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William Steele – *Mayor Pro Tem*
Suzanne Politza – *Council Member*
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Randy Jewell – *City Assessor*
Cullen Harkness – *City Attorney*

CITY OF EATON RAPIDS WORK SESSION AGENDA

January 08, 2024
5:00 pm
200 S. Main Street

This meeting will be streamed live for viewing only at:
<https://us06web.zoom.us/j/85394331944>
Meeting ID: 853 9433 1944
Please note all public comments must be made in person.

Call To Order

Public Comments

Unfinished and Special Business

New Business

- 1. Water Reliability Study Presentation – Jim Minster, C2AE.**
- 2. MDOT Pedestrian Crossing Update**
- 3. City Christmas Tree-discussion**

Public Comments

Adjourn

***Council Picture**

Water System Reliability Study and General Plan Update

City of Eaton Rapids

December 28, 2023

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1. General

The City of Eaton Rapid has completed a Water System Reliability Study and General Plan update in accordance with Part 12 Water System Reliability Study and Part 16 General Plans of the Safe Drinking Water Act, Act 399, P.A. 1976 (Act 399), as amended. Existing population and water system data were evaluated, population and water demand projections were developed, the existing water system model was updated, existing and future water demands were simulated, improvement alternatives were identified, corresponding project cost opinions were prepared, and the water system map was updated.

The City of Eaton of Rapids water system consists of the following:

- seven (7) groundwater supply wells, which are situated in the northern part of the City in two separate wellfields;
- a conventional iron removal Water Treatment Plant (WTP) equipped with aerators/detention tank, high service pumps, and pressure filters;
- two elevated water storage tanks with mixers; and
- approximately 40 miles of 4" to 16" diameter water main.

Figure 1: Existing Water System Map and Service Area Map illustrates the general layout of the existing water system, including water main sizes and rated capacities of the water system components.

The water system currently services approximately 2,114 customers, including residential, commercial, industrial, and public/institutional. Meters at each well totalize daily pumpage to the WTP, while a master meter at the WTP totalizes daily pumpage to the water distribution system. Customer water meters are read/billed monthly.

2. Service Area

The water system service area generally corresponds to the corporation limits. Refer to Figure 1: Existing Water System Map and Service Area Map, which shows the corporation limits/service area relative to the existing water system.

3. Existing Water System Demand

Table A: Summary of Water Pumped from the Water Supply Wells to the WTP provides a tabulation of the monthly water data for year 2018 through year 2022 as well as the derivation of the 2023 Ave Day Demand, the Max Day to Ave Day Ratio, and the 2023 Max Day Demand.

Table B: Summary of Unmetered/Unaccounted for Water (for 2018-2022) provides a summary of the unmetered/unaccounted for water for years 2018 through 2022. Unmetered uses include miscellaneous City facilities, elevated water storage tank maintenance, hydrant flushing, water main breaks, and

firefighting; bulk water, which is metered, is also sold to contractors. The City continues to improve its efforts to estimate and/or meter and subsequently track annual water usage.

Table C: Summary of Existing Water Customers (for 2022) presents a summary of the existing water system customers. For each customer classification, the number of customers and the corresponding average annual consumption are noted. The Residential classification is the largest customer group and also has the largest average annual consumption.

Additionally, refer to Table D: Summary of Existing Residential Equivalent Units (REUs) (for 2022) for the calculated residential units (REUs) based on meter size.

4. Population and Water Demand Projections

Table E: Population Projections includes the U.S. Census population data for the City of Eaton Rapids and the population projections for the twenty-year planning period. The population and projected average day, maximum day, and maximum hourly water demands, including the basis for development, are included in Table F: Population/Water Demand Projections. The firm capacity of the water supply wells and WTP are also noted for comparison to the 2043 Max Day Demand.

5. Water System Infrastructure

Figure 1: Existing Water System Map and Service Area Map and Table G: Summary of Water System Facilities illustrate and summarize the general layout and components of the existing water system, including total, firm, and standby power capacities. The Safe Drinking Water Act 399, Part 12 Reliability rules require that a municipal water supply system be capable of providing the maximum day demand with the largest well out of service, which is referred to as "firm capacity". The current firm capacity of the existing water supply wells is 3.28 million gallons per day (mgd), which is more than 2.5 times the projected year 2043 maximum day demand of 1.154 mgd. The firm capacity of the WTP, which is dependent of the high service pumps, is approximately 1.44 mgd.

The water supply wells are sequenced based on operator setup to pump water to the aerators/detention tank at the WTP. The high service pumps take suction from the detention tank and discharge water through the pressure filters into the water distribution system. The water level in either of the two elevated water storage tanks is used to control the high service pumps.

Table H: Existing Water Distribution System Inventories presents a summary of the water mains by size, material, and age. Additionally, Figure 1: Existing Water System Map and Service Area Map, Figure 2: Existing Water System Water Main Material Map, and Figure 3: Existing Water System Water Main Age Map provide map summaries of the water main size, material, and age. The City utilizes its GIS to manage the water system information and continues to update the data via improvement projects and field work. The GIS is also integral to the City's EGLE approved, Water System Asset Management

Program and a valuable tool for managing the Distribution System Materials Inventory (DSMI), including tracking field investigations.

The Insurance Services Offices (ISO), an independent insurance rating company, defines fire flow recommendations for communities; however, many communities choose not to provide the full ISO recommended flow (i.e., 3,000 to 6,000 gpm for up to six hours) to industrial and commercial/central business district areas because of the significant infrastructure investment required to construct storage/water main to support this flow. Instead, communities adopt reasonably attainable fire flow levels to be provided (i.e., target fire flow) with individual industrial/commercial customers providing additional volumes, as required. The recommended water storage may be calculated by adding the target fire flow to the maximum day demand and subtracting the firm water supply. Assuming a target fire flow of 3,000 gpm for 3 hours for commercial and industrial areas and 1,000 gpm for 2 hours for residential areas, the City has sufficient storage capacity via the existing elevated storage tanks and wells with permanent generators/standby power for year 2043 Max Day Demand conditions; refer to Table I: Water Storage Volume Calculations.

The existing water system GIS data were reviewed and revised as required and provided the basis for updating the City's computer model of the supply, treatment, storage, and distribution system. The GIS/model was updated to include construction projects that have been completed since the 2010 Water System Reliability Study Update and Capital Improvement Plan; Table J: Summary of Water System Improvements (2011 to Present) includes a summary of the completed construction projects. The hydraulic network analysis was completed using GIS-based WaterGEMS software, which allows for water system simulation under various average and maximum day demands and fire flow conditions. The existing average day and maximum day demands were evaluated and demands for the largest users were assigned to junction nodes nearest the source, while the remainder of the demand was evenly distributed amongst the junction nodes throughout the model; the largest 25 users account for approximately 20 percent of the average day demand.

The existing year 2023 and projected year 2043 average day and maximum day water demands were simulated. Figure 4: 2023 Max Day Demand Minimum Pressure and Figure 6: 2043 Max Day Demand Minimum Pressure illustrate the modeling results. EGLE requires a minimum normal system pressure of 35 psi and recommends a normal operation range of 55-60 psi. Figure 5: 2023 Max Day Demand Available Fire Flow and Figure 7: 2043 Max Day Demand Available Fire Flow illustrate the fire flow analysis; the water distribution system can provide the recommended fire flows at 20 psi to the majority of the system with some deficiencies at dead end pipes and 4-inch water mains.

In 2001, the City teamed with C2AE and Peerless-Midwest, Inc. to prepare a Wellhead Protection Program (WHPP) in conjunction with the EGLE WHPP grant program, which was subsequently approved by EGLE. A second WHPP grant was secured and the team updated the WHPP after water supply Well 8 was installed (and Well 6 was abandoned). The City recently initiated another WHPP update.

6. Water System Improvements/Capital Improvement Plan

Table K: Capital Improvement Plan summarizes the improvements for the water system, which the City of Eaton Rapids proposes to implement; a Project Description and corresponding Project Cost Opinion are included for the 5-Year and 20-Year Capital Improvement Plans. Also refer to the excerpt from the City of Eaton Rapids Water System Capital Improvement Plan, which is attached to Table K: Capital Improvement Plan, for addition details.

The City previously submitted a DWSRF Project Planning Document, which included the proposed improvements outlined in the 5- and 20-Year Capital Improvement Plans, but was not included within the fundable range on EGLE's Final Intended Use Plan for FY24. However, the City continues to pursue funding via the EGLE DWSRF program and, as such, submitted an Intent to Apply for FY25 and recently met with EGLE representatives to discuss the City's proposed project(s), Project Planning Document and scoring criteria.

Attachment A

Tables

Table A
 Summary of Water Pumped from Water Supply Wells
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

Year	Month	Total Pumped, mg	Ave Day, mgd	Max Day, mgd	Date of Max Day	Min Day, mgd	Ratio - Max Day to Ave Day	Additional Comments
2018	January	20.6870	0.6673	0.9840	1/24/2018	0.4862	1.47	General Note: WTP filter backwash every Mon & Fri.
	February	17.2000	0.6100	0.9000	2/13/2018	0.4000	1.48	
	March	20.4120	0.6585	0.7723	3/3/2018	0.5011	1.17	WM Breaks - Water; Cumberland.
	April	18.1584	0.6053	0.7692	4/14/2018	0.4397	1.27	
	May	19.4811	0.6284	0.9288	5/30/2018	0.3253	1.48	Hydrant flushing.
	June	20.5527	0.6851	0.8491	6/6/2018	0.5511	1.24	
	July	22.8490	0.7371	0.9451	7/6/2018	0.5924	1.28	
	August	21.5980	0.6967	0.9487	8/6/2018	0.5132	1.36	
	September	19.5000	0.6500	0.9617	9/20/2018	0.5137	1.48	Hydrant flushing.
	October	19.0718	0.6152	0.7361	10/6/2018	0.4883	1.20	
	November	17.8904	0.5963	0.7978	11/2/2018	0.3958	1.34	WM Break - Brook.
	December	18.7649	0.6053	0.8990	12/12/2018	0.3169	1.49	
Totals, mg		236.165						
Average Day, mgd			0.646					
Maximum Day, mgd				0.984				
Minimum Day, mgd						0.317		
Ratio - Max Day to Ave Day							1.35	
2019	January	18.5186	0.5974	0.8514	1/18/2019	0.3176	1.43	
	February	16.3388	0.5835	0.7626	2/22/2019	0.3198	1.31	
	March	18.5636	0.5988	0.8012	3/25/2019	0.4164	1.34	WM Break - Rancho.
	April	17.1956	0.5732	0.6945	4/9/2019	0.3789	1.21	
	May	19.0091	0.6132	0.9047	5/22/2019	0.3485	1.48	Hydrant flushing.
	June	19.0582	0.6353	0.7987	6/1/2019	0.4555	1.26	
	July	22.8434	0.7369	0.8794	7/6/2019	0.5472	1.19	
	August	23.8298	0.7687	0.9400	8/6/2019	0.5968	1.22	
	September	19.8536	0.6618	0.8917	9/19/2019	0.4602	1.35	Hydrant flushing.
	October	17.9619	0.5794	0.6635	10/7/2019	0.4609	1.15	
	November	18.1079	0.6036	0.7421	11/20/2019	0.4444	1.23	WM Breaks - Raymerville; Forest.
	December	19.4643	0.6279	0.7880	12/29/2019	0.3482	1.25	
Totals, mg		230.745						2019-2020 new meter/billing software.
Average Day, mgd			0.632					
Maximum Day, mgd				0.940				
Minimum Day, mgd						0.318		
Ratio - Max Day to Ave Day							1.28	
2020	January	19.6949	0.6353	0.7497	1/17/2020	0.4531	1.18	WM Breaks - Water; Jennie; Brook.
	February	17.2728	0.6169	0.7694	2/20/2020	0.4285	1.25	
	March	18.5625	0.5988	0.7006	3/16/2020	0.3883	1.17	
	April	15.7247	0.5242	0.6550	4/8/2020	0.3426	1.25	
	May	17.6015	0.5678	0.7508	5/28/2020	0.2998	1.32	Hydrant flushing.
	June	21.6718	0.7224	0.8870	6/20/2020	0.5436	1.23	
	July	24.2032	0.7807	0.9805	7/14/2020	0.6243	1.26	
	August	23.9633	0.7730	1.0919	8/25/2020	0.6033	1.41	
	September	20.8328	0.6944	1.2838	9/24/2020	0.5586	1.85	Use Aug Max Day; Sept likely due to WM Break.
	October	20.1181	0.6490	0.9007	10/24/2020	0.4138	1.39	
	November	17.7771	0.5926	0.6954	11/23/2020	0.4011	1.17	Hydrant flushing.
	December	17.9931	0.5804	0.6820	12/3/2020	0.3860	1.18	
Totals, mg		235.416						2019-2020 new meter/billing software.
Average Day, mgd			0.645					
Average Day, mgd - Adjusted for Max Day			0.640					
Maximum Day, mgd				1.092				
Minimum Day, mgd						0.300		
Ratio - Max Day to Ave Day							1.30	
Ratio - Max Day to Ave Day - Adjusted for Max Day							1.25	
2021	January	19.0521	0.6146	0.8433	1/9/2021	0.4577	1.37	WM Breaks - Kil Kelly; Albers; Veroy/Kimbark; Center/Knight.
	February	17.5123	0.6254	0.8214	2/6/2021	0.4744	1.31	
	March	19.5735	0.6314	0.7403	3/20/2021	0.4880	1.17	WM Breaks - Jackson; Water; Forest; Kimbark Dead End.
	April	16.0369	0.6168	0.6869	4/14/2021	0.4828	1.11	
	May	20.6694	0.6668	1.0332	5/18/2021	0.4077	1.55	Hydrant flushing; WM Break - WTP distribution main.
	June	22.0110	0.7340	1.0425	6/18/2021	0.4667	1.42	
	July	21.4224	0.6910	0.8697	7/10/2021	0.4980	1.26	
	August	21.1363	0.6818	0.8487	8/6/2021	0.6210	1.24	
	September	19.4421	0.6481	0.7519	9/4/2021	0.5616	1.16	Hydrant flushing.
	October	19.5161	0.6296	0.8995	10/16/2021	0.4574	1.43	
	November	17.3653	0.5788	0.6972	11/6/2021	0.4217	1.20	
	December	18.6086	0.6003	0.7662	1/0/1900	0.4503	1.28	
Totals, mg		232.346						Includes Metered Bulk Water sales.
Average Day, mgd			0.643					
Maximum Day, mgd				1.043				
Minimum Day, mgd						0.408		
Ratio - Max Day to Ave Day							1.29	
2022	January	18.8950	0.6100	0.8684	1/5/2022	0.4358	1.42	Includes Metered Bulk Water sales.
	February	17.7630	0.6344	0.9011	2/19/2022	0.4801	1.42	
	March	20.0070	0.6450	0.7856	3/29/2022	0.4693	1.22	
	April	18.8783	0.6293	0.7893	4/29/2022	0.4526	1.25	
	May	20.3628	0.6569	1.0241	5/10/2022	0.3080	1.56	Hydrant flushing. Use May Max Day; July due to Storage Tanks.
	June	21.5529	0.7184	0.9293	6/25/2022	0.5054	1.29	
	July	24.0540	0.8300	1.1306	7/1/2022	0.6636	1.36	Elevated Water Storage Tanks - inspection/maintenance.
	August	21.8040	0.7030	0.8820	8/2/2022	0.3576	1.25	
	September	20.1140	0.6700	0.8432	9/28/2022	0.4780	1.26	Hydrant flushing.
	October	20.1248	0.6492	0.9902	10/13/2022	0.4807	1.53	
	November	18.3430	0.6110	0.7229	11/12/2022	0.4468	1.18	WM Break - S Main OD back pking lot.
	December	18.2582	0.5890	0.8325	12/26/2022	0.4333	1.41	
Totals, mg		240.157						Includes Metered Bulk Water sales.
Average Day, mgd			0.662					
Average Day, mgd - Adjusted for Max Day			0.647					
Maximum Day, mgd				1.024				
Minimum Day, mgd						0.308		
Ratio - Max Day to Ave Day							1.35	
Ratio - Max Day to Ave Day - Adjusted for Max Day							1.35	
5-Year Ave Day Demand =					0.642 mgd			
5-Year Max Day =					1.092 mgd			
5-Year Ave Max Day to Ave Day Ratio =					1.31			
Max Day to Ave Day Ratio based on 5-Year Ave Day Demand and 2020 Max Day					1.70			

Notes:
 1. mg = million gallons; 1 mgd = 1,000,000 gallons.
 2. mgd = million gallons per day; 1 mgd = 1,000,000 gallons per day (gpd).

Table B
 Summary of Unmetered/Unaccounted For Water (for 2018-2022)
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

Year	Water Pumped/ Metered at WTP into Distribution System	Total Water Metered/Sold	Metered Bulk Water Sales	Estimated Hydrant Flushing	Estimated WM Breaks	Estimated Water Storage Tank Work	Unaccounted for Water		
	mg	mg	mg	mg	mg	mg	mg	gpd	%
2018	215.20	154.52	1	1	0.20	0.00	58.48	160,000	27%
2019	192.20	158.28	1	1	0.16	0.00	31.76	87,000	17%
2020	195.20	150.00	1	1	0.64	0.20	42.57	117,000	22%
2021	193.40	138.06	1	1	1.19	0.00	52.15	143,000	27%
2022	192.50	140.10	1	1	0.65	1.00	48.75	134,000	25%

Notes:

1. mg = million gallons; 1 mg = 1,000,000 gallons
2. Total Water Pumped/Metered at WTP and Total Water Metered/Sold data obtained from City.
3. Per City, years 2019 and 2020 data may not be accurate due to software changes.

Table C
 Summary of Existing Water Customers (for 2022)
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

<u>Classification</u>	<u>Number of Customers</u>	<u>Average Annual Consumption</u>	
		<u>gpd</u>	<u>%</u>
Residential	1,858	84,156	60%
Commercial	192	28,344	20%
Industrial	15	11,589	8%
Public, Schools, Churches	49	16,009	11%
Totals	2,114	140,098	100%

Notes:

1. gpd = gallons per day
2. Number of Customers and Annual Consumption per Classification obtained from City.

Table D
 Summary of Existing Residential Equivalent Units (REUs) (for 2022)
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

<u>Meter Size, in</u>	<u>Number of Meters</u>	<u>AWWA Meter Factor</u>	<u>REUs</u>
5/8	2,029	1.00	2,029
1	23	2.50	58
1-1/2	30	5.00	150
2	34	8.00	272
3	11	15.00	165
4	3	25.00	75
10	1	115.00	115
Total	2,131		2,864

Note:

1. Number of Meters per meter sized obtained from City.

Table E
 Population Projections
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

	<u>U.S. Census Population</u>				<u>Population Projections</u>					
	<u>1980</u>	<u>1990</u>	<u>2000</u>	<u>2010</u>	<u>2020</u>	<u>2023</u>	<u>2028</u>	<u>2033</u>	<u>2038</u>	<u>2043</u>
City of Eaton Rapids	4,510	4,695	5,330	5,214	5,203	5,230	5,368	5,427	5,488	5,552

Note:

1. Population and demand projections based on City-approved developments, which are under and/or planned for construction, and City-provided information for potential developments:

- a. Greyhound Assisted Living - Convert a portion of Existing Condos to Assisted Living facilities.
- b. Eaton Pines Village MHP Expansion - New manufactured homes.
- c. South Industrial Park - Potential Development, similar to North Industrial Park facilities.
- d. Chester St - New homes.
- e. Ball Property (Centennial Farms - New homes over 20 years).

Table F
 Population/Water Demand Projections
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

<u>Year</u>	<u>Service Area Population</u>	<u>Ave Day Demand</u>	<u>Max Day Demand</u>	<u>Max Hourly Demand</u>
		<u>mgd</u>	<u>mgd</u>	<u>gal / hr</u>
2023	5,230	0.642	1.093	107,000
2028	5,368	0.658	1.120	109,700
2033	5,427	0.664	1.130	110,700
2038	5,488	0.671	1.142	111,800
2043	5,552	0.678	1.154	113,000
Water Supply Firm Capacity, mgd			3.28	
Water Treatment Facility Firm Capacity, mgd			1.44	

Notes:

1. mg = million gallons; 1 mg = 1,000,000 gallons.
2. mgd = million gallons per day; 1 mgd = 1,000,000 gallons per day (gpd).
3. Population and demand projections based on City-approved developments, which are under and/or planned for construction, and City-provided information for potential developments:
 - a. Greyhound Assisted Living - Convert a portion of Existing Condos to Assisted Living facilities.
 - b. Eaton Pines Village MHP Expansion - New manufactured homes.
 - c. South Industrial Park - Potential Development, similar to North Industrial Park facilities.
 - d. Chester St - New homes.
 - e. Ball Property (Centennial Farms - New homes over 20 years).
4. 2023 Average Day Demand based on 2018-2022 data.
5. Max Day Demand based on Max Day to Ave Day ratio of 1.7, which is the average peaking factor for 2018-2022. Assumes Max Day Demand does not include water main breaks, fire fighting, hydrant flushing, or storage tank repairs.
6. Max Hourly Demand based on Max Hourly to Ave Day ratio of 4.
7. Water Supply Firm Capacity based on supply (without permanent generator/standby power).

Table G
 Summary of Water System Facilities
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

Description	Capacity			Standby Power
	gpm	mgd	mg	
Supply	Well #1 - Drift well installed 1930	1,000	1.44	Right Angle Drive Engine/Propane
	Well #2 - Drift well installed 1950	350	0.50	
	Well #3 - Rock well installed 1958	250	0.36	
	Well #4 - Rock well installed 1958	250	0.36	
	Well #5 - Rock well installed 1959	300	0.43	
	Well #6 - Abandoned			
	Well #7 - Drift well installed 2001	700	1.01	Natural Gas Standby Generator (will run Well #1, Well #7, and WTP)
	Well #8 - Drift well installed 2005	430	0.62	Portable Diesel Generator
	Total Capacity	3,280	4.72	
	Firm Capacity	2,280	3.28	
	Capacity with Permanent Generator/Standby Power	2,130	3.07	
Treatment	Iron Removal Water Treatment Facility			Natural Gas Standby Generator (will run Well #1, Well #7, and WTP)
	Two Tray Type Aerators with Two Compartment Detention Tank	1,500 (each)		
	Two High Service/Filter Feed Pumps	1,000 (each)		
	Three Dual Cell Horizontal Pressure Filters	585 (each)		
	Firm Capacity	1,000	1.44	Two gas powered generators located on the north side of town will power the entire north side of town.
Storage	Tank 1 - West, West St, on Westside of Grand River		0.25	
	Tank 2 - East, S Greyhound Dr, on Eastside of Grand River		0.75	
	Total Storage		1.00	

Notes:

1. gpm = gallons per minute
2. mgd = million gallons per day; mg = million gallons
3. Water well supply capacity information obtained from EGLE 2022 Sanitary Survey and is EGLE approved/permitted capacity.
4. Water well supply firm capacity is the capacity with the largest water supply well out of service.
5. Water well supply capacity with Permanent Generator/Standby Power is the capacity of the wells with permanent generators equipped with automatic transfer switches.

Table H
Existing Water Distribution System Inventories
Water System Reliability Study and General Plan Update
City of Eaton Rapids, Eaton County, MI

Water Main Size		
<u>Size</u>	<u>Length, ft</u>	<u>% of Total</u>
≤4"	43,016	20%
6"	54,916	26%
8"	58,816	28%
10"	27,351	13%
12"	27,633	13%
16"	963	≤ 1%
Totals	212,695 (Approx 40 Miles)	100%

Water Main Material		
<u>Material</u>	<u>Length, ft</u>	<u>% of Total</u>
PVC	10,434	5%
HDPE	324	≤ 1%
Cast Iron	87,314	41%
Ductile Iron	114,623	54%
Totals	212,695 (Approx 40 Miles)	100%

Water Main Age		
<u>Age</u>	<u>Length, ft</u>	<u>% of Total</u>
1950-1959	76,550	36%
1960-1969	44,131	21%
1970-1979	19,220	9%
1980-1989	3,314	2%
1990-1999	41,663	20%
2000-2009	21,029	10%
2010-2019	3,380	2%
2020-2023	3,408	2%
Totals	212,695 (Approx 40 Miles)	100%

Note:

1. Data obtained from updated GIS/Water System Model.

Table I
Water Storage Volume Calculations
Water System Reliability Study and General Plan Update
City of Eaton Rapids, Eaton County, Michigan

	<u>2023</u>	<u>2043</u>
Max Day Demand, gpd Max Day Demand, gpm	1,093,000 759	1,154,000 801
Target Fire Flow, gpm Target Fire Flow Duration, hrs	3,000 3	3,000 3
Firm Capacity of Water Treatment Facility, gpm	1,000	1,000
Existing Elevated Tank Storage Volume, gal Tank 1 - West, West St, on Westside of Grand River <u>Tank 2 - East, S Greyhound Dr, on Eastside of Grand River</u> Total	250,000 <u>750,000</u> 1,000,000	250,000 <u>750,000</u> 1,000,000
Required Storage Volume for 3 Hours Fire Flow Volume, gal Max Day Demand, gal Less Firm Capacity of Water Treatment Facility, gal <u>Minimum Required Storage Volume, gal</u>	540,000 136,625 180,000 <u>496,625</u>	540,000 144,250 180,000 504,250
Available Storage Volume, gal	1,000,000	1,000,000
Available Duration of 3,000 gpm Fire Flow Available Storage Volume, gal Net Flow (Fire Flow + Maximum Day Demand - Firm Capacity), gpm No. of Hours Sustained 3,000 gpm Fire Flow, hrs	1,000,000 2,759 6.04	1,000,000 2,801 5.95

Table J
 Summary of Water System Improvements (2011 to Present)
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

<u>Year Constructed</u>	<u>Street</u>	<u>From - To</u>	<u>Description</u>
2020	State St State St Improvements (C2AE JN 20-0038)	From M-99/Main St to John B Davidson Dr	Replaced approx 1,650' of ex 4" WM w/8" PVC C-909 WM; replaced LSL.
2021	Brook St and W Knight St MDOT LAP Brook St, Knight St Improvements (C2AE JN 20-0058)	From West of Vaughn St to M-99/Main St	Replaced approx 1,950' of ex 4" WM w/8" C-909 WM.
2021	Eaton Rapids WTP Site Piping Water Main Emergency Repair (C2AE JN 21-0164.02)	In/under and adjacent to northside of WTP Bldg	Replaced approx 100' of failed ex 10" WM from WTP to ex 12" distribution system WM w/12" WM, including a 12x12 tee with gate valve for future redundant connection to Canal St WM.

Table K
 Water System Capital Improvement Plan
 Water System Reliability Study and General Plan Update
 City of Eaton Rapids, Eaton County, MI

<u>Item No.</u>	<u>Project Description</u>	<u>Project Cost Opinion</u>
<u>5-Year Capital Improvement Plan</u>		
1	WTP Filter Replacement	\$ 2,600,000
2	WTP High Service Pump Replacement	\$ 850,000
3	WTP Redundant Connection to Canal St, 1000ft	\$ 800,000
4	Lead Service Line Replacement	\$ 750,000
5	State St Water Main across Grand River Replacement	\$ 200,000
Total 5-Year Capital Improvement Plan		\$ 5,200,000
<u>20-Year Capital Improvement Plan</u>		
6	Undersized 4-inch Water Main Replacement - Priority 1	\$ 3,600,000
7	Undersized 4-inch Water Main Replacement - Priority 2	\$ 8,000,000
Total 20-Year Capital Improvement Plan		\$ 11,600,000
<u>Notes:</u>		
1. Refer to attached excerpt, including table titled 2021 Project Improvements, Water CIP and map titled 4-inch Water Main Replacement from the City of Eaton Rapids Water System Capital Improvement Plan		

1.6 Summary of Capital Improvement Needs

These improvements consist of the replacement of the WTP Filters which have reached their useful life, lead service line replacements, and replacement of undersized 4-inch water main throughout the city for improved reliability and fire flows. A table of planned improvements and map of improvement areas follows:

CITY OF EATON RAPIDS 2021 WATER SYSTEM CIP

Mar-21

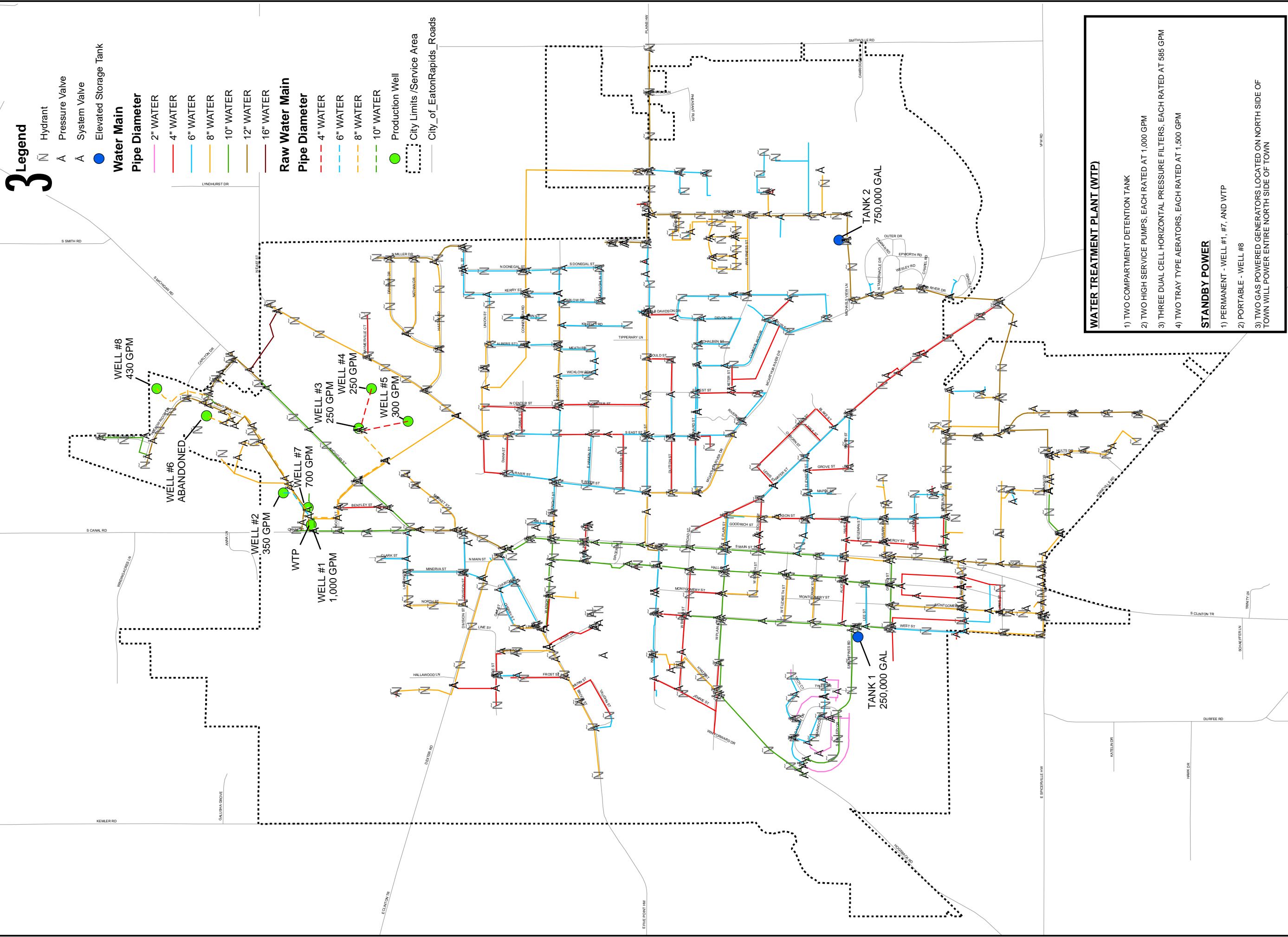
**City of Eaton Rapids - 2021 Project Improvements List
Water - CIP**

PROJECT	COST EST.	PRIORITY
WTP Filter Replacement	\$2,600,000	1
Lead Service Line Replacement	\$750,000	1
REPLACEMENT OF UNDERSIZED 4-INCH WATER MAIN		
11. Water - City Limit to Blake & South to Broad, 3300ft	\$1,000,000	1
14. Broad - Hall to Jennie, 1700ft	\$510,000	1
16. Plains - Hyatt to deadend, 775ft	\$250,000	1
17. Jennie - Plains to King, 920ft	\$300,000	1
30. Center - Union to State, 2300ft	\$725,000	1
34. Forest - Leonard to McArther, 950ft	\$300,000	1
35. Exeter - Forest to Cumberland, 330ft	\$105,000	1
36. Cumberland (backlot) Carlisle to Exeter, 1100ft	\$350,000	1
1. Spicerville, 640ft	\$200,000	2
2. Williams - Montgomery to Main, 450ft	\$150,000	2
3. Hall (backlot) - Williams to Grand, 1500ft	\$450,000	2
4. West (backlot) - Rancho to Grand, 1000ft	\$320,000	2
5. Veroy - Marlin to Haven, 1325ft	\$400,000	2
6. Lindy - Veroy to Jackson, 370ft	\$120,000	2
7. Lee - West to Hall, 600ft	\$210,000	2
8. Haven - West to Jackson, 1500ft	\$460,000	2
9. Jackson - Haven to South, 2000ft	\$625,000	2
10. South - Main to Water, 675ft	\$210,000	2
12. Blake, Chester, Lewis, Hale, Osborn, 2300ft	\$700,000	2
13. Montgomery - Plains to Broad, 480ft	\$150,000	2
15. West - Plains to King, 880ft	\$275,000	2
18. Vaughn, Munn, 1000ft	\$325,000	2
19. Frost - Brook to Lake, 930ft	\$310,000	2

20. Lake - Tompkins to deadend, 800ft	\$250,000	2
21. Backlot from Lake to Dexter, 600ft	\$200,000	2
22. Division - Minerva to North, 500ft	\$140,000	2
23. Canal - Lansing to Alley, 500ft	\$140,000	2
24. Bently - M99 to Wood, 600ft	\$200,000	2
25. Union - East to River, 470ft	\$150,000	2
26. Diana - East to River, 475ft	\$150,000	2
27. Holmes - East to River, 720ft	\$225,000	2
28. River - Union to Diana, 330ft	\$110,000	2
29. S. East - Knight to Holmes, 880ft	\$260,000	2
31. Dutton - River to Gould, 1800ft	\$550,000	2
32. Gould - Dutton to State, 285ft	\$100,000	2
33. East - Leonard to McArther, 470ft	\$150,000	2
37. Well 4&5, 1400ft	\$300,000	2
38. Raymerville - N. East to deadend, 550ft	\$170,000	2
TOTAL COST OF 2021 DWSRF PROJECTS	\$14,890,000	

Attachment B

Figures



3 Legend

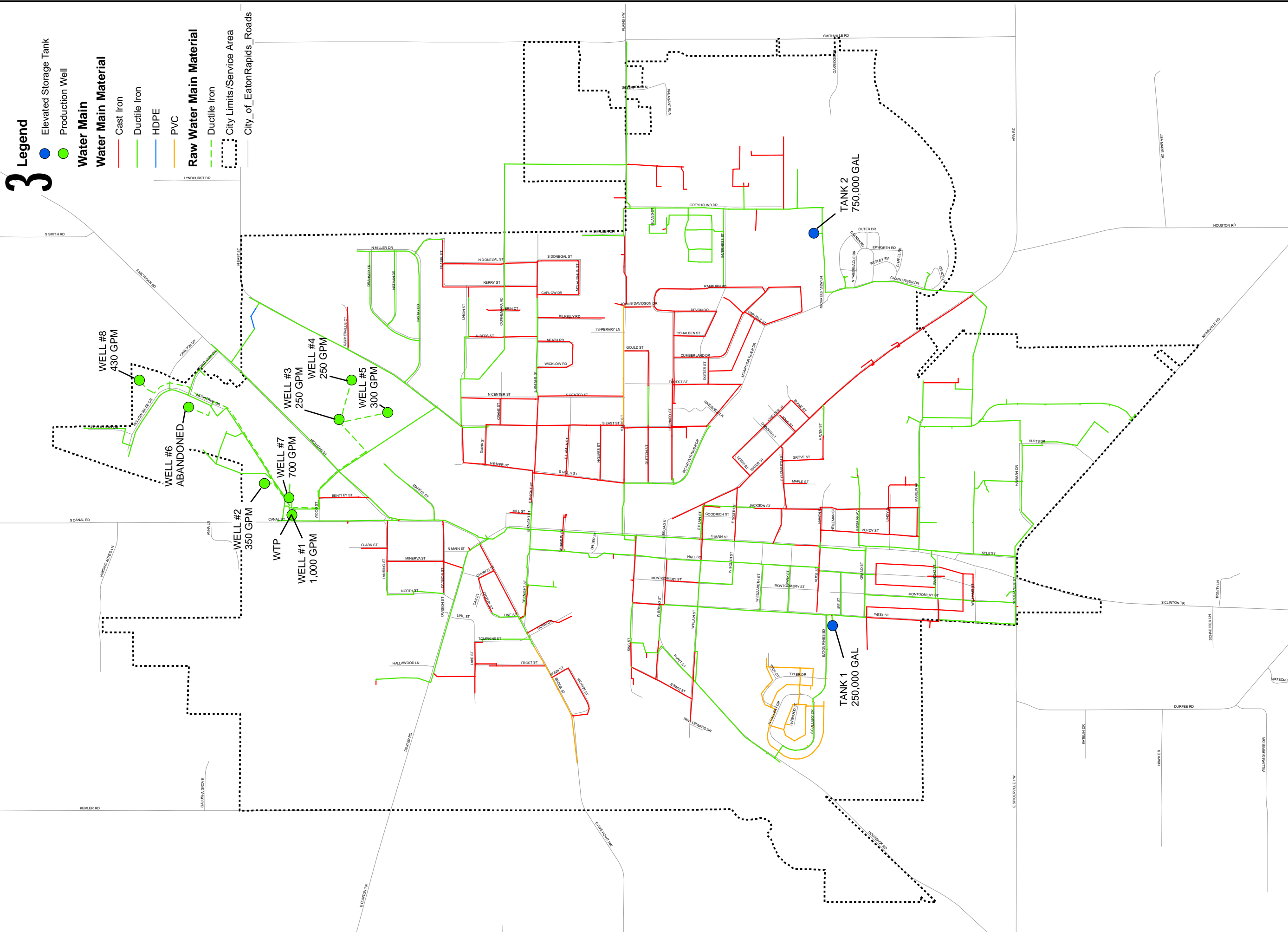
- Hydrant
 - Pressure Valve
 - System Valve
 - Elevated Storage Tank
- Water Main**
- Pipe Diameter**
- 2" WATER
 - 4" WATER
 - 6" WATER
 - 8" WATER
 - 10" WATER
 - 12" WATER
 - 16" WATER
- Raw Water Main**
- Pipe Diameter**
- 4" WATER
 - 6" WATER
 - 8" WATER
 - 10" WATER
- Production Well
 - City Limits /Service Area
 - City_of_EatonRapids_Roads

WATER TREATMENT PLANT (WTP)

- 1) TWO COMPARTMENT DETENTION TANK
- 2) TWO HIGH SERVICE PUMPS, EACH RATED AT 1,000 GPM
- 3) THREE DUAL CELL HORIZONTAL PRESSURE FILTERS, EACH RATED AT 585 GPM
- 4) TWO TRAY TYPE AERATORS, EACH RATED AT 1,500 GPM

STANDBY POWER

- 1) PERMANENT - WELL #1, #7, AND WTP
- 2) PORTABLE - WELL #8
- 3) TWO GAS POWERED GENERATORS LOCATED ON NORTH SIDE OF TOWN WILL POWER ENTIRE NORTH SIDE OF TOWN



3 Legend

- Elevated Storage Tank
 - Production Well
- Water Main Material**
- Cast Iron
 - Ductile Iron
 - HDPE
 - PVC
- Raw Water Main Material**
- Ductile Iron
- City Limits/Service Area
- City_of_EatonRapids_Roads



CITY OF EATON RAPIDS
WATER SYSTEM RELIABILITY STUDY
 EATON COUNTY, MICHIGAN

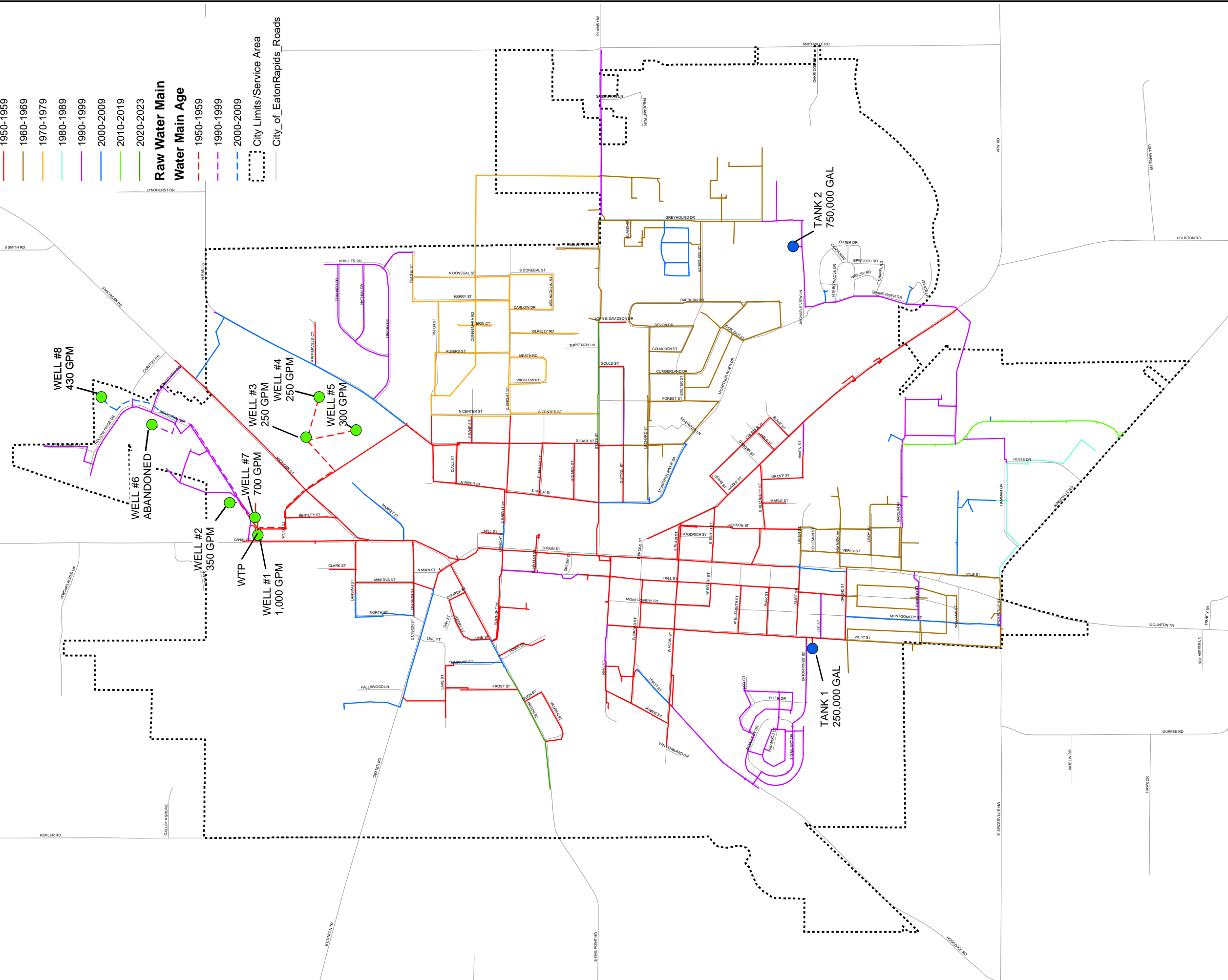
**EXISTING WATER SYSTEM
 WATER MAIN MATERIAL MAP**

PROJ. #	22-0445
DATE	DEC 2023
SHEET	FIG 2



3 Legend

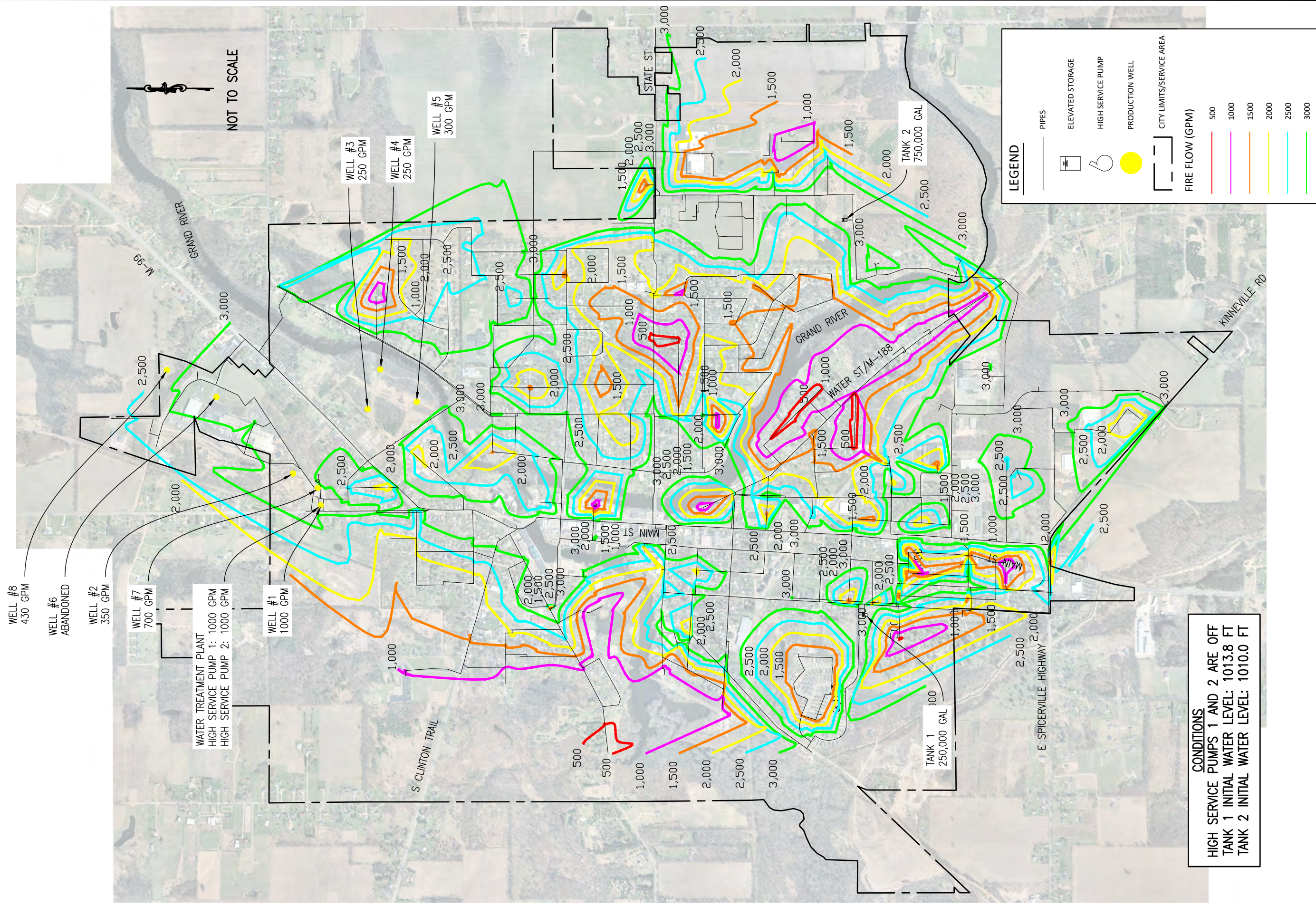
- Elevated Storage Tank
- Production Well
- Water**
- Water Main Age**
- 1950-1959
- 1960-1969
- 1970-1979
- 1980-1989
- 1990-1999
- 2000-2009
- 2010-2019
- 2020-2023
- Raw Water Main**
- Water Main Age**
- 1950-1959
- 1990-1999
- 2000-2009
- City Limits/Service Area
- City_of_EatonRapids_Roads



CITY OF EATON RAPIDS WATER SYSTEM RELIABILITY STUDY

EXISTING WATER SYSTEM WATER MAIN AGE MAP

PROJ. #	22-0445
DATE	DEC 2023
SHEET	FIG 3



NOT TO SCALE

LEGEND

- PIPES
- ELEVATED STORAGE
- HIGH SERVICE PUMP
- PRODUCTION WELL
- CITY LIMITS/SERVICE AREA

FIRE FLOW (GPM)

- 500
- 1000
- 1500
- 2000
- 2500
- 3000

CONDITIONS
HIGH SERVICE PUMPS 1 AND 2 ARE OFF
TANK 1 INITIAL WATER LEVEL: 1013.8 FT
TANK 2 INITIAL WATER LEVEL: 1010.0 FT

