



Real People. Real Solutions.

Water Treatment Study

June 22, 2021



Purpose

- Provide the City of Mound with the decision-making information necessary to move forward with a plan to treat municipal water
- Establish costs and locations/scope of the treatment plant and piping needs for planning and discussion
- Document the process and the considered alternatives as the city's response to the required Manganese notifications
- Provide tools for applications for funding and assistance at the local, state, and federal levels



- City of Mound obtains water from two (2) wells: Well No. 3 and Well No. 8

Supply

- Capacity
 - Total well capacity = 3,000 gpm or 3.6 MGD
 - Total ***firm*** well capacity = 1,500 gpm or 1.8 MGD (with one well out of service)
- Useful Life
 - Typical = 40-60 years
 - Existing = 74 years old (Well No. 3) and 18 years old (Well No. 8)

Table 2.1 – Well Construction Information City of Mound, Minnesota				
Item	Well No. 3	Well No. 4	Well No. 7	Well No. 8
Well Status	Active	Observation	Emergency	Active
Year Installed	1947	1962	1977	2003
Casting Size	20 in.	12-10 in.	16 in.	18-24 in.
Well Depth Total	317 ft.	729 ft.	194 ft.	304 ft.
Capacity	1,500 gpm	NA	750 gpm	1,500 gpm
Aquifer	*OPCJ	*CMRC	*QBAA	*QBAA
Unique Well No.	206994	208866	240756	699091



Storage & Treatment

- Existing Storage = 750,000 gallons
 - Minimum fire storage = 3,500 gpm for 3 hours = 630,000 gallons
- Useful Life
 - Typical = 65-75 years
 - Existing = 51 years (Evergreen Tower) and 15 years (Chateau Tower)
- Treatment occurs at the well house No.3 and No.8
- Treatment includes the following:
 - Fluoridation
 - Chlorination for disinfection



Testing Results - 2021 City of Mound, Minnesota			
Item	Well No.3	Well No.8	Maximum Contaminant Limit
Arsenic (ug/L)	3.10	4.57	10
Bromide (mg/L)	<0.4	<0.2	NA
Chloride (mg/L)	14.7	3.2	250*
Dissolved Oxygen (mg/L)	10.3	10.7	NA
Iron (mg/L)	0.500	1.050	0.3*
Manganese (mg/L)	0.761	0.475	0.05*, 0.1**
Nitrate + Nitrite as N (mg/L)	<0.05	<0.05	10 mg/L as N
pH	7.1	7.4	6.5-8.5*
Sulfate (mg/L)	34.7	24.6	250*
Total Organic Carbon (mg/L)	1.6	1.8	NA

* Secondary Contaminants

** Health advisory limit for infants



Water Quality Metrics

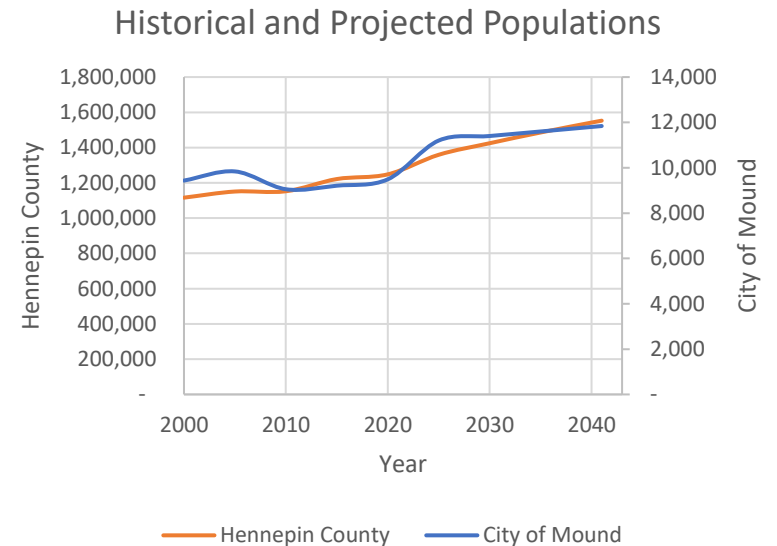
- Water supply hardness is classified as hard
- Complaints of red/orange and sediment in water
- Water supply iron concentration exceeds the limit, a secondary standard of 0.3 mg/L
- Water supply manganese concentration exceeds the limit, a secondary standard of 0.05 mg/L
- Also exceeds health advisory value of 0.1 mg/L for infants and 0.3 mg/L for adults (resulting in the previous notification)
- Wells No.4 and 7 were previously found to be contaminated with arsenic and were taken offline / out of the system



Population & Demand Projections

Year	City of Mound	Hennepin County
2000	9,435	1,116,033
2005	9,838	1,150,912
2010	9,052	1,152,425
2015	9,209	1,221,703
2020	9,489	1,248,250
2025	11,200	1,359,302
2030	11,400	1,424,735
2035	11,600	1,485,751
2040	11,800	1,541,985
2041	11,840	1,552,714

The population projections are from the 2010 Mound Comprehensive Plan. Note: The Water Supply Plan shows lower population projections, conservative projections were used.



Item	Unit	2020	2041
Population	Person	9,410	11,840
Individual Use	gpcd	65.7	70
Average Day Use	gpd	623,526	828,800
Peaking Factor		1.82	2
Maximum Day Use	gpd	1,136,000	1,657,600
Total Design Treatment Capacity*	gpm	1500**	1382

* Total Proposed Design Treatment Capacity is based on the average day use with the plant running for 20 hours per day

** Existing total design treatment capacity assumed to be firm well capacity



Water Treatment Alternatives

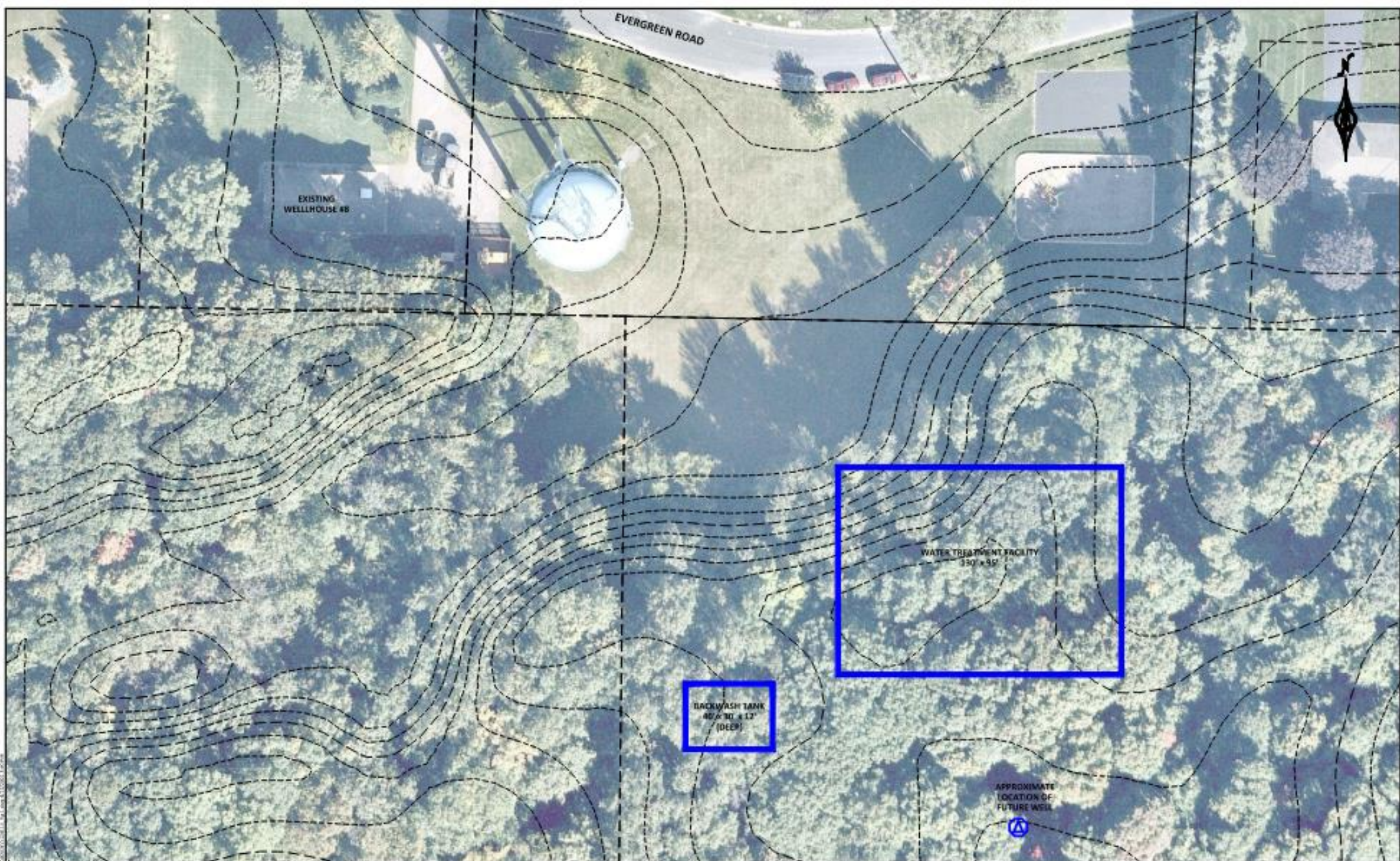
- Alternative No. 1 – Iron and Manganese Filtration Treatment Facility
- Alternative No. 2 - Construction of Lime Softening and Filtration Treatment Facility
- Other alternatives removed from consideration:
 - ~~Do Nothing~~
 - ~~Iron and Manganese sequestration~~
 - ~~Wait and see~~



Alternative No. 1 – Iron and Manganese Filtration Treatment Facility

- This alternative involves the following:
 - Construction of an Iron and Manganese filtration facility
 - A new 1,500 gpm well located near the filtration facility
 - Seal wells No.3, 4 and 7





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NO.	DESCRIPTION	DATE
1	ISSUED FOR PERMIT	10/1/18
2	REVISED	10/1/18
3	REVISED	10/1/18
4	REVISED	10/1/18
5	REVISED	10/1/18
6	REVISED	10/1/18
7	REVISED	10/1/18
8	REVISED	10/1/18
9	REVISED	10/1/18
10	REVISED	10/1/18

CITY OF MOUND, MINNESOTA
WATER TREATMENT STUDY
EXISTING SITE
PRELIMINARY SITE LAYOUT

SHEET
1



Alternative No. 1 Construction Costs

Table 7.1 – Estimated Water Treatment Facility Construction Costs	
City of Mound, Minnesota	
Item	Cost
Mobilization, Bonds Insurance	\$600,000
Well Construction	\$440,000
Well House Building Construction	\$350,000
Seal Well No.4 and 7	\$200,000
Site Work	\$870,000
Utilities	\$1,400,000
Water Treatment Facility Building Construction	\$5,500,000
Vertical Turbine Pumps	\$240,000
Air wash blowers	\$80,000
Water Aeration Equipment	\$140,000
Underdrain/media/troughs	\$350,000
Chlorine Feed System	\$190,000
Fluoride Feed System	\$80,000
Corrosion Inhibitor Feed System	\$80,000
Process Piping and Valves	\$1,100,000
Painting & Coating Systems	\$240,000
HVAC & Plumbing	\$350,000
Electrical, Instrumentation, & Controls	\$1,300,000
Watermain	\$4,515,000
Subtotal	\$18,025,000
Contingency (15%)	\$2,730,750
Construction Subtotal	\$20,728,750
Legal, Engineering, and Administration (20%)	\$4,145,750
Total	\$24,874,500

- All in: \$24,874,500

* Watermain costs require a caveat/explanation



Alternative No. 1 Pros and Cons

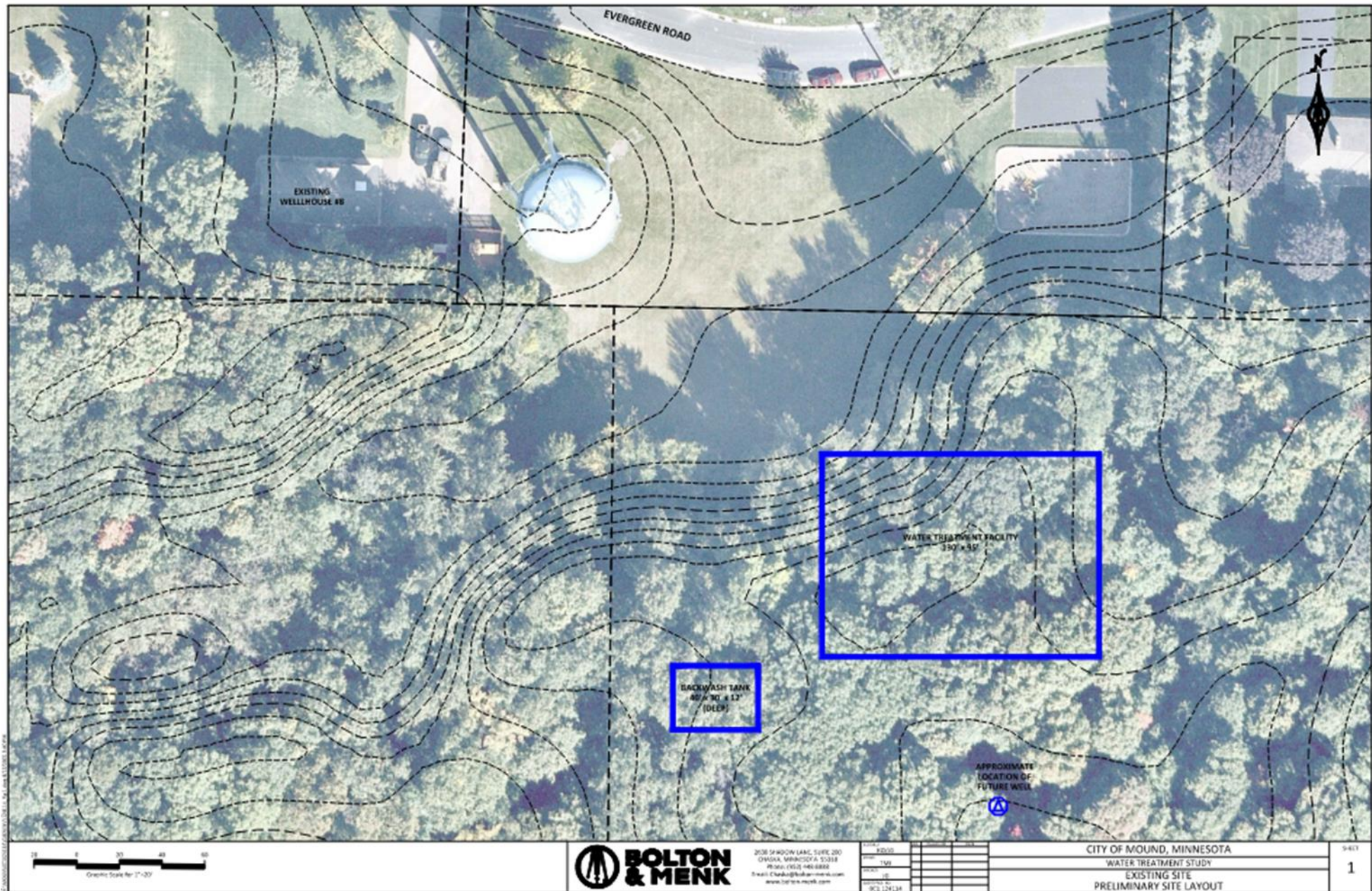
- Pros
 - Design provides redundancy in the treatment process and allows for economic and flexible future expansion.
 - Operations are flexible and reliable.
 - Iron and Manganese removal
 - Removal of Iron color
- Cons
 - Operational and capital cost
 - Requires higher level of operator license than existing



Alternative No. 2 – Construction of Lime Softening and Filtration Treatment Facility

- This alternative involves the following:
 - Construction of a Lime softening facility and an Iron and Manganese filtration treatment facility.
 - A new 1,500 gpm well near the new treatment facility
 - Seal Wells No.3, 4, and 7





Alternative No. 2 Construction Cost

Table 7.3 Estimated WTF and Lime Softening Construction Cost	
City of Mound	
Mobilization, Bonds Insurance	\$ 750,000
Well Construction	\$ 440,000
Well House Building Construction	\$ 350,000
Seal Well No.3, 4 and 7	\$ 200,000
Site Work	\$ 1,000,000
Utilities	\$ 1,600,000
Water Treatment Facility Building Construction	\$ 7,000,000
Vertical Turbine Pumps	\$ 375,000
Air wash blowers	\$ 100,000
Water Aeration Equipment	\$ 140,000
Backwash Reclaim System	\$ 350,000
Underdrain/media/troughs	\$ 350,000
Chlorine Feed System	\$ 190,000
Fluoride Feed System	\$ 80,000
Corrosion Inhibitor Feed System	\$ 80,000
Lime Soda Ash Softening Systems (including lime and soda silo and feed system)	\$ 1,600,000
Sludge Storage tank or Lagoon and Pumping	\$ 1,000,000
Solids contact clarifier, lime solids tank, and sludge press facility	\$ 3,000,000
Process Piping and Valves	\$ 150,000
Painting & Coating Systems	\$ 300,000
HVAC & Plumbing	\$ 450,000
Electrical, Instrumentation, & Controls	\$ 2,000,000
Watermain	\$ 4,000,000
Subtotal	\$ 25,505,000
Contingency (15%)	\$ 3,825,750
Construction Subtotal	\$ 29,330,750
Legal, Engineering, and Administration (20%)	\$ 5,866,750
Total	\$ 35,196,900

- All in: \$35,196,900



Alternative No. 2 Pros and Cons

- Pros
 - Design provides redundancy in the treatment process and allows for economic and flexible future expansion.
 - Operations are flexible and reliable.
 - Removes manganese, iron, hardness, and other contaminants found in lower levels.
 - Softens water to roughly 100 mg/L of hardness.
- Cons
 - High construction, operation and maintenance, and capital costs
 - Requires higher level of operator license than existing
 - Requires additional storage for lime sludge



Recommendations

Alternative 1 is recommended it will provide the city with clean water that meets both the EPA's primary and secondary drinking water standards.

Table 8.1 – Total Annual Project Costs	
Item	Cost
Total Capital Costs	\$20,030,000
Annual Capital Costs	\$1,346,000
Projected O&M Costs	\$236,500
Total Annual Project Costs	\$1,582,500

Annual Capital Cost based on project financing for 20-years at three (3) percent annual interest



Proposed Implementation Schedule

Table 8.3 – Project Implementation Schedule	
Item	Date
Review with City / Finalize Report	June 2021
Submit to MDH	July 2021
Deadline to Submit IUP Letter to PFA	Completed
PFA Funding List Released	August- September 2021
Design of Improvements	October 2021- March 2022
Submit Plans and Specifications to MDH	March 2022
Advertise for Bids	June 2022
Award of Bid	July 2022
Complete Construction and Closeout	July 2024



HUGELY Collaborative efforts to ask for HELP

- Submitted to PFA (PPL) and IUP (state level funding sources)
 - Elected Officials & City Manager Efforts
 - Aligning with other municipalities also seeking solutions
 - Minnesota Department of Health
-
- We continue to monitor, seek, and make application on behalf of the city, for every available opportunity





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