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FORWARD TO COMMISSION
HPUC MEETING: 4/25/2022 Working Session
Review
I RECOMMEND APPROVAL OF THIS
SUBJECT MATTER: L.P.P.
HPUC Hibbing Public Utilities Commission
LUKE J. PETERSON
GENERAL MANAGER
4/22/22
DATE

VIA Email

April 22, 2022

Luke Peterson, General Manager
Hibbing Public Utilities
1902 E 6th Ave
Hibbing, MN 55746

RE: Water System Update

Dear Luke,

In preparation for the Commission work session on April 25th, I wanted to provide you with some critical pieces of data that should be considered prior to discussion at the work session. Below is a summary of these items.

Discussion

The most critical item for consideration by the Commission is selection of future water supply needs. Table 3.2 on the following page is from the report and compares current capacities with three different demand scenarios which were selected to assist the Commission in selection of the design demand to be used when evaluating improvements. The scenarios include:

- Recent Historical Demand Over the Past 8 Years
- Extreme System Growth (Equivalent to Peak Usage During 2009)
- Moderate System Growth (Average of Current and 2009)

The firm capacity listed in the table represents the capacity of the existing system with the largest well out of service. The listed firm capacities do not include the Carey Valley well since treatment is needed before this well can be utilized. Industry standards indicate the firm capacity should be equal to or greater than the max day demand. As shown, the current firm capacity does not meet the max day demand for any of the scenarios listed. The firm capacities are based on 20 run hours per day to allow for backwashing of the filters and recharge of the wells.

Table 3.2 – Water Supply and Demand	
	MGD (20 Hours Runtime Per Day)
Firm Capacity (With Scranton)	2.69
Firm Capacity (Without Scranton)	2.05
Recent Historical Demands (Past 8 Years)	
Average Day Demand (ADD)	1.73
Maximum Day Demand (MDD)	3.49
Extreme Growth (2009 Flows Equivalent)	
Average Day Demand (ADD)	2.66
Maximum Day Demand (MDD)	5.39
Moderate Growth (Halfway Point)	
Average Day Demand (ADD)	2.19
Maximum Day Demand (MDD)	4.44

To further analyze the current capacities against historical usage, the graph on the next page was created. This graph shows the daily pumpage from all of the wells as compared to current capacities. The four categories of current capacities are discussed below.

1) Total Well Capacity (Not Including Carey Valley)
   As shown in the graph, the total well capacity has only been exceeded one time since 2017.

2) Total Capacity Without Scranton
   As shown in the graph, the total well capacity without Scranton has been exceeded several times since 2017 with the most critical period occurring in 2019 when this capacity was exceeded on two different occasions for multiple days.

3) Firm Capacity With Scranton
   The firm capacity with Scranton is nearly identical to the total capacity without Scranton. Therefore, this capacity has also has been exceeded several times since 2017 with the most critical period occurring in 2019 when this capacity was exceeded on two different occasions for multiple days.

4) Firm Capacity Without Scranton
   As shown in the graph, the firm well capacity without Scranton has been exceeded often and for long durations on many instances since 2017.

The major thing to consider when reviewing this information is the level of risk the PUC is comfortable with. For example, the total well capacity without Scranton meets nearly all the demand needs over the last 5 years. However, the demands that occurred in 2019 would have exceeded the capacity if Scranton was not available. During this period, it would have been difficult to keep the water towers full without the Scranton well.

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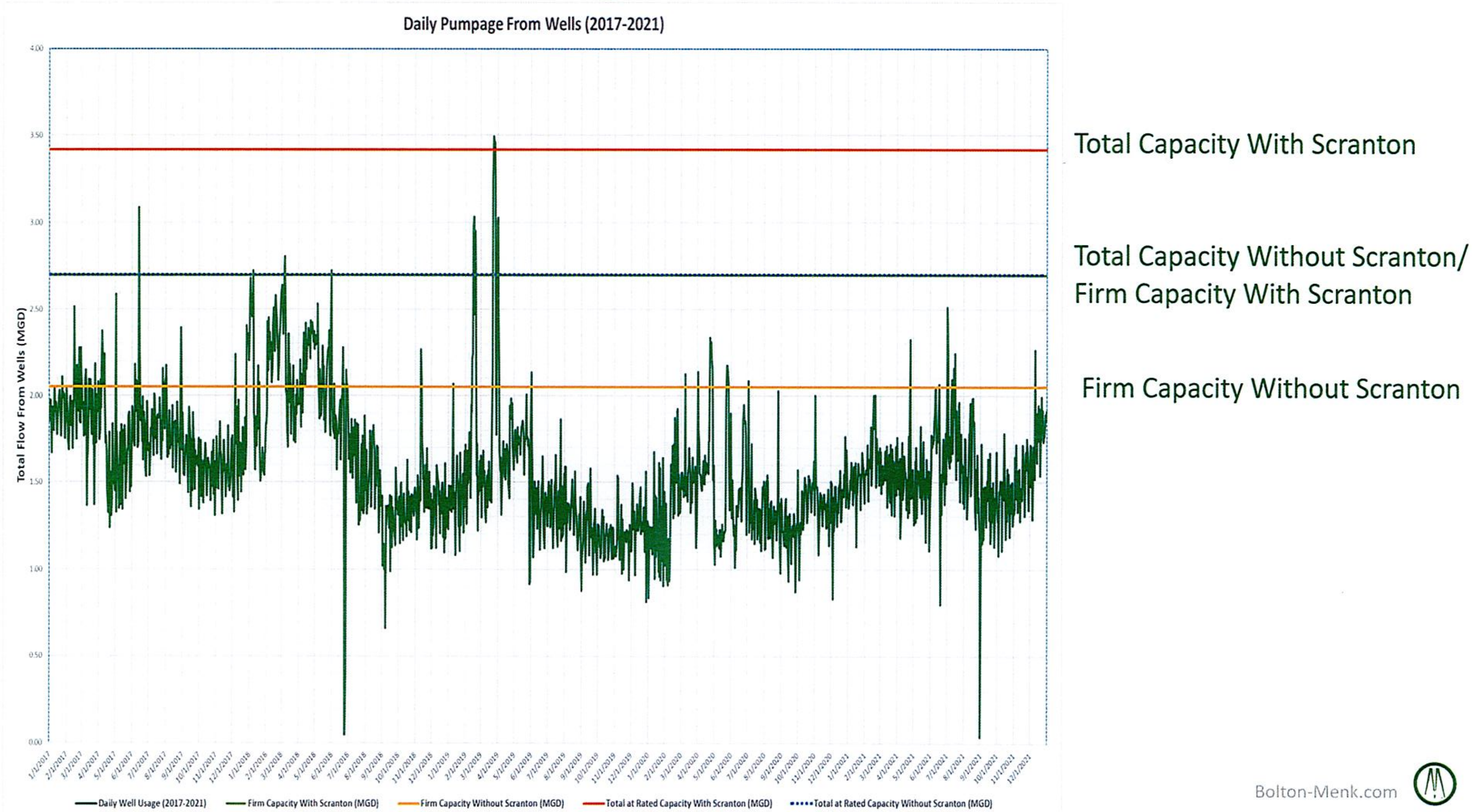

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Summary

The selection of future design demands along with assessing the risks of the various capacities discussed in this letter will be of utmost importance for planning of upcoming improvements to the system. I am planning to discuss these items in detail with the Commission on April 25th and would recommend the Commission review this information prior to the meeting so they have some background for the discussion.

Please do not hesitate to contact me if you have any questions on this update.

Sincerely,

Bolton & Menk, Inc.

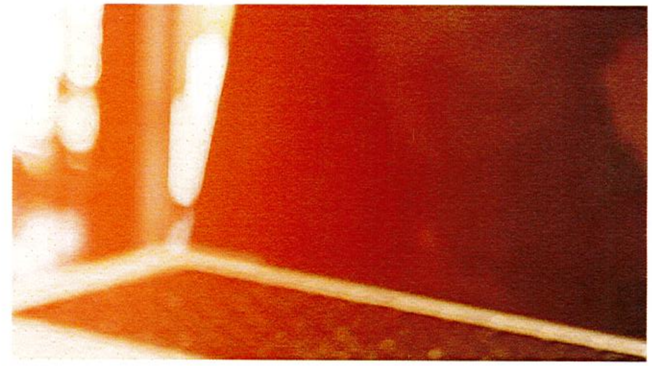
Brian J Guldan P.E.
Principal Environmental Engineer

Hibbing Public Utilities

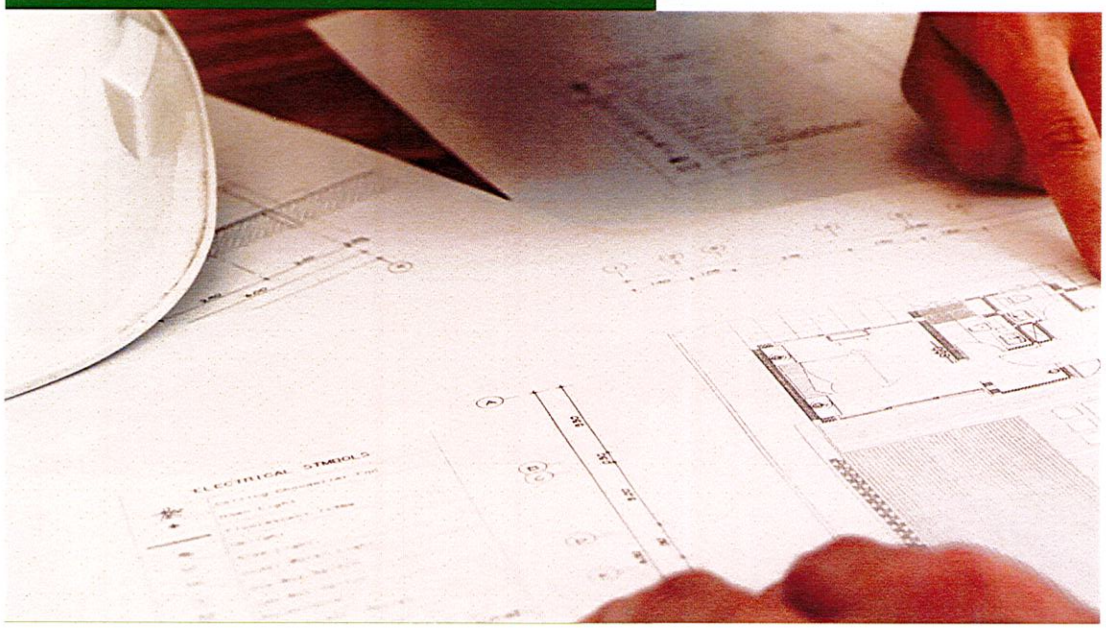
Water System Technical Review

April 25, 2022

Presented By: Brian Guldan, PE



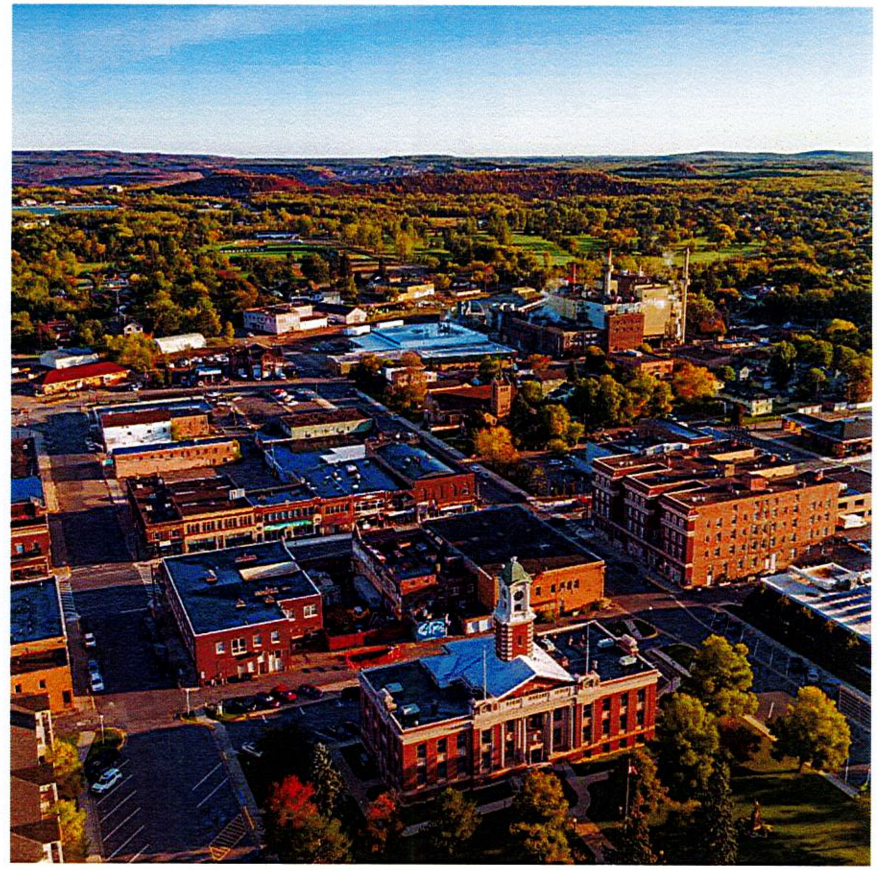
Introduction



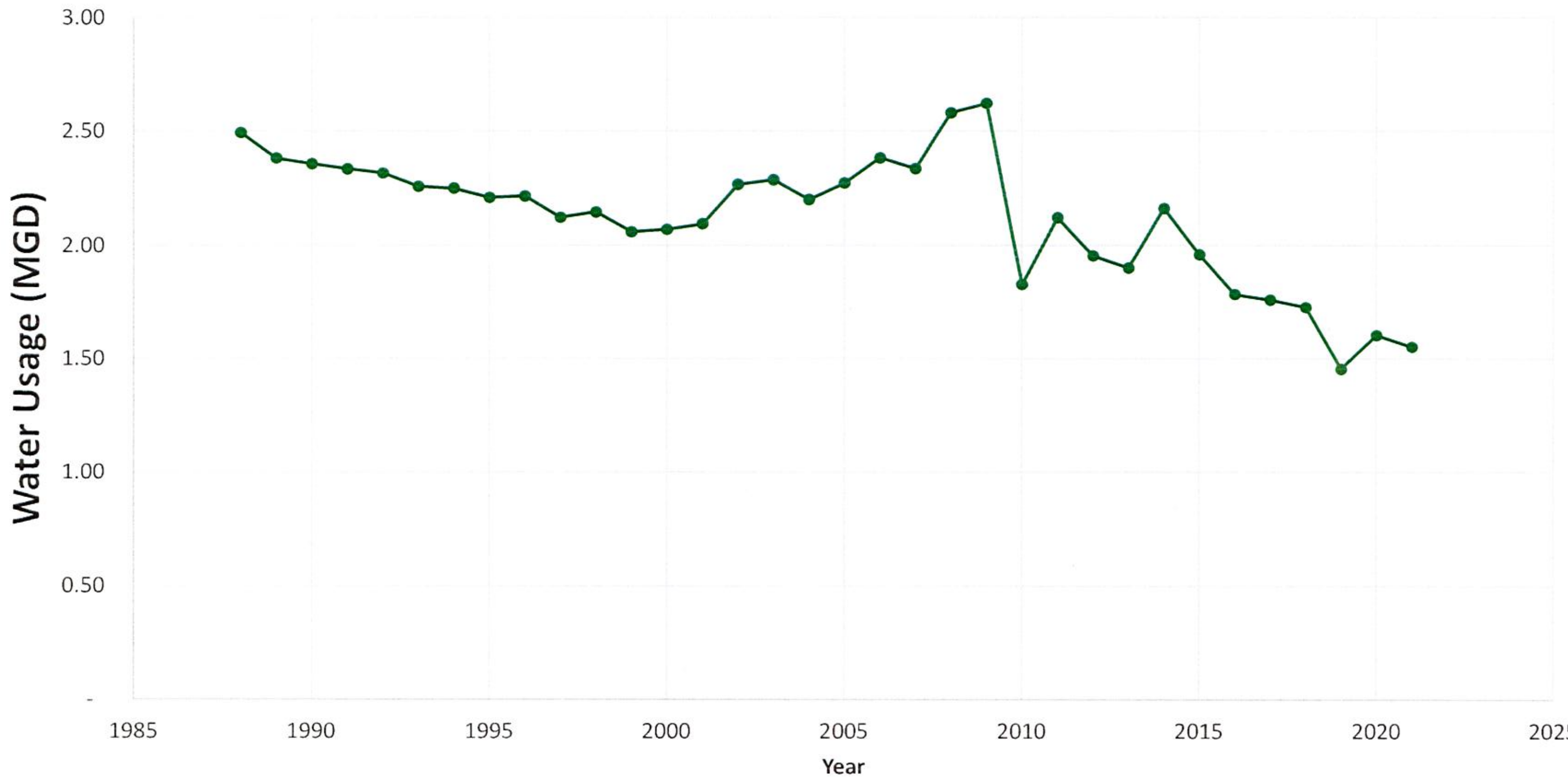
- Purpose of Study
- Water Demand Projections
- Options for Additional Capacity
- Cost Evaluation of Alternatives
- Overview of Existing System Needs
- Cost of Existing Needs
- Schedule

Purpose

- Provide the City of Hibbing with the necessary information to plan out the future of its drinking water system
- Provide different alternatives for the City to meet its water supply needs
- Estimate costs for all improvements.
- Comply with all MDH and EPA drinking water regulations.



Historical Water Usage



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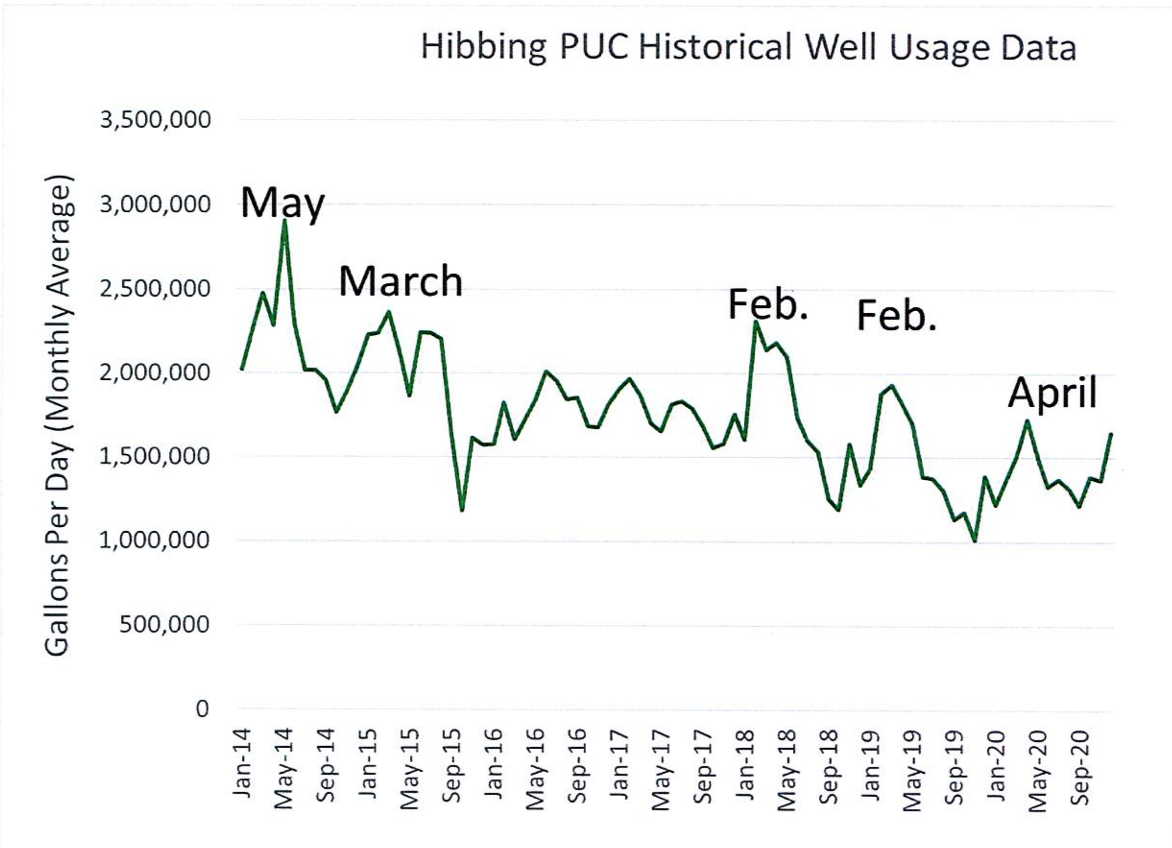
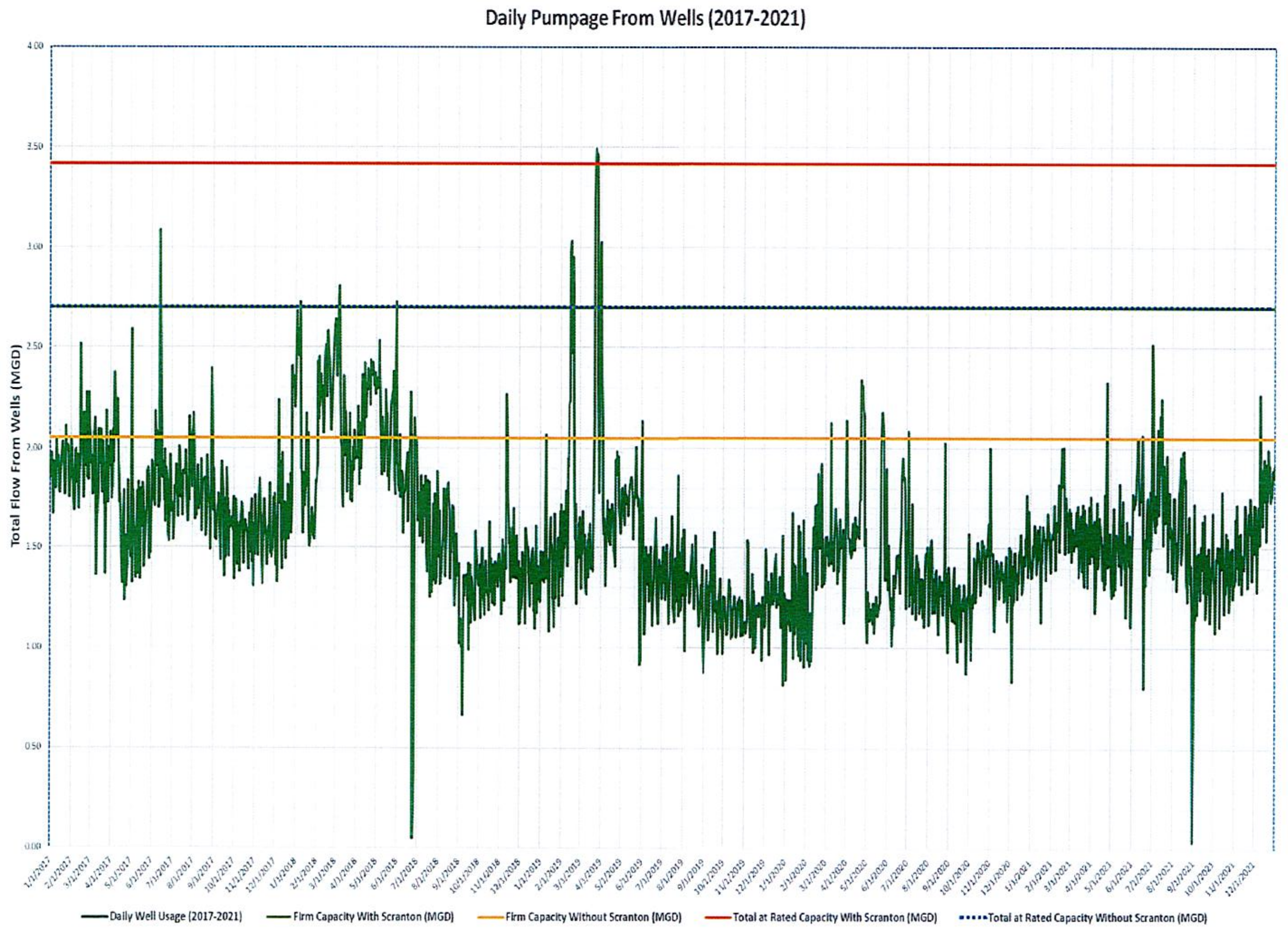
Historical Water Usage



Historical Water Usage



Total Capacity With Scranton

Total Capacity Without Scranton/
Firm Capacity With Scranton

Firm Capacity Without Scranton

Water Supply and Demand

Table 3.2 – Water Supply and Demand	
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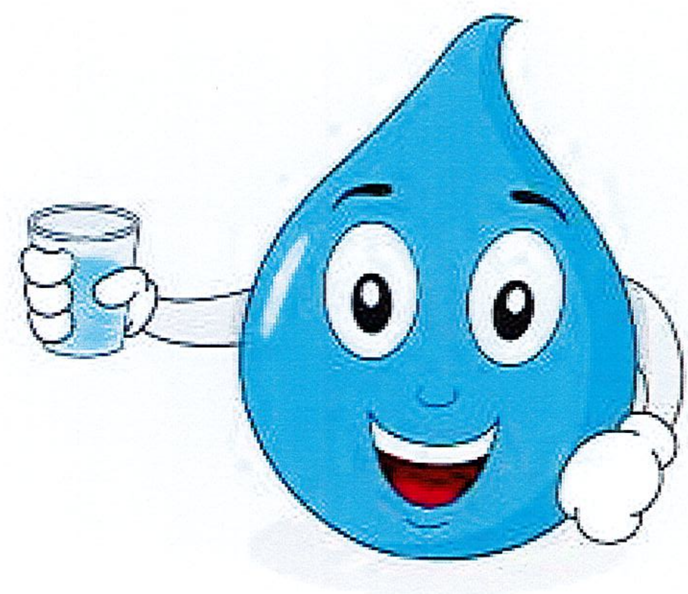
Options for Additional Capacity

- Alt 1: Drill test wells to try and find Biwabik Iron Formation
- Alt 2: Construct a surface water treatment plant at Scranton Pit
- Alt 3: Construct a water treatment plant at Carey Valley
- Alt 4: Expand existing wellfield and water treatment plant



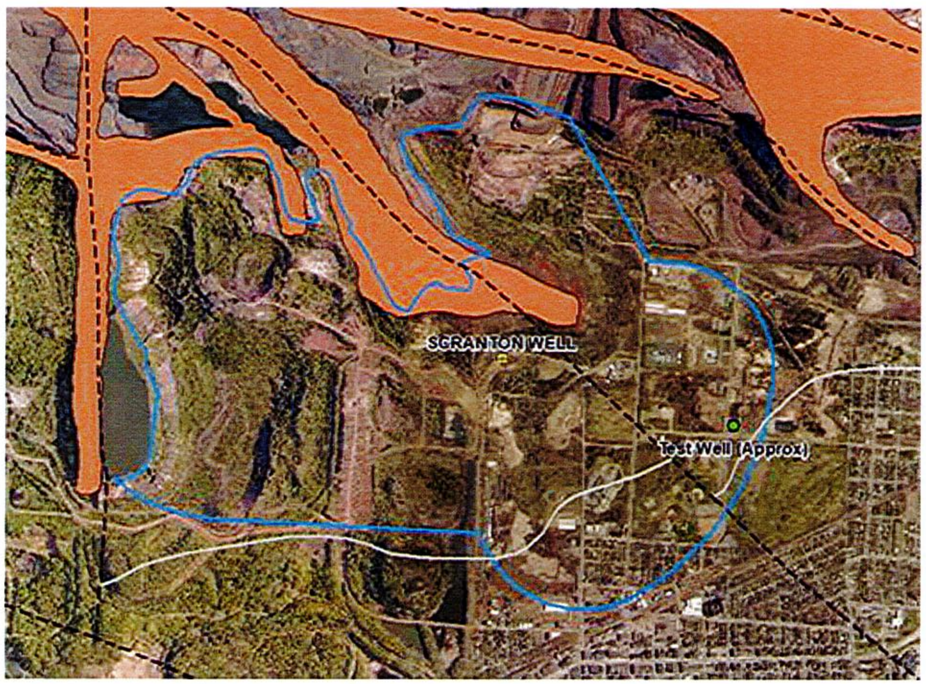
Alt 1: Try to Find Biwabik Iron Formation

Water Quality

- No guarantee that a new Biwabik well will not require treatment. Water quality data from MDH for Biwabik wells in Buhl, Calumet, Hibbing, Keewatin, Kinney, Marble, Nashwauk, and Taconite showed varying levels of iron and manganese in the Biwabik formation.
- 27 of the 48 samples from MDH would require treatment
- Scranton well has had instances of poor water quality

Alt 1: Try to Find Biwabik Iron Formation

- Braun drilled a test well in 2009 to evaluate another Biwabik Well



Alt 1: Try to Find Biwabik Iron Formation

- Braun drilled a test well in 2009 to evaluate another Biwabik Well
- Findings
  - The distance from the Scranton pit reduced the impact of mine dewatering.
  - The lack of influence from the Scranton pit showed the well was less likely to be able to supply sufficient volumes for municipal water supply.
  - High-capacity wells are difficult to locate due to fracture variability in the Biwabik
  - Biwabik wells with sufficient supply will likely be impacted by mine dewatering efforts.

Alt 2: Surface Water Plant at Scranton

- Requires reliable raw water pumping as pit level changes
- Conflict may still arise between interests of the PUC and Hibbing Taconite
- Higher standard of treatment
- Higher O&M Costs
- Mixing of surface water from pit and groundwater from south well field may cause operational challenges

Alt 3: WTP at Carey Valley

- Requires treatment similar to southern wellfield
- Water quality of existing well is similar to south well field
- Pressure or gravity filtration
- Provides opportunity for creation of east well field as demand increases

Alt 4: Expand Existing Wellfield and WTP

- Requires additional wells in southern wellfield
- Likely requires long raw water mains to further space out new wells
- Requires expansion of the existing WTP
- Ultimate capacity is limited due to needed spacing of wells

Overview of Main Existing System Needs

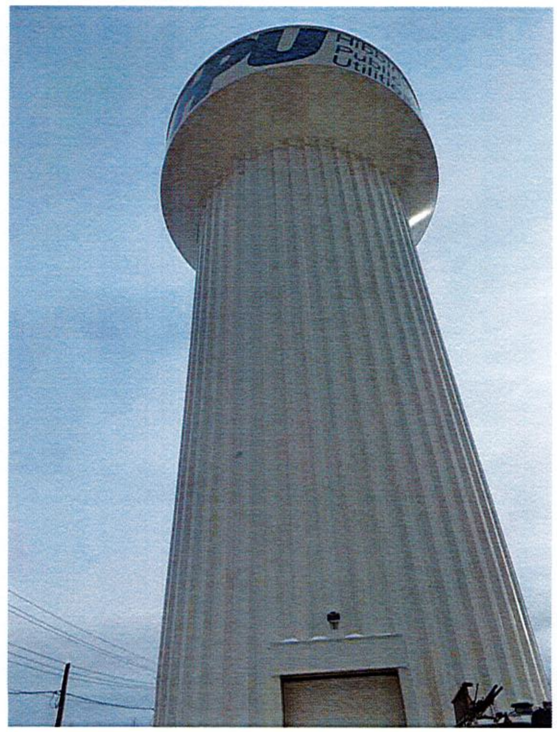
- WTP
  - Replace backwash seepage basins with reclaim tanks (15,000 gallons per day wasted to seepage basins)
  - Complete electrical and controls replacement (all original from 1980's)
  - Valve replacement for existing filters
  - Chemical feed system improvements
  - Further inspection of underground reservoir (Constructed in 1914, last inspected in 2019)

Overview of Main Existing System Needs

- Wells
  - Rehab of Wells 8 and 11
  - Miscellaneous painting at other wells

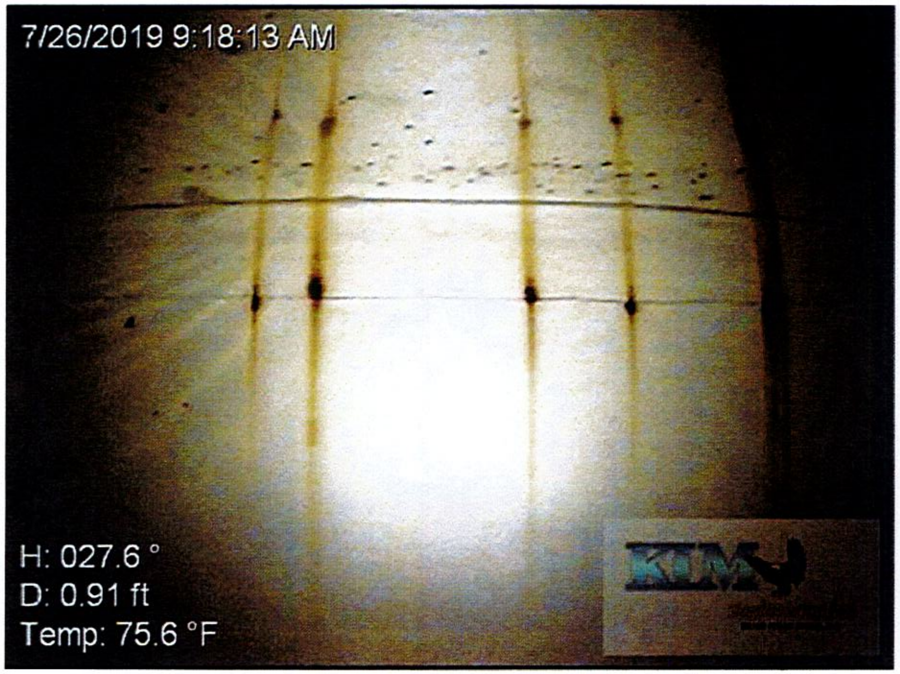
Overview of Main Existing System Needs

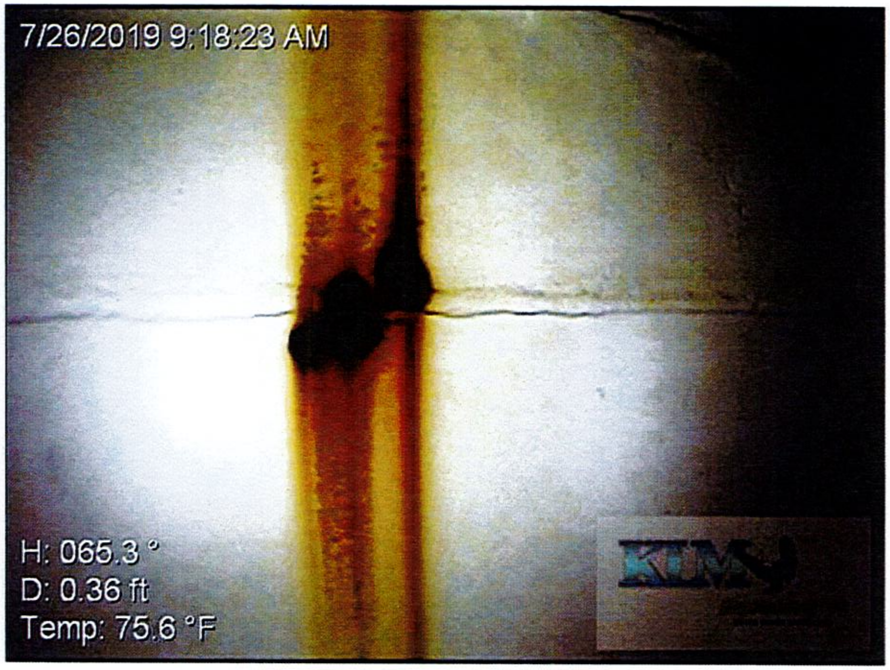
- Water Towers
  - Ansley (Reconditioned in 2021)



Overview of Main Existing System Needs

- Mesabi Tower – Due for reconditioning soon





Preliminary Cost Evaluation – Existing Facilities

Item	Cost
Wells Rehab	$500,000
Water Tower Reconditioning	$1,300,000
Water Treatment Plant Rehab	$4,000,000
Construction Subtotal	$5,800,000
Soft Costs (20%)	**$1,100,000**
Total	**$6,900,000**
Expected Cost Range (+/- 15%)	**$5.9-8.0M**

Preliminary Cost Evaluation – Biwabik Wells

Alternative 1 – Biwabik Wells	
Item	**Cost**
Test Wells (Assumes 4)	$800,000
Production Wells/Well Houses	$2,000,000
Raw Watermain	$500,000
Treatment Facility (1,000 gpm)	$8,000,000
Construction Subtotal	$11,300,000
Soft Costs (20%)	$2,260,000
Total	$13,560,000
Expected Cost Range (+/- 15%)	**$11.5M - $15.5M**

- Pros
  - Possible water quality that does not require treatment
- Cons
  - Difficult to locate adequate volume for supply
  - May still require treatment
  - Influenced by mining activity

Preliminary Cost Evaluation – Surface WTP

Alternative 2 – Surface WTP	
Item	**Cost**
Raw Watermain	$500,000
Treatment Facility (1,000 gpm)	$13,000,000
Construction Subtotal	$13,500,000
Soft Costs (20%)	$2,700,000
Total	$16,200,000
Expected Cost Range (+/- 15%)	**$13.7M - $16.6M**

- Pros
  - Allows the continued use of Scranton water
- Cons
  - Influenced by mining activities
  - Higher operating costs
  - Requires higher licensure for operators

Preliminary Cost Evaluation – Carey Valley

Alternative 3 – Carey Valley	
Item	**Cost**
Treatment Facility (1,000 gpm)	$9,000,000
Construction Subtotal	$9,000,000
Soft Costs (20%)	$1,800,000
Total	$10,800,000
Expected Cost Range (+/- 15%)	**$9.2M - $12.4M**

- Pros
  - Known source water and infrastructure
  - Offers future expansion for east wellfield
- Cons
  - Requires treatment

Preliminary Cost Evaluation – Expand South WTP

Alternative 4 – Expand South WTP	
Item	**Cost**
Test Wells (Assumes 4)	$400,000
Production Wells/Well Houses	$1,500,000
Raw Watermain	$1,000,000
Treatment Facility (1,000 gpm)	$7,000,000
Construction Subtotal	$9,900,000
Soft Costs (20%)	$1,980,000
Total	$11,880,000
Expected Cost Range (+/- 15%)	**$10.1M - $13.6M**

- Pros
  - Eliminates need for multiple treatment facilities
- Cons
  - Requires treatment plant expansion
  - Difficult to find new sources with other existing wells
  - Requires long raw watermains

Preliminary Cost Evaluation – Summary

Table 6.1 – Preliminary Cost Evaluation				
Item	**Biwabik Wells**	**Surface WTP**	**Carey Valley WTP**	**Expand South WTP**
Test Wells (Assumes 4)	$800,000	-	-	$400,000
Production Wells/Well Houses	$2,000,000	-	-	$1,500,000
Raw Watermain	$500,000	$500,000	-	$1,000,000
Treatment Facility (1,000 gpm)	$8,000,000	$13,000,000	$9,000,000	$7,000,000
Construction Subtotal	$11,300,000	$13,500,000	$9,000,000	$9,900,000
Soft Costs (20%)	$2,260,000	$2,700,000	$1,800,000	$1,980,000
Total	$13,560,000	$16,200,000	$10,800,000	$11,880,000
Expected Cost Range (+/- 15%)	**$11.5M - $15.5M**	**$13.7M - $16.6M**	**$9.2M - $12.4M**	**$10.1M - $13.6M**

Affordability Grant Analysis

Median Household Income (MHI)	$47,030
Total Equivalent Residential Units (ERUs)	8,364
Max Monthly Water Cost per ERU (1.2% of MHI)	$47.03
Max Yearly Revenue at 1.2% MHI	$4,720,000
	2020 Actual
Operating Expenses	$2,000,000
Available Yearly Debt Service at 1.2% MHI (Max Revenue Minus Operating Expenses)	$2,720,000
Yearly Debt Service Payment at 2% Interest Over 20-year Term Per $1.0M Loan	$60,700
Debt Capacity	$45,000,000

Cost Increase Per Household

Capital Cost	$11M	$13M	$15M	$17M
Yearly Revenues Required for Project Loan	$667,700	$789,100	$910,500	$1,031,900
ERUs	8,364	8,364	8,364	8,364
Yearly Cost per ERU	$79.83	$94,35	$108.86	$123.38
Monthly Cost per ERU	$6.65	$7.86	$9.07	$10.28

Schedule

Table 7.1 – Project Implementation Schedule	
Item	**Date**
Present Preliminary Findings	April 2022
Submit Funding Applications	May 3, 2022
Finalize Report and Scope of Improvements	May/June 2022
Design	July 2022– March 2023
Bid Project	Spring 2023
Construction	Summer 2023 – 2025