt the plan. A copy of the Master Plan is attached for your review and information. A representative from Ruckert & Mielke will be in attendance at the Village Board meeting to review the draft plan and address any questions the Village Board may have. The draft Master Plan provides a framework for the future maintenance needs and enhancements for the Village's water system.

ACTION REQUESTED

The action requested of the Village Board is to review the attached draft Water System Master Plan as well as the presentation and provide any questions the Village Board may have. Should the Village Board be prepared, the action requested of the Village Board by the Public Works & Safety Committee is to accept or adopt the Master Plan as a framework for the maintenance of the water system.

Attachment

Water System Master Plan



Water System Master Plan

April 2022

PREPARED FOR:
Village of Pewaukee
235 Hickory Street
Pewaukee, WI 53072

PREPARED BY:
Ruekert & Mielke, Inc.
W233 N2080 Ridgeview Parkway
Suite 300
Waukesha, WI 53188

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DRAFT

I. INTRODUCTION

The Village of Pewaukee Water Utility is a municipally owned water utility that provides water service to residences and businesses within the corporate boundaries of the Village of Pewaukee. Located in central Waukesha County in southeast Wisconsin, the Village of Pewaukee Water Utility serves the needs of approximately 8,300 residents along with numerous commercial and industrial customers.

Drawing its water supply from five groundwater wells, the Village of Pewaukee Water Utility water system also consists of two elevated storage tanks, one standpipe, two ground level storage reservoirs, two supply pumping stations, one booster pumping station, and approximately 44 miles of transmission and distribution water mains. The water system is separated into two pressure zones to meet the service needs of the customers.

Located along Wisconsin Highway 16 and north of Interstate Highway 94, the Village of Pewaukee is within close proximity to the greater Milwaukee metropolitan area. Coupled with its smaller size and the Village has a lot to offer residence and business owners and provides the potential for future growth and development.

A. PURPOSE

This report summarizes the results of a water system planning study for the water utility. The primary purpose of the study was to evaluate the water needs and system expansion required to serve current and future Utility customers. Present and future water needs of the Village of Pewaukee Water Utility service area have been evaluated, and recommendations have been made concerning improvements necessary to maintain an adequate level of water service. This report will serve as a comprehensive plan to guide future expansion of the water system.

B. SCOPE

The planning approach used for the study began with an evaluation of the service area needs and characteristics. 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 2040.

This report utilizes a systematic approach to introduce and expand basic planning concepts. To start, a review of existing water system facilities is summarized in Chapter II. Population, community growth, and water consumption projections serve as the foundation for evaluating and identifying recommended improvements to the system and are introduced in Chapter III. The assumptions and conclusions presented in Chapter III were used to develop projections of water requirements that are presented in Chapter IV. The developed water requirements are utilized in Chapter V to summarize the evaluation of the water system supply and storage needs. Chapter VI summarizes the results of the water system network flow analysis, which uses computer software to simulate the operation of the distribution system and the pumping and storage facilities. Based upon the evaluations from the previous chapters recommended water system improvements are presented in Chapter VII, and a proposed capital improvements plan is presented in Chapter VIII.

Because needs change with time, comprehensive planning is a continuous function; therefore, the longer-term projections and improvements discussed in this report should be periodically reviewed, reevaluated, and modified, as necessary, to assure the adequacy of future planning efforts. Proper future planning will help assure that system expansion is coordinated and constructed in the most effective manner.

C. STUDY AREA

The study area is illustrated in Figure I-1 and consists of the Village of Pewaukee and surrounding area. Excluding the City of Pewaukee, the study area has physical or jurisdictional boundaries that may limit growth and represents the most logical and likely growth areas within the planning period. Consideration has been given to areas outside of the study area as identified by Utility and Village staff that may have the potential for long-term future development.

D. STUDY LIMITATIONS AND ASSUMPTIONS

The following limitations and assumptions underlie the work elements of this project.

1. The primary purpose of the study is to develop a system plan to guide the extension of adequate water supply services by the Village of Pewaukee Water Utility to existing and probable future development within the study area. The plan will identify water system infrastructure needed.
2. The study and plan produced are to be in sufficient depth to provide a sound basis for future facility planning. To this end, the study will review the general location, size, and capacity of major water transmission mains, pumping stations, and storage facilities and may recommend changes to existing facilities.
3. The plan is to be based upon previously developed land use and population information provided to Ruckert & Mielke, Inc. and may encompass areas outside the current sanitary sewer service area. The plan is to be designed to serve and support anticipated community needs based upon the current land use and population projections assuming complete development of the study area within the planning period. Thus, it may be necessary to secure regulatory approval to expand the sanitary sewer service area prior to extending water service into these areas.
4. Recommendations resulting from the planning efforts are to be consistent with current federal, state and local regulations regarding facility design.
5. This study includes a cursory investigation of distribution system water. The investigation is limited to a review of existing available water quality data and does not include any sampling, laboratory work, or pilot testing.

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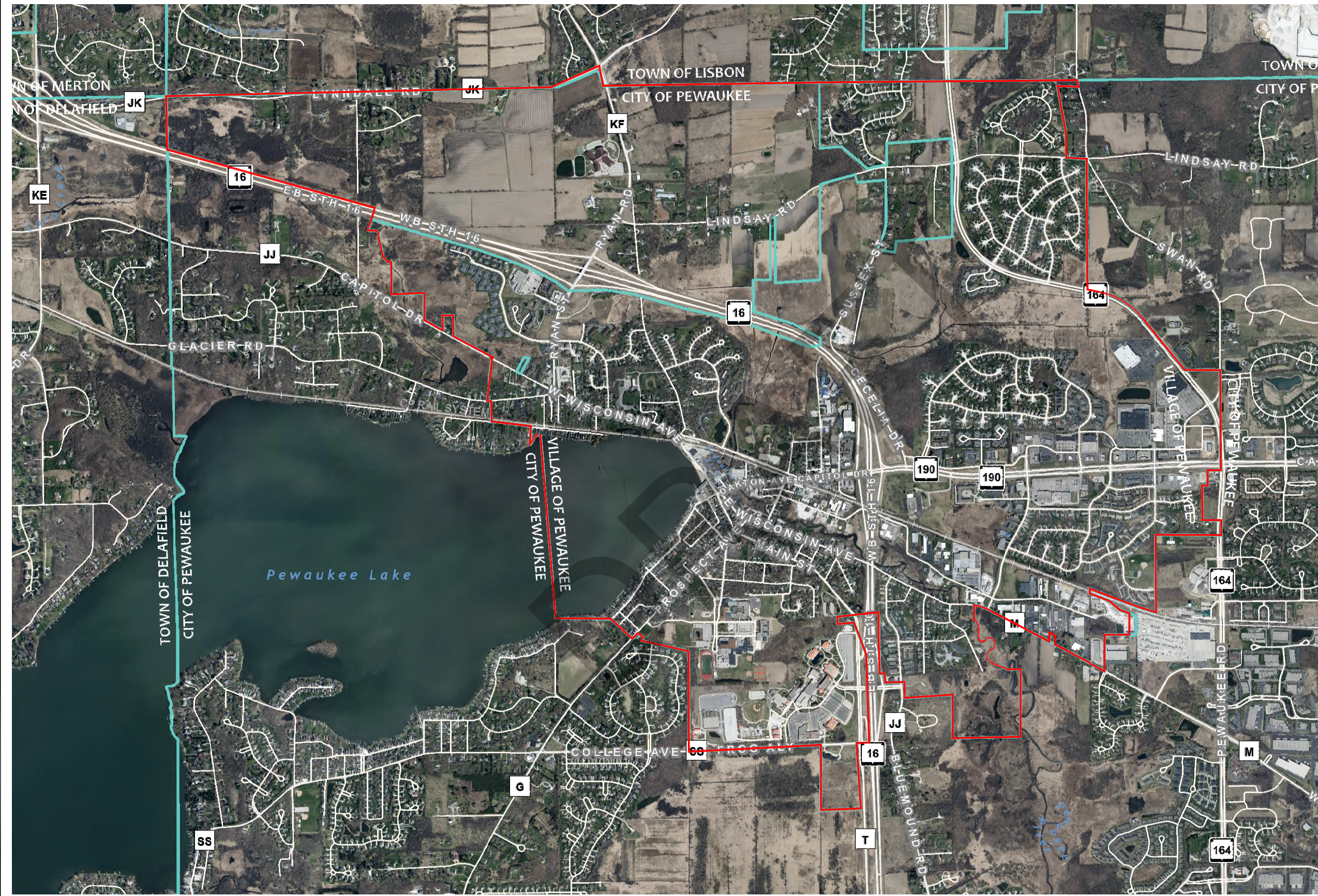
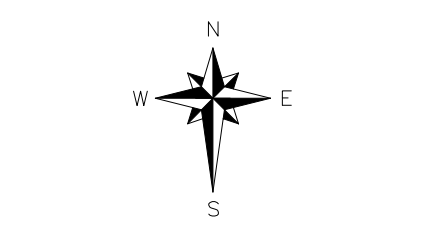


FIGURE I-1
VILLAGE OF PEWAUKEE
WAUKESHA COUNTY, WISCONSIN

LEGEND
— STUDY AREA BOUNDARY



SCALE IN FEET
DATE: MAY 2022
© 2022 Copyright Ruckert & Mielke, Inc.

SOURCE: RJM
BASEMAP SOURCE: WAUKESHA COUNTY PARKS AND LAND USE

II. EXISTING WATER SYSTEM FACILITIES

This chapter presents a summary of the existing water system components of the Village of Pewaukee Water Utility water system. The various facilities operated and maintained by the Village of Pewaukee Water Utility include:

1. Five groundwater wells
2. Two elevated water storage tanks
3. One standpipe
4. Two ground level storage tanks
5. Two supply pumping stations
6. One booster pumping station
7. A network of transmission and distribution water mains

The general location and layout of the water system facilities are illustrated in Figure II-1. A schematic of the water system is illustrated in Figure II-2. The distribution system is separated into two pressure zones to help eliminate undesirable pressures that may otherwise result due to topographic variations that exist throughout the existing service area. The two pressure zones are referred to as:

1. Main Pressure Zone
2. Hawthorne Boosted Pressure Zone

A. Water System Pressure Zones

As mentioned above, the Village of Pewaukee Water Utility water distribution system consists of two pressure zones as illustrated in Figure II-1. As the Village of Pewaukee encompasses an area of variable topographical terrain, the pressure zones are necessary to provide water system pressure to all customers within more desirable limits.

1. Main Pressure Zone

The Main Pressure Zone is currently the largest pressure zone and serves all but a small portion on the northern part of the Village. Currently all of the groundwater wells are located within the Main Pressure Zone. The ground elevations currently served by the Main Pressure Zone are approximately 857 feet to 972 feet USGS.

2. Hawthorne Boosted Pressure Zone

The Hawthorne Booster Pressure Zone serves areas of higher elevation north of the Main Pressure Zone and serves the Hawthorne subdivision. The Hawthorne Boosted Pressure Zone currently serves elevations from approximately 935 feet to 1,000 feet USGS.

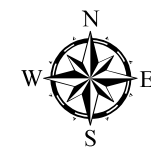
The Hawthorne Boosted Pressure Zone is small in size consisting of approximately 55 acres in total land area.



FIGURE II-1
Existing Water System

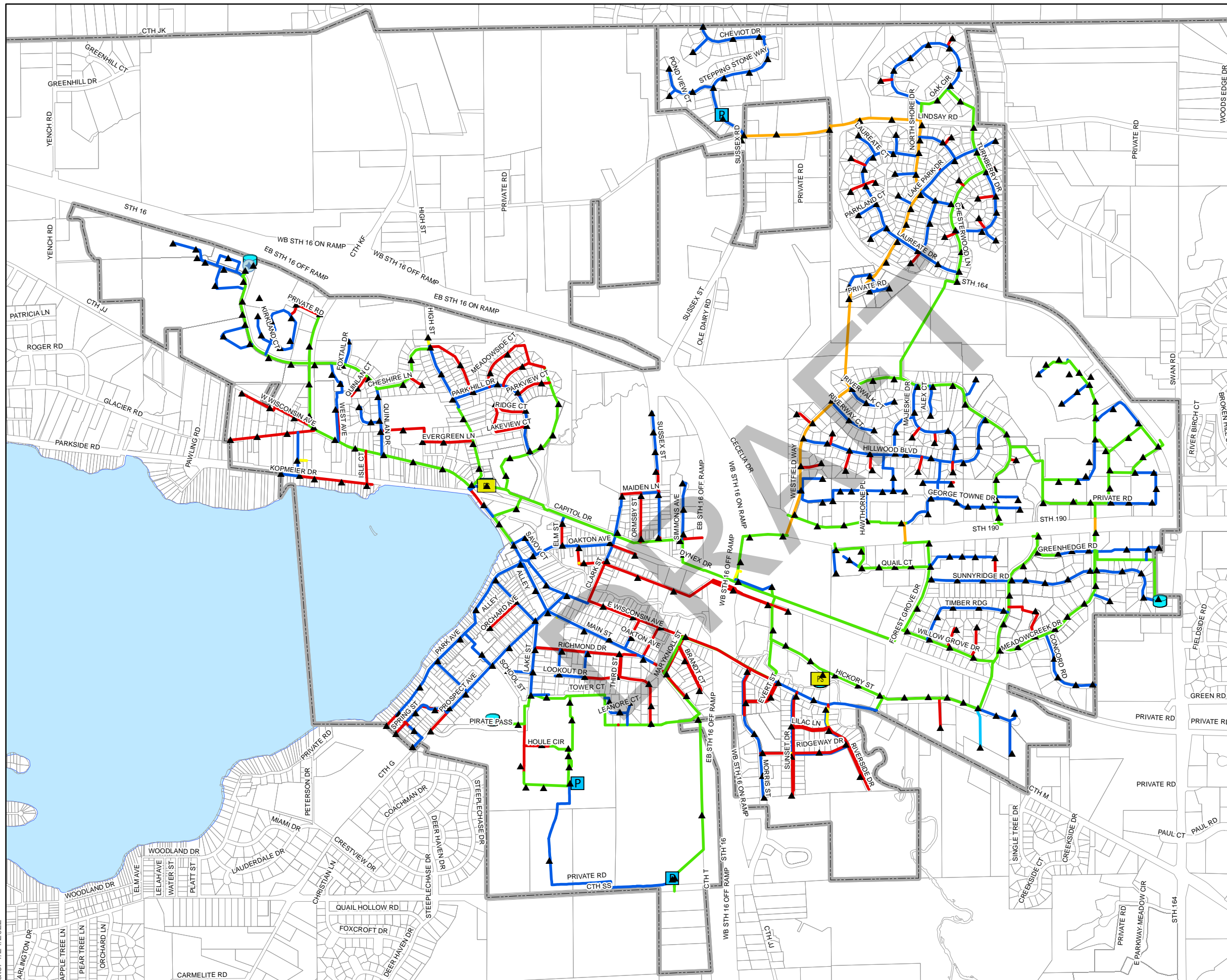
Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

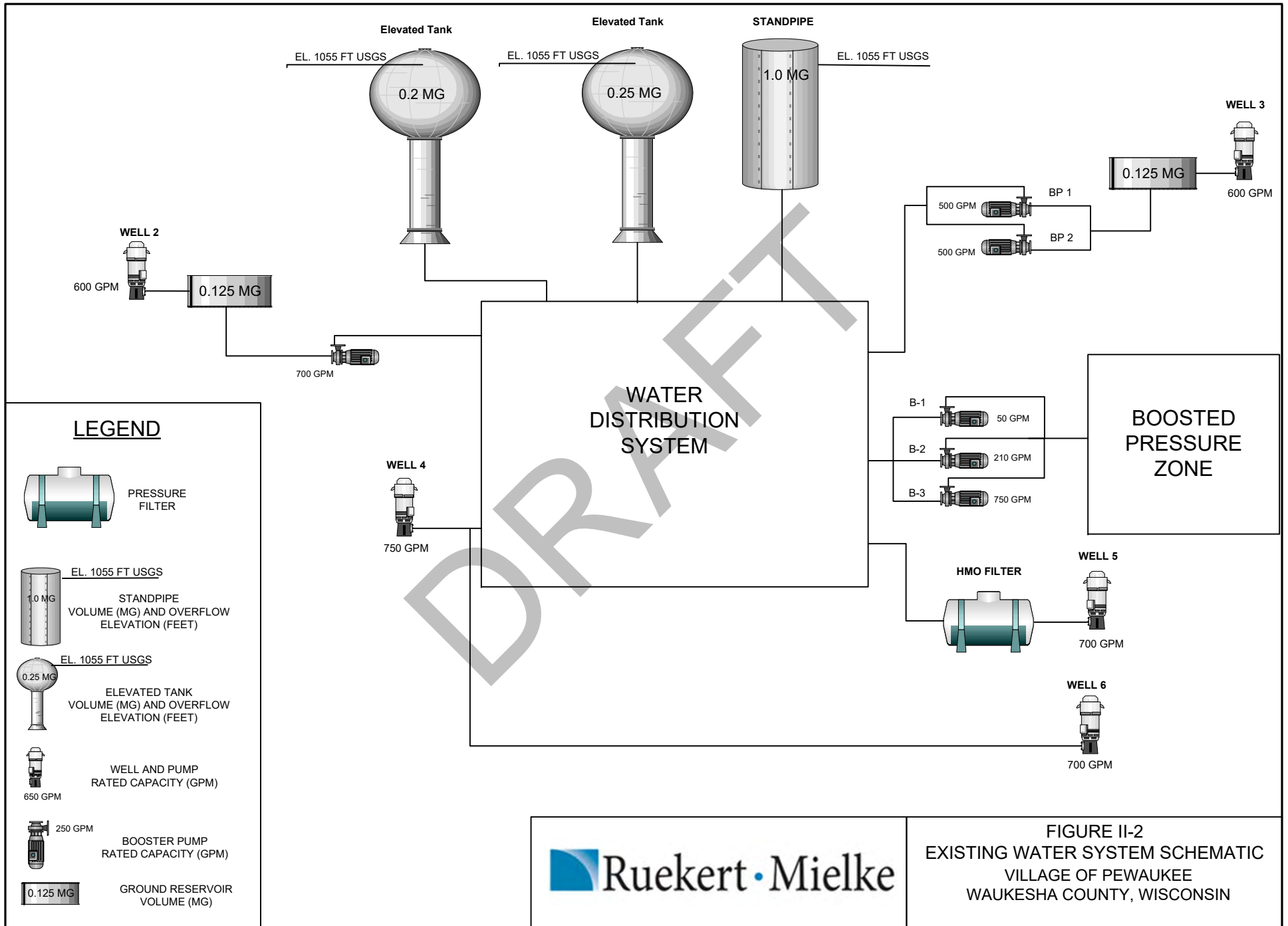
- ▲ Hydrant
- PS Booster Station
- P Pump Station
- Tanks
- Well
- Water Main**
 - 4 - Inch and Less
 - 6 - Inch
 - 8 - Inch
 - 10 - Inch
 - 12 - Inch
 - 16 - Inch
- Civil Division



0 750 1,500 3,000 4,500

Feet





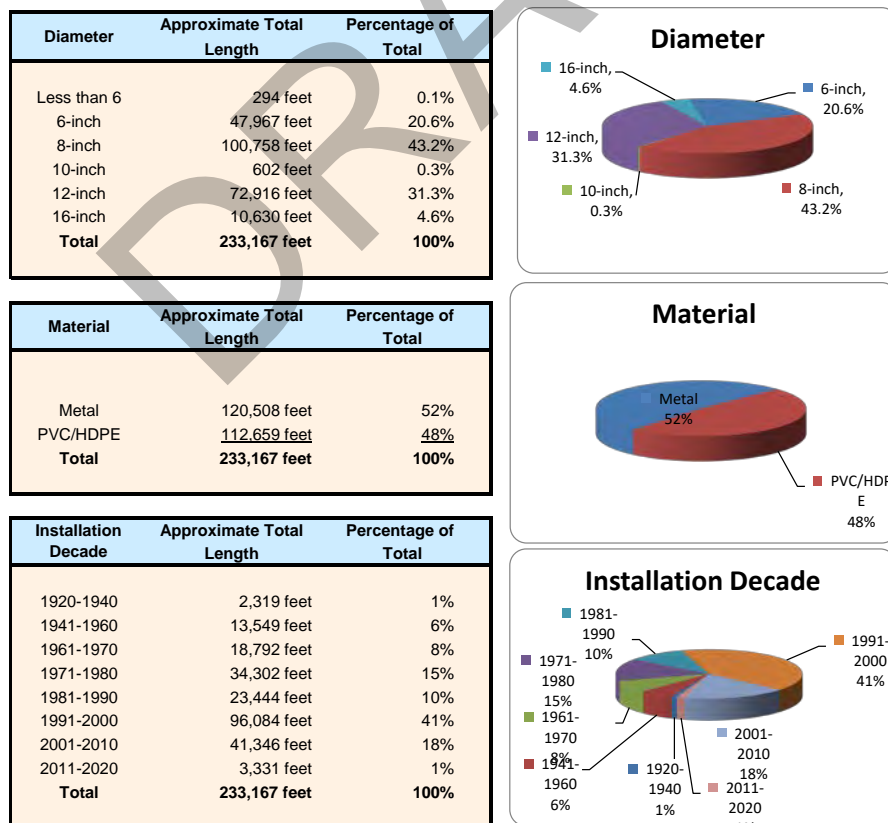
B. Water Distribution System

The water distribution system provides a means of transporting and distributing water from the water supply and storage facilities to the utility customers and other points of usage. The distribution system must be capable of conveying adequate quantities of water at reasonable water system pressures throughout the service area under a range of operating conditions. Furthermore, the distribution system must be able to provide not only uniform distribution of water during normal and peak water demand conditions but must also be capable of delivering adequate water supplies for fire protection purposes.

Utilizing the current inventory information in annual report prepared for the PSC the Village of Pewaukee Water Utility water distribution system, an inventory of the water distribution system was conducted. The water system is comprised of approximately 44 miles of water mains ranging in size from 4 inches to 16 inches in diameter as illustrated in Figure II-1. The current water main inventory is summarized in Table II-1. Of the approximately 44 miles of water main, approximately 36 percent are 12 inches and larger in diameter. These large diameter water mains represent the system's primary transmission facilities.

The current water main inventory based on pipe material is summarized in Table II-1. Of the nearly 44 miles of water mains, approximately 52 percent are metallic, being either ductile or cast iron.

Table II-1 - Water Main Size, Material, and Installation Date Distribution



The current water main inventory based on pipe installation is illustrated in Table II-1. Approximately 40percent of the existing water main was installed prior to 1990, while approximately 60 percent of the water main has been installed since 1990.

C. Water System Facilities

Table II-2 summarizes the water system facilities which are described in further detail in the following sections.

Table II-2 - Water System Facilities

Water System Facility	Description
Well 2	• Water Supply Facility includes Well, Well Pump, Ground Reservoir, and Supply Pump
Well 3	• Water Supply Facility includes Well, Well Pump, Ground Reservoir, and Supply Pumps
Well 4	• Water Supply Facility includes Well and Well Pump
Well 5	• Water Supply Facility includes Well, Well Pump and HMO Feed and Filtration Equipment
Well 6	• Water Supply Facility includes Well and Well Pump
200,000 Gallon Elevated Tank	• Elevated Water Storage Facility
250,000 Gallon Elevated Tank	• Elevated Water Storage Facility
1,000,000 Standpipe	• Elevated Water Storage Facility
Hawthorne Booster Station	• Water Booster Pumping Station

1. Water Supply

The Village of Pewaukee Water Utility currently maintains five groundwater wells to supply water for the needs of its customers. With a combined total design pumping capacity of 4.22 MGD the five wells provide an average of approximately 0.90 million gallons of water every day. Three of the wells discharge directly to the water distribution system, while two discharge to adjacent ground storage reservoirs. Table II-3 through Table II-11 summarize the water supply facilities.

2. Water Storage

The Village of Pewaukee Water Utility operates three water storage facilities which are located throughout the water distribution system. The combined storage capacity of all the facilities is 1,450,000 gallons. All three facilities are elevated tanks. Two are spheroid type tanks and the third facility is a standpipe. The elevated facilities are identified as follows:

200,000 gallon Elevated Storage Tank [Quinlan Drive] (Table II-8)

250,000 gallon Elevated Storage Tank [Lake Street] (Table II-9)

1,000,000 gallon Standpipe [Sunnyridge] (Table II-10)

3. Booster Pumping Facilities

The Village of Pewaukee Water Utility operates and maintains one booster pumping facility. The facility is intended to pump water from the main Pressure Zone into the Boosted Pressure Zone and serves as the source of supply for the Boosted Pressure

Zone. The facility is also equipped with a pressure reducing valve to allow water to return from the Boosted Pressure Zone to the Central Pressure Zone. The booster pumping facility is identified as follows:

Table II-3 - Well 2

Well 2 (125 Capitol Drive)	
Year Constructed	1955
Well Type	Drilled
Well Size:	Depth
	Diameter
Static Water Level (Average)	1250 feet
Pumping Water Level (Average)	12 inches
Well Pump	
Pump Type	Vertical Turbine
Pumping Design Rate	600 gpm
Pump Design Head	750
Motor HP	150 hp
Reservoir	
Capacity	125,000 gallons
HWL Elevation	
Depth	
Surface Dimensions (Dia. or L x W)	
Booster Pump	
Pump 1	
Pump Type	Vertical Turbine
Manufacturer	Byron Jackson
Model	12MQL 3 Stage
Pump Design Rate	700 gpm
Pump Design Head	225 feet
Motor Hp	75 hp
Water Treatment	
Sodium Hypochlorite Disinfection	
Iron sequestering with phosphate	
Fluoridation	
Standby Power	
Type	N/A
Fuel	N/A
Comments:	
Well pump and booster pump are each equipped with a variable frequency drive. Well bowl assembly replaced in 2019.	
Raw water contains combined radium and gross alpha particle activity. A packer was installed at a depth of 880 feet. Pump draws water below the packer. Water below packer has higher gross alpha particle activity.	
Well production limited to 300 gpm due to water level inhibition	



Table II-4 - Well 3

Well 3 (1004 Hickory Street)			
Year Constructed		1953	
Well Type		Drilled	
Well Size:	Depth	1128 feet	
	Diameter	16 inches	
Static Water Level (Average)		395 feet	
Pumping Water Level (Average)		580 feet	
Well Pump			
Pump Type		Submersible	
Pumping Design Rate		600 gpm	
Pump Design Head		710 feet	
Motor HP		150 hp	
Reservoir			
Capacity		125,000 gallons	
HWL Elevation			
Depth			
Surface Dimensions (Dia. or L x W)			
Booster Pump		Pump 1	Pump 2
Pump Type		Split Case	Split Case
Pump Design Rate		500 gpm	500 gpm
Pump Design Head		220 feet	220 feet
Motor Hp		50 Hp	50 Hp
Water Treatment			
Sodium Hypochlorite Disinfection			
Iron sequestration with phosphate			
Fluoridation			
Standby Power			
Type		N/A	
Fuel		N/A	
Comments: Booster Pumps are each equipped with a variable frequency drive. Motor Control Center replaced in 2021. Well pump rebuilt in 2018.			



Table II-5 - Well 4

Well 4 (800 Main Street)	
Year Constructed	1978
Well Type	Drilled
Well Size:	Depth
	Diameter
Static Water Level Average	432 feet
Pumping Level Average	532 feet
Well Pump	
Pump Type	Submersible
Pumping Design Rate	750 gpm
Pump Design Head	825 feet
Motor HP	200 hp
Reservoir	
Capacity	N/A
HWL Elevation	N/A
Depth	N/A
Surface Dimensions (Dia. or L x W)	N/A
Booster Pump	
Pump Type	N/A
Pump Design Rate	N/A
Pump Design Head	N/A
Motor Hp	N/A
Water Treatment	
Sodium Hypochlorite Disinfection	
Iron sequestration with phosphate	
Fluoridation	
Standby Power	
Type	
Fuel	
Comments: Well pump is equipped with a variable frequency drive. Raw water is high in combined radium and gross alpha particle activity. Blends with water from Well 6.	



Table II-6 - Well 5

Well 5 (1010 Quinlan Drive)	
Year Constructed	1996
Well Type	Drilled
Well Size:	Depth
	Diameter
Static Water Level Average	790 feet
Pumping Level Average	833 feet
Well Pump	
Pump Type	Submersible
Pumping Design Rate	500 gpm
Pump Design Head	833 feet
Motor HP	150 hp
Reservoir	
Capacity	N/A
HWL Elevation	N/A
Depth	N/A
Surface Dimensions (Dia. or L x W)	N/A
Booster Pump	
Pump Type	N/A
Pump Design Rate	N/A
Pump Design Head	N/A
Motor Hp	N/A
Water Treatment	
Radium Removal with HMO and pressure filtration	
Sodium Hypochlorite Disinfection	
Iron Sequestration with phosphate	
Fluoridation	
Standby Power	
Type	300 kW Generator
Fuel	Diesel
Comments: Well pump is equipped with a variable frequency drive. HMO Filtration system installed to remove combined radium. Well pump was rebuilt in 2015.	




Table II-7 - Well 6

Well 6 (460 Lake Street)	
Year Constructed	2006
Well Type	Drilled
Well Size:	Depth
	Diameter
Static Water Level Average	153 feet
Pumping Level Average	12 inches
Well Pump	
Pump Type	Vertical Turbine Line shaft
Pumping Design Rate	700 gpm
Pump Design Head	300 feet
Motor HP	75 hp
Reservoir	
Capacity	N/A
HWL Elevation	N/A
Depth	N/A
Surface Dimensions (Dia. or L x W)	N/A
Booster Pump	
Pump Type	N/A
Pump Design Rate	N/A
Pump Design Head	N/A
Motor Hp	N/A
Water Treatment	
Sodium Hypochlorite Disinfection	
Iron sequestration with phosphate	
Fluoridation	
Standby Power	
Type	150 kW Generator
Fuel	Natural Gas
Comments: Well pump is equipped with a variable frequency drive. Well pump was replaced in 2014. Well is susceptible to fouling. Capacity reduces to 290 gpm when fouled and improves to approximately 500 gpm after well rehab. Water from Well 6 blends with water from Well 4.	



Table II-8 – Quinlan Elevated Storage Tank

Quinlan	
Capacity	200,000 gallons
Year constructed	1996
Constructed by	Maguire Iron
Type	Spheroid
Construction material	Steel
Overflow elevation	1,055 feet
Diameter	Varies
Head range	30'-0"
Height to overflow	169'-6" feet
Comments	
Tank inspected in 2021.	




Quinlan

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Table II-9 – Lake Street Elavated Storage Tank

Lake Street	
Capacity	250,000 gallons
Year constructed	1968
Constructed by	CB&I
Type	Spheroid
Construction material	Steel
Overflow elevation	1,055 feet
Diameter	Varies
Head range	32"-6"
Height to overflow	76.25 feet
Comments	
Tank inspected in 2021.	

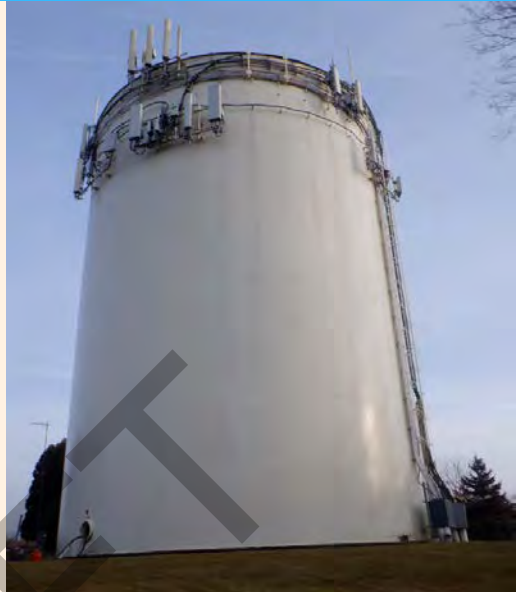


Lake Street

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Table II-10 – Sunnyridge Standpipe

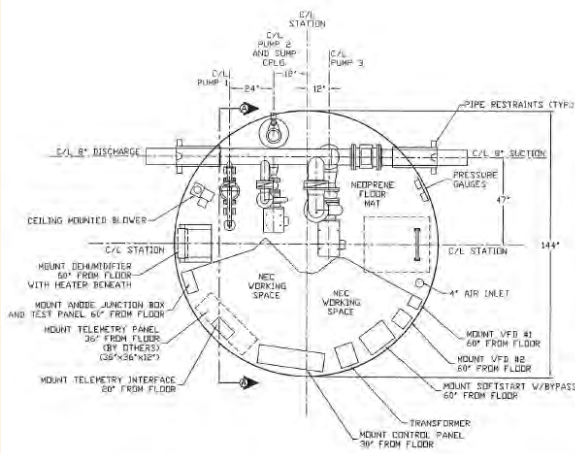
Sunnyridge Standpipe	
Capacity	1,000,000 gallons
Year constructed	1983
Constructed by	Prairie Tank.
Type	Standpipe
Construction material	Steel
Overflow elevation	1,055 feet
Diameter	Varies
Head range	68'-4"
Height to overflow	68.33 feet
Comments	
Tank inspected in 2021.	



STANDPIPE

Table II-11 – Hawthorne Booster Pump Station

Hawthorne Booster Pump Station				
Key Components/Features				
<ul style="list-style-type: none"> • Three Booster Pumps • Pumps from Main to Boosted pressure zone 				
Booster Pumps				
Pump No.	1	2	3	
Type	Vertical Multi-Stage	End Suction	End Suction	
Manufacturer	Berkeley	Berkeley	Berkeley	
Model	BVM8-30	B2TPMS	B5EPHS	
Rated conditions				
Flow (gpm)	50	210	750	
TDH (feet)	94	105	70	
Motor Horsepower	3	10	20	
Motor RPM	3450	3450	1750	
Standby power	N/A			
Comments				
Facility consists of a prepackaged below grade pump station manufactured by USEMCO. Pumps 1 and 2 equipped with VFD units. Pump 3 equipped with soft start.				



III. POPULATION AND COMMUNITY GROWTH

This chapter summarizes the planning assumptions made regarding the Village of Pewaukee Water Utility. The population and community growth discussed here will be used as the basis for the service area water requirement projections presented in Chapter IV.

A. Population

There is generally a close relationship between a community's population and total water consumption volumes. As a community's population may fluctuate up or down it is anticipated that the water sales would also fluctuate. Therefore, future water sales can be expected to generally reflect future changes in service area population. Similarly, commercial, public, and industrial water consumption will also tend to vary proportionately with the growth of the community.

1. Total Population

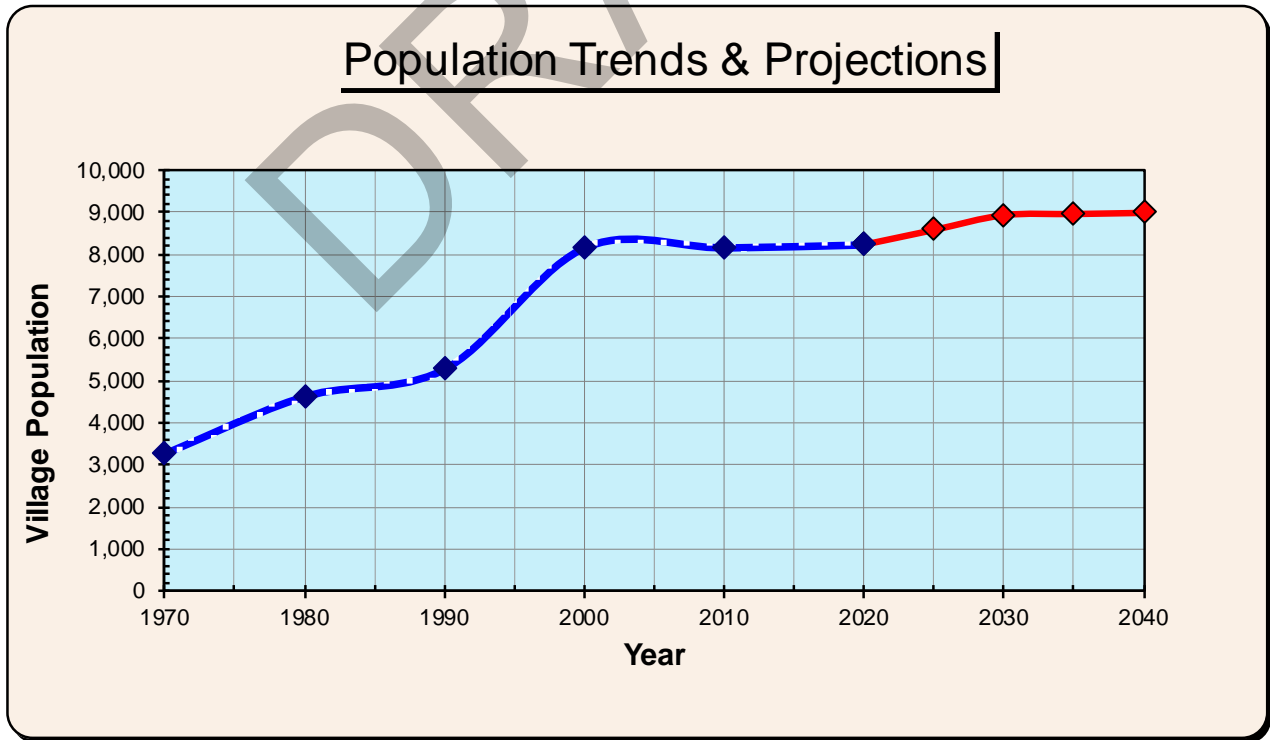
Table III-1 summarizes historical population data and estimates of future population for the Village of Pewaukee. According to the United State Census Bureau, the 2020 population of the Village was approximately 8,238. Comparatively, the 2010 census population was 8,166. The population has therefore grown in recent years having seen an estimated increase of approximately 1 percent since the last census. In, 2013, the Wisconsin Department of Administration (WDOA) prepared population estimates in five-year increments beginning with 2015 and ending in 2040. The estimated future population from WDOA was projected to be 8,625 in 2020. The estimated future population from WDOA was projected to increase to approximately 9,335 persons by 2030 and 9,390 persons by 2040. Assuming a linear growth rate, the average increase in population each year through 2030 is anticipated to be approximately 71 persons (based upon a 2020 estimate of 8,625). The growth rate between 2030 and 2040 is anticipated to be approximately 5.5 persons annually.

Utilizing the 2020 census population, and linear growth rate projections from the WDOA, the future population for 2030 would be estimated to be 8,948, and the future population for 2040 would be estimated to be 9,003.

Table III-1 - Population Trends & Projections

Year	Total	Percent Change
1970	3,271	---
1980	4,637	41.8%
1990	5,287	14.0%
2000	8,170	54.5%
2010	8,166	-0.05%
2020	8,238	0.9%
2025	8,593	4.3%
2030	8,948	4.1%
2035	8,976	0.3%
2040	9,003	0.3%

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



B. Utility Service Area

Figure III-1 illustrates the existing zoning and anticipated future service area within the Village of Pewaukee for the water utility. The future utility service area consists of currently undeveloped commercial (Office and Service Business) and residential (R-5 Single-Family Residential) lands within the Village. The boundary of the Village represents the future utility service area illustrated in Figure III-1 was used for this study to identify the areas which are expected to develop by 2030 and 2035 and require municipal water services. For the purpose of preparing this study, it is assumed that the developable areas within the future utility service area will be 100 percent developed by the end of the planning period. (That is not to say that every parcel within the service area will be developed, but only that water service will be required throughout the entire service area.)

Figure III-2 illustrates the planned development and a potential service area outside the Village boundary. The future utility service area is within the corporate boundary of the City of Pewaukee and consists of planned commercial, residential, public and industrial lands. The boundary of the service is identified in Figure III-2 was used for this study to identify the area which is expected to be developed and require water service by 2040. The City of Pewaukee has indicated that service from the Village of Pewaukee is not anticipated, and the City will provide water service. For the purpose of preparing this study, it is assumed that the Village may be requested to serve this area in the future, and assumed that the developable areas within the future utility service area will be 100 percent developed by the end of the planning period. (That is not to say that every parcel within the service area will be developed, but only that water service will be required throughout the entire service area.) This service area will only be included to estimate water supply needs in the event that the City of Pewaukee requests service from the Village of Pewaukee.

C. Land Use

For this study, zoning maps were reviewed for the Village of Pewaukee and that make up the anticipated future service area for the Water Utility. The zoning map represents the nature and extent of existing development within the current municipal limits and potential future developments through the year 2030. Table III-2 summarizes existing land use categorized by water service customer type for the Village of Pewaukee.

Table III-2 - Summary of Existing Land Use

Existing Water Service Land Use	2021
Residential	821.07
Multifamily	188.29
Commercial	280.74
Industrial	225.25
Public/Institutional	318.67
Total	1,833.01
Footnotes: Assumes Total land use is 2771.03 acres. The additional acres include areas not provided with water service including shoreland and general conservancy and parks and recreation as shown on Figure III-2.	

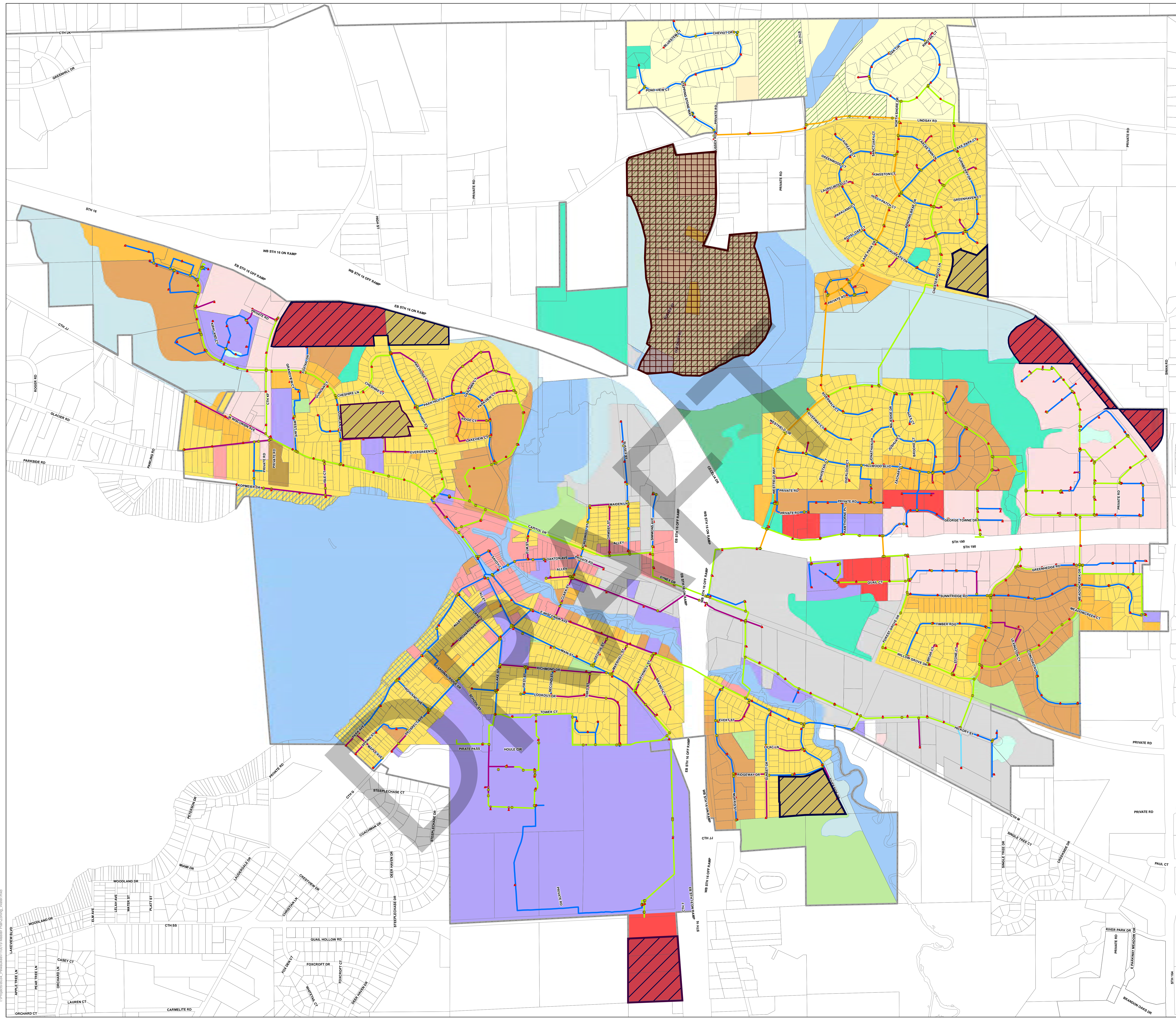
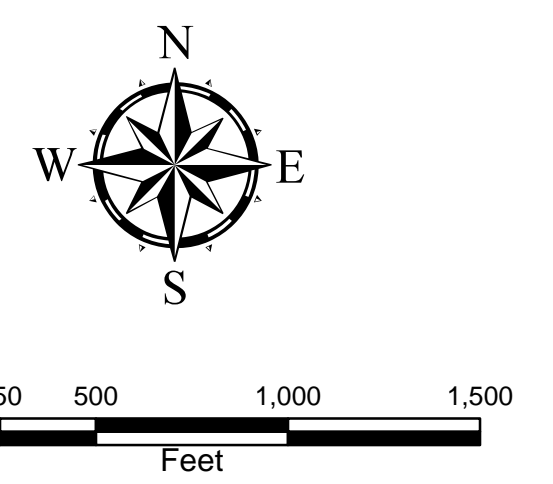


Figure III-1 2021 Zoning with Water Distribution Map



<ul style="list-style-type: none"> ● Hydrant ● Main, Active ● Hydrant, Active — 4" — 6" — 8" — 10" — 12" — 16" 	<p>Zone Code</p> <ul style="list-style-type: none"> ■ B-1 Community Business ■ B-2 Downtown Business ■ B-3 Office and Service Business ■ B-5 Light Industrial ■ C-1 Shoreland Wetland Conservancy ■ C-2 General Conservancy ■ 2030 Future Water Service Area ■ 2035 Future Water Service Area 	<ul style="list-style-type: none"> ■ FC Floodplain Conservancy ■ FW Floodway ■ IPS Institutional and Public Service ■ P-1 / C-2 Park and Recreation / General Conservancy ■ P-1 Park and Recreation ■ R-1 Single-Family Residential (1 Acre Minimum) ■ R-1 / OA Single-Family Residential (1 Acre Minimum) / Agricultural Overlay 	<ul style="list-style-type: none"> ■ R-2 Single-Family Residential (0.50 Acre Minimum) ■ R-5 Single-Family Residential (0.24 Acre Minimum) ■ R-5 / LO Single-Family Residential (0.24 Acre Minimum) Lakefront Overlay ■ R-6 Plex Residential ■ R-M Multi-Family Residential ■ MH Mobile Home Residential ■ Civil Division
---	--	--	--



D. Future Growth and Pressure Zones

An important consideration when evaluating future growth is the relative growth within each pressure zone (or the need to establish new pressure zones). To estimate the likely growth of water demand by pressure zone, a review of the location of anticipated growth was completed. Figure III-3 illustrates the need for a new pressure zone and a potential need for a boosted pressure zone based upon limits of acceptable pressures under static conditions utilizing the hydraulic grade line (HGL) of the existing elevated storage tanks assuming a 10-foot operational variation in HGL. As illustrated in Figure III-2, it is anticipated that the potential service area in the City of Pewaukee can generally be served within an acceptable range of pressures from the existing main service zone, however there are some isolated areas within which potential service area that may not be adequately serviced from the anticipated existing main service zone which may require the creation of additional pressure zones. A more detailed evaluation of both existing and future pressures as well as service needs is included later in this report.

The expected increase in residential development is directly related to projections of population growth. Likewise commercial and public land uses are also expected to increase with increases in population. As a result, future water demand projections discussed in Chapter IV will be estimated from the land use projections as presented in this chapter. For this study, future growth was assumed to be directly related to the amount of developable acreage within the future service areas.

Using the available projected zoning and anticipated land use data provided coupled with unit consumption values (in Chapter IV) future demands will be computed by pressure zone.

1. 2030 Development/Population Growth

Based upon the analysis of existing residential lots and future developable residential lands, the 2030 service area development/population growth is anticipated to be distributed as follows:

Main Pressure Zone: 100 percent of development (198 acres)
Hawthorne Boosted Pressure Zone: No additional development

2. 2035 Development/Population Growth

Based upon the analysis of existing residential lots and future developable residential lands, the 2035 service area development/population growth is anticipated to be distributed as follows:

Main Pressure Zone: 100 percent of development (108 acres)
Hawthorne Boosted Pressure Zone: No additional development

3. 2040 Development/Population Growth

Based on the projected land use in Figure III-2, the 2040 service area within the City of Pewaukee corporate boundary is anticipated to be distributed as follows:

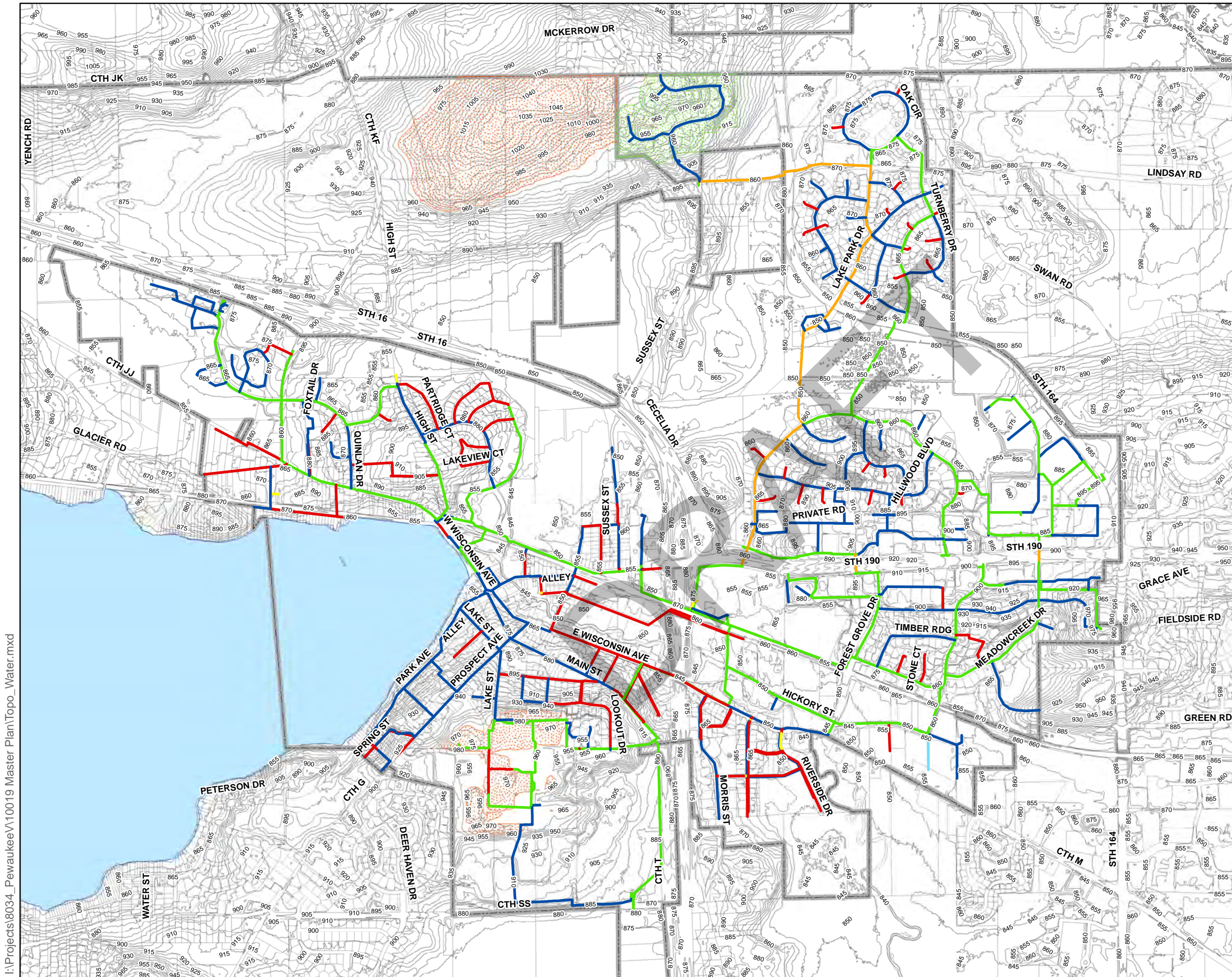
Main Pressure Zone: 337 Acres
Hawthorne Boosted Pressure Zone: No additional development
Potential Future Boosted Pressure Zone: 50 Acres



Figure III-3

Existing Service Limits and Potential Service Areas

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022



- Hawthorne Boosted Zone
- Unsuitable for Main Service Zone
- 5' Contours
- 4 - Inch and Less
- 6 - Inch
- 8 - Inch
- 10 - Inch
- 12 - Inch
- 16 - Inch
- Civil Division



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E. Summary

This chapter summarizes the primary assumptions regarding future growth of the Village of Pewaukee Water Utility service area. The present and future needs and characteristics of the identified service area will have a direct impact on the need for expansion of water system facilities; therefore, the conclusions discussed in this chapter were used as a primary basis for projecting future water needs, evaluating the adequacy of existing water system facilities, and identifying needs for future water system expansion. Table III-3 summarizes the assumptions for future growth for the Village of Pewaukee Water Utility service area that will be used to project future water requirements.

Table III-3 - Summary of Future Potential Growth

	Year 2040
Incremental Service Area Increase	692
Main Pressure Zone	
Future Residential Acres	454.9
Future Commercial Acres	89.3
Future Industrial Acres	68.5
Future Public Acres	19.3
Boosted Pressure Zone	
Future Residential Acres	50
Future Public Acres	10
Footnotes:	
Assumes complete development within the proposed 2040 utility service area as shown on Figure III-1, and III-2.	

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IV. WATER REQUIREMENTS

Projections of customer demands serve as the basis for capital improvements planning. Several standard methods were used in this study to project water supply and storage needs based on estimates of population and community growth. This chapter summarizes the methodology used and the results of those projections.

A. Water Consumption History

To project future water requirements, it is first necessary to determine the water use characteristics of the utility customers. Geographical location as well as socio-economic factors often play a role in shaping how water is used at the local level. For example, communities located in areas of sandy soil may utilize more water for irrigation than communities located in moisture-retaining soils. Communities with agricultural businesses (i.e., canneries) or heavy manufacturing (paper mills, iron and steel production) often use more water than communities with only lighter manufacturing (i.e. fabricating or assembly plants). In order to determine the water characteristics of the Village, an analysis of past pumpage and water sales records for the period from 2010 to 2020 was conducted. The analysis included a review of both average and maximum day water pumpage along with the amount of water sold in each customer class. The results of this analysis are then utilized to project future water requirements when coupled with estimates of population and community growth discussed in Chapter III.

A summary of historical water sales and pumpage is provided in Table IV-1. Over the 11-year period of data summarized in the table, water sales have fluctuated from a low of 213 million gallons per year (MGY) in 2019 to a high of 269 MGY in 2012. Although water sales have fluctuated both up and down, the overall trend in sales over the past 11 years has been a slight decrease with 2020 water sales being approximately 7 percent less than sales in the 2010. Over the same period, total pumpage has increased and is currently approximately 10 percent greater than in it was in the late 2010.

A historical summary of Village of Pewaukee Water Utility customers served is provided in Table IV-2. Water sales to individual customer classes are summarized in Table IV-3. As seen in the tables, while the number of residential, commercial, and multifamily customers has had a small increase, sales to residential and commercial customers have remained relatively constant, and sales to multifamily customers has had a slight decrease. Also, while the number of industrial and public customers have remained relatively constant, sales to industrial and public customers have actually decreased.

As illustrated in Table IV-2 and Table IV-3, residential customers presently account for 77 percent of the utility's customers and approximately 43 percent of the total sales. Commercial and multifamily water use in 2020 accounted for approximately 20 percent of the customers and 49 percent of total sales. Metered industrial sales and public uses currently each account for approximately 2 percent and 1 percent of the customers respectively, and represent approximately 5 and 3 percent of total sales, respectively.

Table IV-1 - Historical Water Pumpage and Sales

Year	Estimated Population	Total Pumpage (MG)	Total Sales (MG)	Pumpage Sold (%)	Non-Revenue Water (%)	Water Losses (%)	Average Day		Maximum Day		Ratio of Maximum to Average Day Pumpage
							MGD	GPCD	MGD	Date	
2010	8,166	304	236	78%	22%	21%	0.832	101.8	1.961	Sept. 16	2.36
2011	8,159	302	245	81%	19%	18%	0.828	101.5	1.271	July 10	1.53
2012	8,165	322	269	83%	17%	16%	0.882	108.0	1.445	July 1	1.64
2013	8,170	304	241	79%	21%	20%	0.832	101.8	1.650	Sept. 12	1.98
2014	8,176	282	230	82%	18%	17%	0.772	94.4	1.077	Sept. 9	1.39
2015	8,182	271	231	85%	15%	13%	0.742	90.7	1.230	March 11	1.66
2016	8,187	279	231	83%	17%	16%	0.763	93.2	1.140	July 19	1.49
2017	8,193	279	232	83%	17%	14%	0.765	93.3	1.230	Sept 12	1.61
2018	8,199	318	225	71%	29%	25%	0.871	106.2	1.180	Sept. 28	1.36
2019	8,204	322	213	66%	34%	29%	0.882	107.6	1.119	June 6	1.27
2020	8,210	335	220	66%	34%	30%	0.918	111.8	1.438	July 6	1.57

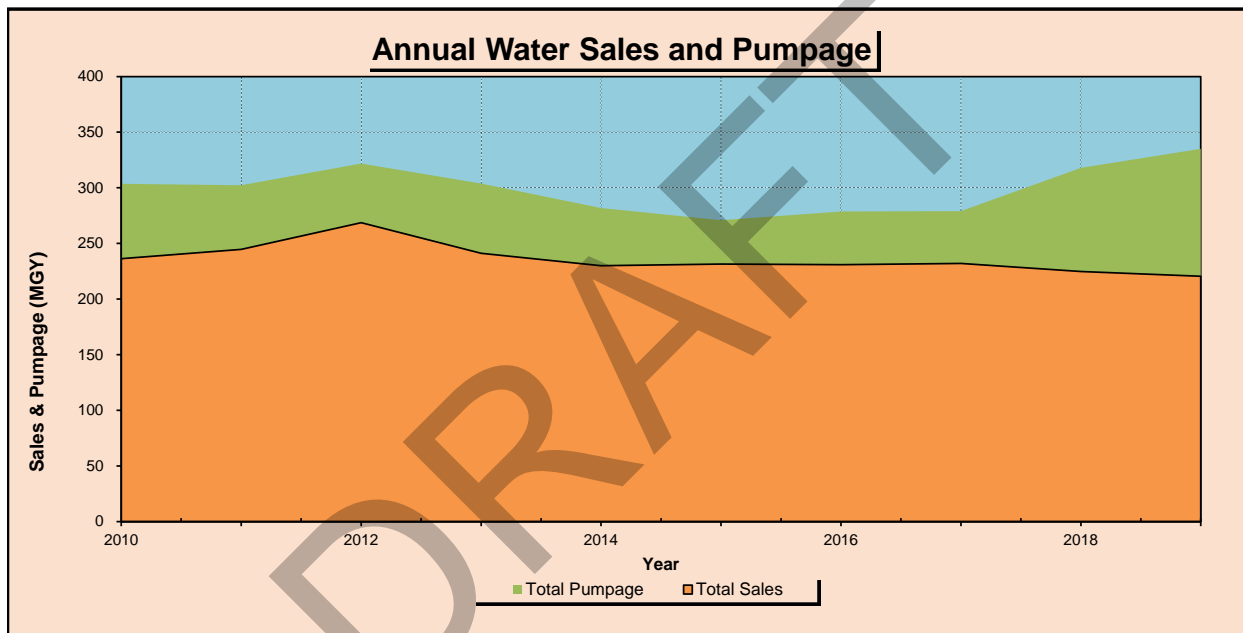


Table IV-2 - Historical Customer Summary

Year	Number of Customers					Total
	Residential	Commercial	Industrial	Public	Multifamily ¹	
2010	1,659	409	45	24		2,137
2011	1,667	409	47	24		2,147
2012	1,672	410	46	24		2,152
2013	1,682	412	46	24		2,164
2014	1,682	413	45	24		2,164
2015	1,683	168	46	26	248	2,171
2016	1,685	172	46	26	248	2,177
2017	1,687	173	46	26	248	2,180
2018	1,689	175	46	26	247	2,183
2019	1,686	178	45	26	247	2,182
2020	1,687	180	45	26	248	2,186

Notes:

1. Multifamily (previously considered commercial) was first established in 2013 and required in 2015

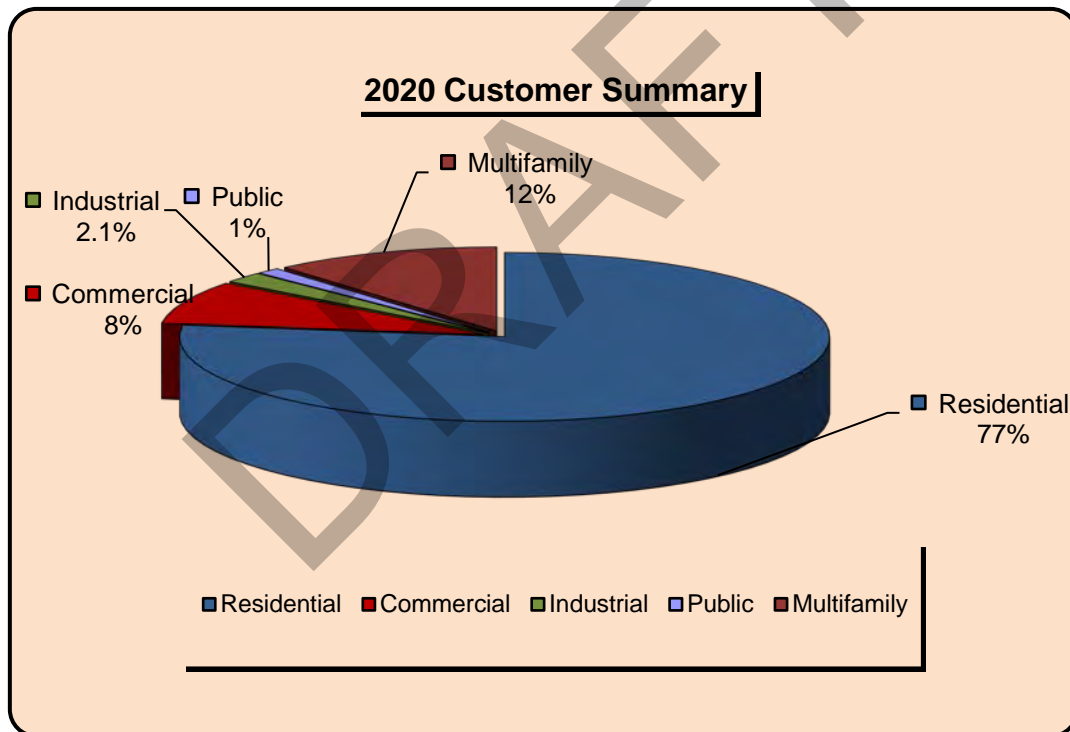
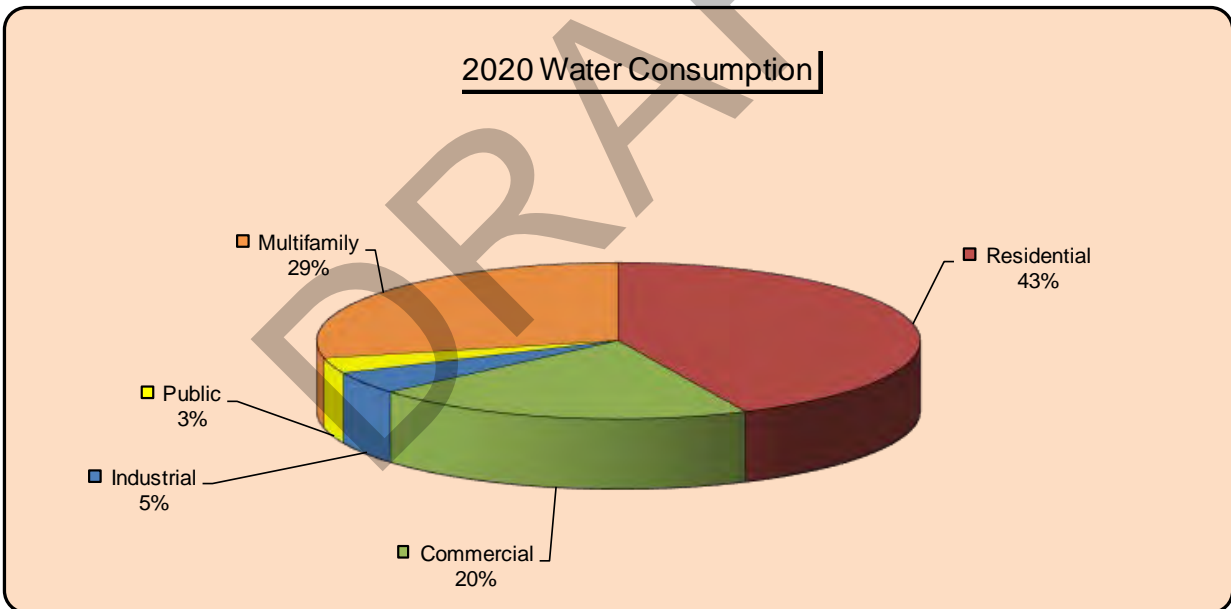


Table IV-3 - Water Consumption History

Year	Annual Water Sales (MGY)					Total Sales (MGY)	Total Pumpage (MGY)	% of Pumpage Sold
	Residential	Commercial	Industrial	Public	Multifamily ¹			
2010	93.45	118.92	10.73	13.15		236.25	303.56	78%
2011	97.01	122.19	11.37	14.14		244.70	302.23	81%
2012	100.71	126.73	11.68	29.48		268.60	321.77	83%
2013	92.95	120.16	15.34	12.58		241.02	303.71	79%
2014	93.01	113.97	10.08	12.81		229.87	281.83	82%
2015	94.72	46.13	9.84	12.70	68.10	231.49	270.87	85%
2016	92.33	49.75	8.06	13.75	67.01	230.89	278.65	83%
2017	89.56	53.90	9.54	13.23	65.73	231.96	279.06	83%
2018	87.44	51.85	7.88	13.00	64.62	224.79	317.84	71%
2019	85.10	46.31	6.88	12.25	62.37	212.90	322.09	66%
2020	95.04	45.17	7.04	10.15	63.09	220.49	334.94	66%

Notes:

1. Multifamily (previously considered commercial) was first established in 2013.



B. Unit Consumption Water Usage

Residential, commercial, and public water usage can often be correlated to a community's population. Sales to these customer classes will generally rise and fall in proportion to changes in population and thus make it useful for projecting future water sales. Unique to the Village of Pewaukee, however, is that not all residences of the Village are currently served by municipal water and therefore must be considered in the analysis. While commercial and public water usage can be attributed to the entire population, residential sales will be limited to only those customers of the water utility.

An analysis of per capita water consumption for the Village of Pewaukee Utility for each of the above customer classifications was made from the available sales records summarized in Table IV-3. Tabular results of the analysis are illustrated in Table IV-4. As can be seen from the figure and also in the table, per capita sales to residential, commercial, and public customers have followed generally consistent trends over the previous 10 years.

The apparent trend in per capita residential water usage illustrated in Table IV-4 is consistent with observed results for other Wisconsin municipal water utilities. Currently it is common for per capita trends to be declining or relatively flat. Beginning as far back as the 1970s, consumer awareness of the need for water conservation has increased, and in more recent years the implementation of water conservation measures has become even more common.

Although slightly declining, the Village of Pewaukee residential per capita consumption has remained fairly constant over the previous 11 years, averaging approximately 31.1 gallons per capita per day (gpcd). Likewise, the per capita consumption for commercial water sales has also remained relatively constant over the past 6 years with an average per capita consumption rate of 16.3 gpcd. Per capita consumption for public water uses has decreased over the past ten years. While public per capita consumption has averaged approximately 4.8 gpcd over that last 11 years, it has averaged approximately 4.2 gpcd over the past 8 years after the significant increase in 2012.

An analysis of per acre water consumption was also made for the Village of Pewaukee for each of the customer classifications. Table IV-5 summarizes the results of the analysis. Similar to the residential per service consumption trend, the Utility's residential per acre consumption has remained fairly constant over the previous 11 years, averaging approximately 310 gallons per acre per day (gpad). Commercial per acre consumption has seen a slight increase over during 2017 and 2018, but reduced in 2019 and 2020, and has averaged approximately 477 gpad. Industrial per acre consumption has had a moderate decrease over the last 11 years and has averaged 120 gpad. Public per acre consumption has decreased slightly with a sharp increase in 2012 and has averaged approximately 123 gpad over the last 11 years, and it has averaged approximately 108 gpad after the significant increase in 2012. Multifamily per acre consumption has shown a gradual decrease over the past 6 years and has averaged 948 gpad.

It is assumed that future per capita consumption and per acre consumption will remain relatively constant. When coupled with projections of future population the per capita consumption rates summarized in Table IV-4 will be utilized to estimate future water requirements for new development. When coupled with future land use, the per acre consumption rates summarized in Table IV-5 will be utilized to estimate future water requirements. The residential per capita consumption used to project future water demands is 31 gpcd, the commercial per capita consumption is projected at 16 gpcd, and the public per capita consumption is projected at 4.5 gpcd. The residential per acre consumption used to project future demands is 315 gpad, the commercial per acre consumption projected for future water demands is 500 gpad. The industrial per acre consumption used to project future demands is 120 gpad. The public per acre consumption to project future water demands is 110 gpad. The multifamily per acre consumption to project future water demands is 950 gpad.

Table IV-4 - Historical Per Capita Usage

Year	Estimated Total Retail Population	GALLONS PER CAPITA PER DAY						
		Residential	Commercial	Industrial	Public	Multi-family	Total Metered	Total Pumpage
2010	8,166	31.4	39.9	3.6	4.4		79.3	101.8
2011	8,159	32.6	41.0	3.8	4.7		82.2	101.5
2012	8,165	33.8	42.5	3.9	9.9		90.1	108.0
2013	8,170	31.2	40.3	5.1	4.2		80.8	101.8
2014	8,176	31.2	38.2	3.4	4.3		77.0	94.4
2015	8,182	31.7	15.4	3.3	4.3	22.8	77.5	90.7
2016	8,187	30.9	16.6	2.7	4.6	22.4	77.3	93.2
2017	8,193	29.9	18.0	3.2	4.4	22.0	77.6	93.3
2018	8,199	29.2	17.3	2.6	4.3	21.6	75.1	106.2
2019	8,204	28.4	15.5	2.3	4.1	20.8	71.1	107.6
2020	8,210	31.7	15.1	2.3	3.4	21.1	73.6	111.8
Average		31.1	16.3	3.3	4.8	21.8	78.3	100.9

Notes
1. Commercial average is from 2015 through 2020

Table IV-5 - Historical Per Acre Usage

Year	GALLONS PER ACRE PER DAY				
	Residential	Commercial	Industrial	Public	Multi-Family
2010	312	1161	130	113	
2011	324	1192	138	122	
2012	336	1237	142	254	
2013	310	1173	187	109	
2014	310	1112	123	110	
2015	316	450	120	110	991
2016	308	485	98	119	975
2017	299	526	116	114	956
2018	292	506	96	112	940
2019	284	452	84	106	907
2020	317	441	86	88	918
Average	310	477	120	123	948

Notes
1. Commercial average from 2015 through 2020

C. Industrial Water Usage

Tables IV-3 and IV-4 also summarize the annual industrial water sales and resulting per capita usage from 2010 to 2020. As seen in Table IV-4, per capita industrial sales have declined over the years. However, unlike other water sales components, sales to industrial customers do not necessarily correlate well with population but is more a function of business needs and activities. As such, it is often necessary to implement other means of estimating future water sales.

To understand why industrial water sales do not correlate well with population one should consider what is most likely to impact a business's need for water. While the size of the workforce can influence a company's water use, variations in water use are not generally population dependent but rather depend on the types of industries served and the level of production activity. Much more than population, fluctuations in water consumption for a particular industrial firm can be attributed to other factors including:

1. Changes in production schedules or operational capacity.
2. Changes in manufacturing processes.
3. Changes in the number of persons employed.
4. Addition or deletion of product lines.
5. Seasonal variation in cooling requirements.
6. Seasonal changes in business activity.
7. Implementation of conservation measures.

While industrial customers often represent a small percentage of the total number of customers (Table IV-2), these customers can represent a significant portion of the total water sales (Table IV-3). Consequently, changes in water consumption characteristics by these potential high volume water users could have an impact on total future water requirements. Estimates for future industrial water sales are discussed in specific detail later in this Chapter.

D. Non-revenue Water and Unaccounted For Water

There is generally a close relationship between the total gallons of water pumped and the gallons of water metered and sold to water utility customers. The total metered water sales are most often less than the amount of pumpage due to several factors including:

1. Unmetered water usage for firefighting.
2. Inaccuracies in water metering devices.
3. Unmetered public water usage.
4. Leakage within the distribution system.
5. Unmetered water usage for treatment processes and maintenance purposes, such as filter cleaning, hydrant flushing and water main repairs.

The difference between total pumpage and total water sales is termed "non-revenue water" and is usually expressed as a percentage. That portion of non-revenue water attributed to leakage, meter inaccuracies, and other unknown losses is often termed "unaccounted-for water" and can be an indicator of the condition of the water system. When a distribution system is very old or poorly maintained, the amount of unaccounted-for water often increases dramatically.

Over the last 11 years, the percentage of the total pumpage volume that is sold (metered) has been reported to be as low as 66 percent in 2019 and 2020 and as high as 85 percent in 2015. A summary of historical unaccounted-for water (Water Losses) volumes and pumpage sold is

provided in Table IV-1. The degree of fluctuation experienced in metered pumpage is common for public water utilities and can be influenced by the factors summarized above. For example, the percentage of total pumpage metered would be expected to decrease in years when unusual problems with leakage or meter stoppage occurred, or when unusually high water demands for fire protection occurred. As a very general rule, the percentage of unaccounted-for water should ideally be less than 15 percent.

Historically, the unaccounted-for water for the Village of Pewaukee Water Utility has varied and was near the ideal percentage during the period of 2014 through 2017. The water utility staff during the past year, have identified and repaired significant leaks in water services and water mains that have minimized unaccounted for water. For this study, it was assumed that the percentage of total pumpage unmetered in future years will be maintained at 20 percent.

It is important to note that quantifying unaccounted-for water simply as a percent of pumped water to billed water, while widely used and accepted, is limited in its ability to accurately indicate an appropriate or acceptable level of water loss. For example, if water conservation measures are implemented causing total consumption to decrease, and yet leakage and other unaccounted for water uses remain that same (as volume) then the percent of unaccounted-for water actually increases as a percent. This would mistakenly indicate that the level of water loss has gotten worse, while in actuality it has remained the same. Currently, the water industry is moving to new ways of estimating and reporting leakage and unaccounted-for water that are more comparative of the system conditions and provide benchmarks for acceptable levels of leakage.

E. Variations in Customer Demands and Pumpage

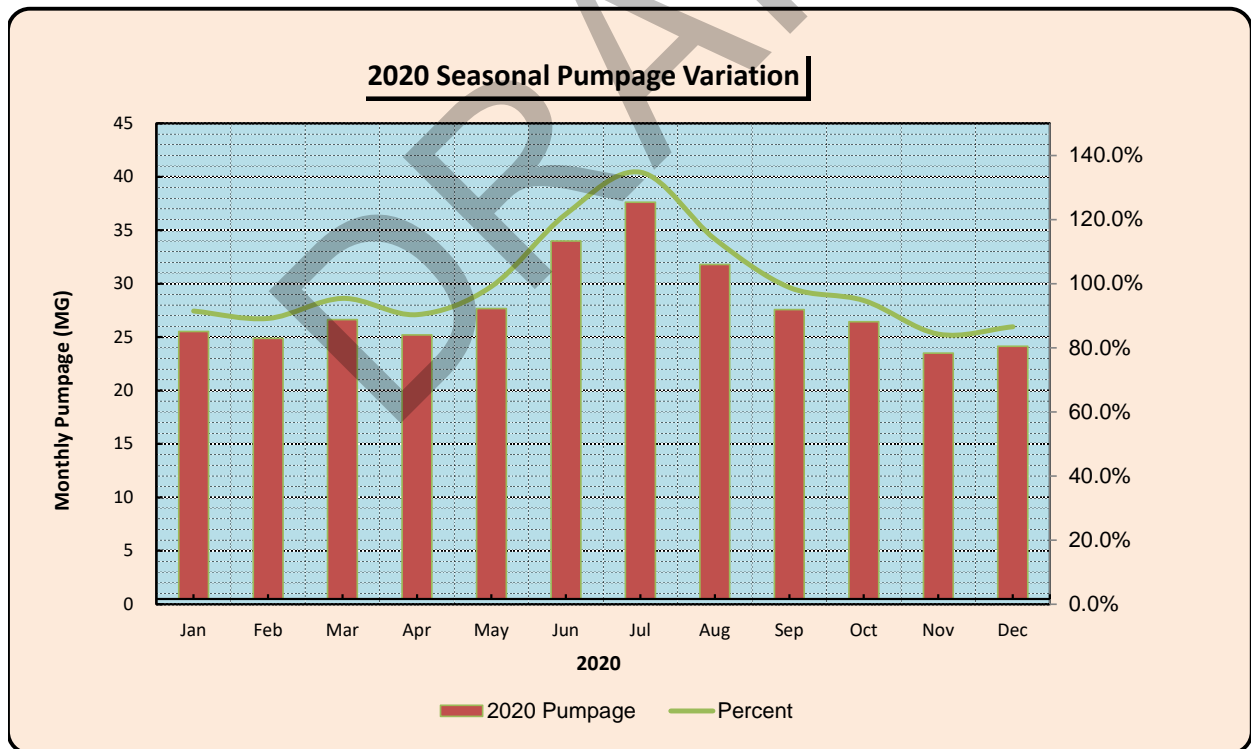
Water consumption is not constant throughout the calendar year and varies season to season, month to month, day to day and even hour to hour. It is important that the Village of Pewaukee Water Utility be able to meet the needs of its customers even during periods of increased water demand. To ensure that the needs of customers can be met at all times it is important to understand the variations that occur in water consumption and then quantify the variations in demand.

Seasonal fluctuations in water usage are important factors in the design and sizing of water supply and storage facilities. The seasonal nature of water consumption in the Village of Pewaukee Water Utility system can be demonstrated by an analysis of monthly pumpage. Variations in pumpage are often attributed to seasonal changes in customer demands, however, in smaller water systems, variations can be heavily influenced by artificial means, including refilling water storage facilities after maintenance activities, water main breaks, fighting fires, and flushing hydrants. In northern climates the maximum pumpage often occurs during the warmer summer months and the minimum pumpage during the colder winter months.

Monthly pumpage for the year 2020 is summarized in Table IV-6. While pumpage reported in 2020 varied between months, overall, the variation in pumpage is small and the total monthly pumpage is relatively constant. As summarized in Table IV-6, the maximum monthly pumpage in 2020 (37.62 MG) occurred in July, while the minimum monthly pumpage (23.507 MG) occurred in November. While the low pumpage reported in November is most likely the results of a reduction in customer demand, the pumpage volume reported in July is most likely the result of an increase in customer demand, in this case due to dry weather.

Table IV-6 - Seasonal Pumpage Variations

Month	2020 Monthly Pumpage (MG)	Percentage of Total Pumpage	Percentage of Average Pumpage
January	25.521	7.6%	91.4%
February	24.874	7.4%	89.1%
March	26.621	7.9%	95.4%
April	25.205	7.5%	90.3%
May	27.670	8.3%	99.1%
June	33.978	10.1%	121.7%
July	37.620	11.2%	134.8%
August	31.786	9.5%	113.9%
September	27.575	8.2%	98.8%
October	26.433	7.9%	94.7%
November	23.507	7.0%	84.2%
December	24.148	7.2%	86.5%
Total	334.938	100.0%	



Often a result of seasonal variations, maximum daily water demands usually occur during the summer months on hot days when additional water is used for watering lawns, gardening, washing, and industrial cooling. Understanding and quantifying the maximum day pumpage is of particular importance to water system planning, because water supply facilities must be sized to meet this demand. The maximum day demand is defined as the amount of water pumped during a single day of the year with the highest water usage. Maximum day demand is often expressed as a ratio (or factor) of the annual average day pumpage.

Table IV-7 presents the average and maximum day pumpage for each year from 2010 to 2021. With the exception of maximum day pumpage resulting from artificial demands caused by water main breaks, tank overflows, or hydrant flushing, the maximum day pumpage typically occurs during the meteorological summer months of June, July, August, or September.

Over the last 12 years, the maximum day pumpage ratio (ratio of maximum day to average day pumpage) has varied from a low of approximately 127 percent in 2019 to a high of 236 percent in 2010. The values shown in Table IV-7 are typical for similar communities, where design ratios of 200 to even 300 percent are common. This is due to the larger percent of the total water usage being consumed to meet the variable demands of residential and commercial customers as opposed to the more continuous water needs of industrial customers.

To gain a better understanding of expected fluctuations in customer demands for the Village of Pewaukee Water Utility, a statistical analysis was performed of historical maximum day to average day pumpage ratios. The results of this analysis are also summarized in Table IV-7. Two periods of analysis were examined: the entire period of 2010 to 2021 and the most recent 8-year period from 2014 to 2021.

For the years 2010 to 2021, the average maximum day demand ratio was approximately 1.63, with a standard deviation of 28 percent. In comparison, over the most recent 8-year period of 2014 to 2021, the average maximum day demand ratio was approximately 1.50, with a standard deviation of 14 percent. Therefore, the maximum to average day ratios for the Village of Pewaukee Water Utility have been both lower and less variable in recent years.

Table IV-6 also includes an analysis of expected maximum day pumpage ratios for various confidence levels. For example, based on the analysis of data from 2010 to 2021, there is a 90 percent chance in any given year that the actual maximum day pumpage ratio will be less than or equal to 1.99. Conversely, there is a 10 percent chance the actual ratio will exceed 1.99.

To evaluate future water supply and storage needs, a maximum day pumpage ratio of 1.99 was used for this study. This ratio provides a confidence level of approximately 99 percent based on maximum day pumpage ratios reported over the past 8-year analysis period.

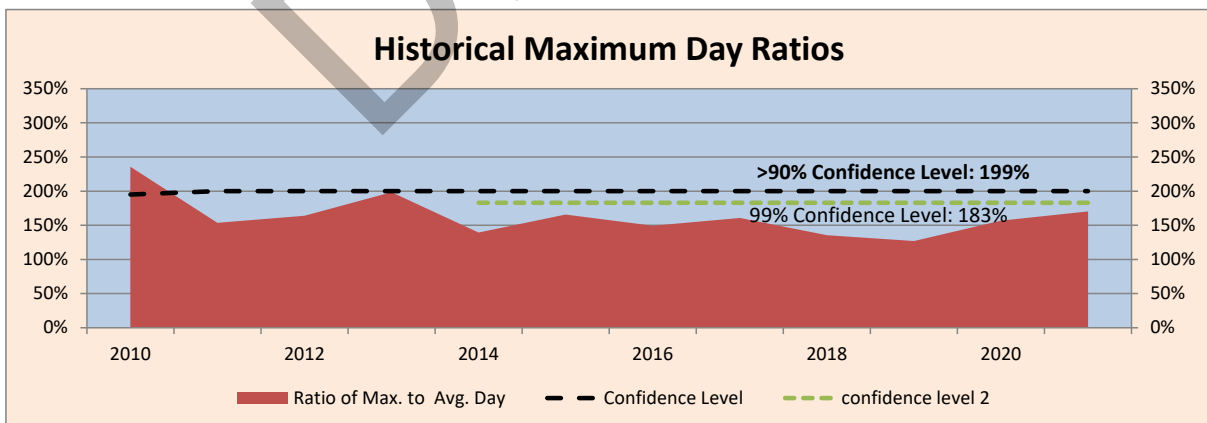
Table IV-7 - Daily Pumpage Variations

Year	Avg. Day Pumpage (MGD)	Max. Day Pumpage (MGD)	Date of Maximum Day	Ratio of Max. to Avg. Day	Year	Avg. Day Pumpage (MGD)	Max. Day Pumpage (MGD)	Date of Maximum Day	Ratio of Max. to Avg. Day
2010	0.83	1.961	Sept. 16	2.36	2018	0.87	1.180	Sept. 28	1.36
2011	0.83	1.271	July 10	1.53	2019	0.88	1.119	June 6	1.27
2012	0.88	1.445	July 1	1.64	2020	0.92	1.438	July 6	1.57
2013	0.83	1.650	Sept. 12	1.98	2021	0.81	1.382	June 14	1.70
2014	0.77	1.077	Sept. 9	1.39					
2015	0.74	1.230	March 11	1.66					
2016	0.76	1.140	July 19	1.49					
2017	0.76	1.230	Sept 12	1.61					

Notes: 1. Maximum day for 2013 was a result of flushing and main breaks
2. Second highest max day used resulting from normal demand. Max day occurred on December 16 resulting from filling stand pipe.

	2014 - 2021	2010 - 2021
Number of years of Data	8	12
Maximum Ratio - Max. to Avg. Day Pumpage	170%	236%
Minimum Ratio - Max. to Avg. Day Pumpage	127%	127%
Average Ratio Max. to Avg. Day Pumpage	151%	163%
Standard Deviation	14%	28%

Confidence Level (%)	Ratio of Max. to Avg. Day Pumpage	
	2014 - 2021	2010 - 2021
80%	163%	187%
85%	166%	192%
90%	169%	199%
95%	174%	209%
98%	180%	221%
99%	184%	229%



F. Hourly Demand Fluctuations

The hour-to-hour variation of customer demands is also an important characteristic used to evaluate water supply and storage requirements. Peak hour demand is important because storage facilities are usually designed to provide water to meet the peak hour demand requirement in excess of the demand equal to the maximum day pumpage. As with maximum day demands, peak hour demand is often expressed as a ratio of peak hour to average day demand for the year. Peak hour demand is defined as the hour of maximum demand that occurs on the maximum day.

According to AWWA Manual M32, typical ranges for peak hour factors in distribution systems of various sizes are 1.3 to 2.0 for peak hour to maximum day and 0.2 to 0.6 for minimum hour to maximum day. An analysis of the SCADA data was performed to calculate the actual peak hour demand factor during June 12, 2021, and June 15, 2021. The maximum day occurred on June 14, 2021. The maximum peak hour demand factor that occurred during this period was 1.6, which occurred on June 15, 2021. Based upon available data SCADA data, the peak hour demand factor is estimated to be 1.60 times the maximum day demand resulting in a total peak hour to average day ratio of 3.18.

G. 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. A detailed summary of the individual components of projected water sales and pumpage requirements is provided in Table IV-8.

1. Residential Sales

Residential sales were projected based on current trends and assumptions regarding future development and per acre water consumption. For the current planning period, it is estimated that the residential consumption rate will remain approximately 315 gpad, resulting in total residential sales of 113 MGY by 2030, and 140 MGY by 2040 if the Village serves customers withing the City of Pewaukee north of HWY 16. Residential water sales are anticipated to account for approximately 47 percent of total water sales by 2040.

2. Public Sales

Future per acre sales to public customers were projected to be approximately 110 gpad throughout the planning period. By the year 2040, it is estimated that public sales will be approximately 14 MGY, or roughly 5 percent of total annual sales.

3. Commercial Sales

Future per acre consumption by commercial customers was projected to be approximately 500 gpad over the planning period. Total annual sales to commercial customers are expected to reach 68 MGY by 2040, or approximately 23 percent of total annual sales.

4. Multi-family Sales

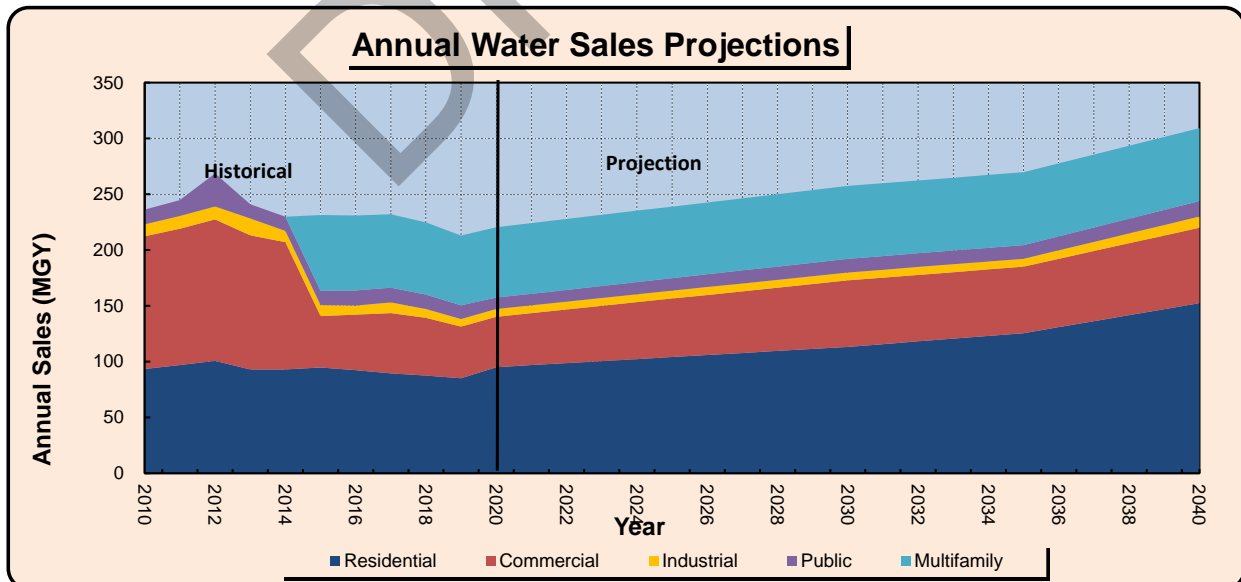
Future per acre sales to multi-family customers was projected to be approximately 950 gpad over the planning period. Total annual sales to multi-family customers are expected to reach 65 MGY by 2040, or approximately 22 percent of total annual sales.

Table IV-8 - Water Sales & Pumpage Projections

<u>Customer Classification</u>	<u>Actual 2020/2021</u>	<u>Projected 2030</u>	<u>Projected 2035</u>	<u>Projected 2040</u>
Population (Total)	8,238			
Est. Population Served	8,210			
Per Acre Sales (gpad)				
Residential Sales	317.0	315.0	315.0	315.0
Public Sales	88.0	110.0	110.0	110.0
Commercial Sales	441.0	500.0	500.0	500.0
Multi-Family Sales	918	950.0	950.0	950.0
Industrial Sales	86.0	120.0	120.0	120.0
Annual Sales (MGY)				
Residential Sales	95	113	126	152
Public Sales	10	12	12	14
Commercial Sales	45	60	60	68
Multi-family	63	65	65	65
Industrial Sales	7	7	7	10
TOTAL METERED SALES (MGY)	221	257	270	309
Non-revenue Water (MGY)	76	60	67	80
TOTAL PUMPAGE (MGY)	296	320	337	390

Note

1. Non-revenue water was projected at 20% of total pumpage for future years.



5. Industrial Sales to Existing Customers

Sales to existing industrial customers have generally decreased in recent years with total sales approximately 66 percent less in 2020 than ten years ago. While decreasing from previous years, industrial sales can still represent a significant portion of the total water sales. To project future industrial sales, it is assumed that the decreasing sales trend will taper off and industrial sales to existing customers will remain generally constant during the planning period. Therefore, it is assumed that future sales to existing industrial customers will remain at approximately 7 MGY through 2040.

6. Future Industrial Growth

A certain amount of industrial development is anticipated to support projected future community and regional growth in population. As illustrated in Figure III-2, planned industrial development exists outside the Village limits in the City of Pewaukee. The total undeveloped acres identified as either Industrial or Business Park land use is approximately 68.5.

To project future industrial sales, an estimate of existing industrial sales per acre was performed using available data regarding industrial land use acreage and metered water sales. Utilizing the land use data in from the zoning map, it is estimated that there are approximately 225.25 acres of industrial land currently receiving water service. Based upon a 2020 total metered sales volume of 7.04 MG, industrial water users are consuming approximately 85.6 gallons per acre per day (gpac).

Although historically a projected consumption rate of 1,500 gpac was not uncommon in water supply planning, currently values between 100 and 500 gpac are typical. Consumption rates less than 100 gpac are also not uncommon. Based upon recent patterns of industrial consumption throughout the industry, a value of between of approximately 100 and 200 gpac is believed to be reasonable estimate of future industrial water sales. For the purpose of future projections, it is assumed that future industrial sales will be approximately 120 gpac.

Future industrial water sales within the existing service area boundary are anticipated to grow by approximately 3 MGY as industrial land use areas are developed by 2040. As previously mentioned, due to the variability in industrial water use, it will be necessary to review and revise water needs projections during future planning efforts based on the actual types and quantity of industrial developments that may occur.

H. Summary of Total Demands and Pumpage Requirements

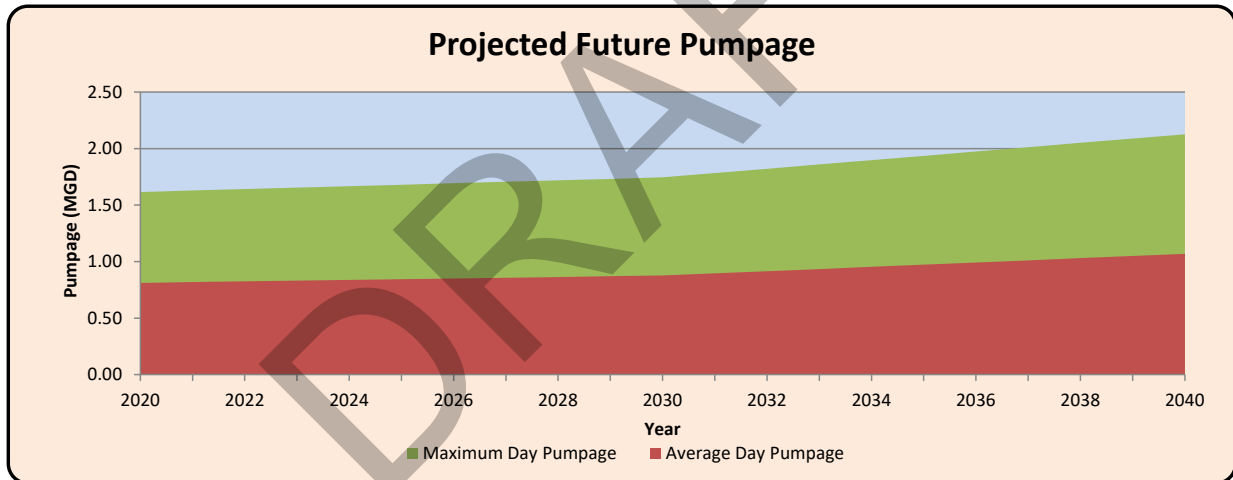
The total annual metered sales projections previously summarized in Table IV-8 were based on a summation of water sales projections for each major customer classification. An allowance was also made for unmetered miscellaneous water usage and losses (non-revenue water) to arrive at total pumpage projections.

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 296 MGY (0.812 MGD) to approximately 370 MGY (1.01 MGD) by the year 2040. Table IV-9 also illustrates the projected water sales and pumpage through the planning period.

Table IV-9 - Future Pumpage Projections

	Actual 2020/2021	Projected 2030	Projected 2035	Projected 2040
Total Annual Retail Sales (MGY)	221	257	270	309
Total Annual Pumpage (MGY)	296	320	337	390
Average Day Pumpage (MGD)	0.812	0.877	0.923	1.068
Design Maximum Day Pumpage (MGD)	1.62	1.74	1.84	2.13
Design Peak Hour Demand (gpm)	1,800	1,940	2,040	2,360

Notes	
1.	Design maximum day pumpage projections were estimated using a ratio of maximum to average day pumpage of 199 percent.
2.	Design peak hour demand projections were estimated using a ratio of peak hour demand to maximum day pumpage of 160 percent.



While the overall demand and pumpage requirements are important in determining supply and storage for the Village of Pewaukee Water Utility, determining water requirements by pressure zone ensures that adequate supply and storage are available where they are needed. Table IV-10 summarizes the projected water requirement by pressure zone based upon anticipated growth and development within each pressure zone during the planning period as presented in Chapter III.

Table IV-10 - Projected Water Sales by Pressure Zone

	<u>Actual 2020/2021</u>	<u>Projected 2030</u>	<u>Projected 2035</u>	<u>Projected 2040</u>
Total Population	8,238			
Population Served	8,210			
Residential Per Acre Sales (gpad)	317.0	315	315	315
Public Per Acre Sales (gpad)	88.0	110	110	110
Commercial Per Acre Sales (gpad)	441.0	500	500	500
Multi-family Sales (gpad)	918.0	950	950	950
Industrial Per Acre Sales (gpad)	86.0	120	120	120
Main Service Zone				
Residential Sales	0.25	0.30	0.33	0.39
Public Sales	0.03	0.03	0.03	0.04
Commercial Sales	0.12	0.16	0.16	0.19
Multi-family	0.17	0.18	0.18	0.18
Industrial Sales	0.02	0.02	0.03	0.03
	-			
Total Water Sales for Zone (MGD)	0.59	0.70	0.74	0.82
Hawthorne Boosted Zone				
Residential Sales	0.010	0.009	0.009	0.009
Total Water Sales for Zone (MGD)	0.010	0.010	0.010	0.010
Future Boosted Zone				
Residential Sales	-	-	-	0.016
Public Sales	-	-	-	0.001
Total Water Sales for Zone (MGD)	0.000	0.000	0.000	0.017
TOTAL METERED SALES (MGD)	0.60	0.71	0.747	0.85

Notes
1. Per acre sales from Table 4-8.
2. Total Metered Sales may not match with Table 4-8 due to estimates and rounding of variables in the calculations

V. SUPPLY AND STORAGE ANALYSIS

A critical step in the water system evaluation for the Village of Pewaukee Water Utility is an assessment of water supply and storage requirements. Water supply and storage needs are closely related. The primary criteria used in determining required supply rates and storage volumes include maximum day and peak hour demands, operational characteristics, and fire protection needs.

A. Water Supply Analysis

As it is frequently necessary to take a well and/or booster pump out of service for periods of days to even weeks for maintenance or repair, it is necessary to properly plan to ensure that demand requirements can be met even when a pumping unit may be out of service. It is then necessary to determine a reliable capacity that accounts for the uncertainty that all pumping units will be available. By excluding one pumping unit (for planning purposes, the largest capacity unit is typically used) the reliable capacity is then determined. Therefore, reliable capacity is defined as the total available delivery rate with the largest pumping unit out of service. For evaluating a municipal water system, the reliable supply capacity should at least equal maximum day pumpage requirements, assuming adequate storage is available. If this criterion is met, supply facilities will have adequate capacity to replenish storage during off-peak hours, while depletion of available storage occurs during peak demand hours.

For the Village of Pewaukee Water Utility, reliable pumping capacity needs to be evaluated for the following two specific requirements:

1. Supply capacity
2. System (Booster Pumping) capacity

Reliable water supply capacity is the capacity of the existing supply sources (well facilities and service pumps) to reliably supply maximum day demands from the aquifer to the water system. System capacity is the capacity of the existing water system to reliably deliver water to all parts of the service area and is usually associated with systems that operate with multiple pressure zones. Table V-1 summarizes the well pump and booster pump capacities used for the reliable water supply and system capacity evaluations. The following section discuss reliable water supply and system capacity in further detail for the existing water system.

Table V-1 - Existing Reliable Supply Capacity

SUPPLY SOURCE	Supply Capacity		Service Pump Capacity		Water To Distribution Capacity		Hawthorne Hill Booster Pump Capacity	
	(gpm)	(MGD)	(gpm)	(MGD)	(gpm)	(MGD)	(gpm)	(MGD)
Wells								
Well No. 2 ¹	600	0.86			300	0.43		
Well No. 3	600	0.86			600	0.86		
Well No. 4 ²	750	1.08			435	0.63		
Well No. 5	500	0.72			500	0.72		
Well No. 6 ³	700	1.01			500	0.72		
Booster Pumps								
Well No. 2 Booster			700	1.01	700	0.43		
Well No. 3 Booster Pump No. 1			500	0.72	500	0.72		
Well No. 3 Booster Pump No. 2			500	0.72	500	0.72		
Hawthorne Hill Booster Pump No. 1							50	0.07
Hawthorne Hill Booster Pump No. 2							210	0.30
Hawthorne Hill Booster Pump No. 3							750	1.08
Total Pumping Supply Capacity ⁴	2,650	3.82	1,700	2.45	2,110	3.04	1010	1.45
Less: Largest Supply Unit ⁵	1,450	2.09	700	1.01	935	1.35	750	1.08
Reliable Supply	1,200	1.73	1,000	1.44	1,175	1.69	260	0.37
Note								
1. Well No. 2 pump capacity rated at 600 gpm. Actual pumping capacity reduced to 300 gpm due to well characteristics.								
2. Well No. 4 pump rated for 750 gpm. Well No. 4 water blends with water from Well 6 at a rate of 10 to 20 percent less than the output of Well 6								
3. Well No. 6 pump rated at 700 gpm. Actual pumping capacity is reduced to 500 gpm.								
4. For Pumping Capacity - Assumes capacity of Well 2 is reduced to 6 hours of operation per day due to inhibition.								
5. For Supply Capacity - Assumes Well No. 6 is out of service. Well No. 6 is required for blending to meet MCL for Radionuclides. Well No. 4 will need to be out of service if Well No. 6 is out of service								

1. Existing Reliable Supply Capacity

Based on the reliable water supply capacities of the existing wells (summarized in Table IV-1), reliable supply capacity evaluations were performed on the existing water system. As mentioned in Chapter II, supply sources are located only in the Main Pressure Zone. The Hawthorne Boosted Pressure Zone relies upon booster pumping capacity to transfer water from the Main Pressure Zone. The Main Pressure Zone must therefore have adequate reliable water supply capacity to meet the needs of not only the Main Pressure Zone, but also the Boosted Pressure Zone as well.

The reliable supply capacity evaluation for the current design maximum day is summarized in Table V-2. The table summarizes the maximum day demand requirement and the available reliable water supply capacity for the entire system. As shown in Table V-2, the total reliable supply capacity from the existing wells and service pumps is currently adequate to meet maximum day demands.

2. Existing Reliable System Capacity

As stated above, to meet the demand requirements of the Hawthorne Boosted Pressure Zone, it is necessary to transfer water from the Main Pressure Zone or add additional supply sources to those pressure zones. To ensure that there is adequate capacity to transfer water between pressure zones, a system capacity analysis was conducted that looks at meeting the needs of each individual pressure zone.

a. Main Pressure Zone

As mentioned above, with all of the supply sources being located in the Main Pressure Zone there is currently adequate reliable supply capacity to meet the needs of the Main pressures zone and Hawthorne pressure zone.

Table V-2 - Existing Recommended Reliable Supply Capacity

SUPPLY REQUIREMENTS

Design Average Day Demand (gpm)
 Design Maximum Day Demand (gpm)
 Design Peak Hour Demand (gpm)

Present Reliable Supply Capacity (gpm)¹

Reliable Supply Capacity Excess or (Deficiency) (gpm)

Water System	
<u>2021</u>	
Design Average Day Demand (gpm)	576
Design Maximum Day Demand (gpm)	1,146
Design Peak Hour Demand (gpm)	1,834
Present Reliable Supply Capacity (gpm) ¹	1,175
Reliable Supply Capacity Excess or (Deficiency) (gpm)	29

Notes
1. Reliable Supply Capacity is Water Distribution Capacity from Table V-1

b. Boosted Pressure Zone

The Hawthorne Boosted Pressure Zone has no supply sources and relies upon the transfer of water from the Main Pressure Zone via booster pumps located at the Hawthorne Booster Pump Station. The existing reliable booster pumping capacity is summarized in Table V-1. The total amount of recommended reliable pumping capacity is determined in the same way as the reliable supply capacity described above.

The reliable booster pumping capacity for the Hawthorne Boosted Pressure Zone is based on the number of homes in the service area and the requirements established in NR 811.29 when no storage is provided. The pumping equipment must be sized to provide the peak hour flow. The reliable supply capacity of 260 gpm is suitable for approximately 70 homes in accordance with Figure 1 in the Appendix of NR 811. There are approximately 49 existing homes in the boosted zone. The pumping station has adequate reliable capacity to meet the current needs of the pressure zone.

3. Supply Reliability

For any water utility to serve its customers and protect the public welfare, water system facilities, equipment, and distribution systems must be reliable under all operating conditions. Reliability of utility services comprises a large part of the investment in plant and equipment.

The Wisconsin Administrative Code (WAC), Section NR 811.27, requires utilities to maintain, at a minimum, sufficient supply capacity to meet an average day demand with the use of auxiliary power sources. To meet this requirement pumping stations may be served by a power supply from at least two independent electrical substations or from a standby, auxiliary power source dedicated to water supply use. As a general rule, the Village of Pewaukee Water Utility should be able to reliably supply average day customer demands and maintain adequate fire protection using auxiliary power sources. Assuming adequate elevated water storage to provide fire protection, the Village of Pewaukee Water Utility must then only maintain adequate reliable supply to meet average day demands while using auxiliary power sources.

Currently the Village of Pewaukee Water Utility has standby power available at Well 5 and Well 6. With these facilities equipped with dedicated standby power sources, the system has sufficient auxiliary power to meet current average day pumpage requirements in the event of an emergency or other power interruption.

The Hawthorn Booster Station is provided with a single electrical service. A portable generator connection and manual transfer switch should be provided to ensure adequate service can be provided in the event of a power interruption.

B. Water Storage Analysis

1. Water Storage Needs

In addition to providing water for fire protection, system storage is used as a “cushion” to equalize fluctuations in customer demands, establish and maintain water system pressures, provide operational flexibility for water supply facilities, and improve water supply reliability. The primary criteria used in this study for evaluating storage volume

needs include average and peak hour demands, water supply capacities, and fire protection needs.

In general, storage facilities should be adequately sized to provide sufficient quantities of water for fire protection on days of maximum customer demands. Although storage requirements for fire protection are not anticipated to change over the planning period of this study, peak hour demands and reliable supply capacities will change as the community grows and improvements are implemented.

Figure V-1 illustrates general components of system storage. As customer demands exceed supply capacities during peak hour conditions, the excess demands must be met by depleting available storage. The amount of storage depleted is referred to as equalizing storage for peak hour requirements.

Storage should also be available for fire protection purposes. To assure a reliable supply for fire protection, this portion of storage should be reserved for emergency use only and should not be utilized to meet peak hour or operational requirements. Based upon the existing and anticipated future land uses within each pressure zone it is assumed that the maximum fire flow requirement for the Village Main Pressure Zone is 3,500 gpm for a duration of 3 hours, or the equivalent of 630,000 gallons and 750 gpm for a duration of 2 hours, or the equivalent of 90,000 gallons, for the Hawthorne Boosted Pressure Zone.

In most instances, it is desirable to provide additional storage for the purposes of operational needs. Operational storage allows for the control of pumps prior to the depletion of needed peak hour equalizing storage. Operational storage may be needed as a safety factor in emergencies or where customer demands are unpredictable and fluctuate widely. Operational storage may also be desired to take advantage of off-peak electrical rates for pumping. An additional storage volume of 30% of the equalizing storage volume is included for an operational cushion.

2. Effective Storage Volumes

The effective storage volume of a water storage facility is the amount of available water that can be utilized while meeting regulatory requirements for system pressure. The Wisconsin Department of Natural Resources (WDNR) requires that water system

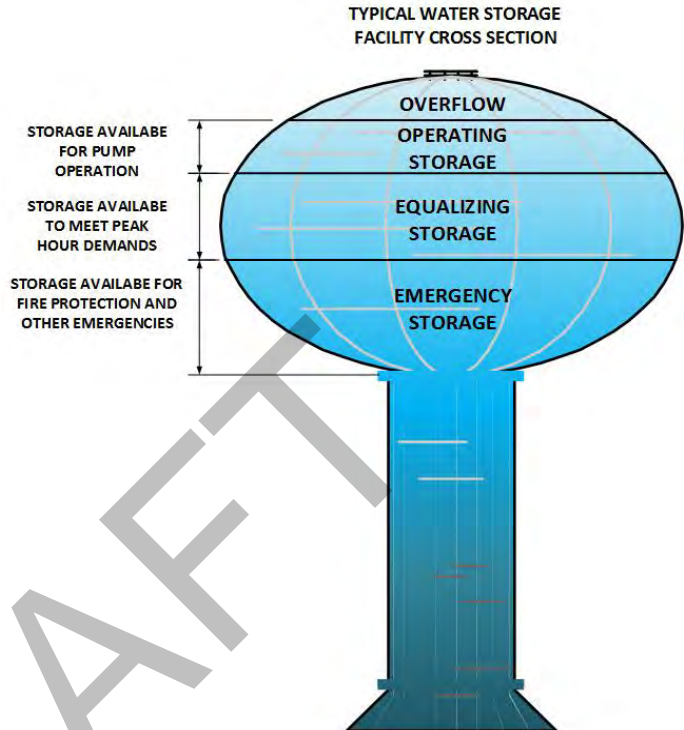


Figure V-1 Components of Distribution Storage

pressures under normal operating conditions are above 35 psi and under emergency conditions, such as during a fire, system pressures must be maintained at a minimum pressure of 20 psi. To meet these requirements the water surface in the storage facility must be approximately 81 feet above the highest elevation area in the service area to maintain 35 psi and at least 46 feet to maintain 20 psi. These water column heights are based upon static conditions (assuming no head losses due to friction) so actual water column heights would be higher as friction losses are included. Based upon this evaluation, the effective volume of each existing storage facility is summarized in Table V-3. As can be seen in the table, 1.011 million gallons of the Utility's 1.45 million gallons total storage is effective. However, approximately 0.941 million gallons is ineffective for meeting peak hour equalizing requirements and can only be utilized to meet emergency (fire protection) needs.

3. Recommended Existing Water Storage Volumes

The following relationships between supply capacities and storage volumes are the primary criteria used to determine optimum storage volumes:

1. Reliable supply capacity should at least equal projected maximum day supply requirements.
2. Total available storage should be capable of meeting demands in excess of the maximum day demand as well as fire protection needs, assuming reliable supply capacity is adequate to meet maximum day requirements.
3. Based upon the above criteria, Table V-4 summarizes the existing supply and storage requirements for the Village of Pewaukee Water Utility. The table includes calculations for the water system as a whole. Storage for the Hawthorne Boosted Pressure Zone is provided by the Main pressure zone. Since the supply and storage for the Hawthorne Booster Zone is supplied by the Main pressure zone, a global review of available supply and storage capacity provides an adequate evaluation of available and recommended supply and storage capacities.

Table V-3 - Effective Storage Volumes

	.20 MG Spheroid	.25 MG Tower	1.0 MG Standpipe
Pressure Zone	Main	Main	Main
Design Volume (gallons)	200,000	250,000	1,000,000
Diameter (feet)	Varies	Varies	51.0
Head Range (feet)	30.0	32.50	68.00
Storage Volume per foot (gallons)	Varies	Varies	15,280
Overflow elevation (feet USGS)	1,055.0	1,055.0	1,055.0
Approximate Highest Elevation Served in Pressure Zone (feet USGS)	972	972	972
Approximate Hydraulic Grade Elevation needed to provide minimum 35 psi to all areas	1,053	1,053	1,053
Maximum Effective Peak Hour Storage Volume (gallons) ¹	12,704	26,187	31,000
Approximate Hydraulic Grade Elevation needed to provide minimum 20 psi to all areas	1,018	1,018	1,018
Additional Effective Fire Protection and Emergency Storage Volume (gallons) ²	187,296	223,813	530,000
Total Effective Storage Volume (gallons)	200,000	250,000	561,000

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 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 20psi (under static conditions.) Volumes derived from storage tank gauging tables.

Table V-4 - Existing Supply and Storage Requirements

	Water System 2021
<u>SUPPLY REQUIREMENTS</u>	
Design Average Day Demand (gpm)	576
Design Maximum Day Demand (gpm)	1,146
Design Peak Hour Demand (gpm)	1,845
Present Reliable Supply Capacity (gpm) ¹	1,175
Reliable Supply Capacity Excess or (Deficiency) (gpm)	29
<u>STORAGE REQUIREMENTS</u>	
Peak Hour Equalizing Need (gallons) ²	163,000
Optimum Fire Protection Needs (gallons) ³	630,000
Reserve Storage (gallons; 15% of Total) ⁴	140,000
Total Optimum Recommended Storage (gallons)	933,000
Available Effective Storage Capacity (gallons):	
Tower (26,187 gallons peak hour, 223,813 gallons fire flow)	250,000
Tower (12,704 gallons peak hour, 187,296 gallons fire flow)	200,000
Standpipe (31,000 gallons peak hour, 530,000 gallons fire flow)	561,000
Total Effective Storage Capacity (gallons)⁵	1,011,000
Additional Recommended Storage Capacity (gallons)	None
Existing Excess Available Storage Capacity (gallons)	78,000

Notes
1. Reliable Supply Capacity is Water Distribution Capacity from Table V-1
2. Peak hour storage is storage utilized to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes.
4. Reserve storage is storage utilized to provide a start/stop range for pump operation and an emergency. reserve storage supply.
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage to maintain regulatory system pressures.

The existing optimum water storage requirement for the Village is 0.933 MG. The existing storage facilities provide 1.011 MG of available storage. However, the existing storage available for peak hour equalizing and reserve storage (0.069 MG) is less than the peak hour equalizing and reserve storage requirements (0.303 MG).

a. Alternative Supply and Storage Evaluation

As the total water requirements are a balance between both supply capacity and storage volumes, it is possible to utilize available supply (and storage) sources to reduce recommended individual pressure zone storage volumes. When excess reliable supply capacity exists and/or the hydraulic capabilities of the water system allow the transfer of water from one pressure zone to another it is possible to reduce storage requirements for individual pressure zones. Table V-5 summarizes the storage requirements when the following additional criteria are considered.

- 1) Where reliable pumping capacity exceeds maximum day demands, the excess reliable pumping capacity may offset total storage requirements in the following ways:
 - a. Peak Hour Equalization Storage: The reliable pumping capacity in excess of the maximum day demand requirement may be utilized to offset peak hour equalizing storage.
 - b. Fire Protection Storage: Excess reliable pumping capacity which exceeds the peak hour demand requirement may offset the required fire protection storage need for the duration of the maximum fire flow requirement for the pressure zone.

The excess supply capacity results in an offset of 30,000 gallons for peak hour storage, and utilizing additional storage from the ground reservoir at Well 3, and additional offset of 24,000 gallons for peak hour storage. However, the existing storage available and excess capacity and repumping capacity for peak hour equalizing and reserve storage (0.123 MG) is less than the peak hour equalizing and reserve storage requirements (0.303 MG).

Table V-5 - Alternative Existing Supply and Storage Requirements

	Water System 2021
<u>SUPPLY RECOMMENDATIONS</u>	
Design Average Day Demand (gpm)	576
Design Maximum Day Demand (gpm)	1,146
Design Peak Hour Demand (gpm)	1,845
Present Reliable Supply Capacity (gpm) ¹	1,175
Reliable Supply Capacity Excess or (Deficiency) (gpm)	29
<u>STORAGE RECOMMENDATIONS</u>	
Peak Hour Equalizing Need (gallons) ²	163,000
Optimum Fire Protection Needs (gallons) ³	630,000
Reserve Storage (gallons; 15% of Total) ⁴	<u>140,000</u>
Total Optimum Recommended Storage (gallons)	933,000
Available Effective Storage Capacity (gallons):	
Tower (26,187 gallons peak hour, 223,813 gallons fire flow)	250,000
Tower (12,704 gallons peak hour, 187,296 gallons fire flow)	200,000
Standpipe (31,000 gallons peak hour, 530,000 gallons fire flow)	561,000
Total Effective Storage Capacity (gallons)⁵	1,011,000
	None
Less Excess Available Reliable System Supply Capacity for Peak Hour ⁶	30,000
Repump Capacity from reservoir at Well 3 ⁷	24,000
Total Additional Capacity Recommended (gallons)	None

Notes
1. Reliable Supply Capacity is Water Distribution Capacity from Table V-1
2. Peak hour storage is storage utilized to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes.
4. Reserve storage is storage utilized to provide a start/stop range for pump operation and an emergency reserve storage supply
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage to maintain regulatory system pressures.
6. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
7. Additional capacity of 400 gpm for 60 minutes

C. Supply and Storage

The following sections evaluate the supply and storage requirements for each pressure zone. Tables V-4, along with Tables V-6, V-7 and V-8, summarize the existing and projected optimum supply and storage needs for the water system.

1. Main Pressure Zone

Currently all the supply wells are located within the Main Pressure Zone. The supply system is adequate to meet the existing design maximum day demand. The total volume of storage provided is adequate for the aggregate of peak hour equalizing, fire protection, and reserve storage for existing conditions. However, the high service elevations in the Main Pressure Zone along Tower Road result in a deficiency in available equalizing and reserve storage to provide normal service pressure.

For the projected planning year 2030, the existing reliable supply capacity is slightly deficient for the projected maximum day demand. The total volume of existing storage is adequate for the total aggregate of peak hour equalizing, fire protection, and reserve storage. The amount of existing equalizing and reserve storage is deficient to meet the projected conditions in 2035, and 2040. The deficiency in supply capacity results in an increase in equalizing storage and reserve storage needed for the projected conditions.

For the projected planning year 2035 and 2040, the existing reliable supply capacity is deficient for the projected maximum day demand. The total volume of existing storage is deficient by 0.05 MG in 2035 and 0.229 MG in 2040. The amount of existing equalizing and reserve storage is deficient to meet the projected conditions in 2035 and 2040. The deficiency in supply capacity results in an increase in equalizing storage and reserve storage needed for the projected conditions.

Table V-6 - 2030 Supply and Storage Requirements

	Water System 2030
<u>SUPPLY RECOMMENDATIONS</u>	
Design Average Day Demand (gpm)	609
Design Maximum Day Demand (gpm)	1,212
Design Peak Hour Demand (gpm)	1,939
Present Reliable Supply Capacity (gpm) ¹	1,175
Reliable Supply Capacity Excess or (Deficiency) (gpm)	(37)
<u>STORAGE RECOMMENDATIONS</u>	
Peak Hour Equalizing Need (gallons) ²	212,000
Optimum Fire Protection Needs (gallons) ³	630,000
Reserve Storage (gallons; 15% of Total) ⁴	<u>149,000</u>
Total Optimum Recommended Storage (gallons)	991,000
Available Effective Storage Capacity (gallons):	
Tower (26,187 gallons peak hour, 223,813 gallons fire flow)	250,000
Tower (12,704 gallons peak hour, 187,296 gallons fire flow)	200,000
Standpipe (31,000 gallons peak hour, 530,000 gallons fire flow)	561,000
Total Effective Storage Capacity (gallons)⁵	1,011,000
Subtotal Capacity Recommended (gallons)	None
Less Excess Available Reliable System Supply Capacity for Peak Hour ⁶	None
Repump Capacity from reservoir at Well 3 ⁷	24,000
Total Additional Capacity Recommended (gallons)	None

Notes
1. Reliable Supply Capacity is Water Distribution Capacity from Table V-1
2. Peak hour storage is storage utilized to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is less than the maximum day rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes.
4. Reserve storage is storage utilized to provide a start/stop range for pump operation and an emergency reserve storage supply
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage to maintain regulatory system pressures.
6. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
7. Additional capacity of 400 gpm for 60 minutes

Table V-7 - 2035 Supply and Storage Requirements

<u>SUPPLY RECOMMENDATIONS</u>	
Design Average Day Demand (gpm)	640
Design Maximum Day Demand (gpm)	1,274
Design Peak Hour Demand (gpm)	2,038
Present Reliable Supply Capacity (gpm) ¹	1,175
Reliable Supply Capacity Excess or (Deficiency) (gpm)	(99)

<u>STORAGE RECOMMENDATIONS</u>	
Peak Hour Equalizing Need (gallons) ²	290,000
Optimum Fire Protection Needs (gallons) ³	630,000
Reserve Storage (gallons; 15% of Total) ⁴	163,000
Total Optimum Recommended Storage (gallons)	1,083,000
Available Effective Storage Capacity (gallons):	
Tower (26,187 gallons peak hour, 223,813 gallons fire flow)	250,000
Tower (12,704 gallons peak hour, 187,296 gallons fire flow)	200,000
Standpipe (31,000 gallons peak hour, 530,000 gallons fire flow)	561,000
Total Effective Storage Capacity (gallons)⁵	1,011,000
Subtotal Capacity Recommended (gallons)	72,000
Less Excess Available Reliable System Supply Capacity for Peak Hour ⁶	None
Repump Capacity from reservoir at Well 3 ⁷	24,000
Total Additional Capacity Recommended (gallons)	48,000

Notes
1. Reliable Supply Capacity is Water Distribution Capacity from Table V-1
2. Peak hour storage is storage utilized to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is less than the maximum day rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes.
4. Reserve storage is storage utilized to provide a start/stop range for pump operation and an emergency reserve storage supply
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage to maintain regulatory system pressures.
6. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
7. Additional capacity of 400 gpm for 60 minutes

Table V-8 - 2040 Supply and Storage Requirements

	Water System 2040
<u>SUPPLY RECOMMENDATIONS</u>	
Design Average Day Demand (gpm)	701
Design Maximum Day Demand (gpm)	1,395
Design Peak Hour Demand (gpm)	2,232
Present Reliable Supply Capacity (gpm) ¹	1,175
Reliable Supply Capacity Excess or (Deficiency) (gpm)	(220)
<u>STORAGE RECOMMENDATIONS</u>	
Peak Hour Equalizing Need (gallons) ²	444,000
Optimum Fire Protection Needs (gallons) ³	630,000
Reserve Storage (gallons; 15% of Total) ⁴	190,000
Total Optimum Recommended Storage (gallons)	1,264,000
Available Effective Storage Capacity (gallons):	
Tower (26,187 gallons peak hour, 223,813 gallons fire flow)	250,000
Tower (12,704 gallons peak hour, 187,296 gallons fire flow)	200,000
Standpipe (31,000 gallons peak hour, 530,000 gallons fire flow)	561,000
Total Effective Storage Capacity (gallons)⁵	1,011,000
Subtotal Capacity Recommended (gallons)	253,000
Less Excess Available Reliable System Supply Capacity for Peak Hour ⁶	None
Repump Capacity from reservoir at Well 3 ⁷	24,000
Total Additional Capacity Recommended (gallons)	229,000

Notes
1. Reliable Supply Capacity is Water Distribution Capacity from Table V-1
2. Peak hour storage is storage utilized to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is less than the maximum day rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes.
4. Reserve storage is storage utilized to provide a start/stop range for pump operation and an emergency reserve storage supply
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage to maintain regulatory system pressures.
6. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
7. Additional capacity of 400 gpm for 60 minutes

2. Hawthorne Boosted Pressure Zone

With a total reliable pumping capacity of 260 gpm, the Hawthorne Boosted Pressure Zone has adequate reliable pumping capacity to meet the existing and projected requirements of the existing boosted pressure zone through the planning period.

The reliable capacity of the booster pump station is designed to accommodate peak demands with no storage in the boosted pressure zone. Storage for the Hawthorne Boosted Pressure Zone is provided by the Main Pressure Zone.

3. Future Boosted Pressure Zone

The Future Boosted Pressure Zone presents a unique situation. Service outside the limits of the Village of Pewaukee has not been requested at this time. However, it is likely that a separate booster station will be needed to provide service to the future boosted pressure zone within the potential Village service area in the City of Pewaukee. This future booster station would need to accommodate the number of residential properties following the requirements of NR 811 and considering the future planned public customer. It is anticipated that storage would be provided by the Main Service Zone

D. Summary

This section summarizes the findings from the supply and storage evaluation of the Village of Pewaukee Water Utility water system. Major findings from this evaluation include the following:

1. The existing reliable supply capacity is adequate to meet current requirements when looked at aggregately for the entire water system.
2. Supply capacity is deficient for projected water pumpage volumes for planning years 2030, 2035 and 2040.
3. Of the total 1.011 MG of elevated water storage, only 0.069 MG is effective for meeting peak hour equalizing and reserve storage requirements based upon meeting minimum pressure requirements to current service area elevations.
4. The high elevations in the Main Pressure Zone at the west end of Tower Court and near the Pewaukee High School result in a deficiency in equalizing and reserve storage volume available in the existing storage facilities.
5. The existing available equalizing and reserve storage is deficient for the projected needs in planning years 2030, 2035 and 2040.

VI. WATER SYSTEM DEFICIENCY ANALYSIS

An important component of the Utility's master planning process was the evaluation of the existing water system and performing a deficiency analysis. This chapter summarizes the findings from this evaluation.

A. Existing System Deficiency Analysis

Water systems are analyzed, planned, and designed primarily through the application of basic hydraulic principles. Some important factors that must be considered when performing this analysis include:

1. The location and capacity of supply facilities
2. The location, sizing, and design of storage facilities
3. The location, magnitude, and variability of customer demands
4. Water system geometry and geographic topography
5. Minimum and maximum pressure requirements
6. Land use characteristics with respect to fire protection needs
7. Other operational criteria which define the manner in which the system can most efficiently be operated.

For this study, an evaluation of the Village of Pewaukee water system was performed to determine the adequacy of the system to supply existing and future water needs, and to supply water for fire protection purposes.

The system was evaluated based on the following criteria:

1. Pressure
2. Flow Capacity
3. Water Main Velocities and Headlosses
4. Water Quality
5. Reliability

The water system evaluation was based on compliance with state code requirements (Wisconsin Administrative Code NR 809 and NR 811) and standard water industry engineering practice.

B. Water System Pressures

The Village of Pewaukee water system model was used to evaluate existing water distribution system characteristics and identify deficiencies with respect to pressures and flow capacities. Water system pressure will vary within the service area based on differences in topographic elevations, as well as supply rates and customer demands. In general, as customer demands increase, pressures will decrease. Areas higher in topographic elevation will also tend to exhibit lower water system pressures.

A water distribution system must be designed to provide pressures within a range of minimum and maximum allowable conditions. When system pressure is too low, customers may complain of inadequate water supply, customer meters may tend to record inaccurately, and fire protection will be limited. Pressures that are too high can cause problems with system operation and maintenance, and will tend to cause higher consumption rates by customers. High water system pressures can also increase the amount of water loss, as leakage rates will increase with increases in system pressure.

The Wisconsin Administrative Code requires that municipal water systems be designed with a minimum pressure of 35 psi and a maximum pressure of 100 psi at all locations in the service area under normal operating conditions. Furthermore, water systems are required to be operated so that under fire flow conditions, the residual pressure in the system will not fall below 20 psi at any location. In addition, while system pressure up to 100 psi is allowable, the state plumbing code (SPS 382) requires that pressure reducing valves (PRVs) be installed on service lines where the incoming water pressure is in excess of 80 psi.

Figures VI-1, VI-2, and VI-3 illustrate water system pressure throughout the Village of Pewaukee water system for varying demand conditions. As indicated in the figures, system pressures may vary considerably around the existing service area from approximately 25 psi to approximately 90 psi.

The highest system pressures typically occur in the low topographical elevation areas. These high pressures are the result of a varying topography and occur most prominently during low demand period (average day compared to maximum day or peak hour).

Lower system pressures, as seen in the figures, are anticipated in only isolated areas within the water system. These low pressures can be attributed primarily to high elevations.

C. Fire Flow Capacities

Water system planning for fire protection is an important consideration. In most instances, water main sizes are designed specifically to supply desired fire flows.

Fire protection needs vary with the physical characteristics of each building to be protected. For example, needed fire flows for a specific building can vary from 500 gpm to as high as 12,000 gpm. A building's recommended fire protection need is determined by many factors including habitation classification, separation distance between buildings, building height, materials of construction, size of the building, and the presence or absence of building sprinklers. Although a building may have a high fire protection need, the municipal fire insurance rating is determined based upon a maximum needed fire flow of up to 3,500 gpm.

If a specific building has a need for fire flow greater than this 3,500 gpm, the community's fire insurance rating will only be based on the water system's ability to provide 3,500 gpm.

Figure VI-4 illustrates the assumed fire flow required at existing fire hydrants based on zoning land use presented in Chapter III. Table VI-1 summarizes the assumptions for assigning fire flow requirements in the model.

Table VI-1 - Assumed Fire Flow Requirements by Land Use

Land Use	Fire Flow Requirement
Single and Two Family Residential (R1, R2, R5)	750 gpm
Multi-Family Residential (R6, RM, MH)	1,500 gpm
Institutional (IPS) and Commercial (B2 and B3)	2,500 gpm
Industrial (B5) and Commercial (B1)	3,500 gpm



Figure VI-1

Average Day Demand System Pressure

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

Pressure

- Less than 35 PSI
- 35 - 40 PSI
- 40 - 50 PSI
- 50 - 60 PSI
- 60 - 70 PSI
- 70 - 80 PSI
- Greater than 80 PSI
- PS Booster Station
- P Pump Station
- Tanks
- + Well
- Water Main
- ▭ Civil Division



0 750 1,500 3,000 4,500

Feet



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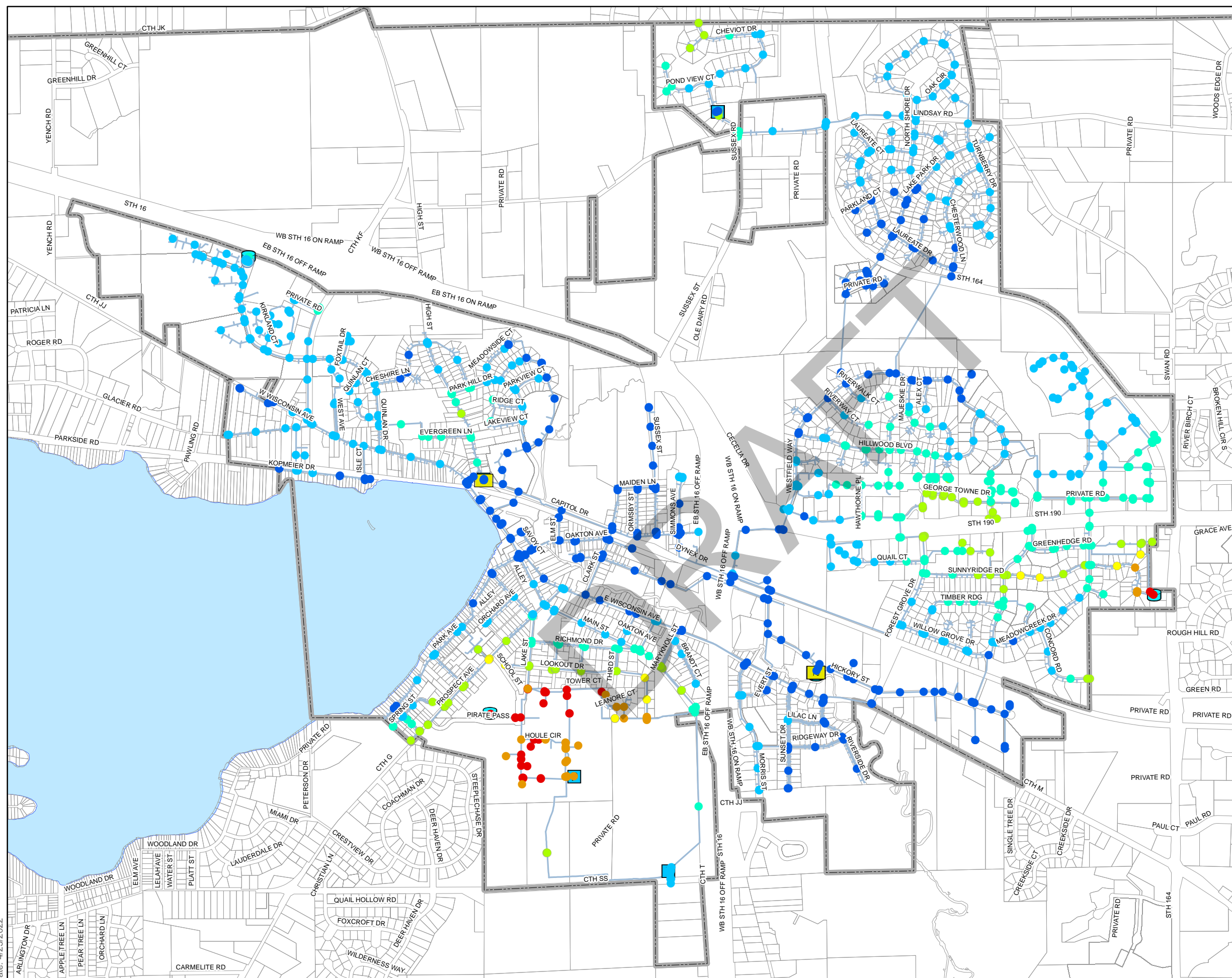




Figure VI-2

Maximum Day Demand System Pressure

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

Pressure

- Less than 35 PSI
- 35 - 40 PSI
- 40 - 50 PSI
- 50 - 60 PSI
- 60 - 70 PSI
- 70 - 80 PSI
- Greater than 80 PSI
- PS Booster Station
- P Pump Station
- Tanks
- + Well
- Water Main
- Civil Division



0 750 1,500 3,000 4,500

Feet

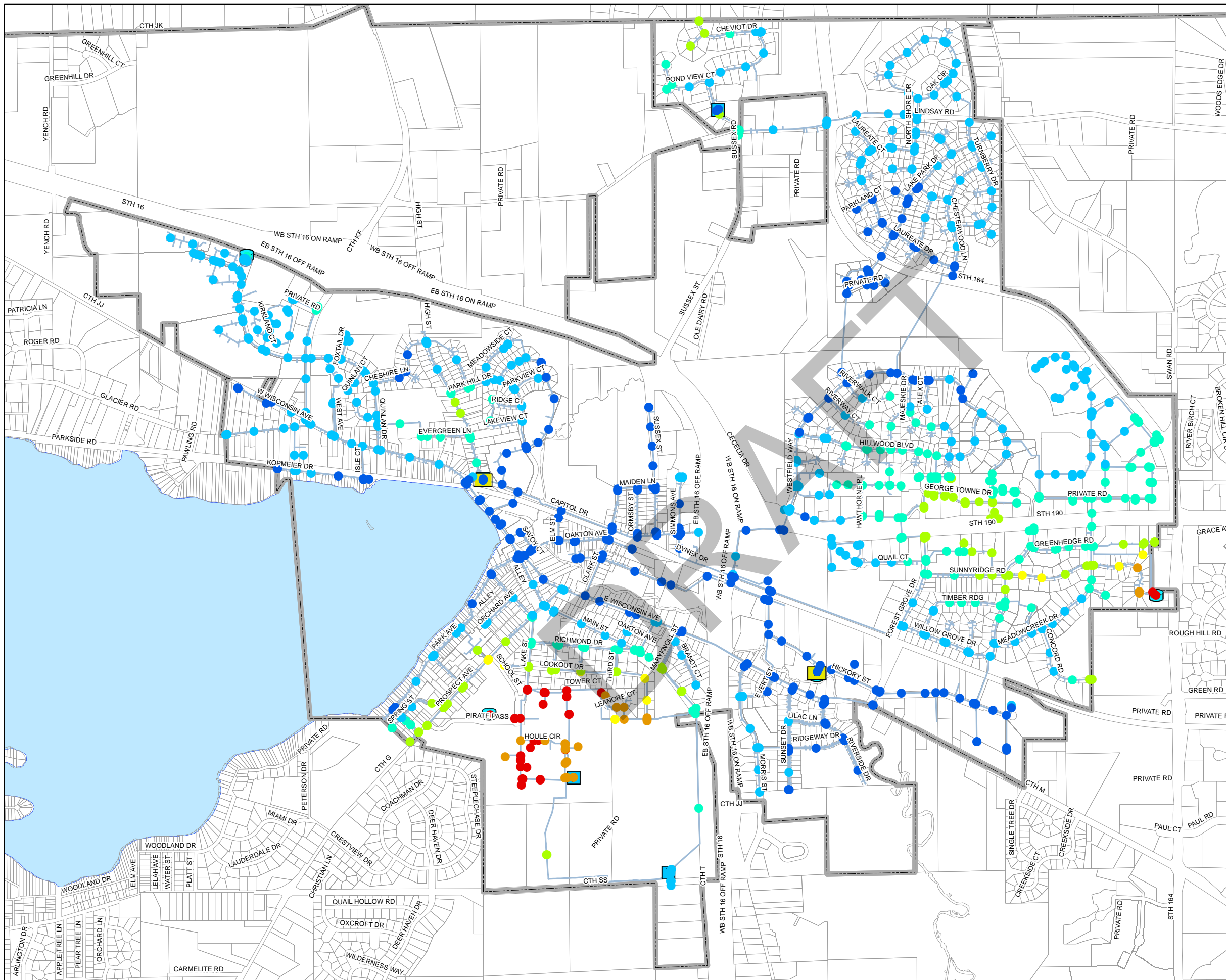




Figure VI-3

Peak Hour Demand System Pressure

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

Pressure

- Less than 35 PSI
- 35 - 40 PSI
- 40 - 50 PSI
- 50 - 60 PSI
- 60 - 70 PSI
- 70 - 80 PSI
- Greater than 80 PSI
- PS Booster Station
- P Pump Station
- Tanks
- + Well
- Water Main
- ▭ Civil Division



0 750 1,500 3,000 4,500

Feet



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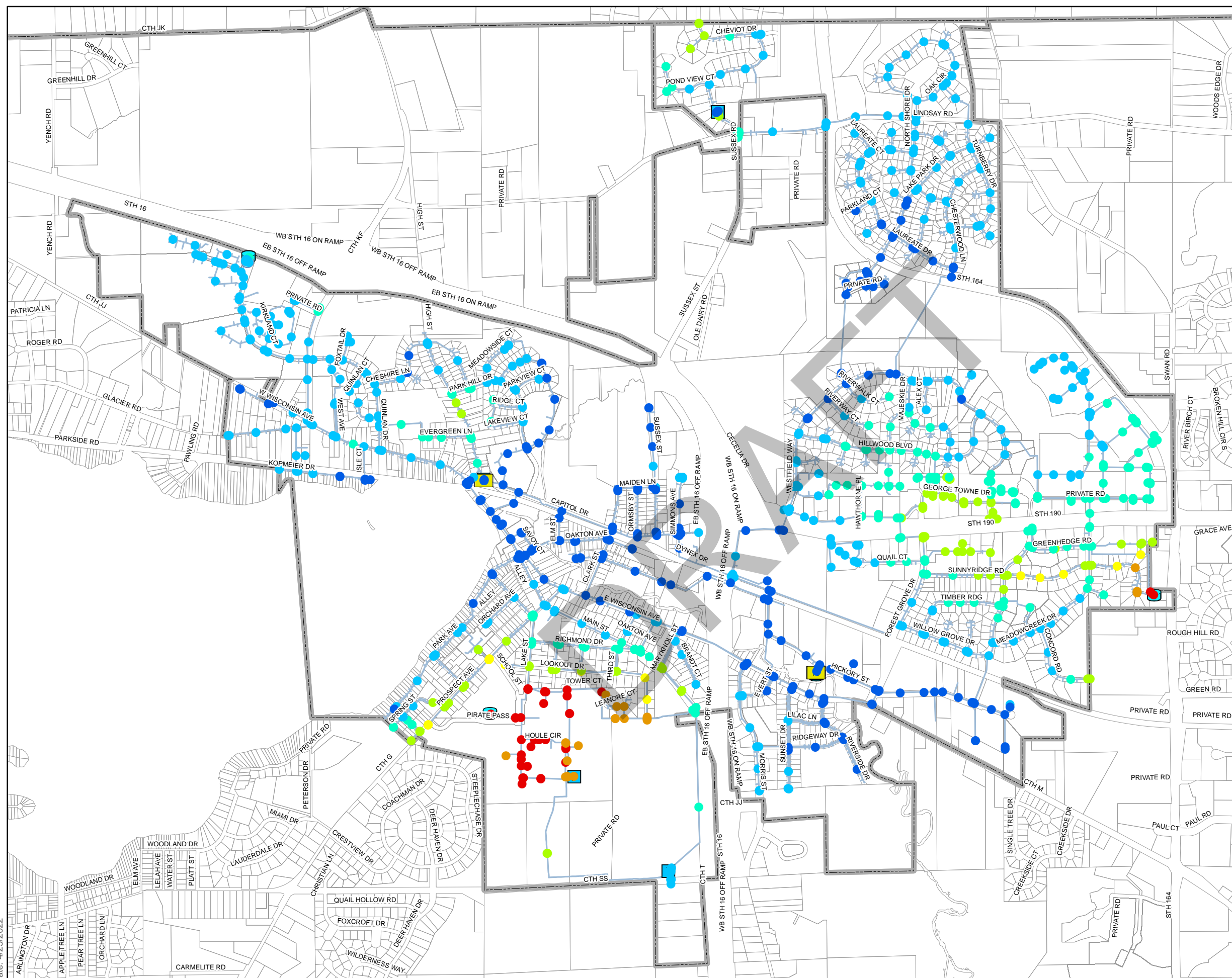




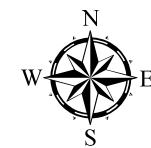
Figure VI-4

Recommended Fire Flow

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

Total Flow Needed

- 500 GPM
- 750 GPM
- 1,500 GPM
- 2,500 GPM
- 3,500 GPM
- PS Booster Station
- P Pump Station
- Tanks
- Well
- Water Main
- ▭ Civil Division



0 750 1,500 3,000 4,500

Feet



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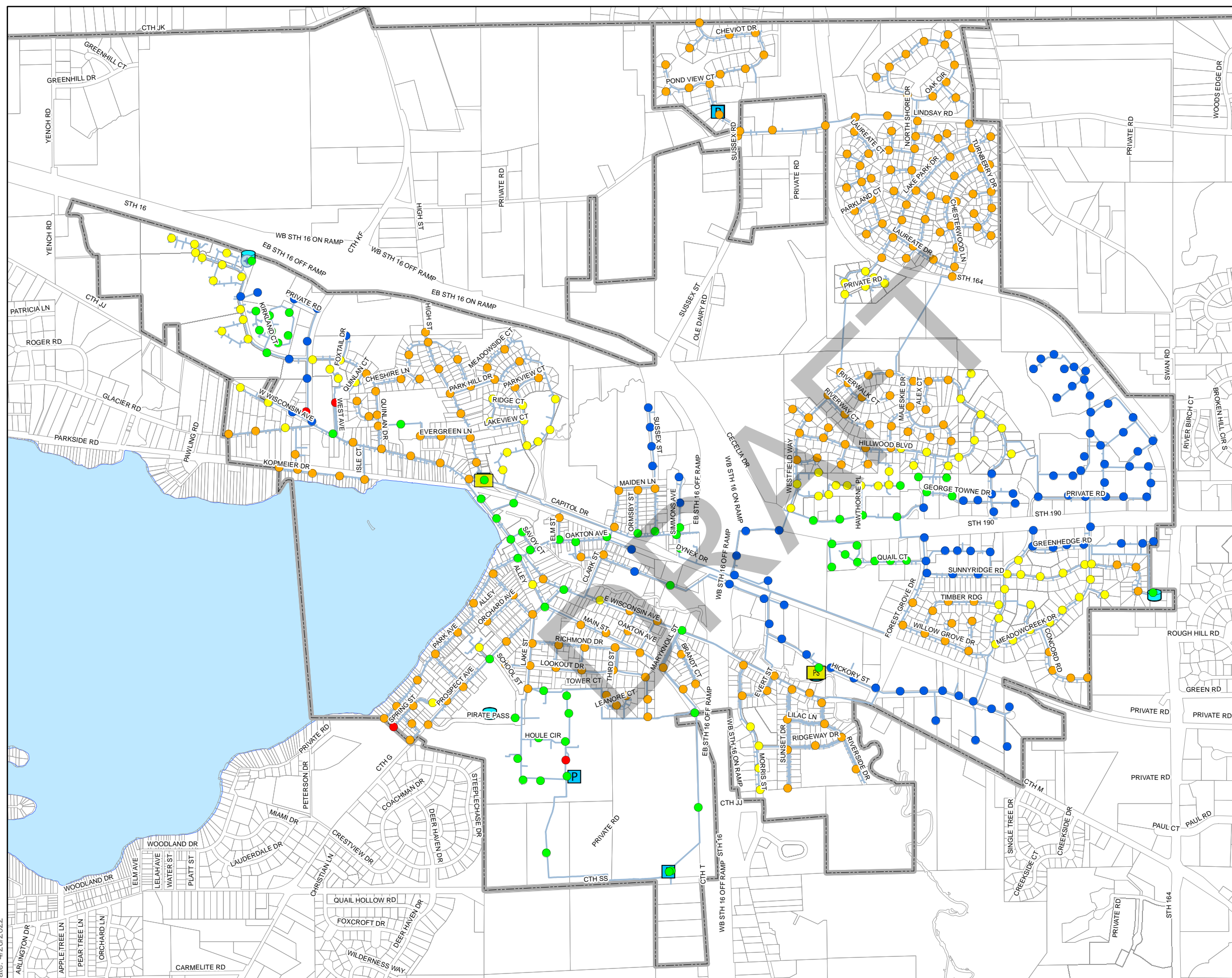


Figure VI-5 illustrates the estimated available fire flow throughout the water system during maximum day water demand while maintaining a residual pressure of 20 psi throughout the system. As can be seen from the figure, available fire flows range considerably throughout the water system from 600 gpm to greater than 3,500 gpm.

Figure VI-6 identifies areas where potential fire flow deficiencies currently exist. Deficiencies were identified where the assumed fire flows identified in Table VI-1 were not met for a particular land use as determined from the available land use data.

As seen in Figure VI-6, deficiencies are found in isolated areas throughout the water system, most prevalently in high fire flow required land use areas such as in commercial and industrial and/or in areas served by older, small diameter water mains and at dead ends.

While this simple analysis provides insight into potential problems with providing adequate fire protection as mentioned above, other factors must also be considered such as a building's use of sprinkler systems, firewalls, fire retardant materials, or other means, which can substantially reduce presumed fire flow requirements. Therefore, a location identified as deficient in needed fire flow may have sufficient fire flow available to meet the specific requirements for structures located near that particular node.

Other deficiencies, as in many water systems, are the result of dead ends, small diameter water mains, and older water mains that tend to exhibit reduced flow capacity. These deficiencies may be corrected with a proactive water main replacement and improvement program.

D. Water Main Velocities and Headlosses

High headlosses are indicative of water mains that are exceeding their flow capacity. During gravity conditions (when well or booster pumps are off), headlosses within a water distribution system result in lower system pressure. During pumped conditions (elevated tank filling), headlosses can contribute to higher operating costs as it takes more power to overcome the energy losses occurring within the water mains. Mathematically, headloss is a function of velocity and high headlosses occur within water mains that exhibit high velocities. However, older water mains may also exhibit high headlosses due to the deterioration of the interior of the pipe even when velocities are within acceptable values.

To increase system pressures and minimize operating cost (pumping energy) it is desirable to minimize both velocity and headloss within the distribution system under normal operating conditions. AWWA Manual M32, Computer Modeling of Water Distribution Systems, Third Edition, includes guidelines for maximum recommended limits of pipe headloss and velocity. AWWA Manual M32 recommends that all pipe velocities should be less than 5 feet per second (fps) during normal operation. Additionally, M32 recommends headlosses in pipes less than 16-inches in diameter should be less than 5 to 7 feet per 1,000 feet of pipe during normal operating conditions. The recommended headloss limit for water main 16-inches in diameter and larger is 2 to 3 feet per 1,000 feet of pipe during normal operating conditions.

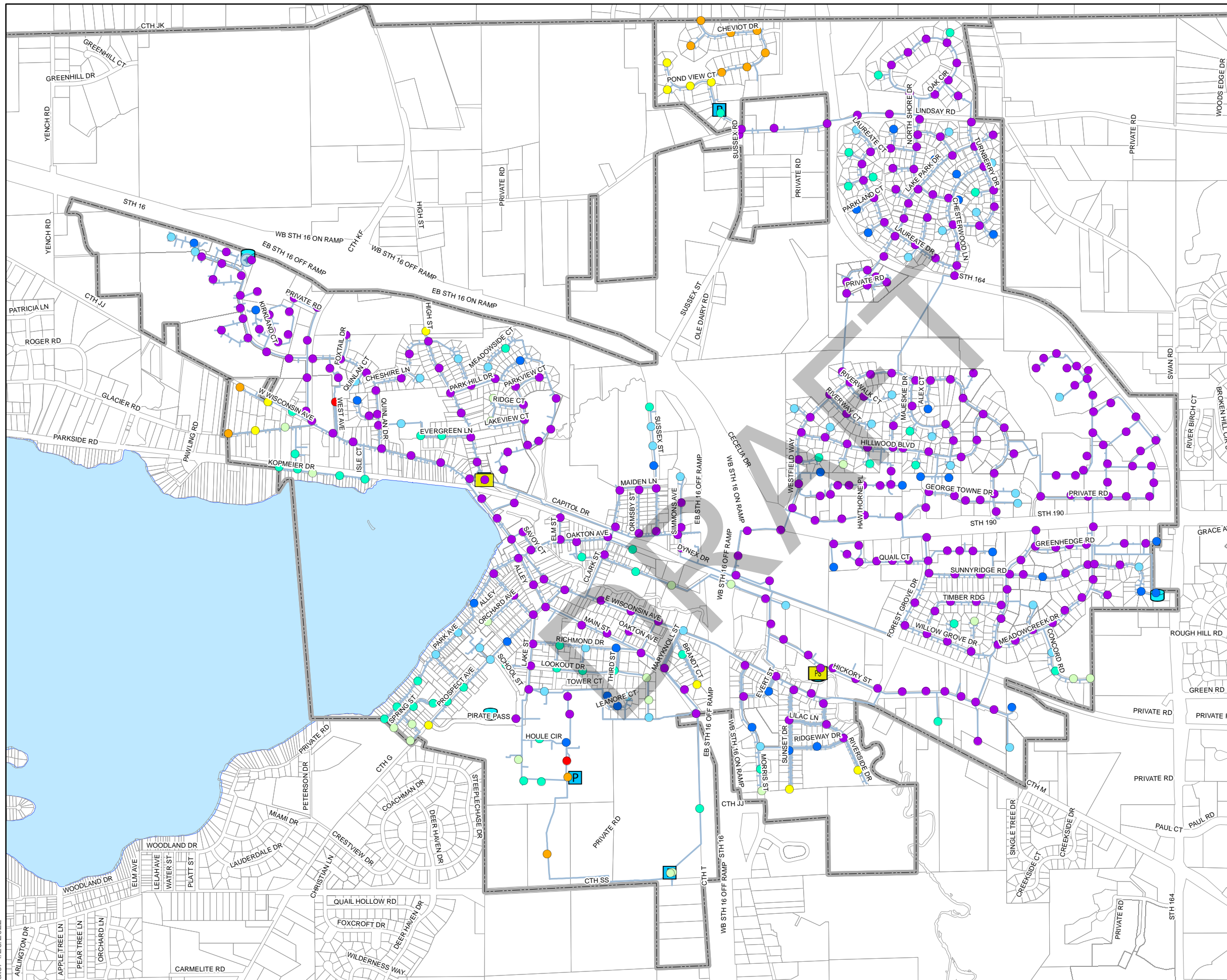
Generally speaking, high velocity/headloss water mains appear to be located in areas with limited loops or in close proximity to pumping and storage facilities where higher rates of flow are common.



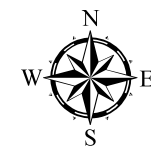
Figure VI-5

Available Fire Flow

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022



- Less than 500 GPM
- 500 GPM - 999 GPM
- 1,000 GPM - 1,500 GPM
- 1,500 GPM - 2,000 GPM
- 2,000 GPM - 2,500 GPM
- 2,500 GPM - 3,000GPM
- 3,000 GPM - 3,500 GPM
- Great than 3,500 GPM
- PS Booster Station
- P Pump Station
- Tanks
- + Well
- Water Main
- Civil Division



0 750 1,500 3,000 4,500



Feet





Figure VI-6

Fire Flow Adequacy

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

- Does not Meet Fire Flow
- Meets Fire Flow
- Booster Station
- Pump Station
- Tanks
- Well
- Water Main
- Civil Division

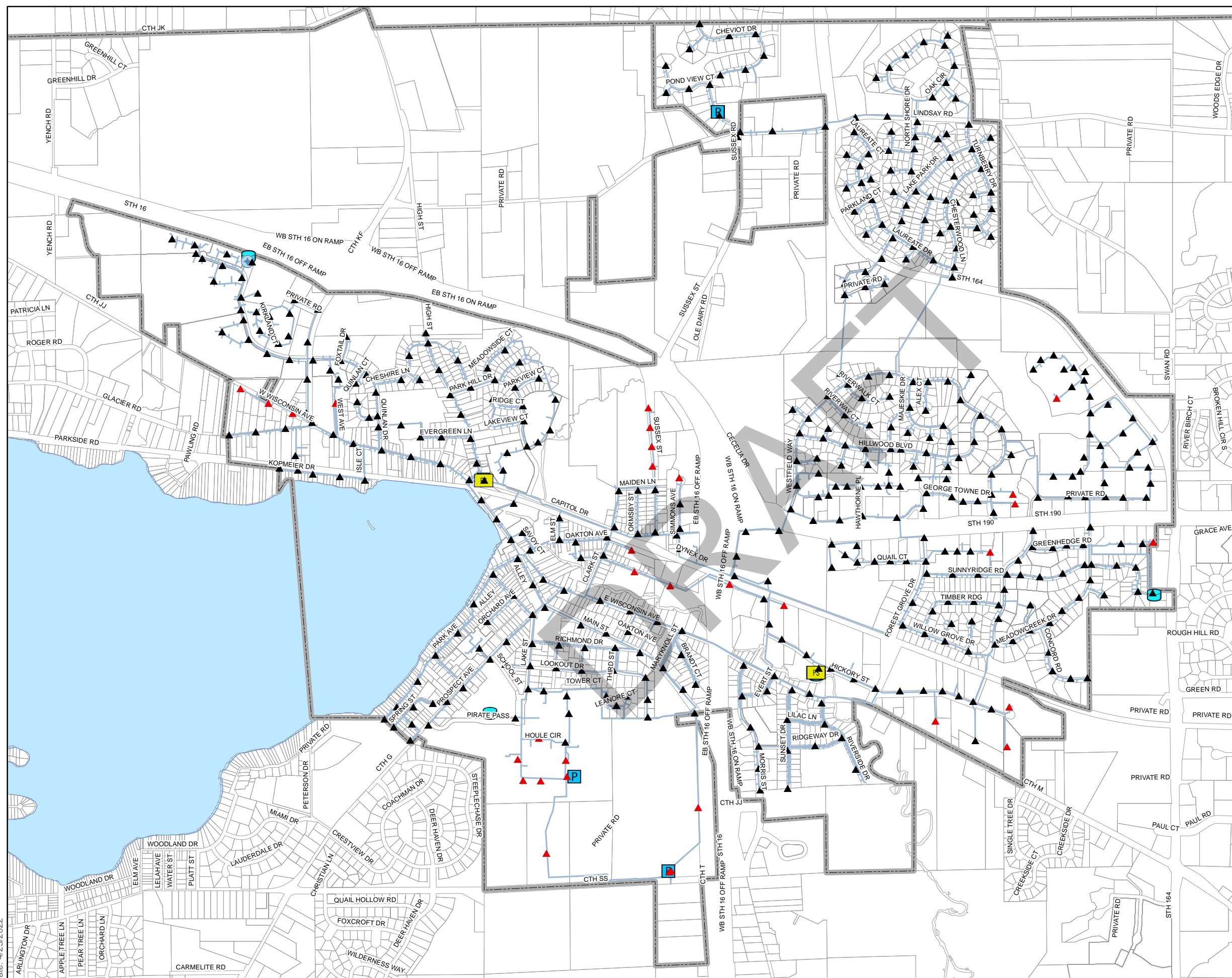


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Pipe flow velocities within the Village of Pewaukee distribution system are typically below 1 fps under average demand conditions. Even during periods of high demand, flow velocities do not exceed 5 fps. No water main exhibits either high velocity or headloss during peak hour demand conditions during model simulations utilizing existing control strategies.

E. Water Quality

Groundwater quality is expressed in terms of its chemical and physical characteristics. The quality of the water determines its suitability for use and the level of treatment required. The chemical characteristics of entry point water samples taken at Well No. 2, Well No. 3, and Well No. 5 and entry point 100 (blend of Wells 4 and 6) are summarized in Table VI-2, Table VI-3, and Table VI-4.

Water quality problems in the Village of Pewaukee are primarily aesthetic and are generally due to high concentrations of iron, dissolved solids, chlorides, and manganese. The groundwater meets the primary (health related) drinking water contaminant standards for inorganics of NR 809 of the Wisconsin Administrative Code.

The water at Well No. 2 has detectable levels of volatile organic compounds, moderate levels of iron, high levels of manganese and current test results indicate high activity for gross alpha particles. Currently, a packer is installed in the well to isolate the aquifer to draw water with lower combined radium activity.

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Table VI-2 - Inorganic Concentrations

Characteristic	Concentration, mg/l				Drinking Water Standard
	Village of Pewaukee				
	Well No. 2	Well No. 3	Well No. 5	Entry Point 100	
Alkalinity, Total	240	240	280	270	--
Aluminum	ND	ND	ND	ND	0.05 to 0.2 ⁽²⁾
Antimony, Total	ND	ND	ND	ND	0.006 ⁽¹⁾
Arsenic	ND	ND	ND	ND	0.010 ⁽¹⁾
Barium	0.066	0.085	0.12	0.088	2.0 ⁽¹⁾
Beryllium, Total	ND	ND	ND	ND	0.004 ⁽¹⁾
Cadmium	ND	ND	ND	ND	0.005 ⁽¹⁾
Calcium	88	72	64	90	--
Chloride	16	4.90	5.3	100	250 ⁽²⁾
Chromium	ND	0	ND	ND	0.1 ⁽¹⁾
Fluoride	0.69	0.71	0.63	0.39	2.0 ⁽²⁾
Hardness	320	280	280	380	--
Iron	0.21	0.12	ND	0.26	0.3 ⁽²⁾
Magnesium	24	23	25	37	--
Manganese, ug/l	49	46	ND	49	50 ⁽²⁾
Mercury	ND	ND	ND	ND	0.002 ⁽¹⁾
Nickel	0.001	0.00061	0.00084	0.0016	0.1 ⁽¹⁾
Nitrate-Nitrite	ND	ND	ND	0.11	10 ⁽¹⁾
Nitrite	ND	ND	ND	ND	1.0 ⁽¹⁾
pH, s.u.	7.69	7.58	7.54	7.31	--
Residue, Total	470	330	290	500	500 ⁽²⁾
Selenium	ND	ND	ND	ND	0.05 ⁽¹⁾
Silver, ug/l	ND	ND	ND	ND	0.100 ⁽²⁾
Sodium	25	12	12	43	--
Thallium, Total	ND	ND	ND	ND	0.002 ⁽¹⁾
Zinc	ND	ND	ND	ND	5.0 ⁽²⁾

Sample Date – February 2017

ND = Not Detected

(1) – Primary Drinking Water Standard

(2) – Secondary Drinking Water Standard

Table VI-3 - Radiological Concentrations

Characteristic	Concentration, pCi/l				
	Village of Pewaukee			Entry Point 100 ³	Drinking Water Standard
	Well No. 2 ¹	Well No. 3 ²	Well No. 5 ³		
Gross Alpha	17.2	6.16--	1.21	4.87	15
Radium-226	2.1	--	--	--	5
Radium – 226 & 228	3.23	3.98	ND	1.26	5

1. Sample Date – 8/10/2021
2. Sample Date- 2/11/2020
3. Sample Date – 2/23/2021

ND = Not Detected

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Table VI-4 - Volatile Organic Concentrations

Characteristic	Concentration, ug/l				Drinking Water Standard
	Village of Pewaukee				
	Well No. 2	Well No. 3	Well No. 5	Entry Point 100	
Benzene	ND	ND	ND	ND	5
Bromodichloromethane	0.9	--	--	--	80
Bromoform	0.94	--	--	--	80
Carbon Tetrachloride	ND	ND	--	--	5
Chloromethane (Methylchloride)	ND	ND	ND	ND	--
Dibromochloromethane	1.6	--	--	--	80
O-Dichlorobenzene	ND	ND	ND	ND	600
P-Dichlorobenzene	ND	ND	ND	ND	75
1,2-Dichloroethane	ND	ND	ND	ND	5
1,1-Dichloroethylene	ND	ND	ND	ND	7
CIS-1,2-Dichloroethylene	ND	ND	ND	ND	70
Trans-1,2-Dichloroethylene	ND	ND	ND	ND	100
Dichloromethane	ND	ND	ND	ND	5
1,2-Dichloropropane	ND	ND	ND	ND	5
Ethylbenzene	ND	ND	ND	ND	700
Monochlorobenzene	ND	ND	ND	ND	100
Styrene	ND	ND	ND	ND	100
Tetrachloroethylene	ND	ND	ND	ND	5
Toluene	ND	ND	ND	ND	1,000
1,2,4-Trichlorobenzene	ND	ND	ND	ND	70
1,1,1-Trichloroethane	ND	ND	ND	ND	200
1,1,2-Trichloroethane	ND	ND	ND	ND	5
Trichloroethylene	ND	ND	ND	ND	5
Vinyl Chloride	ND	ND	ND	ND	0.2
Xylenes, Total	ND	ND	ND	ND	10,000

Sample Date – 4/7/2020

ND = Not Detected

The water at Well No. 3 has moderately high to high level of manganese. The treated water at Well No. 5 meets primary and secondary standards when using a Hydrous Manganese Oxide pressure filtration treatment system located at the well site.

The blended water from Wells 4 and 6 at Entry Point 100 has moderately high to high levels of iron and manganese.

One factor affecting water quality within a water system is the water age. As the water age increases the water quality can deteriorate. The rate at which the water quality deteriorates is dependent on water flow rate, finished water quality, pipe materials, and deposited materials. Water quality problems associated with water age include disinfection by-product formation, disinfectant decay, corrosion control effectiveness, taste and odor, nitrification, microbial regrowth, temperature changes, sediment deposition, and color. The disinfection byproducts

concentrations of water samples taken from the distribution system are summarized in Table VI-5. The concentration of disinfection byproducts are below the maximum contaminant levels and may indicate adequate water age.

Table VI-5 - Disinfection Byproducts Concentrations

Characteristic	Concentration, ug/l	
	Village of Pewaukee	
	Distribution System	Drinking Water Standard
Bromodichloromethane	2.2	80
Bromoform	0.92	80
Chloroform	2.9	80
Dibromoacetic Acid	0.23	
Dibromochloromethane	2	80
Dichloroacetic Acid	0.33	
HAA5	0.93	60
Monobromoacetic Acid	ND	
Monochloroacetic Acid	ND	
Trichloroacetic Acid	0.37	
TTHM	8.02	80

Sample Date – 8/3/2021
 ND = Not Detected

E. System Reliability

Although water distribution systems are generally reliable, an important consideration in the design of a water distribution system is providing continued service to water utility customers even in the event of a water main failure and minimizing water main failures. There are several areas within the existing water distribution system that are not looped and served by only a single water main and are typically dead end streets. In the event of a water main failure customers within these areas would be without service. The majority of the water distribution system is looped. While typically these areas are generally small and isolated there are significant portions of the distribution system that are served by a single main. A significant area that is not looped includes the Hawthorne Boosted Zone. The area west of Ryan Road is served by a single water main; however, Well 5 and the Quinlan tank add reliability to this area in the event of a water main failure.

The Village has experienced several water main breaks in areas with cast iron water mains, or with ductile iron water mains with spoil bedding and backfill. These areas include Parkhill Drive, Quinlan Drive, Glacier Road, and West Wisconsin Avenue. The Village has identified water main replacements in the Village Capital Improvement Plan to address some areas susceptible to breaks

Storage facilities provide water for equalizing storage, fire protection and operational storage. Storage facilities are generally reliable and require routine inspections to assess condition to identify needs for maintenance and repair to ensure reliability. The Village recently had the ground storage reservoirs and elevated storage facilities inspected in dry conditions. Detailed inspection reports were provided by Dixon Engineering and identified deficiencies for each of the storage facilities. A summary of the recommendations and estimated costs improvements to correct the deficiencies identified during the inspections are included in Appendix C.

F. System Staffing

Staffing for a Water Utility includes engineering, operation and maintenance, and metering/billing/administrative personnel. The Village of Pewaukee has a combined utility department that includes the Water Utility and the Sewer Utility. The combined utility department has one full time Supervisor and four full time operators that split their duties between the water and sewer utilities. The Village Engineer dedicates approximately 50 percent of a full-time employee to the combined utility department. The Village Clerk/Treasurer dedicates approximately 30 percent of a full-time employee to the combined utility department. Considering that the combined utility staff split their time with the water and sewer utilities, the Water Utility is staffed with a Full Time Equivalent (FTE) of approximately 2.6 employees.

Each year the AWWA performs a Utility Benchmarking Survey for 58 key performance indicators. One of these indicators evaluated is the MGD of water produced per employee. Based on the 2020 and 2021 average water pumpage data in Table IV-7, the Village of Pewaukee Water Utility produced 0.35 and 0.31 MGD per employee respectively. The AWWA Utility Benchmarking survey for 2020 reported a median value of 0.17 MGD per employee for water utilities. The 75th percentile value was 0.25 MGD per employee and the 25th percentile value was 0.14 MGD per employee. The Village of Pewaukee Water Utility is in the upper quartile of the range surveyed by the AWWA (lower staffing based on typical water utilities). Based on the median value from the AWWA Utility Benchmarking survey for 2020, the FTE water utility employees for 2020 would be 5.4, and the FTE water utility employees for 2021 would be 4.82. Based on the 75th percentile value from the AWWA Utility Benchmarking survey for 2020, the FTE water utility employees for 2020 would be 3.68 and the FTE water utility employees for 2021 would be 3.28. It appears that the Village of Pewaukee Water Utility has a need for at least one additional FTE employee.

G. Summary

This chapter summarizes the findings from evaluation of the Village of Pewaukee Water Utility water distribution system. Major findings from this evaluation include the following:

1. Under normal operating conditions, the system provides pressure above the minimum required 35 psi and below the maximum 100 psi the majority of the service area. Pressures less than 35 psi under normal conditions were identified north of the High School and along Tower Road.
2. There are areas within the system where available fire flows are below recommended flows based upon surrounding land use.
3. There is no identified water main in the Village water system where velocities or head losses exceed industry standards during normal operations including during peak hour demand conditions.
4. The groundwater sources for Well 2 exceeds the maximum contaminant level for Gross Alpha particle activity and Well 4 exceeds the drinking water Maximum Contaminant Level for Combined Radium. The groundwater and treated water from all wells meet the primary

drinking water maximum contaminant levels Inorganic and Volatile Organic substances as identified in Chapter NR 809 of the Wisconsin Administrative Code.

5. Iron and manganese from Well 2 and combined water from Wells 4 and 6 are approaching the concentration of the secondary standard as identified in Chapter NR 809 of the Wisconsin Administrative Code.
6. There are portions of the water system with reduced reliability, being served by only a single water main.
7. The recent inspections of the storage facilities identified deficiencies and recommended maintenance to ensure compliance with code requirements and to ensure continued service.
8. The current staffing for the Water Utility is low in comparison to the median range for typical water utilities. Additional staffing will be needed as the system expands, additional facilities or treatment systems are placed in service, and additional needs for Lead and Copper Rule compliance monitoring becomes effective.

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VII. RECOMMENDATIONS

This chapter presents an evaluation of water system improvements intended to address existing water system deficiencies identified in Chapters V and VI and improve overall water system operation. In addition, this chapter evaluates improvement alternatives necessary to serve future developments. The chapter concludes with recommended water system improvements that will meet the needs and requirements of the Village of Pewaukee Water Utility over the planning period.

This chapter details the evaluation of the following improvements:

- Evaluation of future pressure zones development
- Water supply improvements
- Distribution system improvements
- Distribution system expansion

A. Pressure Zone Development

A critical step in long-range planning for the Village of Pewaukee Water Utility is identifying the future needs of the service area coupled with an assessment of water supply and storage requirements. The topography of the Pewaukee area makes providing water service to some areas difficult; therefore, as development occurs, the Utility will need to decide if and how to provide service to each area.

The existing customers at 326 Lake Street and at 313, 319, 325, 335, 343, 353, and 361 Tower Court are located at ground elevations ranging from 966 feet to 972 feet in the main service zone. The ground elevation of the existing customers results in static pressures less than 35 psi when utilizing the typical control range of the elevated storage tanks. If the Village is to provide water service outside the corporate boundary to serve the potential 2040 service area, an additional pressure zone may need to be created to properly serve areas of higher elevations:

To ensure adequate service can be provided within the 2040 service area, an analysis of possible future pressure zone areas will need to be performed to identify potential issues, deficiencies, or concerns. It is worthwhile to note that the Utility will have to determine how to serve specific growth areas as future development occurs. During planning for future development, the information provided in this section should be reviewed with additional information available at that time to determine the best possible strategy to provide water service. A specific development may be served from one pressure zone initially and later converted to a different pressure zone as the water system continues to develop and grow. Additional considerations regarding pressure zone development are discussed below.

1. Proposed Pressure Zone Modifications

Figure III-3 in Chapter III illustrates the existing pressure zone service area limits. As is often the case, there are areas which can be adequately served from more than one pressure zone. There are also areas which are inadequately or only marginally served from the existing pressure zones within which the area lies. As is illustrated in Figure III-3, the delineation of pressure zones simply based upon topography can isolate local service areas thereby creating undesirable zone boundaries.

Currently the Village of Pewaukee water system consists of a Main Service Zone, and the Hawthorne Boosted Pressure Zone. Water from the Main Service Zone is supplied to the Boosted Pressure Zone.

As shown in Figure III-3, the area north of STH 16 and East of Ryan Road is currently in the City of Pewaukee and is a potential service area of the Village. This area would require service from a boosted pressure zone and will not be evaluated as part of this report since the City of Pewaukee has plans to provide service to this area.

The existing customers at 326 Lake Street and at 313, 319, 325, 335, 343, 353, and 361 Tower Court are located area included in the Main Service Zone. Chapter NR 810.10 of the Wisconsin Administrative Code allows the use of pressure boosting systems on individual services lines, limited to 10 individual system in a service zone. Chapter NR 810.10 requires that the individual booster system be owned and maintained by the public water system owner. The Utility does not desire to own and maintain any facilities within the premises of individual customer. An alternative is to construct a booster station to serve the customers along Tower Court to improve pressure under normal operating conditions.

The water services for customers along Tower Court are connected to the 8-inch diameter and 6-inch diameter water main on Lookout Drive. A small duplex booster station could be constructed in the future right of way at the intersection of First Street and Lookout Drive to provide improved pressures for all customers along Lookout Drive from First Street to approximately 240 feet east of Second street. Check valve vaults would be required to be installed on the 8-inch water main on Lookout Drive near First Street, on the 8-inch water main on Second Street, and on the 6-inch water main on Lookout Drive approximately 240 feet east of the intersection of Second Street. The check valve vaults would be used to isolate this area for increased pressure would also allow additional water to this area under fire flow demand conditions. The booster pumps would be sized to increase the pressure in the water main by a maximum of 20 psi (46 feet) to ensure the existing customers on the North Side of Lookout Drive do not experience excessive pressure.

B. Water Supply Improvements

As summarized in Chapter V, the Village currently has a deficiency in the system reliable supply capacity and will need additional capacity to meet future water demands. Currently, the water from Well No. 6 is blended with water from Well No. 4 prior to entering the distribution system to meet the MCL for combined radium. If Well No. 6 is out of service, the Village is unable to use Well No. 4 as the water would exceed the MCL for combined radium. Construction of a treatment facility to remove combined radium for Well No. 4 is recommended to improve the reliable capacity of the supply system. A treatment system at Well No. 4 would increase the reliable capacity of the existing system to 1,250 gpd when operating the wells for 20 hours per day. Table VII-1 summarize the recommended reliable supply capacity.

A new Hydrous Manganese Oxide (HMO) treatment facility at Well No. 4 would be constructed to treat the water from Well No. 4 prior to entering the distribution system. It is recommended that a pilot study be performed to assess a higher filtration surface loading rate filtration system. Conventional hydraulic surface loading rates to pressure filters are limited to 3.0 gpm/square foot. Pilot testing can be performed to document performance of a filtration system at hydraulic surface loading rates in the 6 to 8 gpm/square foot range. A higher hydraulic surface loading rate can reduce the size of the filtration equipment at a significant cost savings. For example, the equipment cost for a single horizontal pressure filter to treat a flow of 720 gpm at a 3.0 gpm/square foot hydraulic surface loading rate is approximately \$490,000, and the equipment cost for 6 vertical pressure filters to treat a flow of 720 gpm at a 7.55 gpm/square foot hydraulic surface loading rate is approximately \$295,000. The cost of a pilot study is estimated to be in the range of \$15,000 to \$20,000.

With the addition of an HMO treatment facility at Well No. 4, the reliable supply capacity is adequate to meet the projected supply needs for planning years 2030 and 2035, with Well No. 2 out of service and retained for emergency operation. In the event that water is provided by the Village to the area in the City of Pewaukee as shown in Figure III-3, the supply system would be deficient for planning year 2040. An additional well would be required to have adequate reliable supply capacity to meet the water needs for planning 2040. Since the City of Pewaukee is currently planning on providing water service to this area, an additional well is not recommended at this time.

Table VII-1 - Recommended Reliable Supply Capacity

SUPPLY SOURCE	Supply Capacity		Service Pump Capacity		Water To Distribution Capacity		Hawthorne Hill Booster Pump Capacity	
	(gpm)	(MGD)	(gpm)	(MGD)	(gpm)	(MGD)	(gpm)	(MGD)
Wells								
Well No. 2 ¹	600	0.86			0	0.00		
Well No. 3	600	0.86			600	0.86		
Well No. 4 ²	750	1.08			650	0.94		
Well No. 5	500	0.72			500	0.72		
Well No. 6 ³	700	1.01			400	0.58		
Booster Pumps								
Well No. 2 Booster			700	1.01	0	0.00		
Well No. 3 Booster Pump No. 1			500	0.72	500	0.72		
Well No. 3 Booster Pump No. 2			500	0.72	500	0.72		
Hawthorne Hill Booster Pump No. 1							50	0.07
Hawthorne Hill Booster Pump No. 2							210	0.30
Hawthorne Hill Booster Pump No. 3							750	1.08
Total Pumping Supply Capacity ⁴	2,650	3.82	1,700	2.45	2,150	3.10	1,010	1.45
Less: Largest Supply Unit ⁵	1,450	2.09	700	1.01	650	0.94	750	1.08
Reliable Supply⁶	1,200	1.73	1,000	1.44	1,250	2.23	260	0.37
Note								
1. Well No. 2 pump capacity rated at 600 gpm. Assumes out of service for emergency use only.								
2. Well No. 4 pump rated for 750 gpm. Assumes pumping capacity reduced to 650 gpm with treatment.								
3. Well No. 6 pump rated at 700 gpm. Actual pumping capacity is reduced to 400 gpm average due to fouling.								
4. For Pumping Capacity - Only well pumps are considered as booster pump capacities exceed well pump capacities.								
5. For Supply Capacity - Assumes Well No. 4 is out of service.								
6. Water to distribution capacity estimated with 20 hours of operation per day.								

C. Water Storage Improvements

As summarized in Chapter V, under current operational conditions there are existing storage deficiencies in the Pewaukee water system.

With the addition of a small boosted pressure zone to serve the customers along Lookout Drive, the available storage volume from the existing storage facilities would increase based on serving a revised maximum elevation. Table VII-2 summarizes the Optimized effective storage volume from the existing storage facilities.

Table VII-2 – Optimized Effective Storage Volumes

	.20 MG Spheroid	.25 MG Tower	1.0 MG Standpipe
Pressure Zone	Main	Main	Main
Design Volume (gallons)	200,000	250,000	1,000,000
Diameter (feet)	Varies	Varies	51.0
Head Range (feet)	30.0	32.50	68.00
Storage Volume per foot (gallons)	Varies	Varies	15,280
Overflow elevation (feet USGS)	1,055.0	1,055.0	1,055.0
Approximate Highest Elevation Served in Pressure Zone (feet USGS)	965	965	965
Approximate Hydraulic Grade Elevation needed to provide minimum 35 psi to all areas	1,046	1,046	1,046
Maximum Effective Peak Hour Storage Volume (gallons) ¹	72,450	91,770	138,000
Approximate Hydraulic Grade Elevation needed to provide minimum 20 psi to all areas	1,011	1,011	1,011
Additional Effective Fire Protection and Emergency Storage Volume (gallons) ²	127,550	158,230	530,000
Total Effective Storage Volume (gallons)	200,000	250,000	668,000

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 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 20psi (under static conditions.) Volumes derived from storage tank gauging tables.

Comparing Table V-3 with Table VII-2, it can be seen that the total effective storage volume of the standpipe increased by 107,000 gallons, and the volume of effective peak hour storage for each storage facility increased as a result of reducing the highest elevation served within the Main Service Area. The combined effective peak hour storage volume increases by 0.232 MG gallons for a total of 0.302 MG by constructing a booster station to serve the customers along Tower Road.

Tables VII-3, VII-4, and VII-5 summarize the supply and storage analysis with the recommended supply and storage/pressure zone improvements for the Village of Pewaukee for planning years 2030, 2035, and 2040. The recommended improvements satisfy the supply and storage needs for the planning years for 2030 and 2035.

D. Distribution System Improvements

1. Existing System Deficiencies

This section summarizes distribution system improvements that are recommended to strengthen the existing system, enhance supply reliability and improve flow capacity and fire protection to various parts of the Village.

As discussed in Chapter VI, there are several areas within the Village of Pewaukee water distribution system where the needed fire flows cannot be supplied. For isolated deficiencies, it is often not economical to recommend specific improvements as these deficiencies will eventually be corrected by annual water main replacements (replacing existing older small diameter mains) and /or distribution system growth (primarily as a result of looping existing dead end mains). Recommended water main improvements were identified in locations where more widespread deficiencies are found. The proposed deficiency improvements are shown in Figure VII-1. Table VII-6 summarizes the recommended water system improvements shown in Figure VII-1.

Chapter VI identified Hawthorne Boosted Zone was served by a single main a water main failure could result in loss of water to the water system customers. An emergency connection to the Village of Sussex water system in the Village of Lisbon recommended to enhance system reliability.

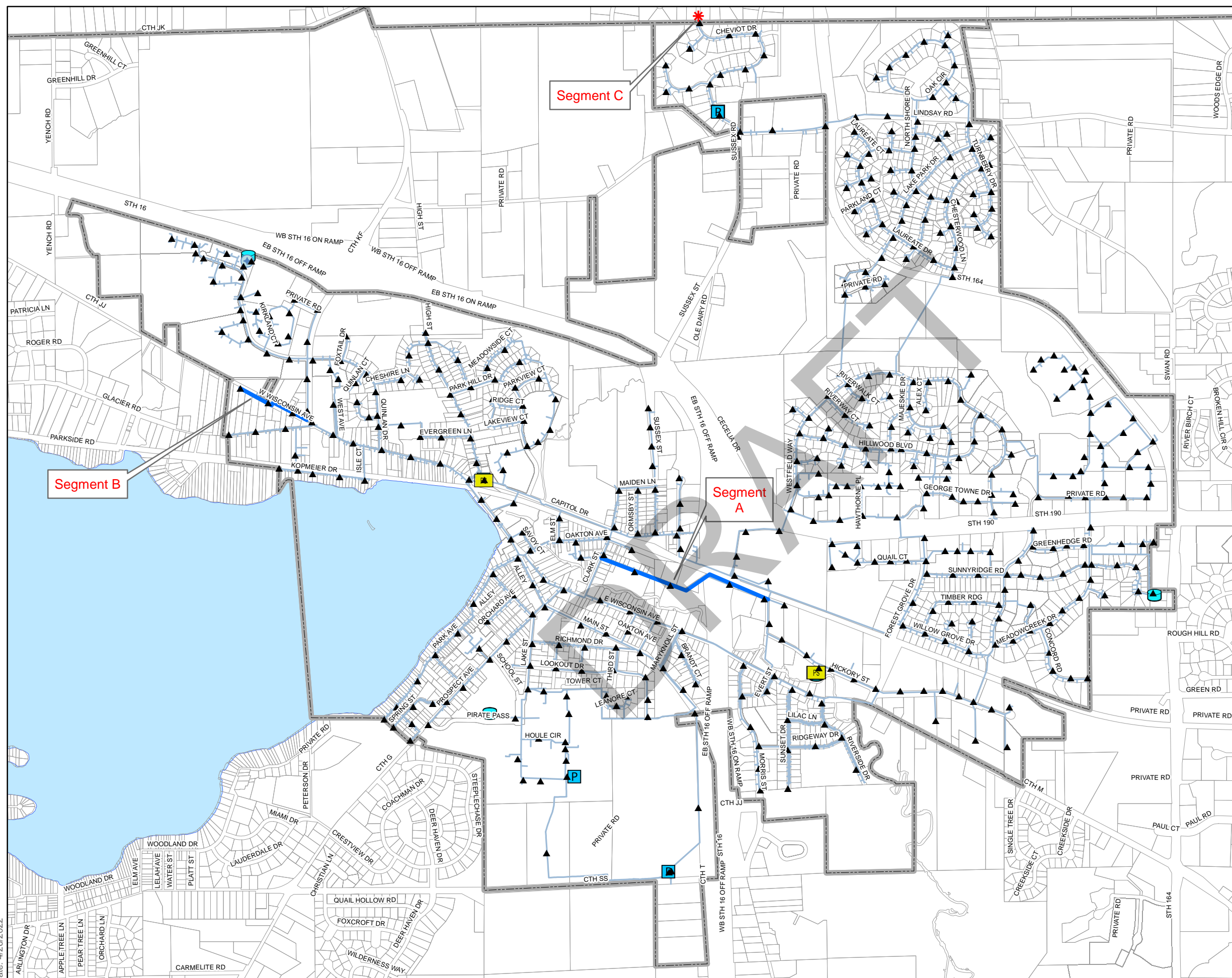
The Village of Pewaukee has previously identified targeted areas for water main replacement to address to replace water main to improve reliability in areas susceptible to breaks in their Capital Improvement Plan. The Village has also included maintenance and repair projects for the exiting water storage facilities based on recent inspections.



FIGURE VII-1

Water Distribution Improvements

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022



- ▲ Hydrant
- PS Booster Station
- P Pump Station
- T Tanks
- W Well
- 8" Proposed Mains
- Water Main
- Civil Division



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Table VII-3: 2030 Recommended Supply and Storage Requirements

	Water System 2030
<u>SUPPLY RECOMMENDATIONS</u>	
Design Average Day Demand (gpm)	609
Design Maximum Day Demand (gpm)	1,212
Design Peak Hour Demand (gpm)	1,939
Present Reliable Supply Capacity (gpm) ¹	1,250
Reliable Supply Capacity Excess or (Deficiency) (gpm)	38
<u>STORAGE RECOMMENDATIONS</u>	
Peak Hour Equalizing Need (gallons) ²	172,000
Optimum Fire Protection Needs (gallons) ³	630,000
Reserve Storage (gallons; 15% of Total) ⁴	142,000
Total Optimum Recommended Storage (gallons)	944,000
Available Effective Storage Capacity (gallons):	
Tower (72,450 gallons peak hour, 177,550 gallons fire flow)	250,000
Tower (91,770 gallons peak hour, 108,230 gallons fire flow)	200,000
Standpipe (138,000 gallons peak hour, 530,000 gallons fire flow)	668,000
Total Effective Storage Capacity (gallons)⁵	1,118,000
Subtotal Capacity Recommended (gallons)	None
Less Excess Available Reliable System Supply Capacity for Peak Hour ⁶	41,000
Repump Capacity from reservoir at Well 3 ⁷	24,000
Total Additional Capacity Recommended (gallons)	None

Notes
1. Reliable Supply Capacity is with largest well (Well No. 4) out of service . Wells operated for 20 hours per day.
2. Peak hour storage is storage utilized to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes.
4. Reserve storage is storage utilized to provide a start/stop range for pump operation and an emergency reserve storage supply
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage to maintain regulatory system pressures.
6. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
7. Additional capacity of 400 gpm for 60 minutes

Table VII-4: 2035 Recommended Supply and Storage Requirements

	Water System 2035
<u>SUPPLY RECOMMENDATIONS</u>	
Design Average Day Demand (gpm)	640
Design Maximum Day Demand (gpm)	1,274
Design Peak Hour Demand (gpm)	2,038
Present Reliable Supply Capacity (gpm) ¹	1,281
Reliable Supply Capacity Excess or (Deficiency) (gpm)	8
<u>STORAGE RECOMMENDATIONS</u>	
Peak Hour Equalizing Need (gallons) ²	181,000
Optimum Fire Protection Needs (gallons) ³	630,000
Reserve Storage (gallons; 15% of Total) ⁴	144,000
Total Optimum Recommended Storage (gallons)	955,000
Available Effective Storage Capacity (gallons):	
Tower (72,450 gallons peak hour, 177,550 gallons fire flow)	250,000
Tower (91,770 gallons peak hour, 108,230 gallons fire flow)	200,000
Standpipe (138,000 gallons peak hour, 530,000 gallons fire flow)	668,000
Total Effective Storage Capacity (gallons)⁵	1,118,000
Subtotal Capacity Recommended (gallons)	None
Less Excess Available Reliable System Supply Capacity for Peak Hour ⁶	6,000
Repump Capacity from reservoir at Well 3 ⁷	24,000
Total Additional Capacity Recommended (gallons)	None

Notes
1. Reliable Supply Capacity is with largest well (Well No. 4) out of service . Wells operated for 20.5 hours per day.
2. Peak hour storage is storage utilized to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes.
4. Reserve storage is storage utilized to provide a start/stop range for pump operation and an emergency reserve storage supply
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage to maintain regulatory system pressures.
6. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
7. Additional capacity of 400 gpm for 60 minutes

Table VII-5: 2040 Recommended Supply and Storage Requirements

	Water System 2040
<u>SUPPLY RECOMMENDATIONS</u>	
Design Average Day Demand (gpm)	701
Design Maximum Day Demand (gpm)	1,395
Design Peak Hour Demand (gpm)	2,232
Present Reliable Supply Capacity (gpm) ¹	1,250
Reliable Supply Capacity Excess or (Deficiency) (gpm)	(145)
<u>STORAGE RECOMMENDATIONS</u>	
Peak Hour Equalizing Need (gallons) ²	199,000
Optimum Fire Protection Needs (gallons) ³	630,000
Reserve Storage (gallons; 15% of Total) ⁴	147,000
Total Optimum Recommended Storage (gallons)	976,000
Available Effective Storage Capacity (gallons):	
Tower (72,450 gallons peak hour, 177,550 gallons fire flow)	250,000
Tower (91,770 gallons peak hour, 108,230 gallons fire flow)	200,000
Standpipe (138,000 gallons peak hour, 530,000 gallons fire flow)	668,000
Total Effective Storage Capacity (gallons)⁵	1,118,000
Subtotal Capacity Recommended (gallons)	None
Less Excess Available Reliable System Supply Capacity for Peak Hour ⁶	None
Repump Capacity from reservoir at Well 3 ⁷	24,000
Total Additional Capacity Recommended (gallons)	None

Notes
1. Reliable Supply Capacity is with largest well (Well No. 4) out of service and operating wells for 20 hours per day
2. Peak hour storage is storage utilized to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes.
4. Reserve storage is storage utilized to provide a start/stop range for pump operation and an emergency reserve storage supply
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage to maintain regulatory system pressures.
6. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
7. Additional capacity of 400 gpm for 60 minutes

Table VII-6 - Summary of Water distribution Improvements to Address Existing Deficiencies

SUMMARY OF WATER DISTRIBUTION IMPROVEMENTS TO ADDRESS EXISTING DEFICIENCIES

Segment	Location	Diameter	Approximate Length	Improvement
A	Hickory Street.	8-inch	2,950 feet	To help improve fire flows and improve overall hydraulic capacity.
B	Capital Drive west of Ryan Street	8-inch	1,300 feet	To help improve fire flows and improve overall hydraulic capacity.
C	Cheviot Drive	8-Inch	100 feet	Emergency connection with Village of Sussex water system to enhance reliability

As the Utility begins to grow into the future service area, it will be necessary to further expand the water transmission main system to adequately accommodate these new service areas. Figure VII-2 illustrates the recommended improvements to serve the 2035 service area. Where possible all major transmission mains identified in Figure VII-2 have been sized to meet projected future water system demands, and support system supply sources and storage facilities to serve outlying area land uses. Mains were sized to provide at least 3,500 gpm of flow capacity in industrial areas and 1,500 gpm in commercial areas at a residual pressure of 20 psi.

The mains shown in Figure VII-2 are only the recommended transmission mains. Smaller local service mains have not been shown. The transmission mains shown follow known or presumed locations for major streets or roads in the future urban service area. Adjustments in the actual location of these mains can be expected at the time the mains are required or as local needs dictate.

Water mains to serve developing residential land should be sized at a minimum of 8 inches in diameter. These mains will provide a minimum of 750 gpm at a 20 psi residual pressure in single-family areas. Fire flows of 1,500 gpm should be used as the criterion for multiple family developments. To demonstrate the effectiveness of the recommended improvements, Figures VII-3, VII-4, VII-5, and VII-6, illustrate recommended fire flows, available fire flows, fire flow adequacy, and maximum day demand pressures respectively, with the recommended improvements under projected 2035 demands conditions.

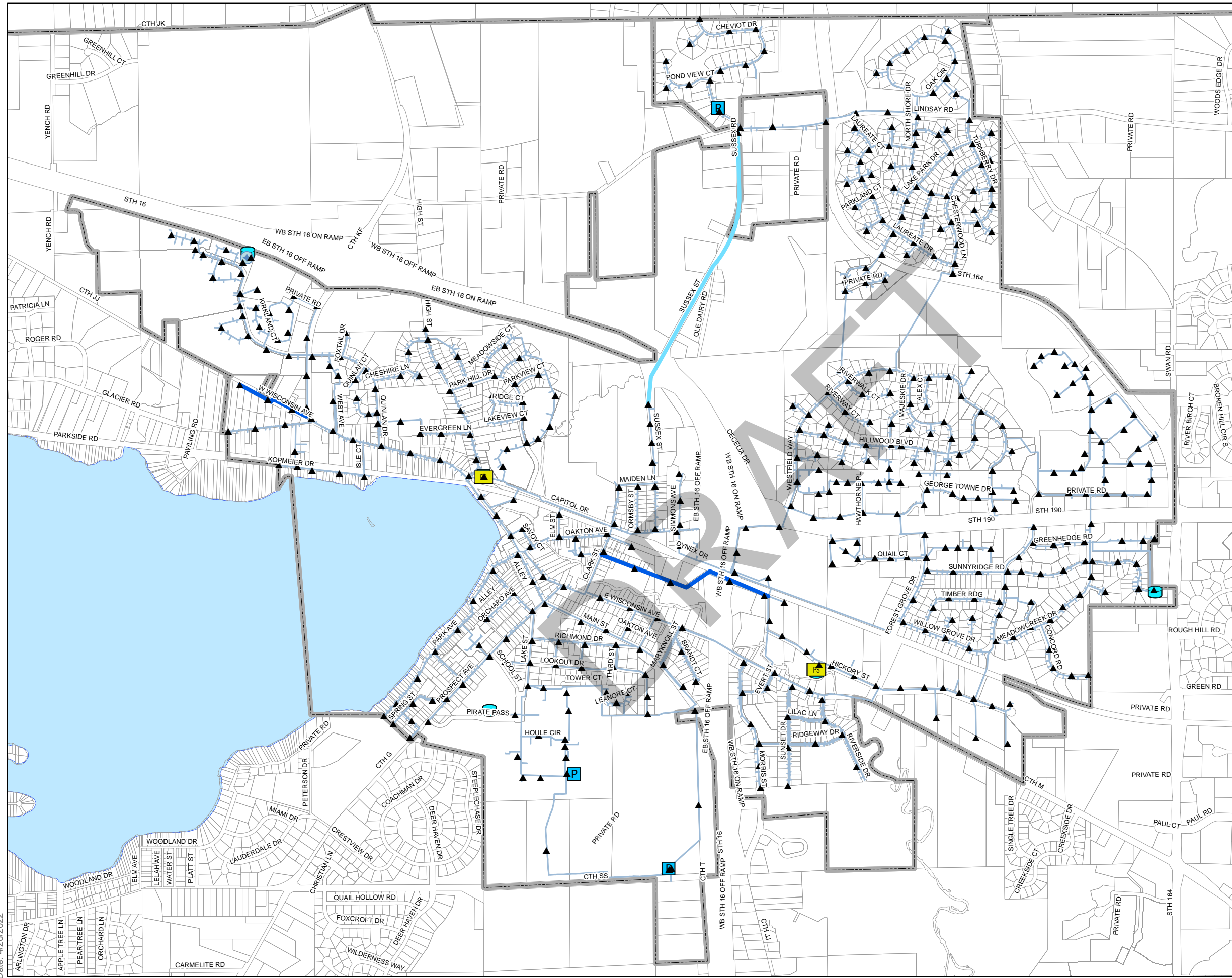
As the Village of Pewaukee water system expands, the Utility should continue to loop existing dead end mains to improve fire flows and help build strength to the areas where the system is expanding.



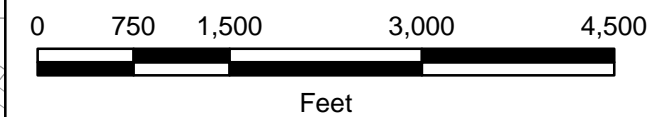
FIGURE VII-2

Proposed Expansion Improvements

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022



- ▲ Hydrant
- PS Booster Station
- P Pump Station
- Tanks
- Well
- 8" Proposed Main
- 10" Proposed Main
- Water Main
- Civil Division



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Figure VII-3

Proposed Recommended Fire Flow

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

Total Flow Needed

- 500 GPM
- 750 GPM
- 1,500 GPM
- 2,500 GPM
- 3,500 GPM
- PS Booster Station
- P Pump Station
- T Tanks
- + Well
- 8" Proposed Main
- 10" Proposed Main
- Water Main
- Civil Division



0 750 1,500 3,000 4,500

Feet



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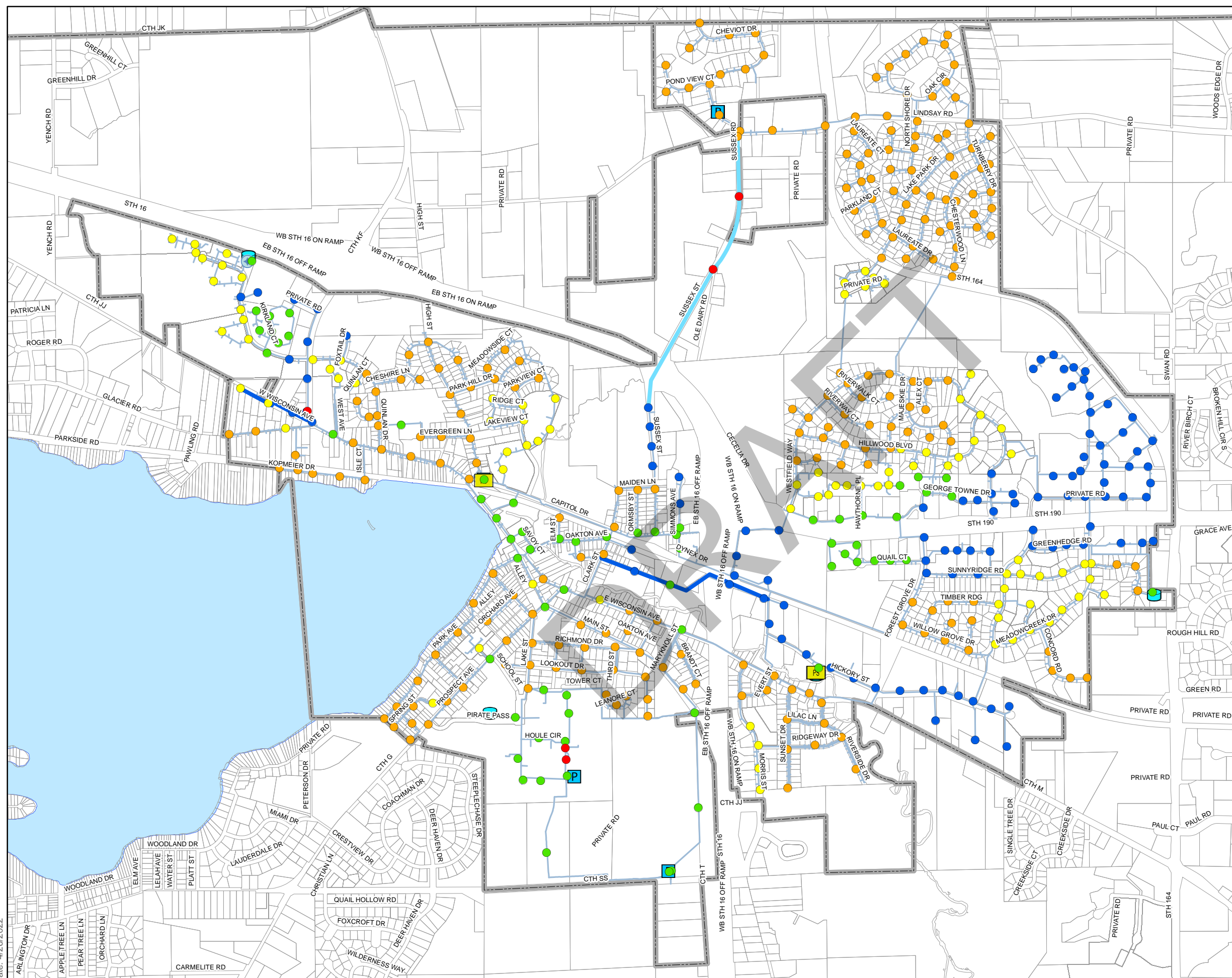


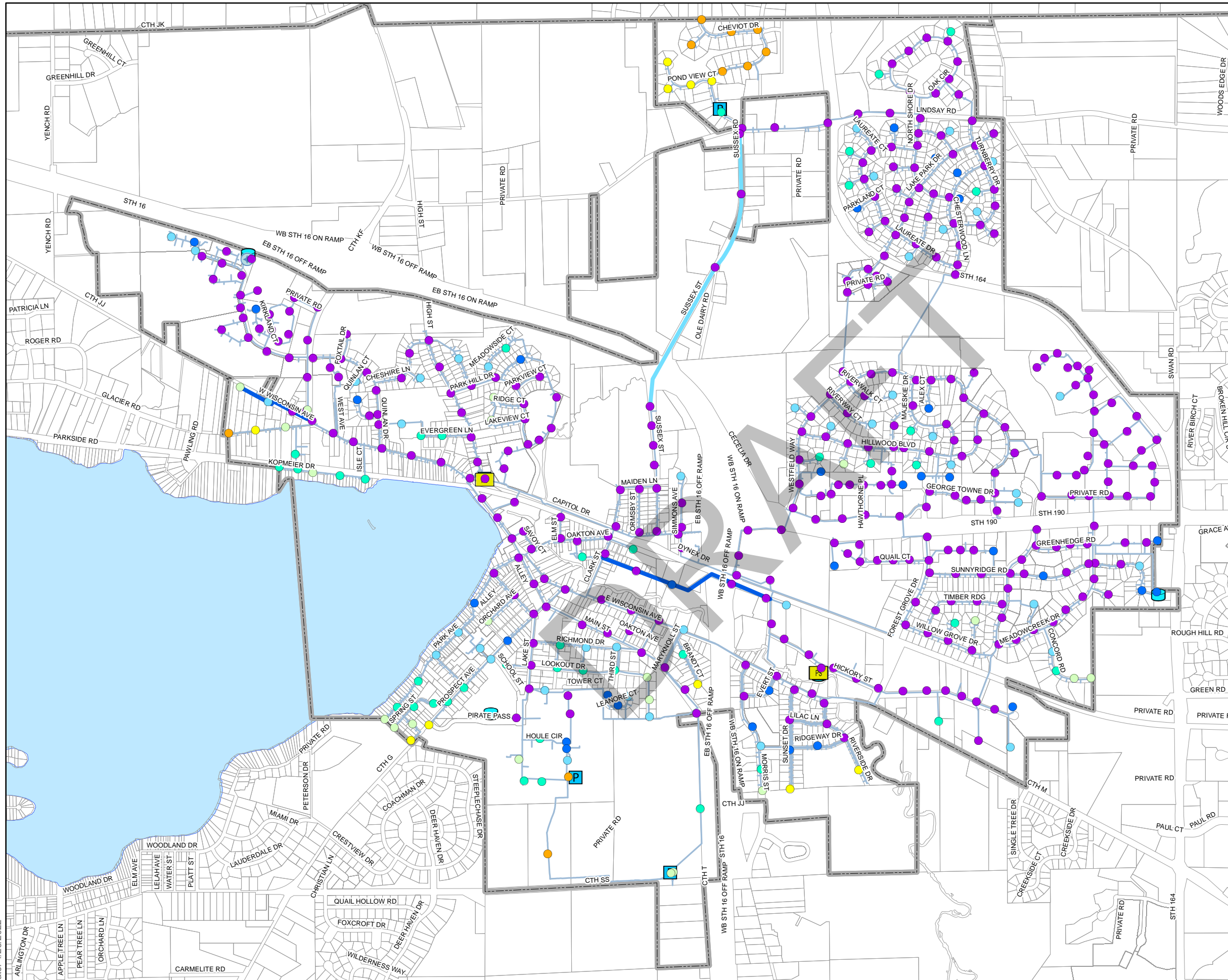
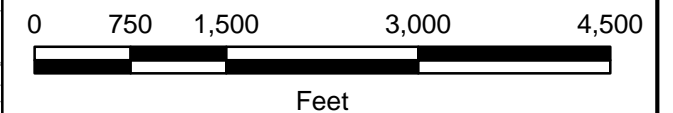
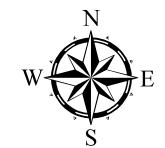


Figure VII-4

Proposed Available Fire Flow

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

- Less than 500 GPM
- 500 GPM - 999 GPM
- 1,000 GPM - 1,500 GPM
- 1,500 GPM - 2,000 GPM
- 2,000 GPM - 2,500 GPM
- 2,500 GPM - 3,000GPM
- 3,000 GPM - 3,500 GPM
- Great than 3,500 GPM
- PS Booster Station
- P Pump Station
- T Tanks
- W Well
- 8" Proposed Main
- 10" Proposed Main
- Water Main
- Civil Division



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Figure VII-5

Proposed Fire Flow Adequacy

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

- Does not Meet Fire Flow
- Meets Fire Flow
- Booster Station
- Pump Station
- Tanks
- Well
- 8" Proposed Main
- 10" Proposed Main
- Water Main
- Civil Division



0 750 1,500 3,000 4,500

Feet



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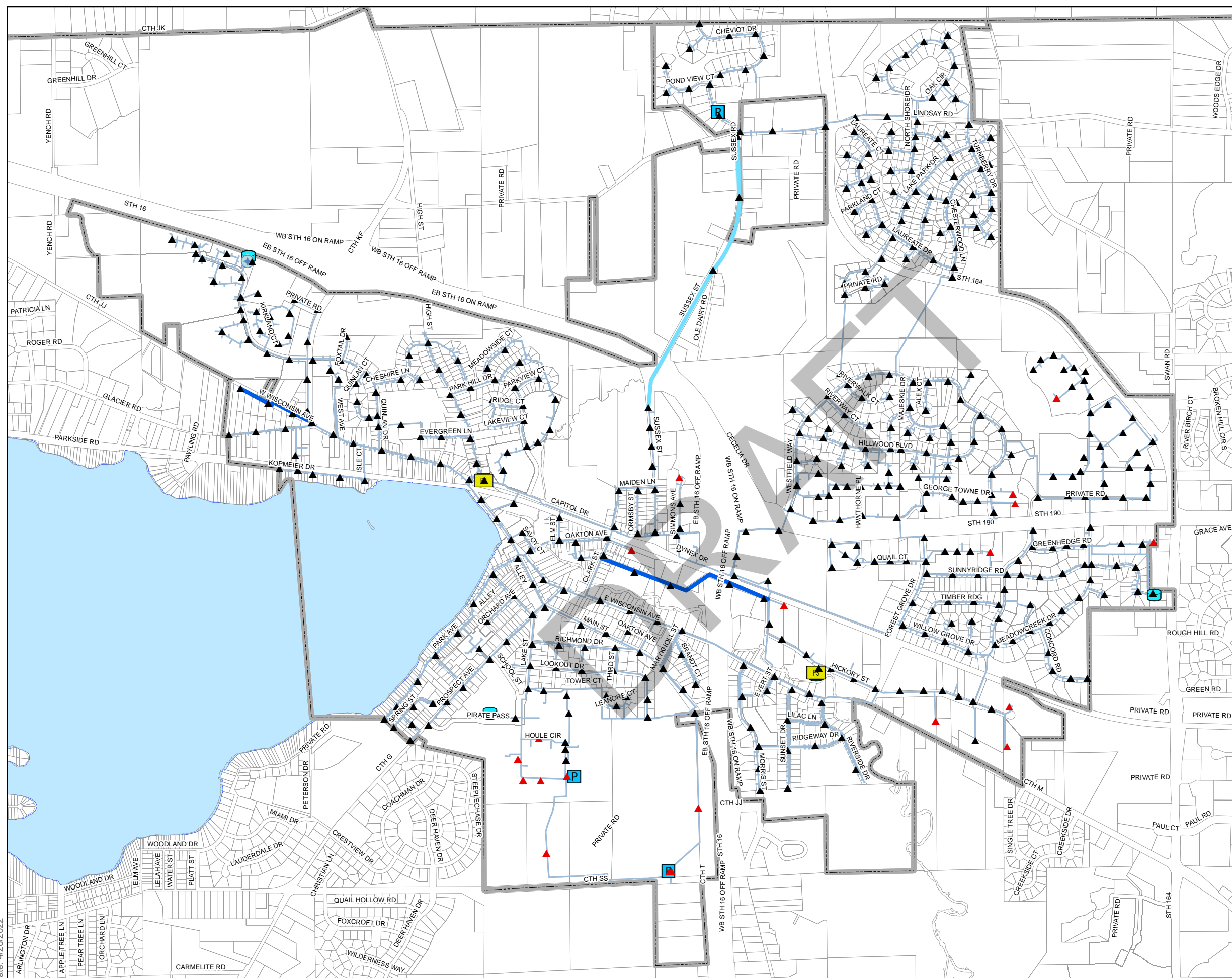




Figure VII-6

Proposed Maximum Day Demand System Pressure

Village of Pewaukee
Water Utility
Waukesha County, Wisconsin
April, 2022

Pressure

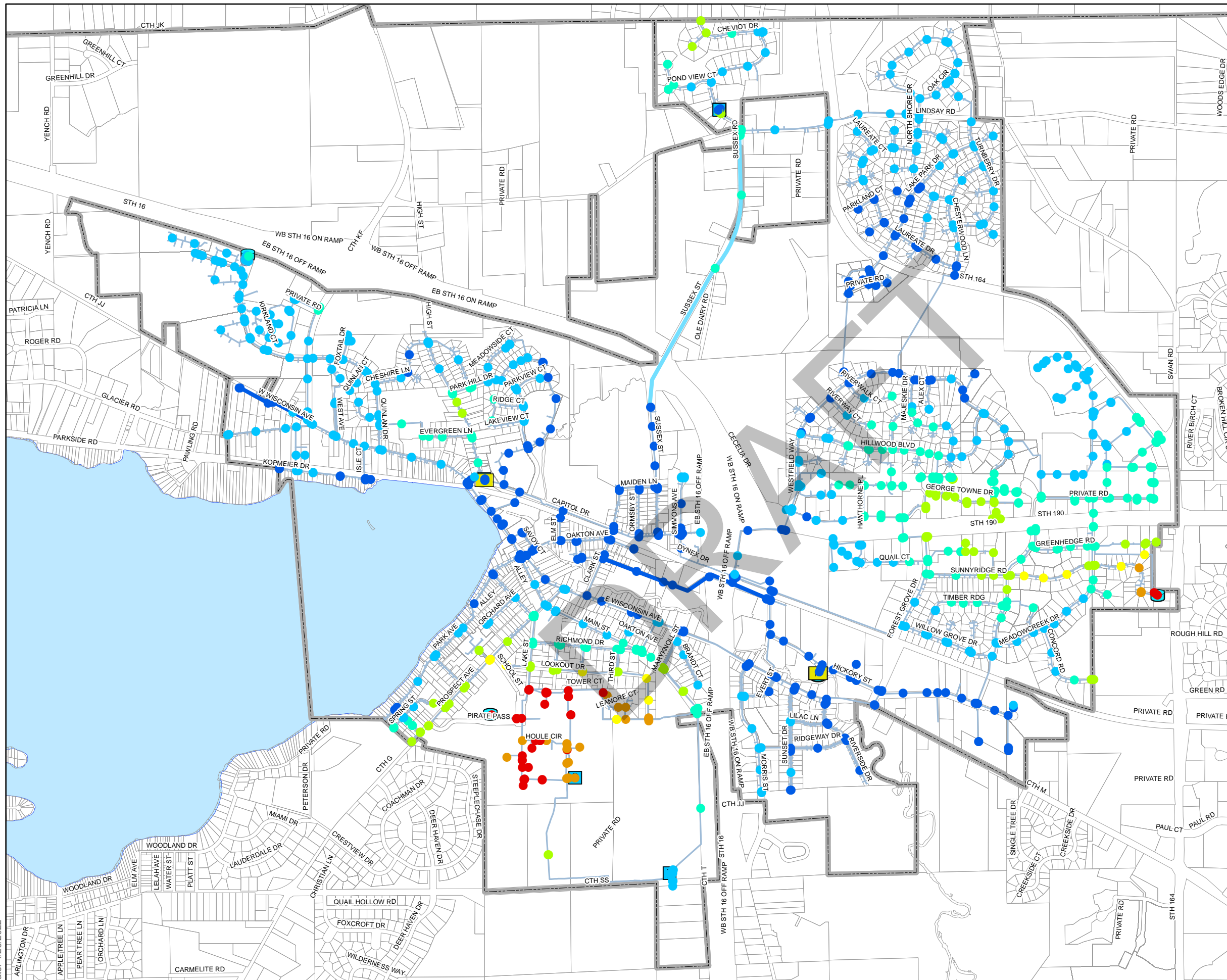
- Less than 35 PSI
- 35 - 40 PSI
- 40 - 50 PSI
- 50 - 60 PSI
- 60 - 70 PSI
- 70 - 80 PSI
- Greater than 80 PSI
- PS Booster Station
- P Pump Station
- T Tanks
- W Well

- 8" Proposed Main
- 10" Proposed Main
- Water Main
- ▭ Civil Division



0 750 1,500 3,000 4,500

Feet



2. Future Updates

The recommended improvement plan to serve the future service area has been developed as a tool to guide the Utility in the siting and sizing of future system improvements. While the plan may represent the current planned expansion of the Village of Pewaukee system, future changes in land use, water demands, or customer characteristics could substantially alter the implementation of the plan. For this reason, it is recommended that the plan be periodically reviewed and updated using Village planning information to reflect the most current projections of Village of Pewaukee area growth and development.

The improvement plan is a guidance document that details existing conditions and recommendations for the future. The plan is based on future conditions as perceived in 2022. As time progresses, additional information will become available, and events will shape the development of the Village of Pewaukee area. The plan must be dynamic in response; it should be studied and used but also adjusted to conform to the changes and knowledge that will come with time. Updates should be made on a regular basis, probably every five to ten years.

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VIII. CAPITAL IMPROVEMENTS PLAN

Chapter VIII summarizes the recommended water system improvements anticipated throughout the planning period. This chapter presents a proposed Water Utility capital improvements program. The recommended Capital Improvements Plan prioritizes system improvements and provides a schedule for the timing of construction. Budget cost estimates for each improvement are also included.

A. Recommended Capital Improvements

1. Supply

The construction of an HMO Filtration treatment facility is recommended to improve the present reliable supply capacity for future water demands. An additional 99 gpm of reliable supply capacity will be needed by the end of the 2035 planning period

2. Pressure Zone Development

The construction of a small boosted pressure zone is recommended to improve the level of service to the customers along Tower Road. A booster pump station will be required to meet the typical average, maximum day, and peak hour demands. Check valve vaults would be installed to establish the extents of the pressure zone and to allow water to flow from the main service zone to the boosted pressure zone to satisfy fire flow needs.

3. Storage

The development of the small boosted pressure zone increases the available equalizing storage volume of the existing elevated storage facilities. Only maintenance and repairs are needed to ensure reliability.

4. Distribution System

Figures VII-1 and VII-2 illustrate the proposed improvements to be completed by the year 2035. The figures illustrate recommended improvements to the existing distribution system and the recommended transmission mains required to serve the future service area. The improvements have been recommended to strengthen and expand the existing transmission main network, and support system expansion into future service areas.

To address existing deficiencies and provide water to developing areas in the Village, approximately 4,300 feet of water main replacements are recommended in the intermediate term. An additional 4,600 feet are recommended in the long term to provide service to future development.

The recommended improvements do not include all water mains needed for the expansion or development of all areas in the proposed water service area. Improvements associated with water mains to be installed to serve future developments or existing unserved developments are dependent on the location and size of the proposed development and will be determined on a case by case basis. Much of the cost of these improvements will be assessed to the benefitted properties.

B. Capital Improvements Plan

The proposed Capital Improvements Plan is presented in Table VIII-1. The plan presents budget cost estimates and a proposed schedule for the recommended system-wide improvements to be implemented over the planning period.

The proposed Capital Improvements Plan has been formulated based on all the information presented in this study. All the improvements have been developed and prioritized based on deficiencies identified in the existing water system, and the needs of the Utility's future service area. Improvements have been broken down into three categories:

- Short-term improvements (2022 – 2025)
- Intermediate-term improvements (2026 – 2030)
- Long-term improvements (2031 – 2035)

The actual construction cost for the recommended improvements may vary from the costs outlined in this report, depending on the year facilities are constructed, the rate of increase in future construction costs, and unforeseen conditions which could be encountered during design of the improvements.

In establishing priorities for these improvements, it will be necessary to take into consideration the availability of Utility financial resources and local Village needs to assure that the recommended improvements are implemented in an orderly, coordinated, and economical fashion.

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Table VIII-1: Capital Improvements Plan

Short-Term Improvements (2022 – 2025)	Estimated Cost^{2,3}
Distribution System Improvements	
Water Main Replacement E. Wisconsin Prospect to Maryknoll ⁴	\$ 440,000
Water Main Replacement Stone Ct. Briar Ct. Lexington Ct, Timber Ridge ⁴	\$ 15,000
Water Main Replacement Evergreen ⁴	\$ 285,000
Water Main Replacement Concord Road, Meadow Creek Ct. ⁴	\$ 10,000
Water Main Replacement Orchard Ave ⁴	\$ 170,000
Water Main Replacement Park Hill Drive ⁴	\$ 170,000
Water Main Replacement Glacier/Wisconsin West of Ryan ⁵	\$ 500,000
Well Rehab – Well 4, and Well 6 ⁴ .	\$ 290,000
Storage Facility Rehab -Quinlan, Well 3 Standpipe, Lake Street and Sunnyridge ⁴	\$1,190,000
Well 4 HMO Treatment	\$1,675,900
Subtotal	\$4,745,900
Engineering and Contingencies ¹	\$1,423,800
Total	\$6,169,700
Intermediate-Term Improvements (2026 – 2030)	
Distribution System Improvements	
Water Main Replacement Richmond Drive from Main St. to Like St. ⁴	\$ 300,000
Water Main Replacement Prospect Ave from Main St. to Maple ⁴	\$ 100,000
Water Main Loop Capital -Celia-Quail Ct. ⁴	\$ 150,000
Water Main Replacement Main Street from Prospect to Village Limit ⁴	\$ 80,000
Water Main Replacement Hickory Street from Clark to Village Hall ⁴	\$ 100,000
Water Main Replacement Kopmeier Drive from Kopmeier Rd to east end ⁴	\$ 285,000
Water Main Loop Glacier to Capito ⁴	\$ 175,000
Water Main Replacement Sussex Street from Maiden to 300 feet North ⁴	\$ 75,000
Water Main Replacement – Hickory Street (2,950 Feet 8-inch)	\$ 467,800
Booster Pump Station for customers on Tower Road	\$ 305,300
Well Rehab -Well 5, Well 3 and Well 2 ⁴	\$ 475,000
Subtotal	\$2,513,100
Engineering and Contingencies ¹	\$ 753,900
Total	\$3,267,000
Long-Term Improvements (2031 – 2035)	
Distribution System Improvements	
Provide 10-inch on Sussex Street, crossing STH 16 to Lindsay Road (Approximately 4,600 feet of 10-inch diameter pipe)	\$ 1,062,600
Subtotal	\$1,062,600
Engineering and Contingencies ¹	\$340,100
Total	\$1,402,700
Footnotes:	
¹ Assumes 30 percent for engineering, administrative, legal, and contingencies.	
² Estimates do not include land purchase, if necessary.	
³ All costs are presented in 2022 dollars.	
⁴ Costs obtained from Village CIP for 2021 through 2030.	
⁵ Recommended for correcting existing deficiency, cost obtained from Village CIP for 2021 through 2030.	

C. Recommended Studies and Evaluations

Table VIII-2 summarizes the recommended studies and evaluations that the Utility should conduct over the long-term planning period in the event that the Village of Pewaukee would be requested to provide water service to the area in the City of Pewaukee as shown in Figure III-3.

Table VIII-2: Recommended Studies and Evaluations

Study	Purpose
Well Siting Study	Evaluate the potential for siting a new well to identify land requirements (location and size) so that land acquisitions can be made.

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IX. APPENDIX A - GLOSSARY OF TERMS

Average Day Demand:	The average quantity of daily water usage in a municipal water system.
Elevated Storage:	A facility for storing water supplies above ground level at a specific elevation.
Flow Capacity:	The maximum flow rate that can be supplied by a water distribution system at a specified location and residual pressure (usually expressed as gpm).
Headloss	The energy loss as a result of friction caused by water passing along the interior surface of a pipe. (Usually expressed as feet of hydraulic head per 1,000 feet of pipe length, ft/1,000 ft)
Hydraulic Gradient:	The unconfined change in water surface elevation with respect to horizontal distance for a sloping water surface.
Maximum Day Demand:	The highest quantity of daily water usage in a municipal water system.
Maximum Day Ratio:	The ratio of maximum day to average day demand (usually expressed as a percentage).
Peak Hour Demand:	The daily rate of water usage during the hour of greatest water demand on a maximum usage day.
Peak Hour Demand Ratio:	The ratio of peak hour pumpage (expressed as a daily rate) to average day pumpage (usually expressed as a percentage).
Pipe Roughness Coefficient:	A coefficient (generally assumed to be constant) which describes the energy loss due to friction that will occur as water flows through a section of piping.
Reliable Supply Capacity:	The pumping capacity of a water supply facility with the largest pumping unit out of service.
Residual Pressure:	Pressure at a specified location in the water distribution system when water is being removed or flowed.
Static Pressure:	Normal pressure at a specified location in the water distribution system when no water is being removed or flowed.
Static Water Level:	The water level in a well when no water is being taken from the aquifer either by pumping or free flow (usually measured from ground surface or top of well casing).
Time-of-day Demand Curve:	A curve which describes changes in the quantities of water used by customers at different times of the day.
Total Dynamic Head:	The total energy that a pump must overcome to deliver a given flow rate including suction lift, discharge, and friction losses (usually expressed in feet of water).
Unaccounted-For Water:	The difference between the total volume of water pumped and the volume of water sold (expressed as gallons or as a percentage of total pumpage).

Water Balance:	A water balance displays how quantities of water flow into and out of the distribution system and to the customer. All data in the water balance is expressed as a volume per year.
Water Demand:	The amount of water required by a water user or users at a specific point or area within a water distribution system.
Water Distribution Main:	A water main which primarily extends water services and fire protection to an area.
Water Distribution System:	A facility usually consisting of a network of piping which is designed to distribute water from a given water supply to specific water users.
Water Supply System:	Facilities designed to collect and furnish a controlled supply of water for consumption or other water needs.
Water Transmission Main:	A large water main (generally 10-inch or larger) which is used to convey water between a water system's supply/storage facilities and service area.

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X. APPENDIX B - LIST OF ABBREVIATIONS

fps	feet per second
gpcd	gallons per capita per day
gpd/acre	gallons per acre per day
gpm	gallons per minute
ft/1,000 ft	feet [of head] per 1,000 feet [of pipe length]
ppb	parts per billion
ppm	parts per million
psi	pounds per square inch
AWWA	American Water Works Association
DBPs	Disinfection Byproducts
FAA	Federal Aviation Administration
GAC	Granular Activated Carbon
GIS	Geographical Information System
GWR	Groundwater Rule
HGL	Hydraulic Grade Line
MG	Million Gallons
MGD	Million Gallons Per Day
MGY	Million Gallons Per Year
PSC	Public Service Commission
PRV	Pressure Reducing Valve
SCADA	Supervisory Control and Data Acquisition
TOD	Time of Day
USGS	United States Geological Survey
VOCs	Volatile Organic Compounds
WDNR	Wisconsin Department of Natural Resources
WI DOA	Wisconsin Department of Administration

XI. APPENDIX C – WATER STORAGE FACILITY INSPECTION REPORTS

DRAFT

Dixon Engineering, Inc.

Maintenance Inspection

250,000 Gallon Spheroid
(Lake Street)

Pewaukee, Wisconsin

Inspection Performed: September 15, 2021
Reviewed by Joseph T. Hoban P.E.: December 14, 2021

Phone (414) 529-1859
Fax (414) 282-7830
<http://www.dixonengineering.net>
Wisconsin@dixonengineering.net

Dixon Engineering, Inc.
4811 S. 76th St. Ste. 109, Greenfield, WI 53220

CONCLUSIONS:

1. The exterior coating is a urethane overcoat system. The coating is in good condition overall with no significant deterioration.
2. The dry interior coating is an epoxy system. Coating deterioration includes spot failures to the substrate with rust undercutting and rust bleedthrough. Most of the failures are on the bowl and access tube.
3. The wet interior coating is an epoxy system. The coating is in good condition overall with no significant deterioration.

RECOMMENDATIONS (GENERAL AND IMMEDIATE WORK):

Annually inspect the roof vent, hatches, and any other health or security items on the structure. The work could be performed by in-house personnel or contracted as part of a regular maintenance program.

Schedule regular cleanings and inspections of the tank by an independent third party once every five years as recommended by AWWA.

1. Continue to maintain the cathodic protection system. The cost would be dependent on your contract with your cathodic vendor.

RECOMMENDATIONS (IMMEDIATE WORK TO MEET WISCONSIN DNR REQUIREMENTS):

The Wisconsin DNR may allow some of the required changes to be delayed until the next paint project. These items are listed as immediate work since they are currently out of compliance.

1. Modify the overflow pipe discharge so it points downward to bring it into compliance with current Wisconsin DNR requirements. The estimated cost is \$3,000.
2. Replace the screen at the overflow pipe discharge to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project or could be performed by in-house personnel.
3. Install a weather tight cover over the access tube air gap to meet current Wisconsin DNR requirements. The estimated cost is \$3,000.
4. Install deflector bars at the end of the fill/draw pipe in the wet interior to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project.
5. Install a sample tap on the fill/draw pipe as required by the Wisconsin DNR. The estimated cost is \$1,000.

RECOMMENDATIONS (WITH THE NEXT PAINT PROJECT):

Complete the recommended work in four years. The repairs and upgrades should be completed during the next major tank rehabilitation project when coating repairs are made.

1. High pressure water clean and overcoat the exterior with a urethane system. The estimated cost is \$70,000.
2. Spot abrasive blast clean the topside of the platforms, the entire access tube, bowl, and other spot coating failures in the dry interior. Spot repaint all prepared surfaces with an epoxy coating system. The estimated cost is \$25,000.
3. Coat the foundation to help prevent deterioration. The cost would be incidental to exterior painting.
4. Replace the damaged light fixtures in the dry interior. The estimated cost is \$3,000.
5. Install a ladder extension at the condensate platform. The estimated cost is \$2,000.
6. Install an aluminum cover over the fill/draw pipe insulation. The estimated cost is \$3,000.

A DISCUSSION ON RESCUE AND RETRIEVAL OPERATIONS FROM ELEVATED STORAGE TANKS

Working on elevated water storage tanks is inherently dangerous. OSHA regulations give guidelines for the climbing on elevated structures. Contractors and Engineers/Consultants are responsible for their own employees, but even with safety training and proper equipment, accidents can occur. Most rescue squads are local or neighboring fire departments, with some departments having more experience than others. Water storage tanks are designed to store water and are not suited for rescue or retrieval convenience. We recommend that you meet with your local rescue personnel and draft a rescue plan. A copy of the plan should be kept at the tank and with the rescue crew.

OSHA does not require 30 inch manways or hatches but for rescue purposes 30 inch openings would allow enough room for a rescue basket with an injured person on it to pass through. Smaller openings may not be sufficient for retrieval.

Rescue personnel would gain access to the injured person using the existing ladders while attached to fall prevention devices. If possible, the basket would be lowered through the riser and out the opening in the bottom. If needed, the rescue crew would work from the roof inside a handrail. A tripod would be used to attach a winch to the basket. If the basket cannot fit through the riser then it would need to be raised to the roof.

From the roof it is possible to lower the basket over the side to ground level, but that would require a very large winch and increased loading on the attachment point. On a rainy, windy, or snowy day, the objective would be to get rescue personnel off the roof as soon as possible, so lowering through the dry interior is preferred. A helicopter rescue would need to be performed if it is not possible to lower the rescue basket down the dry interior.

Upgrades intended to make a rescue easier are included in this report. Dixon recommends 30 inch manways or hatches where possible and fall prevention devices on all ladders.

COST SUMMARY:

Exterior overcoat	\$70,000
Dry interior partial repaint	25,000
Light fixtures	3,000
Overflow discharge modification	3,000
Ladder extension at the condensate platform	2,000
Access tube air gap seal	3,000
Sample tap	1,000
Fill/draw pipe insulation cover	<u>3,000</u>
Sub Total	\$110,000
Engineering and Contingencies	<u>\$22,000</u>
Total	\$132,000

INSPECTION:

On September 15, 2021, Dixon Engineering Inc. performed a maintenance inspection on the 250,000 gallon spheroid (Lake Street) elevated water storage tank owned by the Village of Pewaukee, Wisconsin. Purposes of the inspection were to evaluate the interior and exterior coating's performance and life expectancy, assess the condition of metal surfaces and appurtenances, review safety and health aspects, and make budgetary recommendations for continued maintenance of the tank. All recommendations with budgeting estimates for repairs are incorporated in this report.

The inspection was performed by Josh Grover, Engineering Technician. The inspector was assisted by Lane Tremblay, ROV Operator, and Ryan Szczepaniak, Staff Technician.

A source of water for cleaning was provided by the Village. Sediment was flushed from the wet interior. Following the inspection, chlorine was added to disinfect the tank per AWWA Standard C652-19 Method No. 3. Photos are included with this report.

GENERAL INFORMATION:

The tank was built in 1968 by CB&I with a height to low-water level of 43.75 feet.

CONDITIONS AND RECOMMENDATIONS:

EXTERIOR COATING CONDITIONS:

Information on file with DIXON indicates that the exterior was last painted in 2010. The exterior was pressure washed and spot power tool cleaned to SSPC-SP11 condition. The coating applied was a urethane system.

The coating is in good condition overall with no significant deterioration. The coating is beginning to chalk and fade and there is loss of gloss. Surfaces have faded due to exposure to ultraviolet light which is a normal occurrence for an exterior coating system.

The bowl is covered with moderate mildew growth.

Good adhesion was noted on the ASTM X-cut test areas. If overcoating is not performed within the next two years, additional adhesion testing should be performed.

EXTERIOR COATING RECOMMENDATIONS:

Budget for overcoating in four years. The typical overcoat frequency for modern urethane systems is fifteen years. There is always a risk in overcoating the exterior, but we have had several successful projects when performed in the timeframe noted. The risk of poor adhesion of the overcoat system gets higher as the existing system gets older. Current adhesion showed the existing coating would support an additional coating system.

The recommended procedure is to high pressure water clean (5,000-10,000 psi) the exterior to remove any poorly adhered coating and any contaminants. Coating failures to the substrate would be spot power tool cleaned to bare metal (SSPC-SP11) condition. All sharp edges would be feathered into the surrounding coating.

The coating system would consist of a spot prime coat on the bare metal, a full coat of epoxy, and followed by two full coats of urethane. The urethane system offers excellent abrasion resistance with high gloss and sheen retention. The expected life of this system is fifteen years. The tank would be removed from service during the coating project. This is necessary to reduce condensation on the tank's surface. Urethane coatings have a minimum temperature requirement for application and are sensitive to moisture during the curing process. If moisture is present during the curing process, the appearance will become cloudy with little or no gloss. The estimated cost is \$70,000.

DRY INTERIOR COATING CONDITIONS:

The dry interior on this structure is defined as the non-water contact surfaces, consisting of the basebell, riser, bowl, and access tube.

Information on file with DIXON indicated the dry interior was last painted in 2010. The dry interior was spot abrasive blast cleaned to SSPC-SP6 commercial condition. The coating applied was an epoxy system.

The basebell coating is in good condition with a few spot failures to the substrate with rust undercutting on the service door threshold.

The riser coating is in good condition with a few failures. Primary method of deterioration is spot failures to the substrate with rust undercutting. Most of the failures are on the riser stiffeners.

The coating on the topside of the platforms is in good condition with a few failures. Primary method of deterioration is spot failures to the substrate.

The bowl and access tube coating is in poor condition with numerous failures. Primary methods of deterioration are spot failures to the substrate with rust undercutting and extensive rust bleedthrough.

DRY INTERIOR COATING RECOMMENDATIONS:

Spot abrasive blast clean the dry interior to a commercial (SSPC-SP6) condition including the topside of the platforms, the entire access tube, the entire bowl, and other areas of failed coating. The prepared surfaces would be coated with an epoxy system. The work should be performed with an exterior painting project. The estimated cost is \$25,000.

WET INTERIOR COATING CONDITIONS:

Information on file with DIXON indicated the wet interior was last painted in 2010. The wet interior was abrasive blast cleaned to SSPC-SP10 near-white condition. The coating applied was an epoxy system. The wet interior coating is in good condition overall with no significant deterioration.

The bowl was covered with approximately 8 inches of sediment that was flushed from the wet interior during the inspection.

The surfaces below the normal operating water level are covered with mineral staining which does not affect the integrity of the coating system.

WET INTERIOR COATING RECOMMENDATIONS:

The existing coating system has not deteriorated to the point where replacement is warranted. The cathodic protection system should adequately protect all areas below the high-water level where the coating has deteriorated. Reinspect in five years to update conditions and recommendations.

CATHODIC PROTECTION CONDITIONS:

The tank has a suspended impressed current cathodic protection system. Surfaces below the high-water level are protected by the submerged system that is suspended from arms attached to the access tube. The supporting ropes, arms, and anode wires appear to be in good condition with no visible damage.

CATHODIC PROTECTION RECOMMENDATIONS:

Continue to maintain the cathodic protection system. The cost would be dependent on your contract with your cathodic vendor.

PIT PIPING CONDITIONS:

There is a pit in the basebell that contains piping and valves. The pit has a metal grate and wooden cover that is in good condition. The piping is in good condition. The coating on the piping is in good condition with minor surface corrosion. Most of the coating failures are on the bolts.

FOUNDATION AND ANCHOR BOLT CONDITIONS:

The exposed concrete foundation is in good condition with no deterioration. The foundation is not coated.

There are anchor bolts evenly spaced on the baseplate around the basebell. The anchor bolts are in good condition with no steel loss from corrosion.

FOUNDATION AND ANCHOR BOLT RECOMMENDATIONS:

Coat the exposed concrete with an epoxy coating system to help prevent deterioration. The cost would be incidental to exterior painting.

GROUT CONDITIONS:

The grout between the baseplate and the foundation is in good condition with none damaged or missing.

ROOF HANDRAIL, PAINTER'S RAILING, AND ROOF RIGGING CONDITIONS:

There is a handrail on the roof surrounding the roof hatches and the vent. The handrail is in good condition. There is a painter's railing that surrounds the roof handrail. The painter's railing is in good condition.

There are enough roof rigging couplings for safety and staging lines during wet interior coating work.

LIGHTING/ELECTRICAL CONDITIONS:

The tank has a double aviation light with a photoelectric cell on the roof that appears to be in good condition. The light is operating properly.

There are light fixtures located in the dry interior. Three of the lights are missing globes and cages.

LIGHTING/ELECTRICAL RECOMMENDATIONS:

Replace the damaged light fixtures in the dry interior. The estimated cost is \$3,000.

ANTENNA CONDITIONS:

There are four roof antennas attached to a free-standing mounting pole. The antenna cable routing is in good condition and does not interfere with climbing or tank operations. The cable penetrations through the basebell and access tube cover plate on the roof are sealed with caulk.

OVERFLOW PIPE CONDITIONS:

The overflow pipe extends along the access tube in the dry interior, down through the dry riser, and exits near the bottom of the basebell. The overflow pipe discharge is at an angle. The discharge end of the overflow pipe is screened. The screen is in fair condition. The screen is oversized and deformed. The pipe discharges to a splash pad. The air gap meets the required 12-24 inches. The discharge area is in good condition.

OVERFLOW PIPE RECOMMENDATIONS:

Immediately replace the screen at the overflow pipe discharge to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project or could be performed by in-house personnel.

Modify the overflow pipe discharge to bring it into compliance with current Wisconsin DNR requirements. The discharge must be in a downward position with a 12-24 inch air gap and must have a 4 mesh screen. The estimated cost is \$3,000.

HATCH AND MANWAY CONDITIONS:

There is a 30 inch diameter roof hatch to the wet interior that is in good condition. The hinged cover is in good condition. There is a handhold next to the hatch to aid the climber while entering and exiting the opening. The hatch was not secured. The hatch neck curb height meets the minimum height requirement of 4 inches. The hatch cover lip meets the minimum height requirement of 2 inches. There was no gasket on the hatch. A gasket was installed on the roof hatch curb by the inspection crew.

There is a 24 inch diameter roof hatch into the dry interior that is in good condition. The hinged cover is in good condition. There is a handhold next to the hatch to aid the climber while entering and exiting the opening.

There is a 12 x 18 inch manway in the access tube to the wet interior that is in good condition. The manway gasket showed no signs of leakage and the bolts are in good condition.

There is a service door in the basebell that is in good condition. The door operated properly during the inspection.

There is a painter's hatch (bird hatch) at the top of the riser that is in good condition. There is a safety handhold above the hatch.

The condensate platform ladder opening is 30 inch diameter. The opening is equipped with a hinged cover. There is no safety handhold next to the opening.

The top platform ladder opening is 30 inch diameter. The opening is equipped with a hinged cover. There is a safety handhold next to the opening.

There is a rigging attachment point on the bowl for rescue retrieval line attachment.

HATCH AND MANWAY RECOMMENDATIONS:

Install a ladder extension at the condensate platform to assist entering and exiting the opening. The estimated cost is \$2,000.

VENT CONDITIONS:

The roof vent is a pressure vacuum design that is in good condition. The pressure vacuum plate was found to be properly aligned. There is a large external screen intended to keep birds out and a smaller mesh screen on the interior intended to keep insects out. The screens are in good condition. There is a rain shield over the outer screen.

There is an access tube air gap on the roof that is not screened. This is a possible entry point for birds and/or insects to enter the wet interior, though there was no evidence of entry.

VENT RECOMMENDATIONS:

Install a weather tight cover over the access tube air gap to meet current Wisconsin DNR requirements. The estimated cost is \$3,000.

LADDER CONDITIONS:

The dry interior ladders located in the basebell, riser, and access tube are in good condition. The ladders meet current OSHA size requirements. All ladders are equipped with rail-type fall prevention devices that are in good condition.

There is a wet interior ladder from the roof to the bowl that is in good condition. The ladder meets OSHA size requirements. The ladder is equipped with a rail-type fall prevention device that is in good condition.

FILL/DRAW PIPE CONDITIONS:

The tank fills and draws from a single pipe. The pipe routes through the dry interior, into the bottom of the bowl, and extends approximately 11 inches into the wet interior. There is not a deflector plate or bar over top of the pipe in the wet interior.

There is no sample tap on the fill/draw pipe.

There is a threaded coupling on the fill/draw pipe for future attachment of a chemical feed line.

FILL/DRAW PIPE RECOMMENDATIONS:

Install deflector bars at the end of the fill/draw pipe in the wet interior to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project.

Install a sample tap on the fill/draw pipe as required by the Wisconsin DNR. The estimated cost is \$1,000.

EXPANSION JOINT CONDITIONS:

The fill/draw pipe is equipped with a bellow type expansion joint located in the pit. The expansion joint appears to be in good condition.

INSULATION CONDITIONS:

The fill/draw pipe is covered with rigid foam insulation. There is no cover over the insulation. The insulation seams are sealed with duct tape that has come loose in a few areas.

INSULATION RECOMMENDATIONS:

Install an aluminum cover over the fill/draw pipe insulation. The estimated cost is \$3,000.

MUD VALVE CONDITIONS:

There is a mud valve located in the bottom of the tank to aid in removal of sediment during inspections and routine maintenance. The mud valve operated properly during the inspection.

CONDENSATE DRAIN CONDITIONS:

There is a condensate drain line that routes from the platform to the overflow pipe. There is a check valve in the line to stop backflow during overflow conditions.

WET INTERIOR METAL CONDITIONS:

The steel structure is in good condition overall.

DIXON ENGINEERING, INC.
STEEL TANK FIELD INSPECTION REPORT
PEDESTAL TANK

DATE: September 15, 2021

OWNER: Village of Pewaukee
 CLIENT CODE: 49-68-10-01
 TANK NAME: Lake Street
 LOCATION: Address: 300 School Street
 City: Pewaukee
 State: Wisconsin

TANK SIZE: Capacity: 250,000 gallons
 Bottom (LWL): 43.75 feet (from nameplate)

CONSTRUCTION:

 Type: Spheroid
 YEAR CONSTRUCTED: 1968
 MANUFACTURER: CB&I
 CONTRACT NUMBER: 9-8148
 USE: Potable water and fire protection
 Coating information below is from: Dixon specification/project

COATING HISTORY	EXTERIOR	WET INTERIOR	DRY INTERIOR
YEAR COATED	<u>2010</u>	<u>2010</u>	<u>2010</u>
CONTRACTOR	<u>Horizon Bros</u>	<u>Horizon Bros</u>	<u>Horizon Bros</u>
SYSTEM	<u>Urethane</u>	<u>Epoxy</u>	<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC-SP11</u>	<u>SSPC-SP10</u>	<u>SSPC-SP6 (spot)</u>
MANUFACTURER	<u>Tnemec</u>	<u>Tnemec</u>	<u>Tnemec</u>
HEAVY METAL COATING SAMPLES	<u>No</u>	<u>No</u>	<u>No</u>
HEAVY METAL BEARING	<u>Unknown</u>	<u>No</u>	<u>Unknown</u>

PERSONNEL: Lead inspector Josh Grover
 Crew members Lane Tremblay, Ryan Szczepaniak
 METHOD OF INSPECTION: Dry

SITE CONDITIONS

Fenced: **No**
Site large enough for contractor's equipment: **Yes**
Control building: **No**
Antenna control site: **No**
Power lines within 50 feet: **No**
Site drainage: **Away from tank**
Indications of underground leakage: **No**
Shrub, tree, etc. encroachment: **No**

EXPOSED PIPING

Location: **Tank base (in pit)**
Condition of structure: **Good**
Structure is: **Wet**
Pump present: **Yes**
Drain line present: **No**
Cover condition: **Good**
Locked: **No**
Pipe coating condition: **Good**
Describe coating: **Spot coating failures to substrate**
Condition of metal: **Good**
Piping comments: **There are minor spot coating failures on the bolts**

FOUNDATION

Foundation exposed: **Yes**
Exposed height: **0-3 inches**
Exposed foundation condition: **Good**
Damage or deterioration: **No**
Foundation coated: **No**
Grout condition: **Good**
Amount missing: **0 feet**
Undermining of foundation: **No**

EXTERIOR COATING

Basebell:

Topcoat condition: **Good**
Previous system condition: **Good**
Describe coating: **No significant coating deterioration**
Dry film thickness: **19-22 mils**
Adhesion: **3A**
Metal condition: **Good**

EXTERIOR COATING

Riser:

Topcoat condition: **Good**
Previous system condition: **Good**
Describe coating: **No significant coating deterioration**
Mildew growth: **No**
Metal condition: **Good**

Bowl:

Topcoat condition: **Good**
Previous system condition: **Good**
Describe coating: **No significant coating deterioration**
Mildew growth: **Yes – moderate**
Metal condition: **Good**

Sidewall:

Lettering: **No**
Logo: **No**
Topcoat condition: **Good**
Previous system condition: **Good**
Describe coating: **No significant coating deterioration**
Metal condition: **Good**

Roof:

Topcoat condition: **Good**
Previous system condition: **Good**
Describe coating: **No significant coating deterioration**
Dry film thickness: **18-23 mils**
Adhesion: **5A**
Metal condition: **Good**

EXTERIOR APPURTENANCES

Baseball Door:

Size: **30 x 60 inches**
Metal condition: **Good**

Anchor Bolts:

Number: **10**
Diameter: **1 ¾ inches**
Location: **Exterior**
Metal condition: **Good**

EXTERIOR APPURTENANCES

Overflow Pipe:

Diameter: **10 inches**

Metal condition: **Good**

Discharge orientation: **Angle**

Screen condition: **Fair - deformed**

Percent of screen open: **100**

Mesh size: **4**

Flap gate/duck bill check valve: **No**

Air gap: **Yes**

Lowest part of discharge to the ground distance: **14 inches**

Height to baseball penetration: **21 inches**

Overflow discharges to: **Concrete pad**

Condition: **Good**

Roof Handrail:

Diameter: **18 feet**

Height: **42.5 inches**

Midrail height: **23.5 inches**

Kick plate height: **4 inches**

Vertical post type: **Angle**

Size: **2.5 x 2.5 inches**

Top rail type: **Angle**

Size: **2.5 x 2.5 inches**

Midrail type: **Angle**

Size: **2.5 x 2.5 inches**

Metal condition: **Good**

Painter's Rail:

Diameter: **20 feet**

Are butt welds at braces: **Yes**

Metal condition: **Good**

Roof Rigging Points:

Number: **16**

Couplings covered: **Yes**

Covered with: **Plugs**

Metal condition: **Good**

Removable Cathodic Covers:

N/A

EXTERIOR APPURTENANCES

Wet Interior Roof Hatch:

Neck size: **30 inches**

Distance from center of the tank (to outer edge): **4.5 feet**

Shape: **Round**

Handhold at opening: **Yes**

Curb height: **4 inches**

Cover overlap: **2 inches**

Gasket on cover/neck curb: **Yes (installed by Dixon)**

Hatch security: **None**

Metal condition: **Good**

Dry Interior Roof Hatch:

Neck size: **24 inches**

Shape: **Round**

Handhold at opening: **Yes**

Hatch security: **Lock**

Metal condition: **Good**

Bolted Ventilation Hatch:

N/A

Access Tube Air Gap:

Screened/Covered: **No**

Roof Vent:

Number: **1**

Distance from center of the tank (to outer edge): **6.5 feet**

Type: **Pressure-vacuum**

Neck diameter: **30 inches**

Flange opening diameter: **24 inches**

Vertical screen/expanded metal condition: **Good**

Interior screen condition: **Good**

Mesh size: **24**

Rain shield: **Yes**

Pressure plate condition: **Good**

Plate free to move: **Yes**

Plate screened: **No**

Height of the lowest screen above the roof: **24 inches**

Metal condition: **Good**

EXTERIOR APPURTENANCES

Aviation Lights:

Design: **Double red**
Location: **Free-standing mount**
Functioning: **Yes**
Globe condition: **Good**
Photoelectric cell: **Yes**
Location: **Roof**

Antennas:

Roof number: **4**
Attached to: **Free-standing pole**
Basebell cable penetrations sealed: **Yes**
Sealed with: **Caulk**
Roof cable penetrations sealed: **Yes**
Sealed with: **Caulk**
Antenna or cables interference: **No**

Electrical Components:

Electrical conduit condition: **Good**
Exposed wiring: **No**

DRY INTERIOR COATING

Basebell:

Coating condition: **Good**
Describe coating: **Spot coating failures to substrate, rust undercutting**
Dry film thickness: **9-12 mils**
Metal condition: **Good**
Floor: **Stone**
Drain line present: **No**
Comments: **The spot coating failures are on the service door threshold**

Condensate Platform:

Platform design: **Full**
Coating condition: **Good**
Describe coating: **Spot coating failures to substrate**
Metal condition: **Good**
Ladder opening size: **30 inches**
Shape: **Round**
Opening covered: **Yes**
Handhold at opening: **No**
Drain: **Yes**

DRY INTERIOR COATING

Size: **2 inches**

Type: **To overflow**

Check valve: **Yes**

Riser above the Condensate Platform:

Coating condition: **Good**

Describe coating: **Spot coating failures to substrate, rust undercutting**

Dry film thickness: **9-15 mils**

Metal condition: **Good**

Comments: **The coating failures are at the stiffeners**

Top Platform:

Platform design: **Partial**

Material: **Steel plate**

Coating condition: **Good**

Describe coating: **Spot coating failures to substrate**

Metal condition: **Good**

Ladder opening size: **30 inches**

Shape: **Round**

Opening covered: **Yes**

Handhold at opening: **Yes**

Handrail at platform

Height: **42 inches**

Midrail height: **21 inches**

Kick plate height: **4 inches**

Riser above the Top Platform:

Coating condition: **Good**

Describe coating: **No significant coating deterioration**

Dry film thickness: **10-15 mils**

Metal condition: **Good**

Bowl:

Coating condition: **Poor**

Describe coating: **Spot coating failures to substrate, rust undercutting, rust bleedthrough**

Metal condition: **Good**

Rigging lug above opening: **Yes**

Bowl comments: **There is extensive rust bleedthrough**

DRY INTERIOR COATING

Access Tube:

Diameter: **36 inches**

Topcoat condition: **Poor**

Prime coat condition: **Fair**

Describe coating: **Spot coating failures to substrate, rust undercutting, rust bleedthrough**

Dry film thickness: **10-13 mils**

Metal condition: **Good**

Access tube comments: **With overflow and manway crab bolts only approximately 11 inches of space to get through**

DRY INTERIOR APPURTENANCES

Electrical Components:

Lights functioning: **Yes**

Missing covers (globes and cages): **Yes**

Number missing both globes and cages: **3**

Additional lights needed: **No**

Electrical outlet/conduit condition: **Good**

Used during inspection: **No**

Sample Tap:

N/A

Threaded Coupling (for chemical feed on the fill/draw pipe):

Location: **In pit**

Condition: **Good**

Expansion Joint:

Location: **Bottom of fill pipe**

Accessible for inspection: **Yes**

Type: **Bellows**

Coating condition: **Not coated**

Metal condition: **Good**

Fill/Draw Pipe Insulation:

Insulation cover: **No**

Condition: **Good to fair**

Seams loose: **No**

DRY INTERIOR APPURTENANCES

Basebell Ladder:

Toe clearance: **7 inches or greater**

Width of rungs: **16+ inches**

Thickness of rungs: **3/4 inch**

Shape of rungs: **Round**

Metal condition: **Good**

Fall prevention device: **Yes**

Type: **Rail**

Function properly: **Yes**

Cage: **No**

Riser Ladder:

Toe clearance: **7 inches or greater**

Width of rungs: **16+ inches**

Thickness of rungs: **3/4 inch**

Shape of rungs: **Round**

Metal condition: **Good**

Fall prevention device: **Yes**

Type: **Rail**

Function properly: **Yes**

Cage: **No**

Painter's (bird) Hatch:

Handhold above hatch: **Yes**

Metal condition: **Good**

Hatch security: **Bolt**

Manway to Wet Interior:

Size: **12 x 18 inches**

Location: **In access tube**

Metal condition: **Good**

Mud Valve:

Number: **1**

Type: **Babco**

Discharge material: **Hose**

Discharge slope: **Downward**

Functioning properly: **Yes**

Metal condition: **Good**

DRY INTERIOR APPURTENANCES

Access Tube Ladder:

Toe clearance: **7 inches or greater**

Width of rungs: **16+ inches**

Thickness of rungs: **3/4 inch**

Shape of rungs: **Round**

Metal condition: **Good**

Fall prevention device: **Yes**

Type: **Rail**

Function properly: **Yes**

WET INTERIOR COATING

Roof:

Topcoat condition: **Good**

Primer coating condition: **Good**

Describe coating: **No significant coating deterioration**

Metal condition: **Good**

Lap seams: **Caulked**

Condition of lap seams: **Good**

Roof comments: **There is a small amount of rust staining**

Sidewall:

Topcoat condition: **Good**

Primer coating condition: **Good**

Describe coating: **No significant coating deterioration**

Mineral deposits: **Light**

Metal condition: **Good**

Active pitting: **No**

Previous pitting: **No**

Sidewall comments: **There is extensive mineral staining**

Access Tube:

Topcoat condition: **Good**

Primer coating condition: **Good**

Describe coating: **No significant coating deterioration**

Mineral deposits: **Light**

Metal condition: **Good**

Active pitting: **No**

Previous pitting: **No**

WET INTERIOR COATING

Tank Bottom:

Type: **Bowl**
Topcoat condition: **Good**
Primer coating condition: **Good**
Describe coating: **No significant coating deterioration**
Mineral deposits: **Moderate**
Metal condition: **Good**
Active pitting: **No**
Previous pitting: **No**
Sediment depth: **8 inches**

WET INTERIOR APPURTENANCES

Ladder:

Toe clearance: **7 inches or greater**
Width of rungs: **16+ inches**
Thickness of rungs: **¾ inch**
Shape of rungs: **Round**
Shape of side rails: **Flat**
Metal condition: **Good**
Fall prevention device: **Yes**
Type: **Rail**
Function properly: **Yes**

Cathodic Protection:

Clips: **Yes**
Pressure fitting: **Yes**
Location of clips: **Bowl**
Type: **Arms off access tube**
Location of controls: **In basebell**
Ropes/arms damaged: **No**
Wires damaged: **No**

Roof Stiffeners:

N/A

Sidewall Stiffeners:

N/A

Overflow Pipe Inlet:

Type: **Vortex break**
Metal condition: **Good**

WET INTERIOR APPURTENANCES

Fill Pipe:

Diameter: **12 inches**

Height above the tank bottom: **7-11 inches**

Deflector over end: **No**

Metal condition: **Good**

Separate Draw Pipe:

N/A

Mixer:

N/A

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



250,000 gallon spheroid (Lake Street) elevated water storage tank owned by the Village of Pewaukee, Wisconsin.



1) The concrete foundation is in good condition with no significant deterioration.

2) The anchor bolts are in good condition. There is no missing grout between the baseplate and foundation.



3) The service door operated properly during the inspection.



4) The overflow pipe discharges to a concrete splash pad.

5) The screen at the overflow discharge is intact but deformed and oversized.



6) There are no coating failures on the basebell.



7) Same.

8) The riser coating is in good condition with no deterioration.

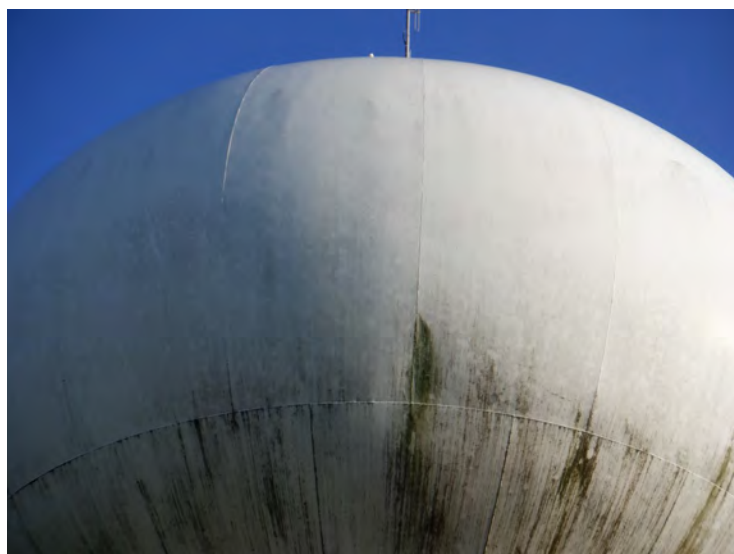


9) Same.



10) The bowl is covered with mildew growth but there are no visible coating failures.

11) Same.



12) The sidewall coating is in good condition overall.



13) Same.

14) The roof coating has faded but there is no significant deterioration.



15) Same.



16) Same.

17) The roof handrail and painter's railing are in good condition.



18) The wet interior roof hatch is in good condition. A gasket was installed on the hatch during the inspection.



19) The dry interior roof hatch is in good condition.

20) There is no cover over the access tube air gap.



21) The roof vent is in good condition.



22) The roof vent pressure plate was properly aligned and free to move.

23) The vertical roof vent screen is in good condition.



24) The interior roof vent screen is intact with no gaps.



25) The double aviation light was operating properly during the inspection.

26) The dry interior basebell coating is in good condition overall with no significant deterioration.

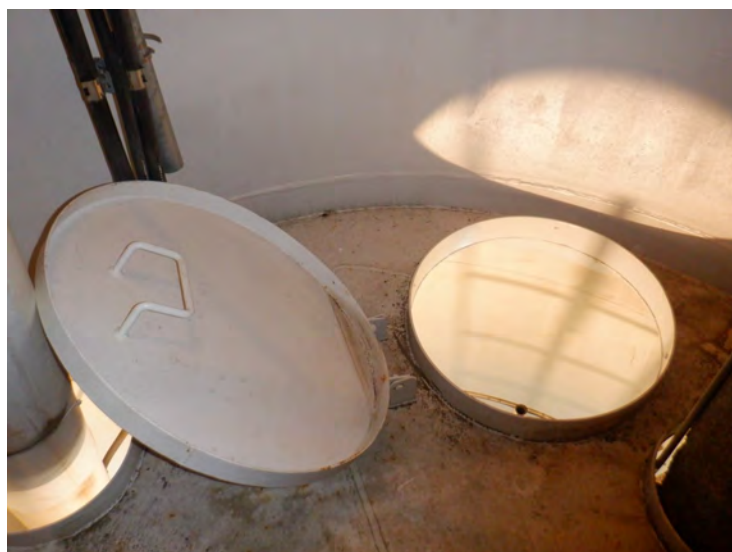


27) Same.



28) There is a check valve on the condensate platform drain.

29) The baseball ladder is in good condition. The ladder is equipped with a fall prevention device.



30) The ladder opening at the condensate platform is equipped with a hinged cover.



31) Minor coating failures on the condensate platform.

32) Same.



33) Coating failures along a stiffener in the dry riser.



34) Same.

35) The dry riser coating is in good condition overall.



36) There is no cover over the fill/draw pipe insulation.

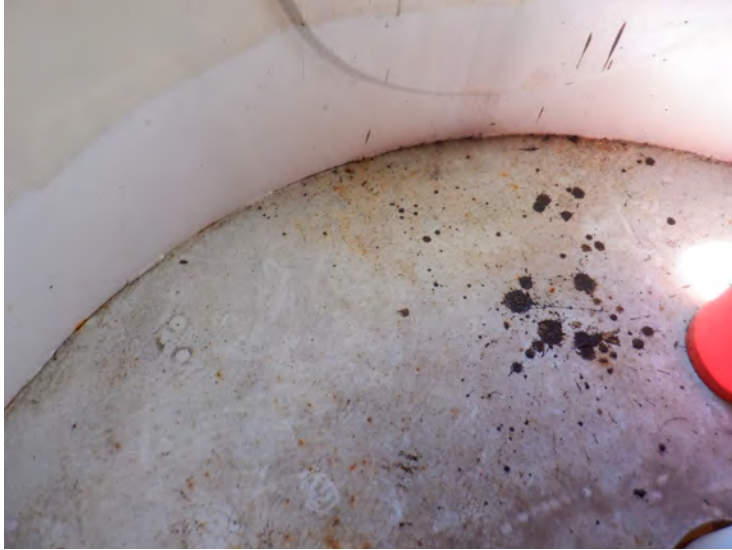


37) The riser ladder is in good condition. The ladder is equipped with a fall prevention device.

38) The ladder opening at the top platform is equipped with a hinged cover.



39) Minor coating failures on the top platform.



40) Coating on the top platform is in good condition overall.

41) There is a handhold above the painter's hatch at the top of the riser.



42) The mud valve operated properly during the inspection.



43) There is a rigging lug on the bowl above the top platform hatch.

44) Extensive rust bleedthrough on the bowl.



45) Same.



46) Extensive rust bleedthrough in the access tube.

47) Same.



48) Coating failures on the wet interior manway.



49) The access tube ladder is in good condition. The ladder is equipped with a fall prevention device.

50) Coating on the wet interior roof is in good condition with no significant deterioration.



51) Same.



52) Same.

53) There is heavy mineral staining on the wet interior sidewall but no coating failures.



54) Same.



55) Same.

56) There are no coating failures on the access tube in the wet interior.



57) Same.



58) The cathodic protection system appears to be in good condition.

59) The wet interior ladder is in good condition. The ladder is equipped with a fall prevention device.



60) The wet interior manway cover is in good condition.



61) The coating on the bowl is in good condition overall.

62) Same.



63) Same.



64) There are no deflector bars over the fill/draw pipe in the wet interior.

65) The mud valve operated properly during the inspection.



66) The cover over the pit in the basebell is in good condition.



67) Minor coating failures on the pit piping.

68) Same.



69) The bellows type expansion joint on the fill/draw pipe is in good condition.

Dixon Engineering, Inc.

Maintenance Inspection

200,000 Gallon Spheroid
(Quinlan Drive)

Pewaukee, Wisconsin

Inspection Performed: November 16, 2021
Reviewed by Joseph T. Hoban P.E.: December 14, 2021

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CONCLUSIONS:

1. The exterior coating is a urethane system. The coating is in good to fair condition overall. Coating deterioration includes spot failures to the substrate with rust undercutting, topcoat delamination, and erosion. There are numerous coating failures on the basebell and roof.
2. The dry interior coating is an epoxy system. Coating deterioration includes spot failures to the substrate and rust bleedthrough. Most of the failures are on the topside of the platforms, transition cone, and access tube.
3. The wet interior coating is an epoxy system. Below the high-water level coating deterioration includes spot failures to the substrate with rust undercutting and topcoat delamination on the bowl and sidewall. Above the high-water level coating is deteriorating at the roof panels.

RECOMMENDATIONS (GENERAL AND IMMEDIATE WORK):

Annually inspect the roof vent, hatches, and any other health or security items on the structure. The work could be performed by in-house personnel or contracted as part of a regular maintenance program.

Schedule regular cleanings and inspections of the tank by an independent third party once every five years as recommended by AWWA.

1. Continue to maintain the cathodic protection system. The cost would be dependent on your contract with your cathodic vendor.

RECOMMENDATIONS (IMMEDIATE WORK TO MEET WISCONSIN DNR REQUIREMENTS):

The Wisconsin DNR may allow some of the required changes to be delayed until the next paint project. These items are listed as immediate work since they are currently out of compliance.

1. Modify the overflow pipe discharge so it points downward and so the air gap is 12 to 24 inches to bring it into compliance with current Wisconsin DNR requirements. The estimated cost is \$2,000.
2. Install a gasket on the wet interior roof hatch to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project or could be performed by in-house personnel.
3. Replace the roof vent with a pressure vacuum vent to meet current Wisconsin DNR requirements. The estimated cost is \$6,000.

RECOMMENDATIONS (WITH THE NEXT PAINT PROJECT):

Complete the recommended work in one to two years. The repairs and upgrades should be completed during the next major tank rehabilitation project when coating repairs are made.

1. Abrasive blast clean the exterior inside a dust tight containment system and repaint with a urethane system. The estimated cost is \$140,000 plus \$100,000 for containment.
2. Spot abrasive blast clean the topside of the platforms, the entire access tube, transition cone, and other spot coating failures in the dry interior. Spot repaint all prepared surfaces with an epoxy coating system. The estimated cost is \$30,000.
3. Abrasive blast clean the entire wet interior and repaint with an epoxy system. The estimated cost is \$75,000.
4. Abrasive blast clean the pit piping and repaint with an epoxy system. The estimated cost is \$5,000.
5. Recoat the foundation to help prevent deterioration. The cost would be incidental to exterior painting.
6. Install a painter's railing outside the existing roof handrail. The estimated cost is \$6,000.
7. Install rigging couplings on the roof for temporary fall prevention of workers in the wet interior. The cost would be incidental to the next painting project.
8. Remove all antennas and antenna cables prior to abrasive blast cleaning and repainting. The cost is assumed to be the responsibility of the antenna owners.
9. Install a handhold at the wet interior roof hatch, access tube roof hatch, and painter's (bird) hatch. The handhold would assist the climber while entering and exiting the openings. The cost would be incidental to the next painting project.
10. Install a rigging lug on the transition cone above the top platform opening. The cost would be incidental to the next painting project.
11. Install a mud valve in the bottom of the tank. The estimated cost is \$5,000.

A DISCUSSION ON RESCUE AND RETRIEVAL OPERATIONS FROM ELEVATED STORAGE TANKS

Working on elevated water storage tanks is inherently dangerous. OSHA regulations give guidelines for the climbing on elevated structures. Contractors and Engineers/Consultants are responsible for their own employees, but even with safety training and proper equipment, accidents can occur. Most rescue squads are local or neighboring fire departments, with some departments having more experience than others. Water storage tanks are designed to store water and are not suited for rescue or retrieval convenience. We recommend that you meet with your local rescue personnel and draft a rescue plan. A copy of the plan should be kept at the tank and with the rescue crew.

OSHA does not require 30 inch manways or hatches but for rescue purposes 30 inch openings would allow enough room for a rescue basket with an injured person on it to pass through. Smaller openings may not be sufficient for retrieval.

Rescue personnel would gain access to the injured person using the existing ladders while attached to fall prevention devices. If possible, the basket would be lowered through the riser and out the opening in the bottom. If needed, the rescue crew would work from the roof inside a handrail. A tripod would be used to attach a winch to the basket. If the basket cannot fit through the riser then it would need to be raised to the roof.

From the roof it is possible to lower the basket over the side to ground level, but that would require a very large winch and increased loading on the attachment point. On a rainy, windy, or snowy day, the objective would be to get rescue personnel off the roof as soon as possible, so lowering through the dry interior is preferred. A helicopter rescue would need to be performed if it is not possible to lower the rescue basket down the dry interior.

Upgrades intended to make a rescue easier are included in this report. Dixon recommends 30 inch manways or hatches where possible and fall prevention devices on all ladders.

COST SUMMARY:

Exterior repaint with containment	\$240,000
Dry interior partial repaint	30,000
Wet interior repaint	75,000
Pit piping repaint	5,000
Roof painter's railing	6,000
Overflow discharge modification	2,000
Pressure vacuum roof vent	6,000
Mud valve	<u>5,000</u>
Sub Total	\$369,000
Engineering and Contingencies	<u>\$74,000</u>
Total	\$443,000

Notes: Exterior coating is primarily for aesthetics and can be delayed since the next paint job cannot be an overcoat. While the appearance will deteriorate the structural integrity should not be impacted.

Exterior repainting will require temporary removal and relocation of the antennas and cables. This cost is not included in these estimates and is assumed to be the responsibility of the antenna owners. Cost is also not included for coordinating with the antenna carriers or for any redesign work needed for antenna mounting or cable routing.

INSPECTION:

On November 16, 2021, Dixon Engineering Inc. performed a maintenance inspection on the 200,000 gallon spheroid (Quinlan Drive) elevated water storage tank owned by the Village of Pewaukee, Wisconsin. Purposes of the inspection were to evaluate the interior and exterior coating's performance and life expectancy, assess the condition of metal surfaces and appurtenances, review safety and health aspects, and make budgetary recommendations for continued maintenance of the tank. All recommendations with budgeting estimates for repairs are incorporated in this report.

The inspection was performed by James Rowley, P.E. The inspector was assisted by Larry Houck and Ben Wozniak, Staff Technicians.

A source of water for cleaning was provided by the Village. Sediment was flushed from the wet interior. Following the inspection, chlorine was added to disinfect the tank per AWWA Standard C652-19 Method No. 3. Photos are included with this report.

GENERAL INFORMATION:

The tank was built in 1996 by Maguire Iron with a height to high-water level of 169 feet 6 inches.

CONDITIONS AND RECOMMENDATIONS:

EXTERIOR COATING CONDITIONS:

Information provided by the Owner to DIXON indicates that the exterior was last painted in 1997. The exterior was abrasive blast cleaned to SSPC-SP6 commercial condition. The coating applied was a urethane system.

The coating is in good to fair condition overall. The coating is beginning to chalk and fade and there is loss of gloss. Surfaces have faded due to exposure to ultraviolet light which is a normal occurrence for an exterior coating system.

The basebell coating is in fair condition with numerous failures. Primary method of deterioration is spot failures to the substrate with rust undercutting.

The riser and bowl coating is in good condition with a few failures. Primary method of deterioration is spot failures to the substrate with rust undercutting. The bowl is covered with moderate mildew growth.

The sidewall coating is in good condition with a few failures. Primary methods of deterioration are spot failures to the substrate and delaminated topcoat.

The roof coating is in fair condition with numerous failures. Primary methods of deterioration are spot failures to the substrate, delaminated topcoat, and erosion.

EXTERIOR COATING RECOMMENDATIONS:

Budget for total exterior coating removal and repainting in approximately one to two years or when aesthetics dictate. Fading will continue, and more rust spots will occur decreasing the tank's aesthetic appearance.

Remove the existing coating by dry abrasive blast cleaning the steel to a commercial (SSPC-SP6) condition and apply a urethane system. All blast work would be performed inside a dust tight containment system using negative air pressure.

Total removal is recommended because the coating failures are extensive and it is not practical to attempt to spot repair all failed areas.

The coating system would consist of a full prime coat on the bare metal, a full coat of epoxy, and followed by two full coats of urethane. The urethane system offers excellent abrasion resistance with high gloss and sheen retention. The expected life of this system is fifteen years. The system can be overcoated in fifteen years, and a second time approximately fifteen years after the first overcoat, extending the total life of the coating to approximately forty-five years before total removal would be necessary. The tank would be removed from service during the coating project. This is necessary to reduce condensation on the tank's surface. Urethane coatings have a minimum temperature requirement for application and are sensitive to moisture during the curing process. If moisture is present during the curing process, the appearance will become cloudy with little or no gloss. The estimated cost is \$140,000 plus \$100,000 for containment.

DRY INTERIOR COATING CONDITIONS:

The dry interior on this structure is defined as the non-water contact surfaces, consisting of the basebell, riser, transition cone, and access tube.

Information provided by the Owner to DIXON indicated the dry interior was last painted in 1997. The dry interior was abrasive blast cleaned to SSPC-SP6 commercial condition. The coating applied was an epoxy system.

The basebell coating is in good condition with a few failures. Primary method of deterioration is spot failures to the substrate with rust undercutting. Most of the failures are on the baseplate.

The riser coating is in good condition with a few failures. Primary methods of deterioration are spot failures to the substrate and rust bleedthrough. Most of the failures are on the stiffeners.

The coating on the topside of the platforms is in poor condition with extensive failures. Primary method of deterioration is spot failures to the substrate with rust undercutting.

The transition cone and access tube coating is in poor condition with extensive rust bleedthrough.

DRY INTERIOR COATING RECOMMENDATIONS:

Spot abrasive blast clean the dry interior to a commercial (SSPC-SP6) condition including the topside of the platforms, the entire access tube, the entire transition cone, and other areas of failed coating. The prepared surfaces would be coated with an epoxy system. The work should be performed with an exterior/wet interior painting project. The estimated cost is \$30,000.

WET INTERIOR COATING CONDITIONS:

Information provided by the Owner DIXON indicated the wet interior was last painted in 1997. The wet interior was abrasive blast cleaned to SSPC-SP10 near-white condition. The coating applied was an epoxy system.

The roof coating is in poor condition with numerous failures. Primary methods of deterioration are spot failures to the substrate with rust undercutting, rust bleedthrough, and delaminated topcoat.

The sidewall coating is in poor condition with a few failures. Primary method of deterioration is spot failures to the substrate with rust undercutting. There is no significant coating damage at the high-water level which would be the area most affected by ice movement. Most of the coating failures are on the weld seams.

The access tube coating is in good condition with no significant deterioration.

The coating on the transition cone is in poor condition with numerous failures. Primary methods of deterioration are spot failures to the substrate with rust undercutting and delaminated topcoat.

The bowl was covered with approximately one inch of sediment that was flushed from the interior during the inspection.

WET INTERIOR COATING RECOMMENDATIONS:

Budget to repaint the wet interior in one to two years. Abrasive blast clean the entire wet interior to a near-white metal (SSPC-SP10) condition. Wet interior coating systems must be approved for potable water storage tanks contingent upon meeting requirements of NSF/ANSI 61.

Apply a three-coat epoxy system to the prepared surfaces. Epoxy coating systems are recommended in most applications because they have good adhesion and abrasion resistant qualities. The estimated cost is \$75,000.

CATHODIC PROTECTION CONDITIONS:

The tank has a suspended impressed current cathodic protection system. Surfaces below the high-water level are protected by the submerged system that is suspended from arms attached to the access tube. The supporting ropes, arms, and anode wires appear to be in good condition with no visible damage.

CATHODIC PROTECTION RECOMMENDATIONS:

Continue to maintain the cathodic protection system. The cost would be dependent on your contract with your cathodic vendor.

PIT AND BUILDING PIPING CONDITIONS:

There is a pit in the basebell that contains piping and valves. The pit has a wooden cover that is in good condition. The piping is in good condition. The coating on the piping is in poor condition with extensive failure.

There is a building adjacent to the tank that contains piping and valves. The piping is above the floor. The piping is in good condition. The coating on the piping is in fair condition with general surface corrosion.

PIT AND BUILDING PIPING RECOMMENDATIONS:

Abrasive blast clean the piping in the pit to a commercial (SSPC-SP6) condition and repaint with an epoxy system. The estimated cost is \$5,000.

Dixon typically does not recommend abrasive blast cleaning in the control building unless there is significant steel loss from corrosion on the piping. Even when thoroughly sealed there is a risk of the dust damaging the controls and/or motors. Spot coating repairs could be performed by in-house personnel as needed.

FOUNDATION AND ANCHOR BOLT CONDITIONS:

The exposed concrete foundation is in good condition with no deterioration. The top of the foundation is coated. The coating is in fair condition with some erosion.

There are anchor bolts evenly spaced on the baseplate around the basebell. The anchor bolts are in good condition with no steel loss.

FOUNDATION AND ANCHOR BOLT RECOMMENDATIONS:

Recoat the exposed concrete with an epoxy coating system to help prevent deterioration. The cost would be incidental to exterior painting.

GROUT CONDITIONS:

The grout between the baseplate and the foundation is in good condition with none damaged or missing.

ROOF HANDRAIL, PAINTER'S RAILING, AND ROOF RIGGING CONDITIONS:

There is a handrail on the roof surrounding the roof hatches and the vent. The handrail is in good condition. The handrail is being used for antenna mounting. There is not a painter's railing on the roof.

There are no roof rigging couplings for safety and staging lines during wet interior coating work.

ROOF HANDRAIL, PAINTER'S RAILING, AND ROOF RIGGING RECOMMENDATIONS:

Install a painter's railing outside the existing roof handrail. The railing gives the contractor a rigging point for staging. The estimated cost is \$6,000.

Install rigging couplings on the roof under the new painter's railing for fall prevention of workers in the wet interior. The cost would be incidental to the next painting project.

LIGHTING/ELECTRICAL CONDITIONS:

The tank has a double aviation light with a photoelectric cell on the roof that is in good condition. The light is operating properly.

There are light fixtures located in the dry interior. The lights were operational during the inspection.

ANTENNA CONDITIONS:

There are fifteen roof antennas and miscellaneous antenna equipment attached to the handrail. There are six antennas and miscellaneous antenna equipment on the riser attached to mounting brackets below the painter's railing. The antenna cable routing is in good condition and does not interfere with climbing or tank operations. The cable penetrations through the basebell, riser, and access tube cover plate on the roof are sealed with rubber boots.

ANTENNA RECOMMENDATIONS:

Remove all antennas and antenna cables prior to abrasive blast cleaning and repainting. The cost is assumed to be the responsibility of the antenna owners.

OVERFLOW PIPE CONDITIONS:

The overflow pipe extends along the access tube in the dry interior, down through the dry riser, and exits near the bottom of the basebell. The overflow pipe discharge is at an angle. The discharge end of the overflow pipe is screened. The screen is in good condition but is oversized. The pipe discharges to a splash pad. The air gap does not meet the required 12-24 inches.

OVERFLOW PIPE RECOMMENDATIONS:

Modify the overflow pipe discharge so it points downward and so the air gap is 12 to 24 inches to bring it into compliance with current Wisconsin DNR requirements. The estimated cost is \$2,000.

HATCH AND MANWAY CONDITIONS:

There is a 30 inch diameter roof hatch to the wet interior that is in good condition. The hinged cover is in good condition. There is no handhold next to the hatch to aid the climber while entering and exiting the opening. The hatch was not secured. The hatch neck curb height meets the minimum height requirement of 4 inches. The hatch cover lip meets the minimum height requirement of 2 inches. There was no gasket on the hatch.

There is a 30 inch diameter roof hatch into the dry interior that is in good condition. The hinged cover is in good condition. There is no handhold next to the hatch to aid the climber while entering and exiting the opening.

There is a 20 inch diameter manway in the transition cone to the wet interior that is in good condition. The manway gasket showed no signs of leakage and the bolt is in good condition.

There is a service door in the basebell that is in good condition. The door operated properly during the inspection.

There is a painter's hatch (bird hatch) at the top of the riser that is in good condition. There is no safety handhold above the hatch.

The platform ladder openings are 30 inch diameter. The openings are equipped with hinged covers. There are safety handholds next to the openings.

There is not a rigging attachment point on the transition cone for rescue retrieval line attachment.

HATCH AND MANWAY RECOMMENDATIONS:

Install a handhold at the wet interior roof hatch, access tube roof hatch, and painter's (bird) hatch. The handhold would assist the climber while entering and exiting the openings. The cost would be incidental to the next painting project.

Install a gasket on the wet interior roof hatch to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project or could be performed by in-house personnel.

Install a rigging lug on the transition cone above the top platform opening. The cost would be incidental to the next painting project.

VENT CONDITIONS:

The roof vent is a flow through design that is in fair condition. The screen is in fair condition. The screen mesh size is larger than the recommended 24 mesh. This is a possible entry point for insects, though none were observed inside the tank.

VENT RECOMMENDATIONS:

Replace the roof vent with a screened pressure vacuum vent to meet current Wisconsin DNR requirements. The new vent would have a movable plate that would allow air to flow in and out of the tank even if the screens become plugged or frosted over. The vent would have a rain shield to prevent rainwater from entering the storage tank during high winds. The estimated cost is \$6,000.

LADDER CONDITIONS:

The dry interior ladders in the basebell, riser, and access tube are in good condition. The ladders meet current OSHA size requirements. The ladders are equipped with cable-type fall prevention devices that are in good condition.

There is a wet interior ladder from the roof to the bowl that is in good condition. The rungs above the high-water level are corroded with steel loss. The ladder meets OSHA size requirements. The ladder is equipped with a cable-type fall prevention device that is in good condition.

FILL/DRAW PIPE CONDITIONS:

The tank fills and draws from a single pipe. The pipe routes through the dry interior into the bottom of the transition cone and extends approximately 10 inches into the wet interior. There are deflector bars over top of the pipe in the wet interior. There is an abandoned pipe with a blind flange in the wet interior that extends up to near the high-water level.

There is a sample tap on the fill/draw pipe located in the building. The tap has a smooth end, faces downward, and is inside a heated room.

There is a threaded coupling on the fill/draw pipe in the pit for future attachment of a chemical feed line.

EXPANSION JOINT CONDITIONS:

The fill/draw pipe is equipped with a bellows type expansion joint located in the pit. The expansion joint appears to be in good condition.

INSULATION CONDITIONS:

The fill/draw pipe is covered with rigid foam insulation. The insulation is covered with an aluminum jacket. The cover is in good condition.

MUD VALVE CONDITIONS:

There is a threaded drain plug located in the bottom of the tank to aid in removal of sediment during inspections and routine maintenance. The pipe is routed to the overflow pipe and was not used during the inspection. The drain is only accessible from the wet interior.

MUD VALVE RECOMMENDATIONS:

Install a mud valve to aid with removal of sediment during regular maintenance inspections. Without a mud valve the sediment must be removed by sending it down the fill/draw pipe and flushing it out of a hydrant, which may not be possible on your tank. The estimated cost is \$5,000.

CONDENSATE DRAIN CONDITIONS:

There is a condensate drain line that routes from the platform to the overflow pipe. There is a check valve in the line to stop backflow during overflow conditions. The line is in good condition. The drain opening appeared to be operational.

WET INTERIOR METAL CONDITIONS:

The steel structure is in good condition overall. No pitting was observed at the coating failures on the sidewall or transition cone.

DIXON ENGINEERING, INC.
STEEL TANK FIELD INSPECTION REPORT
PEDESTAL TANK

DATE: November 16, 2021

OWNER: Village of Pewaukee

CLIENT CODE: 49-68-10-04

TANK NAME: Quinlan Drive

LOCATION: Address: 1010 Quinlan Drive

City: Pewaukee

State: Wisconsin

TANK SIZE: Capacity: 200,000 gallons

Bottom (LWL): 139 feet 6 inches (from nameplate)

Overflow (HWL): 169 feet 6 inches (from nameplate)

CONSTRUCTION:

Type: Spheroid

YEAR CONSTRUCTED: 1996

MANUFACTURER: Maguire Iron

USE: Potable water and fire protection

Coating information below is from: Coating information provided by Owner and an exterior coating sample taken for type (previous report)

COATING HISTORY	EXTERIOR	WET INTERIOR	DRY INTERIOR
YEAR COATED	<u>1997</u>	<u>1997</u>	<u>1997</u>
CONTRACTOR	<u>Roberts Painting</u>	<u>Roberts Painting</u>	<u>Roberts Painting</u>
SYSTEM	<u>Urethane</u>	<u>Epoxy</u>	<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC-SP6</u>	<u>SSPC-SP10</u>	<u>SSPC-SP6</u>
MANUFACTURER	<u>Tnemec 140/74</u>	<u>Tnemec 140</u>	<u>Tnemec 140</u>
HEAVY METAL COATING SAMPLES	<u>No</u>	<u>No</u>	<u>No</u>
HEAVY METAL BEARING	<u>No</u>	<u>No</u>	<u>No</u>

PERSONNEL: Lead inspector James Rowley

Crew members Ben Wozniak, Larry Houck

METHOD OF INSPECTION: Dry

SITE CONDITIONS

Fenced: **No**

Site large enough for contractor's equipment: **Yes**

Control building: **Yes**

Antenna control site: **Yes**

Number: **3**

Type: **Building**

Location: **Adjacent to tank**

Would antenna sites interfere with containment: **Yes**

Power lines within 50 feet: **No**

Site drainage: **Away from tank**

Indications of underground leakage: **No**

Shrub, tree, etc. encroachment: **No**

EXPOSED PIPING

Location: **Tank base (in pit)**

Adjacent to tank (in building)

Condition of structure: **Good**

Structure is: **Dry**

Pump present: **Yes**

Drain line present: **No**

Cover condition: **Good, it is wood**

Locked: **No**

Pipe coating condition: **Poor**

Describe coating: **Spot coating failures to substrate, rust bleedthrough**

Condition of metal: **Good**

Piping comments: **There is a pit with piping and an adjacent building with piping**

FOUNDATION

Foundation exposed: **Yes**

Exposed height: **0-10 inches**

Exposed foundation condition: **Good**

Damage or deterioration: **No**

Foundation coated: **Top only**

Coating condition: **Fair**

Grout condition: **Good**

Amount missing: **0 feet**

Undermining of foundation: **No**

EXTERIOR COATING

Basebell:

Topcoat condition: **Fair**

Previous coat/system condition: **Good**

Describe coating: **Spot coating failures to substrate, rust undercutting**

Dry film thickness: **14-17 mils**

Adhesion: **5A (tape did not adhere due to low temperature)**

Metal condition: **Good**

Basebell comments: **Coating failures throughout baseplate and anchor bolts. Spot coating failures throughout**

Riser:

Topcoat condition: **Good**

Previous coat/system condition: **Good**

Describe coating: **Spot coating failures to substrate, rust undercutting**

Dry film thickness: **12-15 mils**

Adhesion: **Not taken**

Reason not taken: **Cold**

Mildew growth: **No**

Metal condition: **Good**

Bowl:

Topcoat condition: **Good**

Previous coat/system condition: **Good**

Describe coating: **Spot coating failures to substrate, rust undercutting**

Mildew growth: **Yes**

Metal condition: **Good**

Sidewall:

Lettering: **No**

Logo: **No**

Topcoat condition: **Good**

Previous coat/system condition: **Good**

Describe coating: **Delaminating, spot coating failures to substrate**

Metal condition: **Good**

Roof:

Topcoat condition: **Fair**

Previous coat/system condition: **Good**

Describe coating: **Delaminating, spot coating failures to substrate, erosion**

Dry film thickness: **6-10 mils**

EXTERIOR COATING

Adhesion: **Not taken**

Reason not taken: **Cold**

Metal condition: **Good**

Roof comments: **Coating failures due to antenna abrasion from hoisting equipment**

EXTERIOR APPURTENANCES

Basebell Door:

Size: **34 x 80 inches**

Metal condition: **Good**

Anchor Bolts:

Number: **20**

Diameter: **1³/₄ inches**

Location: **Exterior**

Metal condition: **Good**

Overflow Pipe:

Diameter: **8 inches**

Metal condition: **Good**

Discharge orientation: **Angle**

Screen condition: **Good**

Percent of screen open: **100**

Mesh size: **4**

Flap gate/duck bill check valve: **No**

Air gap: **Yes**

Lowest part of discharge to the ground distance: **10 inches**

Height to basebell penetration: **35 inches**

Overflow discharges to: **Concrete pad**

Condition: **Poor**

Overflow comments: **Discharges to concrete pad with pipes that routes under driveway and discharges to riprap**

Roof Handrail:

Diameter: **12 feet**

Height: **42 inches**

Midrail height: **24 inches**

Kick plate height: **4 inches**

Vertical post type: **Angle**

Size: **2 x 2 inches**

Top rail type: **Angle**

EXTERIOR APPURTENANCES

Size: **2½ x 2 inches**

Midrail type: **Plate**

Size: **¼ x 2 inches**

Metal condition: **Good**

Painter's Rail:

N/A

Roof Rigging Points:

N/A

Removable Cathodic Covers:

N/A

Wet Interior Roof Hatch:

Neck size: **30 inches**

Distance from center of the tank (to outer edge): **5 feet**

Shape: **Round**

Handhold at opening: **No**

Curb height: **16½ inches**

Cover overlap: **6 inches**

Gasket on cover/neck curb: **No**

Hatch security: **None**

Metal condition: **Fair**

Hatch comments: **There are 4 mesh screens in the hatch curb. Coating is in poor condition and there is some steel loss from corrosion**

Dry Interior Roof Hatch:

Neck size: **30 inches**

Shape: **Round**

Handhold at opening: **No**

Hatch security: **None**

Metal condition: **Good**

Hatch comments: **There are 4 mesh screens in the hatch curb**

Bolted Ventilation Hatch:

N/A

EXTERIOR APPURTENANCES

Roof Vent:

Number: **1**
Distance from center of the tank (to outer edge): **5½ feet**
Type: **Flow-through**
Neck diameter: **24 inches**
Flange opening diameter: **24 inches**
Screen condition: **Fair**
 Mesh size: **2**
Rain shield: **Yes**
Height of the lowest screen above the roof: **17½ inches**
Metal condition: **Good**

Aviation Lights:

Design: **Double red**
Location: **Free-standing mount**
Functioning: **Yes**
Globe condition: **Good**
Photoelectric cell: **Yes**
 Location: **Roof**

Antennas:

Roof number: **15**
 Attached to: **Handrail**
Riser number: **6**
 Attached to: **Mounting frames**
Basebell cable penetrations sealed: **Yes**
 Sealed with: **Rubber boots and covered with doghouse**
Upper riser cable penetrations sealed: **Yes**
 Sealed with: **Rubber boots**
Roof cable penetrations sealed: **Yes**
 Sealed with: **Rubber boots**
Antenna or cables interference: **No**

Electrical Components:

Electrical conduit condition: **Good**
Exposed wiring: **No**

DRY INTERIOR COATING

Basebell:

Coating condition: **Good**
Describe coating: **Spot coating failures to substrate, rust undercutting**

DRY INTERIOR COATING

Dry film thickness: **13-15 mils**

Metal condition: **Good**

Floor: **Stone**

Drain line present: **No**

Comments: **Coating failures throughout the baseplate**

Condensate Platform:

Platform design: **Full**

Coating condition: **Poor**

Describe coating: **Spot coating failures to substrate, rust undercutting**

Metal condition: **Good**

Ladder opening size: **30 inches**

Shape: **Round**

Opening covered: **Yes**

Handhold at opening: **Yes**

Drain: **Yes**

Size: **2 inches**

Type: **To overflow**

Check valve: **Yes**

Platform comments: **Approximately 90% of the coating is gone**

Riser above the Condensate Platform:

Coating condition: **Good**

Describe coating: **Spot coating failures to substrate, rust bleedthrough**

Dry film thickness: **15-20 mils**

Metal condition: **Good**

Comments: **Coating failures are mainly at stiffeners**

Top Platform:

Platform design: **Full**

Material: **Steel plate**

Coating condition: **Poor**

Describe coating: **Spot coating failures to substrate, rust undercutting**

Metal condition: **Good**

Ladder opening size: **30 inches**

Shape: **Round**

Opening covered: **Yes**

Handhold at opening: **Yes**

Top platform comments: **Approximately 90% of coating is gone**

DRY INTERIOR COATING

Riser above the Top Platform:

Coating condition: **Good**

Describe coating: **Spot coating failures to substrate, rust undercutting**

Dry film thickness: **11-13 mils**

Metal condition: **Good**

Transition Cone:

Coating condition: **Poor**

Describe coating: **Rust bleedthrough**

Metal condition: **Good**

Rigging lug above opening: **No**

Access Tube:

Diameter: **42 inches**

Coating condition: **Poor**

Describe coating: **Rust bleedthrough**

Dry film thickness: **9-14 mils**

Metal condition: **Good**

DRY INTERIOR APPURTENANCES

Electrical Components:

Lights functioning: **Yes**

Missing covers (globes and cages): **No**

Additional lights needed: **No**

Electrical outlet/conduit condition: **Good**

Used during inspection: **No**

Sample Tap:

Location: **In building**

Pipe diameter greater than ¼ inch: **Yes**

12 inches or more above the floor: **Yes**

Down turned: **Yes**

Smooth end: **Yes**

In heated room: **Yes**

Condition: **Good**

Sample tap comments: **There are two sample taps in the building**

Threaded Coupling (for chemical feed on the fill/draw pipe):

Location: **In pit**

Condition: **Good**

DRY INTERIOR APPURTENANCES

Expansion Joint:

Location: **Bottom of fill pipe**
Accessible for inspection: **Yes**
Type: **Bellows**
Coating condition: **Fair**
Metal condition: **Good**

Fill/Draw Pipe Insulation:

Insulation cover: **Yes**
Type: **Aluminum**
Condition: **Good**
Seams loose: **No**

Basebell Ladder:

Toe clearance: **7 inches or greater**
Width of rungs: **16+ inches**
Thickness of rungs: **3/4 inch**
Shape of rungs: **Round**
Metal condition: **Good**
Fall prevention device: **Yes**
Type: **Cable**
Function properly: **Yes**
Cage: **No**

Riser Ladder:

Toe clearance: **7 inches or greater**
Width of rungs: **16+ inches**
Thickness of rungs: **3/4 inch**
Shape of rungs: **Round**
Metal condition: **Good**
Fall prevention device: **Yes**
Type: **Cable**
Function properly: **Yes**
Cage: **No**

Painter's (bird) Hatch:

Handhold above hatch: **No**
Metal condition: **Good**
Hatch security: **Pin**

DRY INTERIOR APPURTENANCES

Manway to Wet Interior:

Size: **20 inch diameter**
Location: **In transition cone**
Metal condition: **Fair**

Drain Pipe:

Discharge material: **Pipe**
Discharge slope: **Downward**
Metal condition: **Good**
Mud valve comments: **There is a threaded drain plug that is accessible only from the wet interior**

Access Tube Ladder:

Toe clearance: **Less than 7 inches**
Width of rungs: **16+ inches**
Thickness of rungs: **3/4 inch**
Shape of rungs: **Round**
Metal condition: **Good**
Fall prevention device: **Yes**
Type: **Cable**
Function properly: **Yes**

WET INTERIOR COATING

Roof:

Topcoat condition: **Poor**
Primer coating condition: **Poor**
Describe coating: **Delaminating, spot coating failures to substrate, rust undercutting, rust bleedthrough**
Metal condition: **Good**
Lap seams: **Welded**
Condition of lap seams: **Good**
Roof comments: **Coating failures throughout and at weld burns**

Sidewall:

Topcoat condition: **Poor**
Primer coating condition: **Poor**
Describe coating: **Spot coating failures to substrate, rust undercutting**
Mineral deposits: **Moderate**
Metal condition: **Good**
Active pitting: **No**
Previous pitting: **No**

WET INTERIOR COATING

Sidewall comments: **A few large (approximately 4 x 24 inch) spot coating failures at weld seams**

Access Tube:

Topcoat condition: **Good**

Primer coating condition: **Good**

Describe coating: **No significant coating deterioration**

Mineral deposits: **Moderate**

Metal condition: **Good**

Active pitting: **No**

Previous pitting: **No**

Tank Bottom:

Type: **Transition cone**

Topcoat condition: **Poor**

Primer coating condition: **Poor**

Describe coating: **Delaminating, spot coating failures to substrate, rust undercutting**

Mineral deposits: **Moderate**

Metal condition: **Good**

Active pitting: **No**

Previous pitting: **No**

Sediment depth: **1 inch**

WET INTERIOR APPURTENANCES

Ladder:

Toe clearance: **Less than 7 inches**

Width of rungs: **16+ inches**

Thickness of rungs: **3/4 inch**

Shape of rungs: **Round**

Shape of side rails: **Flat**

Metal condition: **Poor – steel loss from corrosion on top 6 rungs**

Fall prevention device: **Yes**

Type: **Cable**

Function properly: **Yes**

Cathodic Protection:

Clips: **Yes**

Pressure fitting: **Yes**

Location of clips: **Access tube**

Type: **Arms off access tube**

WET INTERIOR APPURTENANCES

Location of controls: **In basebell**

Ropes/arms damaged: **No**

Wires damaged: **No**

Roof Stiffeners/Painters Railing:

N/A

Sidewall Stiffeners:

N/A

Overflow Pipe Inlet:

Type: **Weir box**

Metal condition: **Good**

Fill/Draw Pipe:

Diameter: **12 inches**

Height above the tank bottom: **10 inches**

Deflector over end: **Yes**

Type: **Bars**

Metal condition: **Good**

Fill/Draw pipe comments: **There is an abandoned pipe with a blind flange in the wet interior that extends up to near the high-water level**

Mixer:

N/A

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



200,000 gallon spheroid (Quinlan Drive) elevated water storage tank owned by the Village of Pewaukee, Wisconsin.



1) The foundation, grout, and anchor bolts are in good condition.

2) Same.



3) The service door operated properly during the inspection.



4) The overflow pipe discharges to a splash pad.

5) The screen at the overflow pipe discharge is intact with no gaps.



6) Coating failures on the baseplate.



7) Coating failures on the basebell.

8) Same.

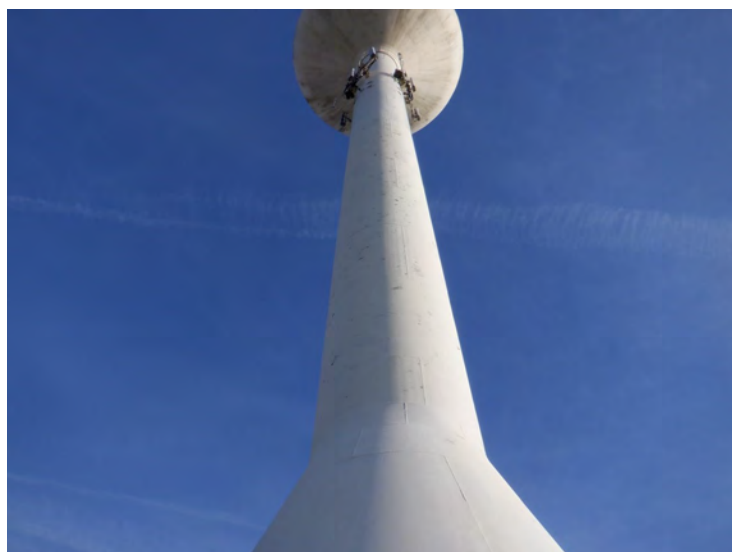


9) Same.



10) The basebell coating is in fair condition overall.

11) Coating failures on the riser.

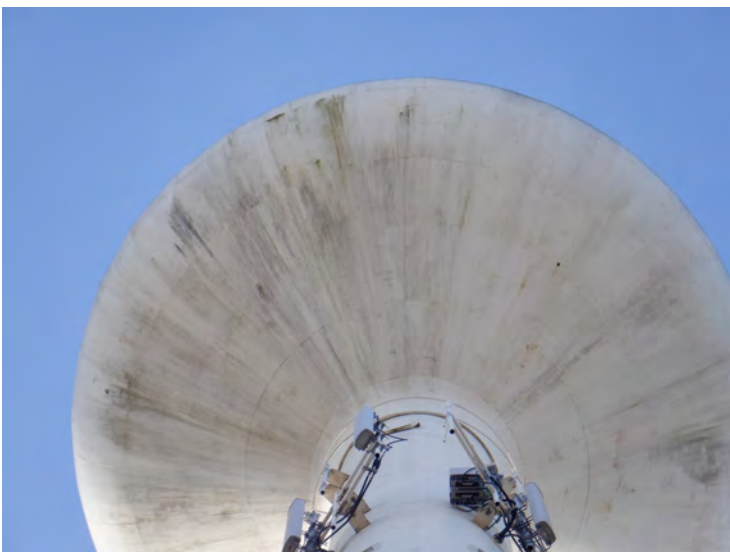


12) The riser coating is in good condition overall.



13) Same.

14) A few coating failures on the bowl.



15) Same.



16) The bowl is covered with moderate mildew growth.

17) Coating failures on the sidewall.



18) The sidewall coating is in good condition overall.



19) Same.

20) Coating failures on the roof.



21) Same.



22) Same.

23) The roof handrail is in good condition. There are antennas attached to the roof handrail. There is not a painter's railing on the roof

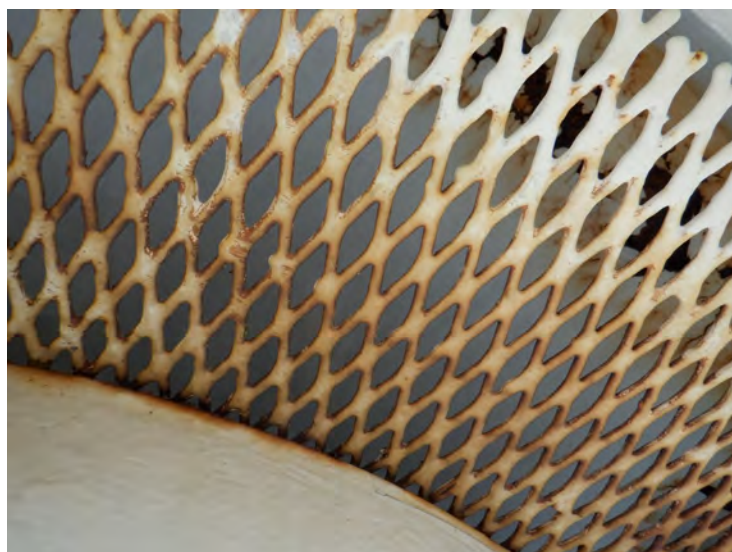


24) There is not a gasket on the wet interior roof hatch.



25) The dry interior roof hatch is in good condition.

26) The roof vent is in fair condition.

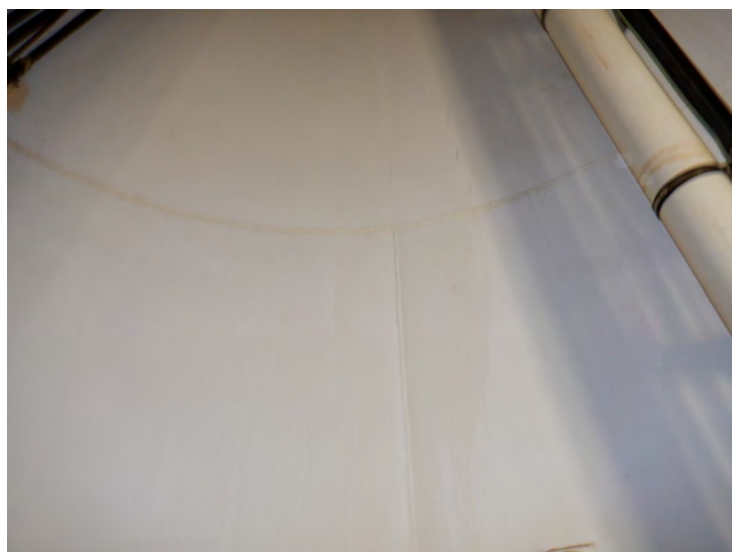


27) The roof vent screen is intact with no gaps.



28) The aviation light was operating properly during the inspection.

29) Coating failures on the baseplate in the dry interior.

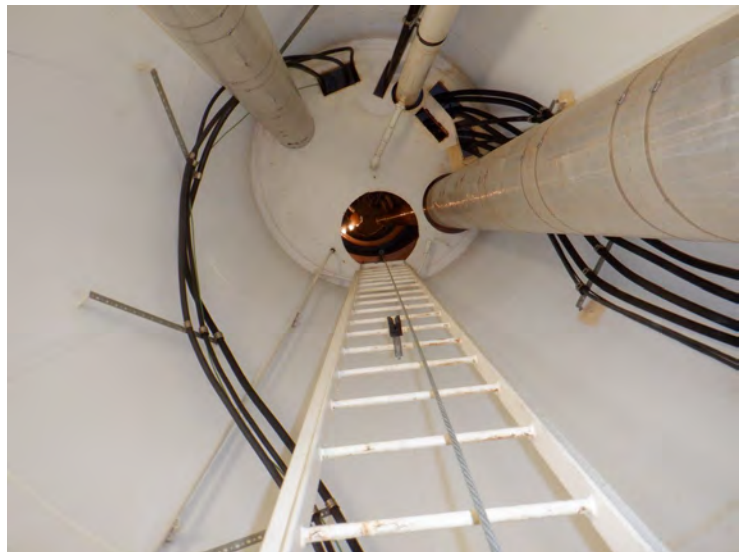


30) The dry interior baseball coating is in good condition overall.



31) Same.

32) The basebell ladder is in good condition. The ladder is equipped with a fall prevention device.



33) There is a check valve on the condensate platform drain.



34) The ladder opening in the condensate platform is equipped with a hinged cover.

35) Coating failure on the condensate platform.



36) Same.



37) Coating failure on a stiffener in the dry riser.

38) Same.



39) The dry riser coating is in good condition overall.



40) The fill/draw pipe insulation and aluminum cover are in good condition.

41) The riser ladder is in good condition. The ladder is equipped with a fall prevention device.



42) The ladder opening at the top platform is equipped with a hinged cover.



43) Coating failure on the top platform.

44) Same.

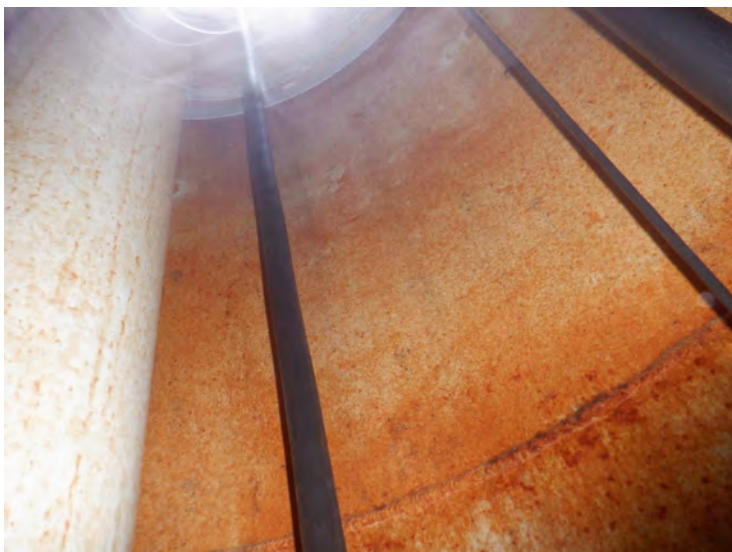


45) Rust bleedthrough on the transition cone.



46) Coating failures on the wet interior manway. The manway is in the transition cone.

47) There is a drain pipe routed to the overflow pipe.



48) Rust bleedthrough in the access tube.



49) Same.

50) The access tube ladder is in good condition. The ladder is equipped with a fall prevention device.



51) Coating failures on the wet interior roof.



52) Same.



53) Same.

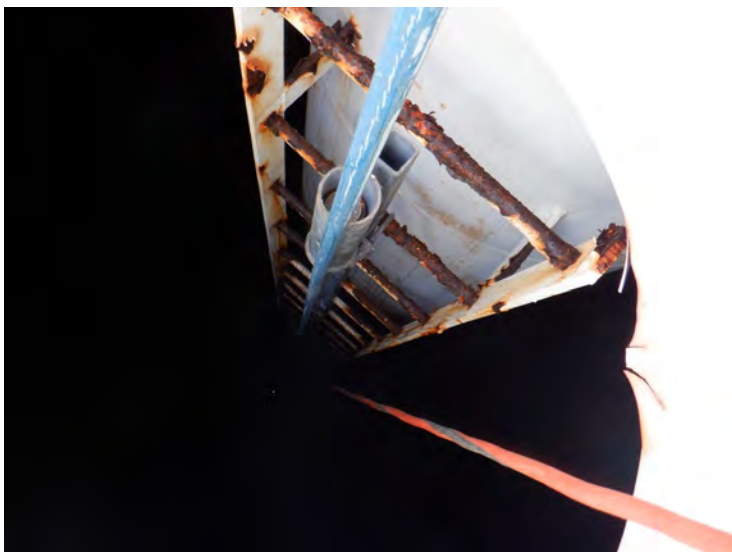


54) The wet interior sidewall coating is in poor condition overall.



55) Same.

56) There is an abandoned pipe with a blind flange in the wet interior that extends up near the high-water level.



57) Steel loss from corrosion on the top rungs of the wet interior ladder.



58) The wet interior ladder is in good condition overall. The ladder is equipped with a fall prevention device.

59) There is no significant coating deterioration on the access tube.



60) The cathodic protection system appears to be in good condition.



61) Coating failures in the transition cone.

62) Same.



63) There is a threaded drain plug in the bowl.me.



64) There are deflector bars over the fill/draw pipe in the wet interior.

65) The wooden cover on the pit is in good condition.



66) Coating failures on the pit piping.



67) Same.

68) The bellow type expansion joint is in good condition.



69) Coating on the piping in the building is in fair condition.



70) Same.

71) The sample tap in the building is in good condition.



Dixon Engineering, Inc.

Maintenance Inspection

125,000 Gallon Concrete Reservoir
(Well 2)

Pewaukee, Wisconsin

Inspection Performed: November 15, 2021
Reviewed by James V. Rowley P.E.: December 15, 2021

Dixon Engineering, Inc.
4811 S. 76th St. Ste. 109, Greenfield, WI 53220

Phone (414) 529-1859
Fax (414) 282-7830
<http://www.dixonengineering.net>
Wisconsin@dixonengineering.net

CONCLUSIONS:

1. The coating on the exterior roof hatches is an unknown system. The coating is in fair condition overall. Coating deterioration includes erosion. The coating failures are minor.
2. The interior concrete is in good condition overall with no significant deterioration.
3. The interior concrete coating is presumed to be an elastomeric system. The coating is in fair condition overall. Coating deterioration includes spot failures, delamination, and erosion. There are a few coating failures on the floor and sidewall.
4. The interior metal appurtenances are not coated.

RECOMMENDATIONS (GENERAL):

Annually inspect the roof vent, hatches, and any other health or security items on the structure. The work could be performed by in-house personnel or contracted as part of a regular maintenance program.

Schedule regular cleanings and inspections of the reservoir by an independent third party once every five years as recommended by AWWA.

RECOMMENDATIONS (IMMEDIATE WORK TO MEET WISCONSIN DNR REQUIREMENTS):

The Wisconsin DNR may allow some of the required changes to be delayed until the next paint project. These items are listed as immediate work since they are currently out of compliance.

1. Modifying the overflow discharge is not practical for this structure. A waiver should be sought from Wisconsin DNR for this non-compliance issue.
2. Install an extension on the roof vent so the screen is 24 inches above the ground to meet current Wisconsin DNR requirements and remove the other finial ball "vent". The work can be performed by in-house personnel.

RECOMMENDATIONS (WITH THE NEXT REHABILITATION PROJECT):

Complete the recommended work in one to two years. The repairs and upgrades should be completed during the next major rehabilitation project.

Best pricing for this work would be obtained if combined with another larger repair or repainting project.

1. Coat the exterior appurtenances with a urethane system. The estimated cost is \$3,000.

2. Abrasive blast clean the exposed rebar in the wet interior and coat with an epoxy system. The estimated cost is \$5,000.
3. Abrasive blast clean the wet interior piping and repaint with an epoxy system. The piping could be allowed to deteriorate and then be replaced once it no longer operates properly, replacement could be performed by in-house personnel. The estimated cost to repaint the piping is \$10,000.
4. The drainage around the reservoir should be verified before starting a long-term project where the chance for heavy rain can elevate the ground water. Drains, if present, should be tested for proper operation and cleaned or repaired as needed. Work can be performed by in-house personnel.

COST SUMMARY:

Wet interior piping repaint	\$10,000
Wet interior roof rebar repaint	5,000
Exterior appurtenance repaint	<u>3,000</u>
Sub Total	\$18,000
Engineering and Contingencies	<u>\$4,000</u>
Total	\$22,000

Note: Best pricing for this work would be obtained if combined with another larger repair or repainting project. The Engineering portion of the Engineering and Contingencies estimate is included with the presumption that rehabilitation of this structure will be included with another project. The Engineering estimate would be significantly larger if this work is performed as a stand-alone project.

INSPECTION:

On November 15, 2021, Dixon Engineering, Inc., performed a maintenance inspection on the 125,000 gallon concrete reservoir (Well 2) owned by the Village of Pewaukee, Wisconsin. Purposes of the inspection were to evaluate the interior and exterior coatings' performance and life expectancy, assess the condition of concrete surfaces and the reservoir's appurtenances, review safety and health aspects and make budgetary recommendations for continued maintenance of the reservoir. All recommendations, with budgeting estimates for repairs, are incorporated in this report.

The inspection was performed by James Rowley, P.E. The inspector was assisted by Larry Houck and Ben Wozniak, Staff Technicians.

A source of water for cleaning was provided by the Village. Sediment was flushed from the wet interior. Following the inspection, chlorine was added to disinfect the reservoir per AWWA Standard C652-19 Method No. 3. Photos are included with this report.

GENERAL INFORMATION:

The original construction date is unknown. The reservoir has a sidewall height of 14 feet 1 inch, a length of 55 feet, and width of 24 feet. The reservoir is underground. The sidewall and floor were cast-in-place and the roof is constructed of precast concrete planks.

CONDITIONS AND RECOMMENDATIONS:

EXTERIOR STRUCTURE AND COATING CONDITIONS:

The roof and sidewalls are not visible; the reservoir is underground. No evidence of settling or deformation was noted on the soil cover. Only the roof hatch curbs are exposed and are in good condition.

The exterior metal appurtenances include the roof hatches, overflow pipe, and roof vent. The roof hatches are coated. The coating is in fair condition. The coating on the overflow pipe is in poor condition. The roof vent is not coated.

EXTERIOR STRUCTURE AND COATING RECOMMENDATIONS:

Coat the exterior metal appurtenances with a urethane system. The estimated cost is \$3,000.

INTERIOR STRUCTURE AND COATING CONDITIONS:

The roof is in good condition overall with no significant deterioration. There is some rusting at the surface from rebar chair bases and rebar.

The soil on top of the roof was not saturated with water prior to the inspection to test for leaks. No leaks were detected during the inspection.

The sidewalls and floor are in good condition overall with no cracks or spalls. The floor was covered with approximately one inch of sediment that was flushed from the interior during the inspection.

It is not known when the wet interior was last coated. The coating is likely an elastomeric system. The coating is located on the floor and sidewalls and is in fair condition. There are areas of delamination, spot failures, and erosion.

Overall adhesion of the coating is good. Adhesion was tested using a low-pressure power washer. With poor adhesion it would be possible to notice the coating fluctuate and loose coating could be completely removed during cleaning. This is a crude form of testing, yet the least destructive.

The wet interior metal appurtenances include the fill pipe, draw pipe, overflow pipe, and ladder cleats. The appurtenances are not coated.

INTERIOR STRUCTURE AND COATING RECOMMENDATIONS:

The interior concrete structure has not deteriorated to the point of needing repairs.

Abrasive blast clean the exposed rebar in the wet interior and coat with an epoxy system. The repair is intended to extend the life of the structure by protecting the exposed rebar. The exposed rebar is due to lack of concrete cover during construction. The rebar near the surface has expanded and created a spall exposing the steel. There may be more exposed areas that will appear in the future. The estimated cost is \$5,000.

Abrasive blast clean the wet interior piping and repaint with an epoxy system. The piping could be allowed to deteriorate and then be replaced once it no longer operates properly, replacement could be performed by in-house personnel. The estimated to repaint the piping is \$10,000.

PUMPHOUSE PIPING CONDITIONS:

There is a pumphouse adjacent to the reservoir that contains piping and valves. The piping is above the floor. The piping is in good condition. The coating on the piping is in good condition with no significant deterioration.

SITE DRAINAGE CONDITIONS:

Drawings were not available for review during the inspection. It is unknown if the reservoir was constructed with drainage piping.

DRAINAGE RECOMMENDATIONS:

The drainage around the reservoir should be verified before starting a long-term project where the chance for heavy rain can elevate the ground water. Drains, if present, should be tested for proper operation and cleaned or repaired as needed. Work can be performed by in-house personnel.

OVERFLOW PIPE CONDITIONS:

The overflow pipe exits the upper sidewall, routes below grade to daylight, and discharges near the ground. The overflow pipe discharge is vertical. The discharge end of the overflow pipe is screened. The screen is in good condition. The pipe discharges to a catch basin. The air gap does not meet the required 12-24 inches. The discharge area is in good condition.

OVERFLOW PIPE RECOMMENDATIONS:

Modifying the overflow discharge is not practical for this structure. A waiver should be sought from Wisconsin DNR for this non-compliance issue.

HATCH AND MANWAY CONDITIONS:

There are two 24 inch square roof hatches that are in good condition. The covers are in good condition. The roof hatch curb extends 24 inches above the ground. The hatch was secured with a padlock. There are gaskets on the hatches that are in good condition.

VENT CONDITIONS:

There is a goose neck roof vent that is in good condition. The screen is in good condition.

There is second vent that routes through the pumphouse and exits the roof. The vent is capped with a finial ball with no screen.

VENT RECOMMENDATIONS:

Install an extension on the water storage tank roof vent so the screen is 24 inches above the ground to meet current Wisconsin DNR requirements and remove the other finial ball “vent”. The work can be performed by in-house personnel.

LADDER CONDITIONS:

There are ladder cleats from the roof to the floor that are in good condition.

FILL/DRAW PIPE CONDITIONS:

The fill pipe penetrates through and stubs at the roof.

The reservoir draws from a separate pipe. The draw pipe penetrates through the roof and extends approximately 15 inches above the floor. It is a suction pipe that extends from the roof. There is not a deflector plate or bar over top of the pipe in the wet interior.

There is a sample tap on the fill pipe located in the pumphouse. The tap has a smooth end, faces downward, and is inside a heated room.

DIXON ENGINEERING, INC.
CONCRETE TANK FIELD INSPECTION REPORT

DATE: November 15, 2021

OWNER: Village of Pewaukee

CLIENT CODE: 49-68-10-05

TANK NAME: Well 2

LOCATION: Address: 125 Capitol Drive

City: Pewaukee

State: Wisconsin

TANK SIZE: Capacity: 125,000 gallons

Length: 55 feet (measured)

Width: 24 feet (measured)

Sidewall height: 14 feet 1½ inches (measured)

CONSTRUCTION: Cast-in-place floor and precast roof

Type of roof: Flat

Layout: Below grade

YEAR CONSTRUCTED: Unknown

MANUFACTURER: Unknown

CONTRACT NUMBER: Unknown

USE: Potable water and fire protection

PERSONNEL: Lead inspector James Rowley

Crew members Ben Wozniak, Larry Houck

METHOD OF INSPECTION: Dry

SITE CONDITIONS

Fenced: No

Site large enough for contractor's equipment: Yes

Control building: Yes

Power lines within 50 feet: Yes (estimated distance 40 feet)

Are power lines attached to the structure: No

Site drainage: Away from tank

Indications of underground leakage: No

Shrub, tree, etc. encroachment: No

EXPOSED PIPING

Location: Adjacent to tank (in building)

Condition of structure: Good

Structure is: Dry

Pump present: Yes

Drain line present: Yes

Pipe coating condition: Good

EXPOSED PIPING

Describe coating: **No significant coating deterioration**

Condition of metal: **Good**

FOUNDATION:

Foundation exposed: **No**

DRAINAGE

Access manholes: **No**

EXTERIOR - GENERAL

Roof/Sidewall not exposed

EXTERIOR APPURTENANCES:

Overflow Pipe:

Diameter: **8 inches**

Metal condition: **Good**

Coating condition: **Poor**

Discharge orientation: **Vertical**

Screen condition: **Good**

Percent of screen open: **5**

Mesh size: **24**

Flap gate/duck bill check valve: **No**

Air gap: **Yes**

Lowest part of discharge to the ground distance: **9½ inches**

Height to penetration: **10 inches**

Overflow discharges to: **Catch basin with drain**

Condition: **Good**

Sample Tap:

Location: **In building**

Pipe diameter greater than ¼ inch: **Yes**

12 inches or more above the floor: **Yes**

Down turned: **Yes**

Smooth end: **Yes**

In heated room: **Yes**

Condition: **Good**

Threaded Coupling (for chemical feed on the fill/draw pipe):

Location: **In building**

Condition: **Good**

EXTERIOR APPURTENANCES:

Roof Hatch:

Neck size: **24 inches**
Hatch 24 inches or more above grade: **Yes**
Curb height: **24 inches**
Cover overlap: **3 inches**
Gasket on cover: **Yes**
Hatch security: **Lock**
Coating condition: **Fair**
Metal condition: **Good**
Hatch comments: **Hatch cover is coated aluminum**

Secondary Roof Hatch:

Neck size: **24 inch**
Hatch 24 inches or more above grade: **Yes**
Curb height: **24 inches**
Cover overlap: **3 inches**
Gasket on cover: **Yes**
Hatch security: **Lock**
Coating condition: **Fair**
Metal condition: **Good**
Hatch comments: **Hatch cover is coated aluminum**

Ventilation:

Number: **1**
Type: **Goose neck**
Location: **Roof**
Size: **5 inches**
Vent material: **Steel**
Coating condition: **Not coated**
Material condition: **Good**
Screen condition: **Good**
Mesh size: **24**
Percent of screen open: **100**
Height of the screen above the ground: **21½ inches**

Vent comments: **There is an additional vent in the west chamber that routes through the roof, through the building, and out the building roof. There is a finial ball on top and no screen. Estimated to be 8 inch diameter pipe**

WET INTERIOR GENERAL

Concrete condition: **Good**

Rusting at surface: **Yes**

Location: **Roof**

Type: **Rebar chair base and rebar at surface**

Coating present: **Yes**

Location: **Entire sidewall and floor**

Type of coating: **Likely elastomeric**

Coating condition: **Fair**

Describe coating: **Delaminating, spot failures to substrate, erosion**

WET INTERIOR ROOF

Cracking:

Number of cracks: **None**

Spalling:

Number of areas spalled: **None**

Interior roof comments: **Some exposed rebar and chairs in the east chamber (approximately 25 sq. feet of exposed rebar area)**

WET INTERIOR SIDEWALL

Cracking:

Number of cracks: **None**

Spalling:

Number of areas spalled: **None**

WET INTERIOR FLOOR

Cracking:

Number of cracks: **None**

Spalling:

Number of areas spalled: **None**

WET INTERIOR APPURTENANCES

Cleats:

Material: **Metal**

Toe clearance: **Less than 7 inches**

Width of cleats: **Less than 16 inches**

Thickness of rungs: **1 inch**

WET INTERIOR APPURTENANCES

Shape of rungs: **Square**
Coating condition: **Not coated**
Material condition: **Good**
Fall prevention device: **No**

Roof Beams:

N/A

Columns:

N/A

Overflow:

Type of inlet: **Stubs at wall**
Condition: **Good**
Coating condition: **Not coated**

Fill Pipe:

Diameter: **8 inches**
Height above floor: **14 feet**
Configuration: **Stubs at roof**
Deflector on end: **No**
Coating condition: **Not coated**
Metal condition: **Good**

Separate Draw Pipe:

Diameter: **8 inches**
Height above floor: **15 inches**
Deflector over end: **No**
Removable silt ring: **No**
Coating condition: **Not coated**
Metal condition: **Good**
Draw pipe comments: **Suction line from roof**

Drain Pipe:

N/A

Sump:

Sump Size: **36 x 36 x 5 inches**

Sediment:

Sediment depth: **1/8-1 inch**
Sediment distribution: **Uniform**

WET INTERIOR APPURTENANCES

Could sediment distribution indicate a leak: **No**

Mixer:

N/A

Miscellaneous Appurtenances:

Description: **Level indicator**

Condition: **Good**

CRACK GRADES

Crack Grade	Width
1	Tight, no separation
2	Tight to up to fingernail width
3	Fingernail width up to 1/8 inch
4	1/8 up to 1/4 inch
5	Greater than 1/4 inch

Field Inspection Report is prepared from the contractor's viewpoint. It contains most of the information the contractor needs to prepare his bid for any repairs or repainting. The Engineer uses it to prepare the engineering report. Cost estimates are more accurate if contractor problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site



1) 125,000 gallon underground concrete water storage reservoir (Well 2) owned by the Village of Pewaukee, Wisconsin.

2) The overflow pipe discharges to a catch basin.



3) The screen at the overflow discharge is intact with no gaps or holes.



4) The goose neck roof vent is in good condition.

5) The roof vent screen is intact.



6) The roof hatch curb is more than 24 inches above grade.



7) The roof hatch covers are in good condition with some coating erosion.

8) The ladder cleats from the roof to the floor are in good condition.



9) Rusting at the surface of the wet interior roof.



10) Same.

11) The fill pipe stubs at the wet interior roof.



12) The concrete sidewalls are in good condition with no significant deterioration.



13) Elastomeric coating failures on the wet interior sidewall.

14) Same.

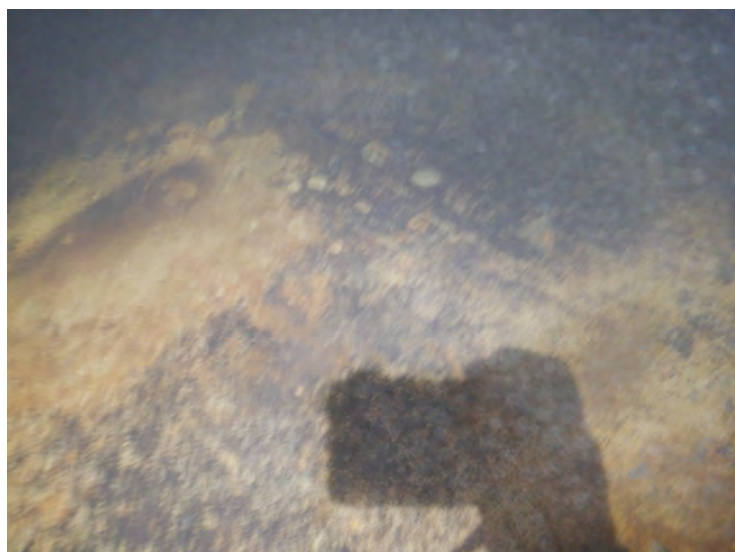


15) The metal wet interior appurtenances are not coated.



16) The wall to floor joint is in good condition.

17) There is no deterioration of the concrete floor.



18) There is some erosion of the elastomeric coating on the floor.



19) Coating on the piping in the pumphouse is in good condition overall.

20) Same.



21) The sample tap in the pumphouse is in good condition.

Dixon Engineering, Inc.

Maintenance Inspection

1,000,000 Gallon Standpipe
(Sunnyridge)

Pewaukee, Wisconsin

Inspection Performed: December 14, 2021
Reviewed by Joseph T. Hoban P.E.: December 21, 2021

Dixon Engineering, Inc.
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CONCLUSIONS:

1. The exterior coating is a urethane overcoat system. The coating is in good condition overall. Coating deterioration includes spot failures to the substrate with rust undercutting and topcoat delamination. There are only a few coating failures throughout.
2. The wet interior coating is an epoxy system. The coating is in good condition overall. Below the high-water level coating deterioration includes spot failures to the substrate and blistering on the sidewall. Above the high-water level coating is deteriorating at the rigging couplings.

RECOMMENDATIONS (GENERAL AND IMMEDIATE WORK):

Annually inspect the roof vent, hatches, and any other health or security items on the structure. The work could be performed by in-house personnel or contracted as part of a regular maintenance program.

Schedule regular cleanings and inspections of the tank by an independent third party once every five years as recommended by AWWA.

1. Continue to maintain the cathodic protection system. The cost would be dependent on your contract with your cathodic vendor.

RECOMMENDATIONS (IMMEDIATE WORK TO MEET WISCONSIN DNR REQUIREMENTS):

The Wisconsin DNR may allow some of the required changes to be delayed until the next paint project. These items are listed as immediate work since they are currently out of compliance.

1. Modify the overflow pipe discharge so it points downward to bring it into compliance with current Wisconsin DNR requirements. The estimated cost is \$3,000.
2. Current Wisconsin DNR requirements state that the ladder start 12 feet above the ground. Since the ladder is properly secured with a vandal guard it may be possible that a waiver may be granted for this non-compliance item.
3. Install deflector bars at the end of the fill/draw pipe in the wet interior to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project.
4. Replace the threaded sample tap on the fill/draw pipe with a smooth ended sample tap to meet current Wisconsin DNR requirements. The work can be performed by in-house personnel.
5. Install a threaded coupling on the fill/draw pipe for a chemical feed line to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project.

RECOMMENDATIONS (WITH THE NEXT PAINT PROJECT):

Complete the recommended work in four years. The repairs and upgrades should be completed during the next major tank rehabilitation project when coating repairs are made.

1. High pressure water clean and overcoat the exterior with a urethane system. The estimated cost is \$110,000.
2. Coat the foundation to help prevent deterioration. The cost would be incidental to exterior painting.
3. Install a 30 inch diameter sidewall manway. The estimated cost is \$10,000.
4. Replace the fall prevention device on the exterior ladder. The estimated cost is \$4,000.

COST SUMMARY:

Exterior overcoat	\$110,000
Overflow discharge modification	3,000
30 inch sidewall manway	10,000
Fall prevention device	<u>4,000</u>
Sub Total	\$127,000
Engineering and Contingencies	<u>\$26,000</u>
Total	\$153,000

INSPECTION:

On December 14, 2021, Dixon Engineering Inc. performed a maintenance inspection on the 1,000,000 gallon water storage standpipe (Sunnyridge) owned by the Village of Pewaukee, Wisconsin. Purposes of the inspection were to evaluate the interior and exterior coating's performance and life expectancy, assess the condition of metal surfaces and appurtenances, review safety and health aspects, and make budgetary recommendations for continued maintenance of the tank. All recommendations with budgeting estimates for repairs are incorporated in this report.

The inspection was performed by Josh Grover, Engineering Technician. The inspector was assisted by Ben Wozniak and Mike Pickett, Staff Technicians.

A source of water for cleaning was provided by the Village. Sediment was flushed from the wet interior. Following the inspection, chlorine was added to disinfect the tank per AWWA Standard C652-19 Method No. 3. Photos are included with this report.

GENERAL INFORMATION:

The tank was built in 1983 by Prairie Tank with a sidewall height of 68 feet 4 inches and a diameter of 51 feet.

CONDITIONS AND RECOMMENDATIONS:

EXTERIOR COATING CONDITIONS:

Information on file with DIXON indicates that the exterior was last painted in 2010. The exterior was pressure washed and spot power tool cleaned to SSPC-SP11 condition. The coating applied was a urethane system.

The sidewall coating is in good condition with a few failures. Primary methods of deterioration are spot failures to the substrate with rust undercutting and delaminated topcoat. The sidewall is covered with light mildew growth.

The roof coating is in good condition with a few failures. Primary methods of deterioration are spot failures to the substrate with rust undercutting and delaminated topcoat.

Adhesion testing was not performed due to cold temperatures and wet conditions. Testing in cold temperatures and in wet conditions could cause inaccurate results. Adhesion testing should be performed before overcoating.

EXTERIOR COATING RECOMMENDATIONS:

Budget for overcoating in four years. The typical overcoat frequency for modern urethane systems is fifteen years. There is always a risk in overcoating the exterior, but we have had several successful projects when performed in the timeframe noted. The risk of poor adhesion of the overcoat system gets higher as the existing system gets older.

The recommended procedure is to high pressure water clean (5,000-10,000 psi) the exterior to remove any poorly adhered coating and any contaminants. Coating failures to the substrate would be spot power tool cleaned to bare metal (SSPC-SP11) condition. All sharp edges would be feathered into the surrounding coating.

The coating system would consist of a spot prime coat on the bare metal, a full coat of epoxy, followed by two full coats of urethane. The urethane system offers excellent abrasion resistance with high gloss and sheen retention. The expected life of this system is fifteen years. The system can be overcoated again in fifteen years, extending the total life of the coating to approximately forty-five years before total removal would be necessary. The tank would be removed from service during the coating project. This is necessary to reduce condensation on the tank's surface. Urethane coatings have a minimum temperature requirement for application and are sensitive to moisture during the curing process. If moisture is present during the curing process, the appearance will become cloudy with little or no gloss. The estimated cost is \$110,000.

WET INTERIOR COATING CONDITIONS:

Information on file with DIXON indicated the wet interior was last painted in 2010. The wet interior was abrasive blast cleaned to SSPC-SP10 near-white condition. The coating applied was an epoxy system.

The roof coating is in good condition with a few failures. Primary method of deterioration is spot failures to the substrate.

There are minor coating failures on the roof panels but most of deterioration is at the roof rigging couplings and on the stiffeners.

The sidewall coating is in good condition with numerous failures. Primary methods of deterioration are spot failures to the substrate and blisters. There is no significant coating damage at the high-water level, but there are scratches in the heavy mineral staining which would be the area most affected by ice movement. Most of the coating failures are near the weld seams on the lower sidewall panels.

The coating on the floor is in good condition with no failures. The floor was covered with approximately 2 inches of sediment that was flushed from the interior during the inspection.

The surfaces below the normal operating water level are covered with mineral staining which does not affect the integrity of the coating system.

WET INTERIOR COATING RECOMMENDATIONS:

The existing coating system has not deteriorated to the point where replacement is warranted. The cathodic protection system should adequately protect all areas below the high-water level where the coating has deteriorated. Reinspect in five years to update conditions and recommendations. Long term budget to repaint in ten years. The estimated cost is \$160,000.

CATHODIC PROTECTION CONDITIONS:

The tank has a suspended impressed current cathodic protection system. Surfaces below the high-water level are protected by the submerged system that is suspended from ropes attached to the sidewall and floor. The supporting ropes and anode wires appear to be in good condition with no visible damage.

CATHODIC PROTECTION RECOMMENDATIONS:

Continue to maintain the cathodic protection system. The cost would be dependent on your contract with your cathodic vendor.

PIT PIPING CONDITIONS:

There is a pit adjacent to the tank that contains piping and valves. The pit has a metal hatch that is in good condition. The piping is in good condition. The coating on the piping is in good condition with minor coating failures. Most of the coating failures are on the bolts and flanges.

FOUNDATION CONDITIONS:

The exposed concrete foundation is in good condition. There is minor deterioration with some cracking and exposed aggregate from weathering. The foundation is not coated.

FOUNDATION RECOMMENDATIONS:

Coat the exposed concrete with an epoxy coating system to help prevent further deterioration. The cost would be incidental to exterior painting.

GROUT CONDITIONS:

The grout between the baseplate and the foundation is in good condition with none damaged or missing.

ROOF HANDRAIL AND ROOF RIGGING CONDITIONS:

There is a handrail that routes around the roof hatch and runs from the sidewall ladder to a circular railing that surrounds the vent. The roof handrails are in good condition.

There are enough roof rigging couplings for safety and staging lines during wet interior coating work.

LIGHTING/ELECTRICAL CONDITIONS:

The tank has a double aviation light on the roof that appears to be in good condition. The light is operating properly. There is a photocell that will switch the lights on when it's dark outside.

ANTENNA CONDITIONS:

There are thirty-one antennas and miscellaneous antenna equipment attached to the sidewall. The antenna cable routing is in good condition and does not interfere with climbing or tank operations.

OVERFLOW PIPE CONDITIONS:

The overflow pipe exits the upper sidewall extends down along the exterior of the sidewall and discharges near the ground. The overflow pipe discharge is at an angle. The end of the pipe is equipped with a screened flap gate that is in good condition. The pipe discharges to a splash pad. The air gap meets the required 12-24 inches. The discharge area is in good condition.

OVERFLOW PIPE RECOMMENDATIONS:

Modify the overflow pipe discharge so it points downward to bring it into compliance with current Wisconsin DNR requirements. The estimated cost is \$3,000.

HATCH AND MANWAY CONDITIONS:

There is a roof hatch to the wet interior that is in good condition. The hinged cover is in good condition. The hatch was secured with a padlock. The hatch neck curb height meets the minimum height requirement of 4 inches. The hatch cover lip meets the minimum height requirement of 2 inches. A gasket was installed on the roof hatch curb by the inspection crew.

There are two 24 inch diameter manways in the sidewall that are in good condition. The manway gaskets showed no signs of leakage and the bolts are in good condition.

HATCH AND MANWAY RECOMMENDATIONS:

Install a 30 inch manway in the sidewall. Average rescue baskets will not pass through the existing manway. The estimated cost is \$10,000.

VENT CONDITIONS:

The roof vent is a pressure vacuum design that is in good condition. The pressure vacuum plate was found to be properly aligned. There is a large external screen intended to keep birds out and a smaller mesh screen on the interior intended to keep insects out. The screens are in good condition. There is a rain shield over the outer screen.

LADDER CONDITIONS:

The exterior sidewall ladder starts approximately 8 feet 8 inches above the ground and extends up to a small platform near the top of the sidewall. The platform is in good condition. The ladder meets OSHA size requirements. The ladder is caged and equipped with a rail-type fall prevention device that is in fair condition. The fall prevention rail is coated making it difficult to use properly. There is a vandal guard on the sidewall ladder that is in good condition. There are chains at the opening in the center handrail opening.

There are roof stairs that route from the sidewall to the center handrail. The stairs are in good condition.

There is no ladder in the wet interior.

LADDER RECOMMENDATIONS:

Replace the fall prevention device on the exterior sidewall ladder. The estimated cost is \$4,000.

Current Wisconsin DNR requirements state that the ladder start 12 feet above the ground. Since the ladder is properly secured with a vandal guard it may be possible that a waiver may be granted for this non-compliance item.

FILL/DRAW PIPE CONDITIONS:

The tank fills and draws from a single pipe. The fill/draw pipe penetrates through floor and extends approximately 7 ½ inches into the tank. There is not a deflector plate or bar over top of the pipe in the wet interior.

There is a sample tap on the fill/draw pipe located in the pit. The tap has a threaded end, faces downward, and is inside a heated room.

There is not a threaded coupling on the fill/draw pipe for future attachment of a chemical feed line.

FILL/DRAW PIPE RECOMMENDATIONS:

Install deflector bars at the end of the fill/draw pipe in the wet interior to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project.

Replace the threaded sample tap on the fill/draw pipe with a smooth ended sample tap to meet current Wisconsin DNR requirements. The work can be performed by in-house personnel.

Install a threaded coupling on the fill/draw pipe for a chemical feed line to meet current Wisconsin DNR requirements. The cost would be incidental to the next painting project.

WET INTERIOR METAL CONDITIONS:

The steel structure is in good condition overall. No significant pitting was observed at the coating failures on the sidewall.

The interior roof is supported by radial stiffeners that are in good condition with no significant corrosion. The connections at the sidewall are bolted and are in good condition.

DIXON ENGINEERING, INC.
STEEL TANK FIELD INSPECTION REPORT
STANDPIPE TANK

DATE: **December 14, 2021**

OWNER: **Village of Pewaukee**

CLIENT CODE: **49-68-10-03**

TANK NAME: **Sunnyridge Tank**

LOCATION: Address: **1515 Sunnyridge Road**

City: **Pewaukee**

State: **Wisconsin**

TANK SIZE: Capacity: **1,000,000 gallons**

Diameter: **51 feet (from nameplate)**

Sidewall height: **68 feet 4 inches (nameplate)**

CONSTRUCTION: **Welded**

Type: **Standpipe**

Type of roof: **Hemisphere**

YEAR CONSTRUCTED: **1983**

MANUFACTURER: **Prairie Tank**

CONTRACT NUMBER: **8342**

USE: **Potable water and fire protection**

Coating information below is from: **Dixon specification/project**

COATING HISTORY	EXTERIOR	WET INTERIOR
YEAR COATED	<u>2010</u>	<u>2010</u>
CONTRACTOR	<u>Horizon Bros</u>	<u>Horizon Bros</u>
SYSTEM	<u>Urethane</u>	<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC-SP11</u>	<u>SSPC-SP10</u>
MANUFACTURER	<u>Tnemec</u>	<u>Tnemec</u>
HEAVY METAL COATING SAMPLES	<u>No</u>	<u>No</u>
HEAVY METAL BEARING	<u>Unknown</u>	<u>No</u>

PERSONNEL: Lead inspector **Josh Grover**

Crew members **Mike Pickett, Ben Wozniak**

METHOD OF INSPECTION: **Dry**

SITE CONDITIONS

Fenced: **No**

Site large enough for contractor's equipment: **Yes**

Control building: **No**

Antenna control site: **Yes**

Number: **4**

Type: **Buildings, platforms**

Would antenna sites interfere with containment: **No**

Power lines within 50 feet: **No**

Site drainage: **Away from tank**

Indications of underground leakage: **No**

Shrub, tree, etc. encroachment: **No**

EXPOSED PIPING:

Location: **Adjacent to tank (in pit)**

Condition of structure: **Good**

Structure is: **Dry**

Pump present: **Yes**

Drain line present: **No**

Hatch condition: **Good**

Locked: **Yes**

Pipe coating condition: **Good**

Describe coating: **Spot coating failures to substrate**

Condition of metal: **Good**

FOUNDATION

Foundation exposed: **Yes**

Exposed height: **4-7 inches**

Exposed foundation condition: **Good**

Damage or deterioration: **Yes**

Type of damage: **Cracks, exposed aggregate**

Severity: **Minor**

Crack location: **Random**

Total cracking: **3 feet (0 feet need repair)**

Foundation coated: **No**

Type of baseplate gap filler: **Grout**

Condition: **Good**

Amount missing: **0 feet**

Undermining of foundation: **No**

EXTERIOR COATING

Sidewall:

Lettering: **No**

Logo: **No**

Topcoat condition: **Good**

Previous coat condition: **Good**

Describe coating: **Delaminating, spot coating failures to substrate, rust undercutting**

Dry film thickness: **10-13 mils**

Adhesion: **Not taken**

Reason not taken: **Wet, cold**

Metal condition: **Good**

Bottom shell steel thickness: **0.760 inch**

Sidewall comments: **There are approximately ten small spot coating failures that are ¼ inch diameter or less and one spot of delamination that is 2 inch diameter on the baseplate**

Roof:

Topcoat condition: **Good**

Previous coat condition: **Good**

Describe coating: **Delaminating, spot coating failures to substrate, scratches**

Dry film thickness: **10-14 mils**

Adhesion: **Not taken**

Reason not taken: **Wet, cold**

Metal condition: **Good**

Roof comments: **There is delamination on the center handrail, several scratches in the topcoat at roof edge, antenna spot coating failures that are 1-2 inch diameter under the step off platform**

EXTERIOR APPURTENANCES

Sidewall Manways

Number: **2**

Size: **24 inches**

Cover attachment: **Davit arm, bolt**

Metal condition: **Good**

Anchor Bolts:

N/A

EXTERIOR APPURTENANCES

Overflow Pipe:

Diameter: **8 inches**

Metal condition: **Good**

Discharge orientation: **Angle**

Screen condition: **Good**

Percent of screen open: **100**

Mesh size: **4**

Flap gate check valve: **Yes, screened**

Condition: **Good**

Air gap: **Yes**

Lowest part of discharge to the ground distance: **12 inches**

Height to elbow: **29 inches**

Overflow discharges to: **Concrete pad**

Condition: **Good**

Sample Tap:

Location: **In pit**

Pipe diameter greater than ¼ inch: **Yes**

12 inches or more above the floor: **Yes**

Down turned: **Yes**

Smooth end: **No - threaded**

In heated room: **Yes**

Condition: **Good**

Threaded Coupling (for chemical feed on the fill/draw pipe):

N/A

Sidewall Ladder:

Height to start of ladder: **8 feet 8 inches**

Toe clearance: **7 inches or greater**

Width of rungs: **16+ inches**

Thickness of rungs: **¾ inch**

Shape of rungs: **Round**

Metal condition: **Good**

Fall prevention device: **Yes**

Type: **Rail**

Function properly: **No (coated)**

Cage: **Yes**

Diameter: **28 inches**

Vandal guard: **Yes**

EXTERIOR APPURTENANCES

Condition: **Good**

Step-off Platforms:

Dimensions: **28 x 36 inches**

Railing height: **41 inches**

Midrail height: **22 inches**

Kick plate height: **4 inches**

Opening for access: **Yes**

Size: **28 inches**

Handhold at opening: **Yes**

Opening security: **None**

Metal condition: **Good**

Step-off platform comments: **There are chains at the opening to center handrail**

Roof Stairs:

Design: **Fixed**

Metal condition: **Good**

Toe clearance: **7 inches or greater**

Width of rungs: **19 x 30 inches**

Thickness of rungs: **1 inch**

Shape of rungs: **Rectangle**

Fall prevention device: **No**

Cage: **No**

Roof stairs comments: **The stairs are galvanized grating**

Roof Handrail:

At the edge of the roof at the sidewall ladder: **Yes**

Location: **One side of ladder at the wet interior hatch**

Along stairs to the center: **Yes**

Location: **One side**

Circular section: **Yes**

Diameter: **26 feet**

Railing height: **42 inches**

Midrail height: **23 inches**

Kick plate height: **4 inches**

Vertical post type: **Angle**

Size: **2 ½ x 2 ½ inches**

Top rail type: **Angle**

Size: **2 ½ x 2 ½ inches**

Midrail type: **Angle**

EXTERIOR APPURTENANCES

Size: **2 ½ x 2 ½ inches**

Metal condition: **Good**

Roof handrail comments: **Delamination along the top and midrail on the center handrail**

Painter's Rail:

N/A

Roof Rigging Points:

Number: **31**

Couplings covered: **Yes**

Covered with: **Plugs**

Metal condition: **Good**

Rigging comments: **There are a couple of plugs that are plastic but most are metal**

Removable Cathodic Covers:

N/A

Wet Interior Roof Hatch:

Neck size: **30 inches**

Distance from center of the tank (to outer edge): **23 feet**

Shape: **Round**

Handhold at opening: **No**

Curb height: **4 inches**

Cover overlap: **2 inches**

Gasket on neck curb: **Yes (installed by Dixon)**

Hatch security: **Lock**

Metal condition: **Good**

Bolted Ventilation Hatch:

N/A

Roof Vent:

Number: **1**

Distance from center of the tank (to outer edge): **0 feet**

Type: **Pressure-vacuum**

Neck diameter: **20 inches**

Flange opening diameter: **30 inches**

Vertical expanded metal condition: **Good**

EXTERIOR APPURTENANCES

Mesh size: **2**
Interior screen condition: **Good**
Mesh size: **24**
Rain shield: **Yes**
Pressure plate condition: **Good**
Plate free to move: **Yes**
Plate screened: **No**
Height of the lowest screen above the roof: **22 inches**
Metal condition: **Good**

Aviation Lights:

Design: **Double red**
Location: **Free-standing mount**
Functioning: **Yes**
Globe condition: **Good**
Photoelectric cell: **Yes**
Location: **Roof**
Aviation light comments: **Both LED lights are on**

Antennas:

Roof number: **0**
Sidewall number: **31**
Attached to: **Welded frames**
Cable runs: **Along sidewall**
Antenna or cable interference: **No**

Electrical:

Electrical conduit condition: **Good**
Exposed wiring: **No**

WET INTERIOR COATING

Roof:

Topcoat condition: **Good**
Primer coating condition: **Good**
Describe coating: **Spot coating failures to substrate**
Metal condition: **Good**
Lap seams: **Caulked**
Condition of lap seams: **Good**
Roof comments: **There are only a few small spot coating failures mainly at the couplings**

WET INTERIOR COATING

Sidewall:

Topcoat condition: **Good**

Primer coating condition: **Good**

Describe coating: **Spot coating failures to substrate, blisters**

Mineral deposits: **Heavy**

Metal condition: **Good**

Active pitting: **No**

Previous pitting: **No**

Sidewall comments: **There are 200+ blisters with a few broken on the lower sidewall. There are two areas where mineral staining is scraped away to paint, possibly due to ice movement**

Floor:

Topcoat condition: **Good**

Primer coating condition: **Good**

Describe coating: **No significant coating deterioration**

Mineral deposits: **Light**

Metal condition: **Good**

Active pitting: **No**

Previous pitting: **No**

Sediment depth: **2 inches**

WET INTERIOR APPURTENANCES

Ladder:

N/A

Cathodic Protection:

Clips: **Yes**

Pressure fitting: **Yes**

Location of clips: **Sidewalls, floor**

Type: **Ring**

Location of controls: **In pit**

Ropes damaged: **No**

Wires damaged: **No**

Roof Stiffeners:

Orientation: **Radial with support ring**

Number of stiffener support rings: **1**

Number of ring stiffeners: **24**

Stiffener shape: **Angle**

WET INTERIOR APPURTENANCES

Dimensions: **3 x 5 inches x 23 feet long (estimated)**

Stiffener condition: **Good**

Connection at sidewall: **Welded**

Coating condition: **Good**

Metal condition: **Good**

Sidewall Stiffener:

N/A

Overflow Pipe Inlet:

Type: **Elbow**

Metal condition: **Good**

Fill Pipe:

Diameter: **12 inches**

Height above floor: **1/2 inch**

Configuration: **Stubs through the floor**

Deflector on end: **No**

Metal condition: **Good**

Fill pipe comments: **There is a 7 inch removable silt ring**

Separate Draw Pipe:

N/A

Drain Pipe:

N/A

Sump:

N/A

Mixer:

N/A

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



1,000,000 gallon standpipe (Sunnyridge) located in the Village of Pewaukee, Wisconsin.



1) The foundation is in good condition overall.

2) There are minor cracks and exposed aggregate on the foundation.



3) The grout between the baseplate and the foundation is in good condition with none missing or damaged.



4) The cathodic protection pressure fitting is in good condition.

5) The overflow pipe discharges to a concrete splash pad.



6) The screened flap gate is in good condition.



7) The screen is in good condition.

8) The two sidewall manways are in good condition.



9) Same.



10) The sidewall ladder vandal guard is in good condition.

11) The sidewall ladder and cage are in good condition.



12) The sidewall ladder fall prevention device is coated.



13) The coating on the sidewall is in good condition overall.

14) Same.



15) There is a small spot of delamination on the baseplate.



16) There are several small spot coating failures on the sidewall.

17) Same.

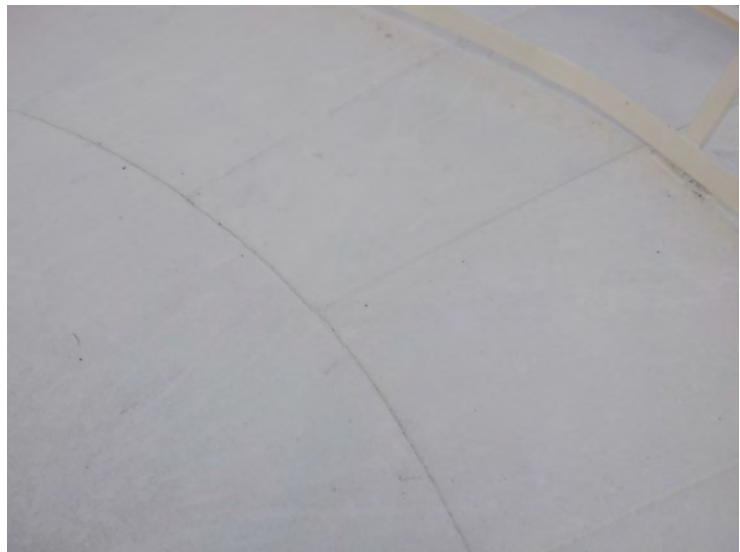


18) Same.



19) There are antennas mounted at the top of the sidewall.

20) The coating on the roof is in good condition overall.



21) Same.

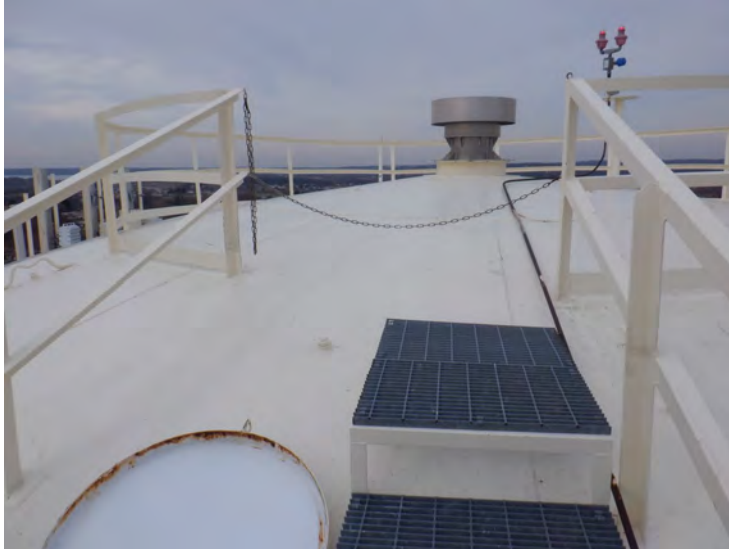


22) Spot coating failures on the roof.

23) The step-off platform is in good condition.



24) The steps to the center of the roof are in good condition.



25) There are safety chains at the opening to the center handrail.

26) The step-off platform and roof hatch are surrounded by a handrail that is in good condition.



27) The center handrail is in good condition.



28) There is delamination along the handrail.

29) The roof rigging couplings are in good condition.



30) Some of the roof rigging couplings have safety clips that are in good condition.



31) The double aviation light is in good condition.

32) Same.



33) The roof vent is in good condition.



34) The vertical expanded metal screen is in good condition.

35) The pressure plate is in good condition.

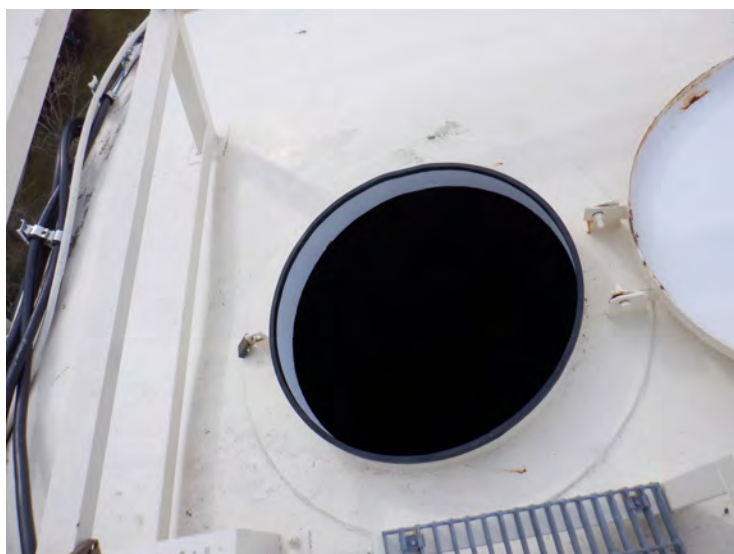


36) The interior screen is in good condition.



37) The roof hatch is secured with a padlock.

38) The roof hatch is in good condition.



39) A roof hatch gasket was installed by the inspection crew.



40) The coating on the roof is in good condition overall.

41) Same.



42) Same.

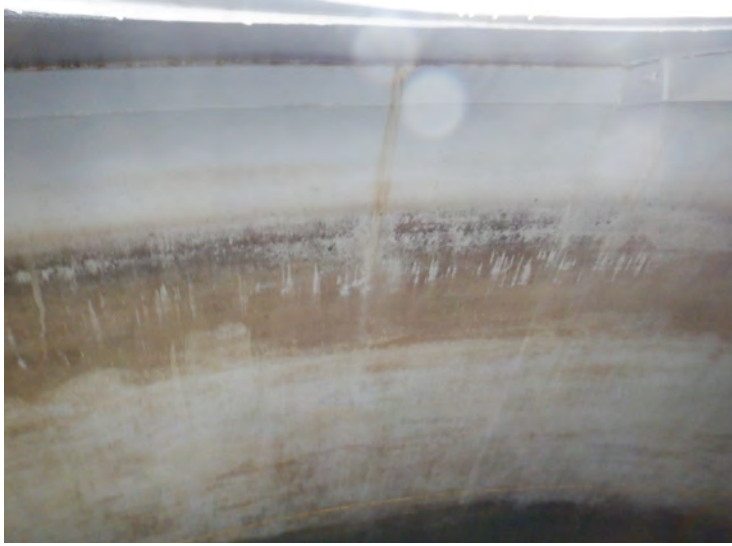


43) The roof stiffeners are in good condition.

44) Same.



45) The overflow elbow is in good condition.



46) The coating on the sidewall is in good condition overall.

47) There is heavy mineral staining on the sidewall.

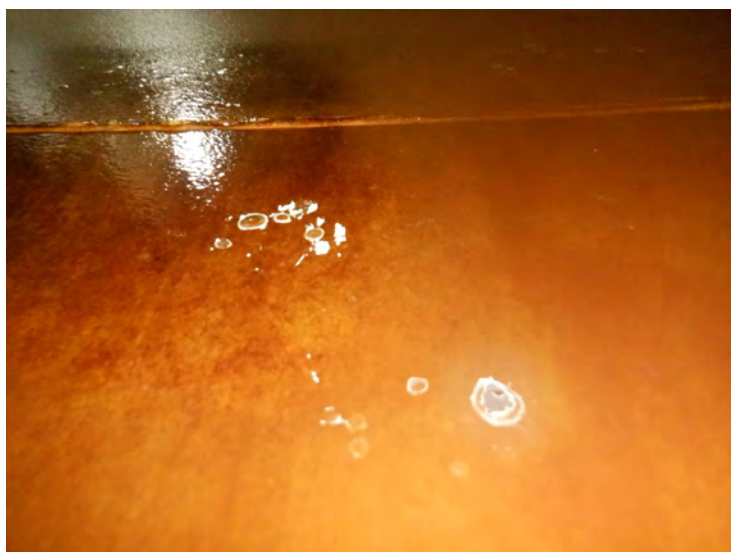


48) There are scratches in the mineral staining near the high-water level.



49) The scratches could be a sign of ice movement.

50) There are blisters in the sidewall coating on the lower sidewall panels.



51) Same.



52) There are cathodic protection clips on the sidewall.

53) The manway covers are held by a davit arm that is in good condition.

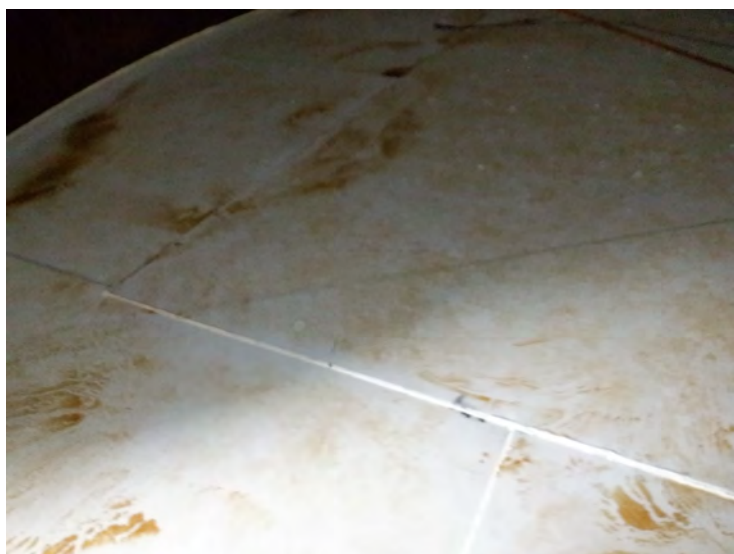
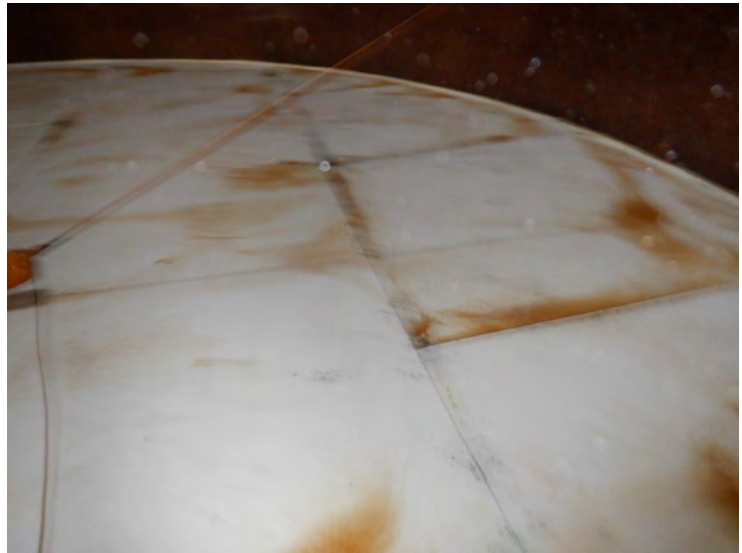


54) The cathodic protection pressure fitting has a deflector plate around it.



55) The coating on the floor is in good condition.

56) Same.



57) Same.



58) There are cathodic clips on the floor.

59) The cathodic protection system appears to be in good condition.



60) The fill/draw pipe is in good condition. There is not a deflector plate or bar over the top of the pipe.



61) There is a pit adjacent to the tank. The pit has a metal hatch that is in good condition.

62) There is a sump pump in the pit.



63) The sample tap is in good condition but has a threaded end.



64) The coating on the piping is in good condition overall.

65) There are spot coating failures on the bolts and flanges.



66) Same.



To: Jeff Knutson, President
Village Board

From: Scott A. Gosse
Village Administrator

Date: July 8, 2022

Re: Agenda Item 8b, Discussion and Possible Action on Rescheduling August 3, 2021 Village Board Meeting

BACKGROUND

The Police Department's National Night Out is scheduled for Tuesday, August 2nd beginning at 6PM. Chief Heier has requested Village Board consideration of possibly rescheduling the August 2nd Village Board meeting to allow for Village Board members to participate in the event. Village President Knutson concurred with placing the matter on the agenda for Village Board discussion and possible action on the request.

ACTION REQUESTED

The action requested of the Village Board is to discuss the request to reschedule the August 2nd Village Board meeting.

POLICE DEPARTMENT													
Vehicle Number	Equipment Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
636	2019 Ford PPV Utility AWD SUV					\$ 58,349.50				\$ 65,672.88			
637	2018 Ford PPV Utility AWD SUV			\$ 55,000.00				\$ 61,902.98				\$ 67,643.06	
639	2019 Ford PPV Utility AWD SUV				\$ 56,650.00				\$ 63,760.07				\$ 69,672.35
645	2017 Ford PPV Utility AWD SUV	\$47,000.00				\$ 58,349.50				\$ 65,672.88			
644	2012 Ford Police Interceptor Crown Victoria				\$ 56,650.00				\$ 63,760.07				\$ 69,672.35
646	2018 Chevrolet 2500 Truck									\$ 65,672.88			
640	2016 Ford PPV Utility AWD SUV			\$ 55,000.00				\$ 61,902.98				\$ 67,643.06	
638	Ford PPV Utility AWD SUV (proposed addition to fleet - discuss)	\$ -					\$ 60,099.99				\$ 67,643.06		
no #	Sig Sauer Service Weapons (Pistols) (10-year rotation)				\$ 25,000.00								\$ 25,750.00
no #	Sig Sauer Squad Weapons (Rifles)									\$ 36,736.33			
no #	Facility Security Cameras and Equipment (Bldg 2?)	\$ 16,000.00	\$ 1,060.50			\$ 28,103.25							
no #	Office Workstation Computers	\$ 3,600.00	\$ 3,708.00	\$ 4,533.00	\$ 4,668.99	\$ 4,809.06	\$ 4,953.33	\$ 5,101.93	\$ 5,254.99	\$ 5,412.64	\$ 5,575.02		
no #	Electronic Control Device (Tasers)								\$ 17,255.00				
no #	Facility Servers (regular rotation)	\$ 13,000.00			\$ 14,950.00	\$ 15,398.50	\$ 15,860.46			\$ 18,239.52	\$ 18,786.71		
no #	Automated License Plate Readers (ALPRS) - Mobile Units - 1 marked squad per year				\$ 18,540.00	\$ 19,096.20	\$ 19,669.09	\$ 20,259.16					
no #	Automated License Plate Readers (ALPRS) - Fixed Units - 1 unit per year								\$ 10,000.00	\$ 10,300.00	\$ 10,609.00		
no #	Squad and Officer Worn Camera Systems		\$ 63,967.92							\$ 65,886.96			
no #	Officer Worn Bullet Resistant Vest	\$ 2,700.00	\$ 2,781.00		\$ 4,400.00	\$ 4,499.00	\$ 4,664.00	\$ 4,796.00	\$ 4,862.00	\$ 4,994.00	\$ 5,093.00	\$ 5,258.00	\$ 5,390.00
no #	Squad Laptop Computers (MDC)							\$ 22,496.00					
	FLOC Camera System - Fixed Units - 6 units				\$ 15,000.00	\$ 15,450.00	\$ 15,913.50	\$ 16,390.91	\$ 16,882.63	\$ 17,389.11	\$ 17,910.78	\$ 18,448.11	\$ 19,001.55
	Dictation System (2-year product license)				\$ 1,915.20		\$ 1,972.66		\$ 2,031.84		\$ 2,092.79		\$ 2,155.57
	Watercraft and UTV - Lake Patrol - 2023 purchase UTV v ATV (sell/trade-in)				\$19,000.00			\$ 71,981.92					\$ 83,446.77
	TOTAL	\$82,300.00	\$71,517.42	\$114,533.00	\$216,774.19	\$204,055.01	\$123,133.01	\$264,831.88	\$183,806.61	\$355,977.19	\$127,710.36	\$158,992.23	\$275,088.60
	NOTE: All figures include a 3% increase per year												
ADMIN/CLERK DEPARTMENT													
Equipmen	Equipment Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
	E-Poll Books (7)			\$ 15,000.00						\$ 15,000.00			
	Cassie's Computer			\$ -		\$ 2,000.00			\$ 2,000.00			\$ 2,000.00	
	Front Office Computer		\$ 2,000.00										
	Jackie's Computer					\$ 2,000.00			\$ 2,000.00			\$ 2,000.00	
	Kayla's Computer			\$ 2,000.00			\$ 2,000.00			\$ 2,000.00			\$ 2,000.00
	Vick's Computer				\$ 2,000.00			\$ 2,000.00			\$ 2,000.00		
	Scott's Computer				\$ 2,000.00								
	Election Box and ADA booths						\$ 20,000.00						
	Digital Scanning Software (periodically reviewed by staff)												
	TOTALS	\$ -	\$ 2,000.00	\$ 17,000.00	\$ 4,000.00	\$ 4,000.00	\$ 22,000.00	\$ 2,000.00	\$ 4,000.00	\$ 17,000.00	\$ 2,000.00	\$ 4,000.00	\$ 2,000.00



To: Jeff Knutson, Village President
Village Board

From: Cassie Smith
Village Clerk

Date: July 15, 2022

Re: Agenda Item 8e(1), Premise Change for Alcohol License Holder

BACKGROUND

The Village Board is the ruling body responsible for approving premise description changes for all alcohol license holders. At the meeting on June 21st the Village Board approved the license and premise description for Aladdin Campus Dining at Waukesha County Technical College which stated the premise as

“ALCOHOL TO BE CONSUMED THROUGHOUT THE FOLLOWING BUILDINGS: RTA CENTER, C BUILDING HUB, AND COURTYARD, C BUILDING HARRY V QUADRACCI EDUCATION & TRAINING CENTER, Q BUILDING ANTHONY J NATALIZIO CENTER, AND S BUILDING. ALCOHOL AND RECEIPTS STORED IN ROOM C129A”

ACTION REQUESTED

The action of the Village Board is to consider an amendment to expand the premise description for Aladdin Campus Dining at Waukesha County Technical College located at 800 Main St, Pewaukee, WI 53072 to include a larger premise. The applicant included an additional premise description which was missed when imputing the details on the memo.

The proposed premise description reads:

“ALCOHOL TO BE CONSUMED THROUGHOUT THE FOLLOWING BUILDINGS: B, C, E, G, H, I, K, L, S, T, W, RTA CENTER, C BUILDING-HUB, AND COURTYARD, Q BUILDING-HARRY V QUADRACCI EDUCATION & TRAINING CENTER, S BUILDING-ANTHONY J NATALIZIO CENTER, I BUILDING-TERRY LUTZ INTEGRATED MANUFACTURING CENTER, AND ALL OUTDOOR AREAS INCLUDING THE PARKING LOTS. ALCOHOL AND RECEIPTS STORED IN ROOM C129A”

ANALYSIS

This update is to include the full premise as approved in the year prior.



To: Jeff Knutson, Village President
Village Board

From: Cassie Smith
Village Clerk

Date: July 15, 2022

Re: Agenda Item 8e(2), Approval of Temporary Class "B" Retailer's License(s)

BACKGROUND

The Village Board is the ruling body responsible for approving Temporary Class "B"/"Class B" Retailer's License applications.

ACTION REQUESTED

To approve the Temporary Class "B" Retailer's License application made by Positively Pewaukee to hold the Pints in the Park event at Village Park (323 Capitol Drive on August 25, 2022. This is a new event that was approved by the Park and Recreation Department on July 13, 2022.

ANALYSIS

This is a new event for the Village. Positively Pewaukee has held successful events in past years and the organization meets the requirements to hold a temporary Class "B" retailer's license in the Village of Pewaukee.

Staff recommends approval of the license(s) as recommended above.

Report Criteria:

Report type: Invoice detail

Check.Type = {<->} "Adjustment"

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
0						
06/22	06/30/2022	0	E H WOLF & SONS INC	120860	FUEL DELIVERY 6-27-22	3,324.30
06/22	06/30/2022	0	EWALD'S HARTFORD FO	41112	PD/NEW SQUAD637	33,457.00
06/22	06/30/2022	0	EWALD'S HARTFORD FO	41113	PD/NEW SQUAD640	33,457.00
Total 0:						70,238.30
69986						
06/22	06/04/2022	69986	E H WOLF & SONS INC	85483	FUEL DELIVERY 05-23-2022	4,816.02- V
Total 69986:						4,816.02-
69994						
06/22	06/02/2022	69994	ALL-WAYS CONTRACTO	52246	TOPSIL FOR CURB BOX REPAIRS	340.00
Total 69994:						340.00
69995						
06/22	06/02/2022	69995	ARAMARK	6240022289	VH MATS	38.00
Total 69995:						38.00
69996						
06/22	06/02/2022	69996	ARAMARK UNIFORM & C	6240015760	SEWER UNIFORMS	94.70
06/22	06/02/2022	69996	ARAMARK UNIFORM & C	6240018468	SEWER UNIFORMS	94.70
06/22	06/02/2022	69996	ARAMARK UNIFORM & C	6240020711	SEWER UNIFORMS	94.70
06/22	06/02/2022	69996	ARAMARK UNIFORM & C	6240023370	SEWER UNIFORMS	94.70
06/22	06/02/2022	69996	ARAMARK UNIFORM & C	6240025610	SEWER UNIFORMS	112.70
Total 69996:						491.50
69997						
06/22	06/02/2022	69997	BATZNER PEST CONTRO	3338915	LIBRARY/PEST MGMT MAY 2022	94.00
Total 69997:						94.00
69998						
06/22	06/02/2022	69998	BLACKSTONE PUBLISHI	2040829	LIBRARY/ADULT CD	34.94
06/22	06/02/2022	69998	BLACKSTONE PUBLISHI	2042613	ADULT AUDIO	123.22
Total 69998:						158.16
69999						
06/22	06/02/2022	69999	BRIDGES LIBRARY SYST	2022-1301023	LIBRARY/ZOOM ENTERPRISE LICENSE	216.00
Total 69999:						216.00
70000						
06/22	06/02/2022	70000	CENTER POINT LARGE P	1928422	LIBRARY/BOOKS-LARGE PRINT (2)	47.94
Total 70000:						47.94

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
70001						
06/22	06/02/2022	70001	COUGHLAN COMPANIES	282373	JUVENILE BOOKS	43.98
Total 70001:						43.98
70002						
06/22	06/02/2022	70002	E H WOLF & SONS INC	88459	FUEL DELIVERY 05-26-2022 NO-LEAD REFORM	220.39
06/22	06/02/2022	70002	E H WOLF & SONS INC	93167	FUEL DELIVERY 05-31-2022	3,229.32
Total 70002:						3,449.71
70003						
06/22	06/02/2022	70003	GREY HOUSE PUBLISHIN	972030	LIBRARY/BOOKS/REFERENCE	148.50
Total 70003:						148.50
70004						
06/22	06/02/2022	70004	KEN WEBER TRUCK SER	32370-1	TOW UNIT #107 FOR ENGINE REPAIR	262.50
Total 70004:						262.50
70005						
06/22	06/02/2022	70005	MENARDS-CAPITAL ONE	314311222047	MENARDS/APPLIANCE BULB	7.28
06/22	06/02/2022	70005	MENARDS-CAPITAL ONE	314311722048	MENARDS/PAINT TRAY-LINERS-ROLLERS	13.93
06/22	06/02/2022	70005	MENARDS-CAPITAL ONE	314311722062	MENARDS/PAINT SUPPLIES & PRIMER	45.92
06/22	06/02/2022	70005	MENARDS-CAPITAL ONE	314312522030	MENARDS/MINI FOAM ROLLER	1.99
06/22	06/02/2022	70005	MENARDS-CAPITAL ONE	314312922043	MENARDS/GREEN TREAT LUMBER	92.56
06/22	06/02/2022	70005	MENARDS-CAPITAL ONE	314313722026	MENARDS/MINI FOAM ROLLER	13.07
06/22	06/02/2022	70005	MENARDS-CAPITAL ONE	314313822609	MENARDS/OIL DRY-76 BAGS	468.92
Total 70005:						643.67
70006						
06/22	06/02/2022	70006	TAYLOR COMPUTER SER	23238	MGD SVCS-MAY 2022	462.90
Total 70006:						462.90
70007						
06/22	06/02/2022	70007	WISCONSIN LAW ENFOR	2022	POLICE/2022 PRGM FEES & WIPAC MEMBRSH	650.00
Total 70007:						650.00
70012						
06/22	06/10/2022	70012	CITY OF PEWAUKEE	June 2022	JUNE FIRE CONTRIBUTION	163,570.42
Total 70012:						163,570.42
70013						
06/22	06/10/2022	70013	CONLEY MEDIA LLC	6333070522	PH AD-PLAN COMMISSION 5/12/22	69.36
Total 70013:						69.36
70014						
06/22	06/10/2022	70014	E H WOLF & SONS INC	338328	CRANKCASE OIL	125.00
06/22	06/10/2022	70014	E H WOLF & SONS INC	99992	FUEL DELIVERY 06-06-2022	1,019.80

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
Total 70014:						1,144.80
70015						
06/22	06/10/2022	70015	Educational Development	DIR10074050	JUV BOOKS	514.55
Total 70015:						514.55
70016						
06/22	06/10/2022	70016	ELECTRICAL SERVICES	3606	SIREN SYSTEM MAINTENANCE	422.00
Total 70016:						422.00
70017						
06/22	06/10/2022	70017	GRAINGER	9321908817	WELL 2 FILTER	69.34
Total 70017:						69.34
70018						
06/22	06/10/2022	70018	HAWKINS INC	6188766	WELL 5 PUMP TUBE	267.76
Total 70018:						267.76
70019						
06/22	06/10/2022	70019	J & H HEATING INC	W35102	LIBRARY/HVAC SPRING MAINTENANCE	2,110.00
Total 70019:						2,110.00
70020						
06/22	06/10/2022	70020	KMB ELECTRIC LLC	22-06	KIWANIS VILLAGE PARK STAINLESS STEEL LIGHT PANEL	12,000.00
Total 70020:						12,000.00
70021						
06/22	06/10/2022	70021	LAWSON PRODUCTS, IN	9309581587	SHOP SUPPLIES	132.97
Total 70021:						132.97
70022						
06/22	06/10/2022	70022	LYONS ELECTRIC	1657	LIBRARY/REMOVED ARCH LIGHTS IN CHILDREN'S ROOM	814.00
Total 70022:						814.00
70023						
06/22	06/10/2022	70023	MIDWEST TAPE	502050778	ADULT DVD	22.49
06/22	06/10/2022	70023	MIDWEST TAPE	502050779	ADULT DVD	49.48
06/22	06/10/2022	70023	MIDWEST TAPE	502055550	ADULT DVD	59.98
06/22	06/10/2022	70023	MIDWEST TAPE	502055551	ADULT CD	10.39
06/22	06/10/2022	70023	MIDWEST TAPE	502055553	ADULT DVD	75.72
06/22	06/10/2022	70023	MIDWEST TAPE	502055554	JUVENILE DVD	22.49
06/22	06/10/2022	70023	MIDWEST TAPE	502084548	JUVENILE DVD	12.74
06/22	06/10/2022	70023	MIDWEST TAPE	502084943	ADULT DVD	71.22
06/22	06/10/2022	70023	MIDWEST TAPE	502084944	ADULT DVD	65.97
06/22	06/10/2022	70023	MIDWEST TAPE	502084945	ADULT CD	33.97
06/22	06/10/2022	70023	MIDWEST TAPE	502084947	JUVENILE DVD	44.23
06/22	06/10/2022	70023	MIDWEST TAPE	502121664	JUVENILE DVD	18.74

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
06/22	06/10/2022	70023	MIDWEST TAPE	502152803	JUVENILE DVD	5.24
06/22	06/10/2022	70023	MIDWEST TAPE	502152804	JUVENILE DVD	26.23
06/22	06/10/2022	70023	MIDWEST TAPE	502152805	LIBRARY/JUVENILE CD	13.99
Total 70023:						532.88
70024						
06/22	06/10/2022	70024	MRSA-UV, LLC	05-VPP	TURBO UV GERMICIDAL BULB	129.89
Total 70024:						129.89
70025						
06/22	06/10/2022	70025	NAPA AUTO PARTS	142787	SPARK PLUGS FOR TRIMMERS	13.16
06/22	06/10/2022	70025	NAPA AUTO PARTS	142928	#701 FUEL FILTER	13.41
06/22	06/10/2022	70025	NAPA AUTO PARTS	143009	#701 UPPER RADIATOR HOSE	21.16
06/22	06/10/2022	70025	NAPA AUTO PARTS	143133	#107 FUEL FILTER	7.43
06/22	06/10/2022	70025	NAPA AUTO PARTS	143161	#107 AIR FILTER	45.54
06/22	06/10/2022	70025	NAPA AUTO PARTS	143274	#107 FAN BELT-ALTERNATOR	46.32
06/22	06/10/2022	70025	NAPA AUTO PARTS	143414	#705 FUEL FILTERS	13.18
06/22	06/10/2022	70025	NAPA AUTO PARTS	143499	#706 AIR FILTERS	74.18
06/22	06/10/2022	70025	NAPA AUTO PARTS	143595	#111 OIL FILTERS	16.48
06/22	06/10/2022	70025	NAPA AUTO PARTS	143677	SAW TRAILER HUB NUT	7.50
06/22	06/10/2022	70025	NAPA AUTO PARTS	143741	SAW TRAILER WHEEL BOLT	10.65
06/22	06/10/2022	70025	NAPA AUTO PARTS	143798	GREASE (10)	70.80
Total 70025:						339.81
70026						
06/22	06/10/2022	70026	PEWAUKEE SCHOOL DIS	June 2022	MOBILE HOME FEES-JUNE 2-22	89.65
Total 70026:						89.65
70027						
06/22	06/10/2022	70027	POSITIVELY PEWAUKEE	100	1/2 COST OF DOWNTOWN AREA MULCH	710.00
Total 70027:						710.00
70028						
06/22	06/10/2022	70028	S-0-S ELECTRONICS CO	22-05025	LIBRARY/TROUBLESHOOT AND REPAIR KEY FOB SYSTEM ISS	230.25
Total 70028:						230.25
70029						
06/22	06/10/2022	70029	STATE OF WISCONSIN C	053120222	STATE SURCHARGES	3,474.23
Total 70029:						3,474.23
70030						
06/22	06/10/2022	70030	TDS	June 2022 566	TELEPHONE	1,844.95
06/22	06/10/2022	70030	TDS	JUNE 2022 56	TELEPHONE	351.50
Total 70030:						2,196.45
70031						
06/22	06/10/2022	70031	TREMAINE, SHAWN	MEALS 05.25.	REIMBURSE/MEALS	8.08

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
Total 70031:						8.08
70032						
06/22	06/10/2022	70032	WAUKESHA COUNTY TR	05312022	COUNTY SURCHARGES	1,143.00
Total 70032:						1,143.00
70033						
06/22	06/10/2022	70033	WEGENER, JENNY R	004060	PRIZE FOR CHILDREN'S PROGRAM	25.00
06/22	06/10/2022	70033	WEGENER, JENNY R	036716	PRIZE FOR CHILDREN'S PROGRAM	25.00
06/22	06/10/2022	70033	WEGENER, JENNY R	09536	PRIZE FOR CHILDREN'S PROGRAM	25.00
06/22	06/10/2022	70033	WEGENER, JENNY R	1325714161	PRIZE FOR CHILDREN'S PROGRAM	40.98
06/22	06/10/2022	70033	WEGENER, JENNY R	203900272887	CHILDREN'S PROGRAMMING	3.34
06/22	06/10/2022	70033	WEGENER, JENNY R	2173601	CHILDREN'S PROGRAMMING	4.00
06/22	06/10/2022	70033	WEGENER, JENNY R	27266734	CHILDREN'S PROGRAMMING	5.00
06/22	06/10/2022	70033	WEGENER, JENNY R	40610401942	CHILDREN'S PROGRAMMING	9.96
Total 70033:						138.28
70034						
06/22	06/10/2022	70034	WISCONSIN DEPARTME	268495260-20	STORMWATER ENVIRONMENTAL FEES	1,000.00
Total 70034:						1,000.00
70035						
06/22	06/17/2022	70035	ABT MAILCOM	42325	DNR GROSS ALPHA COMPLIANCE MAILING	1,475.50
Total 70035:						1,475.50
70036						
06/22	06/17/2022	70036	BAKER TILLY US, LLP	BT2105024	FINANCIAL STMT AUDIT THRU 5/31/22	1,565.00
06/22	06/17/2022	70036	BAKER TILLY US, LLP	BT2105024LIB	AUDIT 2021	250.00
Total 70036:						1,815.00
70037						
06/22	06/17/2022	70037	BATTERIES PLUS LLC	P51819788	LIFT 1 BACK UP BATTERY	81.69
Total 70037:						81.69
70038						
06/22	06/17/2022	70038	BIG JIM'S SMALL ENGINE	123711	BUMP HEADS FOR TRIMMERS	59.72
Total 70038:						59.72
70039						
06/22	06/17/2022	70039	BLACKSTONE PUBLISHI	2044270	ADULT AUDIO	100.84
06/22	06/17/2022	70039	BLACKSTONE PUBLISHI	2044779	LIBRARY/ADULT CD	73.89
06/22	06/17/2022	70039	BLACKSTONE PUBLISHI	2045683	ADULT AUDIO	38.95
Total 70039:						213.68
70040						
06/22	06/17/2022	70040	BROOKFIELD BUICK GM	5020996	#201 SLN MOTOR KIT	185.44
06/22	06/17/2022	70040	BROOKFIELD BUICK GM	5021048	#110 POWER STEER PRESSURE HOSE	144.24

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Total 70040:						329.68
70041						
06/22	06/17/2022	70041	CINTAS CORPORATION	5109490442	FIRST AID CABINET SUPPLY	117.70
Total 70041:						117.70
70042						
06/22	06/17/2022	70042	E H WOLF & SONS INC	106382	FUEL DELIVERY 06-13-2022	1,568.95
Total 70042:						1,568.95
70043						
06/22	06/17/2022	70043	HAWTHORNE HILL HOME	ELECTRIC RE	STREET LIGHT REIMBURSE 03-2021 TO 04-22-2022	1,062.50
Total 70043:						1,062.50
70044						
06/22	06/17/2022	70044	KAESTNER AUTO ELECT	411722	THROTTLE RELAY #401	9.00
Total 70044:						9.00
70045						
06/22	06/17/2022	70045	KETTLE MORAIN HEATI	80473	THERMOSTAT REPLACEMENTS	529.00
Total 70045:						529.00
70046						
06/22	06/17/2022	70046	LAKE COUNTRY REPAIR	19470	POLICE/EVIDENCE FRIDGE REPAIR	210.00
Total 70046:						210.00
70047						
06/22	06/17/2022	70047	LANGE ENTERPRISES IN	80084	ALUM BACK BRACKETS PED XING SIGNS LKFNT	188.00
Total 70047:						188.00
70048						
06/22	06/17/2022	70048	LANNON STONE PRODU	1329506	WATER MAIN REPAIRS BACK FILL / ROAD REPAIRS	510.32
06/22	06/17/2022	70048	LANNON STONE PRODU	1329507	WATER MAIN REPAIR BACK FILL / ROAD PATCH	318.95
Total 70048:						829.27
70049						
06/22	06/17/2022	70049	MIDWEST METER INC	143550	METERS-SCREWS-TWISTS	6,904.15
06/22	06/17/2022	70049	MIDWEST METER INC	143551	IR COMM DEVICE CELLULAR	161.00
Total 70049:						7,065.15
70050						
06/22	06/17/2022	70050	MIDWEST TAPE	502121338	ADULT DVD	32.23
06/22	06/17/2022	70050	MIDWEST TAPE	502121339	ADULT CD	48.36
06/22	06/17/2022	70050	MIDWEST TAPE	502121661	ADULT DVD	39.73
06/22	06/17/2022	70050	MIDWEST TAPE	502121662	ADULT DVD	14.99
06/22	06/17/2022	70050	MIDWEST TAPE	502121663	ADULT DVD	82.47

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
06/22	06/17/2022	70050	MIDWEST TAPE	502152368	ADULT DVD	70.46
06/22	06/17/2022	70050	MIDWEST TAPE	502152369	ADULT CD	13.99
06/22	06/17/2022	70050	MIDWEST TAPE	502152801	ADULT DVD	44.23
06/22	06/17/2022	70050	MIDWEST TAPE	502152802	ADULT CD	47.99
Total 70050:						394.45
70051						
06/22	06/17/2022	70051	MONTAGE ENTERPRISE	95000	#706 DRIVELINE	490.24
Total 70051:						490.24
70052						
06/22	06/17/2022	70052	NORTHERN LAKE SERVI	417824	2ND QUARTER RADIOACTIVITY	856.80
06/22	06/17/2022	70052	NORTHERN LAKE SERVI	417953	WATER/BACTERIA-DRINKING	92.00
06/22	06/17/2022	70052	NORTHERN LAKE SERVI	418280	WATER/BACTERIA-DRINKING	23.00
06/22	06/17/2022	70052	NORTHERN LAKE SERVI	418281	WATER/BACTERIA-DRINKING	69.00
06/22	06/17/2022	70052	NORTHERN LAKE SERVI	418538	WATER/BACTERIA-DRINKING	92.00
Total 70052:						1,132.80
70053						
06/22	06/17/2022	70053	PORT A JOHN	0442833	MAY PORT - A - JOHN SERVICE	121.00
Total 70053:						121.00
70054						
06/22	06/17/2022	70054	RUEKERT & MIELKE, INC	141518	SEWER/GIS UPDATES	534.50
06/22	06/17/2022	70054	RUEKERT & MIELKE, INC	141519	SANITARY SEWER SCADA SERVICES	973.51
06/22	06/17/2022	70054	RUEKERT & MIELKE, INC	141520	WATER/VILLAGE MSTR PLN APRIL 2022	4,009.60
Total 70054:						5,517.61
70055						
06/22	06/17/2022	70055	SELZER-ORNST CONSTR	Pay App #5	PAY APP #5	122,075.00
Total 70055:						122,075.00
70056						
06/22	06/17/2022	70056	SHRED-IT USA	8001631040	SHRED SERVICE MAY 2022	58.85
Total 70056:						58.85
70057						
06/22	06/17/2022	70057	SOERENS FORD INC	44118	#636 ALTERNATOR CORE RETURN	11.38
06/22	06/17/2022	70057	SOERENS FORD INC	44600	#305 OIL-SCREEN ASY-GASKET	146.64
06/22	06/17/2022	70057	SOERENS FORD INC	44626	#202 CAP ASSY=FUEL	16.87
06/22	06/17/2022	70057	SOERENS FORD INC	44695	SQUAD 636 GAS TANK FILLER NECK ASSEMBLY	193.34
Total 70057:						345.47
70058						
06/22	06/17/2022	70058	TACTICAL SOLUTIONS	8872	PD/CERTIFICATION OF RADAR-LASER UNITS	395.00
Total 70058:						395.00

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
70059						
06/22	06/17/2022	70059	THE CHILD'S WORLD	NA153152	LIBRARY/BOOKS/JUV NF	738.20
Total 70059:						738.20
70060						
06/22	06/17/2022	70060	TOM'S TRAILERS INC	5888	#704 WHEEL BEARING SEALS	28.70
Total 70060:						28.70
70061						
06/22	06/17/2022	70061	WASTE MANAGEMENT	0000270-2275	DISPOSAL STREET SWEEPINGS	662.60
06/22	06/17/2022	70061	WASTE MANAGEMENT	0326755-4163	SOLID WASTE RECYCLING	25,434.93
Total 70061:						26,097.53
70062						
06/22	06/17/2022	70062	WAUKESHA COUNTY TE	896046	FIRING RANGE RENTAL	998.10
Total 70062:						998.10
70063						
06/22	06/17/2022	70063	WAUKESHA COUNTY TR	2022-5401002	APRIL ELECTION BALLOTS AND NOTICES	193.56
Total 70063:						193.56
70064						
06/22	06/17/2022	70064	WE ENERGIES	4160486771	STREET LIGHTING	268.39
06/22	06/17/2022	70064	WE ENERGIES	4160488607	WASTEWATER OTHER LIFT STATIONS	5,145.83
06/22	06/17/2022	70064	WE ENERGIES	4160490433	ELECTRIC PUBLIC WORKS	5,630.00
Total 70064:						11,044.22
70065						
06/22	06/17/2022	70065	WISCONSIN LIBRARY AS	14733	LIBARY/MEMBERSHIP TO 04/05/2023 - MOORE	162.00
Total 70065:						162.00
70066						
06/22	06/17/2022	70066	Zimmerman Architectural S	63806	ARCHITECTURAL FEE FOR SERVICES THROUGH MAY 15, 2022	3,620.00
Total 70066:						3,620.00
70073						
06/22	06/24/2022	70073	ALL STAR HEATING & CO	350243	DPW HVAC FILTERS	51.90
Total 70073:						51.90
70074						
06/22	06/24/2022	70074	ASSOCIATED APPRAISAL	162668	ASSESSOR/FULL VALUE MAINT-JUNE 2022	3,541.67
Total 70074:						3,541.67
70075						
06/22	06/24/2022	70075	BADGER METER INC	80100396	BEACON HOSTING FEE- MAY 2022	128.75

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
Total 70075:						128.75
70076						
06/22	06/24/2022	70076	BEACHSIDE BOAT & BAIT	2022-01	LAIMON CC FEES 4/20-6/19/22	626.78
Total 70076:						626.78
70077						
06/22	06/24/2022	70077	BLACKSTONE PUBLISHI	2032447	ADULT AUDIO	53.89
06/22	06/24/2022	70077	BLACKSTONE PUBLISHI	2040469	ADULT AUDIO	74.68
06/22	06/24/2022	70077	BLACKSTONE PUBLISHI	2041771	ADULT AUDIO	154.96
06/22	06/24/2022	70077	BLACKSTONE PUBLISHI	2041951	ADULT AUDIO	38.95
06/22	06/24/2022	70077	BLACKSTONE PUBLISHI	2046530	ADULT AUDIO	274.21
06/22	06/24/2022	70077	BLACKSTONE PUBLISHI	2046531	ADULT AUDIO	296.33
Total 70077:						893.02
70078						
06/22	06/24/2022	70078	BUELOW VETTER BUIKE	MAY 2022 ST	PPA GRIEVANCE-AUDIT RESPONSE	1,440.00
Total 70078:						1,440.00
70079						
06/22	06/24/2022	70079	BV TETZLAFF	21182	PD / VILLAGE HALL WATER HEATER REPAIRS	150.00
06/22	06/24/2022	70079	BV TETZLAFF	21190	227 SUSSEX ST WATER MAIN BREAK	1,682.50
Total 70079:						1,832.50
70080						
06/22	06/24/2022	70080	CENTER POINT LARGE P	1934739	LIBRARY/BOOKS-LARGE PRINT (2)	47.94
Total 70080:						47.94
70081						
06/22	06/24/2022	70081	CERTIFIED PRODUCTS I	May 2022 Stm	15 LOADS OF COMPOST / YARD WASTE	600.00
Total 70081:						600.00
70082						
06/22	06/24/2022	70082	CHARTER COMMUNICATI	007630206182	INTERNET/06-18 TO 07-17-2022	169.98
Total 70082:						169.98
70083						
06/22	06/24/2022	70083	CONLEY MEDIA LLC	3256610622-1	DNR GA COMPLIANCE NOTICE PUB & AFFIDAVIT	210.28
Total 70083:						210.28
70084						
06/22	06/24/2022	70084	DANES, MADELINE	841301	HYDRANT REPAIR	22.70
Total 70084:						22.70
70085						
06/22	06/24/2022	70085	DATCP	115-00000260	W&M CONTRACT 07-01-21 TO 06-30-22	2,800.00

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
Total 70085:						2,800.00
70086						
06/22	06/24/2022	70086	DIVERSIFIED BENEFIT S	356447	FSA ACCOUNT JUNE 2022	156.06
Total 70086:						156.06
70087						
06/22	06/24/2022	70087	E H WOLF & SONS INC	114072	FUEL DELIVERY 6-20-22	4,714.31
Total 70087:						4,714.31
70088						
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841146	2 CYCLE & WOODCUTTER OIL	72.41
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841155	FASTENERS-HARDWARE-ROPE	7.26
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841230	701 BOAT FUEL TANK CONNECTORS	25.63
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841264	#305 SAWZALL BLADE	16.99
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841298	FASTENERS-HARDWARE-ROPE	7.18
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841301	HYDRANT REPAIR	22.70
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841337	#107 DRILL BITS	12.17
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841407	WIRE ROPE CLIP	6.36
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841414	#706 REAR FLAIL MOWER CONNECTOR	2.39
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841432	CONNECTORS-FASTNERS-HARDWARE-ROPE	10.88
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841473	4X6 NYLON FLAG	38.99
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841493	MOUSE STATION REFILLS	9.59
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841521	#706 BOLT CARRIAGE	12.78
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841531	TAPE-PERMANENT MARKERS	10.37
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841532	PIPING & ELBOW	8.48
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841545	14 GALLON TOTE	28.99
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841562	GERMICIDAL BLEACH	14.58
06/22	06/24/2022	70088	ELLIOTT'S ACE HARDWA	841609	QUINLAN TOWER LIGHT BULBS	.99
Total 70088:						308.74
70089						
06/22	06/24/2022	70089	HEIER, TIMOTHY	30142272	HOTEL REIMBURSEMENT/CHIEF HEIER	164.00
Total 70089:						164.00
70090						
06/22	06/24/2022	70090	HIPPENMEYER REILLY B	52889	VILLAGE ATTY SERVICES MAY-JUNE	9,596.10
06/22	06/24/2022	70090	HIPPENMEYER REILLY B	52890	MUNI COURT/LEGAL SERVICES	2,898.50
Total 70090:						12,494.60
70091						
06/22	06/24/2022	70091	HOLCIM - MAMR INC	716248927	SPOIL FROM FULL BODY BURIALS	540.00
Total 70091:						540.00
70092						
06/22	06/24/2022	70092	HYDROCORP	0067205	WATER/CROSS CONNECT PRGM/MAY 2022	2,137.00
Total 70092:						2,137.00

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
70093						
06/22	06/24/2022	70093	JAMES IMAGING SYSTE	31772382	LIBRARY/MONTHLY COPIER CONTRACT PYMT	793.53
Total 70093:						793.53
70094						
06/22	06/24/2022	70094	JANI-KING OF MILWAUKE	MIL06220425	LIBRARY/JANITOR SVC-JUNE 2022	2,623.44
Total 70094:						2,623.44
70095						
06/22	06/24/2022	70095	JFTCO INC / FABICK CAT	PIMK0189014	#113 HYDRAULIC HOSE FOR BOOM	356.51
06/22	06/24/2022	70095	JFTCO INC / FABICK CAT	PIMK0189015	#113 AIR FILTER	52.17
Total 70095:						408.68
70096						
06/22	06/24/2022	70096	JOHNSON CONTROLS S	37494372	SECURITY 07-01 TO 09-30-2022	327.15
Total 70096:						327.15
70097						
06/22	06/24/2022	70097	KAESTNER AUTO ELECT	411818	QUINLAN TOWER LEVEL SENSOR PRESSURE SWITCH	1,242.00
Total 70097:						1,242.00
70098						
06/22	06/24/2022	70098	KUJAWA ENTERPRISES I	97813	EXTERIOR MAINTENANCE-JUNE 2022	1,895.00
Total 70098:						1,895.00
70099						
06/22	06/24/2022	70099	LANGE ENTERPRISES IN	80252	(2) 24" STOP / SLOW TRAFFIC CONTROL SIGNS	220.28
Total 70099:						220.28
70100						
06/22	06/24/2022	70100	LEXISNEXIS RISK DATA	1451230-2022	LEXISNEXIS MONTHLY BILLING	150.00
Total 70100:						150.00
70101						
06/22	06/24/2022	70101	MCPMAHON MANAGEMEN	COIN MACH R	COIN MACHINE REFUND 2022	175.00
Total 70101:						175.00
70102						
06/22	06/24/2022	70102	MEI TOTAL ELEVATOR S	965844	LIBRARY/QTRLY ELEVATOR SERVICE	337.43
Total 70102:						337.43
70103						
06/22	06/24/2022	70103	MIDWEST FIBER NETWO	27038	DPW/INTERNET-JUNE 2022	150.14
06/22	06/24/2022	70103	MIDWEST FIBER NETWO	27039	WATER/INTERNET-JUNE 2022	150.14
06/22	06/24/2022	70103	MIDWEST FIBER NETWO	27040	SEWER/INTERNET JUNE 2022	150.14

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
Total 70103:						450.42
70104						
06/22	06/24/2022	70104	MIDWEST METER INC	143960	IMPLEMENT CASELLE PLATFORM	2,250.00
Total 70104:						2,250.00
70105						
06/22	06/24/2022	70105	MIDWEST TAPE	502183148	ADULT DVD	14.99
06/22	06/24/2022	70105	MIDWEST TAPE	502183149	ADULT CD	31.17
06/22	06/24/2022	70105	MIDWEST TAPE	502184280	ADULT DVD	63.72
06/22	06/24/2022	70105	MIDWEST TAPE	502184281	ADULT CD	13.99
06/22	06/24/2022	70105	MIDWEST TAPE	502184283	ADULT CD	23.18
06/22	06/24/2022	70105	MIDWEST TAPE	502184284	ADULT DVD	73.46
06/22	06/24/2022	70105	MIDWEST TAPE	502212669	ADULT DVD	185.17
06/22	06/24/2022	70105	MIDWEST TAPE	502216390	ADULT DVD	59.22
06/22	06/24/2022	70105	MIDWEST TAPE	502216391	ADULT CD	23.98
06/22	06/24/2022	70105	MIDWEST TAPE	502216393	JUVENILE DVD	9.74
06/22	06/24/2022	70105	MIDWEST TAPE	502216394	ADULT DVD	11.24
Total 70105:						509.86
70106						
06/22	06/24/2022	70106	MIDWEST TAPE - HOOPL	502192867	DIGITAL ACCOUNT ENDING 05-31-2022	322.13
Total 70106:						322.13
70107						
06/22	06/24/2022	70107	MONROE TRUCK EQUIP	5473319	#201 TOOLBOX DOOR SHOCK	54.45
Total 70107:						54.45
70108						
06/22	06/24/2022	70108	MONTAGE ENTERPRISE	95237	#706 HORIZONTAL CUTTER SAFETY SWITCH & MOUNTING PL	825.07
Total 70108:						825.07
70109						
06/22	06/24/2022	70109	MOTION & CONTROL EN	B38119-001	#113 HYDRAULIC HOSE FOR BOOM CURL	260.80
Total 70109:						260.80
70110						
06/22	06/24/2022	70110	NORTH SHORE BANK CA	06-2022 STMT	AMAZON - USB STICKS FOR TRIALS	5,381.76
06/22	06/24/2022	70110	NORTH SHORE BANK CA	111873	MEMORY CAFÉ SUPPLES/METRO MARKET	21.53
06/22	06/24/2022	70110	NORTH SHORE BANK CA	1629042	ADULT SUMM PROG PRIZE/CHICK-FIL-A GIFTCARD	25.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	214000863733	ADULT PROG SUPPLIES/WALMART	74.60
06/22	06/24/2022	70110	NORTH SHORE BANK CA	215700206251	SLP/COSTCO	141.48
06/22	06/24/2022	70110	NORTH SHORE BANK CA	217254	ADULT SUMM PROG PRIZE/CHOCOLATE FACTORY	25.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	217293	ADULT SUMM PROG PRIZE/ARTISAN 179	50.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	220527-03-4	ADULT SUMM PROG PRIZE/PARK AVENUE PIZZA	50.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	220603-03-1	SLP PRIZE/PARK AVE PIZZA	50.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	245619972-00	OFFICE SUPPLIES/OFFICE DEPOT	143.13
06/22	06/24/2022	70110	NORTH SHORE BANK CA	245857034-00	OFFICE SUPPLIES/OFFICE DEPOT	99.03
06/22	06/24/2022	70110	NORTH SHORE BANK CA	5122022	EXPLORE PASS RENEWAL/BETTY BRINN	500.00

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
06/22	06/24/2022	70110	NORTH SHORE BANK CA	5166	TELEPHONE/DATACOMM PLUS	332.30
06/22	06/24/2022	70110	NORTH SHORE BANK CA	613032	JUV SLP PRIZE/BEACH BUM BAKERY	15.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	669C0221662	OVERDRIVE	495.22
06/22	06/24/2022	70110	NORTH SHORE BANK CA	6954	ADULT SUMM PROG PRIZE/BUBBA'S FROZEN CUSTARD	25.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	710102	PICK N SAVE/FOOD	26.31
06/22	06/24/2022	70110	NORTH SHORE BANK CA	716682108	SLP PRIZE/ORIENTAL TRADING	159.89
06/22	06/24/2022	70110	NORTH SHORE BANK CA	77052051722	TELEPHONE/SPECTRUM	222.94
06/22	06/24/2022	70110	NORTH SHORE BANK CA	78161827	ADULT SUMM PROG PRIZE/MOE'S SW GRILL	25.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	88190	ADULT SUMM PROG PRIZE/SEESTER'S	50.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	B7A571EB	BOOK OUTLET	39.97
06/22	06/24/2022	70110	NORTH SHORE BANK CA	G0522060615	SLP/BUBBA GIFT CARDS	100.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	SC-555746	SUBSCRIPT FOR VIDEO EDITING	29.00
06/22	06/24/2022	70110	NORTH SHORE BANK CA	W2884476	ADULT SUMM PROG PRIZE/CRAFT BEER CELLAR	51.00
Total 70110:						8,133.16
70111						
06/22	06/24/2022	70111	PITNEY BOWES GLOBAL	3315741001	POSTAGE METER RENTAL 03-30 TO 06-29-2022	385.17
Total 70111:						385.17
70112						
06/22	06/24/2022	70112	PRICE TRANSPORT INC	19405	TRUCKING OF SPOILS FROM MAIN BREAKS (12) LOADS	3,866.76
Total 70112:						3,866.76
70113						
06/22	06/24/2022	70113	PROHEALTH CARE LABO	10000997885	LEGAL LAB DRAWS - MAY 2022	36.05
Total 70113:						36.05
70114						
06/22	06/24/2022	70114	PROHEALTH MEDICAL G	313041-L	NEW EMPLOYEE SCREENING	73.00
06/22	06/24/2022	70114	PROHEALTH MEDICAL G	313484	NEW HIRE SCREENS (3)	195.00
06/22	06/24/2022	70114	PROHEALTH MEDICAL G	313706	DRUG TEST/H&P NEW HIRE RHODE	95.00
06/22	06/24/2022	70114	PROHEALTH MEDICAL G	313757	NEW HIRE SCREEN	176.00
Total 70114:						539.00
70115						
06/22	06/24/2022	70115	R & R INSURANCE SERVI	2660306	3RD QTR WORKERS COMP	18,413.38
06/22	06/24/2022	70115	R & R INSURANCE SERVI	2660306-LIB	3RD QTR WORKERS COMP	225.62
06/22	06/24/2022	70115	R & R INSURANCE SERVI	2660307	3RD QTR LIABILITY PACKAGE	27,057.72
06/22	06/24/2022	70115	R & R INSURANCE SERVI	2660307-LIB	3RD QTR LIABILITY POLICY	1,632.28
Total 70115:						47,329.00
70116						
06/22	06/24/2022	70116	RA SMITH, INC	164792	RA SMITH CHARGEBACK - RIVERSIDE PRESERVE	38.50
06/22	06/24/2022	70116	RA SMITH, INC	164794	RA SMITH CHARGEBACK - GLEN @ PEW LAKE	2,175.55
06/22	06/24/2022	70116	RA SMITH, INC	164804	RA SMITH CHARGEBACK- MATTER SENIOR HOUSING	269.50
06/22	06/24/2022	70116	RA SMITH, INC	165487	GLEN @ PEWAUKEE LAKE	2,838.46
06/22	06/24/2022	70116	RA SMITH, INC	165502	MATTER SENIOR HOUSING	912.50
Total 70116:						6,234.51

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
70117						
06/22	06/24/2022	70117	REGISTRATION FEE TRU	VIN1FM5K8A	POLICE/VEH REGISTRATION	169.50
06/22	06/24/2022	70117	REGISTRATION FEE TRU	VIN1FM5K8A	VEHICLE REGISTRATION	165.50
Total 70117:						335.00
70118						
06/22	06/24/2022	70118	Rochelle Pennington	06032022	ADULT PROGRAMMING	175.00
Total 70118:						175.00
70120						
06/22	06/24/2022	70120	STAPLES ADVANTAGE	3509439148	VILLAGE HALL CLEANING SUPPLIES	122.00
Total 70120:						122.00
70121						
06/22	06/24/2022	70121	STREICHERS	1570258	UNIFORMS-MARKUT	557.00
Total 70121:						557.00
70122						
06/22	06/24/2022	70122	TAYLOR COMPUTER SER	23364	MANAGED SERVICES FOR 06.2022	253.45
06/22	06/24/2022	70122	TAYLOR COMPUTER SER	23365	ADV SERVER MONITORING; PC TROUBLESHOOTING	640.75
Total 70122:						894.20
70123						
06/22	06/24/2022	70123	TOTAL APPEARANCE SIG	10157	POLICE/VINYL REFLECTIVE DECALS	1,394.00
Total 70123:						1,394.00
70124						
06/22	06/24/2022	70124	US CELLULAR	0511697405	TABLET SERVICE	30.52
06/22	06/24/2022	70124	US CELLULAR	0511804004	MONTHLY CELL PHONE	632.31
06/22	06/24/2022	70124	US CELLULAR	0511904442	POLICE/CELLPHONES 05/02/2022-06/02/2022	450.58
Total 70124:						1,113.41
70125						
06/22	06/24/2022	70125	WACHTEL TREE SCIENC	98838	WACHTEL 2022 TREE INVENTORY	12,950.00
Total 70125:						12,950.00
70126						
06/22	06/24/2022	70126	WALDEN, NEITZKE & KU	126028	CORRESPONDENCE AND REVIEW POLICIES	440.00
Total 70126:						440.00
70127						
06/22	06/24/2022	70127	WALMART	2022 REFUND	OVERPAYMENT OF PREMISE FEE - NO LONGER APPLICABLE	30.00
Total 70127:						30.00
70128						
06/22	06/24/2022	70128	WAUKESHA COUNTY TR	2022-4003002	#636 FULL SERVICE/INSPECTION/ INSTALL 4 NEW TIRES	268.09

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
06/22	06/24/2022	70128	WAUKESHA COUNTY TR	2022-4003002	FULL SERVICE / VEHICLE INSPECTION SQUAD 640	426.32
06/22	06/24/2022	70128	WAUKESHA COUNTY TR	2022-5004005	POLICE-SPILLMAN/NETMOTION/INTERGRAPH/REDHAT	5,510.15
Total 70128:						6,204.56
70129						
06/22	06/24/2022	70129	WE ENERGIES	4170049896	LIBRARY UTILITIES MAY 2022	4,396.96
06/22	06/24/2022	70129	WE ENERGIES	4171877733	STREET LIGHTING	2,213.32
06/22	06/24/2022	70129	WE ENERGIES	4175306356	STEPPING STONE BOOSTER	15,750.87
Total 70129:						22,361.15
70130						
06/22	06/24/2022	70130	WEGENER, JENNY R	007154	LIBRARY/JUV PRGRM	22.50
06/22	06/24/2022	70130	WEGENER, JENNY R	3085891	LIBRARY/JUV PRGRM	19.45
06/22	06/24/2022	70130	WEGENER, JENNY R	521225	LIBRARY/JUV PRGRM	10.93
Total 70130:						52.88
70131						
06/22	06/24/2022	70131	WISCONSIN MUNICIPAL	MEMBERSHIP	WMCA ANNL 2022 MEMBER APP- PETER	50.00
Total 70131:						50.00
70132						
06/22	06/24/2022	70132	WISCONSIN RURAL WAT	S5309	WATER/ANNUAL SYSTEM MEMBERSHIP DUES	550.00
Total 70132:						550.00
70133						
06/22	06/24/2022	70133	WISCONSIN STATE LABO	712691	FLOURIDE TESTING 05-04-2022	26.00
Total 70133:						26.00
70134						
06/22	06/24/2022	70134	WISCONSIN SUPREME C	09212223	COURT CLERK SEMINAR/A.PROCHNIEWSKI	40.00
Total 70134:						40.00
70135						
06/22	06/24/2022	70135	ROWE, MICHAEL	W1246502	POLICE/REIMBURSE WORK BOOTS-ROWE	159.99
Total 70135:						159.99
70136						
06/22	06/29/2022	70136	ARAMARK UNIFORM & C	6240028248	SEWER UNIFORMS	94.70
06/22	06/29/2022	70136	ARAMARK UNIFORM & C	6240030532	SEWER UNIFORMS	94.70
06/22	06/29/2022	70136	ARAMARK UNIFORM & C	6240032043	MAT EXCHANGE JUNE 2022	38.00
06/22	06/29/2022	70136	ARAMARK UNIFORM & C	6240032970	SEWER UNIFORMS	128.86
Total 70136:						356.26
70137						
06/22	06/29/2022	70137	ASSOCIATED APPRAISAL	163164	FULL VALUE MAINT-JULY 2022	3,541.67

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
Total 70137:						3,541.67
70138						
06/22	06/29/2022	70138	BLACKSTONE PUBLISHI	2047154	ADULT AUDIO	71.49
Total 70138:						71.49
70139						
06/22	06/29/2022	70139	BURKE TRUCK & EQUIP	29972	#127 BURKE PACKAGE UPFIT REMAINING BALANCE	40,723.03
Total 70139:						40,723.03
70140						
06/22	06/29/2022	70140	CENSKY, MARY M	22-0006	LAND USE PLAN/PARKING ORD REVIEW/MISC PLANNING INQUI	2,189.10
06/22	06/29/2022	70140	CENSKY, MARY M	22-0007	WELLSPRING SELF STORAGE 01.15.22 TO 03.15.22	821.34
06/22	06/29/2022	70140	CENSKY, MARY M	22-0008	STREETWORKS EXOTICS CUG APR 2022	190.13
06/22	06/29/2022	70140	CENSKY, MARY M	22-0009	KOEHLER-ZOELLNER MF 01.14.22 TO 03.10.22	474.44
06/22	06/29/2022	70140	CENSKY, MARY M	22-0010	CORNERSTONE DEVLP 01.01.22 TO 03.31.22	211.19
06/22	06/29/2022	70140	CENSKY, MARY M	22-0011	HLAVINKA RIVERSIDE PRESERVE MAR 2022	131.63
06/22	06/29/2022	70140	CENSKY, MARY M	22-0012	FIRST WATCH CAFE 02.02.22 TO 03.22.22	370.67
06/22	06/29/2022	70140	CENSKY, MARY M	22-0013	BRANDT ACCY STORAGE 02.17.22 TO 03.14.22	416.22
06/22	06/29/2022	70140	CENSKY, MARY M	22-0014	MATTER SR HOUSING 01.31.22 TO 03.10.22	699.63
06/22	06/29/2022	70140	CENSKY, MARY M	22-0015	GREAT LAKES POWER 02.15.22 TO 02.24.22	234.00
Total 70140:						5,738.35
70141						
06/22	06/29/2022	70141	DEPARTMENT OF ADMIN	505000006956	LIBRARY/TEACH SVCS 01-01-2022 - 06-30-2022	600.00
Total 70141:						600.00
70142						
06/22	06/29/2022	70142	DIXON ENGINEERING IN	22-0328	ENGNR/VERIZON WI2021-JTH-3618	1,350.00
06/22	06/29/2022	70142	DIXON ENGINEERING IN	22-0430	ENGNR/US CELL-WI2021-JTH-3660	1,350.00
06/22	06/29/2022	70142	DIXON ENGINEERING IN	22-0431	ENGNR/VERIZON WI2021-JTH-3618	1,350.00
Total 70142:						4,050.00
70143						
06/22	06/29/2022	70143	E H WOLF & SONS INC	116901	FUEL DELIVERY 6-23-22	1,685.91
Total 70143:						1,685.91
70144						
06/22	06/29/2022	70144	FOX VALLEY TECHNICAL	TPB00007311	POLICE/TRAINING/LEAP-ANGELA PROCHNIEWSKI	235.00
Total 70144:						235.00
70145						
06/22	06/29/2022	70145	GIUFFRE BROS. CRANE	101954	STORAGE RENTAL 06-13 TO 07-10-2022	320.00
Total 70145:						320.00
70146						
06/22	06/29/2022	70146	HAWKINS INC	6193199	HMO	2,722.92

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
Total 70146:						2,722.92
70147						
06/22	06/29/2022	70147	JFTCO INC / FABICK CAT	PIMK0189543	#113 HYDRAULIC HOSE FOR BOOM	353.61
06/22	06/29/2022	70147	JFTCO INC / FABICK CAT	PIMK0189544	#113 HYDRAULIC FILTER / HYDRAULIC HOSE FOR BOOM	279.00
06/22	06/29/2022	70147	JFTCO INC / FABICK CAT	PIMK0189546	#113 BOLT FOR HYDRAULIC HOSE CLAMP	1.24
06/22	06/29/2022	70147	JFTCO INC / FABICK CAT	PIMK0189819	#113 HYDRAULIC HOSE FOR BOOM	299.73
06/22	06/29/2022	70147	JFTCO INC / FABICK CAT	PIMK0189820	#113 HYDRAULIC HOSE FOR BOOM	294.30
06/22	06/29/2022	70147	JFTCO INC / FABICK CAT	PIMK0189821	#113 MISC CLAMPS, GROMMETS, HYDRAULIC FLUID	274.55
06/22	06/29/2022	70147	JFTCO INC / FABICK CAT	PIMK0190054	#113 HYDRAULIC HOSE FOR BOOM X2	445.77
Total 70147:						1,948.20
70148						
06/22	06/29/2022	70148	LAWSON PRODUCTS, IN	9309650044	STEEL WASHER FOR STREET SIGNS	15.60
Total 70148:						15.60
70149						
06/22	06/29/2022	70149	MIDWEST METER INC	0144161	NEW CELLULAR METERS/RADIOS	29,425.00
06/22	06/29/2022	70149	MIDWEST METER INC	0144165	NEW CELLULAR RADIOS	870.00
Total 70149:						30,295.00
70150						
06/22	06/29/2022	70150	MIDWEST TAPE	502239870	ADULT NON FICTION DVD	39.73
06/22	06/29/2022	70150	MIDWEST TAPE	502239871	ADULT DVD	141.69
06/22	06/29/2022	70150	MIDWEST TAPE	502239872	ADULT DVD	62.97
06/22	06/29/2022	70150	MIDWEST TAPE	502239873	ADULT CD	13.99
06/22	06/29/2022	70150	MIDWEST TAPE	502247401	ADULT CD	25.98
06/22	06/29/2022	70150	MIDWEST TAPE	502247403	ADULT CD	11.99
Total 70150:						296.35
70151						
06/22	06/29/2022	70151	MILLER-BRADFORD & RI	P33081	#113 FUEL/WATER SEP	38.75
Total 70151:						38.75
70152						
06/22	06/29/2022	70152	NELSON, KELLY	06132022	LIBRARY/RMBRSE MILEAGE	35.10
06/22	06/29/2022	70152	NELSON, KELLY	8696923	LIBRARY/ADULT PRGM	18.98
Total 70152:						54.08
70153						
06/22	06/29/2022	70153	PAUL KNIGHT	PK06202022	LIBRARY/ADULT PROGRAMMING	100.00
Total 70153:						100.00
70154						
06/22	06/29/2022	70154	PROCHNIEWSKI, ANGEL	81202000	PD/RMBSE/HOTEL FOR LEAP CONFERENCE/PROCHNIEWSKI	164.00
Total 70154:						164.00

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
70155						
06/22	06/29/2022	70155	RA SMITH, INC	165488	RA SMITH CHARGEBAK - GLEN @ PEW LAKE	9,261.61
Total 70155:						9,261.61
70156						
06/22	06/29/2022	70156	RHYME BUSINESS PROD	31820779	COPIES & LEASE 05-09 TO 06-08-2022	481.14
Total 70156:						481.14
70157						
06/22	06/29/2022	70157	SALEM PRESS INC	181666	LIBRARY/ADULT NON FICTION	196.56
Total 70157:						196.56
70158						
06/22	06/29/2022	70158	SCHOLASTIC INC	40105690	LIBRARY/JUVENILE BOOKS	1,413.15
Total 70158:						1,413.15
70159						
06/22	06/29/2022	70159	SHORT ELLIOTT HENDRI	427236	SEH 2021 MILL AND PAVE PUNCHLISTING	89.75
Total 70159:						89.75
70160						
06/22	06/29/2022	70160	SOMAR TEK LLC/SOMAR	102692	POLICE/VALOR PINS (3)	184.00
Total 70160:						184.00
70161						
06/22	06/29/2022	70161	STREICHERS	1574912	PD/UNIFORM DC GARRY	339.91
06/22	06/29/2022	70161	STREICHERS	1575175	PD/UNIFORMS-DC GARRY	99.99
06/22	06/29/2022	70161	STREICHERS	1575184	PD/UNIFORM-ROWE	57.95
06/22	06/29/2022	70161	STREICHERS	1575188	PD/UNIFORM-NEW HIRE RHODE BELT/PANTS	57.98
06/22	06/29/2022	70161	STREICHERS	1575744	PD/WEAPON LIGHT-TYLER	144.99
06/22	06/29/2022	70161	STREICHERS	1575785	PD/UNIFORM-RHODE SHIRTS/PANTS	343.91
Total 70161:						1,044.73
70162						
06/22	06/29/2022	70162	UNITED RENTALS (NORT	207597892-00	GAS CALIBRATION CAP FOR AIR MONITOR AT LIFT #1	24.95
Total 70162:						24.95
70163						
06/22	06/29/2022	70163	WAUKESHA COUNTY EM	434	POLICE/ID CARD-NEW HIRE	2.25
Total 70163:						2.25
70164						
06/22	06/29/2022	70164	WAUKESHA COUNTY TR	2022-2004008	INMATE BILLING	37.60
Total 70164:						37.60

GL Period	Check Issue Date	Check Number	Payee	Invoice Number	Description	Check Amount
300000002						
06/22	06/20/2022	300000002	KWIK TRIP INC - FUEL	DPW 05-2022	DPW- MAY 2022	1,952.65
06/22	06/20/2022	300000002	KWIK TRIP INC - FUEL	LAKE PTRL 0	LAKE PATROL- MAY 2022	84.20
06/22	06/20/2022	300000002	KWIK TRIP INC - FUEL	PD 05-2022	POLICE- MAY 2022	3,446.79
06/22	06/20/2022	300000002	KWIK TRIP INC - FUEL	SEWER 05-20	SEWER- MAY 2022	162.23
06/22	06/20/2022	300000002	KWIK TRIP INC - FUEL	STORM 05-20	STORM- MAY 2022	1,079.46
06/22	06/20/2022	300000002	KWIK TRIP INC - FUEL	WTR 05-2022	WATER- MAY 2022	753.30
Total 300000002:						7,478.63
Grand Totals:						725,419.72

Summary by General Ledger Account Number

GL Account	Debit	Credit	Proof
001-00-11000-000-000	.00	.00	.00
110-00-21400-000-000	75.00	403,634.78-	403,559.78-
110-00-21761-000-000	89.65	.00	89.65
110-00-44210-000-000	205.00	.00	205.00
110-00-45100-000-000	4,654.83	.00	4,654.83
110-00-51100-000-000	14.67	.00	14.67
110-00-51120-000-000	2,189.10	.00	2,189.10
110-00-51120-000-100	23,138.29	.00	23,138.29
110-00-51200-000-140	40.00	.00	40.00
110-00-51300-000-000	6,697.60	.00	6,697.60
110-00-51300-000-110	5,840.36	.00	5,840.36
110-00-51320-000-000	1,440.00	.00	1,440.00
110-00-51400-000-140	24.56	.00	24.56
110-00-51420-000-140	3,290.24	.00	3,290.24
110-00-51440-000-000	6.17	.00	6.17
110-00-51440-000-130	193.56	.00	193.56
110-00-51460-000-000	147.79	.00	147.79
110-00-51470-000-000	69.36	.00	69.36
110-00-51510-000-000	375.00	.00	375.00
110-00-51520-000-000	7,083.34	.00	7,083.34
110-00-51600-000-310	6,091.15	.00	6,091.15
110-00-51612-000-000	38.99	.00	38.99
110-00-51938-000-000	32,970.91	.00	32,970.91
110-00-51980-000-000	171.05	.00	171.05
110-00-52100-000-140	5,905.15	.00	5,905.15
110-00-52100-000-310	4,500.04	75.00-	4,425.04
110-00-52100-000-320	552.15	.00	552.15
110-00-52100-000-330	926.68	.00	926.68
110-00-52100-000-340	1,215.37	.00	1,215.37
110-00-52100-000-350	1,060.70	.00	1,060.70
110-00-52100-000-360	579.99	.00	579.99
110-00-52100-000-380	1,552.02	.00	1,552.02
110-00-52100-000-400	1,616.73	.00	1,616.73
110-00-52200-000-000	131,491.75	.00	131,491.75
110-00-52400-000-100	2,800.00	.00	2,800.00
110-00-53100-000-140	280.00	.00	280.00
110-00-53310-000-310	300.00	.00	300.00
110-00-53310-000-311	3,210.53	.00	3,210.53

GL Account	Debit	Credit	Proof
110-00-53330-000-310	7,098.00	.00	7,098.00
110-00-53420-000-310	3,544.21	.00	3,544.21
110-00-53620-000-000	19,674.96	.00	19,674.96
110-00-53635-000-000	8,508.21	.00	8,508.21
110-00-55200-000-000	15,965.42	.00	15,965.42
110-00-55300-000-000	16,113.25	.00	16,113.25
110-00-56600-000-000	13,660.00	.00	13,660.00
110-00-57210-000-000	68,308.00	.00	68,308.00
200-00-21400-000-000	.00	131,260.78-	131,260.78-
200-00-53300-000-100	89.75	.00	89.75
200-00-55200-000-000	12,000.00	.00	12,000.00
200-00-57324-002-000	40,723.03	.00	40,723.03
200-00-57324-003-000	78,448.00	.00	78,448.00
455-00-21400-000-000	.00	426.00-	426.00-
455-00-51800-000-000	426.00	.00	426.00
600-00-21400-000-000	.00	80,004.37-	80,004.37-
600-00-50605-002-000	337.10	.00	337.10
600-00-50605-004-000	486.76	.00	486.76
600-00-50605-006-000	37.95	.00	37.95
600-00-50622-000-000	15,383.19	.00	15,383.19
600-00-50630-003-000	1,158.80	.00	1,158.80
600-00-50631-002-000	1,186.52	.00	1,186.52
600-00-50631-005-000	1,536.40	.00	1,536.40
600-00-50641-001-000	578.86	.00	578.86
600-00-50650-002-000	161.23	.00	161.23
600-00-50650-005-000	1,242.99	.00	1,242.99
600-00-50651-002-000	2,997.79	.00	2,997.79
600-00-50652-002-000	340.00	.00	340.00
600-00-50652-006-000	1,682.50	.00	1,682.50
600-00-50653-005-000	7,065.15	.00	7,065.15
600-00-50654-002-000	45.40	.00	45.40
600-00-50655-002-000	168.50	.00	168.50
600-00-50700-001-000	753.30	.00	753.30
600-00-50700-002-000	320.38	.00	320.38
600-00-50903-001-000	1,475.50	.00	1,475.50
600-00-50903-004-000	1,125.00	.00	1,125.00
600-00-50904-001-000	161.95	.00	161.95
600-00-50921-004-000	15.26	.00	15.26
600-00-50923-001-000	956.66	.00	956.66
600-00-50923-002-000	4,009.60	.00	4,009.60
600-00-50923-003-000	2,137.00	.00	2,137.00
600-00-50923-004-000	267.25	.00	267.25
600-00-50923-007-000	210.28	.00	210.28
600-00-50924-000-000	2,904.47	.00	2,904.47
600-00-50930-001-000	307.50	.00	307.50
600-00-50930-002-000	550.00	.00	550.00
600-00-50930-004-000	106.08	.00	106.08
600-00-50931-002-001	30,295.00	.00	30,295.00
650-00-21400-000-000	.00	6,013.19-	6,013.19-
650-00-51938-000-000	2,293.52	.00	2,293.52
650-00-53100-000-140	1,116.67	.00	1,116.67
650-00-53310-000-310	1,079.46	.00	1,079.46
650-00-53330-000-310	739.94	.00	739.94
650-00-53440-000-310	662.60	.00	662.60
650-00-53650-000-000	121.00	.00	121.00
675-00-10367-000-000	19,532.00	.00	19,532.00
675-00-21400-000-000	.00	19,955.88-	19,955.88-

GL Account	Debit	Credit	Proof
675-00-53470-000-310	423.88	.00	423.88
700-00-10367-000-000	24,415.00	.00	24,415.00
700-00-21400-000-000	.00	39,628.52-	39,628.52-
700-00-50821-000-000	631.58	.00	631.58
700-00-50822-002-000	4,150.50	.00	4,150.50
700-00-50822-003-000	363.75	.00	363.75
700-00-50822-005-000	341.54	.00	341.54
700-00-50822-006-000	14.58	.00	14.58
700-00-50822-010-000	106.64	.00	106.64
700-00-50832-002-000	80.39	.00	80.39
700-00-50832-003-000	486.75	.00	486.75
700-00-50835-002-000	325.86	.00	325.86
700-00-50836-000-000	161.95	.00	161.95
700-00-50851-000-000	1,125.00	.00	1,125.00
700-00-50851-004-000	128.75	.00	128.75
700-00-50852-002-000	267.25	.00	267.25
700-00-50852-004-000	116.67	.00	116.67
700-00-50852-006-000	15.26	.00	15.26
700-00-50853-000-000	6,897.05	.00	6,897.05
800-00-21400-000-000	.00	98.48-	98.48-
800-00-54920-000-000	98.48	.00	98.48
900-00-21400-000-000	.00	31,044.34-	31,044.34-
900-00-55110-000-141	1,737.67	.00	1,737.67
900-00-55110-000-142	3,069.89	.00	3,069.89
900-00-55110-000-143	1,561.35	.00	1,561.35
900-00-55110-000-144	1,035.69	.00	1,035.69
900-00-55110-000-146	270.10	.00	270.10
900-00-55110-000-150	2,107.90	.00	2,107.90
900-00-55110-000-310	11,724.12	.00	11,724.12
900-00-55110-000-311	4,952.20	.00	4,952.20
900-00-55110-000-312	817.35	.00	817.35
900-00-55110-000-313	398.21	.00	398.21
900-00-55110-000-400	440.00	.00	440.00
900-00-55110-000-500	2,929.86	.00	2,929.86
950-00-21400-000-000	.00	1,325.64-	1,325.64-
950-00-51938-000-000	405.15	.00	405.15
950-00-52100-000-140	6.36	.00	6.36
950-00-52100-000-145	65.40	.00	65.40
950-00-52100-000-300	595.03	.00	595.03
950-00-52100-000-310	253.70	.00	253.70
960-00-21400-000-000	4,816.02	16,918.76-	12,102.74-
960-00-55200-000-150	15,762.98	4,816.02-	10,946.96
960-00-55200-000-155	626.78	.00	626.78
960-00-55200-000-165	529.00	.00	529.00
Grand Totals:	735,201.76	735,201.76-	.00

Dated: _____

Mayor: _____

City Council: _____

City Recorder: _____

Report Criteria:

Report type: Invoice detail

Check.Type = {<>} "Adjustment"