

JOHNSON WATER IMPROVEMENT DISTRICT

CULINARY WATER MASTER PLAN 2026

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Project #: 2410-042

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1. EXECUTIVE SUMMARY

This Culinary Water Master Plan provides an analysis of existing system components, such as storage, system piping, water rights, and sources for Johnson Water Improvement District (JWID). The plan also provides recommendations for JWID to supply water for projected growth through 2045. This plan updates the 2019 Master Plan and reflects system changes, recent capital improvements, updated demand data, and a fully calibrated hydraulic model developed using InfoWater Pro. The recommendations in this plan are given to meet the minimum level of service required by the State while providing the best value to JWID.

JWID currently serves approximately 2,060 people across a large rural service area spanning portions of Duchesne and Uintah Counties, including the communities of Upalco, Ioka, Myton Bench, Pleasant Valley, Independence, and areas near Roosevelt. The system includes approximately 180 miles of pipe, nine primary pressure zones, seven storage tanks (one currently out of service), and multiple purchased water sources. In addition to residential, commercial, and industrial users, JWID also supplies water for hydraulic fracturing operations, which represent the largest single demand on the system and introduce unique operational challenges.

The District's combined source capacity is approximately 2,248 gallons per minute (gpm), equivalent to 3,919 equivalent residential connections (ERCs). This exceeds the projected 2045 demand of approximately 3,581 ERCs, including anticipated growth in fracking demand. Under typical operating conditions and assuming fracking withdrawals remain within modeled limits, source capacity is adequate throughout the planning horizon. No immediate source expansion projects are required, though continued monitoring of industrial demand is recommended.

Systemwide storage capacity is also adequate to meet equalization and fire flow requirements, particularly with the planned construction of a new 200,000-gallon Independence Tank. However, the Pleasant Valley Tank is currently out of service and does not effectively support system operations due to pressure control limitations. While overall storage volume is sufficient, this tank represents an operational deficiency that requires corrective action or repurposing.

The most significant deficiencies in the JWID system are within the distribution network. Hydraulic modeling indicates widespread fire flow and pressure limitations driven by long dead-end mains, undersized 4-inch and 6-inch pipelines, pressure-reducing valve (PRV) conflicts, and significant elevation changes. Several areas fail to meet minimum fire flow requirements of 1,000 gpm at 20 psi, while other locations exceed the maximum allowable pressure of 120 psi.

The most critical system constraint occurs in Zone 15 (South Myton Bench / Sand Wash Road), which functions as a bottleneck for the southern system. In this zone, fire flow compliance cannot be achieved without major pipeline upsizing or operational restrictions on fracking during fire events. Additional high-priority deficiencies exist in Zones 10, 7, 9, 12, and 14, where fire flow reliability and pressure stability depend on targeted pipe replacement and system looping.

To address identified deficiencies and support future growth, the plan recommends a phased capital improvement program focused primarily on pipeline replacement and upsizing, improved system looping, and refined pressure control. Minimum recommended pipe sizes are 8 inches for looped mains and 10 inches or greater for long dead-end segments. Across priority zones, approximately 35,000 to 40,000 linear feet of pipe replacement or upsizing are required to meet minimum levels of service.

Additional recommendations include resolving PRV conflicts, restoring or reconfiguring the Pleasant Valley Tank, continuing SCADA implementation, replacing aging fire hydrants, and securing rights-of-way for existing pipelines.

Capital projects are prioritized based on public health and safety, regulatory compliance, and system reliability. High-priority projects address fire flow and pressure deficiencies, while moderate and low-priority projects improve redundancy, resilience, and long-term system performance. Given the scale of recommended improvements, phased implementation and pursuit of external funding will be essential.

2. INTRODUCTION

2.1. PURPOSE

Jones & DeMille Engineering (JDE) has developed an updated Culinary Water Master Plan for JWID to replace the existing plan implemented in 2019. This updated plan is designed to guide future infrastructure development, support anticipated growth, and ensure reliable water service throughout the district's service area.

2.2. BACKGROUND

JWID is located in Duchesne County and provides water to the unincorporated areas from Bridgeland to Roosevelt, Independence to Upalco, and the Myton Bench. JWID serves a population of approximately 2,060 people, as well as multiple commercial and industrial connections. The largest water users in the system are oilfield users whose demand and water use purposes vary throughout the year. This variable demand makes planning improvement projects difficult for JWID. Although JWID's service size and connection number have remained relatively stable over the past five years, the district is now anticipating growth in the coming years, in line with the expansion seen in surrounding counties.

According to Utah Water Rights data and data provided by JWID, JWID has 961 Residential Connections, 62 Commercial Connections, 16 Industrial Connections, and 5 Fracture Water Connections. The district sources water from the Victory Pipeline, JWID-owned well (Well #3 for emergency use only), East Duchesne Water Improvement District (EDWID), Duchesne City, Upper Country, and the Ute Tribe. JWID holds a contract with the Duchesne County Water Conservancy District (DCWCD) to withdraw up to 744 gpm from four Victory Pipeline locations: Bridgeland, Boreham, Central Basin, and Pole Line Connections. If excess capacity is available, JWID may use additional water without impacting other

Victory Pipeline users, which has been utilized to supply water for hydraulic fracturing (fracking) operations.

The previous JWID Culinary Water Master Plan was completed in June of 2019 by CIVCO Engineering and Sunrise Engineering. As part of the previous plan, a water model was created for the JWID system and a list of recommended improvements outlined. Since the 2019 plan, the JWID has made changes and improvements to the water system including:

- Central Basin Victory Connection – Victory Pipeline connection approximately 5,000 feet north of the Myton City Water Tanks.
- Independence Connection – Connected Independence portion of system to the rest of the system to be able to feed Independence from the west if needed.
- Meter and SCADA Improvements – Ongoing improvements for real time access to system changes.
- 8000 West Improvements – Increased capacity of lines from Ioka Tank and installed booster pump to better utilize Ioka Tank.
- East System Capital Improvement Project – Currently underway with design and right-of-way acquisition occurring. Increases fire flow, provides looped system in area, and would help with future growth near Roosevelt.

2.2.1. DISTRICT BOUNDARY

Areas outside JWID's service boundaries are served by six other providers: Cedarview Montwell Special Service District (CMSSD), Roosevelt City Water System, Ballard Water Improvement District (BWID), Ute Indian Tribe Water, Upper Country Water Improvement District, and EDWID. A map showing JWID's approximate service area and those of neighboring providers is included in Appendix A – Exhibit 1. These boundaries were updated using Utah Water Rights data and may not be fully accurate. The dark blue line on the map reflects JWID's boundary based on district-provided information.

JWID currently has a service agreement with Roosevelt City for an area where Roosevelt has extended service to JWID customers. This agreement includes a 15-year sunset clause requiring renegotiation. It is recommended that, upon expiration, JWID renegotiates the agreement with Roosevelt City to benefit all parties involved.

2.2.2. PRESSURE ZONES

The existing system has nine main pressure zones. Pressure zone boundaries were based on topographic data for the area, PRV settings, and tank elevations. Each pressure zone is outlined in the list below and a map of the pressure zones is included in Appendix A – Exhibit 2.

- Zone 1 is supplied by Sand Wash Tank. Zone 1 serves the Upalco area.
- Zone 2 is primarily supplied by Bridgeland Tank, with additional water sources available from the Boreham, Central Basin, and Pole Line Victory Connections. High-pressure transmission lines

from this zone supply water to the Ioka Tank and the Pleasant Valley Tank. Some customers along the high-pressure transmission lines receive water directly in areas of elevated pressure. This configuration causes Zone 2 to be split into four subzones by Zone 3 and Zone 4. Zone 2 serves the west side of North Myton Bench, eastern Ioka, and western Roosevelt.

- Zone 3 is primarily supplied by Ioka Tank and can also be supplied by Zone 1 and Zone 2. Zone 3 serves western and southern Ioka.
- Zone 4 is primarily supplied by Zone 3 and can also be supplied by Zone 2. The high-pressure transmission line from Zone 2 runs through Zone 4. Zone 4 serves the northeastern portion of Ioka, the upper east side of North Myton bench, and the Vonsville Tank.
- Zone 5 is supplied by Zone 2. Zone 5 serves the South Myton bench.
- Zone 6 is primarily supplied by Zone 2 and can also be supplied by Zone 5. (The Pleasant Valley Tank is also meant to supply Zone 6 though is currently unable to do so.) Zone 6 is made up of two disconnected subzones which could be combined. Zone 6 serves Pleasant Valley.
- Zone 7 is supplied by Zone 2, Zone 4, Zone 5, and the Vonsville Tank. Zone 7 is made up of five disconnected subzones which could be combined. Zone 7 borders the north, east, and south sides of Zone 4 to serve south Roosevelt, west Myton valley, and the lower east side of North Myton bench.
- Zone 8 is supplied by Zone 5 and Zone 7. Zone 8 is made up of two disconnected subzones which could be combined. Zone 8 serves east Myton valley.
- Zone 9 is primarily supplied by the Independence Tank and can also be supplied by Zone 7. Zone 9 primarily serves Independence and can serve lower portions of Zone 7.

It is important to note the transmission line (Lake Boreham Pipeline) from Duchesne City and the East Duchesne Water Improvement District (EDWID) turnout to Bridgeland tank are not part of any pressure zones.

2.3. OBJECTIVES

The objectives of this plan are to:

- Establish levels of service JWID's water system.
- Analyze system capacities to understand performance and limitations.
- Identify system deficiencies, which hinder or prevent operation.
- Provide strategic improvements to address existing deficiencies.
- Plan for future water demands through the year 2045.
- Assign cost estimates and priorities to proposed improvement projects.
- Identify potential funding sources to support implementation of improvements.

2.4. DEFINITIONS

ac-ft	Acre-feet	MG	Million Gallons
ADD	Average Day Demand	LOS	Level of Service

DDW	Division of Drinking Water	PDD	Peak Day Demand
DWR	Division of Water Rights	PID	Peak Instantaneous Demand
EPA	Environmental Protection Agency	PRV	Pressure Reducing Valve
ERCs	Equivalent Residential Connections	psi	pounds per square inch
ft	Feet	SRF	State Revolving Fund
gpm	gallons per minute	UAC	Utah Administrative Code
IFC	International Fire Code	WR	Water Right

3. DEMOGRAPHICS

3.1. EXISTING POPULATION

As an improvement district, JWID does not conduct its own surveys or censuses, which makes population projections more challenging to obtain. Historical and current population estimates were developed using data reported to the state and figures from JWID's accounting software. Future growth projections were based on U.S. Census data from 1980 to 2020 and county-level growth rates provided by the Kem C. Gardner Policy Institute. Although JWID has seen minimal growth over the past 40 years—and at times a reduction in service connections, the district anticipates future growth in line with trends observed in surrounding areas.

3.2. PROJECTED POPULATION

To estimate future growth, projected growth rates for Duchesne County were taken from the Gardner Institute and used to estimate the population for the next 20-years (2045). By 2045, the population served by JWID is projected to be approximately 2,127. To calculate the projected population, the future value formula was used, see Equation 1.

$$FP = CP \times (1 + r)^t \quad (1)$$

Where:

FP = Future Population

CP = Current Population

r = Annual Growth Rate (%)

t = Number of Years Between Current and Future Population

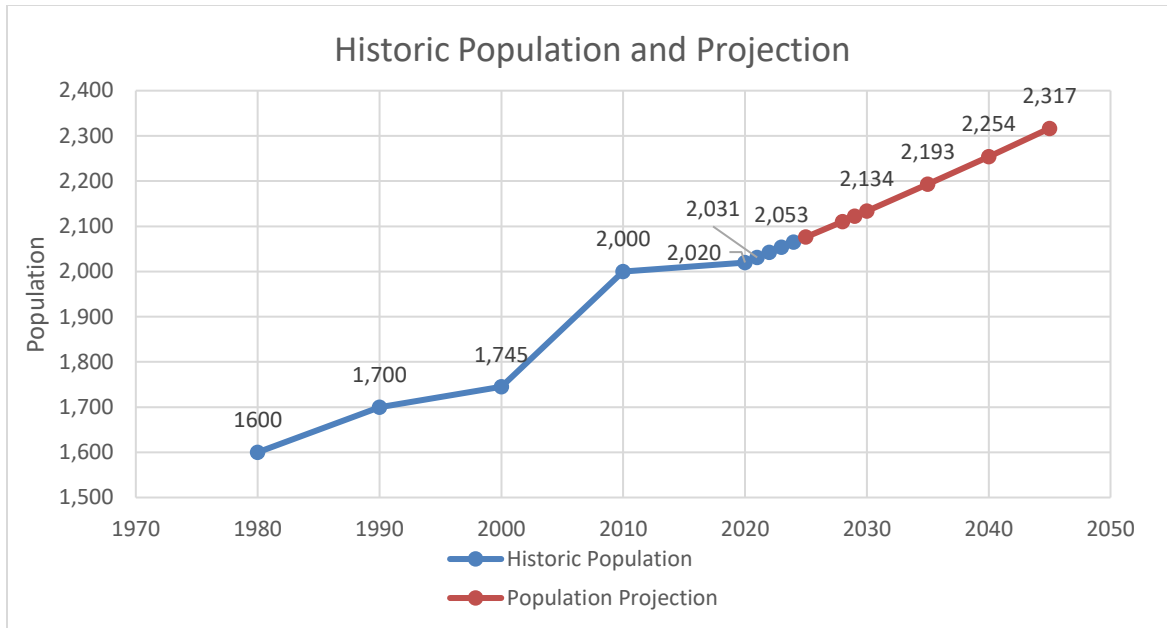


Figure 3-1. Population Projection

4. EQUIVALENT RESIDENTIAL CONNECTIONS

Currently, there are 1,045 connections reported to the State with a mix of residential, commercial, and industrial users. Water usage for these connections was determined based on water usage reports submitted to the State by JWID. JWID's system also includes 5 connections used for hydraulic fracturing (fracking). JWID provided 2018 data distinguishing typical industrial use from fracking. Fracking accounted for 99.53% of industrial water use that year. This ratio was applied to the past three years for ERC calculations related to industrial and fracking use.

Because the water usage data does not differentiate between indoor and outdoor water usage, the calculation for converting connections to ERCs is straightforward and combines indoor and outdoor use. Typically, for planning purposes, ERCs are used to define the capacities of system components. Equations 2 and 3 show the conversion from connections to ERCs. Some commercial connections use more than a typical residential connection and therefore have more ERCs than connections. A breakdown of connections and their ERC value is shown in Table 4-1.

$$\text{Water Usage per ERC} = \frac{\text{Total Water Used by Residential Connections}}{\text{Number of Residential Connections}} \quad (2)$$

$$\text{Number of ERCs} = \frac{\text{Water Usage by Type of Connection}}{\text{Water Usage per ERC}} \quad (3)$$

Table 4-1. Culinary Water Connections

Type	Connections	ERCs	Avg ERC Value per Connection
Residential	961	961	1.00
Commercial	62	36.32	0.59
Industrial (no fracking)	17	11.75	0.69
Industrial (fracking)	5	2,200	440
Total	1,045	3,209.07	-

4.1. ERC PROJECTIONS

To project future water demands, it was assumed that the system ERCs would grow at the same rate as the population with residential, commercial, industrial, and institutional connections growing proportionally. Table 4-2 shows the existing (3,209 ERCs) and projected number of ERCs through 2045 (3,581 ERCs).

Table 4-2. ERC Projections

	2025	2026	2027	2028	2029	2030	2035	2040	2045
Residential ERCs	961	966	972	977	982	988	1,015	1,043	1,072
Commercial ERCs	36	36.20	36.40	36.60	36.80	37.00	38.03	39.08	40.17
Industrial ERCs	12	12.07	12.13	12.20	12.27	12.33	12.68	13.03	13.39
Hydraulic Fracturing ERCs	2,200	2,212	2,224	2,236	2,249	2,261	2,324	2,389	2,455
Total ERCs	3,209	3,227	3,244	3,262	3,280	3,298	3,390	3,484	3,581

5. LEVEL OF SERVICE REQUIREMENTS

The State of Utah DDW Rules and the current IFC outline the minimum LOS that water systems are required to provide. Establishing a LOS allows the City to provide new water users with the same quantity and quality of water as existing users.

In 2018, the DDW updated the requirements for calculations to determine the LOS for water systems serving more than 500 people. In general, the new sizing guideline requires the use of measured data from the sources and water meter data by connection type to determine requirements for source, storage, and water rights. In 2023, the System-Specific Variation Factor was removed. However, if a system determines that a variation factor is needed to increase the system-specific sizing requirements, then one may be used. A technical memo from a licensed P.E. in the State of Utah or an accepted Master Plan with the reasons for the increased variability will be required to use a variation factor greater than zero. A variation factor was not used as part of this report.

The LOS for each system component will be discussed in their respective sections below.

6. SOURCE

JWID has five sources for the water system. These sources include the Victory Pipeline, their own well, EDWID and Duchesne City (aqueduct), Upper Country, and the Ute Tribe.

JWID has a contract with Duchesne County Water Conservancy District (DCWCD) to pull 744 gpm from the Victory Pipeline. This water can be delivered at four locations within the JWID system including Bridgeland Victory Connection, Boreham Victory Connection, Central Basin Victory Connection, and Pole Line Victory Connection.

Upper Country supplies water to the Sand Wash Tank. This connection usually supplies approximately 150 gpm.

Ute Indian Tribe Water supplies water to the Independence Tank at a rate of approximately 120 gpm.

Water from EDWID and Duchesne City is delivered to the system through an aqueduct that comes from the Duchesne Valley Water Treatment Plant. JWID takes water out of the aqueduct north of Duchesne City and the water is conveyed from the aqueduct to the JWID distribution system by the Lake Boreham Pipeline. The Lake Boreham Pipeline has a capacity of 980 gpm. JWID owns 80% of the capacity (784 gpm) and Myton City owns the other 20%.

JWID owns 4 wells. Well 3 is the only operational well, Well 1 and 2 are abandoned, and Well 4 is a test well that has never been proofed. Well 3 is certified for culinary water and has a capacity of approximately 450 gpm in an emergency. It has historically only been used for fracking operations because of taste and color.

6.1. LEVEL OF SERVICE

The LOS related to source is as follows:

- Flow rate: provide a flow equal to the Peak Day Demand of 0.574 gpm per ERC for indoor and outdoor use.

These levels are consistent with the UAC Section R309-510-7, Source Sizing. The system has five sources of water:

- Purchase from DCWCD – Victory Pipeline
- Purchase from Upper County Water Improvement District
- Purchase from Duchesne City and EDWID
- Purchase from Ute Tribe
- Well #3 (emergency use only)

6.2. EXISTING SOURCE CAPACITY

6.2.1. SPRING CAPACITY

There are no springs serving the JWID system.

6.2.2. WELL CAPACITY

JWID owns four wells. Well #3 is the only well that is currently operational. Well #2 is abandoned and Well #4 is a test well that has never been proofed. Well #1 is currently not in use and can not be utilized in the culinary system due to high sulfate concentration. Because of this, it was not utilized in the source capacity calculations.

Well #3 was drilled in Roosevelt in 1987. The well casing is 12" diameter, a depth of 300 ft, and sealed with cement and bentonite. The well is still active, however, it is disconnected from the culinary system and only connected to serve a fracking connection due to the water's color and taste.

To identify a well's ability to provide water for a system, a well's safe yield is established based on two-thirds of the pumping rate from the aquifer drawdown test or well capacity. The safe yield determines the number of ERCs a well source can support. Well #3 was pump tested at 675 gpm, which equates to a safe yield capacity of approximately 450 gpm. The well can provide sufficient flow to supply approximately 784 ERCs.

It should be noted that even though a safe yield is used for planning purposes, a well can be pumped more than the safe yield or at the test pumping rate. If a well's safe yield capacity needs to be reevaluated, it is recommended a well pump test be conducted to determine a new safe yield capacity.

6.2.3. TOTAL SOURCE CAPACITY

The combined source capacity of the connections and well is approximately 2,248 gpm. This is equivalent to approximately 3,919 ERCs. The sources are sufficient to meet the existing system demands. Table 6-1 shows current safe yield and ERC capacities.

Table 6-1. Total Source Capacity

Source	Safe Yield Capacity (gpm)	ERC Capacity
Purchase from DCWCD – Victory	744	1,297.05
Purchase from Upper County	150	261.50
Purchase from Duchesne City and EDWID	784	1,366.78
Purchase from Ute Tribe	120	209.20
Well #3	450	784.50
Total	2,248	3,919.03

6.3. PROJECTED SOURCE REQUIREMENTS

The JWID water system has sufficient source capacity to meet anticipated municipal growth, provided that future demands remain within typical municipal and non-industrial use levels. Additionally, if the hydraulic fracturing demands grow at the projected rate as well, the current sources will be sufficient for the study period.

The two figures below show the projected ERC growth both excluding and including fracking.

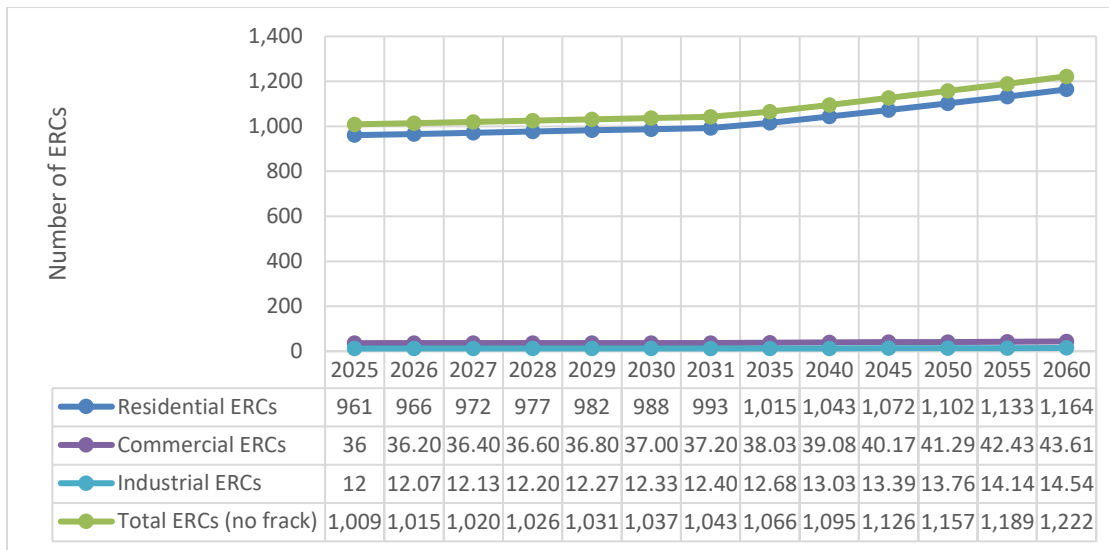


Figure 6-1. ERC Projections – excluding fracking

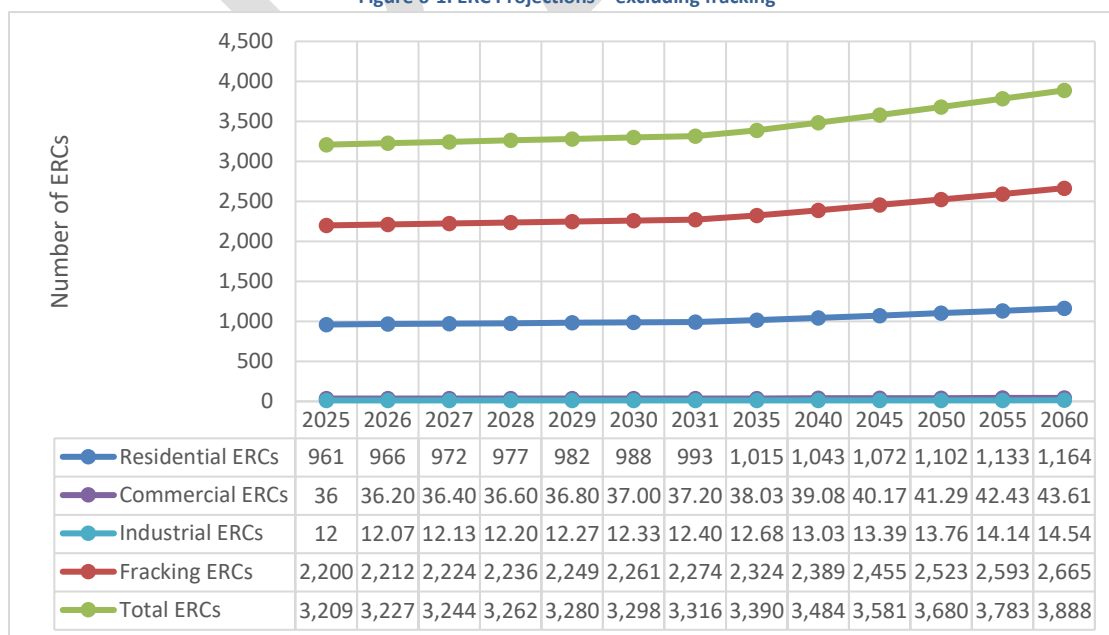


Figure 6-2 ERC Projections – including fracking.

6.4. DEFICIENCIES

The available water sources are adequate to meet projected demands within the planning horizon assuming the fracking demand grows at the same projected rate. The water system has a total capacity of 3,919 ERCs, which accommodates anticipated baseline growth while maintaining sufficient reserve capacity. For planning purposes, hydraulic fracturing demand was estimated at 440 gallons per minute (gpm), based on in-field testing and observed operational conditions. Under this assumption, fracking water use does not compete with existing municipal or residential demands, and the system is able to reliably serve both traditional users and temporary industrial demands without exceeding source capacities. The table below shows the cumulative source capacity, the source capacity in use, available source capacity, and the number of available fracking connections if each connection was 440 gpm.

Table 6-2. Projected Allowable Fracking Connections

Year	Cumulative Source Capacity (gpm)	Source Capacity in Use (gpm)	Available Source Capacity (gpm)	Allowable Fracking Connections (440 gpm/connection)
2025	2,248	578.77	1,669.23	3.79
2026		581.95	1,666.05	3.79
2027		585.15	1,662.85	3.78
2028		588.37	1,659.63	3.77
2029		591.60	1,656.40	3.76
2030		594.85	1,653.15	3.76
2035		611.38	1,636.62	3.72
2040		628.37	1,619.63	3.68
2045		645.83	1,602.17	3.64
2060		701.17	1,546.83	3.52

It is recommended that when new fracking connections are requested, the feasibility of adding these connections are investigated using the new calibrated model to ensure that the new connections do not negatively affect the rest of the system.

There has been discussion to disconnect Well #1 from the system and utilize it solely for fracking. In doing this, this would increase the number of fracking connections that can be served.

6.4.1. IMPROVEMENT PRIORITY SYSTEM (IPS) POINTS

There are a total of 25 IPS points for the system. Each compliance schedule and deficiency is detailed in Table 6-3 below.

Table 6-3. IPS Points Summary

Required Activity	Facility ID	Associated Deficiency	Status	Due Date
Physical Deficiencies				
GWR Correct Deficiency 120 days	WS003	Well pump to waste line not downturned	Overdue	10/25/2024
GWR Correct Deficiency 120 days	WS003	Well lacks the required well seal	Overdue	10/25/2024
GWR Correct Deficiency 120 days	WS001	Well pump to waste line not downturned	Overdue	10/25/2024
GWR Correct Deficiency 120 days	WS001	Well lacks the required well seal	Overdue	10/25/2024
CCR Schedules				
CCR1			Pending	07/01/2026
CCR2			Pending	10/01/2026

6.5. RECOMMENDED IMPROVEMENTS

Under the assumption that future fracking operations rely solely on excess water that would otherwise remain unused, the community's existing water sources are projected to provide adequate supply to meet all anticipated demands. Current source capacities are sufficient to sustain up to two simultaneous fracking connections without affecting municipal water availability or system reliability. Under these conditions, water supply remains stable throughout the planning horizon, and no system improvements, expansions, or additional water-supply projects are recommended at this time. Continued monitoring of consumption patterns and industrial activity is advised to ensure that these conditions remain consistent in the future.

7. STORAGE

7.1. LEVEL OF SERVICE

The LOS related to storage is the combination of the following:

- **Equalization Storage: 632 gallons per ERC**
This volume is based on the Water System Minimum Sizing Requirements (Utah Code 19-4-104 and 114) and water usage data provided by Johnson Water District and Johnson Water District - Independence. Indoor and outdoor water usage is included and reflects the average day water usage.
- **Fire storage: 180,000 gallons**
This volume is based on 1,500 gpm required for 2 hours. This amount was verified by the local fire authority.
- **Emergency Storage: 0 gallons**

- UAC Section R309.510-8(4), Facility Design and Operation: minimum Sizing Requirements, Storage Sizing, Emergency Storage states that, *“Emergency storage shall be considered during the design process. The amount of emergency storage shall be based upon an assessment of risk and the desired degree of system dependability. The Director may require emergency storage when it is warranted to protect public health and welfare.”* The District currently does not have a specific storage volume requirement for emergency storage and therefore it was not evaluated for this study.

7.2. EXISTING STORAGE

JWID currently has seven concrete storage tanks with a total existing storage of 3,145,000 gallons and 4,018. The system is also connected to two concrete tanks owned by Myton City but the volume of these tanks is not included in the system capacity.

- Tank 1 – The Sand Wash Tank is a buried, circular concrete tank serving the northwest portion of the JWID system. The tank is located northeast of the Big Sand Wash Reservoir dam.
- Tank 2 – The Ioka Tank is a buried, circular concrete tank that provides service to the JWID system in the Upalco and Ioka areas. The tank is located on Ledge Lane, north of Ioka.
- Tank 3 – The Vonsville Tank is an above-ground, circular concrete tank that provides storage for the northern portion of the JWID system. The tank is located south of the Roosevelt Airport and east of U.S. Highway 40.
- Tank 4 – The Pleasant Valley Tank is located on the South Myton Bench above Pleasant Valley. The tank has a storage capacity of 100,000 gallons but is currently out of service. Future use of this tank is anticipated; however, it is not included in this analysis.
- Tank 5 – The Bridgeland Tank is a circular concrete tank located on the eastern end of Blue Bench in the western portion of the JWID system. This tank serves as the primary storage facility for much of the system. The total tank capacity is 2,000,000 gallons and is jointly owned with the East Duchesne Water Improvement District (EDWID). JWID owns 82.5 percent, or 1,650,000 gallons, of the total capacity. The tank was constructed in 2005.
- Tank 6 – The Independence Tank is a small, circular tank located west of Bottle Hollow Reservoir. The tank provides storage for the isolated Independence area of the JWID system. A new 200,000 gallon tank is in the design phase to replace this existing tank.
- Tank 7 – The North Myton Bench Tank is a steel, circular tank that was previously used for fire flow storage. The tank is currently empty and out of service due to operational limitations and is not included in this analysis. Future use of this tank is not anticipated.
- The Myton City Tanks consist of two circular concrete tanks located on the Myton Bench and connected to the Lake Boreham Pipeline. These tanks supply water to the Town of Myton and are owned and operated by Myton City. As such, they are not included in this analysis.

7.3. EQUALIZATION AND FIRE FLOW STORAGE

The existing ERC capacity was evaluated by first determining the required fire storage. Typically, this is based on the 2018 IFC standards. However, the local fire authority was contacted, and it was determined that a fire flow demand of 1,500 gpm for 2 hour was sufficient for the service area. Reference Section 8.3. This brings the required fire storage to 180,000 gallons.

After the fire storage is accounted for, the tanks may have additional storage for emergencies. Currently, the DDW does not specify the amount of storage volume required for emergencies. Since the existing storage tanks have not been planned or constructed with emergency storage, the current emergency storage LOS is 0 gallons.

Using the ERCs calculated in Section 4 and the equalization storage requirements outlined above, the required equalization storage per ERC was approximated at 632 gallons. The existing storage capacity provides for approximately 4,691 ERCs and is adequate to meet current demands. A breakdown of the existing storage capacity is shown in Table 7-1.

Table 7-1. Existing Storage Tank Capacity

Name	Total Volume (gal)
Sand Wash Tank	150,000
Ioka Tank	750,000
Vonsville Tank	571,000
Pleasant Valley Tank	-
Bridgeland Tank	1,650,000
Independence Tank	24,000
North Myton Bench Tank	-
Total Existing Storage	3,145,000
Total Fire Storage	180,000
Emergency Storage	0
Required Equalization Storage	2,590,461
Total Storage Used	2,770,461
System ERC Capacity	4,691

7.4. PROJECTED STORAGE REQUIREMENTS

The planned construction of the new 200,000-gallon Independence storage tank, which will replace the existing 24,000-gallon facility, increases the system's operational and equalization storage capacity. This expanded volume ensures that the system can reliably meet current and projected demands throughout the planning period, even with the potential for two simultaneous fracking connections. Additionally, when a fix is implemented for Pleasant Valley Tank, an additional 100,000 gallons of storage will be added to the system that can be utilized. It was assumed this fix would be implemented in 2027. If the suggested capital improvement project of adding a new tank in the Pleasant Valley area is completed, this would add an additional 500,000 gallons of storage as well.

The upgraded storage provides improved system resiliency, enhances fire protection capabilities, and eliminates the constraints associated with the undersized existing tank. With the new tank in service, no additional storage improvements are recommended at this time; however, continued monitoring of system performance is advised to ensure storage capacity remains aligned with future demands.

Table 7-2. Projected Storage Requirements

	Year	Population	ERC	Additional Storage (gal)	Additional Equalization (ERC)	Cumulative Storage Capacity (gal)	Storage Capacity (ERC)
Short Term Planning Period	2025	2,076	1,009			3,145,000	4,691
	2026	2,088	1,015			3,145,000	4,691
	2027	2,099	1,020	100,000	158	3,245,000	4,850
	2028	2,111	1,026	176,000	278	3,421,000	5,128
	2029	2,122	1,031	500,000	791	3,921,000	5,919
	2030	2,134	1,037			3,921,000	5,919
Long Term Planning Period	2035	2,193	1,066			3,921,000	5,919
	2040	2,254	1,095			3,921,000	5,919
	2045	2,317	1,126			3,921,000	5,919
	2060	2,515	1,222			3,921,000	5,919
	Total Storage Added			776,000		3,921,000	5,919

7.5. DEFICIENCIES

With the Independence Connector Project that was completed in the past year, the Independence portion of the system, which was once isolated from the rest of the system, is now connected with the new line. However, to utilize water from the Tribe and the Independence tank, there is a closed valve on the line that isolates Independence from the rest of the system. This closed valve is to the east of the new PRV and allows water to be fed from the Tribe rather than the west side of the system. Having this closed valve limits the fire flow storage on the Independence portion of the system. The Independence Tank is 24,000 gallons, which is not enough to provide fire flow for that section of the system, but with the planned 200,000-gallon tank for Independence, there will be sufficient fire storage while having that isolation valve closed.

7.6. STORAGE RECOMMENDED IMPROVEMENTS

7.6.1. PLEASANT VALLEY TANK IMPROVEMENTS

The Pleasant Valley Tank is not currently in service due to constant backflow and overfilling of the tank. This occurs because the pressure setting at PRV 1018 exceeds the tank's maximum water elevation head by about 4 feet. To operate the tank effectively, the PRV 1018 pressure setting must not exceed 40 psi. However, PRV 1018 is currently set at 50 psi to maintain the minimum allowable pressure at the

intersection of Pariette Road and 13500 S. It is recommended that the pipe along Pariette Road and 13500 S be rerouted along 12750 S and 3000 W. After this improvement, it is recommended the PRV 1018 pressure setting be reduced from 50 psi to 40 psi. These recommendations will make the Pleasant Valley Tank operational while also meeting the minimum system pressure requirements.

7.6.2. INDEPENDENCE TANK REPLACEMENT

Ensure that the design and construction of the new Independence tank is completed to ensure there is sufficient fire flow storage for the Independence section of the system.

7.6.3. NEW PLEASANT VALLEY TANK

The board proposed constructing a new tank in the Pleasant Valley area at the coordinates 40.135091°N, 110.118530°W. This tank will help serve the required fire flow in the Pleasant Valley area and some surrounding pressure zones, eliminating the need to upsize many miles of line within the system to try and eliminate head loss experienced within smaller lines that stretch a long distance in order to obtain fire flow.

Currently, the JWID system has sufficient storage for the study period, so the size of the tank is not dictated by a storage deficit. However, the size of the tank should be chosen to provide the required fire flow for the area, which is 1,500 gpm for 2 hours, which equates to a minimum of 180,000 gallons.

7.6.4. EMERGENCY STORAGE

Consideration for emergency storage should be evaluated and it is recommended to be included in the tank storage volume, which will increase the storage capacity required per ERC. Emergency storage is valuable during emergencies (e.g., natural disasters) and maintenance operations (e.g., well pump maintenance, spring redevelopment, and tank cleaning). The existing storage does not currently allow for a significant amount of emergency storage so making an emergency storage plan is recommended.

8. DISTRIBUTION SYSTEM

8.1. LEVEL OF SERVICE

The distribution system was evaluated for its ability to provide minimum water pressures and to meet minimum fire flow demands.

8.1.1. PRESSURE

The LOS related to minimum water pressure is as follows:

- Minimum of 20 psi during fire flow and PDD
- Minimum of 30 psi during PID
- Minimum of 40 psi during PDD

These levels are consistent with the UAC Section R309-105-9, Minimum Water Pressure.

The LOS related to maximum water pressure is as follows:

- Maximum of 150 psi during ADD

This is consistent with the UAC Section R309-550-5, Water Main Design.

8.1.2. FIRE FLOW

The LOS related to minimum available fire flow is as follows:

- 1,000 gpm for residential homes with a finished square footage less than 3,600 square feet
- 1,500 gpm for residential homes with a finished square footage greater than 3,600 square feet.
- Non-residential buildings vary based on finished square footage, usage, automatic sprinkler systems, and construction material type in accordance with the International Fire Code.

These levels are consistent with the UAC Section R309-550-5(5), Water Main Design, Fire Protection. The fire protection flow was set at 1,500 gpm for the system as there are homes larger than 3,600 square feet, and this flow covers the non-residential buildings in the service area as well. See contact information for the local fire authorities in Table 8-1 below.

Table 8-1, Local fire authorities

Entity	Contact	Phone Number	Email
Duchesne County	Joshua Phillips	435-738-1226	jphillips@duchesne.utah.gov
Uintah County	Jeremy Raymond	435-781-6756	
Roosevelt City	Lee Rockwood	435-722-4893	fire@rooseveltcity.com
Myton City	Sam Davis	435-299-9137	mytonfiredept@yahoo.com

The DDW rules require fire hydrants to meet a minimum specified flow while maintaining 20 psi of pressure throughout the system during the PDD plus fire flow event. The minimum flow varies based on building size, type, and use. In general, the minimum fire flow required is between 1,000 gpm and 1,500 gpm. Schools and other large commercial buildings may require greater flows, but the same minimum 20 psi pressure must be maintained. Facilities constructed prior to this rule may not be required to meet these conditions; when improvements are made to older facilities or newer facilities are constructed, they should provide the necessary system improvements to meet their required fire flow conditions.

8.2. EXISTING DISTRIBUTION SYSTEM

The JWID has served rural areas of Duchesne and Uintah counties since it was established in 1984. Thus, the age of the system varies from a few months to several decades. The system serves about 930

connections, in 9 pressure zones, over an area of about 200 square miles, with about 180 miles of pipe. Water users range from residential homes and commercial businesses to industrial manufacturing and oilfield fracking operations. The 9 pressure zones are divided by 24 pressure-reducing valves. Nearly all the pipes are PVC or HDPE. Pipe diameters range from 1.5 inches to 16 inches. About 67% of the system is 8-inch diameter pipe or larger and about 22% of the system is 4-inch diameter pipe or smaller.

8.3. HYDRAULIC MODELING

The hydraulic model from the previous master plan was provided by Town personnel. The water system model was then imported into InfoWater Pro version 2026.2.0. The hydraulic model was created to check existing conditions and evaluate future scenarios. The values described in Section 5 are the assigned rate values per ERC by scenario. These calculations were used as a global demand factor and adjusted for the required scenario.

The original model provided was adjusted to match existing conditions. Junctions were placed at the beginning, middle, and end of pipes; along major roads and intersections; and at other locations as necessary to achieve system representation. Junctions were used to represent the nearby ERC values of homes and businesses. The demand allocator tool was used to assign ERC values to the junctions based on the nearest connection locations and each connection type. The hydraulic model was used to check multiple scenarios for system performance in accordance with Utah drinking water laws and rules. The scenarios evaluated include ADD, PDD, PID and PDD plus Fire Flow. The scenarios include minimum system pressures that must be checked for the function of the system.

The model was calibrated with existing flow data, PRV pressure gauges, and current fire flow tests (see Appendix C-1 for Fire Flow Test results). Hazen-Williams roughness values were assigned based on pipe material. A typical roughness value of 140 was used for all system pipe. Any recommended pipe improvements were assigned a roughness value of 140 to show typical PVC conditions.

Upon completing the existing system model, dependent scenarios were created for full buildout. By creating dependent scenarios, any changes to the base or parent model were carried out through the rest of the project. The system model was continually updated as adjustments were made during the modeling process.

Growth calculations were used to estimate future ERC values and were based on previously described growth data. Additional ERCs were added to the model in areas identified by JWID personnel. The number of additional ERCs were distributed based on the estimated number of connections for the future development areas, which were identified by District personnel.

Table 8-2 shows model flows for various scenarios. Typically, the PID is calculated using Equation 4 below and dividing by the total amount of ERCs.

$$Total\ Flow\ (gpm) = 10.8 * Number\ of\ ERCs^{0.64} \quad (4)$$

Table 8-2. Model Flows

ADD Flow per ERC	PDD Flow per ERC	PID Flow Capacity per ERC (Existing System)
0.301 gpm	0.632 gpm	0.948 gpm

8.4. DEFICIENCIES

8.4.1. PRESSURE DEFICIENCIES

Under the PDD and fire flow scenario, as many as 118 hydrants drop pressures below the 20 psi minimum requirement somewhere in the system. About 10 of these hydrants cause negative pressure within the system. Sometimes the pressure drop is at the hydrant itself; however, there are about 8 locations that experience a drop in pressure from two or more individual hydrants. These locations are listed in Table 8-3. Other areas with pressures below the required minimum include those adjacent to tanks or immediately downstream of PRVs. These are typically not of concern as tanks are gravity controlled and PRVs are adjustable. All PRVs evaluated have a pressure setting of 19 psi or greater.

Table 8-3. System Pressure Deficiencies for PDD and Fire Flow Scenario

Model ID	Pressure Zone	Location	Number of Influencing Hydrants
J90	2	Ridge South of Central Basin connection	91
J66	9	6000 E and 4000 S Independence	7
WDNJ_ID_108	2/5	Near PRV 1012 Pleasant Valley	5
J312	7	500 W 2500 S Vonsville	3
WDNJ_ID_224	1	End of 2000 S Line Upalco	2
WDNJ_ID_254	2	Center St Ioka Tank Road Supply Line	2
WDNJ_ID_359	8	End of 1000 W Line Myton	2
J136	6	Pariette Road and 13500 S Pleasant Valley	2

Under the PID scenario, most of the system meets the 30 psi minimum pressure requirement. Exceptions to this include areas near tanks, PRVs, and the 13500 S Pariette Road intersection in Pleasant Valley. Appendix A, Map 17 shows model node pressures for the PID scenario.

Under the PDD scenario, several locations do not meet the 40 psi minimum pressure required. Six of these are listed in Table 8-4; the remaining locations are near a tank or a PRV. Appendix A, Map 16 shows pressures for the PDD scenario at every model node.

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Table 8-4. System Pressure Deficiencies for PDD Scenario

Model ID	Pressure Zone	Location
WDNJ_ID_214	1	End of 2000 W Line Upalco
J90	2	Ridge South of Central Basin connection
J454	7	East of Independence PRV
J514	7	Center of O E
WDNI_ID_195	7	East of 2000 W 5000 S Intersection
J136	6	Pariette Road and 13500 S Pleasant Valley

Under the ADD scenario, several locations exceed the 150 psi recommended maximum pressure. Nearly all of these exist along the main line supplying water from the Bridgeland Tank to the Ioka Tank. Pressures in the supply line are about 200 psi or less. The maximum pressure in the system is 235 psi and occurs immediately downstream of the Ioka Booster Pump Station. Two other areas, one along State Street in Zone 4 and one at the south end of 2000 W in Zone 7, have pressures between 153 psi and 164 psi. Appendix A, Map 15 shows pressures for the ADD scenario at every model node.

8.4.2. FIRE FLOW DEFICIENCIES

Available fire flow throughout the system varied widely. Table 8-5 shows the total number of hydrants in each zone and what percentage of those meet or exceed the fire flow requirements. Appendix A, Map 18 shows the fire flow available at each hydrant.

Table 8-5. Available Fire Flow by Zone

Zone	Number of Hydrants	Available Fire Flow meets 1,500 gpm	Available Fire Flow meets 1,000 gpm	Available Fire Flow below 1,000 gpm
1	3	0%	0%	100%
2	29	59%	7%	34%
3	4	25%	0%	75%
4	26	23%	50%	27%
5	4	0%	25%	75%
6	3	0%	0%	100%
7	65	35%	29%	35%
8	2	0%	0%	100%
9	9	0%	0%	100%
Cumulative	145	32%	24%	43%

8.5. DISTRIBUTION SYSTEM RECOMMENDED IMPROVEMENTS

The deficiencies listed in Section 8.4 are largely due to undersized pipelines. There are fire hydrants being fed by a single 4-inch line or smaller. This leads to no available fire flow at some hydrants within the system. In other areas, there are hydrants served by an 8-inch line. This size pipe is typically acceptable for fire flow. However, several of these lines extend for 1-mile or more providing lower than expected fire flow at these hydrants.

It is recommended the minimum size of line should be 8 inches if the system is converted to a loop or 10 inches if it remains a dead-end line. It is recommended any loops extending longer than 1-mile be enlarged to a pipe diameter of 10-inch. These recommendations are expected to improve the fire flow and pressure deficiencies listed previously. Several of the capital improvement projects listed in Section 9 include these recommendations. Table 9-1. Undersized Line Replacement Summary all recommended improvements not included in other capital improvement projects.

9. CAPITAL IMPROVEMENT RECOMMENDATIONS

There are multiple recommendations for capital improvement, and a large cost associated with the upgrades if all of them were completed at a single time. The two following sections summarize the capital improvement recommendations and organize them based upon priority.

9.1. PROJECT SUMMARIES

9.1.1. EAST MYTON IMPROVEMENTS PHASE 1

The East Myton Improvement Project Phase 1 is replacement of existing undersized 4-inch and 2-inch line with 8-inch line. This past winter a new section of line was installed from 9100 South to the existing 4-inch PRV on Myton Road in order to replace an existing, damaged line. The East Myton Improvements Project Phase 1 would pick up where that project ended and continue north toward Myton, then east on F Street in Myton. The line would then continue to 2500 West where it would head south to 8000 South, extending approximately 4,700 feet to connect to the existing line. Additionally, two existing PRVs, which are undersized, would also have to be replaced with 6-inch PRVs. This project probable cost is estimated at \$3,620,750. See Appendix A, Map 4 showing this proposed improvement and Appendix B.1 for a cost estimate for this project.

9.1.2. EAST MYTON IMPROVEMENTS PHASE 2

The East Myton Improvement Project Phase 2 is replacement of existing undersized 4-inch and 2-inch line with 10-inch. The East Myton Improvements Project Phase 2 would pick up where Phase 1 ended, continuing along 8000 South to 1000 West, and south along 1000 West to 8200 South. The line replacement then would continue to the east for approximately 9,500 linear feet. This project probable cost is estimated at \$3,239,450. See Appendix A, Map 5 showing this proposed improvement and Appendix B.2 for a cost estimate for this project.

9.1.3. EAST MYTON IMPROVEMENTS PHASE 3

The East Myton Improvement Project Phase 3 is replacement of existing undersized 4-inch line with 10-inch and 8-inch line. The East Myton Improvements Project Phase 3 would pick up where Phase 2 ended, continuing along 8200 South to the east end of the existing line, which is approximately 21,800 feet. This project probable cost is estimated at \$3,496,190. See Appendix A, Map 6 showing this proposed improvement and Appendix B.3 for a cost estimate for this project.

9.1.4. PLEASANT VALLEY IMPROVEMENTS PHASE 1

The Pleasant Valley Improvement Project Phase 1 is replacement of existing undersized 6-inch, 4-inch, and 2-inch line with 8-inch and 10-inch line. Additionally, this project would provide a new loop from the Pleasant Valley area to the East Myton area. The project would begin at the intersection of 8000 South and 2500 West, tying into the East Myton Improvements Phase 1 project, where it would head west to 3000 West and then south along 3000 West for approximately 22,050 linear feet to the intersection of 3000 West and 11970 South. The existing 2-inch PRV would be replaced with a new 6-inch PRV. This project probable cost is estimated at \$4,262,800. See Appendix A, Map 7 showing this proposed improvement and Appendix B.4 for a cost estimate for this project.

9.1.5. PLEASANT VALLEY IMPROVEMENTS PHASE 2

The Pleasant Valley Improvement Project Phase 2 is replacement of existing undersized 4-inch and 2-inch line with 10-inch line. The project would begin at the end of Pleasant Valley Improvements Phase 1 at the intersection of 3000 West and 11970 South where it would head East along 11970 South to 500 West. At 500 West, the replacement would head south to 13535 South and then head west for approximately 2,640 linear feet to tie into the existing 8-inch line. This project probable cost is estimated at \$3,734,550. See Appendix A, Map 8 showing this proposed improvement and Appendix B.5 for a cost estimate for this project.

9.1.6. IOKA AREA WATER LINE REPLACEMENT

There are existing water lines in the Ioka area that are aging, approaching 50+ years, that will warrant replacement in the near future rather than continued repair. The older areas that were identified include along 8000 West from the pump, south to Ioka Lane, and then east for approximately 23,000 linear feet. The existing line size is 8-inch; however, fire flow is not available in the area. To provide fire flow, it is recommended the line is upsized to 10-inch. Additionally, it is recommended to ensure the lines fire hydrants are located on are upsized from the existing 4-inch and 6-inch lines to a minimum of 8-inch in areas where those lines serve connections in addition to the fire hydrant. This project probable cost is estimated at \$5,537,800. See Appendix A, Map 9 showing this proposed improvement and Appendix B.6 for a cost estimate for this project.

9.1.7. IOKA LANE TO 4000 SOUTH IMPROVEMENTS

The Ioka Lane to 4000 South Improvements Project consists of installation of new 10-inch line to connect the far west end of Ioka Lane to the existing water line on 4000 South near the intersection of 7000 West. Currently, the Upalco Tank only serves the Upalco area of the JWID system. This project would provide a loop in the Ioka area, allowing water to be delivered from the Upalco Tank to other parts of the system, and not just the Upalco area. This line would also be beneficial if additional source in the form of a well is secured above or near Sand Wash (see Section 9.1.1.10). This project probable cost is estimated at \$4,774,000. See Appendix A, Map 10 showing this proposed improvement and Appendix B.7 for a cost estimate for this project.

9.1.8. PLEASANT VALLEY TANK IMPROVEMENTS

The Pleasant Valley Tank Improvement Project consists of new water line from the intersection of Pariette Road and 12750 South to the intersection of 13500 South and 3000 West along 12750 South and 3000 West, which reroutes the existing water line to eliminate the high point at the intersection of 13500 South and Pariette Road. This would allow the PRV to be adjusted to better match the elevation of the Pleasant Valley Tank, so the tank could be operational while still maintaining the minimum required pressures within the system. This project probable cost is estimated at \$1,669,000. See Appendix A, Map 13 showing this proposed improvement and Appendix B.8 for a cost estimate for this project.

9.1.9. RIGHT-OF-WAY / EASEMENT ACQUISITION

JWID has approximately 16.35 miles of pipeline on tribal property without written rights-of-way or easements. Most of this line has been in the ground for multiple years, and it has been continually maintained, which would most likely give them prescriptive easement. However, it is recommended that rights-of-way are acquired for all pipelines on tribal property. These recorded rights-of-way will ensure that access to the pipelines, whether for maintenance or replacement, cannot be stopped or delayed. The probable cost for obtaining these rights-of-way is estimated at \$72,000.

9.1.10. LAMB TRUCKING LOOP

This project would help deliver water from Bridgeland Tank to the Cobble Hollow area while also improving flow along 6250 South by Lamb's Trucking. The project would be installation of new 8-inch line beginning on the east end of 6250 South heading east to 500 North, 5750 South, and finally north on 2000 West, connecting to existing line at the intersection of 2000 West and 5000 South. This project's probable cost is estimated at \$1,611,700. See Appendix A, Map 11 showing this proposed improvement and Appendix B.9 for a cost estimate for this project.

9.1.11. SECURE ADDITIONAL SOURCE WATER

This project would be to determine a new source of water where JWID could serve a large portion of their system from their own well. Currently JWID relies primarily on contracts for water sources, and having their own source would provide a buffer in case one of the contracts could not deliver water. It is recommended that the additional source be in a location, such as above or near Sand Wash, that would allow the source to feed a large portion of the system without additional means such as pumping. For the probable cost, it was assumed that 2 miles of pipe would be included with the project in order to connect to the existing system. This project probable cost is estimated at \$3,955,900. See Appendix B.10 for a cost estimate for this project.

9.1.12. SCADA IMPROVEMENTS

This project would include continued installation of Supervisory Control and Data Acquisition (SCADA) improvements. SCADA provides real-time information for the system with many benefits. SCADA installation can include tank levels, pump monitoring, well monitoring, pressures at PRVs, pressures at strategic locations in the system, and meter monitoring. Knowing this information in real-time allows water to be better managed and delivered more efficiently. Additionally, it is recommended that all current SCADA be tied together with new installation, having one host platform for all SCADA throughout the system. This allows everything to be easily accessed and managed, and this would reduce costs of monthly subscriptions required for each host platform. SCADA improvements can vary widely in cost based off of chosen services, so it is recommended that JWID seek proposals from SCADA companies for accurate probable costs.

9.1.13. FIRE HYDRANT REPLACEMENT

There are multiple fire hydrants in the system that were either not operational or in disrepair. It is recommended that aged and deteriorating fire hydrants be replaced. A plan needs to be implemented to replace existing fire hydrants that require replacement, and then it is recommended that a periodic check of the system's fire hydrants is performed to ensure all are in working condition. If replacement is required, it is recommended to replace it when discovered. In recent projects, the price for installation of a fire hydrant was approximately \$12,000, so this would be a budgetary number to use when planning for replacement of fire hydrants.

9.1.14. UNDERSIZED LINE REPLACEMENT

As mentioned in Section 8.5 of this report, there is a large quantity of undersized line throughout the JWID system. Because of these smaller lines, fire flow is not available in some parts of the system. A lot of these water lines will be replaced with other capital improvement projects mentioned previously. The water lines not included in other capital improvement projects are listed in Table 9-1.

It is recommended the minimum size of line should be 8 inches if the system is converted to a loop or 10 inches if it remains a dead-end line. It is recommended any loops extending longer than 1-mile be enlarged to a pipe diameter of 10-inch. The probable cost of each stretch of line was assumed to include services, valves, fire hydrants, other appurtenances, engineering, and contingency.

Table 9-1. Undersized Line Replacement Summary

Zone	Improvement Description
1	Upsize pipe along 12000 W between Upalco Tank and Center Street from 8-inch to 12-inch. Upsize pipe along 2000 W and SR 87 between Center Street and 11000 W from 8-inch to 10-inch.
2	Upsize pipe along 10550 S between Sand Wash Rd and Upper Pleasant Valley Canal from 8-inch to 10-inch Connect new 10-inch line to pipe east of Upper Pleasant Valley Canal
2/7	Upsize pipe along Pole Line Rd between 1000 W and 2750 W from 6-inch and 8-inch to 10-inch
4	Upsize pipe along Cobble Hollow Dr between Highway 40 and 1300 W from 8-inch to 10-inch Upsize pipe along Mortensen Ln between Highway 40 and 1000 W from 8-inch to 10-inch
4/7	Upsize pipe along Highway 40 between Mortensen Ln and 6250 S from 6-inch to 10-inch
5/7	Upsize pipe along Sand Wash Rd between 10400 S and 9000 S from 8-inch to 10-inch Upsize pipe along 9000 S between Sand Wash Rd and 4500 W from 4-inch and 6-inch to 8-inch
7	Upsize pipe along 5500 W between PRV1015 and 7500 S from 8-inch to 10-inch Upsize pipe along 7000 W and 7625 S between 5500 W and 6800 W from 8-inch to 10-inch Connect new 10-inch line to West Myton along 7500 S between 5500 W and Myton Rd
7	Upsize pipe between PRV1010 and 1500 E from 6-inch to 8-inch Upsize pipe along 1500 E between 3500 S and 3750 S from 6-inch to 8-inch
9	Upsize pipe along Hilltop Rd between 2800 S and the Independence Tank from 4-inch to 10-inch

9.1.15. NEW PLEASANT VALLEY TANK

The board proposed constructing a new tank in the Pleasant Valley area at the coordinates 40.135091°N, 110.118530°W. This tank will help serve the required fire flow in the Pleasant Valley area and some surrounding pressure zones, eliminating the need to upsize many miles of line within the system to try and eliminate head loss experienced within smaller lines that stretch a long distance in order to obtain fire flow.

Currently, the JWID system has sufficient storage for the study period, so the size of the tank is not dictated by a storage deficit. However, the size of the tank should be chosen to provide the required fire flow for the area, which is 1,500 gpm for 2 hours, which equates to a minimum of 180,000 gallons. A 500,000 gallon tank was chosen during the preparation of the master plan, which provides additional fire flow storage as well as emergency storage if and when this is calculated into the storage requirements for the system.

Two lines run parallel to serve the Pleasant Valley area from the Bridgeland Tank. One line is an 8-inch line the entire distance, and the other line is 8-inch for 1.2 miles and then 10-inch for the remainder of the way. The existing 8-inch line could serve to fill the new tank. The other line would need to be upsized to 10-inch for the entire distance and then could then be dedicated to the Knoll's Pit connection to serve the requested oil field flows.

The distribution line from the tank would be a 12-inch line that ties into the existing line on Sand Wash Road near the Speedy Goat in order to serve multiple pressure zones.

These upgrades and installations, along with turning off some valves, would allow the 10-inch line to serve the Knoll's Pit connection at 1,000 gpm. Additionally, the 8-inch line would deliver water to the proposed tank at a rate of 200 gpm, which is greater than the ADD flow out of the proposed tank. Connecting the 12-inch line above PRV-1018 would allow the tank to serve multiple pressure zones in addition to Pleasant Valley.

This project's probable cost is estimated at \$4,165,700. See Appendix A, Map 14 showing this proposed improvement and Appendix B.11 for a cost estimate for this project.

9.1.16. WATER CONSERVATION

As noted previously in the new DDW calculation requirements, all the LOS thresholds for the various capacity requirements are based on actual water usage. Water conservation can significantly reduce capacity requirements. Water conservation is a great way to reduce the cost of new infrastructure and to capitalize on existing facilities.

It is recommended that JWID develop a Drought and Water Shortage Policy to guide actions during periods of drought, service interruptions, or other emergencies. The policy would prioritize water conservation, with a focus on maintaining drinking water and fire protection services. A key element of a successful and sustainable policy will be keeping customers informed about the status of the shortage.

9.2. CAPITAL IMPROVEMENT PRIORITY LIST

The capital improvements were prioritized as High, Moderate, and Low to give JWID an outline on which projects to complete first. High priority projects are projects that need to be completed to bring JWID culinary water system into compliance with DDW requirements at this time. High priority projects typically have a time frame for completion in 0-5 years.

Moderate priority projects generally consist of upgrades to the system in order to meet projected demands through the study period. These projects typically have a time frame for completion of 5-10 years. Low priority projects are projects that when completed would make the system more efficient; however, they do not affect the health, safety, or required level of service the system provides. The following table lists each of the suggested improvements along with their assigned priority level.

(Remainder of page intentionally left blank.)

Table 9.2 Capital Improvement Priority List

Proposed Improvement Project	Priority	JWID Priority Number
East Myton Improvements Phase 1	High	2
East Myton Improvements Phase 2	High	3
East Myton Improvements Phase 3	High	5
Pleasant Valley Improvements Phase 1	High	6
Pleasant Valley Improvements Phase 2	High	7
Ioka Water Line Replacement	High	1
Ioka Lane to 4000 S Improvements	High	4
Pleasant Valley Tank Improvements	High	8
Right-of-Way / Easement Acquisition	Moderate	9
Lamb Trucking Loop	Moderate	10
Secure Additional Source Water	Low	14
SCADA Improvements	Low	15
Fire Hydrant Replacement	Moderate	13
Undersized Line Replacement	Moderate	11
New Pleasant Valley Tank	Moderate	12

10. FUNDING SOURCES AVAILABLE

Several funding sources are available to Johnson Water Improvement District to help fund water system improvements and other public infrastructure/service projects. Interest rates are given based on 2025 data and recently funded projects.

10.1. FUNDING FINDER

Jones & DeMille Engineering developed the Funding Finder to serve as a type of online 'catalog' of options for local government leaders who are looking for funding support for capital projects. This tool helps local communities locate, analyze, and apply for grants and funding for infrastructure projects, including culinary water projects. It serves as a specialized, searchable database to find eligible public funding sources. The Funding Finder can be located here: <https://funding.jonesanddemille.com/>.

10.2. UTAH DIVISION OF DRINKING WATER

The Utah Division of Drinking Water offers low interest loans from the Federal SRF and the SRF. These funds are available to all political entities of the state. The typical interest rate ranges between 1.5 to 4% with a 20-year term.

- The Federal SRF is provided to the states by the EPA. These funds are federal dollars and require compliance with the Davis Bacon Wage Act, the American Iron and Steel Act (Buy America), and the other federal programs.
- The SRF is administered by the state and offers low interest loans (2 to 4%) and grants. Typically, only about 5% of the SRF funds are awarded as grants.

- Most systems that have a Median Adjust Gross Income (MAGI) that is below the State of Utah's average MAGI qualify for funding that is a mix of grant and low interest loan.

10.3. PERMANENT COMMUNITY IMPACT FUND BOARD (CIB)

The CIB is an entity of the state that provides loans and grants to cities. The typical conditions of a loan are a 20 to 30-year term at the going interest rate.

10.4. UTAH BOARD OF WATER RESOURCES

The Utah Board of Water Resources offers low interest loans for projects that conserve, protect, or more efficiently use present water supplies, develop new water, or provide flood control. This option is likely a less favorable funding option for culinary water infrastructure improvements. Typical loan terms are 20 to 30 years at 2 to 4%.

10.5. USDA RURAL DEVELOPMENT

10.5.1. USDA EMERGENCY COMMUNITY WATER ASSISTANCE GRANT (ECWAG)

The ECWAG grant can be applied for to aid communities that have experienced a significant decline in water quantity or quality from their sources due to a natural disaster or other emergency event, such as: drought, flood, fire, earthquake, disease outbreak, chemical or leakage spill. The majority of the funding, over 70%, is designated for work at the source, while the remaining portion, approximately 30%, can be allocated to piping. Typical funding limits for projects are capped at \$1,000,000. This funding source requires a Preliminary Engineering Report and an Environmental Report be prepared and submitted with the application.

10.5.2. USDA COMMUNITY FACILITIES DIRECT LOAN & GRANT

This program provides affordable funding to develop essential community facilities in rural areas. These facilities provide an essential service to the local community for the orderly development of the community in a primary rural area populated with 20,000 residents or less.

Funds can be used to purchase, construct, and/or improve essential community facilities, purchase equipment, and pay related project expenses.

10.6. JOHNSON WATER IMPROVEMENT DISTRICT FUNDING (SELF-FUND)

This option is for JWID to self-fund individual projects. Although self-funding is the least expensive money over the life of the project, this option is likely not financially possible for all public water systems.

The most likely source to leverage the most favorable and obtainable funding terms for the JWID culinary water infrastructure improvements is the CIB.

11. NEXT STEPS

To implement the recommendations of this Culinary Water Master Plan, JWID should proceed with a phased and prioritized approach that addresses the most critical system deficiencies while maintaining financial flexibility.

First, JWID should formally adopt this Master Plan as the guiding document for water system planning, capital budgeting, and regulatory coordination. Adoption will support future funding applications and provide consistency in decision-making.

Second, the District should advance high-priority distribution system improvements—particularly those addressing fire flow and pressure deficiencies in Zones 15, 10, 7, and other identified priority areas—into preliminary engineering and design. These projects should focus on pipe replacement, upsizing, looping, and pressure control enhancements.

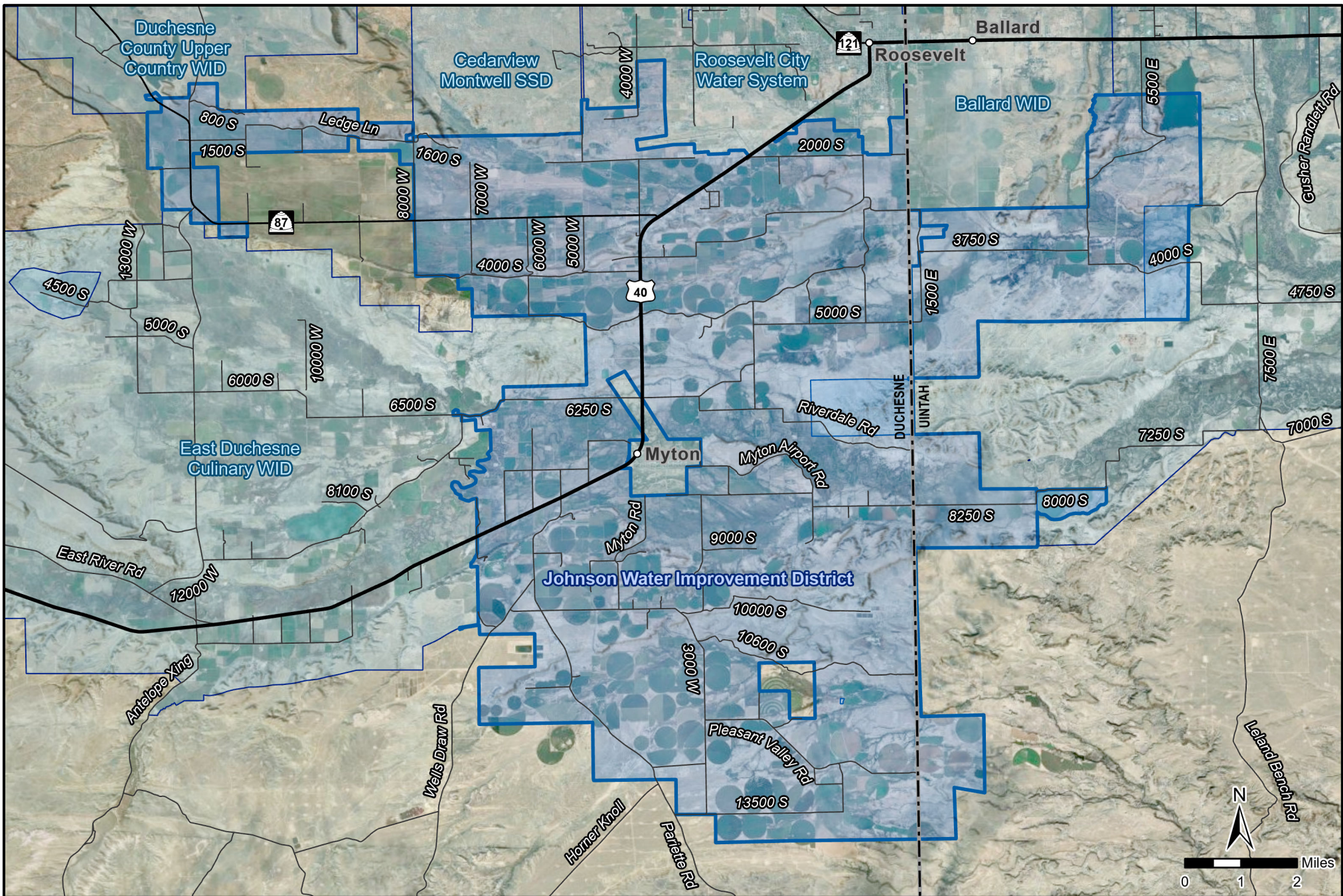
Third, JWID should refine project scopes and cost estimates for near-term capital improvements. Final pipe sizing, alignments, and pressure zone modifications should be confirmed through detailed design and field verification before construction.

Fourth, the District should pursue external funding opportunities to support phased implementation, including programs offered through the Permanent Community Impact Fund Board (CIB), Utah Division of Drinking Water, USDA Rural Development, and other applicable agencies.

Finally, JWID should continue to monitor system demands and operational conditions, particularly industrial and hydraulic fracturing water use. The calibrated hydraulic model should be updated as conditions change to ensure continued compliance and system reliability.

By following these steps, JWID can strategically address existing deficiencies, improve fire protection and pressure reliability, and support sustainable growth over the planning horizon.

DRAFT



Service Areas

- Johnson Water Improvement District
- Adjacent Districts



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**2025 Master Plan Update
District Boundary Overview**

Map Name: H:\2410-042\GIS\Projects\2410-042_Plan\2410-042_Plan.aprx - 1_JWID - Master Plan - District Boundary Overview 8.5x11L

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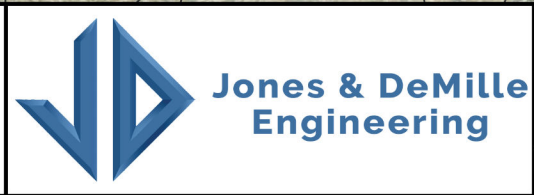
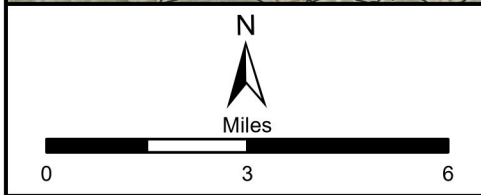
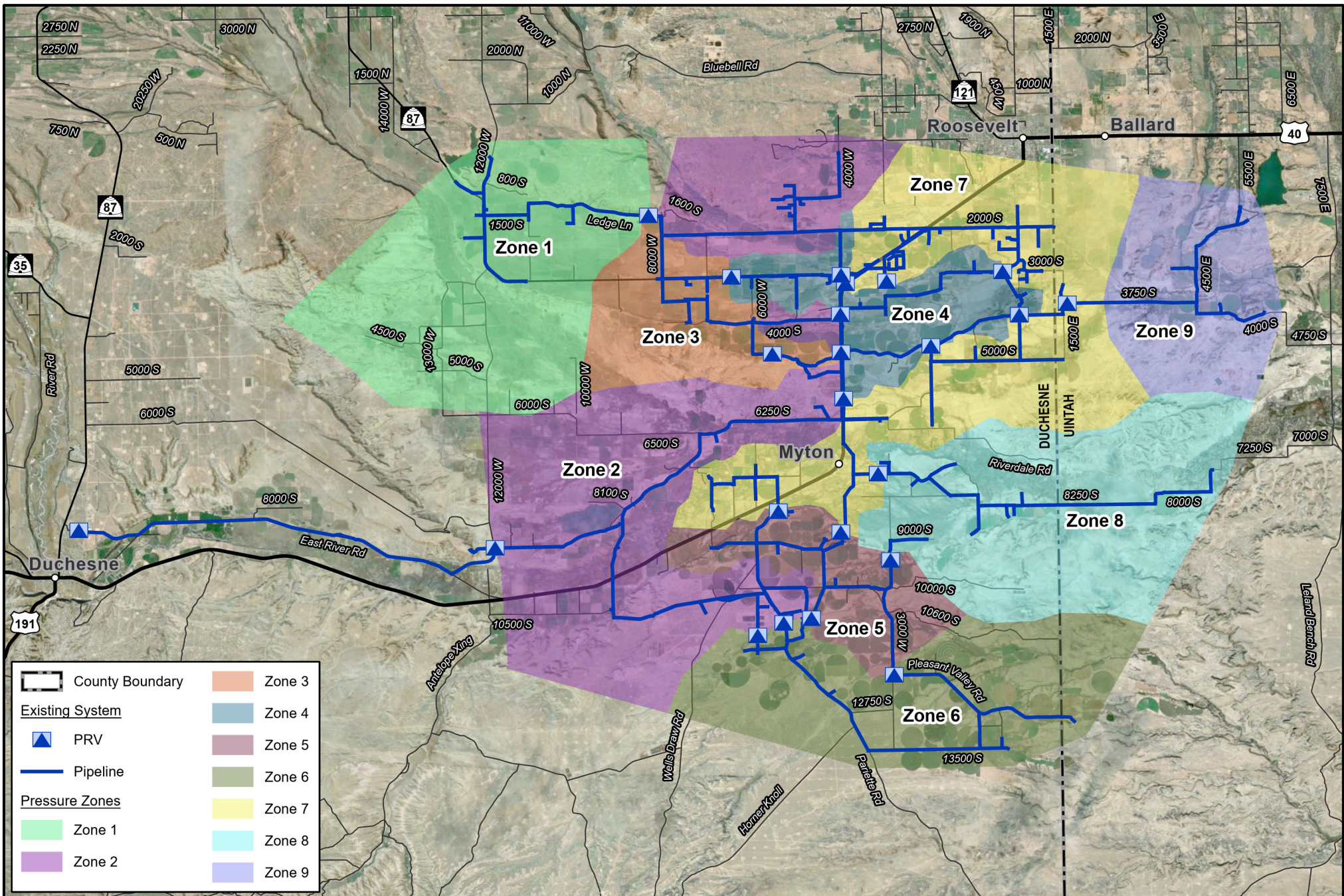
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Last Edit: 04/15/2026

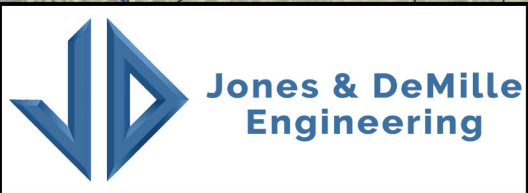
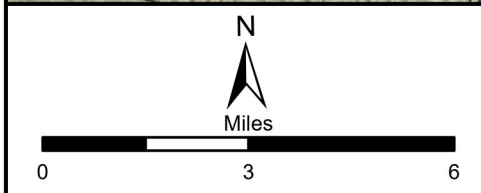
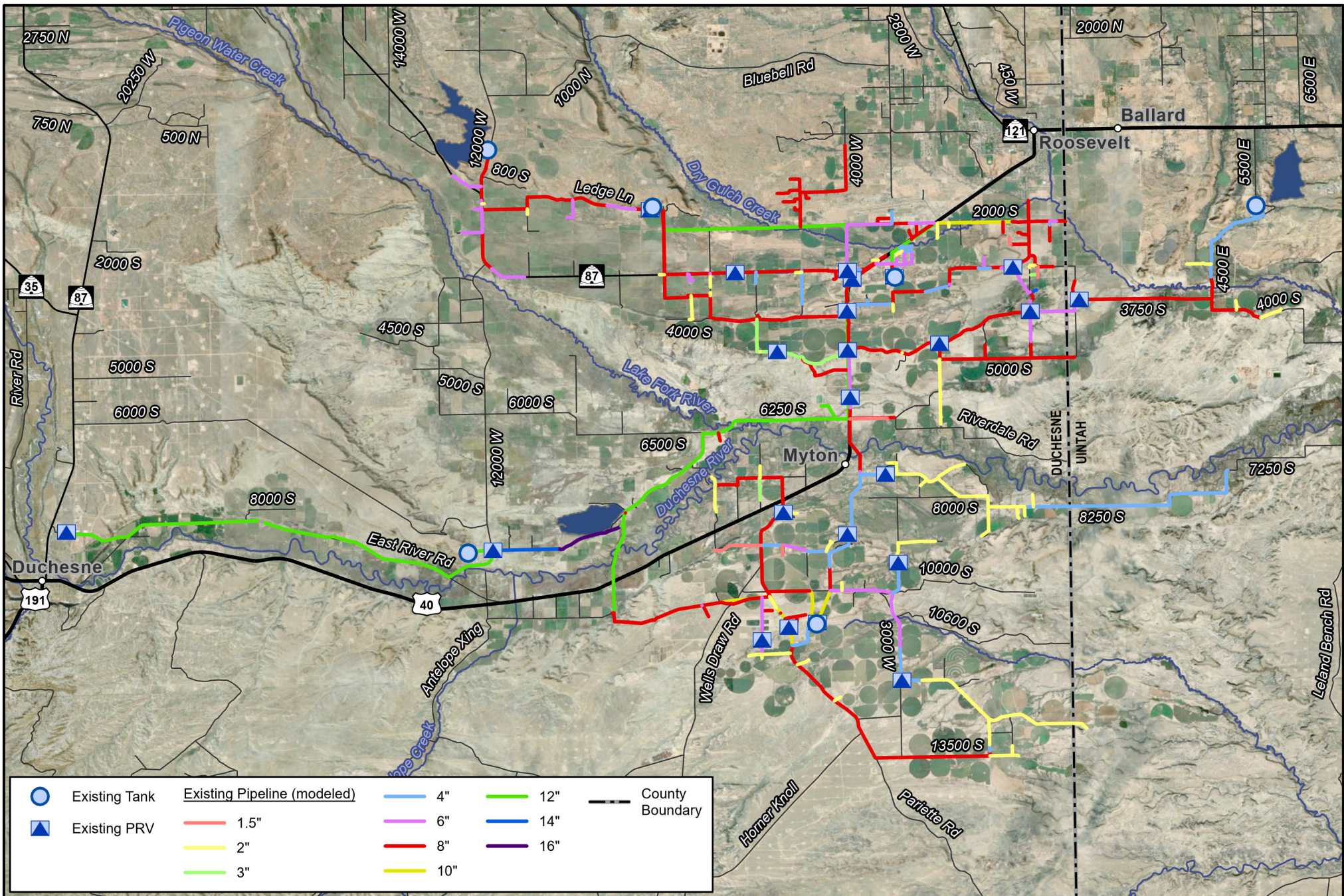
Duchesne County,
Utah

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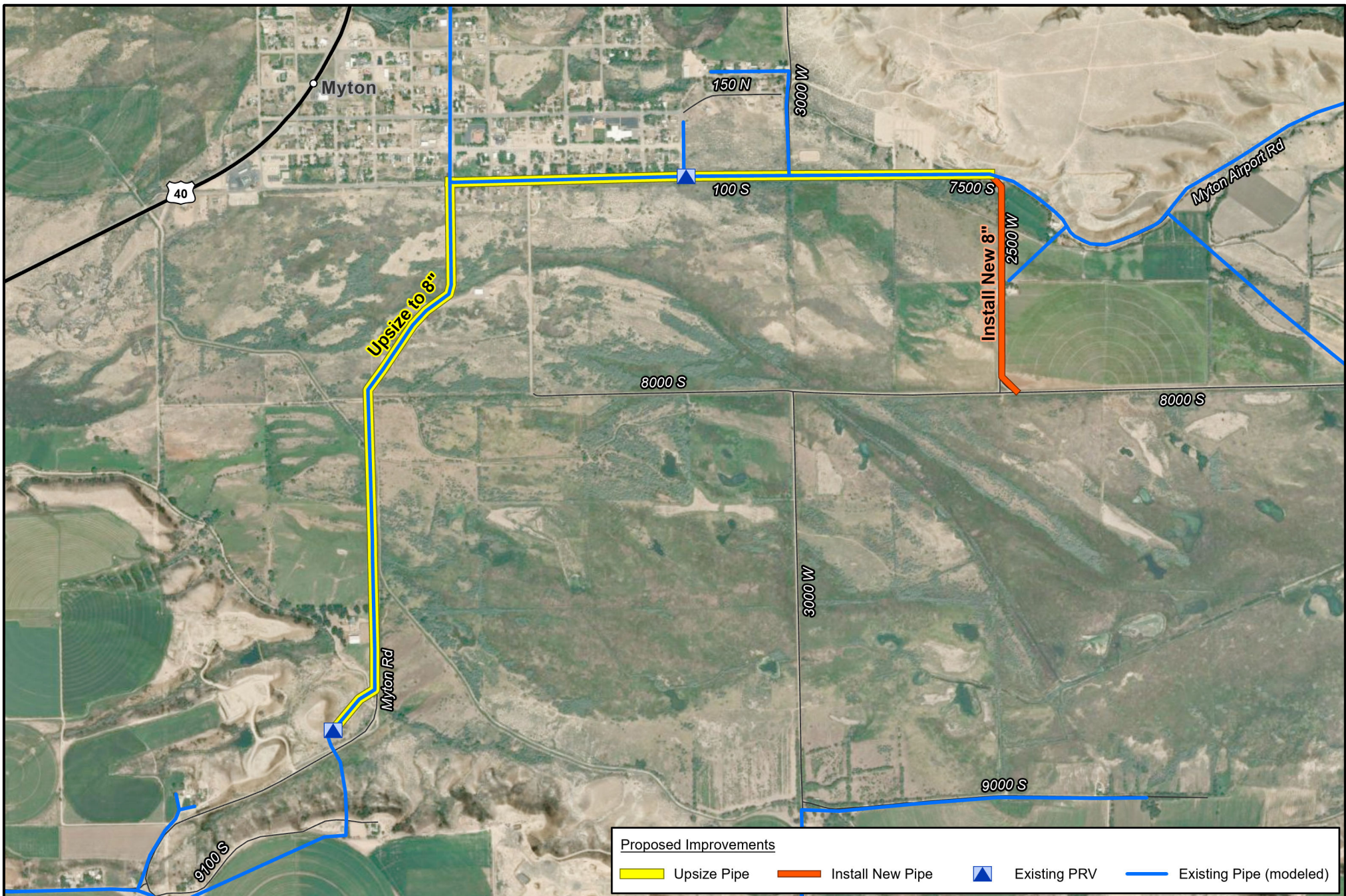
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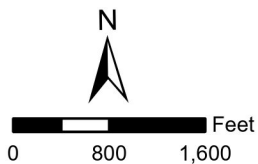
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Johnson Water Improvement District			Duchesne County, Utah
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Proposed Improvements			
—	Upsize Pipe	—	Install New Pipe
▲	Existing PRV	—	Existing Pipe (modeled)



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**2025 Master Plan Update
East Myton Improvements - Phase 1**

**Duchesne County,
Utah**

Scale: 1" = 1,600'

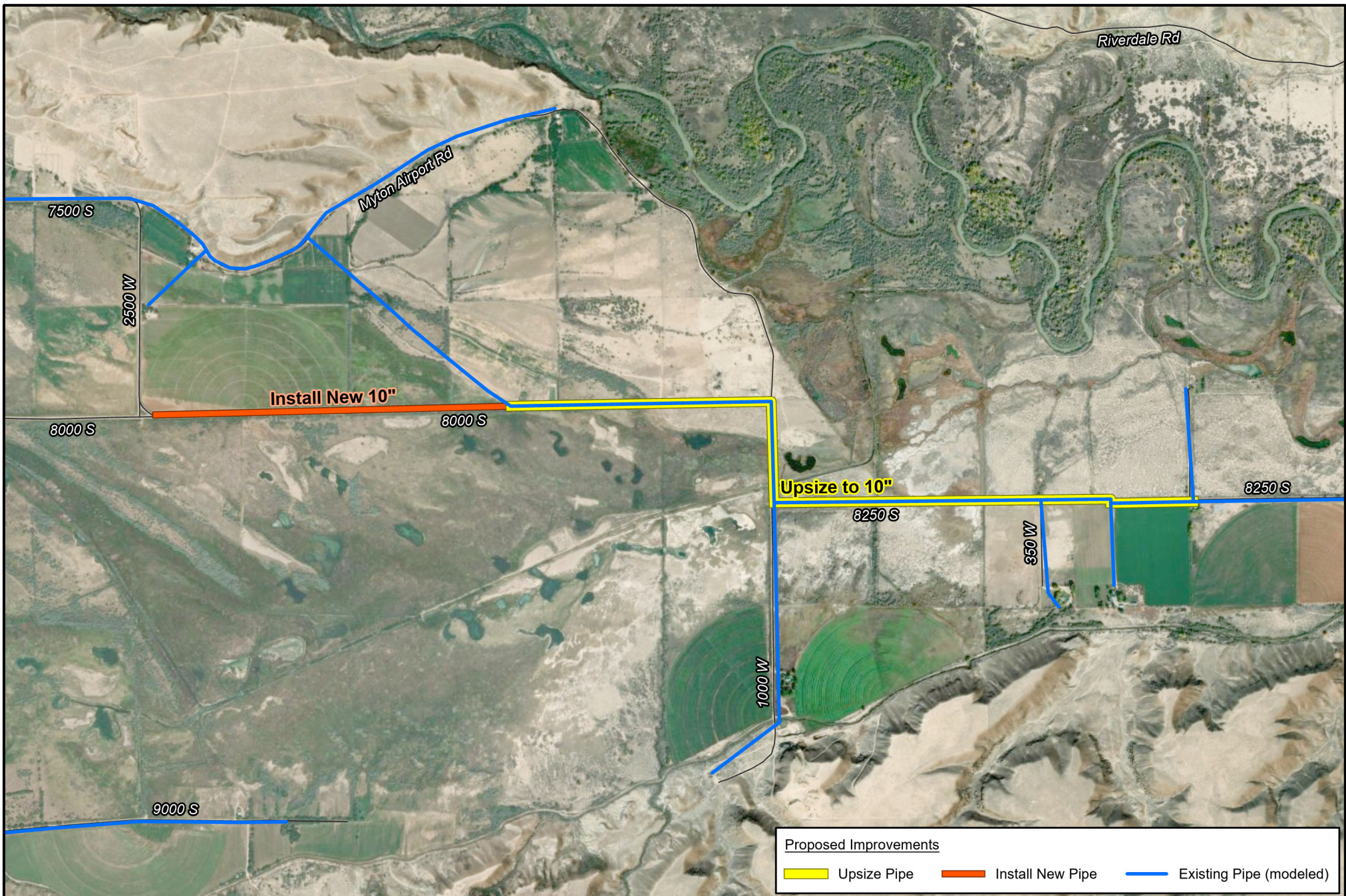
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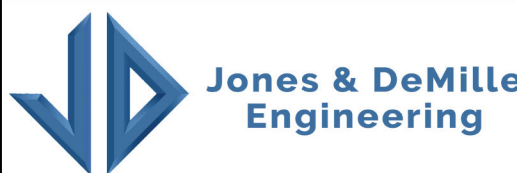
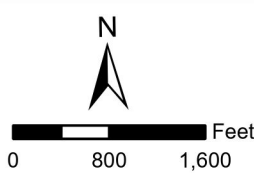
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Last Edit: 04/16/2026



Proposed Improvements

 Upsize Pipe	 Install New Pipe	 Existing Pipe (modeled)
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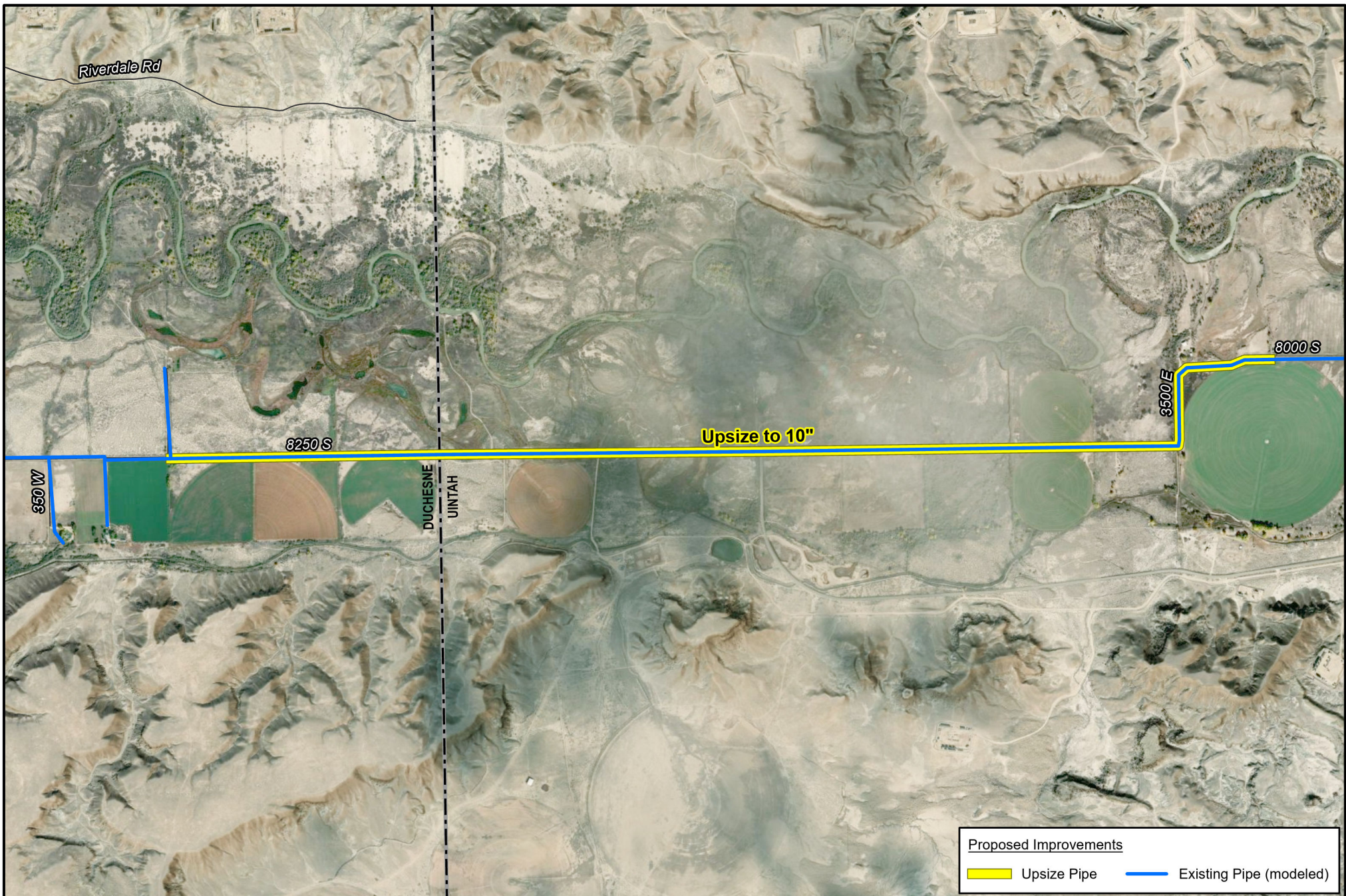


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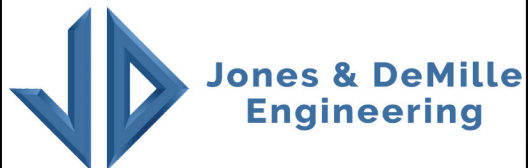
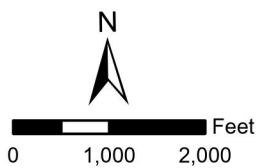
Duchesne County,
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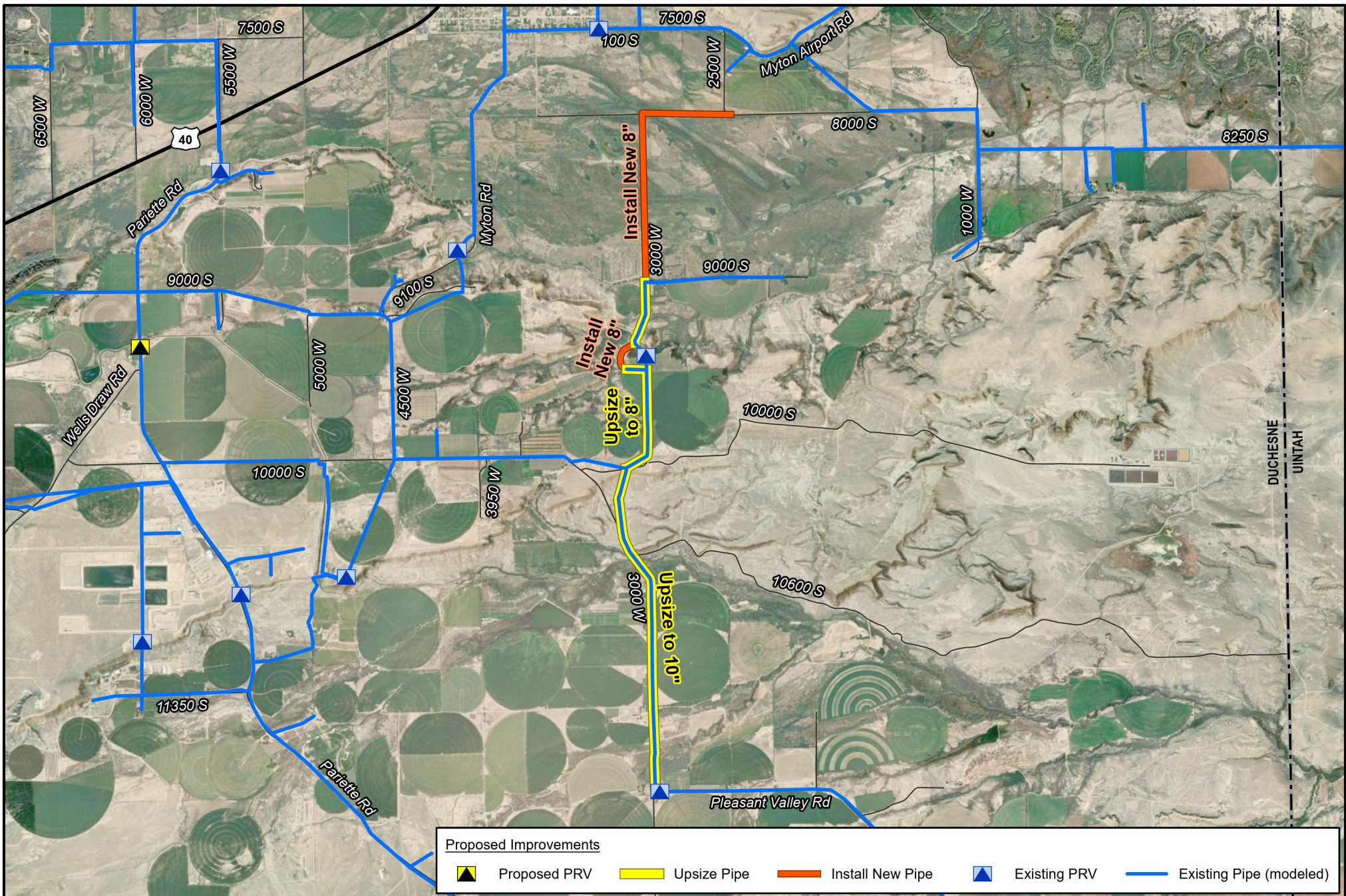


Proposed Improvements	
— Upsize Pipe	— Existing Pipe (modeled)



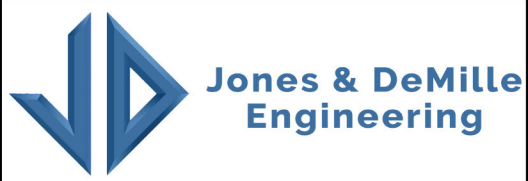
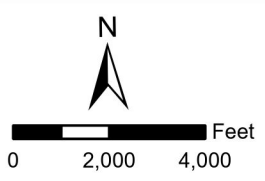
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Project Number: 2410-042	Drawn by: JEM 04-26	Last Edit: 04/16/2026

Duchesne County, Utah
Scale: 1" = 2,000'
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Proposed Improvements

- Proposed PRV
- Upsize Pipe
- Install New Pipe
- Existing PRV
- Existing Pipe (modeled)



Johnson Water Improvement District

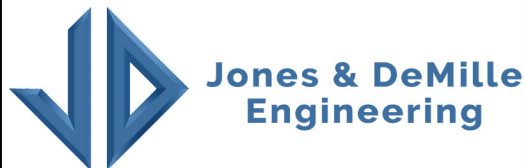
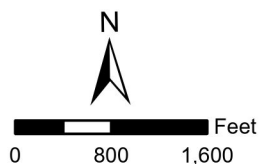
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Pleasant Valley Improvements - Phase 1**

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Duchesne County, Utah
Scale: 1" = 4,000'
7



Proposed Improvements			
 Upsize Pipe	 Install New Pipe	 Existing PRV	 Existing Pipe (modeled)



Johnson Water Improvement District

**Duchesne County,
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**2025 Master Plan Update
Pleasant Valley Improvements - Phase 2**

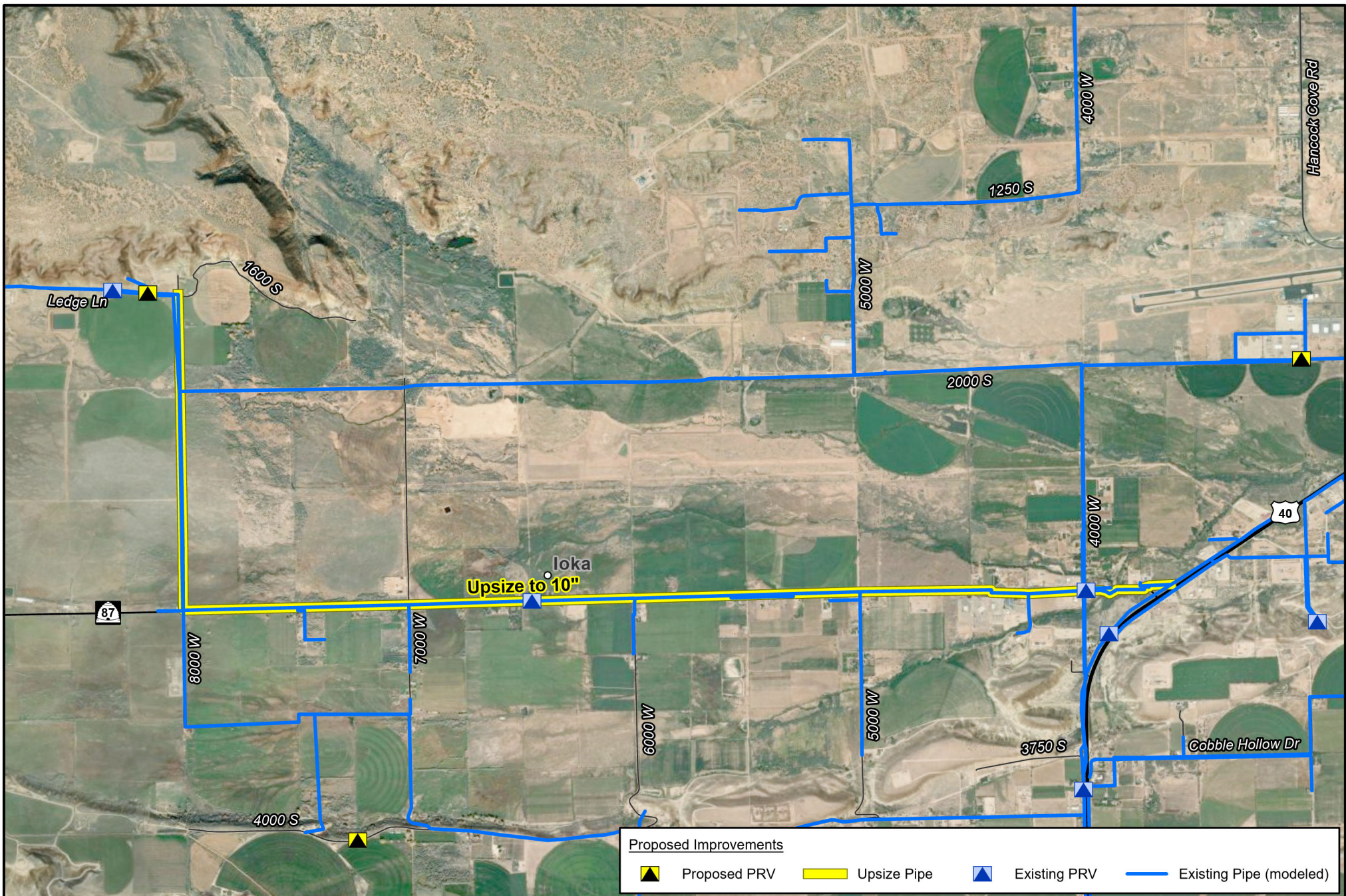
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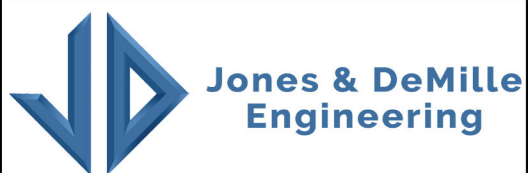
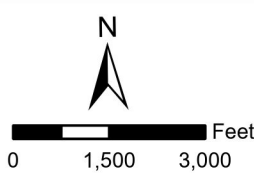
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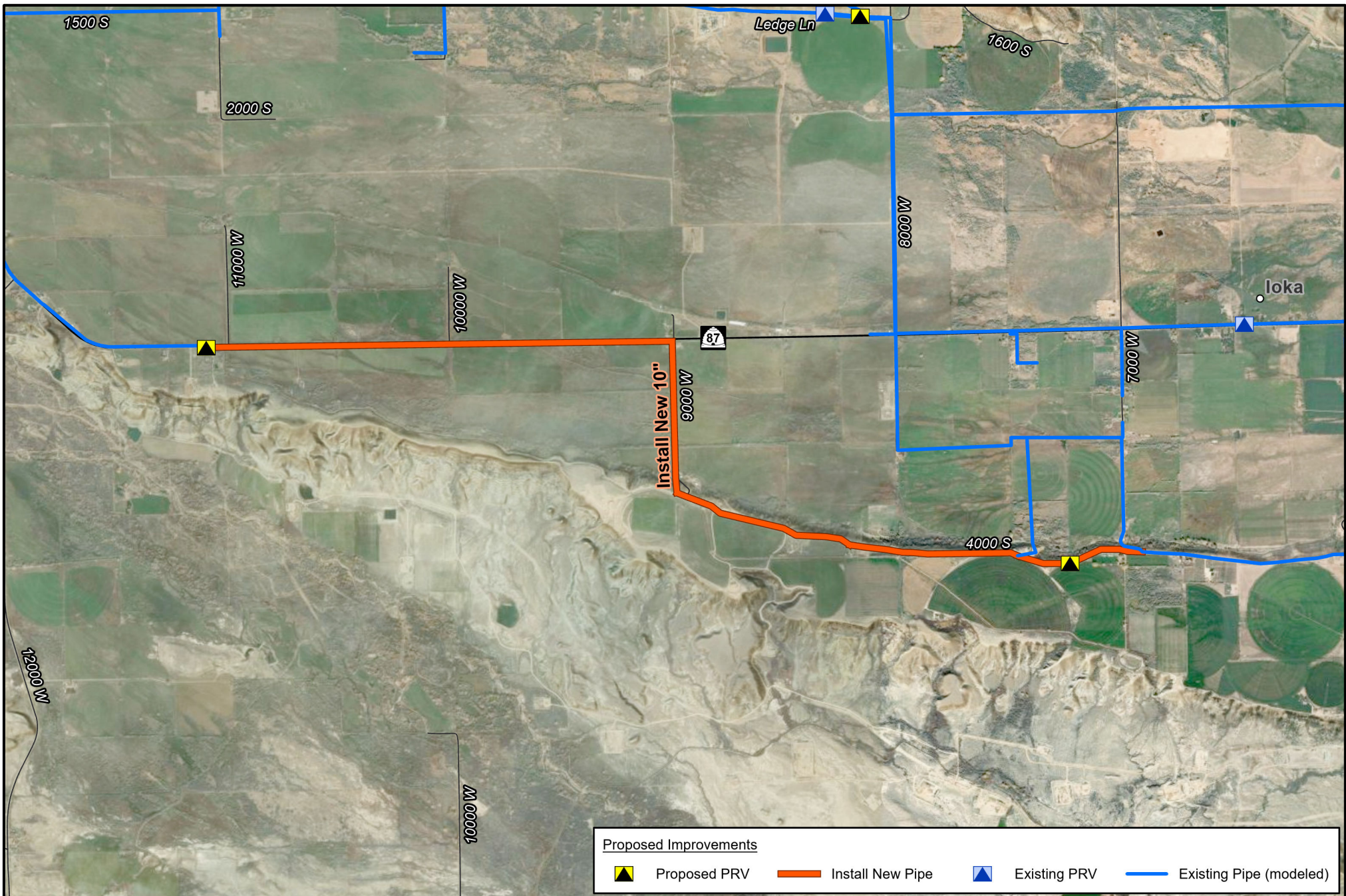


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	Existing PRV		Existing Pipe (modeled)

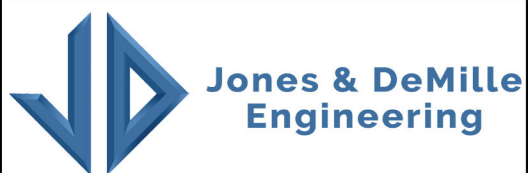
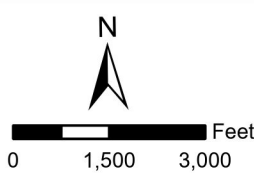


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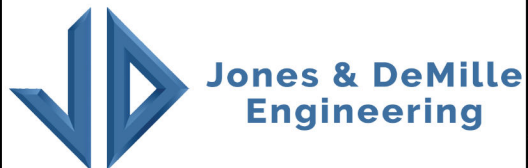
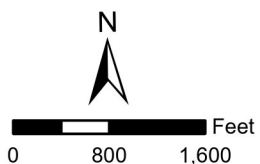
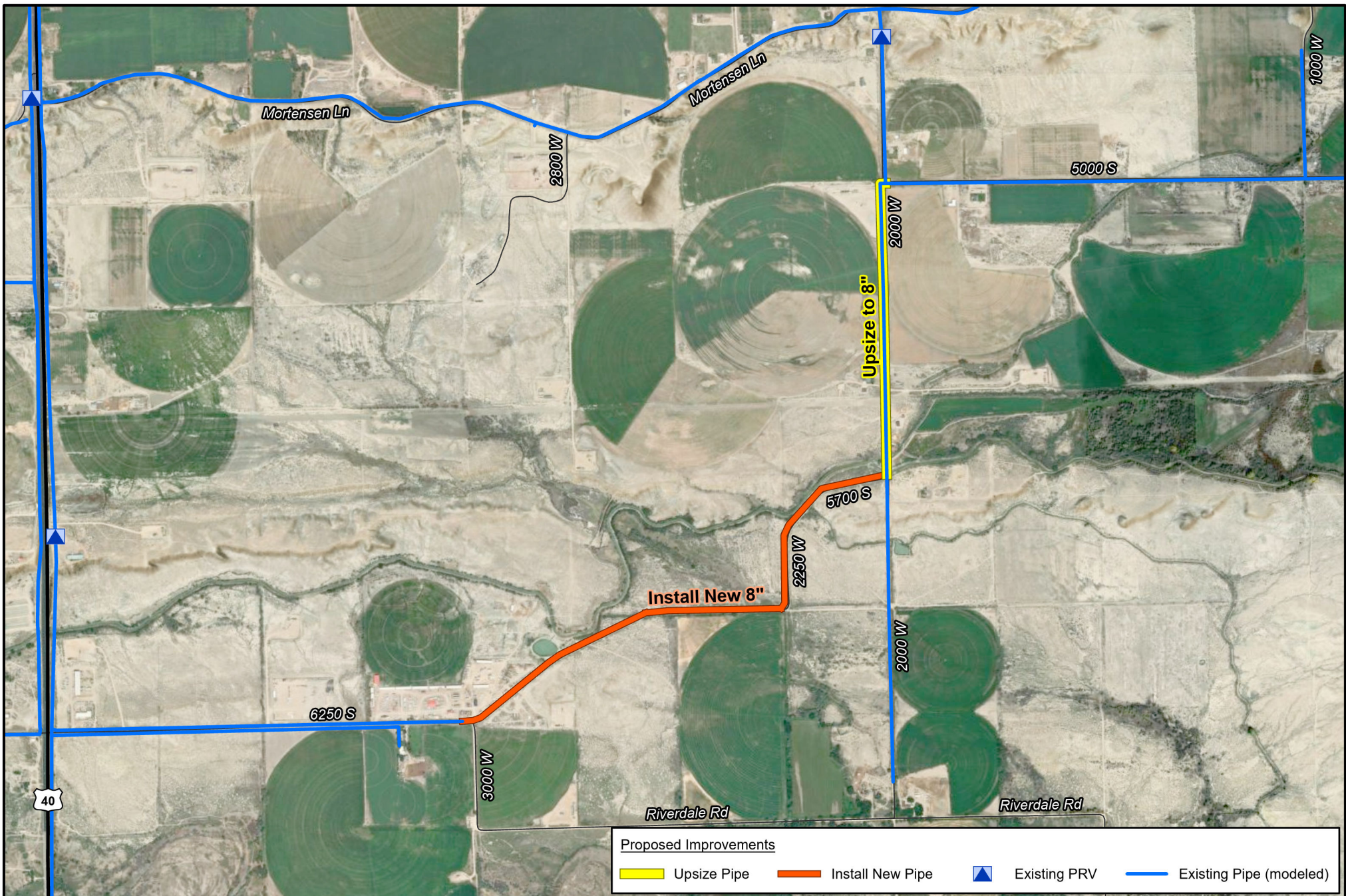
Duchesne County, Utah
Scale: 1" = 3,000'
9



Proposed Improvements			
	Proposed PRV		Install New Pipe
	Existing PRV		Existing Pipe (modeled)



Johnson Water Improvement District			Duchesne County, Utah
2025 Master Plan Update Ioka Lane to 4000 South Improvements			Scale: 1" = 3,000'
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Johnson Water Improvement District

Duchesne County,
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2025 Master Plan Update Lamb Trucking Loop

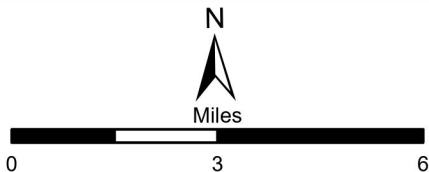
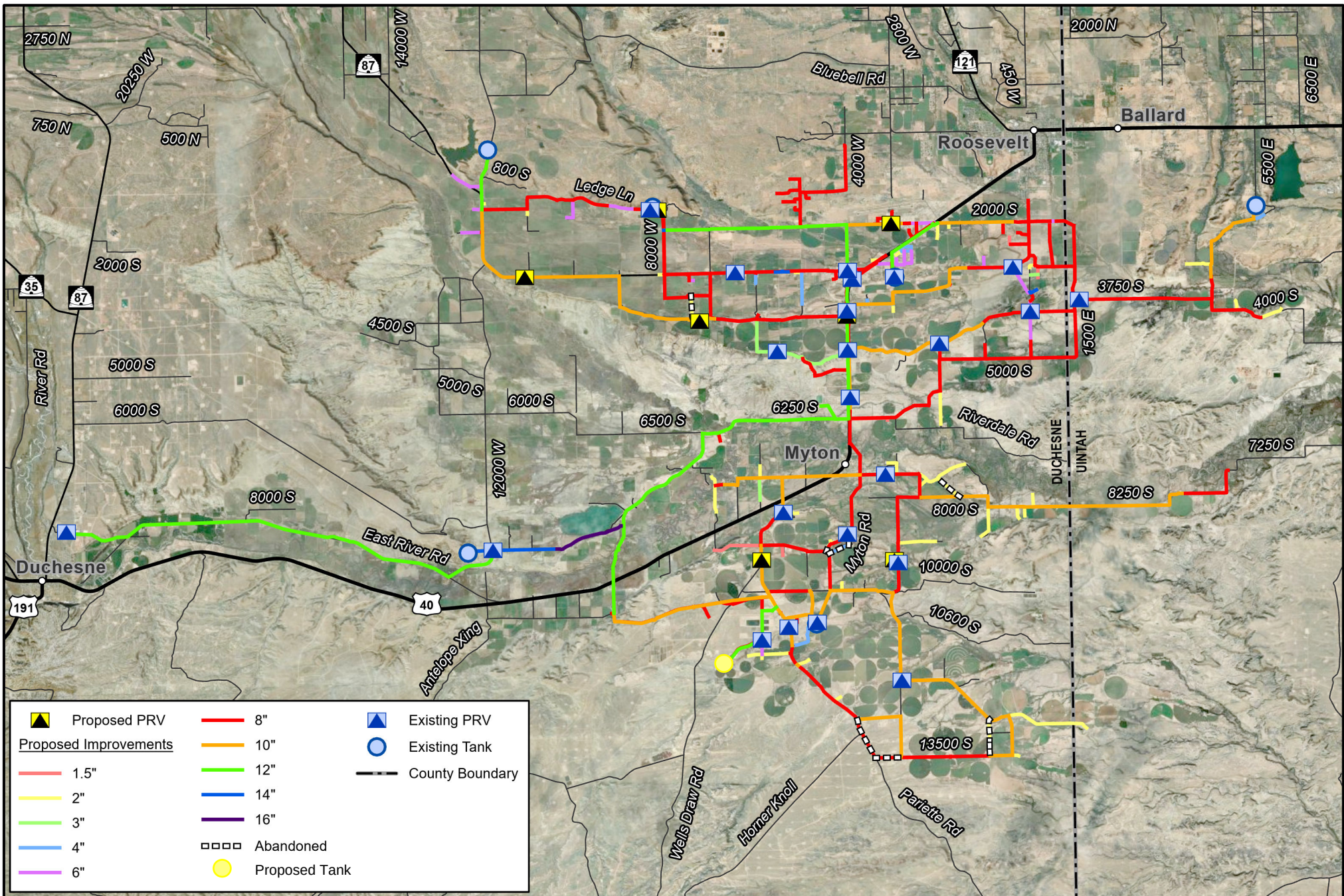
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Project Number: 2410-042

Drawn by: JEM 04-26

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2025 Master Plan Update Proposed System Overview

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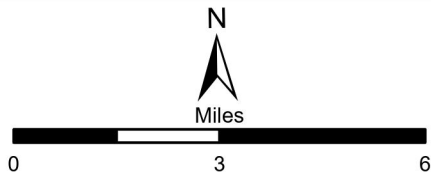
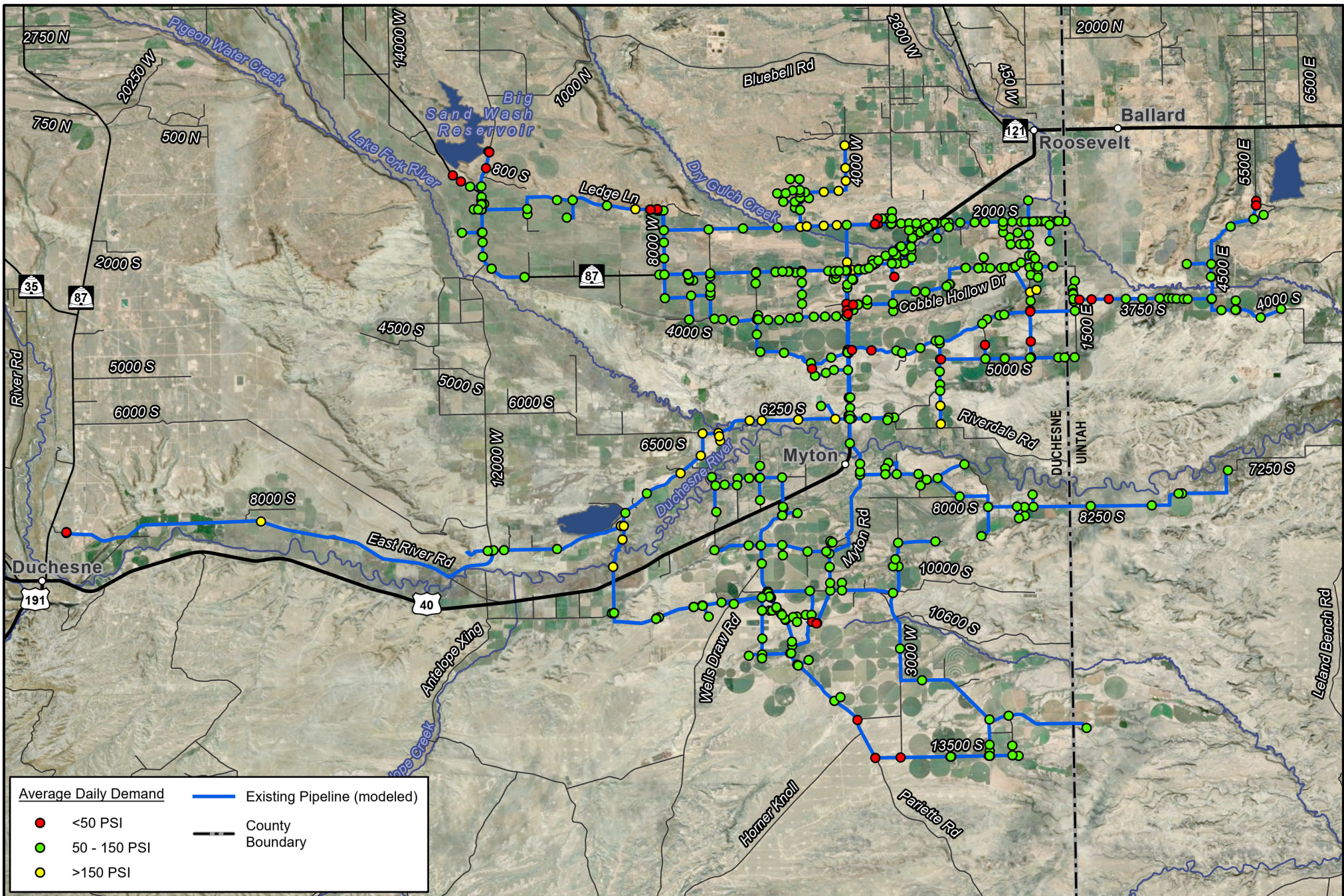
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Duchesne County,
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Scale: 1" = 3 miles

12



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Johnson Water Improvement District

**2025 Master Plan Update
Existing Scenario - Average Daily Demand (ADD)**

Map Name: H:\2410-042\GIS\Projects\2410-042_Plan\2410-042_Plan.aprx - 15-18_JWID - Master Plan - Existing Scenario - Pressure 8.5x11L

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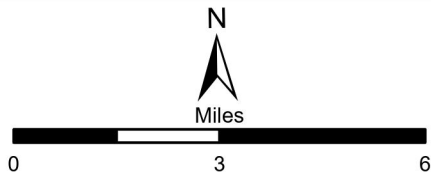
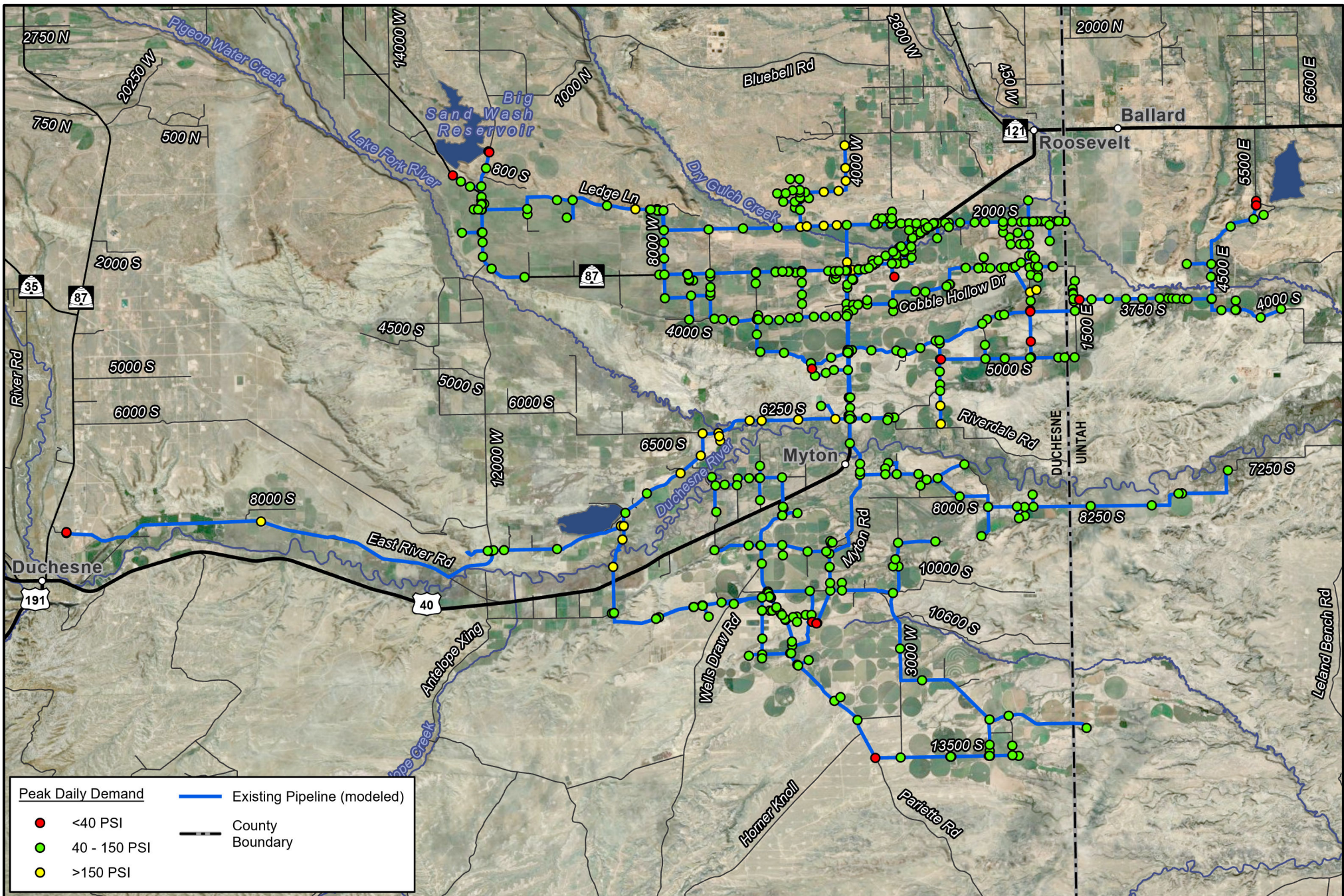
Drawn by: JEM 04-26

Last Edit: 04/16/2026

**Duchesne County,
Utah**

Scale: 1" = 3 miles

13



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Johnson Water Improvement District

**2025 Master Plan Update
Existing Scenario - Peak Daily Demand (PDD)**

Map Name: H:\2410-042\GIS\Projects\2410-042_Plan\2410-042_Plan.aprx - 15-18_JWID - Master Plan - Existing Scenario - Pressure 8.5x11L

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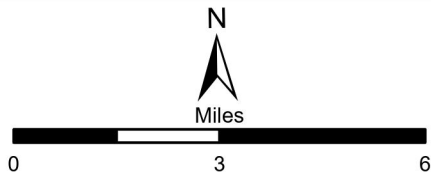
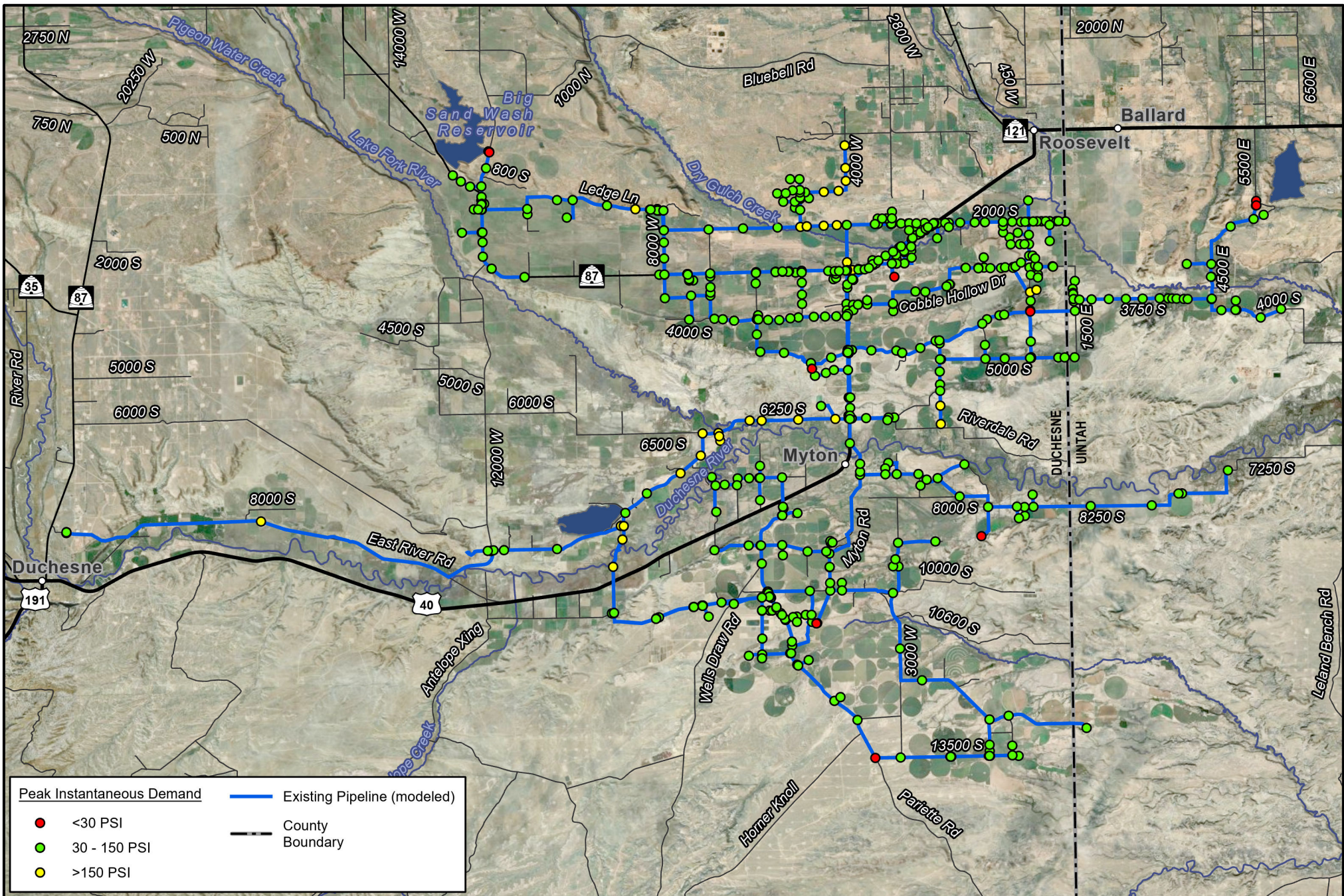
Drawn by: JEM 04-26

Last Edit: 04/16/2026

Duchesne County,
Utah

Scale: 1" = 3 miles

14



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Johnson Water Improvement District

**2025 Master Plan Update
Existing Scenario - Peak Instantaneous Demand (PDD)**

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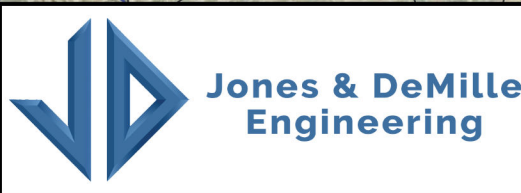
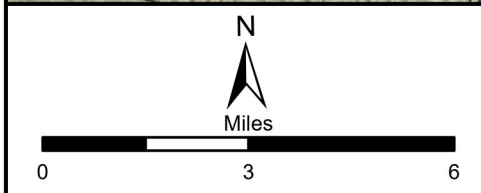
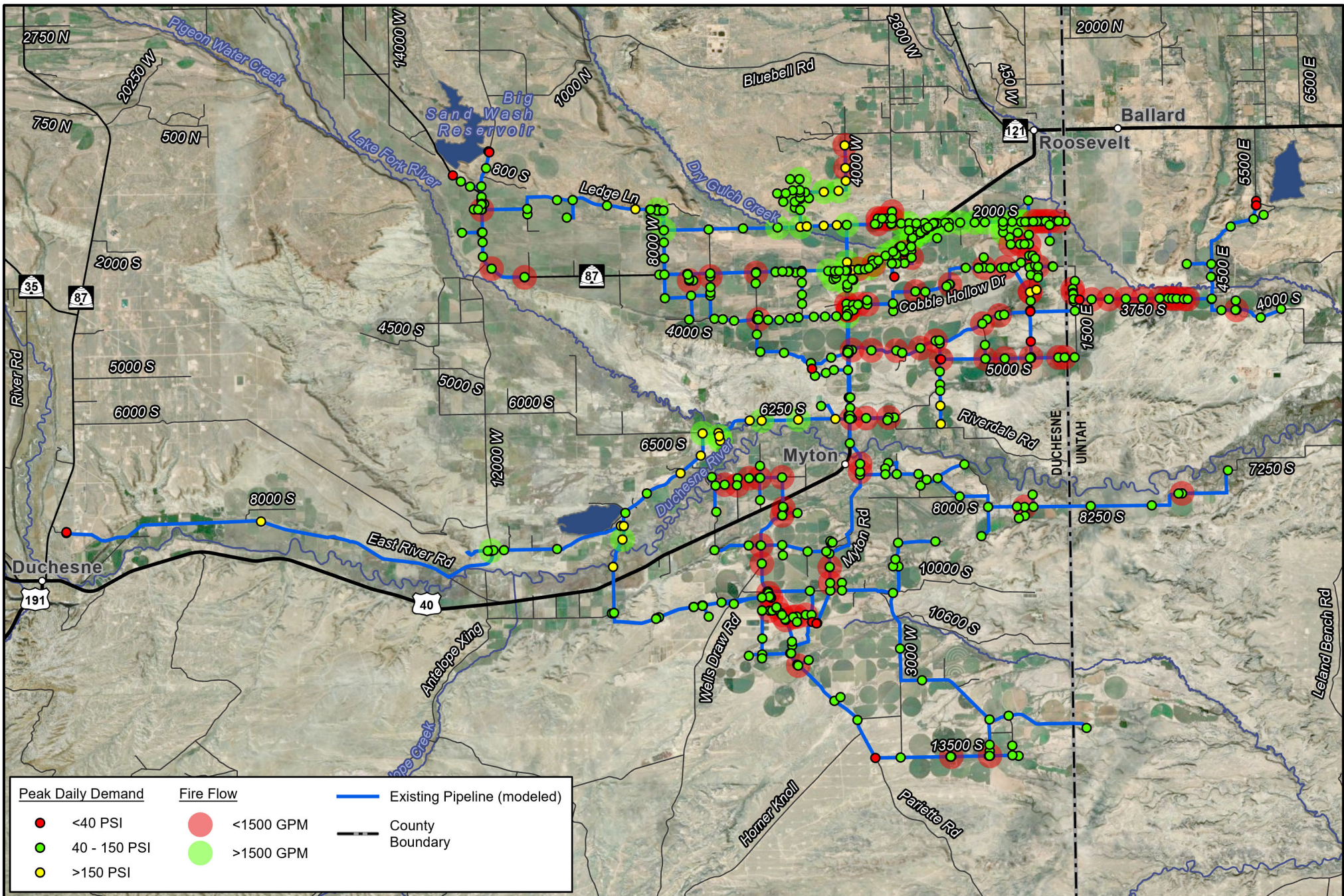
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Last Edit: 04/16/2026

**Duchesne County,
Utah**

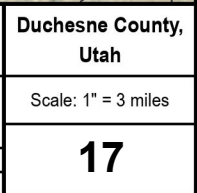
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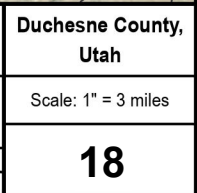
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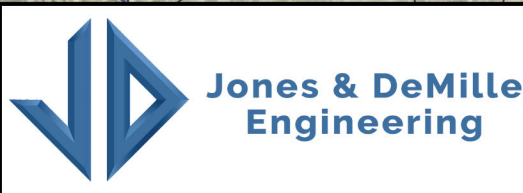
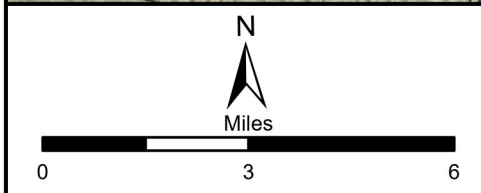
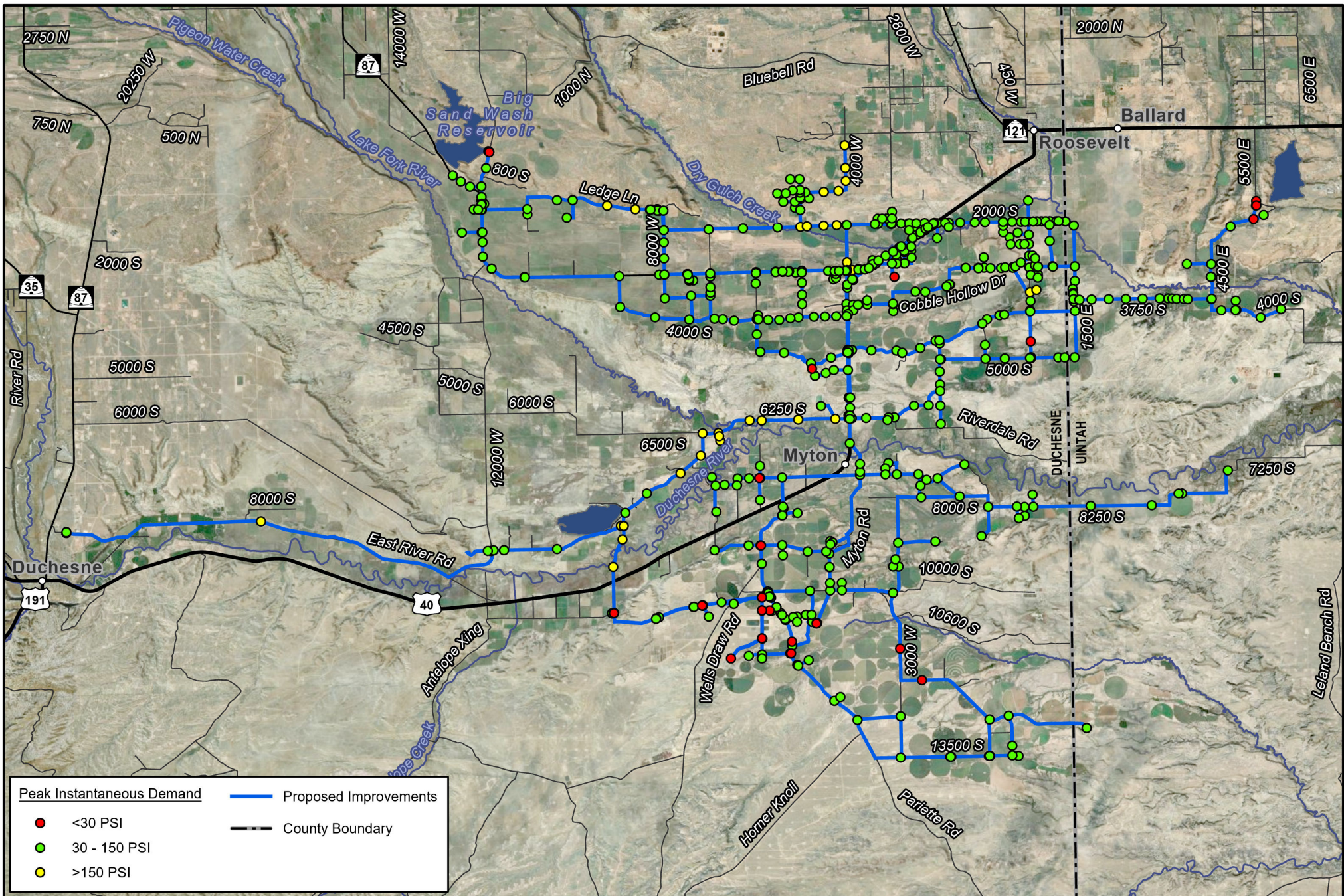


Johnson Water Improvement District		
2025 Master Plan Update Existing Scenario - Peak Daily Demand (PDD) and Fire Flow		
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Project Number: 2410-042	Drawn by: JEM 04-26	Last Edit: 04/16/2026

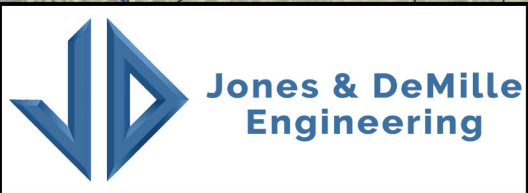
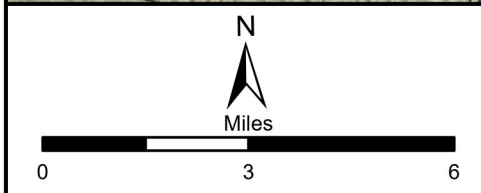
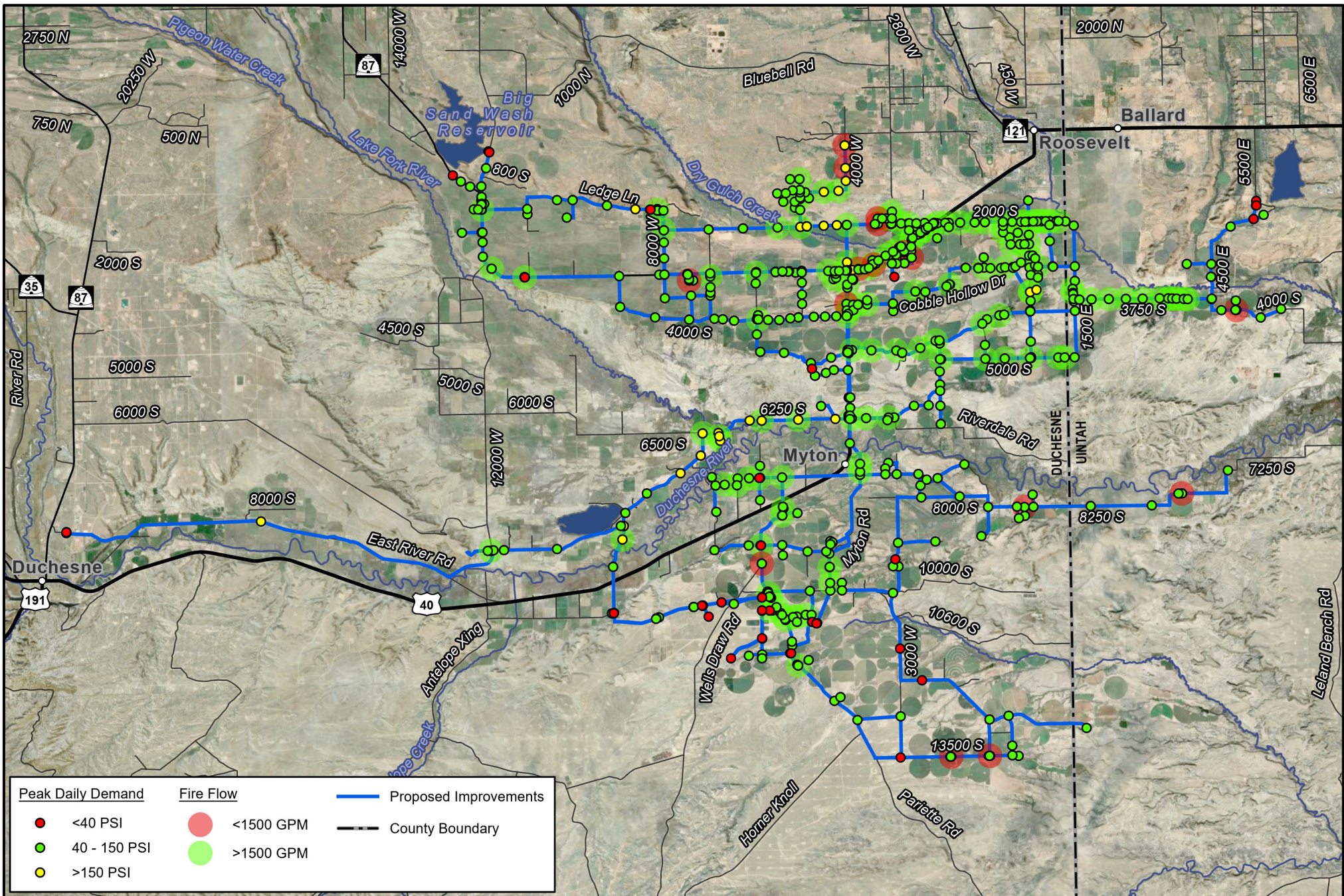
Duchesne County, Utah
Scale: 1" = 3 miles
16







Johnson Water Improvement District			Duchesne County, Utah
2025 Master Plan Update Future Scenario - Peak Instantaneous Demand (PID)			Scale: 1" = 3 miles
Map Name: H:\2410-042\GIS\Projects\2410-042_Plan\2410-042_Plan.aprx - 19-22_JWID - Master Plan - Future Scenario - Pressure 8.5x11L			19
Project Number: 2410-042	Drawn by: JEM 04-26	Last Edit: 04/16/2026	



Johnson Water Improvement District			Duchesne County, Utah
2025 Master Plan Update Future Scenario - Peak Daily Demand (PDD) and Fire Flow			Scale: 1" = 3 miles
Map Name: H:\2410-042\GIS\Projects\2410-042_Plan\2410-042_Plan.aprx - 19-22_JWID - Master Plan - Future Scenario - Pressure 8.5x11L			20
Project Number: 2410-042	Drawn by: JEM 04-26	Last Edit: 04/16/2026	

APPENDIX B. COST ESTIMATES

B.1. EAST MYTON IMPROVEMENT PHASE 1

Owner: Johnson Water Improvement District
Project: East Myton Improvement Phase 1
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$ 91,000.00	\$ 91,000.00
1-2	Mobilization	L.S.	1	\$182,000.00	\$ 182,000.00
1-3	Exploratory Excavation	Each	15	\$ 550.00	\$ 8,250.00
1-4	8-Inch DR-11 HDPE Pipe	L.F.	22,000	\$ 55.00	\$ 1,210,000.00
1-5	3/4-Inch Water Service Connection	Each	5	\$ 4,500.00	\$ 22,500.00
1-6	Fire Hydrant	Each	22	\$ 12,000.00	\$ 264,000.00
1-7	Imported Pipe Bedding	C.Y.	2,200	\$ 20.00	\$ 44,000.00
1-8	Class A Road Repair	S.F.	27,500	\$ 8.00	\$ 220,000.00
1-9	Connect to Existing Water Line	Each	2	\$ 10,000.00	\$ 20,000.00
1-10	Air Vac Station	Each	5	\$ 12,000.00	\$ 60,000.00
1-11	6-Inch PRV Vault	Each	2	\$150,000.00	\$ 300,000.00
1-12	Items Not Estimated (10%)	L.S.	1	\$303,000.00	\$ 303,000.00
1-13	Contingency (10%)	L.S.	1	\$303,000.00	\$ 303,000.00
Total Probable Construction Cost					\$ 3,027,750.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$228,000.00	\$ 228,000.00
2-2	Construction Engineering	L.S.	1	\$258,000.00	\$ 258,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 61,000.00	\$ 61,000.00
2-4	Legal and Administration	L.S.	1	\$ 46,000.00	\$ 46,000.00
Engineering and Professional Services Subtotal					\$ 593,000.00
Total Probable Installation Cost					\$ 3,620,750.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

B.2. EAST MYTON IMPROVEMENT PHASE 2

Owner: Johnson Water Improvement District
Project: East Myton Improvement Phase 2
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$ 82,000.00	\$ 82,000.00
1-2	Mobilization	L.S.	1	\$163,000.00	\$ 163,000.00
1-3	Exploratory Excavation	Each	15	\$ 550.00	\$ 8,250.00
1-4	10-Inch DR-11 HDPE Pipe	L.F.	18,800	\$ 70.00	\$ 1,316,000.00
1-5	3/4-Inch Water Service Connection	Each	8	\$ 4,500.00	\$ 36,000.00
1-6	Fire Hydrant	Each	19	\$ 12,000.00	\$ 225,600.00
1-7	Imported Pipe Bedding	C.Y.	1,880	\$ 20.00	\$ 37,600.00
1-8	Class A Road Repair	S.F.	23,500	\$ 8.00	\$ 188,000.00
1-9	Connect to Existing Water Line	Each	5	\$ 10,000.00	\$ 50,000.00
1-10	Air Vac Station	Each	5	\$ 12,000.00	\$ 60,000.00
1-11	Items Not Estimated (10%)	L.S.	1	\$271,000.00	\$ 271,000.00
1-12	Contingency (10%)	L.S.	1	\$271,000.00	\$ 271,000.00
Total Probable Construction Cost					\$ 2,708,450.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$204,000.00	\$ 204,000.00
2-2	Construction Engineering	L.S.	1	\$231,000.00	\$ 231,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 55,000.00	\$ 55,000.00
2-4	Legal and Administration	L.S.	1	\$ 41,000.00	\$ 41,000.00
Engineering and Professional Services Subtotal					\$ 531,000.00
Total Probable Installation Cost					\$ 3,239,450.00

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B.3. EAST MYTON IMPROVEMENT PHASE 3

Owner: Johnson Water Improvement District
Project: East Myton Improvement Phase 3
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$ 88,000.00	\$ 88,000.00
1-2	Mobilization	L.S.	1	\$176,000.00	\$ 176,000.00
1-3	Exploratory Excavation	Each	15	\$ 550.00	\$ 8,250.00
1-4	10-Inch DR-11 HDPE Pipe	L.F.	14,050	\$ 70.00	\$ 983,500.00
1-5	8-Inch DR-11 HDPE Pipe	L.F.	7,920	\$ 55.00	\$ 435,600.00
1-6	3/4-Inch Water Service Connection	Each	11	\$ 4,500.00	\$ 49,500.00
1-7	Fire Hydrant	Each	22	\$ 12,000.00	\$ 263,640.00
1-8	Imported Pipe Bedding	C.Y.	2,200	\$ 20.00	\$ 44,000.00
1-9	Class A Road Repair	S.F.	27,463	\$ 8.00	\$ 219,700.00
1-10	Connect to Existing Water Line	Each	1	\$ 10,000.00	\$ 10,000.00
1-11	Air Vac Station	Each	5	\$ 12,000.00	\$ 60,000.00
1-12	Items Not Estimated (10%)	L.S.	1	\$293,000.00	\$ 293,000.00
1-13	Contingency (10%)	L.S.	1	\$293,000.00	\$ 293,000.00
Total Probable Construction Cost					\$ 2,924,190.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$220,000.00	\$ 220,000.00
2-2	Construction Engineering	L.S.	1	\$249,000.00	\$ 249,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 59,000.00	\$ 59,000.00
2-4	Legal and Administration	L.S.	1	\$ 44,000.00	\$ 44,000.00
Engineering and Professional Services Subtotal					\$ 572,000.00
Total Probable Installation Cost					\$ 3,496,190.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

B.4. PLEASANT VALLEY IMPROVEMENTS PHASE 1

Owner: Johnson Water Improvement District
Project: Pleasant Valley Improvements Phase 1
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$107,000.00	\$ 107,000.00
1-2	Mobilization	L.S.	1	\$214,000.00	\$ 214,000.00
1-3	Exploratory Excavation	Each	20	\$ 550.00	\$ 11,000.00
1-4	8-Inch DR-11 HDPE Pipe	L.F.	14,300	\$ 55.00	\$ 786,500.00
1-5	10-Inch DR-11 HDPE Pipe	L.F.	11,400	\$ 70.00	\$ 798,000.00
1-6	3/4-Inch Water Service Connection	Each	15	\$ 4,500.00	\$ 67,500.00
1-7	Fire Hydrant	Each	26	\$ 12,000.00	\$ 308,400.00
1-8	Imported Pipe Bedding	C.Y.	2,570	\$ 20.00	\$ 51,400.00
1-9	Class A Road Repair	S.F.	32,125	\$ 8.00	\$ 257,000.00
1-10	6-Inch PRV Vault	L.S.	1	\$150,000.00	\$ 150,000.00
1-11	Connect to Existing Water Line	Each	4	\$ 10,000.00	\$ 40,000.00
1-12	Air Vac Station	Each	5	\$ 12,000.00	\$ 60,000.00
1-13	Items Not Estimated (10%)	L.S.	1	\$357,000.00	\$ 357,000.00
1-14	Contingency (10%)	L.S.	1	\$357,000.00	\$ 357,000.00
Total Probable Construction Cost					\$ 3,564,800.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$268,000.00	\$ 268,000.00
2-2	Construction Engineering	L.S.	1	\$304,000.00	\$ 304,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 72,000.00	\$ 72,000.00
2-4	Legal and Administration	L.S.	1	\$ 54,000.00	\$ 54,000.00
Engineering and Professional Services Subtotal					\$ 698,000.00
Total Probable Installation Cost					\$ 4,262,800.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

B.5. PLEASANT VALLEY IMPROVEMENTS PHASE 2

Owner: Johnson Water Improvement District
Project: Pleasant Valley Improvements Phase 2
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$ 94,000.00	\$ 94,000.00
1-2	Mobilization	L.S.	1	\$188,000.00	\$ 188,000.00
1-3	Exploratory Excavation	Each	15	\$ 550.00	\$ 8,250.00
1-4	10-Inch DR-11 HDPE Pipe	L.F.	21,700	\$ 70.00	\$ 1,519,000.00
1-5	3/4-Inch Water Service Connection	Each	15	\$ 4,500.00	\$ 67,500.00
1-6	Fire Hydrant	Each	22	\$ 12,000.00	\$ 260,400.00
1-7	Imported Pipe Bedding	C.Y.	2,170	\$ 20.00	\$ 43,400.00
1-8	Class A Road Repair	S.F.	27,125	\$ 8.00	\$ 217,000.00
1-9	Connect to Existing Water Line	Each	4	\$ 10,000.00	\$ 40,000.00
1-10	Air Vac Station	Each	5	\$ 12,000.00	\$ 60,000.00
1-11	Items Not Estimated (10%)	L.S.	1	\$313,000.00	\$ 313,000.00
1-12	Contingency (10%)	L.S.	1	\$313,000.00	\$ 313,000.00
Total Probable Construction Cost					\$ 3,123,550.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$235,000.00	\$ 235,000.00
2-2	Construction Engineering	L.S.	1	\$266,000.00	\$ 266,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 63,000.00	\$ 63,000.00
2-4	Legal and Administration	L.S.	1	\$ 47,000.00	\$ 47,000.00
Engineering and Professional Services Subtotal					\$ 611,000.00
Total Probable Installation Cost					\$ 3,734,550.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

B.6. IOKA AREA WATER LINE REPLACEMENT

Owner: Johnson Water Improvement District
Project: Ioka Area Water Line Replacement
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$139,000.00	\$ 139,000.00
1-2	Mobilization	L.S.	1	\$278,000.00	\$ 278,000.00
1-3	Exploratory Excavation	Each	15	\$ 550.00	\$ 8,250.00
1-4	10-Inch DR-11 HDPE Pipe	L.F.	29,350	\$ 70.00	\$ 2,054,500.00
1-5	8-Inch DR-11 HDPE Pipe	L.F.	2,910	\$ 55.00	\$ 160,050.00
1-6	3/4-Inch Water Service Connection	Each	47	\$ 4,500.00	\$ 211,500.00
1-7	Fire Hydrant	Each	29	\$ 12,000.00	\$ 352,200.00
1-8	Imported Pipe Bedding	C.Y.	2,935	\$ 20.00	\$ 58,700.00
1-9	Class A Road Repair	S.F.	40,325	\$ 8.00	\$ 322,600.00
1-10	Connect to Existing Water Line	Each	6	\$ 10,000.00	\$ 60,000.00
1-11	Air Vac Station	Each	5	\$ 12,000.00	\$ 60,000.00
1-12	Items Not Estimated (10%)	L.S.	1	\$464,000.00	\$ 464,000.00
1-13	Contingency (10%)	L.S.	1	\$464,000.00	\$ 464,000.00
Total Probable Construction Cost					\$ 4,632,800.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$348,000.00	\$ 348,000.00
2-2	Construction Engineering	L.S.	1	\$394,000.00	\$ 394,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 93,000.00	\$ 93,000.00
2-4	Legal and Administration	L.S.	1	\$ 70,000.00	\$ 70,000.00
Engineering and Professional Services Subtotal					\$ 905,000.00
Total Probable Installation Cost					\$ 5,537,800.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

B.7. IOKA LANE TO 4000 S IMPROVEMENTS

Owner: Johnson Water Improvement District
Project: Ioka Lane to 4000 South Improvements
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$120,000.00	\$ 120,000.00
1-2	Mobilization	L.S.	1	\$240,000.00	\$ 240,000.00
1-3	Exploratory Excavation	Each	15	\$ 550.00	\$ 8,300.00
1-4	10-Inch DR-11 HDPE Pipe	L.F.	25,872	\$ 70.00	\$ 1,811,100.00
1-6	3/4-Inch Water Service Connection	Each	3	\$ 4,500.00	\$ 13,500.00
1-7	Fire Hydrant	Each	26	\$ 12,000.00	\$ 310,500.00
1-8	Imported Pipe Bedding	C.Y.	2,587	\$ 20.00	\$ 51,800.00
1-9	Class A Road Repair	S.F.	32,340	\$ 8.00	\$ 258,800.00
1-10	6-Inch PRV Vault	Each	2	\$150,000.00	\$ 300,000.00
1-11	Connect to Existing Water Line	Each	2	\$ 10,000.00	\$ 20,000.00
1-12	Air Vac Station	Each	5	\$ 12,000.00	\$ 60,000.00
1-13	Items Not Estimated (10%)	L.S.	1	\$400,000.00	\$ 400,000.00
1-14	Contingency (10%)	L.S.	1	\$400,000.00	\$ 400,000.00
Total Probable Construction Cost					\$ 3,994,000.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$300,000.00	\$ 300,000.00
2-2	Construction Engineering	L.S.	1	\$340,000.00	\$ 340,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 80,000.00	\$ 80,000.00
2-4	Legal and Administration	L.S.	1	\$ 60,000.00	\$ 60,000.00
Engineering and Professional Services Subtotal					\$ 780,000.00
Total Probable Installation Cost					\$ 4,774,000.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

B.8. PLEASANT VALLEY TANK IMPROVEMENTS

Owner: Johnson Water Improvement District
Project: Pleasant Valley Tank Improvements
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$ 42,000.00	\$ 42,000.00
1-2	Mobilization	L.S.	1	\$ 84,000.00	\$ 84,000.00
1-3	Exploratory Excavation	Each	15	\$ 550.00	\$ 9,000.00
1-4	8-Inch DR-11 HDPE Pipe	L.F.	9,850	\$ 55.00	\$ 542,000.00
1-6	Fire Hydrant	Each	10	\$ 12,000.00	\$ 119,000.00
1-7	Imported Pipe Bedding	C.Y.	985	\$ 20.00	\$ 20,000.00
1-8	Class A Road Repair	S.F.	27,500	\$ 8.00	\$ 220,000.00
1-9	Connect to Existing Water Line	Each	2	\$ 10,000.00	\$ 20,000.00
1-10	Air Vac Station	Each	5	\$ 12,000.00	\$ 60,000.00
1-11	Items Not Estimated (10%)	L.S.	1	\$140,000.00	\$ 140,000.00
1-12	Contingency (10%)	L.S.	1	\$140,000.00	\$ 140,000.00
Total Probable Construction Cost					\$ 1,396,000.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$105,000.00	\$ 105,000.00
2-2	Construction Engineering	L.S.	1	\$119,000.00	\$ 119,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 28,000.00	\$ 28,000.00
2-4	Legal and Administration	L.S.	1	\$ 21,000.00	\$ 21,000.00
Engineering and Professional Services Subtotal					\$ 273,000.00
Total Probable Installation Cost					\$ 1,669,000.00

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B.9. LAMB TRUCKING LOOP

Owner: Johnson Water Improvement District
Project: Lamb Trucking Loop
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$ 41,000.00	\$ 41,000.00
1-2	Mobilization	L.S.	1	\$ 81,000.00	\$ 81,000.00
1-3	Exploratory Excavation	Each	10	\$ 550.00	\$ 5,500.00
1-4	8-Inch DR-11 HDPE Pipe	L.F.	10,800	\$ 55.00	\$ 594,000.00
1-6	3/4-Inch Water Service Connection	Each	4	\$ 4,500.00	\$ 18,000.00
1-7	Fire Hydrant	Each	11	\$ 12,000.00	\$ 129,600.00
1-8	Imported Pipe Bedding	C.Y.	1,080	\$ 20.00	\$ 21,600.00
1-9	Class A Road Repair	S.F.	13,500	\$ 8.00	\$ 108,000.00
1-10	Connect to Existing Water Line	Each	3	\$ 10,000.00	\$ 30,000.00
1-11	Air Vac Station	Each	4	\$ 12,000.00	\$ 48,000.00
1-12	Items Not Estimated (10%)	L.S.	1	\$135,000.00	\$ 135,000.00
1-13	Contingency (10%)	L.S.	1	\$135,000.00	\$ 135,000.00
Total Probable Construction Cost					\$ 1,346,700.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$102,000.00	\$ 102,000.00
2-2	Construction Engineering	L.S.	1	\$115,000.00	\$ 115,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 27,000.00	\$ 27,000.00
2-4	Legal and Administration	L.S.	1	\$ 21,000.00	\$ 21,000.00
Engineering and Professional Services Subtotal					\$ 265,000.00
Total Probable Installation Cost					\$ 1,611,700.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

B.10. ADDITIONAL SOURCE WATER

Owner: Johnson Water Improvement District
Project: Additional Source Water
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Traffic Control	L.S.	1	\$ 97,000.00	\$ 97,000.00
1-2	Mobilization	L.S.	1	\$ 194,000.00	\$ 194,000.00
1-3	Exploratory Excavation	Each	15	\$ 550.00	\$ 8,300.00
1-4	12-Inch DR-11 HDPE Pipe	L.F.	10,560	\$ 80.00	\$ 844,800.00
1-5	New Water Well	L.S.	1	\$1,250,000.00	\$ 1,250,000.00
1-6	Imported Pipe Bedding	C.Y.	1,056	\$ 20.00	\$ 21,200.00
1-7	Class A Road Repair	S.F.	13,200	\$ 8.00	\$ 105,600.00
1-8	Connect to Existing Water Line	Each	1	\$ 10,000.00	\$ 10,000.00
1-9	Air Vac Station	Each	4	\$ 12,000.00	\$ 48,000.00
1-10	Items Not Estimated (10%)	L.S.	1	\$ 323,000.00	\$ 323,000.00
1-11	Contingency (10%)	L.S.	1	\$ 323,000.00	\$ 323,000.00
Total Probable Construction Cost					\$ 3,224,900.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$ 242,000.00	\$ 242,000.00
2-2	Construction Engineering	L.S.	1	\$ 275,000.00	\$ 275,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 65,000.00	\$ 65,000.00
2-4	Legal and Administration	L.S.	1	\$ 49,000.00	\$ 49,000.00
2-5	Property Acquisition	L.S.	1	\$ 100,000.00	\$ 100,000.00
Engineering and Professional Services Subtotal					\$ 731,000.00
Total Probable Installation Cost					\$ 3,955,900.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

B.11. NEW PLEASANT VALLEY TANK

Owner: Johnson Water Improvement District
Project: New Pleasant Valley Tank
Date: 3/13/2026



ENGINEER'S OPINION OF PROBABLE COST					
Item No.	Item Description	Unit	Estimated Quantity	Unit Price	Price
1-1	Mobilization	L.S.	1	\$210,000.00	\$ 210,000.00
1-2	Exploratory Excavation	Each	20	\$ 550.00	\$ 11,000.00
1-3	8-Inch DR-11 HDPE Pipe	L.F.	5,200	\$ 55.00	\$ 286,000.00
1-4	10-Inch DR-11 HDPE Pipe	L.F.	6,400	\$ 70.00	\$ 448,000.00
1-5	12-Inch DR-11 HDPE Pipe	L.F.	9,800	\$ 80.00	\$ 784,000.00
1-6	3/4-Inch Water Service Connection	Each	15	\$ 4,500.00	\$ 67,500.00
1-7	Fire Hydrant	Each	5	\$ 12,000.00	\$ 62,400.00
1-8	Imported Pipe Bedding	C.Y.	2,140	\$ 20.00	\$ 42,800.00
1-9	Connect to Existing Water Line	Each	4	\$ 10,000.00	\$ 40,000.00
1-10	Air Vac Station	Each	7	\$ 12,000.00	\$ 84,000.00
1-11	500K Gallon Concrete Tank	L.S.	1	\$750,000.00	\$ 750,000.00
1-12	Items Not Estimated (10%)	L.S.	1	\$349,000.00	\$ 349,000.00
1-13	Contingency (10%)	L.S.	1	\$349,000.00	\$ 349,000.00
Total Probable Construction Cost					\$ 3,483,700.00
ENGINEERING AND PROFESSIONAL SERVICES					
2-1	Design Engineering	L.S.	1	\$262,000.00	\$ 262,000.00
2-2	Construction Engineering	L.S.	1	\$297,000.00	\$ 297,000.00
2-3	Environmental Surveys and Permitting	L.S.	1	\$ 70,000.00	\$ 70,000.00
2-4	Legal and Administartion	L.S.	1	\$ 53,000.00	\$ 53,000.00
Engineering and Professional Services Subtotal					\$ 682,000.00
Total Probable Installation Cost					\$ 4,165,700.00

In providing estimates of probable construction cost, the Client understands that the Consultant has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the Consultant's estimates of probable construction costs are made on the basis of the consultant's professional judgement and experience. The Consultant makes no warranty, express or implied, that the bids or negotiated costs of the Work will not vary from the Consultant's estimate of probable construction cost.

DRAFT



Date: 8/14/2025

Flow Test Data Sheet

Project Title: JWID- Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: Coordinates 40.273089, -109.986390
Test By: Jordan
Witnessed By: Erik

Purpose of Test: Calibration of Model

Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

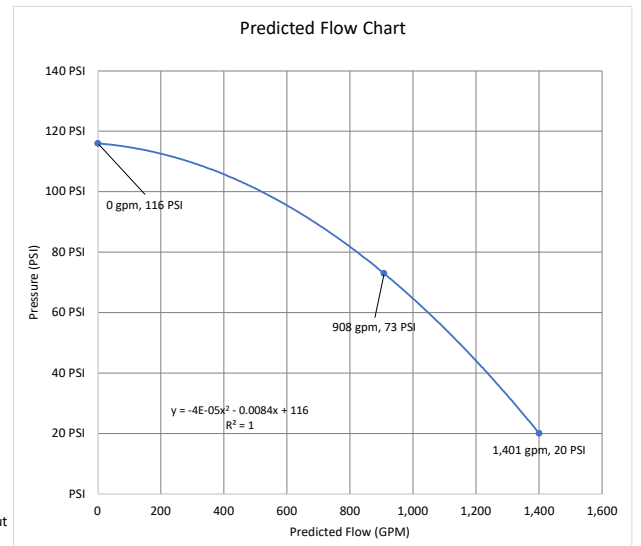
GAUGE HYDRANT Static: 116 PSI Residual: 73 PSI

% Pressure Drop 37.07% *Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.*

FLOW HYDRANT

Outlet Diameter	2-1/2"	in	Little Boy Hose Monster is 2-1/2"
Nozzle Pressure	29	PSI	Big Boy Hose Monster is 4-1/2"
Calculated Flow	908	GPM	
Length of Test	2	Mins	
Amount of Water Used	1,816	Gallons	
Rated Capacity at 20 psi:	1,401	gpm	

More Information
[FocusonFireProtection.pdf](#)



Remarks: Fire Flow test was one Fire Hydrant FH36508. @ Coordinates 40.273089, -109.986390 on 2000 South and about 350 East in Roosevelt

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$$QR = QF \times (HR^{0.54} / HF^{0.54})$$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 8/14/2025

Flow Test Data Sheet

Project Title: JWID- Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: Coordinates 40.298203, -110.067407
Test By: Jordan
Witnessed By: Erik

Purpose of Test: Calibration of Model

Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

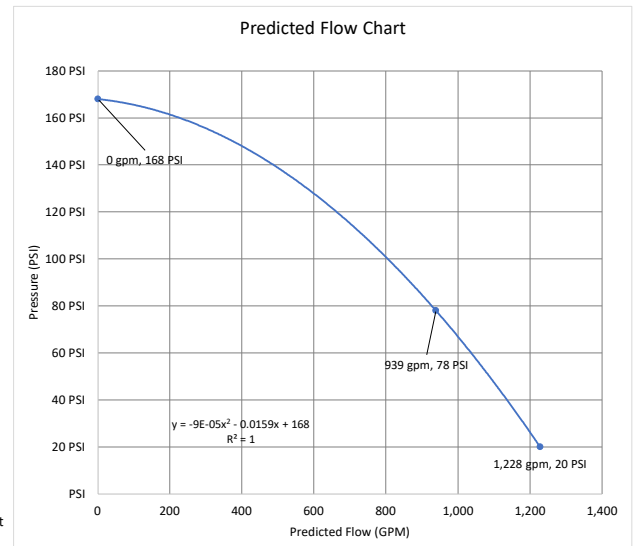
GAUGE HYDRANT Static: 168 PSI Residual: 78 PSI

% Pressure Drop 53.57% *Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.*

FLOW HYDRANT

Outlet Diameter	2-1/2"	in	Little Boy Hose Monster is 2-1/2"
Nozzle Pressure	31	PSI	Big Boy Hose Monster is 4-1/2"
Calculated Flow	939	GPM	
Length of Test	2	Mins	
Amount of Water Used	1,878	Gallons	
Rated Capacity at 20 psi:	1,228	gpm	

More Information
FocusonFireProtection.pdf



Remarks: Fire Flow test was one Fire Hydrant FH34859. @ Coordinates 40.298203, -110.067407 on 4000 West and about 200 South

*Stataic pressure was jumping around +- 10 PSI. 168 psi seemed like where it would settle down at.

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$$QR = QF \times (HR^{0.54} / HF^{0.54})$$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 8/14/2025

Flow Test Data Sheet

Project Title: JWID - Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: 40.17407,-110.162279
Test By: Jordan Kennington
Witnessed By: Erik Rube
Purpose of Test: Calibration of Model
Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

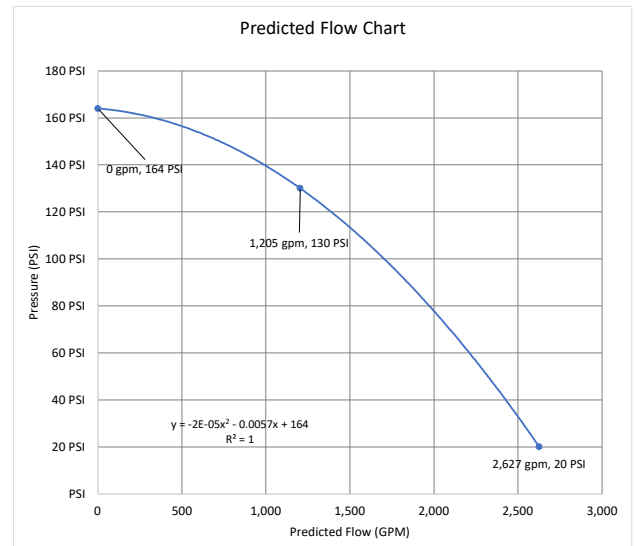
GAUGE HYDRANT Static: 164 PSI Residual: 130 PSI

% Pressure Drop 20.73% *Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.*

FLOW HYDRANT

Outlet Diameter	2-1/2"	in	Little Boy Hose Monster is 2-1/2"
Nozzle Pressure	51	PSI	Big Boy Hose Monster is 4-1/2"
Calculated Flow	1,205	GPM	
Length of Test	2	Mins	
Amount of Water Used	2,410	Gallons	
Rated Capacity at 20 psi:	2,627	gpm	

More Information
[FocusonFireProtection.pdf](#)



Remarks: Single Hydrant test on FH34878 @ 40.17407,-110.162279

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$$QR = QF \times (HR^{0.54} / HF^{0.54})$$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 8/14/2025

Flow Test Data Sheet

Project Title: JWID- Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: Coordinates 40.164257, -110.076570
Test By: Jordan
Witnessed By: Erik

Purpose of Test: Calibration of Model

Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

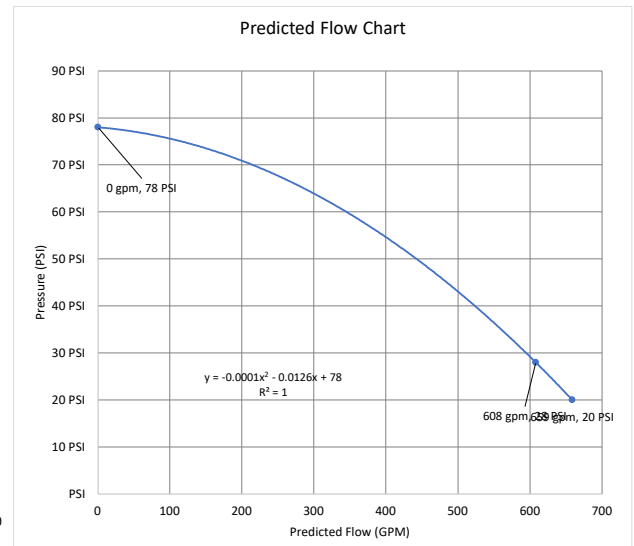
Test Data

GAUGE HYDRANT Static: 78 PSI Residual: 28 PSI

% Pressure Drop 64.10% Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.

FLOW HYDRANT

Outlet Diameter 2-1/2" in Little Boy Hose Monster is 2-1/2"
Nozzle Pressure 13 PSI Big Boy Hose Monster is 4-1/2"
Calculated Flow 608 GPM
Length of Test 2 Mins
Amount of Water Used 1,216 Gallons
Rated Capacity at 20 psi: 659 gpm



Remarks: Fire Flow test was one Fire Hydrant FH34895. @ Coordinates 40.164257, -110.076570 on 9390 South and 4000 West

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$$QR = QF \times (HR^{0.54} / HF^{0.54})$$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P \times D^2 \times C}$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 8/14/2025

Flow Test Data Sheet

Project Title: JWID- Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: Coordinates 40.133121, -110.090244
Test By: Jordan
Witnessed By: Erik

Purpose of Test: Calibration of Model

Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

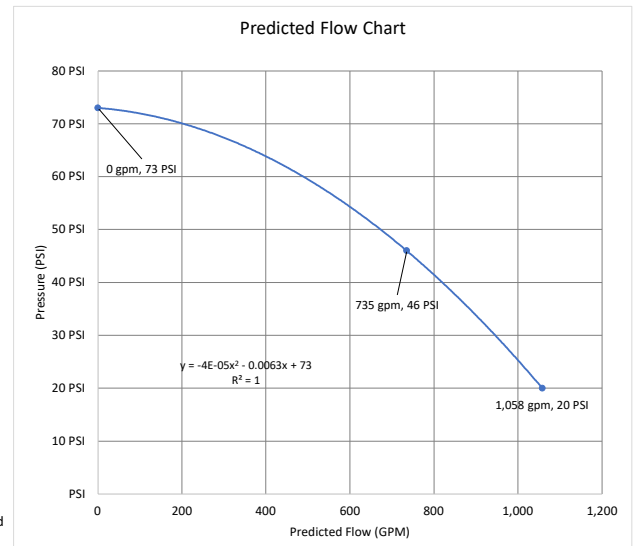
GAUGE HYDRANT Static: 73 PSI Residual: 46 PSI

% Pressure Drop 36.99% Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.

FLOW HYDRANT

Outlet Diameter 2-1/2" in Little Boy Hose Monster is 2-1/2"
Nozzle Pressure 19 PSI Big Boy Hose Monster is 4-1/2"
Calculated Flow 735 GPM
Length of Test 2 Mins
Amount of Water Used 1,470 Gallons
Rated Capacity at 20 psi: 1,058 gpm

More Information



Remarks: Fire Flow test was one Fire Hydrant FH34884. @ Coordinates 40.133121, -110.090244 around 11650 South and Pariette Road

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$QR = QF \times (HR^{0.54} / HF^{0.54})$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 4/15/2026

Flow Test Data Sheet

Project Title: JWID - Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: FH-34821 5000 S
Test By: JK, ER
Witnessed By: _____

Purpose of Test: Model calibration

Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

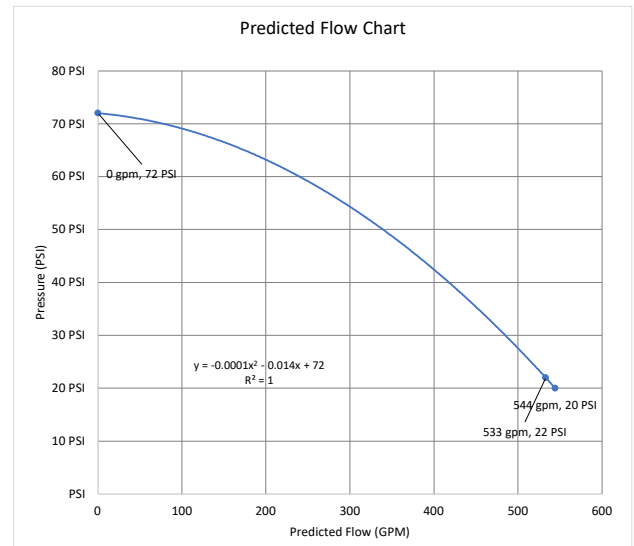
Test Data

GAUGE HYDRANT Static: 72 PSI Residual: 22 PSI

% Pressure Drop 69.44% Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.

FLOW HYDRANT

Outlet Diameter 2-1/2" in Little Boy Hose Monster is 2-1/2"
Nozzle Pressure 10 PSI Big Boy Hose Monster is 4-1/2"
Calculated Flow 533 GPM
Length of Test Mins
Amount of Water Used 0 Gallons
Rated Capacity at 20 psi: 544 gpm



Remarks: Pressure jumping between 70-80 ish

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$QR = QF \times (HR^{0.54} / HF^{0.54})$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P \times D^2 \times C}$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 10/7/2025

Flow Test Data Sheet

Project Title: JWID - Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: FH-34886 8480 S 200 W
Test By: JK, ER
Witnessed By:

Purpose of Test: Model Calibration

Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

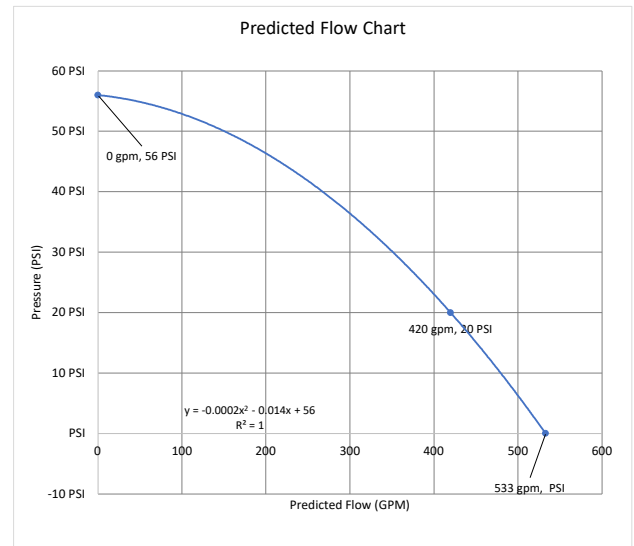
GAUGE HYDRANT Static: 56 PSI Residual: 0 PSI

% Pressure Drop 100.00% Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.

FLOW HYDRANT

Outlet Diameter 2-1/2" in Little Boy Hose Monster is 2-1/2"
Nozzle Pressure 10 PSI Big Boy Hose Monster is 4-1/2"
Calculated Flow 533 GPM
Length of Test Mins
Amount of Water Used 0 Gallons
Rated Capacity at 20 psi: 420 gpm

More Information



Remarks: Not enough to register on gauge.

Residual went to 0 and nozzle was @ 0

Maybe 10 fpm flow estimate. Pressure increased after shutting off back to...

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$QR = QF \times (HR^{0.54} / HF^{0.54})$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 10/7/2025

Flow Test Data Sheet

Project Title: JWID - Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: FH-34-897 Revola Dugway
Test By: JK, ER
Witnessed By:

Purpose of Test: Model Calibration

Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

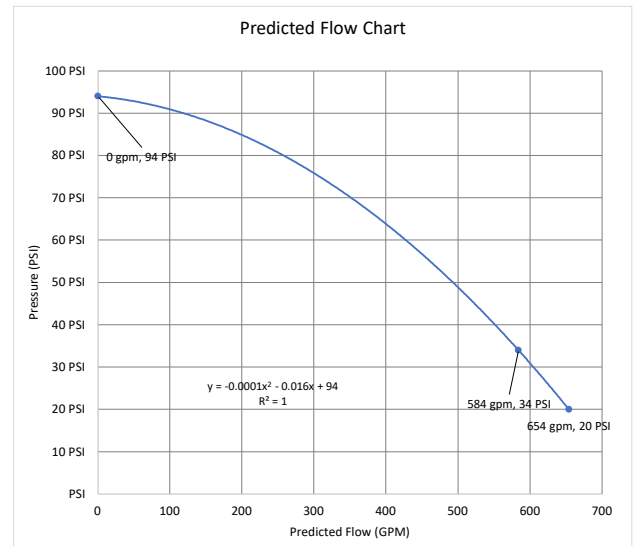
GAUGE HYDRANT Static: 94 PSI Residual: 34 PSI

% Pressure Drop 63.83% Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.

FLOW HYDRANT

Outlet Diameter 2-1/2" in Little Boy Hose Monster is 2-1/2"
Nozzle Pressure 12 PSI Big Boy Hose Monster is 4-1/2"
Calculated Flow 584 GPM
Length of Test Mins
Amount of Water Used 0 Gallons
Rated Capacity at 20 psi: 654 gpm

More Information



<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$$QR = QF \times (HR^{0.54} / HF^{0.54})$$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 12/1/2025

Flow Test Data Sheet

Project Title: JWID - Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: FH-34884 40.133121,-110.090244
Test By: JK, ER
Witnessed By:
Purpose of Test: Model Calibration
Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

GAUGE HYDRANT Static: 76 PSI Residual: 51 PSI

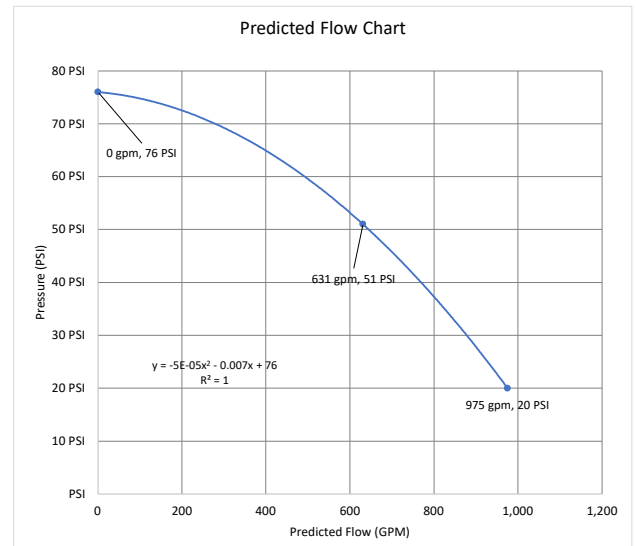
% Pressure Drop 32.89% *Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.*

FLOW HYDRANT

Outlet Diameter	2-1/2"	in	Little Boy Hose Monster is 2-1/2"
Nozzle Pressure	14	PSI	Big Boy Hose Monster is 4-1/2"
Calculated Flow	631	GPM	
Length of Test		Mins	
Amount of Water Used	0	Gallons	
Rated Capacity at 20 psi:	975	gpm	

More Information

FocusonFireProtection.pdf



Remarks:

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$$QR = QF \times (HR^{0.54} / HF^{0.54})$$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P \times D^2 \times C}$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 12/1/2025

Flow Test Data Sheet

Project Title: JWID - Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: FH-34884 40.164257,-110.076570
Test By: JK, ER
Witnessed By:
Purpose of Test: Model Calibration
Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

GAUGE HYDRANT Static: 83 PSI Residual: 44 PSI

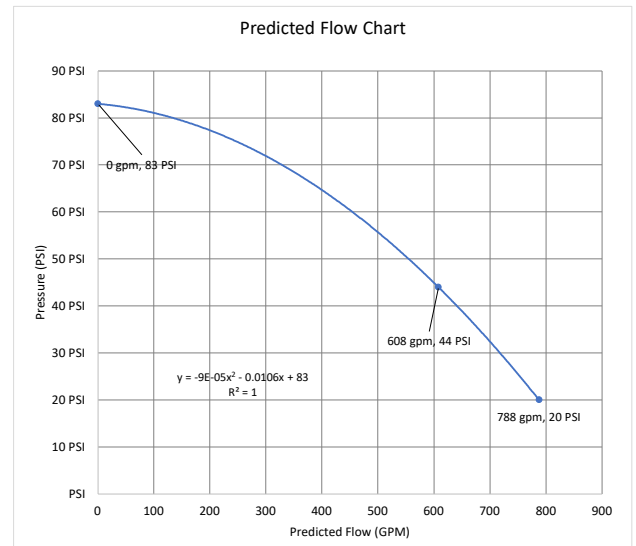
% Pressure Drop 46.99% Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.

FLOW HYDRANT

Outlet Diameter	2-1/2"	in	Little Boy Hose Monster is 2-1/2"
Nozzle Pressure	13	PSI	Big Boy Hose Monster is 4-1/2"
Calculated Flow	608	GPM	
Length of Test		Mins	
Amount of Water Used	0	Gallons	
Rated Capacity at 20 psi:	788	gpm	

More Information

FocusonFireProtection.pdf



Remarks:

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$QR = QF \times (HR^{0.54} / HF^{0.54})$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



Date: 12/1/2025

Flow Test Data Sheet

Project Title: JWID - Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042

Property & Address: FH-34878 40.174075,-110.162279
Test By: JK, ER
Witnessed By:
Purpose of Test: Model Calibration
Type of Test: ☒ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

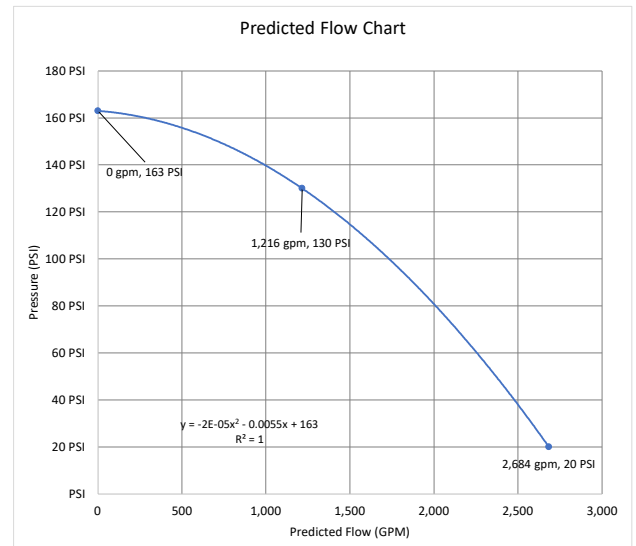
GAUGE HYDRANT Static: 163 PSI Residual: 130 PSI

% Pressure Drop 20.25% Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.

FLOW HYDRANT

Outlet Diameter 2-1/2" in Little Boy Hose Monster is 2-1/2"
Nozzle Pressure 52 PSI Big Boy Hose Monster is 4-1/2"
Calculated Flow 1,216 GPM
Length of Test Mins
Amount of Water Used 0 Gallons
Rated Capacity at 20 psi: 2,684 gpm

More Information



Remarks: Pressure jumping between 70-80 ish

<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$QR = QF \times (HR^{0.54} / HF^{0.54})$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device



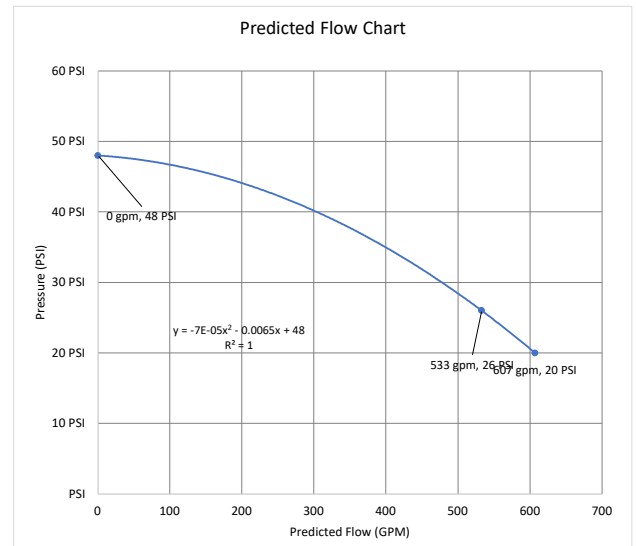
Date: 12/22/2025

Flow Test Data Sheet

Project Title: JWID Master Plan Update
Client: Johnson Water Improvement District
Project Number: 2410-042
Property & Address: 40.248035, -109.951865
Test By: ER, BH
Witnessed By:
Purpose of Test: Model Calibration
Type of Test: ☐ Single-Hydrant Test ☐ Two-Hydrant Test

Test Data

GAUGE HYDRANT Static: 48 PSI Residual: 26 PSI
% Pressure Drop 45.83% Verify 25% pressure drop from static to residual psi. If 25% pressure drop is unattainable you will need a larger test kit or mutiple small kits.
FLOW HYDRANT
Outlet Diameter 2-1/2" in Little Boy Hose Monster is 2-1/2"
Nozzle Pressure 10 PSI Big Boy Hose Monster is 4-1/2"
Calculated Flow 533 GPM
Length of Test 2 Mins
Amount of Water Used 1,066 Gallons
Rated Capacity at 20 psi: 607 gpm



<https://www.hosemonster.com/hydrant-flow-test-calculator-calculate-rated-capacity-at-20-psi/>

EQUATION FOR DETERMINING RATED CAPACITY

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity). The example below enables you to find the predicted flow-rate at 20 psi residual pressure. Use this when fire flow testing hydrants.

$QR = QF \times (HR^{0.54} / HF^{0.54})$

QR = Flow-rate predicted at the desired residual pressure in GPM
QF = Total test flow-rate measured during test in GPM (GPM measured from Hose Monster or Pitotless Nozzle)
HR = Pressure drop from static pressure to desired residual pressure (Static - 20 psi [if 20 psi is the desired residual pressure])
HF = Actual pressure drop measured during the test (Static - Actual Residual)

THEORETICAL DISCHARGE THROUGH CIRCULAR ORIFICES FORMULA

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P \times D^2 \times C}$$

Q = flow-rate in GPM

P = velocity pressure in psi

D = orifice diameter in inches

C = coefficient of flow device