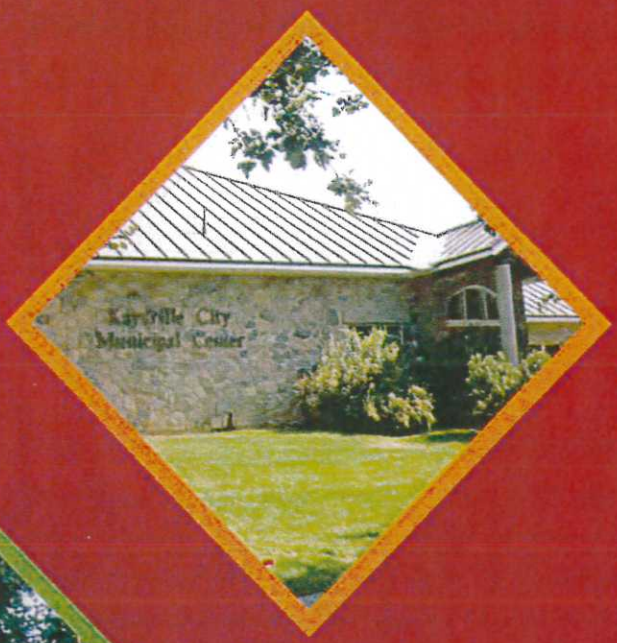
Kaysville City

23 East Center Street
Kaysville, Utah 84037



Kaysville City Water System Impact Fee Facilities Plan

Prepared By:

J·U·B ENGINEERS, INC.

GATEWAY MAPPING INC.
a J·U·B Company

Kaysville City 1850 UTAH'S HOMETOWN

December 2018

Kaysville City Water System Impact Fee Facilities Plan December 2018

J-U-B: #55-18-032-300

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Introduction

The Kaysville City Water System was reviewed, modeled, and analyzed using InfoWater software. Demand or water use data was provided by the City in the analysis as well as the most current Geographic Information System (GIS) data.

This report discusses the existing condition of the water system and a buildout condition using projected demands. A review of the water supply and storage facilities is provided. Existing deficiencies and future deficiencies as well as other system improvements are presented and tabulated.

Population Projections

Significant growth has occurred in Kaysville City since the last water masterplan was completed in 2011. The U.S. Census Bureau, Population Division reports an estimated population in 2016 of 31,117 people. Kaysville City is projecting a growth population in 2040 of approximately 39,121 people. This growth projection was provided by the Wasatch Front Region Small Area Socioeconomic Forecasts: 2007-2040 Technical Report #49. Build out for Kaysville city is projected to be approximately 40,000 people based on the remaining undeveloped land. The following graph shows the projected growth for Kaysville City.

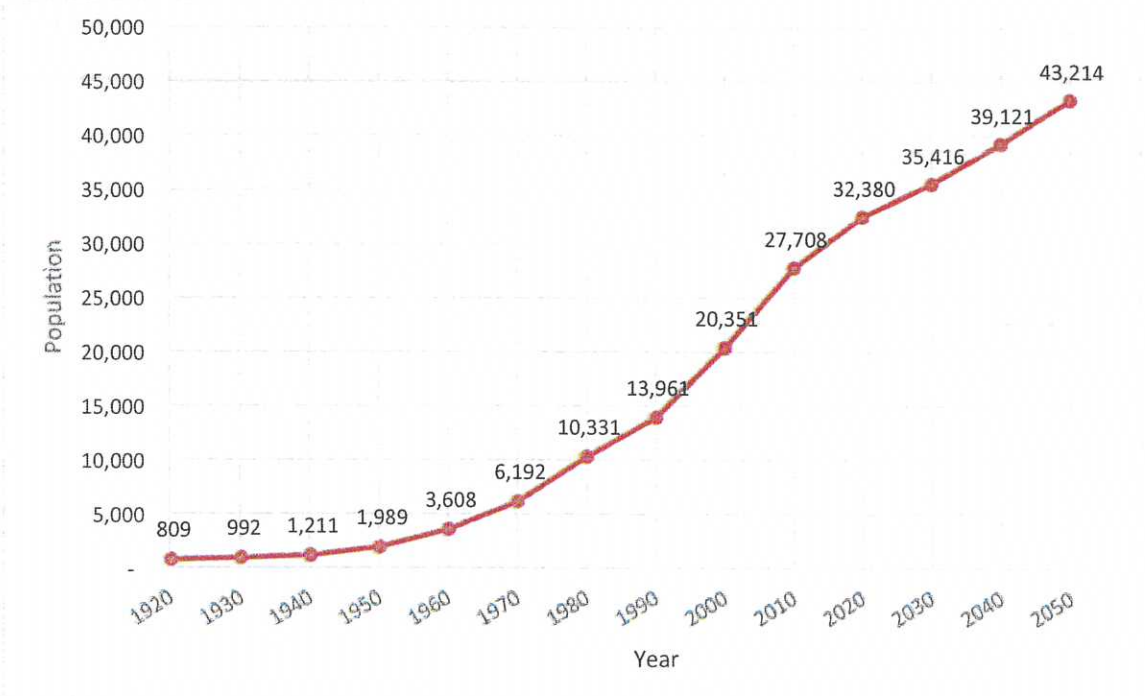


Table 1 – Projected Population Growth for Kaysville City

According to the figure above, the Kaysville City population for 2018 is approximately 31,445. By dividing the current population by the current number of equivalent residential connections (ERCs), the assumed Population/ERC is 3.05. The projected

population for 2028 is 34,875. By dividing the 2028 population by 3.05, the projected number of ERC's for 2028 is 11,434. See the table below for a summary of the projected population and ERCs.

Year	Population Projection	ERC Projection
2018	31,445	10,317
2028	34,875	11,434
Buildout	44,313	14,529

Table 2 – Summary of Projected Population and ERC's

Existing Demands

Existing demands for the computer hydraulic model are generated using water meter information from the billing system and Kaysville City GIS. Nodes or junctions in the model have water demands assigned to them based on the meters within the vicinity.

A standard residential unit is the basic unit used for calculating demand on the system. Water users that differ from a basic residential unit are a multiplier of a single residential unit. This multiplier varies depending on the water use for that unit. Commercial connections are estimated from water usage records and other available data to convert to an ERC. The ERCs are quantified for each demand node/junction for the city as a whole.

The number of ERCs have been calculated based on the Kaysville City Water use records. The data was supplied by Kaysville City for 2016, 2017, and a few months of 2018. Monthly records were also supplied by Weber Basin Water Conservancy District (WBWCD). These records were used to compare the total usage against the metered usages. The Kaysville City billing records do not account for all the water that is being used in the city. The following are ways unmetered water is used in the water system:

- Connections that are not metered
- Bad meters
- Leaks
- Fire hydrant testing, etc.

The water meter data provided by Kaysville City is separated into two categories; Residential and Commercial. Each residential meter is considered as 1 ERC. The total number of residential ERCs is 8,880. The residential meter usage for the months of June, July, and August were averaged for the years 2015, 2016 and 2017. The average of these numbers is used to calculate a peak month demand. A peaking factor of 1.5 was applied to the peak month demand. This resulted in a peak day demand that is used in the water model. The peak day demand per ERC is 0.36 gpm/ERC.

Commercial meters are typically a percentage of an ERC. The peak day demand for each commercial meter was calculated in the same way as the residential meters and then divided by the peak day demand factor of 0.36 gpm/ERC. The number of ERCs in the system from the commercial connections is 1,438. The total number of ERCs for the water system is 10,317.

Future Demands

Future demands have been calculated based on the GIS layer called "impact area," which was provided by Kaysville City. This GIS layer shows the areas within the city that still have the possibility for growth to occur, and the annexation areas of the City. A density factor of 4 ERCs per acre was used for all properties East of I-15 and a density factor of 2 ERCs per acre was used for all properties West of I-15. The area East of I-15, North of Davis High School, and South of 200 North is considered the "Historic" area of Kaysville City. This area has a large potential for "in-fill" development. There are approximately 20 blocks considered for "In-fill" and it was assumed that this would provide approximately 150 ERCs to the future build out number.

It is estimated, using the same procedure to calculate existing ERCs, that future development will result in 4,062 new ERCs and 150 ERCs of "in-fill." The combination of the 10,317 existing ERCs and the future development ERCs results in 14,529 equivalent residential connections at buildout. It should be noted that this number of ERCs does not include any anticipated high water use industry. Proposed development that would use significantly more water than typical residential development should be analyzed on a case by case basis. This number also assumes that the area East of Fairfield Road from Mutton Hollow road to 600 North will be annexed into the City and be served by the Kaysville City Water System.

The assumption has been made that future demand characteristics will be similar to current patterns for similar land uses. Total future water demand at buildout is estimated to be 5,230 gpm for Peak Day, and 2,615 gpm for Average Day.

Level of Service Water Sources/Supply

The Utah Administrative Rule R309-510-7 states that the system requirements for source are 146,000 gallons per year per ERC and 800 gallons per day per year for indoor use.

Yearly Source Demand - State of Utah Formula

Indoor Use:

10,317 ERC X 146,000 gal/ERC/year = 1,506,282,000 gallons per year

10,317 ERC X 800 gal/day = 8,253,600 gallons per day

Kaysville City has historically used less water than what is required in R309-510 of the Utah Administrative Code. The following table outlines the last 4 years of usage for the City.

Year	Total Yearly Usage (Acre-feet)
2014	2,323
2015	2,109
2016	2,312
2017	2,395
Average	2,285

Table 3 – Last 4 Years of Water Usage for Kaysville City

Kaysville's current water supply comes from Weber Basin Water Conservancy District. The current contract with Weber Basin is for 2,786 AF/yr with an ability to peak at a rate of 3,100 gpm. This has typically been sufficient to date. The City receives water credit from exchanged water from Holmes Creek. It should be kept in mind that the average flow rate for the year should not exceed the contract volume of 2,786 AF.

Existing Source Level of Service

The existing level of service for Kaysville City for source is the average of the used Weber Basin contract (2,285 AF) including the water credit received from Holmes Creek Water divided by the total number of ERCs. See equation below. For this analysis, it was assumed that the Holmes Creek water was negligible.

$$\frac{2285\ Acre-Feet}{Year} \div 10{,}317\ ERC's = \frac{0.22\ Acre-Feet}{ERC}$$

Future Source and Supply Calculations

Using this analysis moving forward, the future source needed to maintain the level of service as shown in the calculation below.

$$\frac{0.22\ Acre-Feet}{ERC} \times 14{,}529\ ERC's = 3{,}196\ Acre-Feet$$

This calculation shows a future buildout deficit of 410 Acre-feet. This deficit can be overcome by purchasing more blocks of water from Weber Basin.

Storage

The existing storage capacity for Kaysville City is 8.5 million gallons and is distributed as follows:

Pasture Tank	1,000,000 gallons
Crestwood Road Tanks*	1,000,000 gallons 1,500,000 gallons
Lower Pasture Tank	2,000,000 gallons
Ward Road Tanks	1,000,000 gallons 2,000,000 gallons

Table 4 – Existing Storage Capacity

**The West Crestwood Tank (1,000,000 gallons) will be removed during the re-construction of hwy-89.*

Storage can be divided into three categories:

- Equalization storage volume - to satisfy peak hourly demands. The State requirement is 400 gpd/ERC.
- Fire storage volume - to provide fire-fighting water. The assumption is a 3,000 gpm fire flow for 3 hours.
- Emergency storage volume - to meet emergency demands in the event of some type of system failure. This storage is above and beyond the equalization and fire storage volumes. It is recommended that 300 gpd/ERC be used so that the emergency storage is not a set number but fluctuates as growth occurs. In such times, rationing would occur and this storage would last much longer.

Kaysville City, through ordinance, requires residential development to provide pressurized secondary water to all building lots. Outside irrigation was not included in the tank sizing requirements because there are only a few existing homes without access to pressure irrigation water.

If future commercial or industrial users landscaped significantly more of their property than exists currently, adjustments in storage requirements and some pipe sizes may be required. As an alternative, commercial and industrial users with large landscaped areas should be encouraged to use pressure irrigation.

Based on the above discussion, future storage requirements are determined based on the assumptions listed below:

- New residential development will be required to provide pressure irrigation to all lots (Possible exception east of Hwy-89).
- Future commercial and industrial developments will use culinary water for limited outside irrigation. Pressure irrigation is more likely to be used in the Business Park due to its availability.

Storage needs and recommendations can be summarized as follows:

Storage Needs	2018	2028	Build-Out
Equivalent Residential Connections	10,317	11,434	14,529
Equalization Storage Volume gal. (Indoor Use at 400 gpd/conn.)	4,126,800	4,573,600	5,811,600
Fire Storage Volume gal. (3000 gpm fire for 3 hours)	540,000	540,000	540,000
Emergency Storage Volume gal. (Average Day, 300 gpd/ERC)	3,095,100	3,430,200	4,358,700
Total Storage Required gal.	7,761,900	8,543,800	10,710,300
Existing Storage gal.	8,500,000	7,500,000	7,500,000
Future Storage gal.	-	3,000,000	3,000,000
Total Storage gal.	8,500,000	10,500,000	10,500,000
Storage Surplus/Deficit gal.	**738,100**	**1,956,200**	**(210,300)**
	Anticipated Storage by Site		
Frost Property (New Zone)	-	1,000,000	1,000,000
Pasture (Zones 1-8)	1,000,000	1,000,000	1,000,000
Crestwood Road (Zones 3-8)	1,500,000 1,000,000	1,500,000 -	1,500,000 -
Lower Pasture Tank (Zones 3-8)	2,000,000	2,000,000	2,000,000
Ward Road (Zones 5-8)	1,000,000 2,000,000	1,000,000 2,000,000	1,000,000 2,000,000
Green Road Tank (Zones 5-8)	-	2,000,000	2,000,000
Total Storage Sum	**8,500,000**	**10,500,000**	**10,500,000**

Table 5 – Storage Needs and Recommendations

It is recommended that additional storage be evaluated as demand is added to the Kaysville City culinary water system in the future.

The above table shows a proposed 2 million gallon storage tank at Green Road. The property owned by Kaysville City north of Green Road and east of SR-89 is a viable location for a tank to serve pressure zones 5, 6, 7, and 8. A feed line and transmission line to and from this site have been installed over the years based on previous capital facilities plans.

The Frost property tank is currently being designed to serve a new upper HWY-89 pressure zone. This tank will be filled by a new booster pump station that will pump out of the Upper Pasture tank.

Pressure Zones 1 and 2 are served exclusively by the Pasture Tank. This tank is fed from the Crestwood Tanks through a pump station. Changes in projected land uses, that increase the culinary water demand in pressure zones 1 and 2, could impact both the operational characteristics of the pump and the storage volume needed in the Crestwood Tanks to feed the Pasture Tank.

A pump station is being proposed to supply water from the Upper Pasture tank to the new Frost tank. This would provide redundancy for the upper pressure zones as water could then backfeed through a pressure reducing valve into zones 1 and 2.

Pressure zones 3 and 4 are served primarily by the Crestwood and Lower Pasture Tanks. The area covered by these pressure zones was also evaluated under a buildout condition with land uses from the "Projected Impact Map." Under those assumptions, the existing volume of storage is adequate to meet the future storage requirements for the two pressure zones. These pressure zones serve a significant area that is still undeveloped. Land use assumptions should be reviewed prior to design and for the construction on each tank to verify that the assumptions made are still valid.

Pressure zones 5, 6, 7, and 8 can be served by gravity from the Ward Road tanks and from any of the existing tanks through Pressure Reducing Valves (PRVs). Care should be taken in setting PRVs to ensure that excessive demand is not placed on these tanks; however, due to their elevation, any increase in storage capacity at the Crestwood Road site, the Lower Pasture tank site or the Green Road location could benefit these pressure zones. Serving lower pressure zones from the Pasture Tank is not economical since all water to that tank must be pumped. The energy added by pumping is wasted once the water passes through a PRV.

Distribution

The distribution level of service is based upon a review of the state pressure requirements as shown below. These minimum pressures need to be met at each service in the water system. Figures depicting results from the modeling scenarios are presented in Appendix A.

Pressure Required	Demand Scenario
40 psi	Peak Day
30 psi	Peak Hour
20 psi	Peak Day + Fire flow

Table 6 – State Pressure Requirements

Existing residential areas have a minimum fire flow of 1,000 gpm for homes and 2,000 gpm for other structures found within these areas such as schools and churches. Due to the uncertainty of the location of future schools, churches and other structures commonly found in residential areas, all new residential areas are required to provide a minimum 2,000 gpm fire flow above anticipated peak day demand.

Deficiencies

No existing deficiencies were identified.
Improvements needed to maintain levels of service as demands increase are summarized as follows:

Item	Description	Cost	Construction Year
1	Additional Water Contract with Weber Basin	$267,115	2025
2	Lower Pasture Pump Station	$969,700	2019-2020
3	New 8" pipe connecting Olde Orchard Subdivision with Coventry Place. (Will likely be done with the development.)	$0.00	2025-2026
4	Complete loop with PRV through Coventry Place. (Will likely be done with the development. 50% PRV cost)	$37,500	2025-2028
5	Additional 2 PRVs for future development. (50% PRV cost)	$37,500	2025-2028
6	New 2 MG Green Road Tank	$3,667,200	2027
	Total – Future Improvements	**$4,979,015**	

Table 7 – Improvements Needed to Maintain Levels of Service as Demands Increase

The area along Mutton Hollow Road east of Fairfield Road is included in the future model demands. If this area is evaluated for annexation into Kaysville City, a detailed analysis is recommended. Part of the difficulty in analyzing this area is that it would be divided into two pressure zones and the needed improvements would have to be evaluated on that basis along with storage needs.

A summary of the model results using the fire flow established in the "Distribution" section is included in Appendix B. No pressures are below the acceptable level. All model runs for the future condition include all improvements needed to maintain levels of service. It is a true buildout condition.

Other Improvements

Other improvements are defined as those improvements that are scheduled, but are not needed to provide capacity to meet future demands. While they may have a positive impact on the level of service, they are not required to meet established guidelines. They are improvements that are planned to bring portions of the service area into compliance with more recent construction standards.

After discussion with City staff, additional telemetry and SCADA for crucial elements of the system were identified as improvements that would assist the City in determining water usage and evaluating the overall operation. Another advantage would be to determine system pressures, monitor flows, and control features from a remote location, such as the Operations Center or City Hall. The data collected will enable better calibration of the model and provide information for future system evaluation.

The other planned improvements are summarized as follows:

Item	Description	Cost
1	Telemetry & SCADA	$489,000
2	Replace existing 4" lines with 8" lines.	$2,964,200
3	PRV Upgrades/Replacement	$511,800
4	Upper Pressure Zones Transmission Line	$521,400
5	Bore across I-15 to connect zone 8 with zone 7	$682,400
6	Replace transite transmission lines	$1,337,700
	Total – Other Improvements	**$6,506,500**

Table 8 – Other Planned Improvements

Summary of Costs

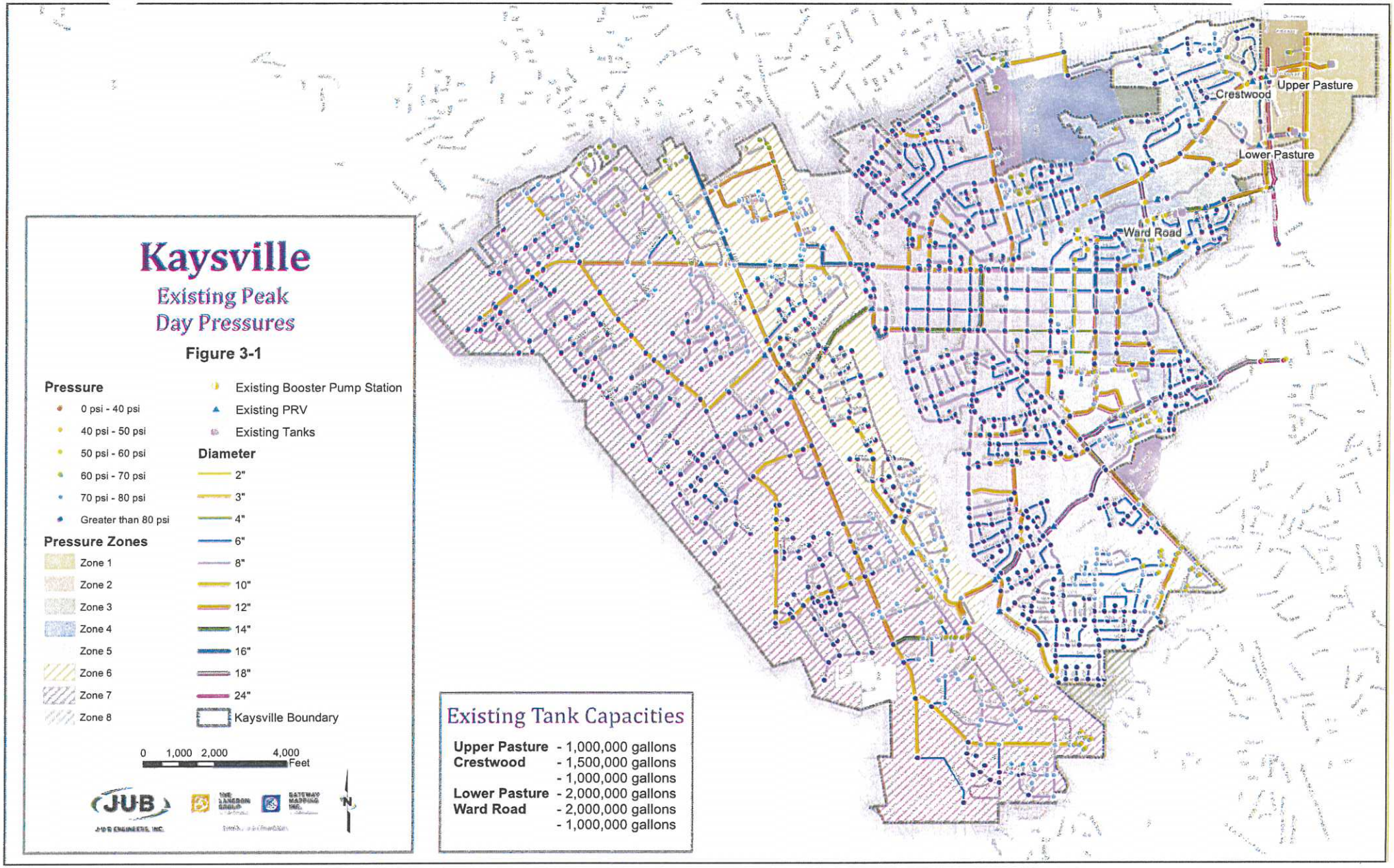
The cost of improvements to provide capacity for growth to "buildout" is **$4,979,015**. The cost of other planned improvements is **$6,506,500.**

Individual cost estimates are located in Appendix C. These costs do not represent all improvements or additions that will be made to the system. There will be many other facilities installed as part of future development. The costs identified above are only for those improvements needed to meet minimum standards at buildout. Other installed facilities will consist of lines to provide service to specific parcels of property.

Revenue Sources

The existing water system was constructed through exactions, impact fees and operating revenues. Undeveloped properties that have not used culinary water have not contributed to the funding. Additional development creates a demand on the system and the resultant impacts. Improvements to the system are needed to maintain established levels of service. A funding source is necessary to construct improvements identified in this plan. Non-capacity related improvements are funded through exactions and operating revenues. Capacity improvements that are required to maintain levels of service as development occurs should be financed through impact fees. Impact fees are necessary to achieve an equitable allocation of the costs borne in the past and the costs to be borne in the future, in comparison to the benefits already received and yet to be received.

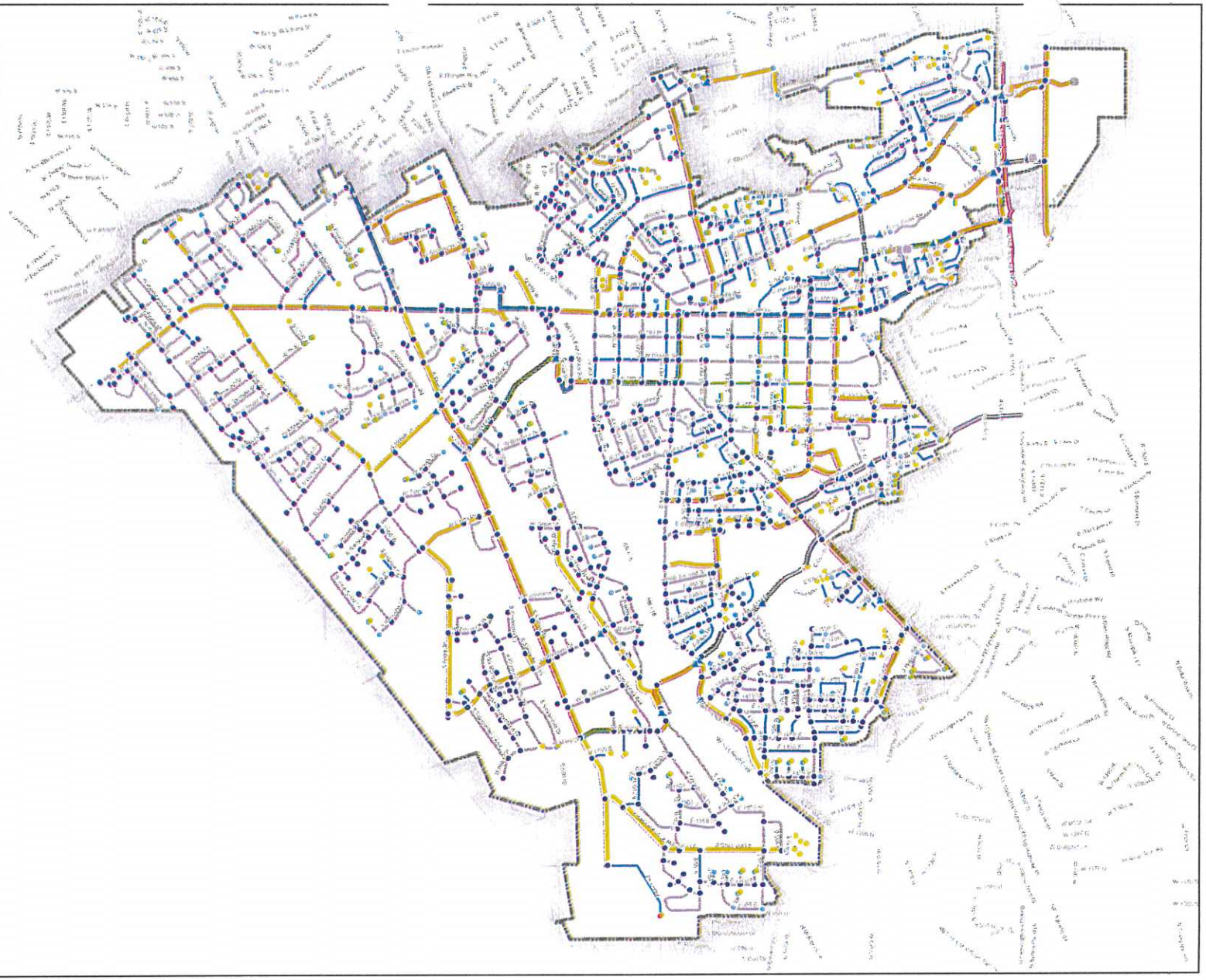
Appendix A - Figures


Kaysville
Existing Peak
Day Pressures
Figure 3-1
Pressure
0 psi - 40 psi
40 psi - 50 psi
50 psi - 60 psi
60 psi - 70 psi
70 psi - 80 psi
Greater than 80 psi
Pressure Zones
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
Existing Booster Pump Station
Existing PRV
Existing Tanks
Diameter
2"
3"
4"
6"
8"
10"
12"
14"
16"
18"
24"
Kaysville Boundary
0 1,000 2,000 4,000
Feet
JUB
JUB ENGINEERS, INC.
N
Upper Pasture
Crestwood
Lower Pasture
Ward Road
Existing Tank Capacities
Upper Pasture - 1,000,000 gallons
Crestwood - 1,500,000 gallons
- 1,000,000 gallons
Lower Pasture - 2,000,000 gallons
Ward Road - 2,000,000 gallons
- 1,000,000 gallons

Kaysville

Existing Peak Day and Available Fire Flow at 20 psi

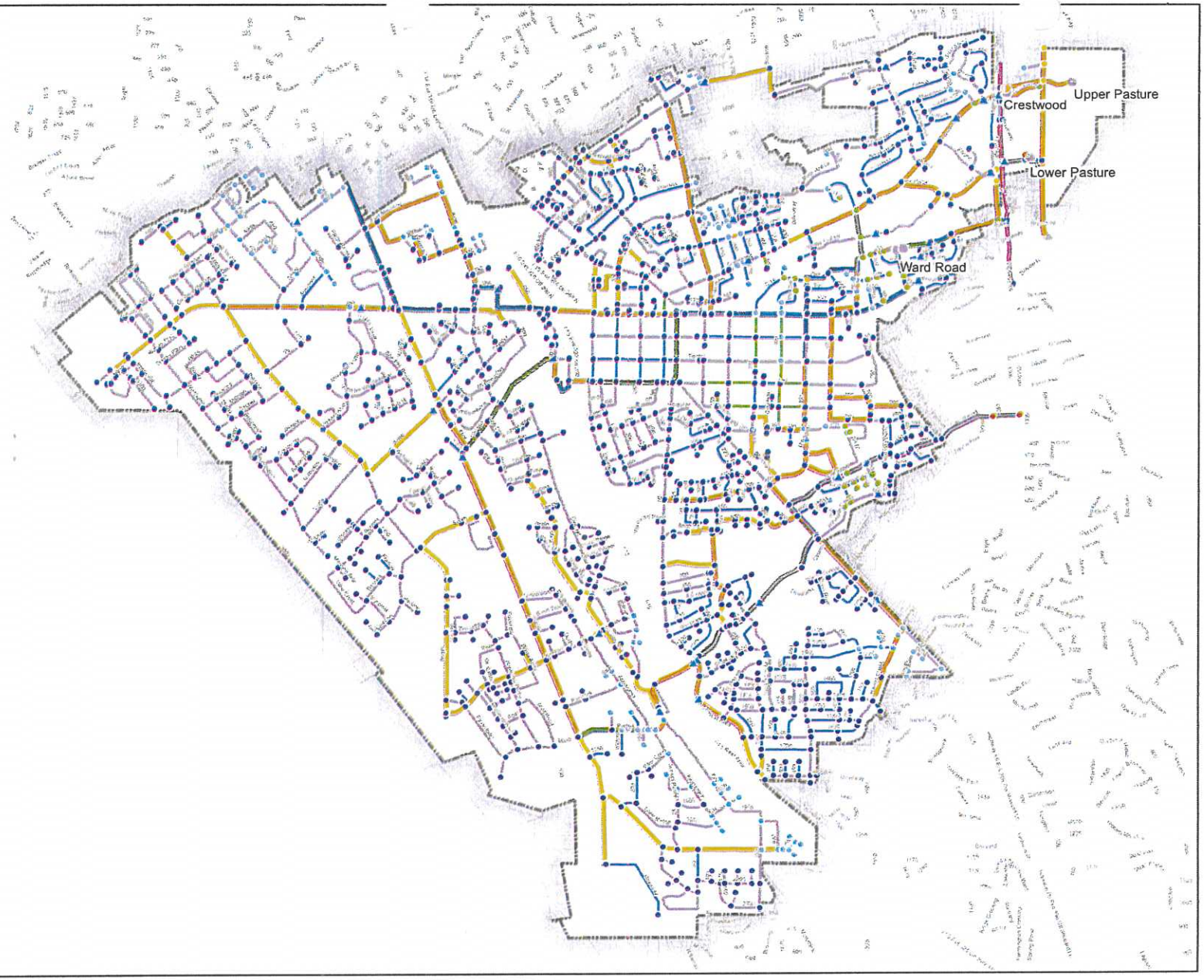
Figure 3-2



Kaysville

Existing Peak Hour Pressures

Figure 3-3



- Existing Booster Pump Station
- Existing PRV
- Existing Tanks

Pressure

- 0 psi - 30 psi
- 30 psi - 40 psi
- 40 psi - 50 psi
- 50 psi - 60 psi
- 60 psi - 70 psi
- Greater than 70 psi

Diameter

- 2"
- 3"
- 4"
- 6"
- 8"
- 10"
- 12"
- 14"
- 16"
- 18"
- 24"
- Kaysville Boundary

0 1,000 2,000 4,000 Feet

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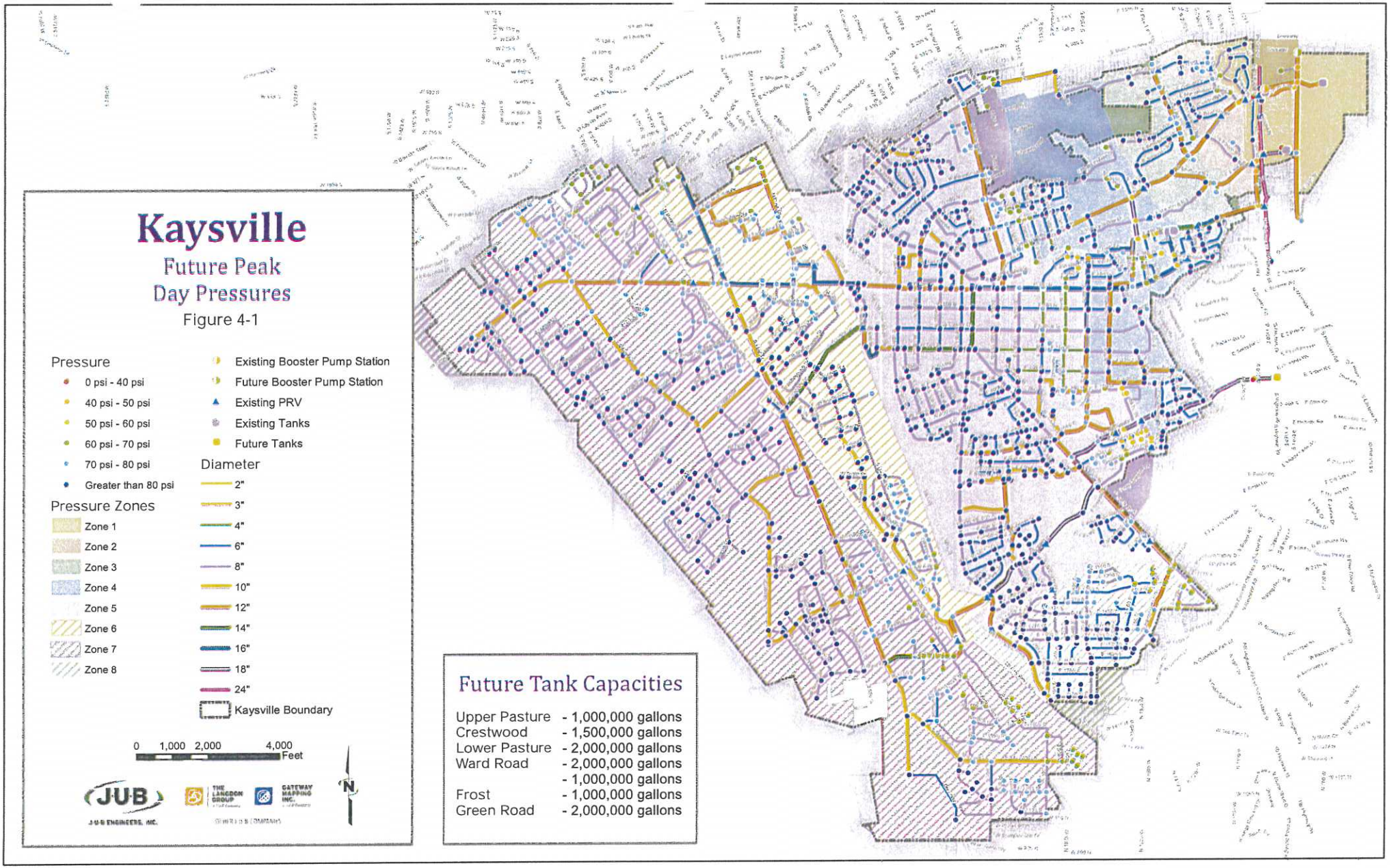
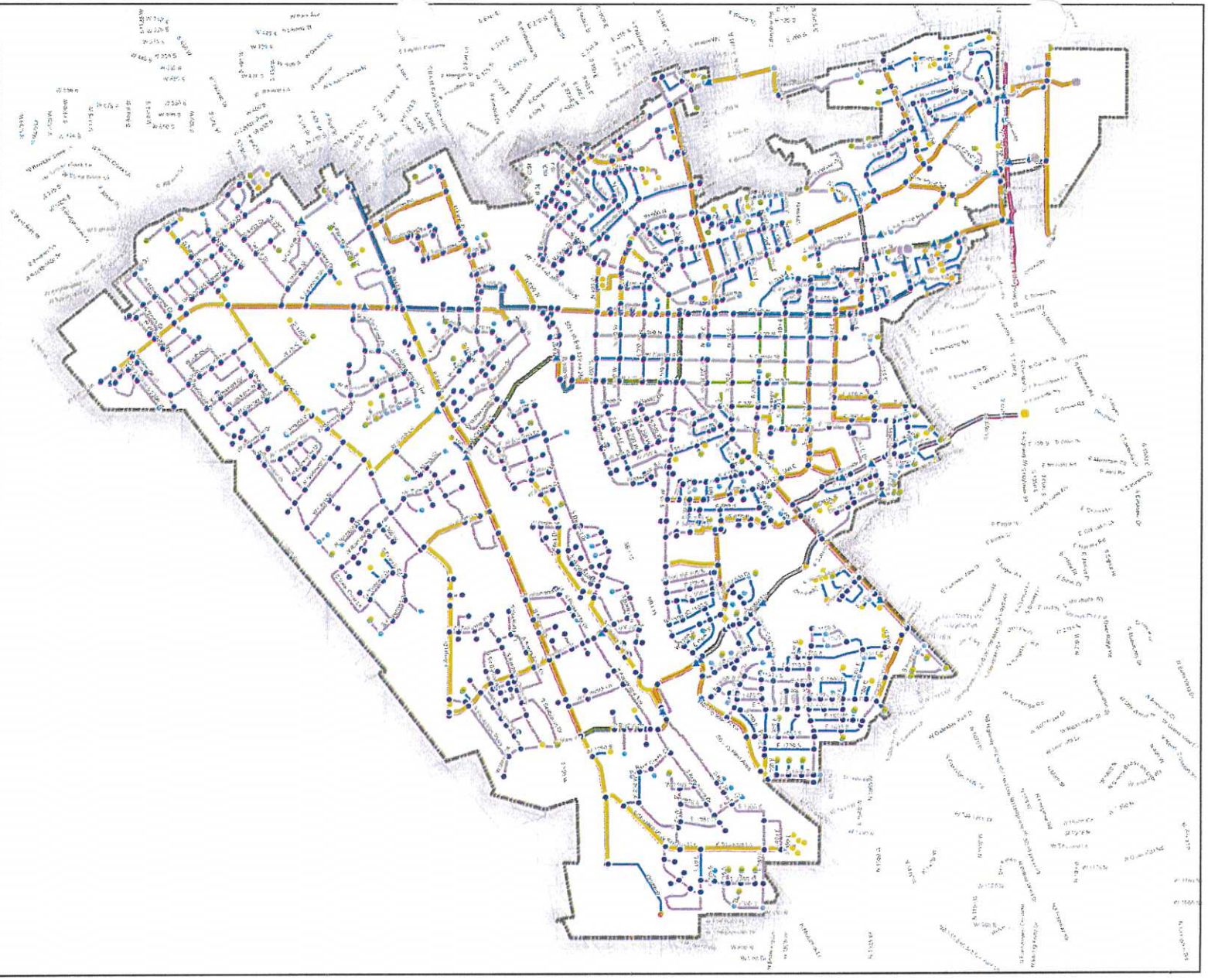
N


Kaysville
Future Peak
Day Pressures
Figure 4-1
Pressure
0 psi - 40 psi
40 psi - 50 psi
50 psi - 60 psi
60 psi - 70 psi
70 psi - 80 psi
Greater than 80 psi
Pressure Zones
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
Existing Booster Pump Station
Future Booster Pump Station
Existing PRV
Existing Tanks
Future Tanks
Diameter
2"
3"
4"
6"
8"
10"
12"
14"
16"
18"
24"
Kaysville Boundary
0 1,000 2,000 4,000 Feet
JUB ENGINEERS, INC.
THE LANGDON GROUP
GATEWAY MAPPING INC.
N
Future Tank Capacities
Upper Pasture - 1,000,000 gallons
Crestwood - 1,500,000 gallons
Lower Pasture - 2,000,000 gallons
Ward Road - 2,000,000 gallons
- 1,000,000 gallons
Frost - 1,000,000 gallons
Green Road - 2,000,000 gallons

Kaysville

Future Peak Day and Available Fire Flow at 20 psi

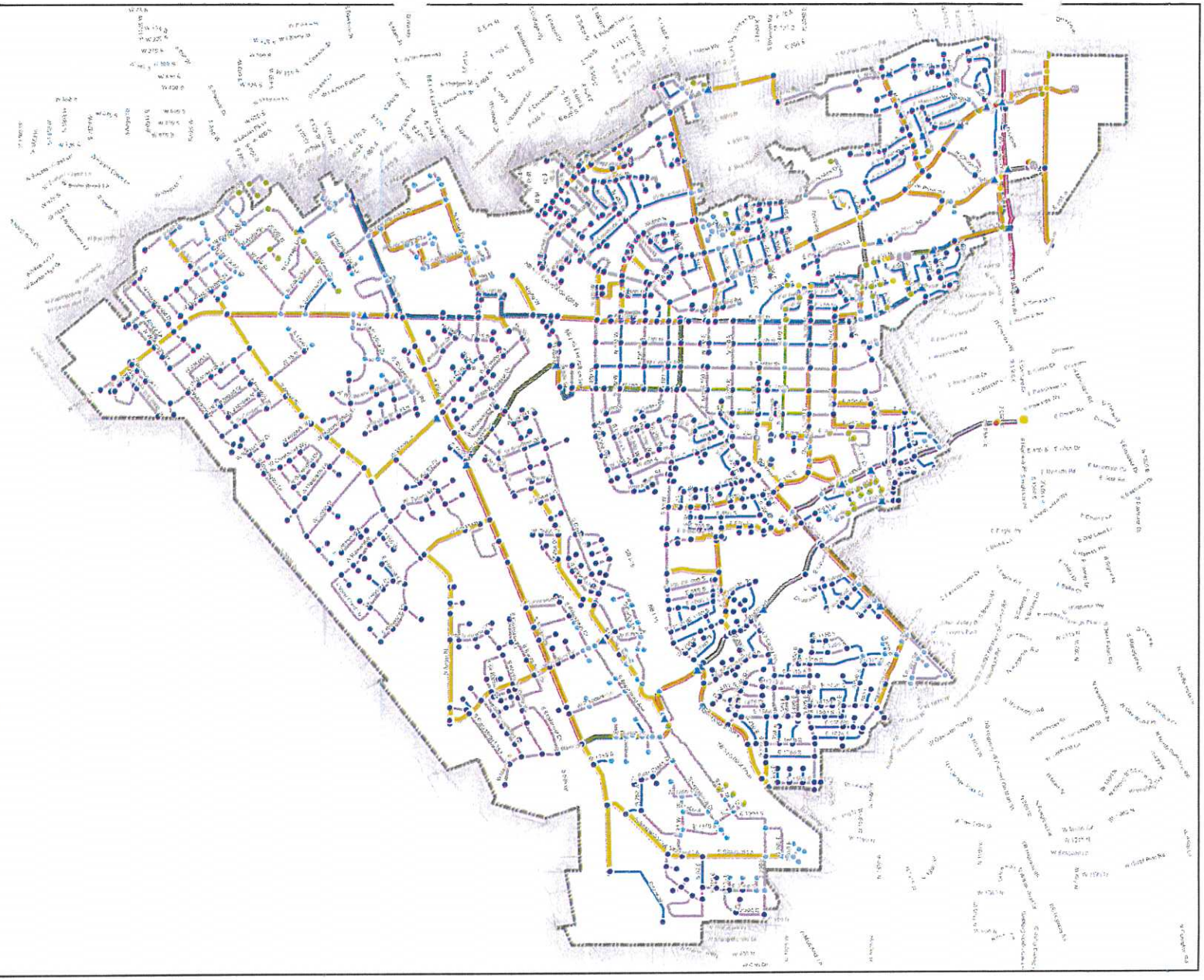
Figure 4-2



Kaysville

Future Peak Hour Pressures

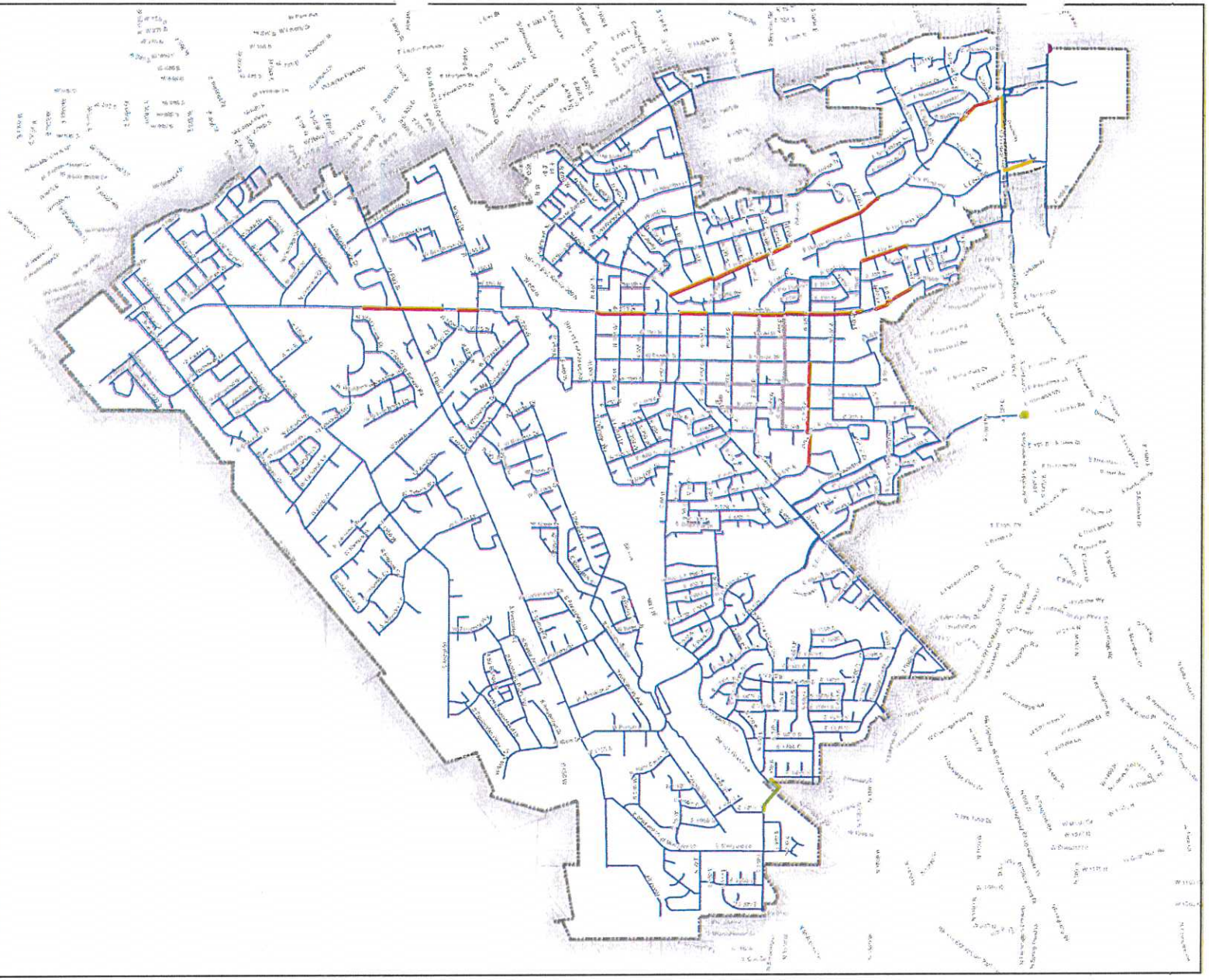
Figure 4-3



Kaysville

Future Projects

Figure 4-4



Appendix B - Model Results

Appendix C - Cost Estimates

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: Additional Water Contract with Weber Basin

Item	Description	Units	Quantitiy	Unit Price	Cost
1	Take or Pay Contract (Purchased in 2019)	Ac-Ft	1000	$609.06	$609,060.00
	or				
1	Take or Pay Contract (Purchased in 2020)	Ac-Ft	1000	$651.50	$651,500.00
			Subtotal		$651,500.00
			TOTAL		**$651,500.00**

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: Lower Pasture Pump Station

Item	Description	Units	Quantitiy	Unit Price	Cost
1	Mobilization	LS	1	$67,811.29	$67,811.29
2	Traffic Control	LS	1	$44,362.53	$44,362.53
3	Pump station building	SF	450	$669.00	$301,050.00
4	12" vertical trubine pump (1,000 gpm, 300 ft TDH) and 100 hp inverter duty motor	EA	2	$69,066.45	$138,132.89
5	100 hp VFD	EA	2	$9,477.50	$18,955.00
6	3 phase power	LF	1050	$167.25	$175,612.50
			Subtotal		$745,924.21
			Contingency	10%	$74,592.42
			Engineering	10%	$74,592.42
			Construction	10%	$74,592.42
			TOTAL		**$969,700.00**

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: New 3.0 MG Green Road Tank

Item	Description	Units	Quantity	Unit Price	Cost
1	Mobilization	LS	1	$384,675.00	$384,675.00
2	3.0 MG Reinforced Concrete Tank	Gal	3,000,000	$1.28	$3,846,750.00
			Subtotal		$4,231,425.00
			Contingency	10%	$423,142.50
			Engineering	10%	$423,142.50
			Construction	10%	$423,142.50
			TOTAL		**$5,500,900.00**

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: Telemetry & Metering

Item	Description	Units	Quantitiy	Unit Price	Cost
1	Mobilization	LS	1	$34,193.05	$34,193.05
2	Traffic Control	LS	1	$22,369.29	$22,369.29
3	Monitoring System & installation.	LS	1	$319,561.23	$319,561.23
			Subtotal		$376,123.57
			Contingency	10%	$37,612.36
			Engineering	10%	$37,612.36
			Construction	10%	$37,612.36
			TOTAL		**$489,000.00**

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: Replace 4" Lines City Wide

Item	Description	Units	Quantity	Unit Price	Cost
1	Mobilization	LS	1	$207,287.70	$207,287.70
2	Traffic Control	LS	1	$135,608.78	$135,608.78
3	8" Water Main	LF	13,012	$42.37	$551,318.44
4	8" Gate Valve	EA	32	$1,951.25	$62,440.00
5	Fire Hydrant Complete (incl. tee and valve)	EA	32	$6,467.00	$206,944.00
6	Reconnect Existing Services	EA	160	$1,003.50	$160,560.00
7	Connect to Existing Water Main	EA	45	$1,784.00	$80,280.00
8	Granular Foundation Material	TONS	2,342	$24.53	$57,453.18
9	Granular Bedding and Backfill Materials	TONS	9,108	$20.07	$182,805.59
10	Granular Roadbase	TONS	4,554	$20.07	$91,402.79
11	Asphalt Repair - City Street	SF	65,060	$3.90	$253,896.65
12	Asphalt Repair - State Highway	SF	65,060	$4.46	$290,167.60
			Subtotal		$2,280,164.74
			Contingency	10%	$228,016.47
			Engineering	10%	$228,016.47
			Construction	10%	$228,016.47
			TOTAL		**$2,964,200.00**

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: PRV Upgrades/Replacement

Item	Description	Units	Quantitiy	Unit Price	Cost
1	Mobilization	LS	1	$35,791.50	$35,791.50
2	Traffic Control	LS	1	$23,415.00	$23,415.00
3	PRV Station Replacement	LS	4	$83,625.00	$334,500.00
			Subtotal		$393,706.50
			Contingency	10%	$39,370.65
			Engineering	10%	$39,370.65
			Construction	10%	$39,370.65
			TOTAL		**$511,800.00**

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: Upper Pressure Zones Transmission Line

Item	Description	Units	Quantitiy	Unit Price	Cost
1	Mobilization	LS	1	$36,459.61	$36,459.61
2	Traffic Control	LS	1	$23,852.08	$23,852.08
3	12" Water Main	LF	2,500	$44.60	$111,500.00
4	12" Gate Valve	EA	7	$3,345.00	$23,415.00
5	12" 90 Deg Bend	EA	1	$1,672.50	$1,672.50
6	Fire Hydrant Complete (incl. tee and valve)	EA	3	$6,467.00	$19,401.00
7	Reconnect Existing Services	EA	4	$1,003.50	$4,014.00
8	Connect to Existing Water Main	EA	2	$1,784.00	$3,568.00
9	Granular Foundation Material	TONS	450	$24.53	$11,038.50
10	Granular Bedding and Backfill Materials	TONS	1,750	$20.07	$35,122.50
11	Granular Roadbase	TONS	875	$20.07	$17,561.25
12	Asphalt Repair - City Street	SF	500	$3.90	$1,951.25
13	Bore State Highway	LF	250	$446.00	$111,500.00
			Subtotal		$401,055.69
			Contingency	10%	$40,105.57
			Engineering	10%	$40,105.57
			Construction	10%	$40,105.57
			TOTAL		**$521,400.00**

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: Bore Across I-15

Item	Description	Units	Quantitiy	Unit Price	Cost
1	Mobilization	LS	1	$47,722.00	$47,722.00
2	Traffic Control	LS	1	$31,220.00	$31,220.00
3	Bore across I-15	LF	400	$1,115.00	$446,000.00
			Subtotal		$524,942.00
			Contingency	10%	$52,494.20
			Engineering	10%	$52,494.20
			Construction	10%	$52,494.20
			TOTAL		**$682,400.00**

KAYSVILLE CITY CORPORATION
CULINARY WATER MASTER PLAN
PRELIMINARY COST ESTIMATES

Project: Replace Transite Transmission Lines

(Assumed leaving existing in place and installing new pipe in new alignment)

Item	Description	Units	Quantitiy	Unit Price	Cost
1	Mobilization	LS	1	$93,547.29	$93,547.29
2	Traffic Control	LS	1	$61,199.16	$61,199.16
3	Furnish and Install 8" C-900	LF	7,765	$37.91	$294,371.15
4	Furnish and Install 12" C-900	LF	8,346	$44.60	$372,231.60
5	Furnish and Install 16" C-900	LF	4,233	$49.06	$207,670.98
			Subtotal		$1,029,020.18
			Contingency	10%	$102,902.02
			Engineering	10%	$102,902.02
			Construction	10%	$102,902.02
			TOTAL		**$1,337,700.00**

SECTION 8: WATER IFA

This section will address the future water infrastructure needed to serve the City through the next ten years, as well as address the appropriate water impact fees the City may charge to new growth to maintain the existing LOS. The Kaysville City Water System Impact Fee Facilities Plan ("Water IFFP") contains the necessary demand, LOS and capital improvement information to calculate a justifiable impact fee. The IFFP information is summarized below.

DEMAND UNITS

TABLE 8.1: WATER DEMAND UNITS

YEAR	TOTAL ERCS
2018	**10,317**
2019	10,424
2020	10,531
2021	10,640
2022	10,750
2023	10,861
2024	10,973
2025	11,087
2026	11,201
2027	11,317
2028	**11,434**
2029	11,522
2030	**11,611**
2040	**12,826**
2050	**14,168**
Buildout	**14,529**

Source: Water IFFP p.2, LYRB

The demand unit utilized in this analysis is ERCs. The primary impact on the system will be growth in residential and commercial ERCs through development. As development occurs within the City, it generates increased demand on the system, above the current demand. The system improvements identified in this study are designed to maintain the existing LOS for any new or redeveloped property within the City. If growth assumptions change substantially, the impact fee analysis should be updated to reflect these changes. According to the Water IFFP, there are 10,317 existing ERCs. It is anticipated that there will be an additional 1,117 ERCs added to the system within the next ten years.

LEVEL OF SERVICE STANDARDS

Impact fees cannot be used to finance an increase in the LOS to current or future users of capital improvements. Therefore, it is important to identify the existing LOS to ensure that the new capacities of projects financed through impact fees do not exceed the established standard. The existing LOS for source is based on factors identified in Water IFFP and summarized in TABLE 8.2.

TABLE 8.2: SUMMARY OF WATER LOS

SOURCE	AC FT	
Existing Source	2,285	Acre Feet from Weber Basin Contract
Existing ERCs	10,317	
Existing LOS	0.22	Acre Feet
Existing LOS	0.14	Gallons per Minute
STORAGE		
Equalization Storage	400	Gallon per ERC
Emergency	300	Gallon per ERC
Equalization + Emergency	700	Gallon per ERC
Fire Suppression	3000	Gallon per Minute per ERC
DISTRIBUTION (PRESSURE REQUIRED)		
40 psi	Peak Day	
30 psi	Peak Hour	
20 psi	Peak Day + Fire flow	

Source: Water IFFP pp.4-7

EXISTING FACILITY INVENTORY

TABLE 8.3: SUMMARY OF EXISTING SYSTEM VALUE

ASSET NO	ORIGINAL COST	COST TO IFFP
Source	$540,000	$540,000
Storage	$3,158,652	$3,158,652
Distribution	$19,982,370	$9,805,770
Other	$899,329	-

Source: Kaysville City, LYRB

The valuation of the existing water system is based on the City's current depreciation schedule and is divided into the water system functional components: source, storage and distribution. Existing assets are valued, with project improvements and developer contributions removed.

The City's existing system capacity is summarized as follows:

TABLE 8.4: EXISTING SOURCE CAPACITY

LOCATION	CAPACITY AF
Weber Basin Contract	2,786
Water IFFP p.4	

TABLE 8.5: EXISTING STORAGE CAPACITY

LOCATION	CAPACITY (GALLONS)
Pasture Tank	1,000,000
Crestwood Road Tanks	1,000,000
	1,500,000
Lower Pasture Tank	2,000,000
Ward Road Tanks	1,000,000
	2,000,000
Total	**8,500,000**
Less Fire Storage	540,000
Available Capacity	**7,960,000**
Source: Water IFFP p.5	

MANNER OF FINANCING EXISTING PUBLIC FACILITIES

The City's existing infrastructure has been funded through a combination of utility rate revenues, impact fees, other governmental revenue, grants and donations. No historic debt financing costs are included in this analysis related to water infrastructure.

The Water IFFP indicates the following with regard to the Distribution System:

> Existing residential areas have a minimum fire flow of 1,000 gpm for homes and 2,000 gpm for other structures found within these areas such as schools and churches. Due to the uncertainty of the location of future schools, churches and other structures commonly found in residential areas, all new residential areas are required to provide a minimum 2,000 gpm fire flow above anticipated peak day demand.[26]

EXCESS CAPACITY

Based on the proposed LOS, new development in the next ten years will utilize approximately 9.5 percent of the excess capacity within existing sources and 19.8 percent of the excess capacity within storage. **TABLES 8.6** and **8.7** illustrate the calculation of excess capacity and the proportional value included in the calculation of the impact fee.

TABLE 8.6: ILLUSTRATION OF SOURCE EXCESS CAPACITY

SOURCE	2018
ERCs	10,317
Total AF Required	2,285
Existing Source Capacity AF	2,786
Source Surplus/Deficit	501
Source Surplus/Deficit. as % of Total Capacity	**18.0%**
ERCs Served by Excess Capacity	2,263
ERCs in IFFP Planning Horizon	1,117
Percent of Excess Capacity	**49%**
Remaining ERCs to Serve	-
Additional Source AF Needed in IFFP	**-**
Source: Water IFFP pp.4-7	

TABLE 8.7: ILLUSTRATION OF STORAGE EXCESS CAPACITY

STORAGE	2018	BUILDOUT
Equivalent Residential Connections	10,317	14,529
Equalization Storage Volume gal.	4,126,800	5,811,600
Emergency Storage Volume gal.	3,095,100	4,358,700
Total Storage Required gal.	7,221,900	10,170,300
Existing Storage Capacity gal. (less fire Suppression)	7,960,000	7,960,000
Storage Surplus/Deficit gal.	738,100	(2,210,300)
Storage Surplus/Deficit gal. as % of Total Capacity	**9.3%**	**-27.8%**
ERCs Served by Excess Capacity	1,054	(3,158)
ERCs in IFFP Planning Horizon	1,117	-
Remaining ERCs to Serve	63	3,158
Additional Storage Gallons Needed in IFFP	**44,100**	**2,210,600**
Source: Water IFFP pp.4-7		

The above tables illustrate available excess source capacity to serve another 2,263 ERCs. The available storage capacity can serve another 63 ERCs. It is anticipated that there will be an additional 1,117 ERCs added to the system within the next ten years. Therefore, additional storage will be required.

[26] Water IFFP p.7

TABLE 8.8: ILLUSTRATION OF TRANSMISSION EXCESS CAPACITY

	ERCs	% OF BUILDOUT	% OF NEW DEVELOPMENT
Existing ERCs	10,317	71.0%	
10 Year IFFP ERCs	11,434	78.7%	
Buildout ERCs	14,529	100.0%	
New ERCs in IFFP	1,117	7.7%	27%
New ERCs to Buildout	4,212	29.0%	100%

Source: LYRB

For the purposes of this analysis, excess capacity for transmission has been defined based on the proportion of ERCs within the IFFP relative to the ERCs at buildout. It is anticipated that the existing transmission system will serve new development through buildout. There will be an estimated 1,117 new ERCs in the next ten years, with 4,212 new ERCs through buildout. The ERCs in the IFFP planning horizon represent approximately 7.7 percent of the buildout system ERCs (See **TABLE 8.8**).

FUTURE CAPITAL FACILITIES ANALYSIS

The estimated costs attributed to new growth were analyzed based on existing development versus future development patterns. From this analysis, a portion of future development costs were attributed to new growth and included in the impact fee analysis as shown in **TABLE 8.9**. Capital projects related to curing existing deficiencies were not included in the calculation of the impact fees. The costs of projects related to curing existing deficiencies cannot be funded through impact fees. Based on the projected growth in ERCs, the following system improvements will be needed in the next ten years.

TABLE 8.9: ILLUSTRATION OF TRANSMISSION CAPITAL IMPROVEMENTS SCHEDULED TO BE COMPLETED IN THE NEXT 10 YEARS

ITEM	DESCRIPTION	COST	FY	FY YEAR COST	ERCs SERVED	ERCs REMAINING	% TO IFFP	COST TO IFFP
Source								
1	987 Ac Ft Additional Water Contract with Weber Basin	$267,115	2025	$328,518	4,457	-	0.00%	-
Storage								
7	New 2 MG Green Road Tank	$3,667,200	2027	$4,784,864	2,857	63	2.21%	$105,506
Distribution								
2	Lower Pasture Pump Station	$969,700	2020	$1,028,755	4,212	1,117	26.52%	$272,820
3	New 8 pipe connecting Olde Orchard "Subdivision with Coventry Place. (Will likely be done with the development.)	$0.00	2026	$0.00	4,212	1,117	26.52%	-
4	Complete loop with PRV through Coventry Place. (Will likely be done with the development. 50% PRV cost)	$37,500	2026	$47,504	4,212	1,117	26.52%	$12,598
5	Additional 2 PRVs for future development. (50% PRV cost)	$37,500	2027	$48,929	4,212	1,117	26.52%	$12,976
6	Replace 8 Line w/10" for Annexed Mutton "Hollow Area (Will likely be done with the development.)	$0.00	2028	$0.00	4,212	1,117	26.52%	-

According to **TABLE 8.9**, there is a small number of future ERCs within the IFFP planning horizon that will exceed existing storage capacity. The future storage and distribution costs are included in the impact fee calculation.

SYSTEM VS. PROJECT IMPROVEMENTS

System improvements are defined as existing and future public facilities designed to provide services to service areas within the community at large.[27] Project improvements are improvements and facilities that are planned and designed to provide service for a specific development (resulting from a development activity) and considered necessary for the use and convenience of the occupants or users of that development.[28] To the extent possible, this analysis only includes the costs of system improvements related to new growth within the proportionate share analysis.

FUNDING OF FUTURE FACILITIES

The IFFP must also include a consideration of all revenue sources, including impact fees and the dedication of system improvements, which may be used to finance system improvements.[29] In conjunction with this revenue analysis, there must be a

[27] 11-36a-102(21)
[28] 11-36a-102(14)
[29] 11-36a-302(2)

determination that impact fees are necessary to achieve an equitable allocation of the costs of the new facilities between the new and existing users.[30] In considering the funding of future facilities, the City has determined the portion of future projects that will be funded by impact fees as growth-related, system improvements. No other revenues from other government agencies, grants or developer contributions have been identified within the IFFP to help offset future capital costs. If these revenues become available in the future, the impact fee analysis should be revised. It is anticipated that future project improvements will be funded by the developer. These costs have not been included in the calculation of the impact fee. Other revenues such as utility rate revenues will be necessary to fund non-growth-related projects and to fund growth related projects when sufficient impact fee revenues are not available. In the latter case, impact fee revenues will be used to repay utility rate revenues for growth related projects.

PROPOSED WATER IMPACT FEE

The water impact fee is based on the plan-based methodology. Using this approach, impact fees are calculated based on a defined set of capital costs specified for future development. The improvements are identified in a capital plan or impact fee facilities plan as growth-related system improvements. The City's existing and proposed future facilities are then proportionately allocated to the new development, providing an equitable distribution of the existing and proposed facilities that will serve development. The total cost is divided by the total demand units the improvements are designed to serve. The water impact fees proposed in this analysis will be assessed within the Service Area. The table below illustrates the appropriate impact fee to maintain the existing LOS, based on the assumptions within this document. The maximum allowable impact fee assignable to new development. The total fee per ERC is **$769**. The City may allocate the proposed impact fee based on meter size, according to **TABLE 8.11**.

TABLE 8.10: IMPACT FEE PER ERC

	ESTIMATE OF PROBABLE COST	% TO IF ELIGIBLE	IF ELIGIBLE COST	% IN IFA HORIZON	COST IN IFA HORIZON	ERCS SERVED	COST PER ERC
Buy In							
Source Buy-In	540,000	18%	97,155	49%	47,955	1,117	43
Distribution Buy-in	9,805,770	29%	2,842,722	27%	753,875	1,117	675
Storage Buy-In	3,158,652	9%	292,890	100%	292,890	1,117	262
New Facilities							
Source	328,518	0%	-	0%	-	1,117	-
Storage	4,784,864	100%	4,784,864	2%	105,506	1,117	94
Distribution	1,125,188	100%	1,125,188	27%	298,394	1,117	267
Other							
Professional Expense	8,000	100%	8,000	100%	8,000	544	15
Impact Fee Fund Balance	(656,098)	100%	(656,098)	100%	(656,098)	1,117	(587)
Total	**$19,094,894**		**$8,494,720**		**$850,521**		**$769**

TABLE 8.11: IMPACT FEE BY METER SIZE

METER SIZE (IN)	AWWA FLOW RATE (GPM)	ERU MULTIPLIER	IMPACT FEE PER METER SIZE	EXISTING FEE	% CHANGE
3/4	30	1.00	$769	$889	-14%
1	50	1.67	$1,282	$1,484	-14%
1 1/2	100	3.33	$2,563	$2,960	-13%
2	160	5.33	$4,101	$4,737	-13%
3	350	11.67	$8,971	$10,372	-14%
4	600	20.00	$15,379	$17,775	-13%
6	1,250	41.67	$32,041	$37,034	-13%

NON-STANDARD IMPACT FEES

The City reserves the right under the Impact Fees Act[31] to assess an adjusted fee that more closely matches the true impact that the land use will have upon the water system. This adjustment could result in a lower impact fee if evidence suggests a particular user will create a different impact than what is standard for its category.

FORMULA FOR NON-STANDARD WATER IMPACT FEES:
Number of ERCs x $769 = Impact Fee

[30] 11-36a-302(3)
[31] 11-36a-402(1)(c)