CITY OF ELLENSBURG
AGENDA
Council Conference
Thursday, June 17, 2021
3:30 PM - Utility Advisory Committee

1. CALL TO ORDER

2. ROLL CALL

3. APPROVAL OF MINUTES

3.A Approve minutes - May 20th, 2021 regular meeting minutes
UAC Minutes 5-20-21

4. APPROVAL OF CONSENT AGENDA

Consent items have been distributed to committee members in advance for study and will be enacted by one motion. If separate discussion is desired on an item, that item may be removed from the Consent Agenda and placed on the Regular Agenda at the request of a committee member or at the request of a member of the public with concurrence of a committee member.

5. CORRESPONDENCE AND CITIZEN COMMENTS ON NON-AGENDA ITEMS

Time is set aside each meeting to allow citizens to address the Utility Advisory Committee on city utility issues that are not on the agenda. Please limit remarks to three minutes. The Committee will not take action when the issue is first raised, but may place the issue on a future agenda. Citizen comment on items on the agenda is also welcome. Please let the chair know you wish to speak and then wait to be recognized.

5.A Letters Acknowledging KITTCOM Representative to Utility Advisory Committee
KITTCOM Representative letters

6. TELECOMMUNICATIONS UTILITY DISCUSSION ITEMS

7. ELECTRIC, NATURAL GAS, WATER, WASTEWATER, STORMWATER UTILITY INFORMATION & DISCUSSION ITEMS

7.A Natural Gas System Plan 2021-2026 Report
City of Ellensburg 2020 System Planning Report Final_v1.pdf

7.B Water Division Strategic Energy Management Report
CompletionReport_CityofEllensburg_Yr2.pdf

7.C Public Works & Utilities Issues and Updates
UAC June 2021 Issues Update

8. NEXT MEETING

8.A July 15th, 2021 at 3:30 pm

9. ADJOURNMENT

CITY OF ELLENSBURG **Utility Advisory Committee**

Date of Meeting **May 20, 2021**
Time of Meeting **3:30 PM**
Place of Meeting **Virtual Conference**

Nancy Lillquist, Chairperson, term expires May 31, 2022
Ed Barry, Vice Chairperson, term expires May 31, 2023
Nancy Goodloe, City Council, term expires May 31, 2021
Gary Gleason, CWU, term expires May 31, 2022
Bob Johnson, KITTCOM, term expires May 31, 2023
Jim Goeben, Telecommunications Utility customer, term expires May 31, 2023
Nate Sitton, City Utility Customer, term expires May 31, 2023

1. CALL TO ORDER

Chair Lillquist called the meeting to order at 3:30 pm.

2. ROLL CALL

Members present: Nancy Lillquist, Chair; Nancy Goodloe, City Council; Gary Gleason, CWU; Nate Sitton, City Utility Customer.

Also present: Ryan Lyyski, Public Works & Utilities Director; Darren Larsen, Assistant Utilities Director; Derek Mayo, Engineering Services Manager; Jon Morrow, Stormwater Manager; Darin Yusi, Gas Engineer; Drew Houck, IT.

Gleason moved to excuse Ed Barry from the May 20th UAC meeting. Sitton seconded. All in favor; **motion approved.**

Chair Lillquist moved to amend the agenda to move Stormwater Management Plan update 2020-2021 from 8.A. to 7.A.

3. APPROVAL OF MINUTES

3.A. Approve minutes - April 15th, 2021 regular meeting minutes

Goodloe moved to approve the minutes. Gleason seconded. All in favor; **motion approved.**

4. APPROVAL OF CONSENT AGENDA

Consent items have been distributed to committee members in advance for study and will be enacted by one motion. If separate discussion is desired on an item, that item may be removed from the Consent Agenda and placed on the Regular Agenda at the request of a

committee member or at the request of a member of the public with concurrence of a committee member.

4.A. Project Acceptance - Bid Call 2020-28 Ridgeview Lane Sewer Main Extension

Goodloe moved to approve the consent agenda. Sitton seconded. All in favor; **motion approved**.

5. CORRESPONDENCE AND CITIZEN COMMENTS ON NON-AGENDA ITEMS

None

6. TELECOMMUNICATIONS UTILITY DISCUSSION ITEMS

Darren Larsen mentioned a letter to the Mayor from George Long, Director of KITTCOM, acknowledging Bob Johnson's retirement effective July 1, 2021 and requesting that Bryan Clark be the new appointee on the UAC committee. The Mayor responded with a letter approving the change.

7. ELECTRIC, NATURAL GAS, WATER, WASTEWATER, STORMWATER UTILITY DISCUSSION ITEMS

7.A. Stormwater Management Plan update 2020-2021.

Jon Morrow presented an overview and discussed the plan. Jon answered the committee's questions regarding the 2020-2021 Stormwater Management Plan.

Goodloe moved the committee accept the 2020-2021 Stormwater Management Plan. Sitton seconded. All in favor; **motion approved**.

8. INFORMATION ONLY ITEMS

8.A. City Gas Division is a recipient of the System Operational Achievement Recognition (SOAR) award.

The City's Gas Division has been selected by the APGA as one of fifteen recipients for the Level Silver SOAR award.

8.B. Public Works & Utilities Issues and Updates

Ryan Lyyski shared issued updates for the Sewer and Water Divisions as listed.

Derek Mayo shared the Public Works & Utilities department has submitted three appropriation requests to Representative Kim Schrier's and Senator Murray's offices for potential funding. The City's RNG project was selected as one of Representative Schrier's district's top 10 projects. Since applying, one additional opportunity for possible funds has arose. Applications are due to Senator Cantwell's office by June 1st. The City is requesting the Committee sign a letter of support.

Goodloe moved the committee send a letter of support from the UAC to Senator Cantwell supporting the renewable natural gas conversion at the Wastewater Treatment Plant, the aeration process replacement at the Wastewater Treatment Plant and the Anderson Road sewer projects. Sitton seconded. All in favor; **motion approved**.

Lillquist moved to amend the motion to include support of <u>any</u> City project for the Senator's appropriation programs. Sitton seconded. All in favor; ***motion approved.***

Darren Larsen shared issue updates for the Electric and Gas Divisions as listed. He reported the Light Division will be going out to bid for primary cable extension from Currier Creek Development up Reecer Creek Road to Cender Road to servce the Blackhorse Development. Bids open next week and due to timing, will go straight to City Council and not through UAC for acceptance.

Staff notified the Committee of a recent natural gas purchase commitment to Shell Energy for November 2021 – March 2022 total value of the contract purchase is $286,522.50.

Chair Lillquist was invited to be on Kittitas County's Broadband Action Team (BAT) as a representative for Council. The first meeting is Wednesday, May 26th at 1:30 pm.

9. NEXT MEETING

9.A. June17th, 2021 at 3:30 pm

10. ADJOURNMENT

With no further discussion, the meeting adjourned at 4:21 pm.

Kim Caulkins
Recording Secretary
Drafted: 5/24/2021
Approved:

KITTCOM (KITTITAS COUNTY 911)
700 ELMVIEW RD
ELLENSBURG, WASHINGTON 98926
509/925-8534 • FAX 509/925-8540

MAY 3, 2021

Mayor Bruce Tabb
501 N Anderson St
Ellensburg, WA 98926

Mayor Tabb,

It is with great pride that KITTCOM announces the upcoming retirement of Communications Engineer Bob Johnson, effective July 1, 2021. Mr. Johnson has served KITTCOM since 1992 and has been a member of the Utility Advisory Committee for some time as an appointed representative for KITTCOM. I write you today to request a new appointment.

Bryan Clark serves as KITTCOM's Information System Administrator and will be working to cover some aspects of the Communications Engineer's position until such time as KITTCOM finds a suitable replacement for Mr. Johnson. Mr. Clark's knowledge makes him the best candidate to represent KITTCOM on the UAC.

KITTCOM requests that effective July 1, 2021 that Bryan Clark be appointed as the KITTCOM representative to the Utility Advisory Committee.

Respectfully,

George Long
Director, KITTCOM

City of Ellensburg WASHINGTON

CITY OF ELLENSBURG
501 North Anderson Street
Ellensburg, WA 98926
Phone: (509) 962-7221 Fax: (509) 962-7143

May 18, 2021

Bryan Clark
KITTCOM
700 Elmview Road
Ellensburg, WA 98926

Re: KITTCOM Representative on the Utility Advisory Committee

Dear Bryan:

This letter is to advise you that on May 17, 2021 the City Council acknowledged KITTCOM's recommendation for you to serve as the KITTCOM representative on the Utility Advisory Committee effective July 1, 2021. The Utility Advisory Committee meets on the third Thursday of the month at 3:30 p.m. Should you have any questions, please feel free to contact Darren Larsen at (509) 962-7227.

In 2014 the Open Government Training Act was enacted which requires all members of governing bodies complete basic Open Public Meetings Act and Public Records training within 90 days of assuming a position or every four years thereafter. As a member of the Utility Advisory Committee, you are required to complete this training. The required training is available through online videos on the following websites:

http://insight.mrsc.org/2014/05/08/open-government-training-resources-and-opportunities/ (MRSC web page listing *most training opportunities and web sites)*

http://www.atg.wa.gov/OpenGovernmentTraining.aspx (Attorney General's Office)

Once you have completed one of these trainings, please provide Laurie Gigstead in the City Manager's office with the certificate of completion. If you have any questions regarding the training, please feel free to contact her at 509-962-7221 or gigsteadl@ci.ellensburg.wa.us.

Enclosed is a copy of the City's *Handbook for Councilmembers and Board, Commission and Committee Members.* The handbook is designed to help you while serving in this advisory capacity. These groups provide valuable advice to the City Council, assisting us in our decision-making process.

Thank you for accepting a position on the Utility Advisory Committee. Your willingness to serve the community in this manner is greatly appreciated.

Sincerely,

Bruce L. Tabb
Mayor

Enclosures
c: Darren Larsen

AGENDA REPORT

Meeting Date: June 17, 2021

Agenda Subject: Natural Gas System Plan 2021-2026 Report

Submitted by: Darin Yusi Public Works & Utilities

Recommended Action or Motion: Staff recommends UAC forward a favorable recommendation to City Council for the acceptance of the 2021-2026 Natural Gas System Plan report as complete.

Background/Summary: The City Gas Division completes a thorough evaluation of its entire system to confirm existing and potential gas loads are met with adequate flow and pressure throughout the system. The system plan identifies potential projects for maintaining and/or improving system reliability and integrity and generates a six-year capital investment plan. Gas System Plan Updates are performed on a six-year basis with the last plan being performed in 2014. At the October 19, 2020 meeting an agreement with EN Engineering was approved for signature.

Staff worked with EN Engineering to complete the updated system plan report. The completed report is attached with this agenda.

There was also a telemetry analysis that was done by EN Engineering as an addendum and separate document to provide guidance on a future bid for upgrading the Gas Division's existing telemetry equipment.

Previous Council Action: City Council approved a supplemental agreement and budget adjustment for the Natural Gas System Plan update at the April 19, 2021 meeting.

The City Manager signed an agreement for Professional Services with EN Engineering for the the Natural Gas System Plan Update at the October 19, 2020 meeting.

Analysis: EN Engineering completed and provided a 114-page Natural Gas System Plan for 2021-2026. The plan included a summary of the system, their modeling and growth projection

methodology, current and project system performance analysis, potential projects to improve the system, minimum improvements needed to meet potential growth, single-feed branches analysis, and recommendations based on all overall analysis.

The analysis determined that the current gas system infrastructure is sufficient to adequately supply additional services resulting from projected medium or high population growth. Utilizing increased supply pressures, the gas system maintains service pressures above 20 PSI during the extreme weather condition of 60 HDD, and when the CWU service is disabled, service pressures are maintained during the very extreme weather condition of 80 HDD.

There was twelve identified system improvements that were determined to be beneficial in limiting the need to increase pressure during extreme weather conditions. These improvements included: Seven areas of looping the system, three areas of pipe replacement (increasing size), a new regulator station off Dry Creek Road, and increasing the supply pressure. Of these improvements, two are already in construction or design (Bull Road Extension and Helena Ave Loop). Also, of these twelve improvements identified, only one of these improvements would be necessary to meet the weather condition of 80 HDD. This is the looping from No 6 Road north to Vantage Hwy and then west on Vantage Hwy to the tie-in point.

In addition to the identified system improvements, there was seventeen single-feed branches with at least twenty services that were identified. According to EN Engineering, single-feed branches pose an elevated service loss risk in gas networks and should be eliminated. Some of the looping improvements will eliminate single-feed branches.

In summary, the City natural gas system is well equipped to continue serving its existing customers and handle any growth that may or may not happen with minimal needed improvements to the piping system through 2026.

Financial Impact: The budgeted amount for the Natural Gas System Plan Update

was $50,000.00. The original contract amount was for a "Maximum Amount Payable" of $47,900.00. A budget adjustment request was approved at the April 19, 2021 City Council meeting as well as a supplemental agreement for additional funds to complete the work. The supplemental agreement was for $4,900.00 and the budget adjustment was for the $2,800.00 in excess of the $50,000.00 budgeted.

Attachments:
City of Ellensburg 2020 System Planning Report Final_v1.pdf

Natural Gas System Plan

Model Creation, Growth Analysis
and Capital Investment Plan
2021 – 2026

Project # 2020-004

Prepared for:

City of Ellensburg WASHINGTON

Prepared by:

ENEngineering

2021 – Final V1

Headquarters:
28100 Torch Parkway, Suite 400. Warrenville, IL 60555
(630) 353-4000 | info@enengineering.com

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SIGNATURE PAGE

City of Ellensburg - 2020 System Planning
EN Project # 2008119.00
Report Date: May 28, 2021

Final Version 1

Author:
Dominic Ciarlette
Project Engineer

Reviewed by:
Jared Flower
Project Manager

Approved by:
Ellie Lynch
Director of Data Solutions

Executive Summary

City of Ellensburg (COE) requested that EN Engineering (EN) perform an analysis to review their current natural gas system infrastructure and develop a six-year capital investment plan to include anticipated growth and infrastructure changes within their distribution system.

A gas network model based on COE's Geographic Information System (GIS) information was built for this analysis. The analysis evaluated the impact of medium and high populated growth scenarios projected to 2026 accounting for potential residential and commercial service increases. These modeling scenarios were used to evaluate system performance under current and projected demands. Planned projects as well as new system improvements were modeled and analyzed for their benefits. Additionally, EN identified and ranked single-feed branches by severity.

The analysis determined that the current gas system infrastructure is sufficient to adequality supply additional services resulting from projected medium or high population growth. Utilizing increased supply pressures, the gas system maintains service pressures above 20 PSI during the extreme weather condition of 60 HDD, and when the Central Washington University (CWU) physical plant service is disabled, service pressures are maintained during the very extreme weather condition 80 HDD conditions.

In order to maintain current system performance under medium projected population growth the following improvements are necessary:

- Increase the system supply pressure to 49 PSI

In order to maintain current system performance under high projected population growth the following improvements are necessary:

- Increase the system supply pressure to 50 PSI and
- A 3,900-foot 4-inch extension along Number 6 Road from West Willis Road to Vantage Highway and then west along Vantage Highway to join to Main ID: 898-131.

1.0 Introduction

City of Ellensburg (COE) requested that EN Engineering (EN) perform an analysis to review their current natural gas system infrastructure and develop a six-year capital investment plan to include anticipated growth and infrastructure changes within their distribution system. EN worked alongside the COE Gas Engineering team to review the current operating system and to perform analysis to identify potential performance issues and infrastructure improvements needed to account for future growth throughout the system.

The analysis was performed by utilizing the current COE GIS data and other available data sources to develop a Synergi Gas model to replicate COE's current operating system. The model was used to perform simulations of the current operating conditions to identify potential performance issues. Additionally, EN performed a future growth analysis projection to identify medium and high growth projects within their service territory. The projected growth results were applied to the model and used to assess current and potential infrastructure. As a result of the modeled projected growth analysis, EN identified potential infrastructure improvements for COE to maintain their system as the demand increases within their system. The following report outlines the analysis performed and the potential improvement within the system to meet the demands.

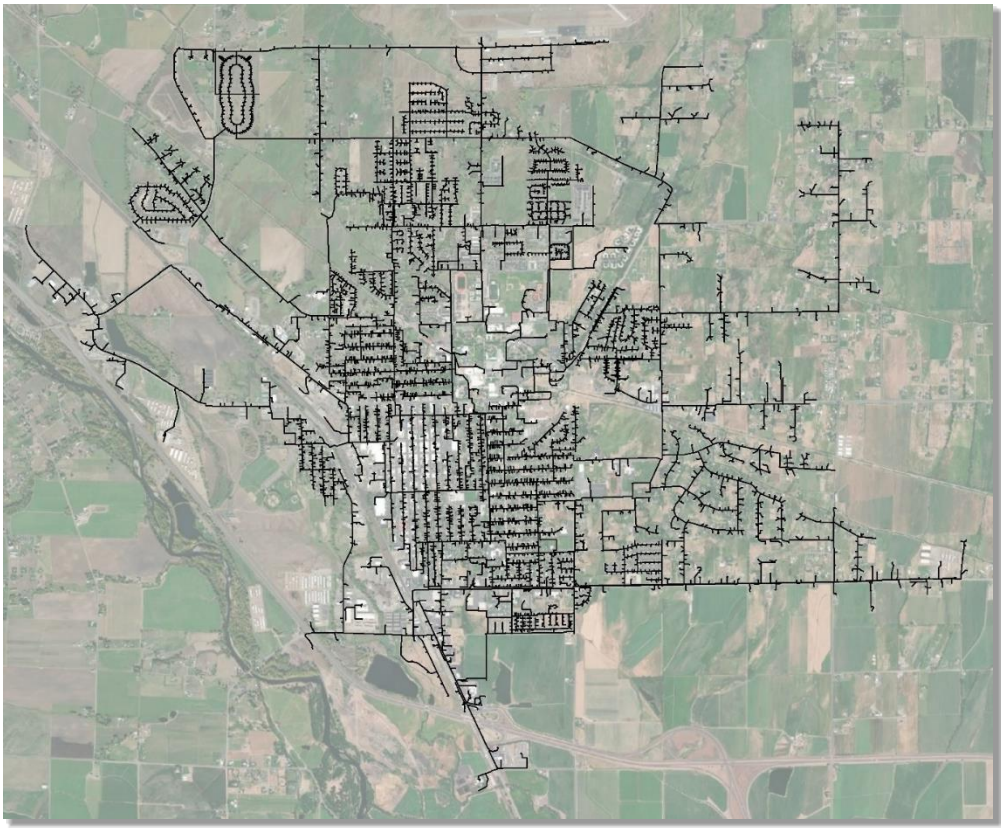

Figure 1 System Overview

2.0 COE Natural Gas System

The COE and surrounding area have an estimated population of 21,345[1] and is the county seat of Kittitas County located in central Washington. The city operates and maintains the natural gas distribution service within their allowable territory which includes the city and parts of Kittitas county residents. The first gate station to the city was constructed in late 1956 supplying gas through the Wenatchee lateral, which is currently operated by the Williams Northwest Pipeline Company.

Currently COE is supplied at the Kittitas Tap Station located at 3261 Kittitas Highway, Ellensburg, WA, which was rebuilt in 2000. Within the tap station there is the Kittitas Regulator Station and there is a second regulator station located on Seattle Avenue supplying the city. Below are the current operating conditions and the maximum capacities of the stations.

Regulator Station	Capacity (SCFH)	Inlet Pressure (PSIG)	Outlet Operating Pressure (PSIG)	Operating MAOP (PSIG)
Kittitas Highway	422,702	145	42	60
Seattle Avenue	1,026,987	145	42	60

Table 1 Regulator Stations

2.1 Distribution System Overview

Over the proceeding years, the infrastructure of the distribution system has expanded to supply new developments and growing business within the city. Currently, the system is comprised of 135.10 miles of distribution main lines and 76.03 miles of service lines. Table 2, Table 3 and Table 4 below detail the sizes, materials and installation decade.

Nominal Diameter (inch)	Mains Lengths (miles)	Services Lengths (miles)
½	0.00	24.70
¾	0.00	7.49
1	0.00	42.83
1 ½	0.07	0.00
2	76.28	1.00
4	38.46	0.01
6	20.26	0.00
8	0.02	0.00
Total	135.10	76.03

Table 2 Mains and Services Lengths[2]

[1] https://worldpopulationreview.com/us-cities/ellensburg-wa-population

Pipe Material	Mains Lengths (miles)	Services Lengths (miles)
PE	92.73	59.03
Steel	42.36	17.00
Total	135.10	76.03

Table 3 Main and Service Materials[2]

Decade Installed	Mains Lengths (miles)	Services Lengths (miles)
1950	34	0.00
1960	6	0.00
1970	4	0.00
1980	6	0.93
1990	30	6.27
2000	40.57	11.27
2010	12.55	7.90
2020	1.97	0.28
Unknown	0.00	49.38
Total	135.10	76.03

Table 4 Main and Service Install Decade[2]

According to GIS data, within the current system there are a total of 991 valves which are used for multiple functions within the system.

Valve Use	Valve Count
System Valve	21
Isolation	28
Emergency	145
Unspecified	797
Total	991

Table 5 GIS Valve Count by Use

2.2 Customer Volume Data

As of 2020, there are currently 4,885 active customers which constitutes of 4,095 residential customers and 790 commercial customers. The customers are grouped into three (3) different categories and their associated average flows per season are outlined in table 6 in units centi-cubic feet per day (CCFD).

Customer Category	Average Winter[3] Flows (CCFD)	Average Summer[4] Flows (CCFD)

[2] GIS Feature Class Tables and PHMSA 2020 Annual Report
[3] December, January, and February

Customer Category	Average Winter[3] Flows (CCFD)	Average Summer[4] Flows (CCFD)
Commercial/Industrial	454.82	282.83
Residential	9.26	1.25
Municipal	54.25	11.80
Combined Averages	518.32	295.88

Table 6 Average Flows by Customer Category[5]

Daily averaged flows hide the impacts of consumption cycle peaks. The analysis was performed using hourly flows to account for peak conditions. Customer load records were provided in the units of centi-cubic feet (CCF) per the billing cycle, which was converted into standard cubic feet per hour (SCFH) based on a 14-hour day. A 14-hour day was used within the analysis to account for normal daily use, which provided a conservative value compared to a 24-hour day.

3.0 Modeling Methodology

A hydraulic model was built of the COE natural gas system using the Synergi Gas modeling software (Synergi). The model was developed by using COE provided GIS data consisting of the distribution system piping and facility features. The provided GIS data was reviewed to ensure the connectivity and attributes reflected the current system.

Additionally, the customer load data provided by COE customer records over the last 6 years (2015 through 2020) were reviewed and the data was correlated to the geospatial location within the system. The customer load data was used to calibrate the model and develop the model parameters and load variables to reflect the current operating conditions. The developed model was used to understand the current operating performance and to generate system improvements recommendations for COE.

3.1 COE GIS Data Review

EN reviewed the provided GIS data in the table below, to ensure the connectivity and attribute information reflected the current COE distribution system. The review of the GIS data was to eliminate out-of-scope, erroneous or duplicate records. Special attention was paid to the connectivity of pipe features and the size of pipes and valves. All the validated input data used in the model went through a series of validations and standardizations before importing the data into Synergi.

Feature Type	Source	Records
Pipes	P_Pipes	2,888
Services	P_Service	7,567
Valves	P_Valves	995
Meter	P_Meter_Setting_Old	5,429

Table 7 GIS Data Summary[6]

[4] June, July, and August
[5] Gas Billing Data
[6] GIS Feature Class Tables

The GIS connectivity review consisted of combining a network dataset model to automatically identify disconnected segments and geometry errors. After the automatic review, a final manual review was performed ensuring that the system's engineering aspects were feasible and correct. Additionally, duplicate records were removed and overlapping segments were corrected.

3.1.1 Service Meter Location Review

In the analysis, the customer locations within the city were spatially placed using the provided meter feature class "P_Meter_Setting_Old". The customer billing records were related to the spatial location through two (2) different methods that include relating the Equipment ID attribute between the two data sets which accounted for relating 4,424 or 90.6% of the customers. The second method used georeferencing the address within GIS to spatially locate the reaming records.

3.2 Model Parameters

The following standard hydraulic modeling parameters were employed for this analysis:

- Friction Factor Calculation method: Colebrook-White equation
- Base Temperature: 60.0 $°F$
- Specific Gravity: 0.60

3.3 Feature Import

The evaluated and confirmed GIS data was imported into Synergi to develop the COE model. Along with the spatial information of the features, the following attributes were imported and associated to their corresponding pipe features.

- GlobalID
- Nominal diameter
- Material
- MainID
- Operating Pressure
- Connectivity
- Status

The GlobalID and MainID were associated with all features within the model to provide COE the flexibility to relate the model and GIS data. These attributes do not directly impact the model hydraulically, but they were included to facilitate updates to the model as needed in the future.

3.4 Calibration

As the preliminary model was developed using GIS data it required to be calibrated to reflect the COE operating conditions. The calibration requires known pressure and flow records to compare model performance. The known pressures and flows are applied to the model, the calibration point pressures are fine tuned to the known values using pipe efficiency and roughness values.

The known pressure points within the system were the Kittitas Tap Station, Central Washington University Physical Plant and the Twin City Foods Station using the 2015-2019 records. Two calibration periods during 2019 were selected to ensure the model was calibrated against the most current available pressure and flow conditions. The flow periods of January-February and May-June were selected as calibration periods. Winter and summer periods were used to capture and account for the seasonal nature of gas demands.

Tuning the pipe efficiency to 97% and using pipe roughness values of 1.8×10^{-3} inches for Steel and 6.0×10^{-5} inches for PE pipe brought the modeled pressures 99.26% within the current recorded operating conditions.

3.5 Variable Demand File

A variable demand file was generated using the recorded load data. Such a demand file allows the model to be loaded based on the weather conditions of the user's choosing. Heating degree days (HDD) were used as the weather variable in this analysis. HDD values are the difference between the outside temperature relative to 65ºF. As outside temperature drops below 65ºF, the HDD value increases. This demand file was used to simulate elevated HDD conditions on the system.

To create the variable demand file a linear relationship was derived between each service type and the HDD conditions experienced by customers during the given billing cycle. The weather data used to establish the relationships were recorded at the Yakima Air Terminal approximately 30 miles south of Ellensburg[7], since this location had complete records for 2020 compared to other locations within the surrounding area.

A linear relationship was determined between the load data records and the weather records on a per service type basis. The chart below illustrates the relationship between customer demand in standard cubic feet per hour (SCFH) and HDD value.

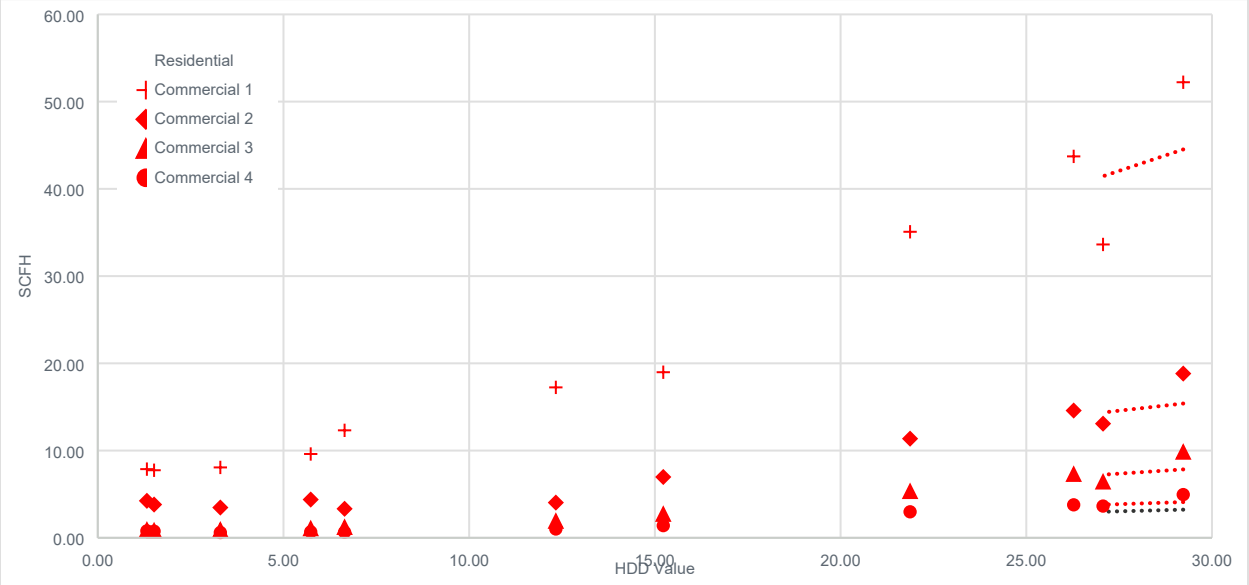

Figure 2 Customer Demand and HDD Relationship[8]

The linear relationship between the customer demands and weather was used to make a demand formula for each service type to be associated to each service in the form of a variable demand file. This variable demand file was used to load the model at arbitrary HDD values to assess the model's response to various loading conditions.

[7] www.degreedays.net
[8] Gas Billing Data

3.5.1 Central Washington University Variable Demand

The method detailed in Section 3.5 was applied to the high demand customer CWU's Physical Plant service. The chart below represents the linear relationship between the demand in SCFH and the HDD value for CWU's Physical Plant service.

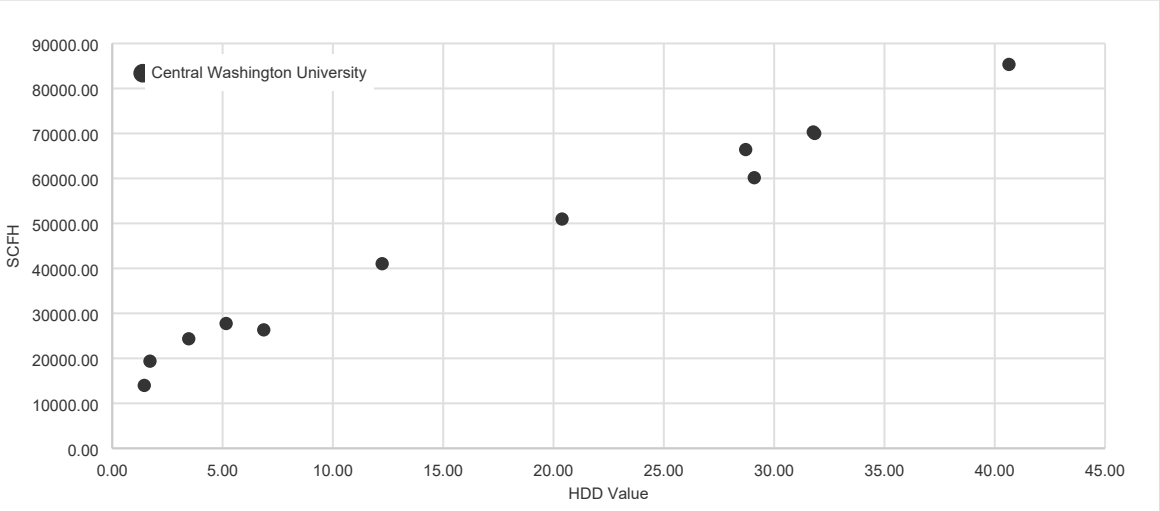

Figure 3 CWU Demand and HDD Relationship[9]

3.5.2 Twin City Foods Consideration

The Twin City Foods customer is a large customer located centrally in the City of Ellensburg. According to billing records, this customer does not follow similar demand/weather trends compared to the commercial and residential customers as detailed in Section 3.5. The peak winter demand of 1,708.33 SCFH was used as a static demand through the different seasons since it does not exhibit a normal seasonal demand response.

3.5.3 Demand Scenarios

Using the above methodology, six (6) demand scenarios were generated. The six (6) scenarios are detailed in Table 8 below. Scenarios 1 and 4 were used to model the system under the current customer demands. While scenarios 2, 3, 5 and 6 were used to model the medium and high population demands in the model.

Scenario Number	Services	HDD condition	CWU Physical Plant
1	2020 services	60	Active
2	2026 medium projected growth	60	Active
3	2026 high projected growth	60	Active
4	2020 services	80	Inactive
5	2026 medium projected growth	80	Inactive
6	2026 high projected growth	80	Inactive

Table 8 Six Demand Scenarios

[9] Gas Billing Data

4.0 Growth Projection Methodology

Medium and high growth projections were generated using publicly available demographic data. The growth projections were based on the population change trends of the City of Ellensburg. As the population expands, so to the number of gas customers is expected to increase. The relationship between the population and customer by type (Section 4.3) was used to project the expansion of gas customers.

4.1 Data Used

Historic population data was used to understand the growth trends for this analysis. Data available from the United States Census Bureau was used to establish a growth trend for the City of Ellensburg and surrounding area. The census data spans from 1990 to 2020.[10]

Year	Population	Year	Population	Year	Population
1990	12,779	2001	15,780	2012	18,460
1991	12,745	2002	16,138	2013	18,520
1992	12,579	2003	16,384	2014	18,961
1993	12,894	2004	17,062	2015	18,985
1994	13,307	2005	16,961	2016	19,763
1995	13,269	2006	17,288	2017	20,300
1996	13,481	2007	17,214	2018	20,977
1997	13,814	2008	17,344	2019	21,111
1998	14,170	2009	17,505	2020	21,345
1999	14,512	2010	18,416		
2000	15,565	2011	18,602		

Table 9 US Census Bureau City of Ellensburg Population 1990-2020[10]

4.2 Projecting Population Growth

The available population records were used to forecast the population growth out to 2026. The population records depict a positive trend best fit to a linear trendline. The fitted linear trendline has a high R-squared value of 98.16%. This indicates a well fit trendline. Figure 4 represents the population records by year. The black line represents the recorded data, while the red lines represent the projected population values. A high and low growth range has been added to the chart and is indicated by the dashed red lines above and below the solid red medium growth line. The high and low growth trend lines represent a 95% confidence range of growth.[10]

[10] Ellensburg, Washington Population 2021 (Demographics, Maps, Graphs) (worldpopulationreview.com)

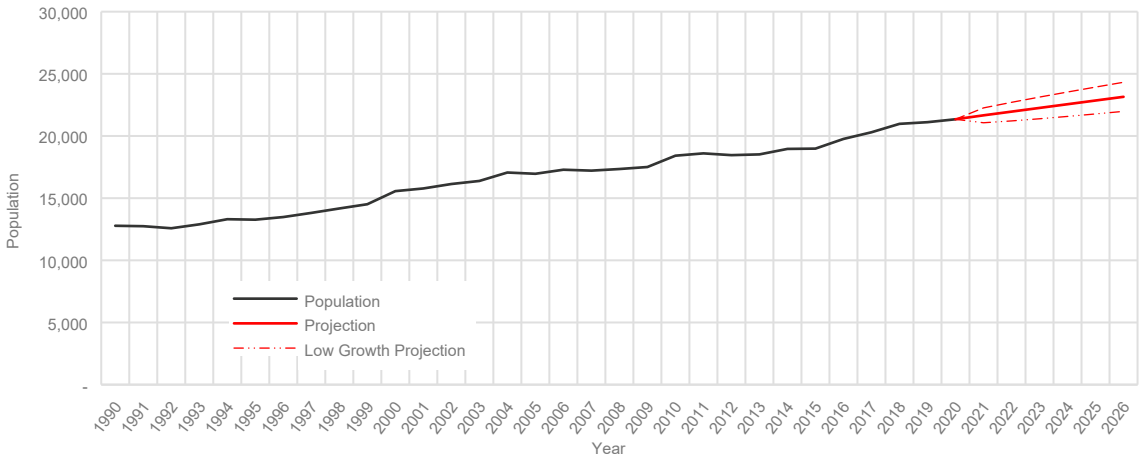

Figure 4 City of Ellensburg Historic and Projected Population[10]

The generated growth projections were used to estimate expected service increases in the gas system. This process is detailed below.

4.3 Estimating Service Growth

A linear relationship was derived between recorded service counts and recorded populations and extrapolated the relationship out to 2026 using the high and medium population growth projections. This method was performed on residential services, and the four (4) commercial category services. The results for each of the five (5) service types are provided below. See Appendix A – Population and Service Projection Tables for more information.

4.3.1 Residential Services

The methodology explained in Section 4.3 was applied to the last five (5) years of customer records provided by COE. A linear relationship was derived between recorded residential service counts and population per year. That relationship was extrapolated out to 2026 using the high and medium population growth projections. The results are in Figure 5 below.[11]

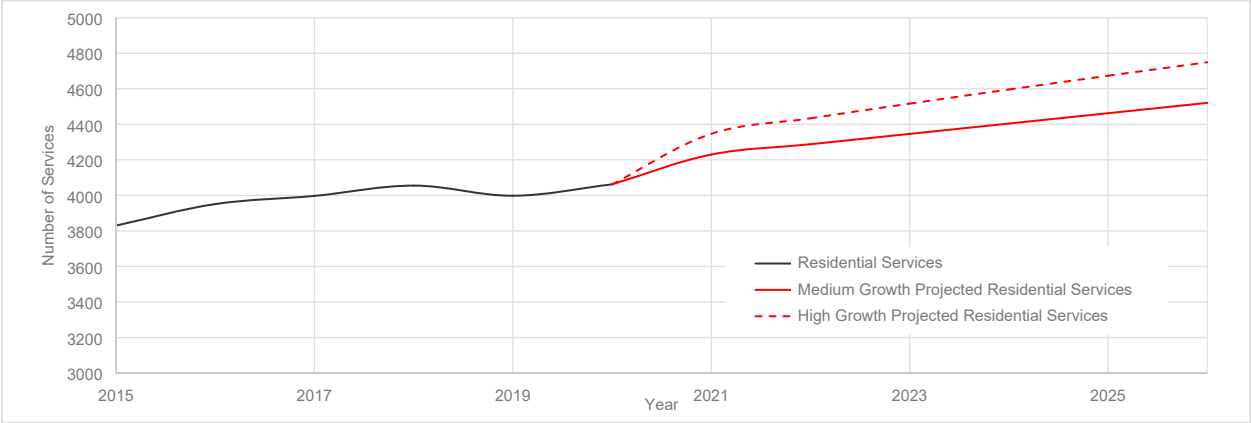

Figure 5 Residential Services Projected Growth[11]

[11] Service Projections

4.3.2 *Commercial Services*

The methodology explained in Section 4.3 was applied to the last five (5) years of customer records provided by COE. A linear relationship between recorded commercial service counts and population per year was established. That relationship was extrapolated out to 2026 using the high and medium population growth projections established in Section 4.2.[11] This was done to the four (4) commercial customer categories:

1. Category 1 – Commercial 1000 CF and greater
2. Category 2 – Commercial 750/800 CF
3. Category 3 – Commercial 415/425 CF
4. Category 4 – Commercial 275 CF and less

The results are in the four (4) charts below.

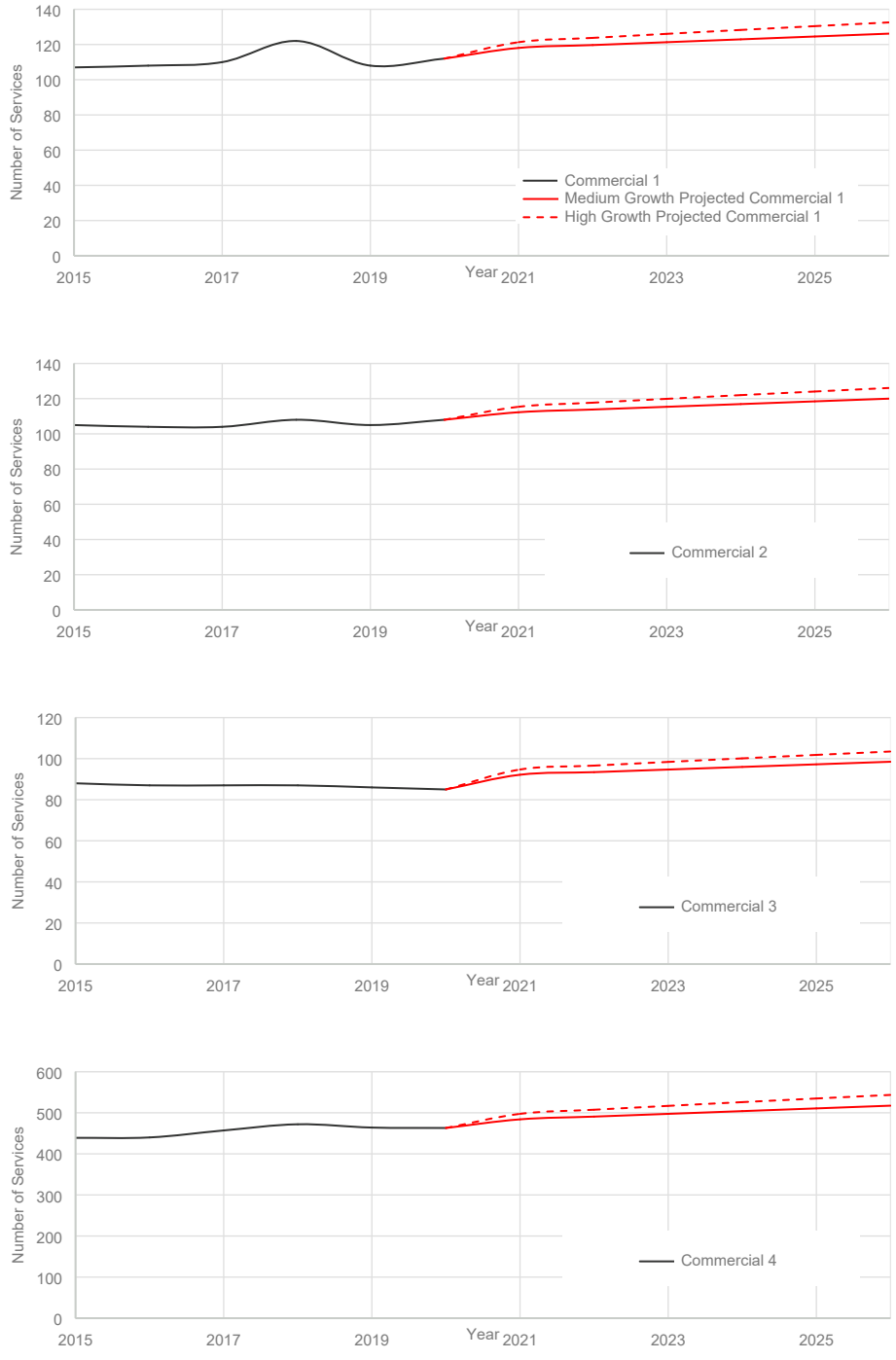

Figure 6 Commercial Category 1-4 Projected Growth[11]

5.0 Current System Performance

The performance of the current system piping was analyzed using the hydraulic model. Analysis criteria and methodology was established to assess the current system performance. Then this methodology was applied to the model under the six (6) demand scenarios (see Section 3.5.3 for demand scenario explanation). Table 10 (below) lists the maximum HDD conditions at which the modeled system can sustain customers at pressures at or greater than 20 PSI. Appendix B – Current System Limits contains the modeling result exhibits.

Scenario Number	Highest HDD that all services are supplied with ≥ 20 PSI.	Total Supply Flow (SCFH)	Supply Pressure (PSIG)
1	63	446,904	41
2	57	443,447	41
3	54	434,869	41
4	88	451,108	41
5	77	445,182	41
6	73	440,652	41

Table 10 Current System HDD Limits

5.1 Current Performance Criteria

The model results indicate that the current system piping can successfully supply all current services with at least 20 PSI of pressure during 60 HDD and slightly beyond. 60 HDD conditions was selected as the first weather condition criteria to attain adequate service pressures during. Under extreme demand cases, such as when the weather conditions exceed 60 HDD, COE can shut off service to their large customer CWU in order to meet the increased demand from other customers. This demand relief mechanism was considered for this analysis and an extreme demand scenario of 80 HDD was selected as the second weather condition criteria. The model results indicate that the current system piping can successfully supply all services except the CWU Physical Plant service with at least 20 PSI of pressure during 80 HDD and slightly beyond.

5.2 Current System Performance Under Projected Growth Scenarios

The current system piping fails to supply at least 20 PSI pressures at services at the established 60/80 HDD criteria under both six (6) year medium and high population growth scenarios. Figure 7 below illustrates the model performance under current and projected customer demands.[12]

[12] Current System Performance

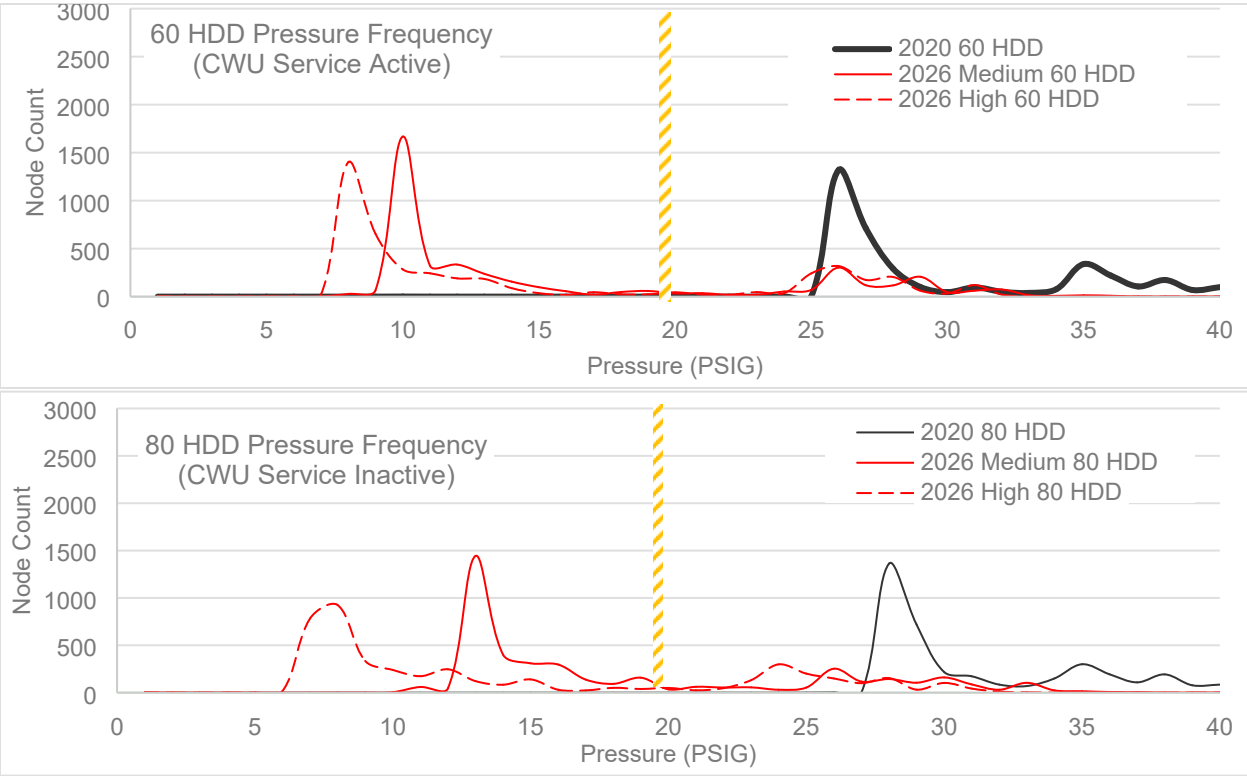

Figure 7 Current System Performance 60/80 HDD[12]

5.2.1 *2026 Medium Projected Growth*

If actual population growth matches the medium projected growth, the current system piping will only be able to maintain adequate pressures up to 57 HDD with CWU active and 77 HDD with CWU inactive.

5.2.2 *2026 High Projected Growth*

If actual population growth matches the high projected growth, the current system piping will only be able to maintain adequate pressures up to 54 HDD with CWU active and 73 HDD with CWU inactive.

6.0 COE System Improvement Analysis

EN analyzed twelve (12) system improvements using the hydraulic model. Individual improvement descriptions, results and benefits are discussed in this section. Six (6) of the twelve (12) system improvements were provided by COE. These planned improvements are renumbered in this report as improvements number one through 6. EN generated the remaining four (4) improvements using the model to identify flow bottle necks and main extension opportunities based on system performance.

The system improvements were modeled and analyzed individually using load scenarios 1, 2 and 3. These scenarios were sufficient in determining the hydraulic impact of each system improvement to the system. See Appendix C – Individual System Improvement Exhibits for the modeling results exhibits for each individual system improvement.

The project cost estimates used in this report were generated using high level estimation methodologies. The estimates include price of pipe material and tracer wire, cost of

contractor installation and cost of directional bore as well as a 20% contingency for fittings, mechanics, technicians and inspector and final restoration) which does not account for trenching, bedding, backfilling. See Table 11 below for per foot prices used for estimates.

Pipe Size (inches)	Material	Pipe Price per Foot	Tracer Wire Price per Foot	Installation Price per Foot	Boring Price per Foot	Combined Price per Foot
2	PE	$0.91	$0.09	$13.00	$12.89	$26.89
4	PE	$3.19	$0.09	$15.17	$14.75	$33.20
6	PE	$5.16	$0.09	$23.23	$18.62	$47.10
6	Steel	$10.15	N/A	$23.23	$18.62	$52.00

Table 11 Cost Estimation Table

Additional considerations were applied to the cost estimates for improvements 8 and 9 because of their small scale compared to the other improvements. Day rate cost considerations were added to these small projects which more accurately approximates the actual costs. An hourly rate of $116 per person and 8-hour workdays were used to estimate these day rates. These additional considerations for improvements 8 and 9 are detailed in their respective sections.

The cost estimates should be used for estimating purposes only and are based on historic values which are non-location specific. Further detailed analysis is required to account for regional and/or site-specific considerations.

6.1 Improvement 1 – Highway 97/10 Connection

The Highway 97/10 connection improvement includes a 3,200-foot of 6-inch main installation located in the northwest of the system. It would span east-west from the intersection of Highway 97 and Desmond Road to the intersection of Old Highway 10 and Clearview Drive at the Currier Creek Development.

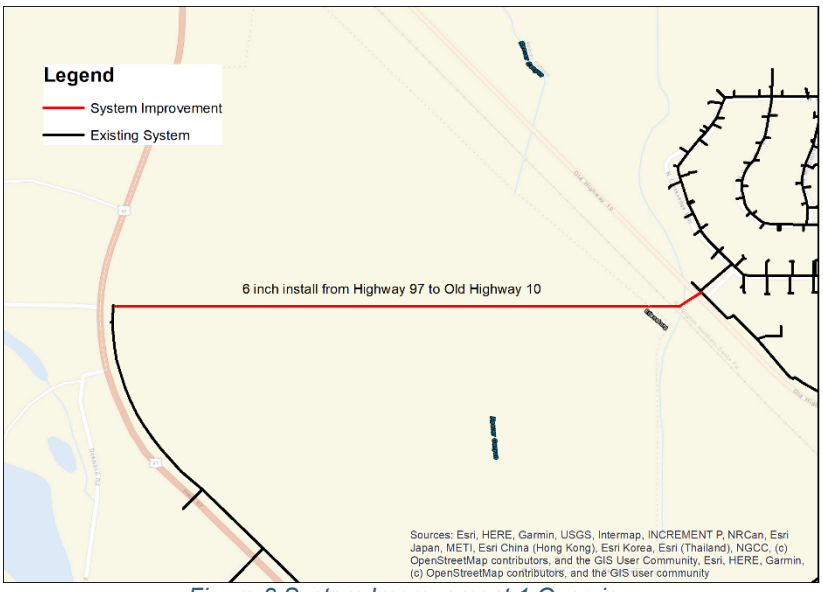

Figure 8 System Improvement 1 Overview

This installation has a looping benefit for the services along Highway 97 in the northwest. According to modeling results, this improvement will provide a slight hydraulic benefit of 0.86 PSI to local services under a medium population growth scenario. And it will provide a significant local hydraulic benefit of 2.65 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Estimated Project Cost: $181,000 (Calculated per unit costs in Table 11)

See Appendix C.01 – Improvement 1 Result Exhibits for modeling results.

6.2 Improvement 2 – Helena Avenue Extension

The Helena Avenue extension improvement incudes 540-foot of 4-inch main extension located in the northwest of the system. It would span east-west from the west end of Helena Avenue to the 4-inch main (ID: 05-2486) located within Cora Street.

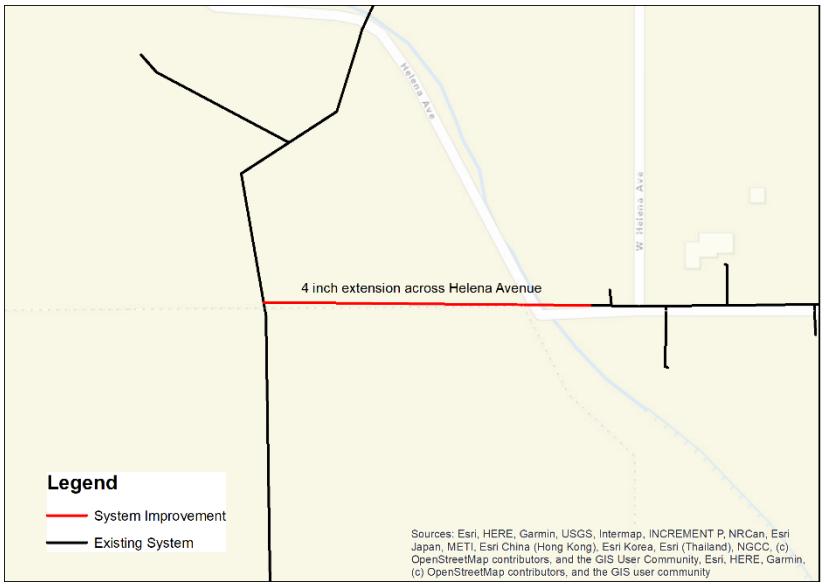

Figure 9 System Improvement 2 Overview

This installation has a looping benefit for the services along West Helena Avenue in the northwest. According to modeling results, this improvement will provide a slight hydraulic benefit of 0.21 PSI to local services under a medium population growth scenario. And it will provide a slight local hydraulic benefit of 0.42 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Estimated Project Cost: $22,000 (Calculated per unit costs in Table 11)

See Appendix C.02 – Improvement 2 Result Exhibits for modeling results.

6.3 Improvement 3 – Game Farm Road Extension

The Game Farm Road extension improvement includes a 3,750-foot of 6-inch main extension located in the northeast of the system. It would span east-west from the intersection of Game Farm Road and Wilson Creek Road to the 6-inch main along Game Farm Road (ID: 899-017), east of Pfenning Road.

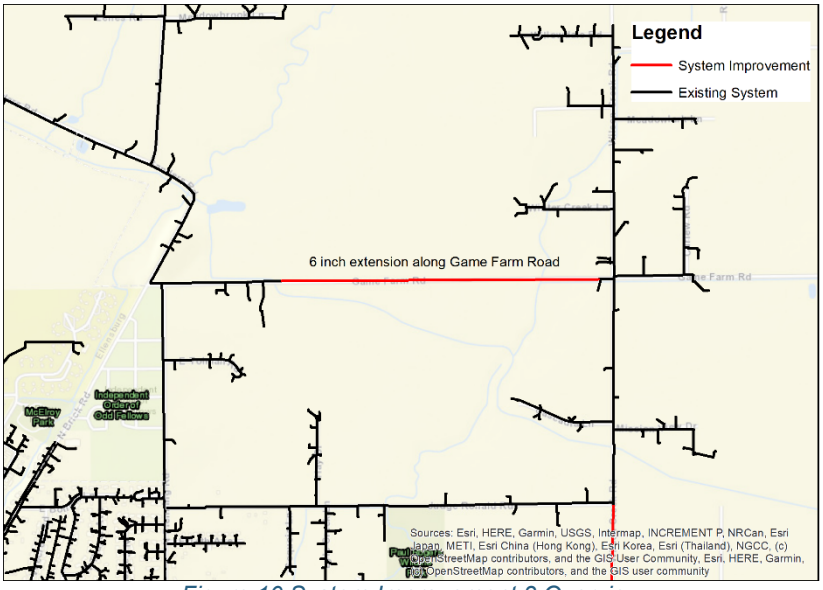

Figure 10 System Improvement 3 Overview

This installation has a major looping benefit for the services along Judge Ronald Road and Wilson Creek Road in the northeast. According to modeling results, this improvement will provide a slight hydraulic benefit of 0.03 PSI to local services under a medium population growth scenario. And it will provide a slight local hydraulic benefit of 0.06 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Estimated Project Cost: $212,000 (Calculated per unit costs in Table 11)

See Appendix C.03 – Improvement 3 Result Exhibits for modeling results.

6.4 Improvement 4 – Number 6 Road Extension

The Number 6 Road extension improvement includes a 3,900-foot of 4-inch main extension located in the East of the system. It would span north-south along Number 6 Road from near the intersection of West Willis Road and Number 6 Road and then east-west along Vantage Highway to a 2-inch main (ID: 898-131).

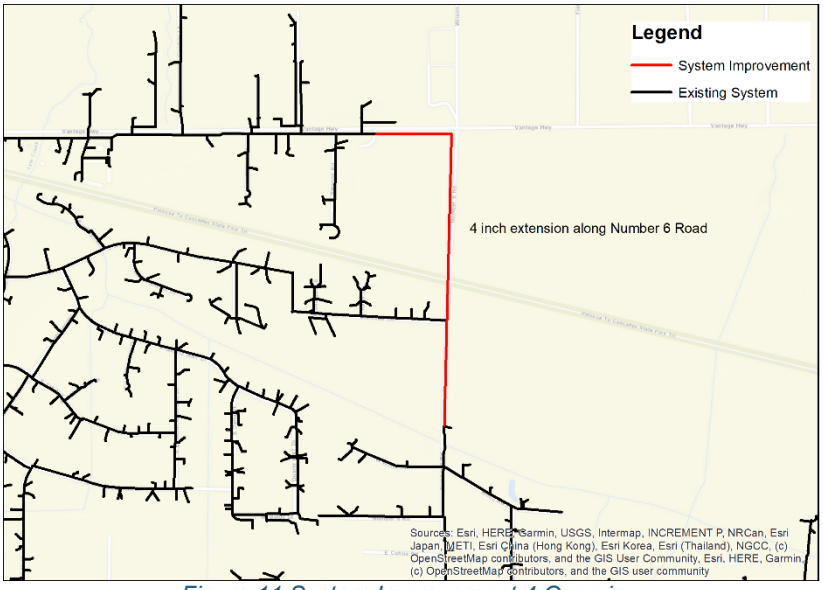

Figure 11 System Improvement 4 Overview

This installation has a major looping benefit for the services along Vantage Highway, Lone Star Lane, and East 3rd Avenue. According to modeling results, this improvement will provide a significant system-wide hydraulic benefit of 5.50 PSI and a significant hydraulic benefit of 4.94 PSI to local services under a medium population growth scenario. And it will provide a significant system-wide hydraulic benefit of 9.51 PSI and a significant local hydraulic benefit of 4.94 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Estimated Project Cost: $155,000 (Calculated per unit costs in Table 11)

See Appendix C.04 – Improvement 4 Result Exhibits for modeling results.

6.5 Improvement 5 – Berry Road Extension

The Berry Road extension improvement includes a 5,360-foot of 4-inch main extension located in the South of the system. It would span north-south along Bull Road from the intersection of Bull Road and East Umptanum Road to the intersection of Bull Road and Berry Road then east-west along Berry Road to the 4-inch main (ID: 897-006).

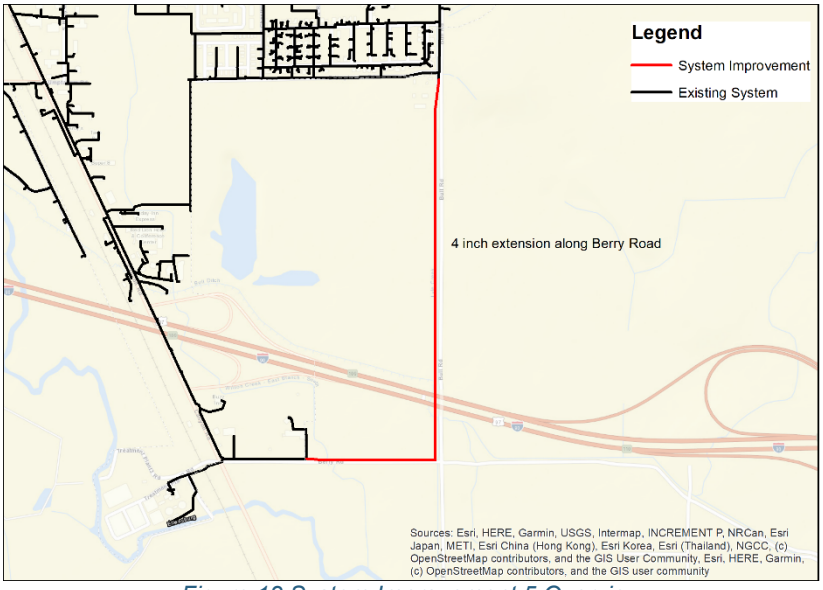

Figure 12 System Improvement 5 Overview

This improvement has a looping benefit for the services along Canyon Road. According to modeling results, this improvement will provide a slight hydraulic benefit of 0.40 PSI to local services under a medium population growth scenario. And it will provide a slight local hydraulic benefit of 0.82 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Estimated Project Cost: $214,000 (Calculated per unit costs in Table 11)

See Appendix C.05 – Improvement 5 Result Exhibits for modeling results.

6.6 Improvement 6 – East 11th Avenue Upgrade

The East 11th Avenue upgrade improvement includes a 1,350-foot of 2-inch main insertion located centrally in the system. It would replace the 4-inch steel main (ID: 859-004) along East 11th Avenue and North Chestnut Street.

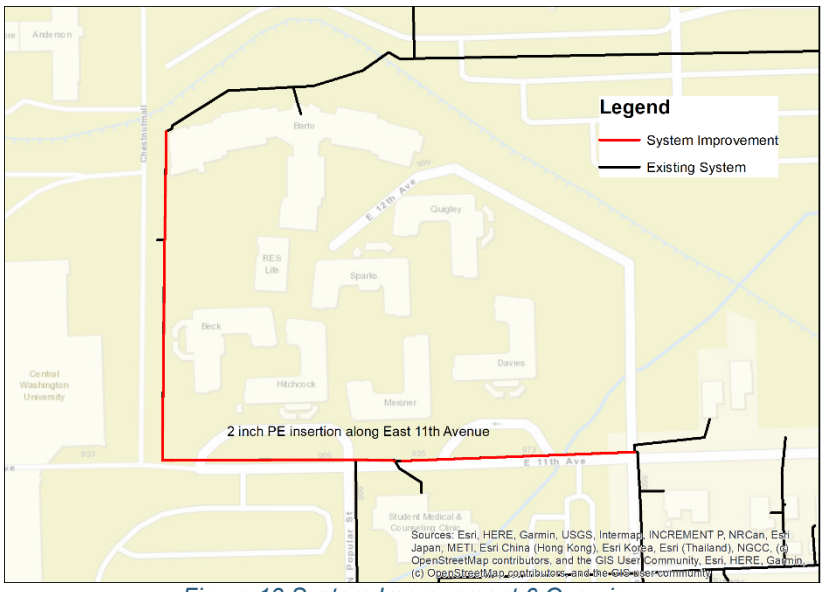

Figure 13 System Improvement 6 Overview

The smaller diameter PE pipe will be adequate to supply gas to this area. This installation would not result in a looping benefit not already seen in the system. According to modeling results, this improvement will create a hydraulic detriment or loss of 1.01 PSI to local services under a medium population growth scenario. And it will create a local hydraulic detriment of 1.88 PSI under a high population growth scenario.

Estimated Project Cost: $44,000 (Calculated per unit costs in Table 11)

See Appendix C.06 – Improvement 6 Result Exhibits for modeling results.

6.7 Improvement 7 – Northwest Regulator Station

The North West Regulator Station improvement includes a regulator station installation at Reecer Creek Road in the northwest of the system near the Currier Creek Development. This station requires a 3.84 mile 6-inch main installation branching from the 6-inch 856-001 main near the Seattle Road Station. The routing for this 3.84-mile main addition was modeled prioritizing the shortest path while following existing mains. A less invasive but longer route was not evaluated as part of this analysis.

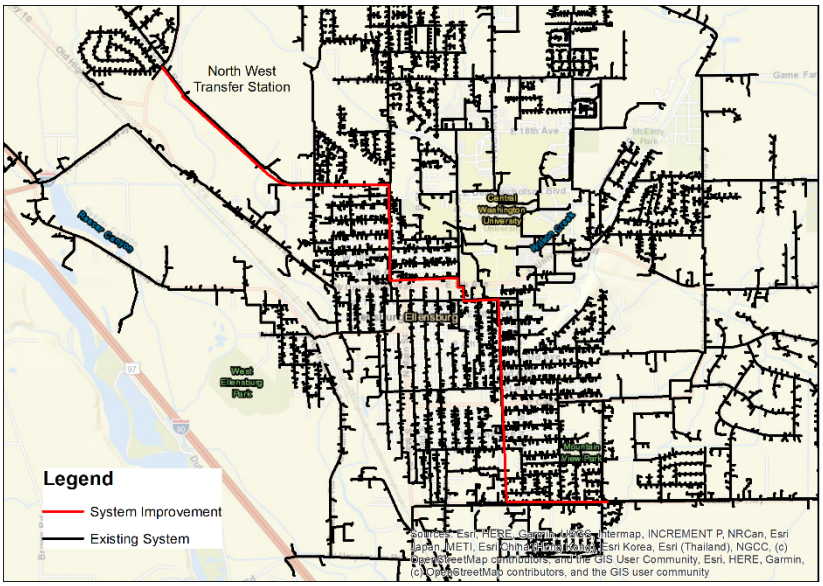

Figure 14 System Improvement 7 Overview

According to modeling results, this improvement will provide a major system-wide hydraulic benefit of 11.11 PSI under a medium population growth scenario. And it will provide a major system-wide hydraulic benefit of 15.75 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Estimated Project Cost: N/A (Project cost not estimated per the request of COE)

See Appendix C.07 – Improvement 7 Result Exhibits for modeling results.

6.8 Improvement 8 – East 7th Avenue Upgrade

The East 7th Avenue upgrade improvement includes replacing 117-foot main ID: 870-001 of the current 4-inch main with a 6-inch main located at the intersection of East 7th Avenue and North Sampson Street.

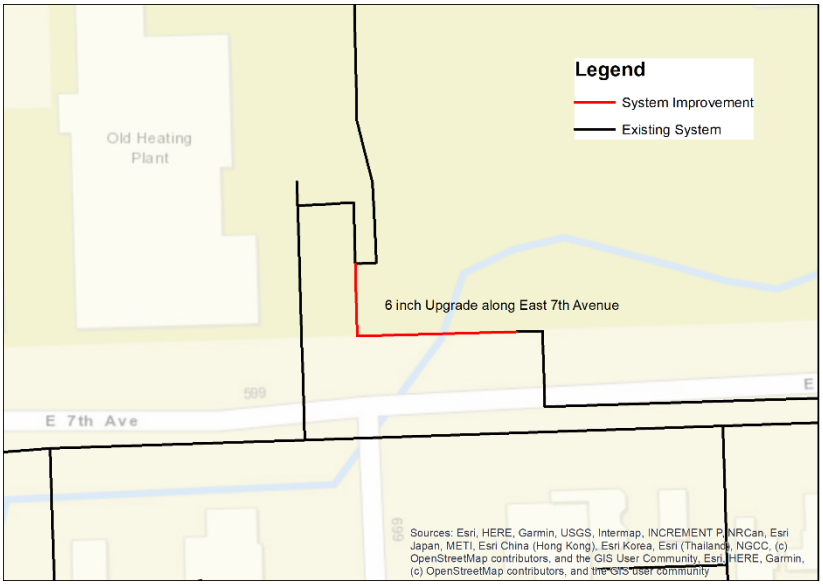

Figure 15 System Improvement 8 Overview

This improvement would not result in a looping benefit not already seen in the system. According to modeling results, this improvement will provide a slight local hydraulic benefit of 0.71 PSI under a medium population growth scenario. And it will provide a slight local hydraulic benefit of 1.29 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Additional cost estimation considerations:

1. Five-man crew with equipment for six (6) days: $27,840
2. Two-man boring crew with equipment for one (1) days: $1,856
3. Pipe cost: $1,220
4. 20% contingency

Estimated Project Cost: $37,100

See Appendix C.08 – Improvement 8 Result Exhibits for modeling results.

6.9 Improvement 9 – Radio Road Upgrade

The Radio Road upgrade improvement includes replacing 80-foot main ID: 870-001 of the current 2-inch main with a 4-inch main located at the intersection of Radio Road and Vista Road.

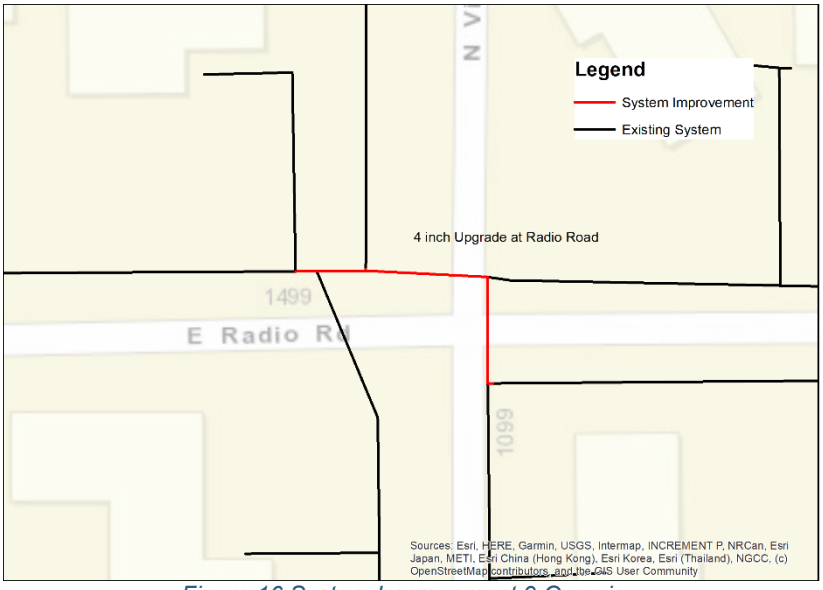

Figure 16 System Improvement 9 Overview

This improvement would not result in a looping benefit not already seen in the system. According to modeling results, this improvement will provide a slight local hydraulic benefit of 0.24 PSI under a medium population growth scenario. And it will provide a slight local hydraulic benefit of 0.38 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Additional cost estimation considerations:

5. Five-man crew with equipment for five (5) days: $23,000
6. Two-man boring crew with equipment for one (1) days: $1,856
7. Pipe cost: $263
8. 20% contingency

Estimated Project Cost: $30,400

See Appendix C.09 – Improvement 9 Result Exhibits for modeling results.

6.10 Improvement 10 – Wilson Creek Road Extension

This improvement expands upon improvement 4, named the Number 6 Road extension. The Wilson Creek Road extension improvement involves the installation of 2,700-feet of 4-inch main in addition to the 3,900-foot of 4-inch main installed for Number 6 Road extension (improvement 4). It would span north-south along Wilson Creek Road to Judge Ronald Road.

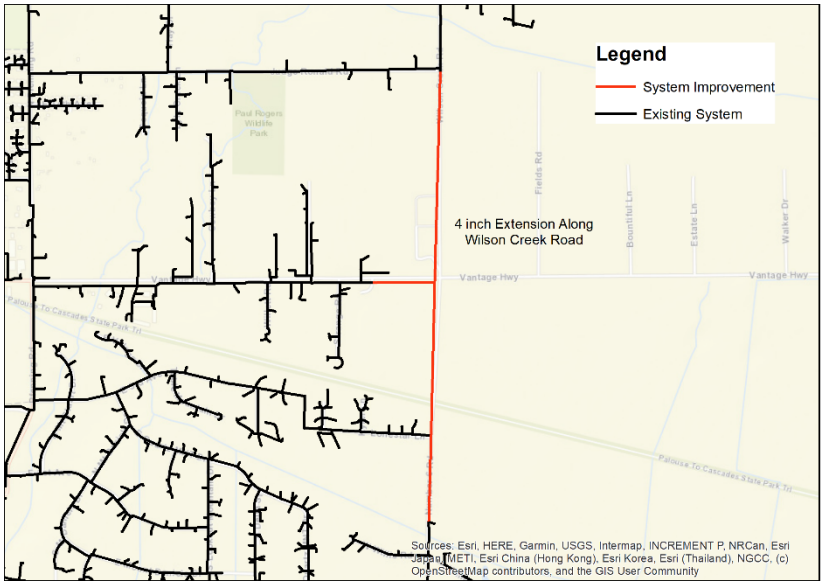

Figure 17 System Improvement 10 Overview

This improvement would result in a significant looping benefit to services along Judge Ronald Road, Vantage Highway, Lone Star Lane, and East 3rd Avenue. According to modeling results, this improvement will provide a significant system-wide hydraulic benefit of 8.18 PSI and a significant hydraulic benefit of 9.72 PSI to local services under a medium population growth scenario. And it will provide a significant system-wide hydraulic benefit of 13.22 PSI and a significant local hydraulic benefit of 14.74 PSI under a high population growth scenario. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Estimated Project Cost: $108,000 (Calculated per unit costs in Table 11)
Total project cost including $155,000 for Improvement 4: $263,000

See Appendix C.10 – Improvement 10 Result Exhibits

6.11 Improvement 11 – Increase Supply Pressure

Customer pressures can be improved throughout the system by increasing the system supply pressures. The minimum supply pressures recommended to maintain current performance criteria (Section 5.1) were modeled. These results are listed in Table 12 below.

Scenario Number	Services	HDD condition	CWU Physical Plant	Minimum Supply Set Pressures (PSIG)
2	2026 medium projected growth	60	Active	49
3	2026 high projected growth	60	Active	56
5	2026 medium projected growth	80	Inactive	47
6	2026 high projected growth	80	Inactive	56

Table 12 Improvement 11 Results

Under scenarios 2 and 5: 2026 medium projected growth, a supply pressure increase to at least 49 PSIG is recommended to maintain system performance without the need to implement any other system improvements.

Under scenarios 3 and 5: 2026 high projected growth, a supply pressure increase to 56 PSIG is recommended to maintain system performance without the need to implement any other system improvements. A smaller supply pressure increase less than 56 PSIG would not be sufficient alone to maintain system performance under high growth projections. Additional system improvements can be implemented in concurrence with a reduced supply pressure increase less than 56 PSIG and still maintain system performance under high growth projections.

6.12 Improvement 12 – Meadowbrook Lane to Willowdale Road Extension

The Meadowbrook Lane to Willowdale Road extension improvement includes 3,000-foot of 2-inch main extension located in the North East of the system. It would span east-west from Meadowbrook Lane to Willowdale Road.

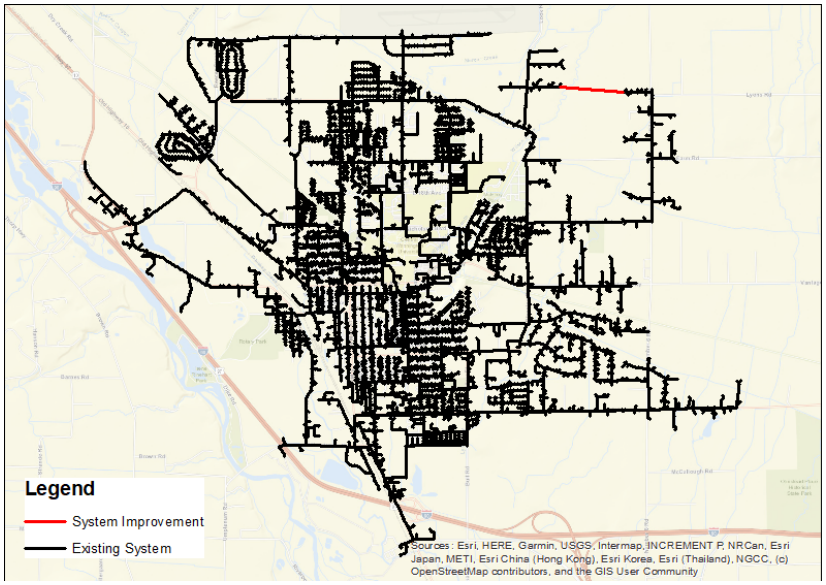

Figure 18 System Improvement 12 Overview

This improvement would result in a significant looping benefit to services branching from Main ID: 899-115 and 800-104. According to modeling results, this improvement will not provide a significant system-wide hydraulic benefit. Alone, this improvement does not enable the system to maintain current system performance under medium or high population growth scenarios.

Estimated Project Cost: $97,000 (Calculated per unit costs in Table 11)

See C.11 – Improvement 12 Result Exhibits

7.0 Minimum Improvements to Maintain System Performance

The six (6) year projected demand increase necessitates system improvements to maintain performance at current benchmarks (Section 5.1). Implementing one or more improvements are recommended to allow the system to function within the performance criteria established for this analysis. Those criteria being:

1. Supply all services with at least 20 psi up to 60 HDD conditions
2. Supply all services except CWU with at least 20 psi up to 80 HDD conditions

Through an iterative process, the minimum configuration of improvements which allow the system to maintain performance was determined. The following projected demand growth scenarios were considered:

Scenario Number	Services	HDD condition	CWU Physical Plant
2	2026 medium projected growth	60	Active
3	2026 high projected growth	60	Active
5	2026 medium projected growth	80	Inactive
6	2026 high projected growth	80	Inactive

Table 13 Projected Growth Scenarios

7.1 Maintaining System Performance Under Medium Population Growth Scenario

The following system improvement is recommended to maintain system performance under a six (6) year medium population growth scenario:

- Improvement 11 – Increase Supply Pressure to 49 PSIG

See Appendix D – Minimum Improvements Result Exhibits.

7.1.1 Six-Year Plan and Cost Estimates – Medium Population Growth

The following schedule of recommended improvements was made using the yearly population projections established in Section 4.2. This schedule reflects the recommended improvements under medium projected population growth.

Year	Does the System Meet Performance Criteria?[13]	Estimated Project Cost[14]
2021	System meets criteria with current infrastructure and supply pressures.	N/A
2022	System meets criteria with current infrastructure and supply pressures.	N/A
2023	System meets criteria with current infrastructure and supply pressures.	N/A
2024	System meets criteria with supply pressure set to 43 PSIG.	N/A
2025	System meets criteria with supply pressure set to 45 PSIG.	N/A
2026	System meets criteria with supply pressure set to 49 PSIG.	N/A

Table 14 Six-Year Improvement Schedule Medium Growth

[13] Performance criteria is established in Section 5.1
[14] Adjusted for annual inflation of 2.5%

7.2 Maintaining System Performance Under High Population Growth Scenario

The following system improvements are recommended to maintain system performance under a six (6) year high population growth scenario:

- Improvement 4 – Number 6 Road Extension
- Improvement 11 – Increase Supply Pressure to 50 PSIG

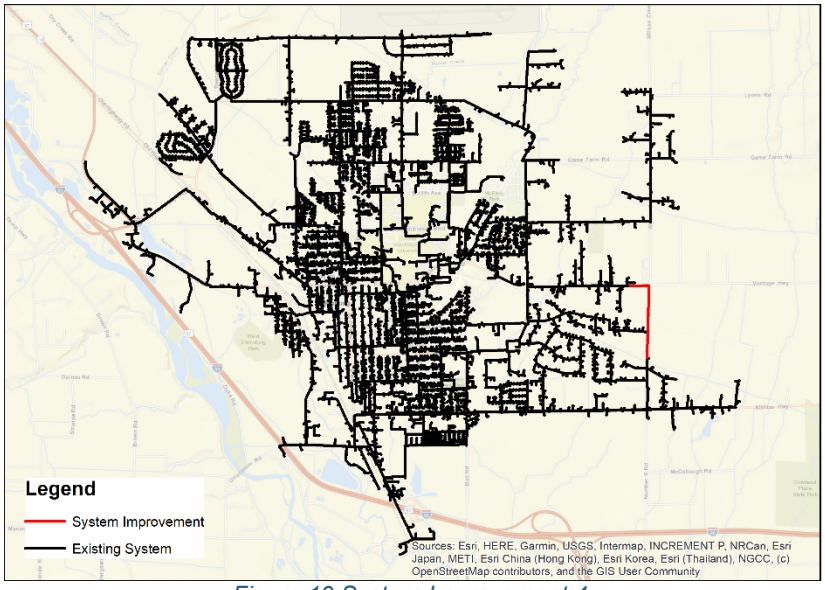

Figure 19 System Improvement 4

See Appendix D – Minimum Improvements Result Exhibits.

7.2.1 Six-Year Plan and Cost Estimates – High Population Growth

The following schedule of recommended improvements was made using the yearly population projections established in Section 4.2. This schedule reflects the recommended improvements under high projected population growth.

Year	Does the System Meet Performance Criteria?[15]	Estimated Project Cost[16]
2021	System meets criteria with current infrastructure and supply pressures.	N/A
2022	System meets criteria with supply pressure set to 44 PSIG.	N/A
2023	System meets criteria with supply pressure set to 47 PSIG.	N/A
2024	System meets criteria with supply pressure set to 49 PSIG.	N/A
2025	System meets criteria with supply pressure set to 52 PSIG.	N/A
2026	System meets criteria with improvement 4 and supply pressure set to 50 PSIG.	$175,368

Table 15 Six-Year Improvement Schedule High Growth

[15] Performance criteria is established in Section 5.1.
[16] Adjusted for annual inflation of 2.5%

8.0 Additional Analysis Results

Two (2) additional analyses were conducted during this project. For the first, single-feed branches were identified and ranked by potential impact to customers. For the second, EN was asked to prepare a telemetry system upgrade scope of work to serve as guidance on replacing and upgrading the telemetry system with considerations to see live data and remote integration of small pressure recorders.

8.1 Single-Feed Branches

As part of the current system review, EN identified the seventeen (17) single-feed branches with the greatest number of services. Single-feed branches pose an elevated service loss risk in gas networks and should be eliminated. Only branches with at least twenty (20) services were included in this analysis. Table 16 details each single-feed branch.

Single-Feed Branch Number	Feed Main ID	Current Service Count
1 A[17]	899-115	83
1 B17	899-115	34
2[18]	896-027	63
3	856-114	50
4	856-054	50
5	856-056	49
6	5-1968	43
8	895-004	35
9	856-040	34
10	899-069	33
11[19]	890-136	33
12	898-125	31
13	4-1955	29
14	856-025	29
15	856-026	24
16	856-028	24
17	856-044	24

Table 16 Single-Feed Branch Ranking

Figure 20 depicts the seventeen (17) single-feed branches locations within the COE system.

[17] Single-feed branch 1 A&B are related and are affected by system improvement number 3.
[18] Single-feed branch 2 would be eliminated by system improvement number 4.

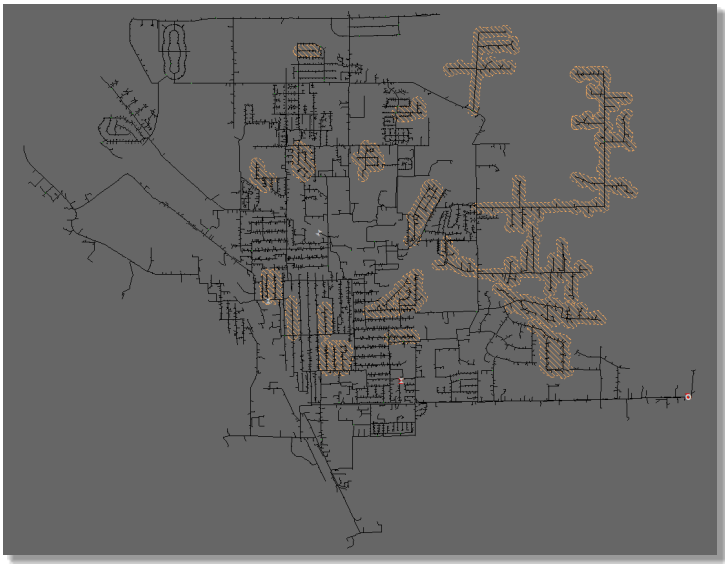

Figure 20 Single-Feed Branches Overview

See Appendix E – Single Feed Branch Model Exhibits for a plan view of each single feed branch.

9.0 Recommendations

Based on the model results, the current system piping is capable of adequately supplying service points with at least 20 PSIG under the medium growth scenarios through 2026 if supply pressures are increased. And the current system piping is capable of adequately supplying service points with at least 20 PSIG under high growth scenarios through 2025 if supply pressures are increased. Implementing system improvement 4 and increasing supply pressures are recommended to enable the system to adequately supply service points with at least 20 PSIG under high growth scenarios through 2026. The minimum system improvements for both the medium and high population six (6) year projection are as follows:

Six (6) Year Medium Projected population growth recommended improvements:

- Improvement 11 – Increase Supply Pressure to 49 PSIG

Six (6) Year High Projected population growth recommended improvements:

- Improvement 4 – Number 6 Road Extension
- Improvement 11 – Increase Supply Pressure to 50 PSIG

9.1 Other System Improvement Recommendations

In addition to the minimum recommended improvements, the other system improvements were prioritized by degree of benefit according to modeling results and looping benefit. Improvement 7 was not considered for prioritization because of the infeasibility of implementation due to its extreme cost. Improvement 2 and 5 were not considered for prioritization because it is already planned as of the writing of this report.

Priority	System Improvement Number	Hydraulic Benefit Medium Growth (PSIG)	Looping Benefit 2020 services looped	Estimated Project Cost (2021 Prices)
1	4	5.50	63	$155,000
2	10[20]	8.18	29	$108,000
3	12	-0.01	83	$97,000
4	3	0.03	32	$212,000
5	1	0.86	16	$181,000
6	8	0.50	0	$37,100[21]
7	9	0.04	0	$30,400[21]
8	6	-0.44	0	$44,000

Table 17 Project Prioritization

[20] System improvement 10 is an expansion of system improvement 4 and thus is subsequent to system improvement 4 in this prioritization list.
[21] Cost estimate based on approximate daily crew rates.

Appendix A – Population and Service Projection Tables

Appendix A – Population and Service Projection Tables

Medium Growth Projection													
Year	Population	Population Forecast	Percent Change	Residential Services	R/P Ratio	Commercial 1	C/P 1 Ratio	Commercial 2	C/P 2 Ratio	Commercial 3	C/P 3 Ratio	Commercial 4	C/P 4 Ratio
1990	12,779	-	-	-	-	-	-	-	-	-	-	-	-
1991	12,745	-	-	-	-	-	-	-	-	-	-	-	-
1992	12,579	-	-	-	-	-	-	-	-	-	-	-	-
1993	12,894	-	-	-	-	-	-	-	-	-	-	-	-
1994	13,307	-	-	-	-	-	-	-	-	-	-	-	-
1995	13,269	-	-	-	-	-	-	-	-	-	-	-	-
1996	13,481	-	-	-	-	-	-	-	-	-	-	-	-
1997	13,814	-	-	-	-	-	-	-	-	-	-	-	-
1998	14,170	-	-	-	-	-	-	-	-	-	-	-	-
1999	14,512	-	-	-	-	-	-	-	-	-	-	-	-
2000	15,565	-	-	-	-	-	-	-	-	-	-	-	-
2001	15,780	-	-	-	-	-	-	-	-	-	-	-	-
2002	16,138	-	-	-	-	-	-	-	-	-	-	-	-
2003	16,384	-	-	-	-	-	-	-	-	-	-	-	-
2004	17,062	-	-	-	-	-	-	-	-	-	-	-	-
2005	16,961	-	-	-	-	-	-	-	-	-	-	-	-
2006	17,288	-	-	-	-	-	-	-	-	-	-	-	-
2007	17,214	-	-	-	-	-	-	-	-	-	-	-	-
2008	17,344	-	-	-	-	-	-	-	-	-	-	-	-
2009	17,505	-	-	-	-	-	-	-	-	-	-	-	-
2010	18,416	-	-	-	-	-	-	-	-	-	-	-	-
2011	18,602	-	-	-	-	-	-	-	-	-	-	-	-
2012	18,460	-	-	-	-	-	-	-	-	-	-	-	-
2013	18,520	-	-	-	-	-	-	-	-	-	-	-	-
2014	18,961	-	-	-	-	-	-	-	-	-	-	-	-
2015	18,985	-	-	3,830	0.202	107	0.006	105	0.006	88	0.005	439	0.023
2016	19,763	-	-	3,951	0.200	108	0.005	104	0.005	87	0.004	440	0.022
2017	20,300	-	-	3,997	0.197	110	0.005	104	0.005	87	0.004	457	0.023
2018	20,977	-	-	4,055	0.193	122	0.006	108	0.005	87	0.004	472	0.023
2019	21,111	-	-	3,998	0.189	108	0.005	105	0.005	86	0.004	464	0.022
2020	21,345	-	-	4,062	0.190	112	0.005	108	0.005	85	0.004	463	0.022
2021	-	21,662	1.48%	4,230	0.195	118	0.005	112	0.005	92	0.004	484	0.022
2022	-	21,960	1.38%	4,288	0.195	120	0.005	114	0.005	93	0.004	491	0.022
2023	-	22,258	1.36%	4,346	0.195	121	0.005	115	0.005	95	0.004	497	0.022
2024	-	22,556	1.34%	4,404	0.195	123	0.005	117	0.005	96	0.004	504	0.022
2025	-	22,854	1.32%	4,462	0.195	125	0.005	118	0.005	97	0.004	511	0.022
2026	-	23,152	1.30%	4,521	0.195	126	0.005	120	0.005	98	0.004	517	0.022

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Appendix A – Population and Service Projection Tables

High Growth Projection													
Year	Population	Population Forecast	Percent Change	Residential Services	R/P Ratio	Commercial 1	C/P 1 Ratio	Commercial 2	C/P 2 Ratio	Commercial 3	C/P 3 Ratio	Commercial 4	C/P 4 Ratio
1990	12,779	-	-	-	-	-	-	-	-	-	-	-	-
1991	12,745	-	-	-	-	-	-	-	-	-	-	-	-
1992	12,579	-	-	-	-	-	-	-	-	-	-	-	-
1993	12,894	-	-	-	-	-	-	-	-	-	-	-	-
1994	13,307	-	-	-	-	-	-	-	-	-	-	-	-
1995	13,269	-	-	-	-	-	-	-	-	-	-	-	-
1996	13,481	-	-	-	-	-	-	-	-	-	-	-	-
1997	13,814	-	-	-	-	-	-	-	-	-	-	-	-
1998	14,170	-	-	-	-	-	-	-	-	-	-	-	-
1999	14,512	-	-	-	-	-	-	-	-	-	-	-	-
2000	15,565	-	-	-	-	-	-	-	-	-	-	-	-
2001	15,780	-	-	-	-	-	-	-	-	-	-	-	-
2002	16,138	-	-	-	-	-	-	-	-	-	-	-	-
2003	16,384	-	-	-	-	-	-	-	-	-	-	-	-
2004	17,062	-	-	-	-	-	-	-	-	-	-	-	-
2005	16,961	-	-	-	-	-	-	-	-	-	-	-	-
2006	17,288	-	-	-	-	-	-	-	-	-	-	-	-
2007	17,214	-	-	-	-	-	-	-	-	-	-	-	-
2008	17,344	-	-	-	-	-	-	-	-	-	-	-	-
2009	17,505	-	-	-	-	-	-	-	-	-	-	-	-
2010	18,416	-	-	-	-	-	-	-	-	-	-	-	-
2011	18,602	-	-	-	-	-	-	-	-	-	-	-	-
2012	18,460	-	-	-	-	-	-	-	-	-	-	-	-
2013	18,520	-	-	-	-	-	-	-	-	-	-	-	-
2014	18,961	-	-	-	-	-	-	-	-	-	-	-	-
2015	18,985	-	-	3,830	0.202	107	0.006	105	0.006	88	0.005	439	0.023
2016	19,763	-	-	3,951	0.200	108	0.005	104	0.005	87	0.004	440	0.022
2017	20,300	-	-	3,997	0.197	110	0.005	104	0.005	87	0.004	457	0.023
2018	20,977	-	-	4,055	0.193	122	0.006	108	0.005	87	0.004	472	0.023
2019	21,111	-	-	3,998	0.189	108	0.005	105	0.005	86	0.004	464	0.022
2020	21,345	-	-	4,062	0.190	112	0.005	108	0.005	85	0.004	463	0.022
2021	-	22,260	4.28%	4,346	0.195	121	0.005	115	0.005	95	0.004	497	0.022
2022	-	22,707	2.01%	4,434	0.195	124	0.005	118	0.005	97	0.004	507	0.022
2023	-	23,130	1.86%	4,516	0.195	126	0.005	120	0.005	98	0.004	517	0.022
2024	-	23,537	1.76%	4,596	0.195	128	0.005	122	0.005	100	0.004	526	0.022
2025	-	23,934	1.68%	4,673	0.195	130	0.005	124	0.005	102	0.004	535	0.022
2026	-	24,322	1.62%	4,749	0.195	133	0.005	126	0.005	103	0.004	543	0.022

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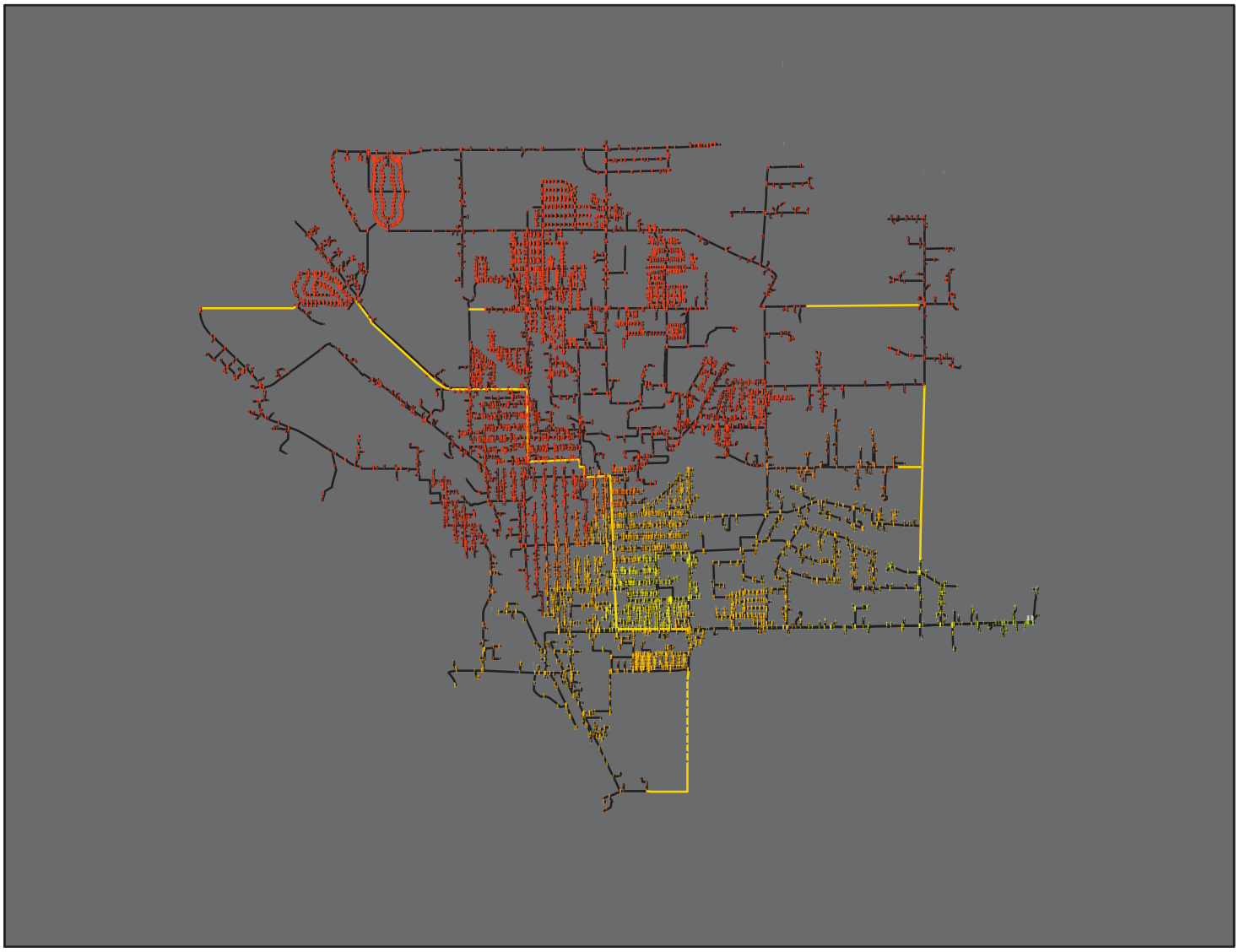
Appendix B – Current System Limits

Current System Limit
2020 Current | CWU Active



0 2,900 5,800 8,700 11,600 Feet

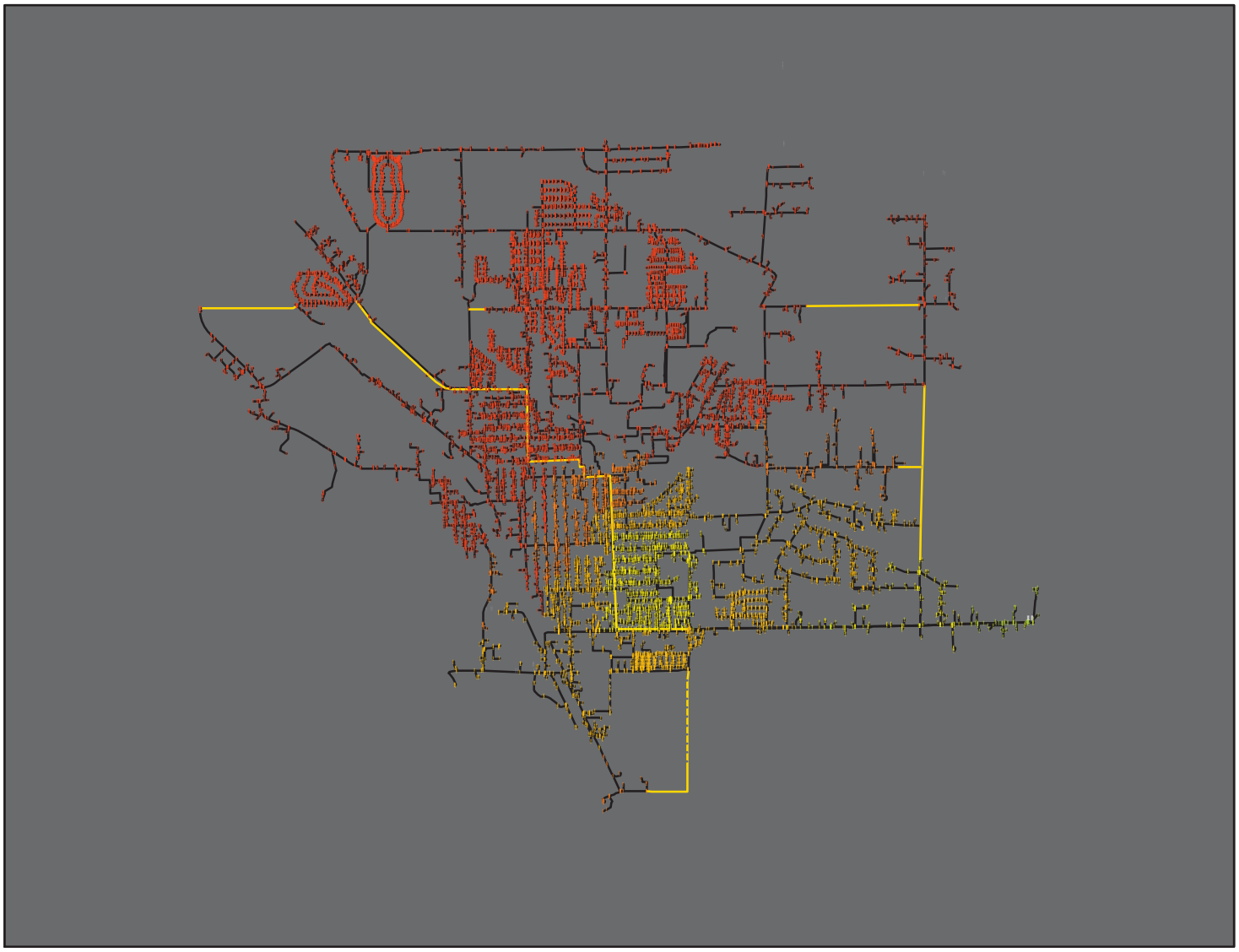
Scale: 1 = 64,830

Current System Limit Information

Services: 2020 Current
HDD: 63
CWU Service: Active
Total Supply Flow: 446,904.36 SCFH
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2565)
Enabled (17640)	< 20.00 (2)
Disabled (2563)	20.00 - 25.00 (11781)
Proposed (21)	25.00 - 30.00 (975)
Retired (0)	30.00 - 35.00 (3492)
	35.00 - 40.00 (1116)
	40.00 - 45.00 (69)
	> 45.00 (33)

Current System Limit
2026 Medium Growth | CWU Active



0 2,900 5,800 8,700 11,600 Feet

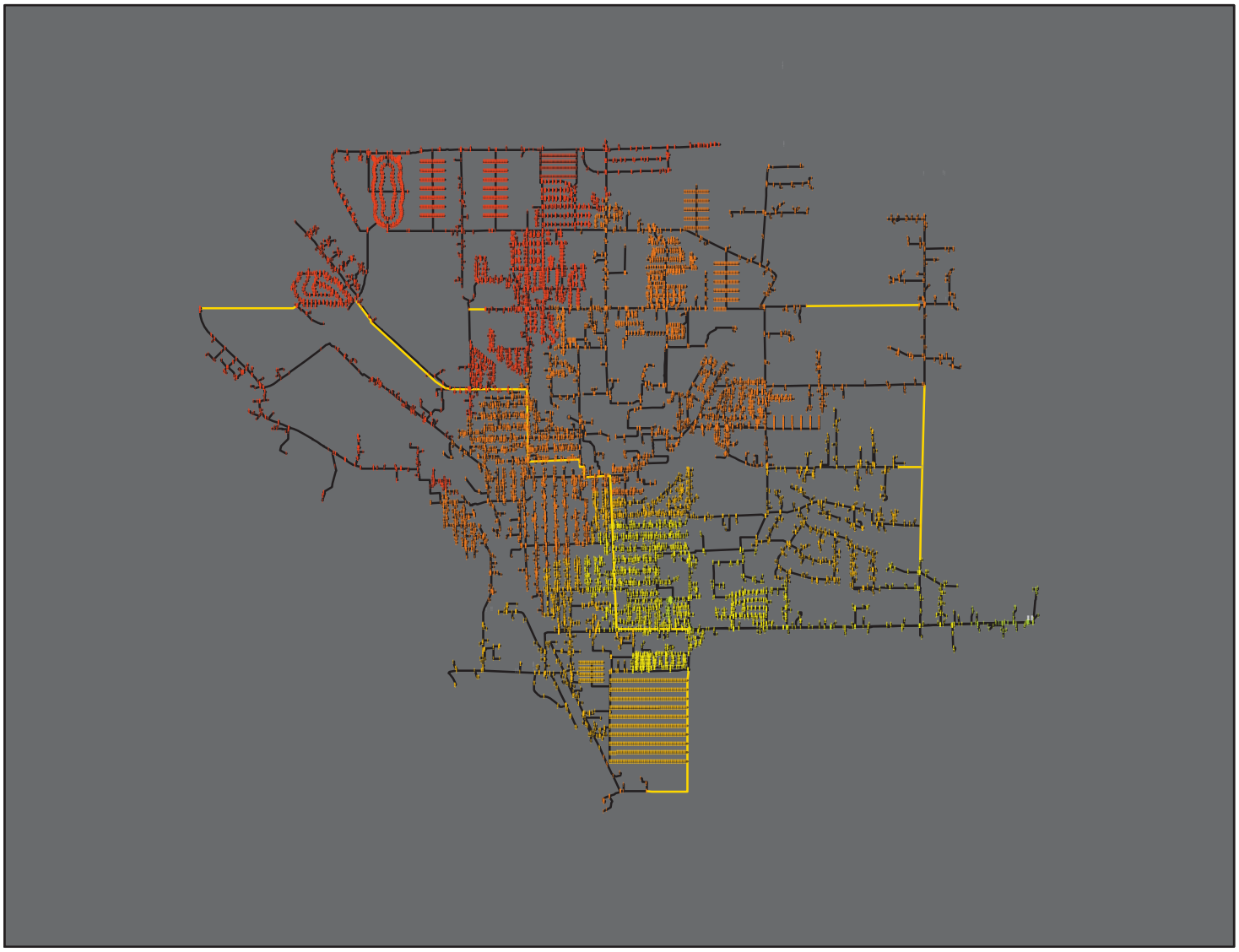
Scale: 1 = 64,830

Current System Limit Information

Services: 2026 Medium
HDD: 57
CWU Service: Active
Total Supply Flow: 443,447.16 SCFH
Suply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (2565)
.	Enabled (17640)	!	< 20.00 (2)
.	Disabled (2563)	!	20.00 - 25.00 (11270)
.	Proposed (21)	!	25.00 - 30.00 (1414)
.	Retired (0)	!	30.00 - 35.00 (3141)
		!	35.00 - 40.00 (1535)
		!	40.00 - 45.00 (73)
		!	> 45.00 (33)

Current System Limit
2026 High Growth | CWU Active



0 2,900 5,800 8,700 11,600 Feet

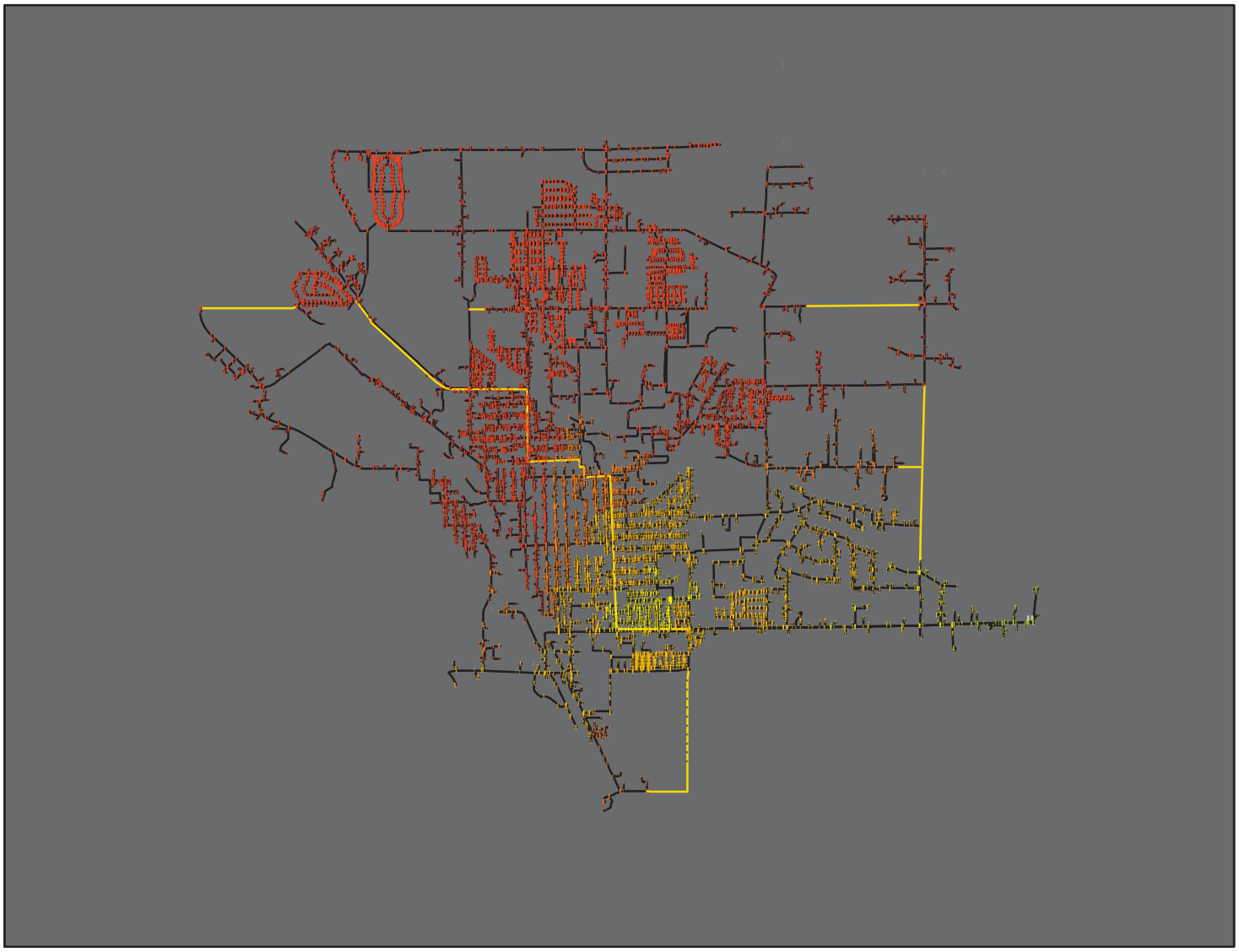
Scale: 1 = 64,830

Current System Limit Information

Services: 2026 High
HDD: 54
CWU Service: Active
Total Supply Flow: 434,868.95 SCFH
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (35)
Enabled (20179)	< 20.00 (2)
Disabled (24)	20.00 - 25.00 (6352)
Proposed (21)	25.00 - 30.00 (7276)
Retired (0)	30.00 - 35.00 (3373)
	35.00 - 40.00 (2801)
	40.00 - 45.00 (157)
	> 45.00 (37)

Current System Limit
2020 Current | CWU Inactive



0 2,900 5,800 8,700 11,600 Feet

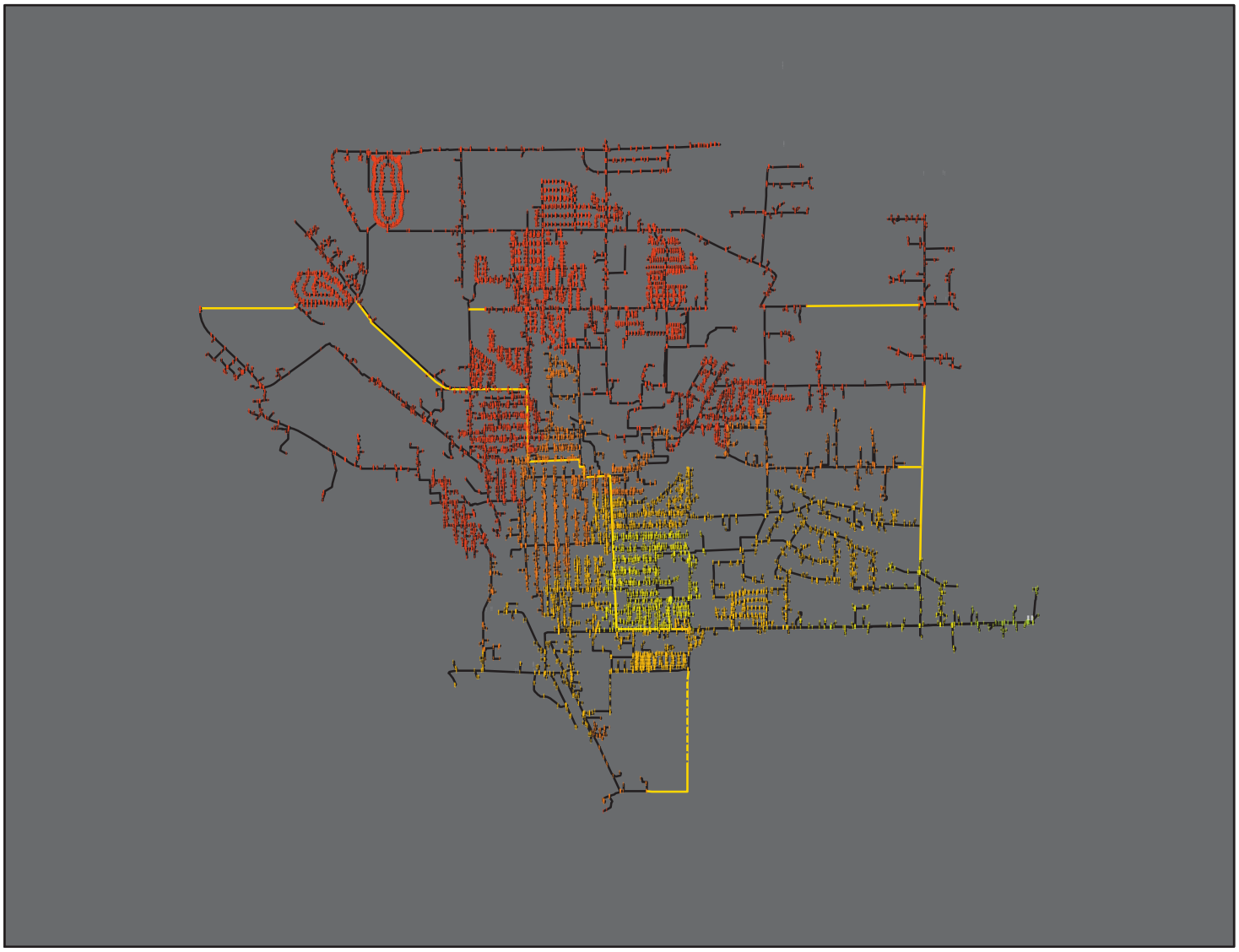
Scale: 1 = 64,830

Current System Limit Information

Services: 2020 Current
HDD: 88
CWU Service: Inactive
Total Supply Flow: 451,107.93 SCFH
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 1*
*TCF is supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2566)
Enabled (17639)	< 20.00 (1)
Disabled (2564)	20.00 - 25.00 (11224)
Proposed (21)	25.00 - 30.00 (1670)
Retired (0)	30.00 - 35.00 (3675)
	35.00 - 40.00 (796)
	40.00 - 45.00 (68)
	> 45.00 (33)

Current System Limit
2026 Medium Growth | CWU Inactive



0 2,900 5,800 8,700 11,600 Feet

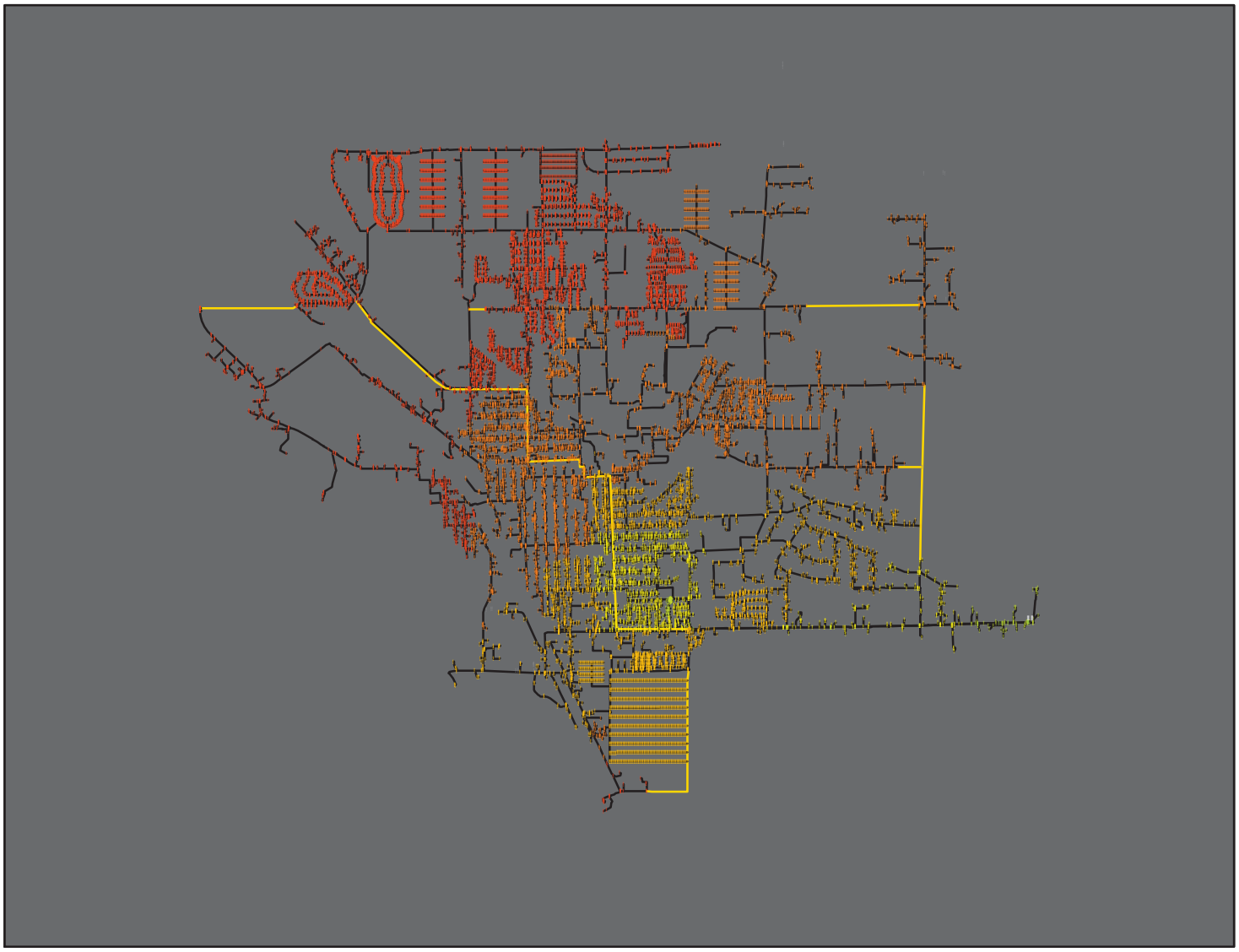
Scale: 1 = 64,830

Current System Limit Information

Services: 2026 Medium
HDD: 77
CWU Service: Inactive
Total Supply Flow: 445,182.33 SCFH
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*TCF is supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2566)
Enabled (17639)	< 20.00 (1)
Disabled (2564)	20.00 - 25.00 (10193)
Proposed (21)	25.00 - 30.00 (2423)
Retired (0)	30.00 - 35.00 (3252)
	35.00 - 40.00 (1476)
	40.00 - 45.00 (89)
	> 45.00 (33)

Current System Limit
2026 High Growth | CWU Inactive



0 2,900 5,800 8,700 11,600 Feet

Scale: 1 = 64,830

Current System Limit Information

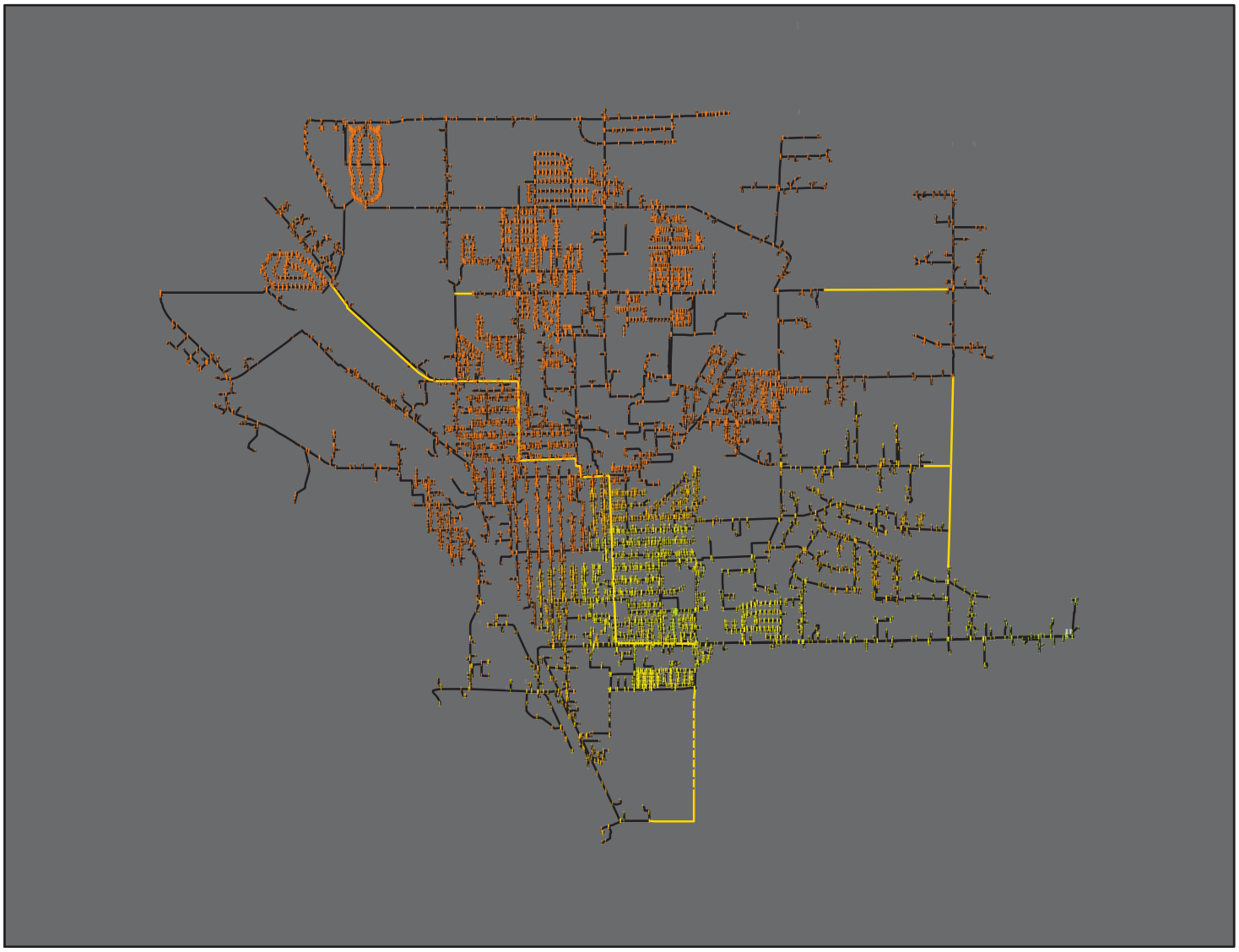
Services: 2026 High
HDD: 73
CWU Service: Inactive
Total Supply Flow: 440,652.26 SCFH
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*TCF is supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (36)
.	Enabled (20178)	!	< 20.00 (1)
.	Disabled (25)	!	20.00 - 25.00 (8045)
.	Proposed (21)	!	25.00 - 30.00 (5682)
.	Retired (0)	!	30.00 - 35.00 (4465)
		!	35.00 - 40.00 (1617)
		!	40.00 - 45.00 (154)
		!	> 45.00 (33)

Appendix C – Individual System Improvement Exhibits

Appendix C.01 – Improvement 1 Result Exhibits

Improvement 1 - Highway 97/10 Connection
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

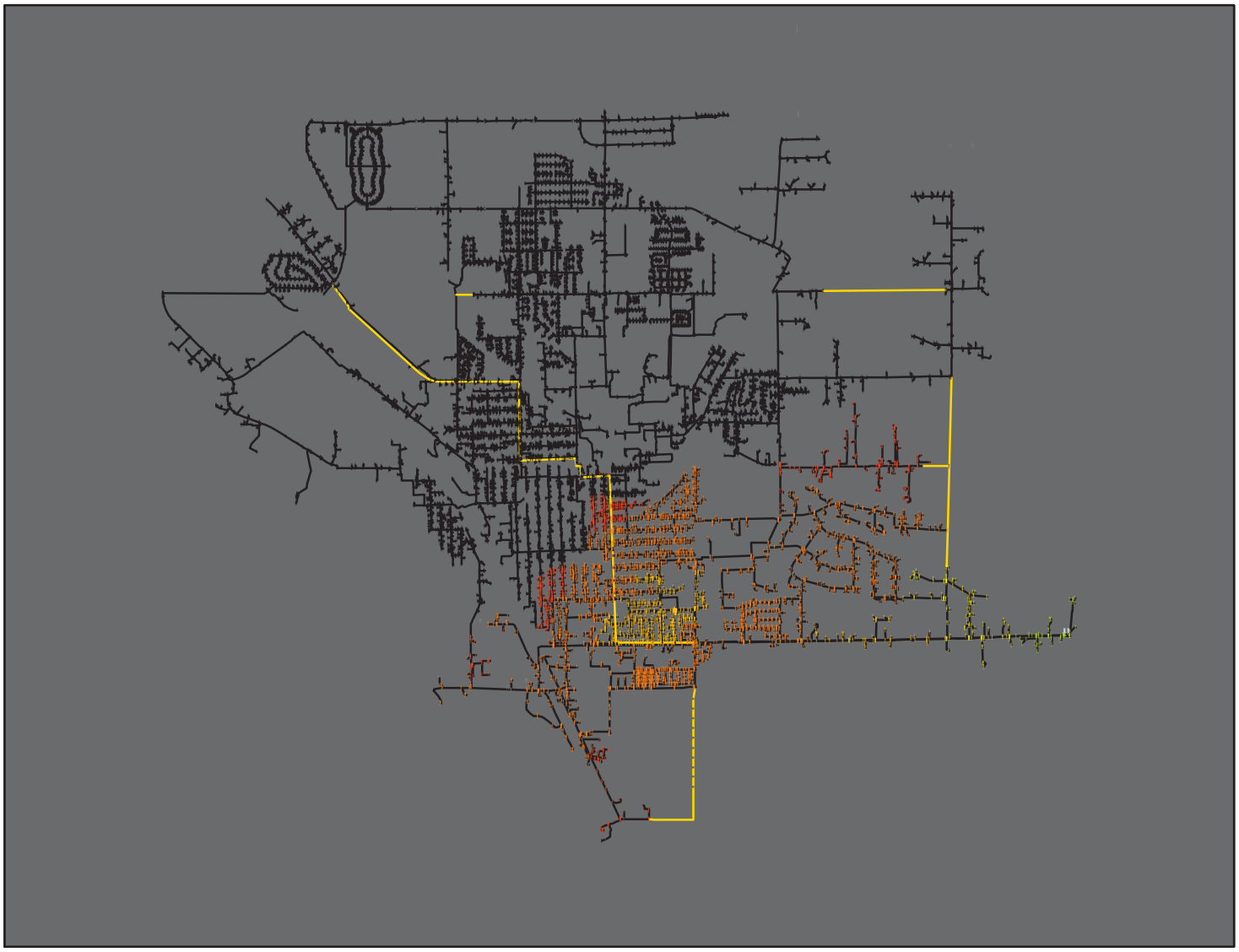
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2564)
Enabled (17641)	< 20.00 (2)
Disabled (2563)	20.00 - 25.00 (1)
Proposed (20)	25.00 - 30.00 (12108)
Retired (0)	30.00 - 35.00 (2188)
	35.00 - 40.00 (2974)
	40.00 - 45.00 (146)
	> 45.00 (50)

Improvement 1 - Highway 97/10 Connection
Scenario 2



0 2,400 4,800 7,200 9,600 Feet

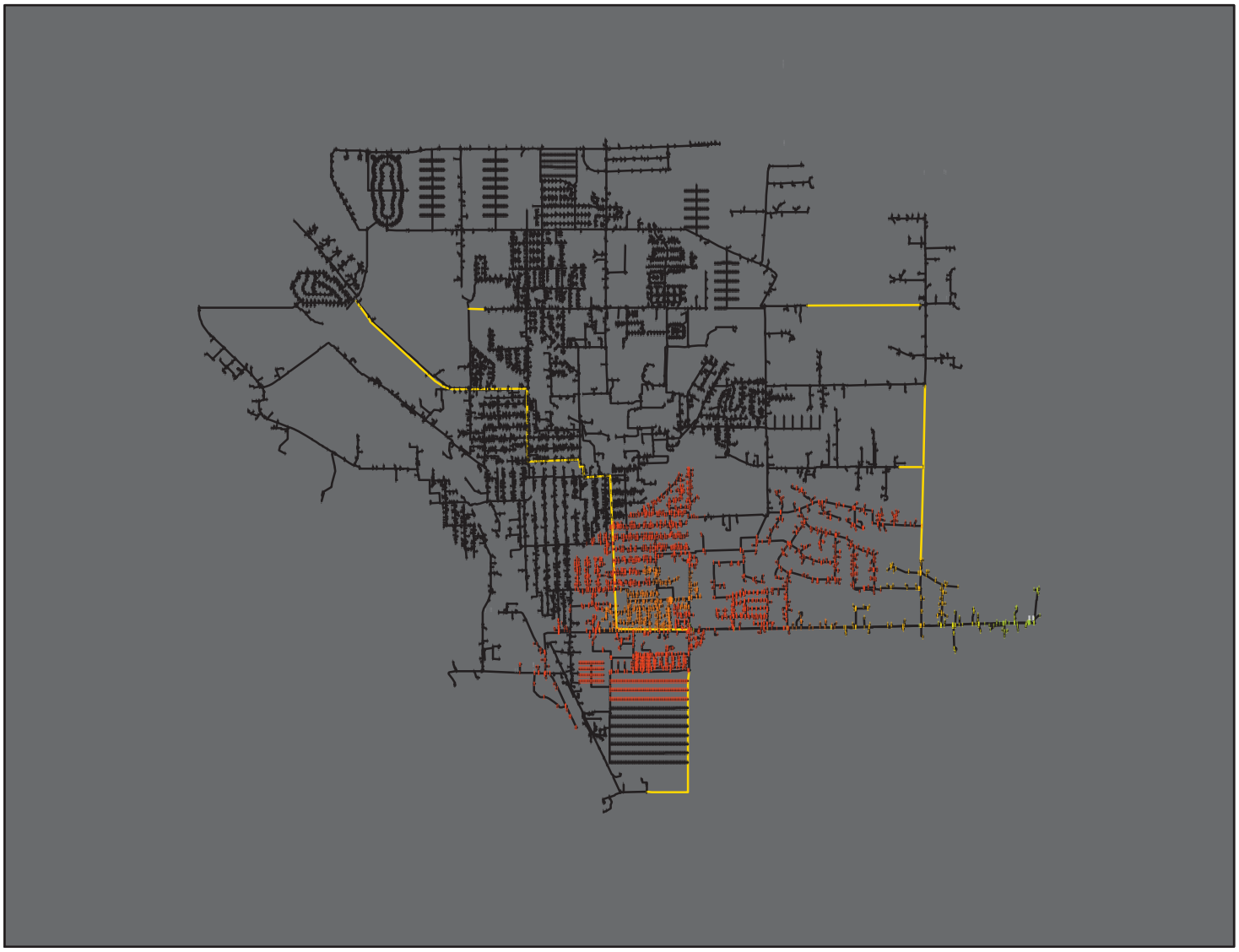
Scale: 1 = 59,550

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,076

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (2564)
.	Enabled (17641)	!	< 20.00 (12251)
.	Disabled (2563)	!	20.00 - 25.00 (722)
.	Proposed (20)	!	25.00 - 30.00 (3498)
.	Retired (0)	!	30.00 - 35.00 (775)
		!	35.00 - 40.00 (136)
		!	40.00 - 45.00 (55)
		!	> 45.00 (32)

Improvement 1 - Highway 97/10 Connection
Scenario 3



0 2,600 5,200 7,800 10,400 Feet

Scale: 1 = 64,660

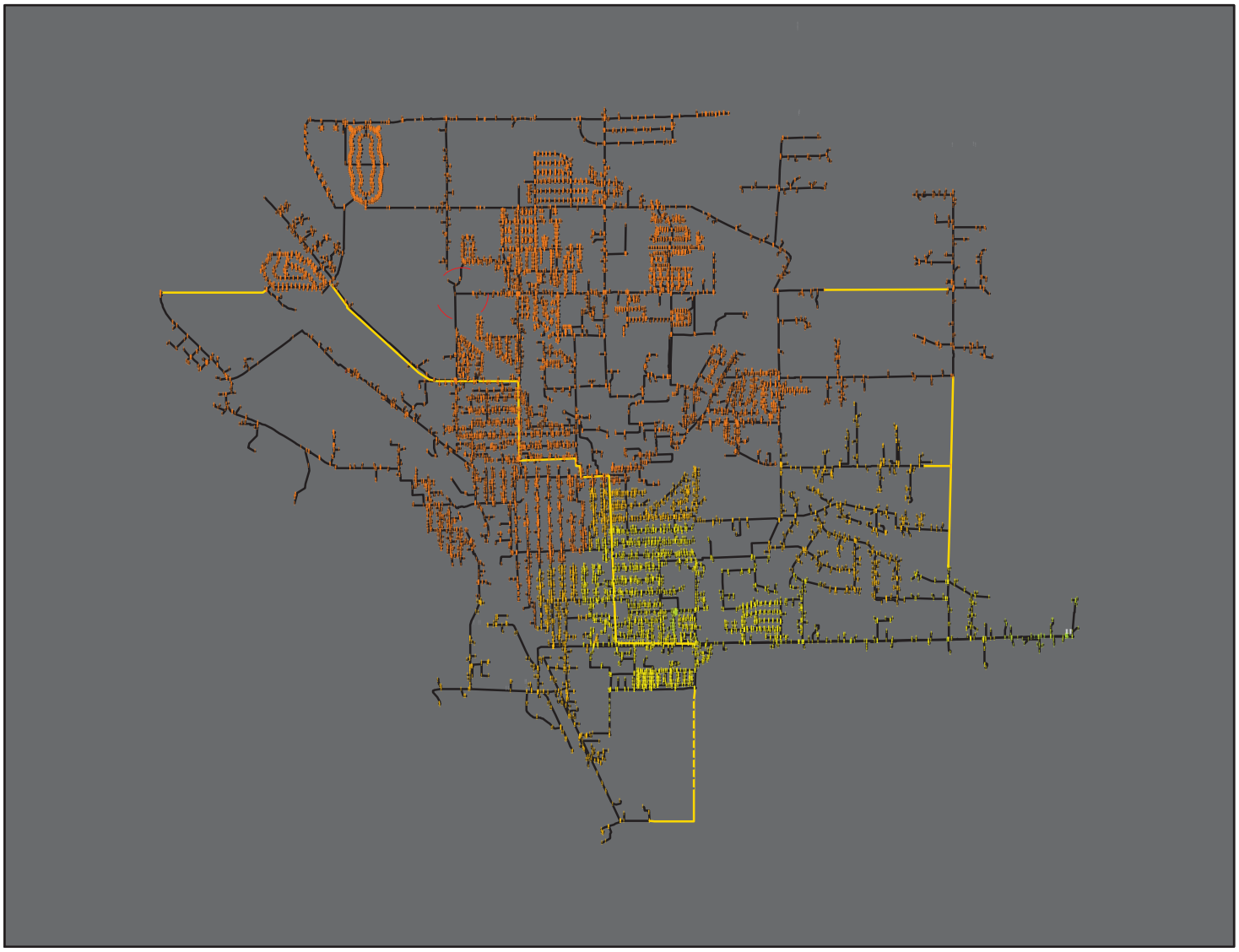
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,605

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (34)
Enabled (20180)	< 20.00 (15403)
Disabled (24)	20.00 - 25.00 (3646)
Proposed (20)	25.00 - 30.00 (680)
Retired (0)	30.00 - 35.00 (141)
	35.00 - 40.00 (42)
	40.00 - 45.00 (55)
	> 45.00 (32)

Appendix C.02 – Improvement 2 Result Exhibits

Improvement 2 - Helena Avenue
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

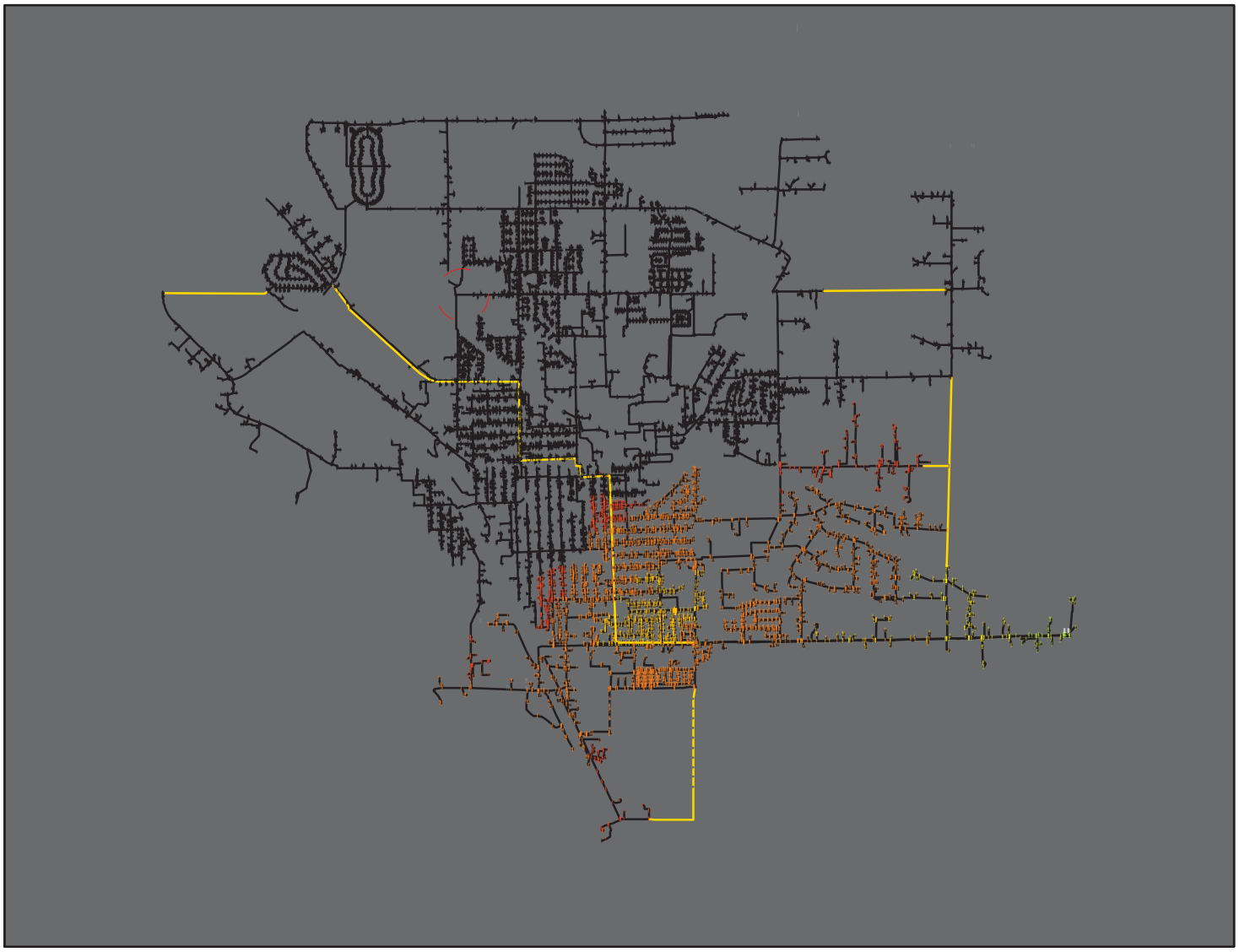
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2564)
Enabled (17641)	< 20.00 (2)
Disabled (2563)	20.00 - 25.00 (1)
Proposed (20)	25.00 - 30.00 (12108)
Retired (0)	30.00 - 35.00 (2188)
	35.00 - 40.00 (2974)
	40.00 - 45.00 (146)
	> 45.00 (50)

Improvement 2 - Helena Avenue
Scenario 2



0 2,400 4,800 7,200 9,600 Feet

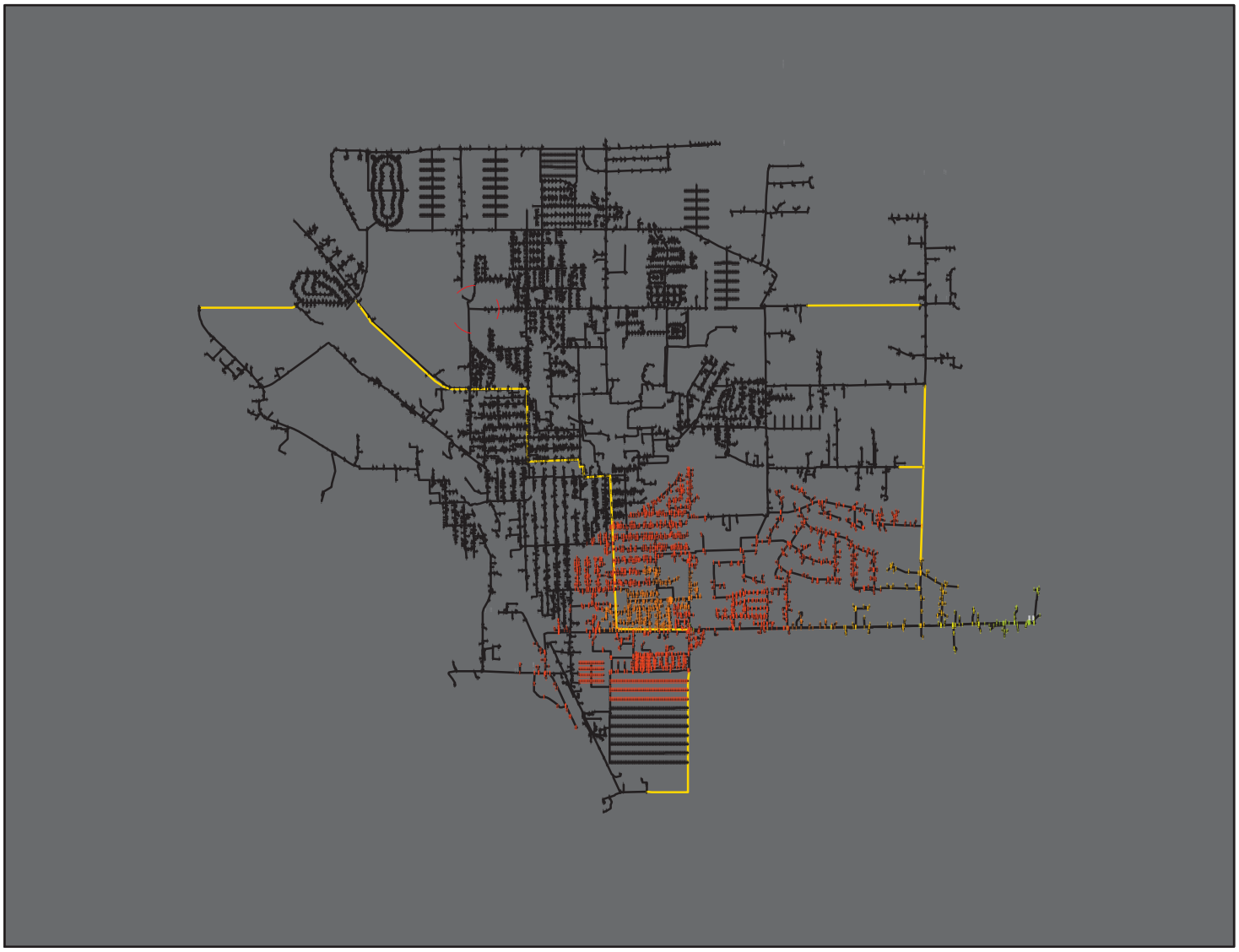
Scale: 1 = 59,550

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,076

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (2564)
.	Enabled (17641)	!	< 20.00 (12251)
.	Disabled (2563)	!	20.00 - 25.00 (724)
.	Proposed (20)	!	25.00 - 30.00 (3496)
.	Retired (0)	!	30.00 - 35.00 (775)
		!	35.00 - 40.00 (136)
		!	40.00 - 45.00 (55)
		!	> 45.00 (32)

Improvement 2 - Helena Avenue
Scenario 3



0 2,600 5,200 7,800 10,400 Feet

Scale: 1 = 64,660

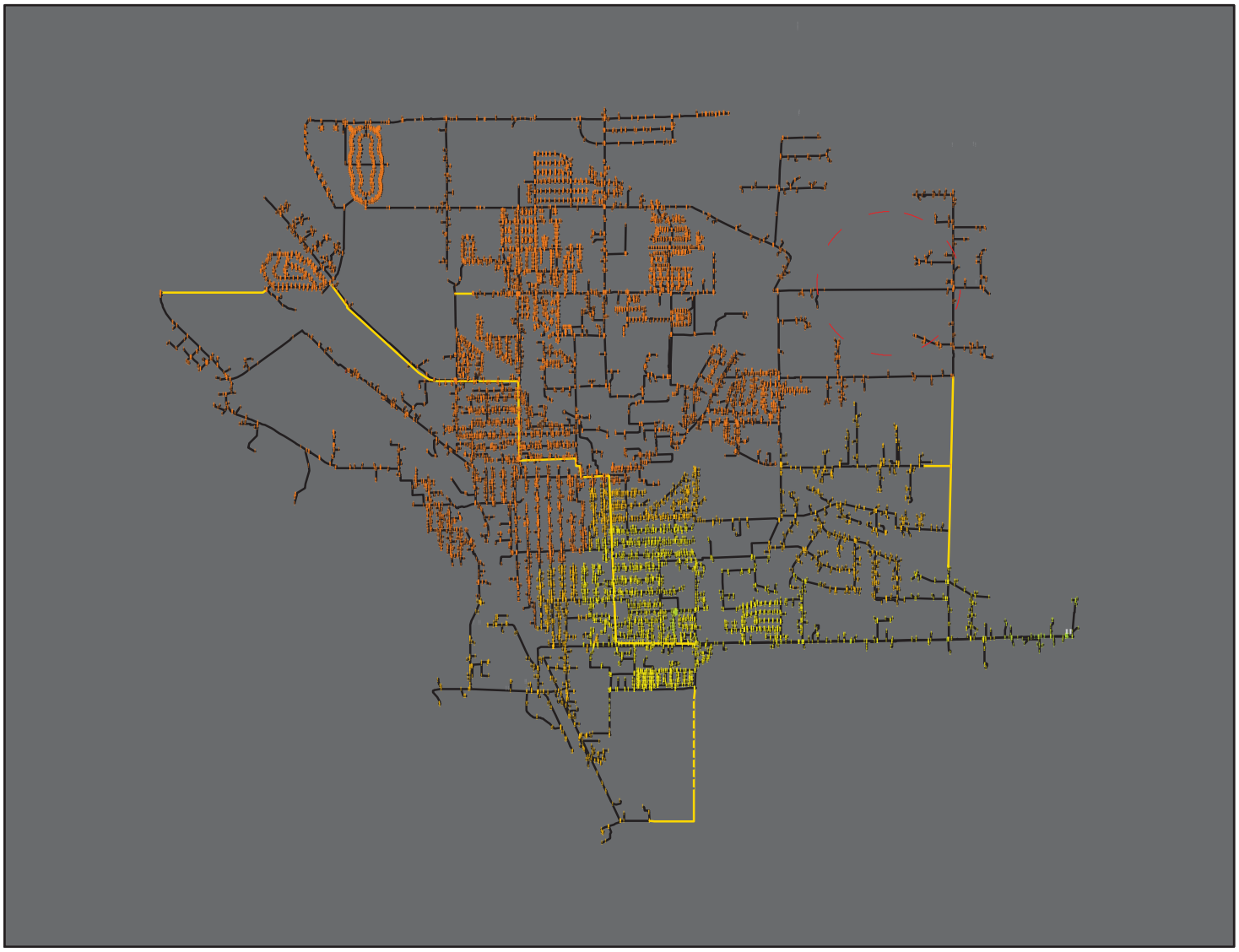
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,606

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (34)
Enabled (20180)	< 20.00 (15400)
Disabled (24)	20.00 - 25.00 (3649)
Proposed (20)	25.00 - 30.00 (680)
Retired (0)	30.00 - 35.00 (141)
	35.00 - 40.00 (42)
	40.00 - 45.00 (55)
	> 45.00 (32)

Appendix C.03 – Improvement 3 Result Exhibits

Improvement 3 - Game Farm Road Extension
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

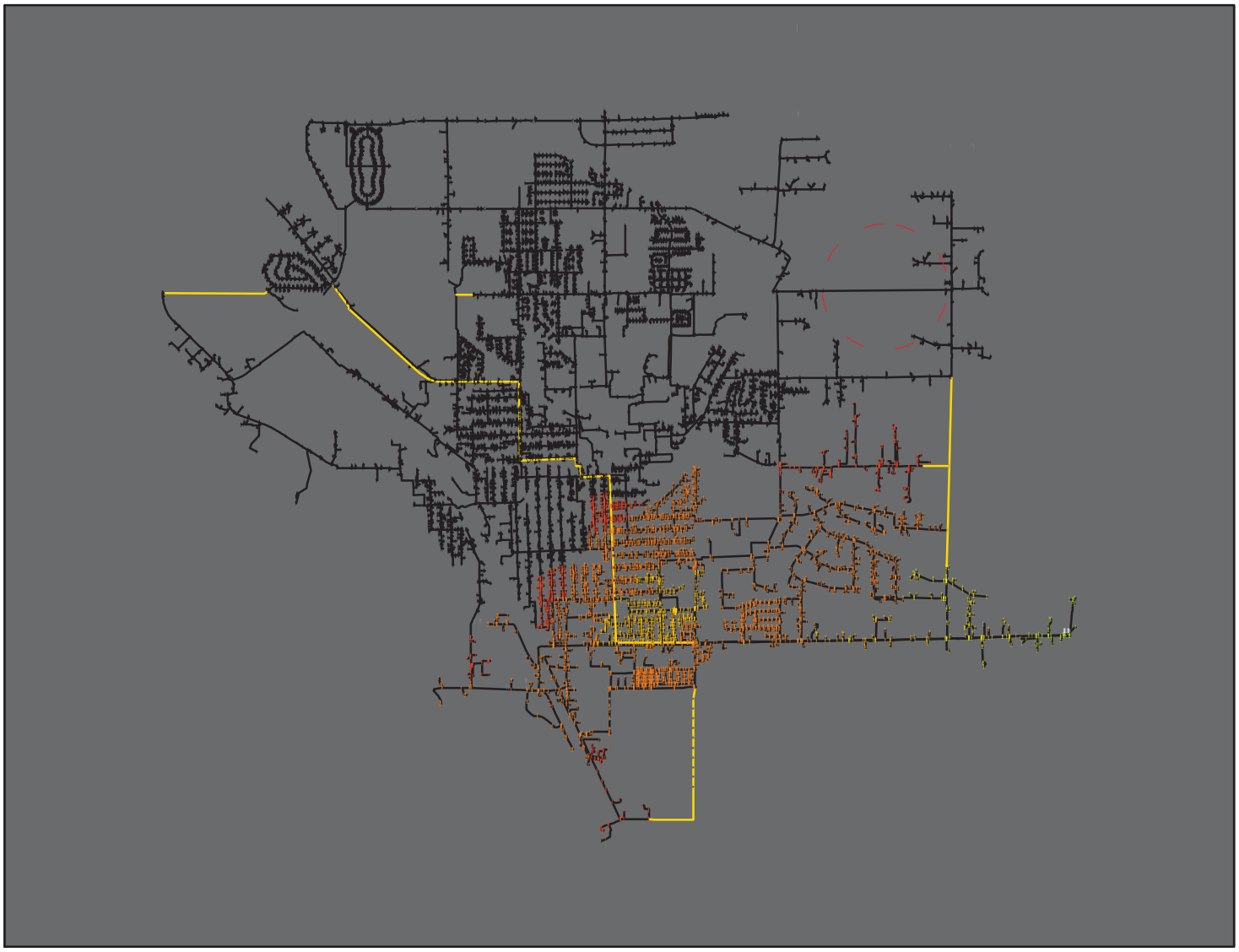
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2564)
Enabled (17641)	< 20.00 (2)
Disabled (2563)	20.00 - 25.00 (1)
Proposed (20)	25.00 - 30.00 (12108)
Retired (0)	30.00 - 35.00 (2190)
	35.00 - 40.00 (2972)
	40.00 - 45.00 (146)
	> 45.00 (50)

Improvement 3 - Game Farm Road Extension
Scenario 2



0 2,400 4,800 7,200 9,600 Feet

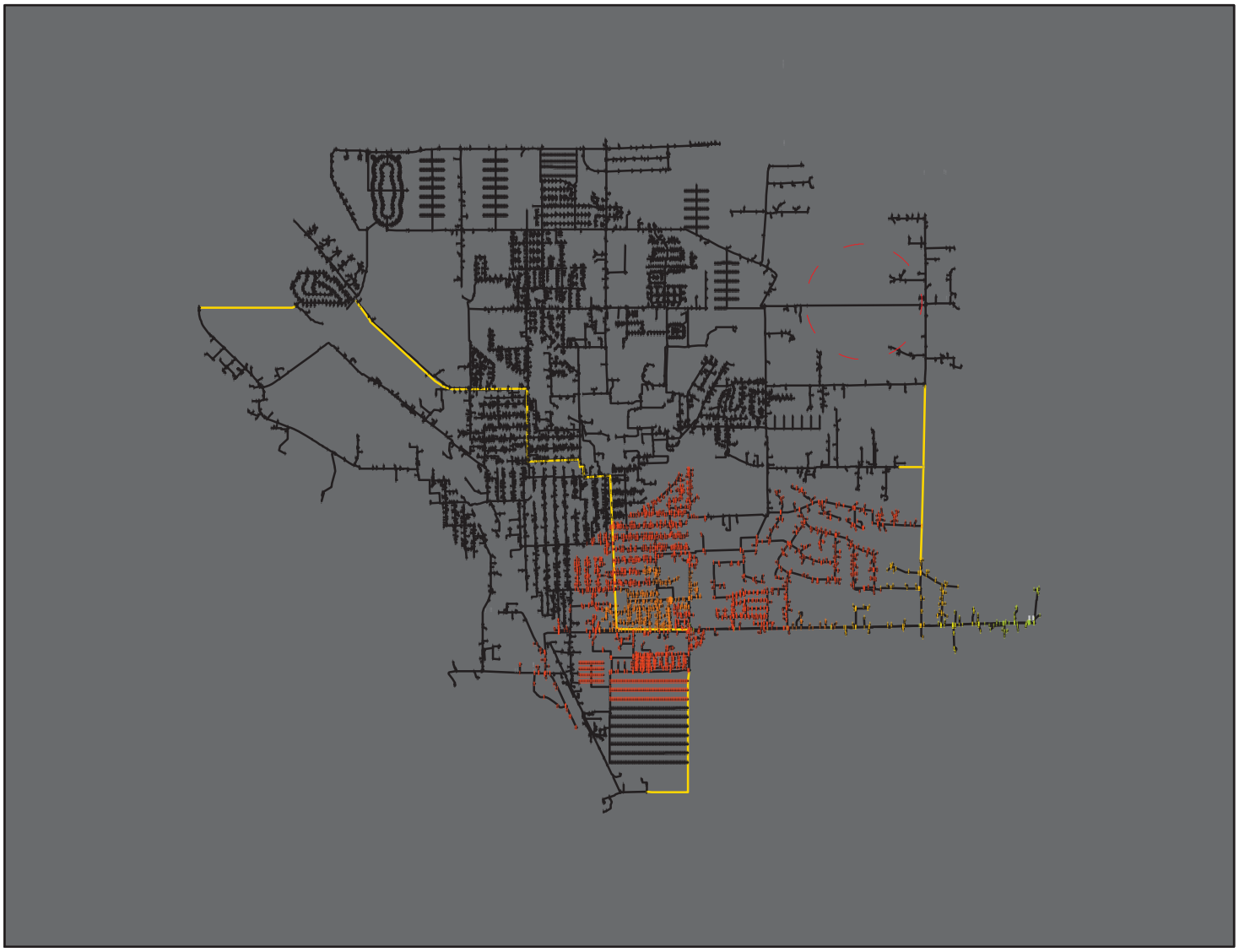
Scale: 1 = 59,550

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,074

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2565)
Enabled (17641)	< 20.00 (12246)
Disabled (2563)	20.00 - 25.00 (728)
Proposed (20)	25.00 - 30.00 (3496)
Retired (0)	30.00 - 35.00 (775)
	35.00 - 40.00 (136)
	40.00 - 45.00 (55)
	> 45.00 (32)

Improvement 3 - Game Farm Road Extension
Scenario 3



0 2,600 5,200 7,800 10,400 Feet

Scale: 1 = 64,660

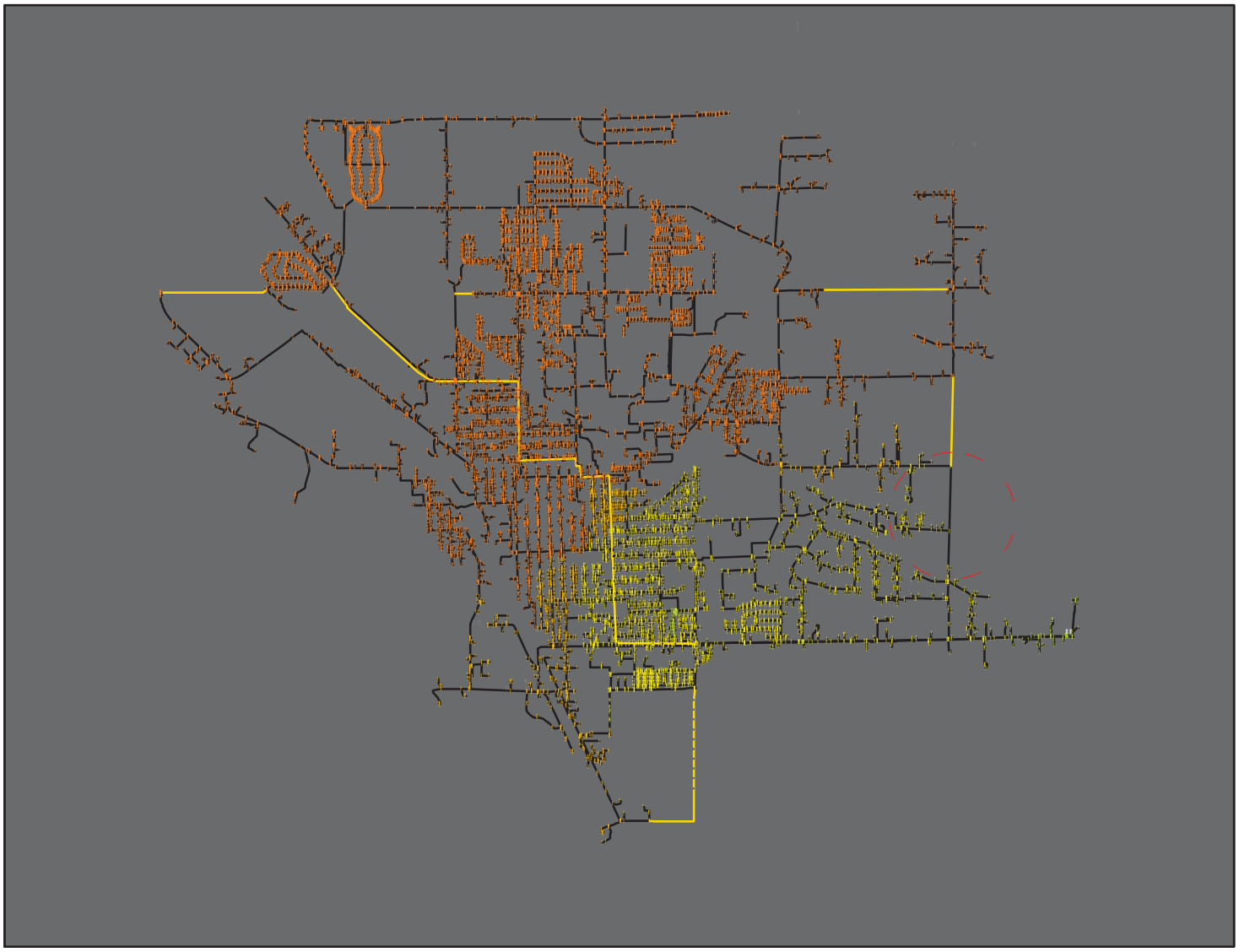
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,606

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (35)
Enabled (20181)	< 20.00 (15399)
Disabled (24)	20.00 - 25.00 (3649)
Proposed (19)	25.00 - 30.00 (680)
Retired (0)	30.00 - 35.00 (141)
	35.00 - 40.00 (42)
	40.00 - 45.00 (55)
	> 45.00 (32)

Appendix C.04 – Improvement 4 Result Exhibits

Improvement 4 - Number 6 Road Extension
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

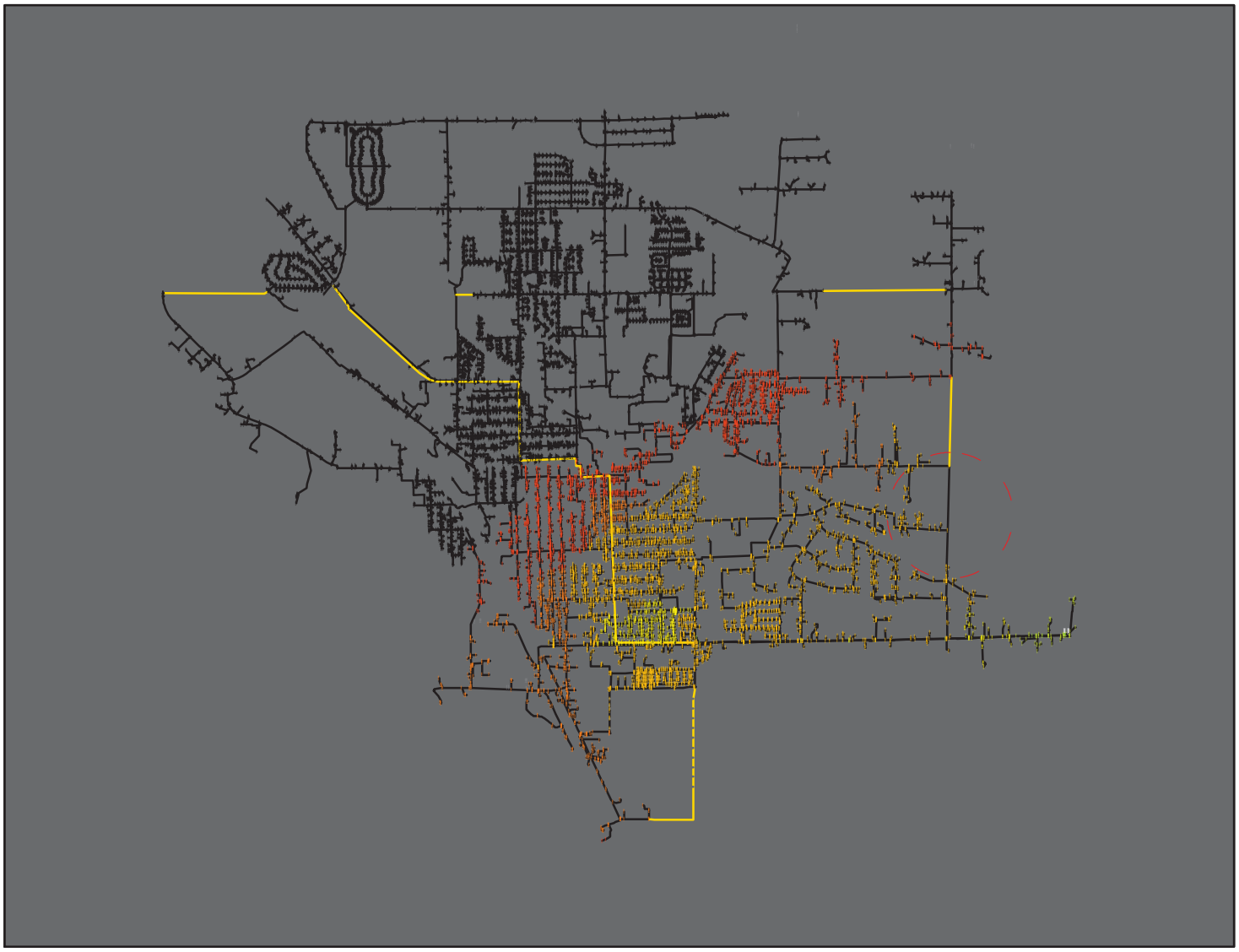
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2564)
Enabled (17643)	< 20.00 (2)
Disabled (2563)	20.00 - 25.00 (0)
Proposed (18)	25.00 - 30.00 (12064)
Retired (0)	30.00 - 35.00 (1352)
	35.00 - 40.00 (3851)
	40.00 - 45.00 (150)
	> 45.00 (50)

Improvement 4 - Number 6 Road Extension
Scenario 2



0 2,400 4,800 7,200 9,600 Feet

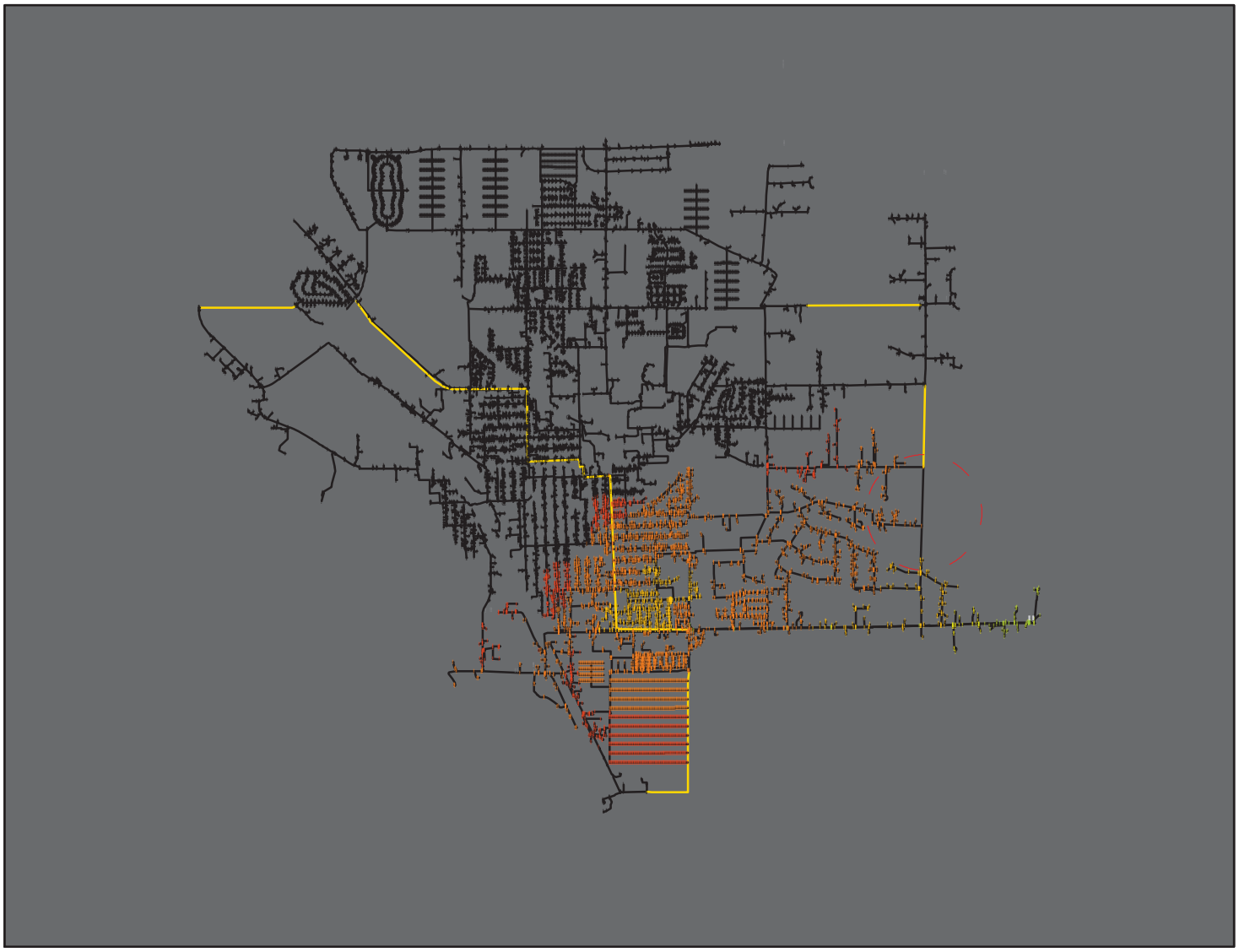
Scale: 1 = 59,550

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2,366

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (2564)
.	Enabled (17643)	!	< 20.00 (9905)
.	Disabled (2563)	!	20.00 - 25.00 (2358)
.	Proposed (18)	!	25.00 - 30.00 (1029)
.	Retired (0)	!	30.00 - 35.00 (3539)
		!	35.00 - 40.00 (551)
		!	40.00 - 45.00 (54)
		!	> 45.00 (33)

Improvement 4 - Number 6 Road Extension
Scenario 3



0 2,600 5,200 7,800 10,400 Feet

Scale: 1 = 64,660

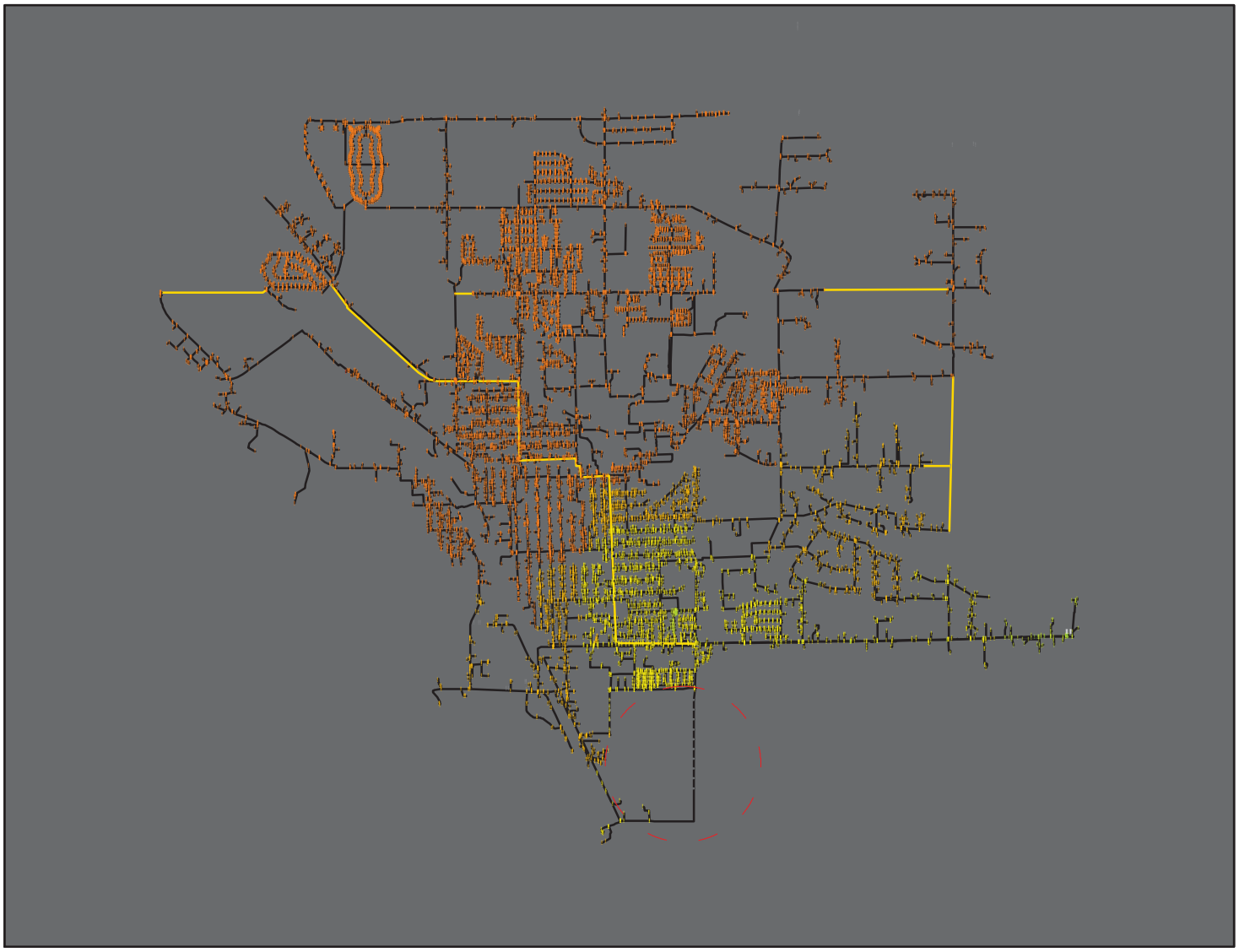
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,230

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (34)
.	Enabled (20183)	!	< 20.00 (13659)
.	Disabled (24)	!	20.00 - 25.00 (1360)
.	Proposed (17)	!	25.00 - 30.00 (4061)
.	Retired (0)	!	30.00 - 35.00 (793)
		!	35.00 - 40.00 (39)
		!	40.00 - 45.00 (55)
		!	> 45.00 (32)

Appendix C.05 – Improvement 5 Result Exhibits

Improvement 5 - Berry Road Extension
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

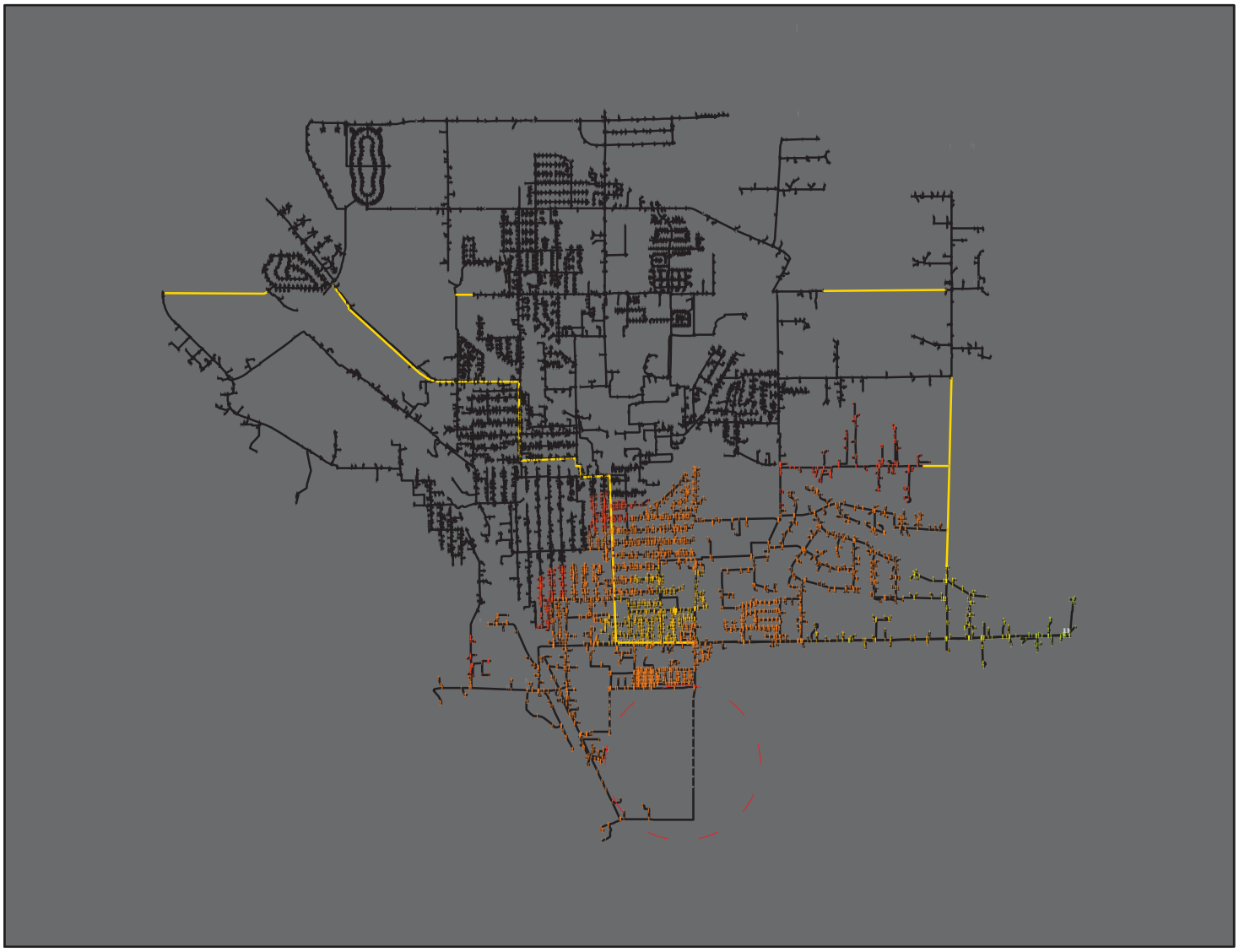
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2555)
Enabled (17651)	< 20.00 (2)
Disabled (2564)	20.00 - 25.00 (1)
Proposed (9)	25.00 - 30.00 (12103)
Retired (0)	30.00 - 35.00 (2146)
	35.00 - 40.00 (3030)
	40.00 - 45.00 (146)
	> 45.00 (50)

Improvement 5 - Berry Road Extension
Scenario 2



0 2,400 4,800 7,200 9,600 Feet

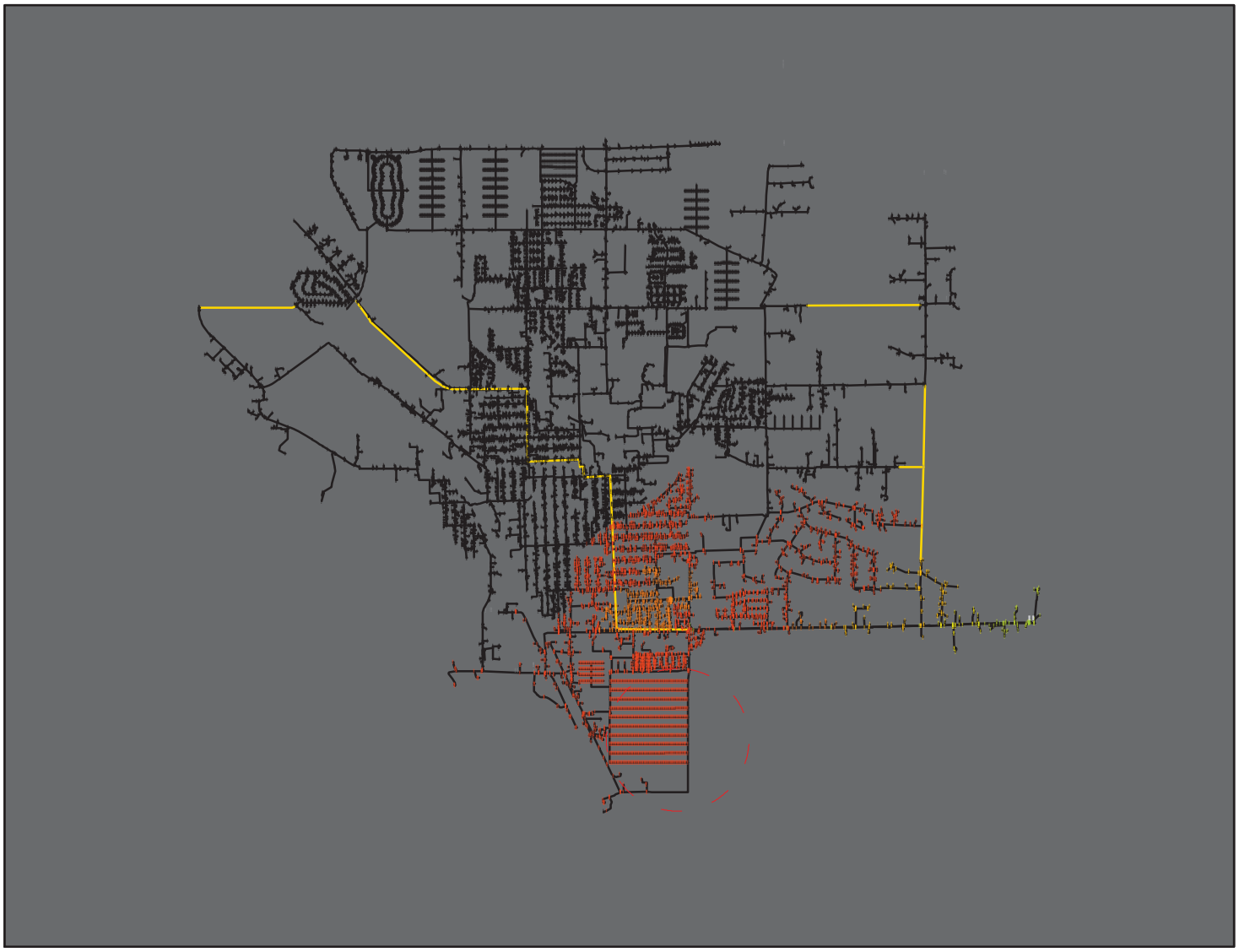
Scale: 1 = 59,550

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,071

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2555)
Enabled (17651)	< 20.00 (12242)
Disabled (2563)	20.00 - 25.00 (662)
Proposed (10)	25.00 - 30.00 (3569)
Retired (0)	30.00 - 35.00 (782)
	35.00 - 40.00 (136)
	40.00 - 45.00 (55)
	> 45.00 (32)

Improvement 5 - Berry Road Extension
Scenario 3



0 2,600 5,200 7,800 10,400 Feet

Scale: 1 = 64,660

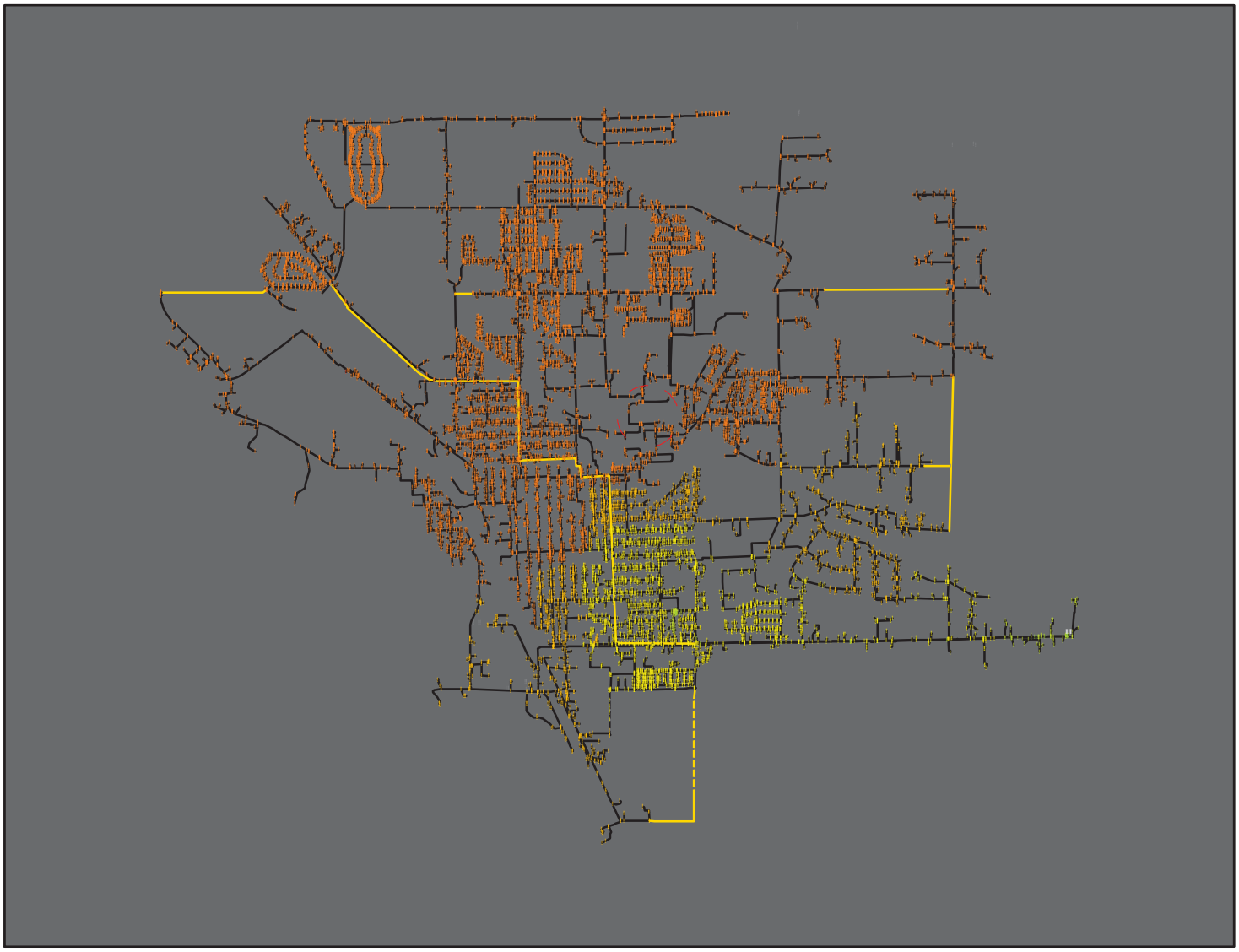
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,428

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (35)
Enabled (20191)	< 20.00 (14378)
Disabled (24)	20.00 - 25.00 (4669)
Proposed (9)	25.00 - 30.00 (681)
Retired (0)	30.00 - 35.00 (141)
	35.00 - 40.00 (42)
	40.00 - 45.00 (55)
	> 45.00 (32)

Appendix C.06 – Improvement 6 Result Exhibits

Improvement 6 - East 11th Avenue Upgrade
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

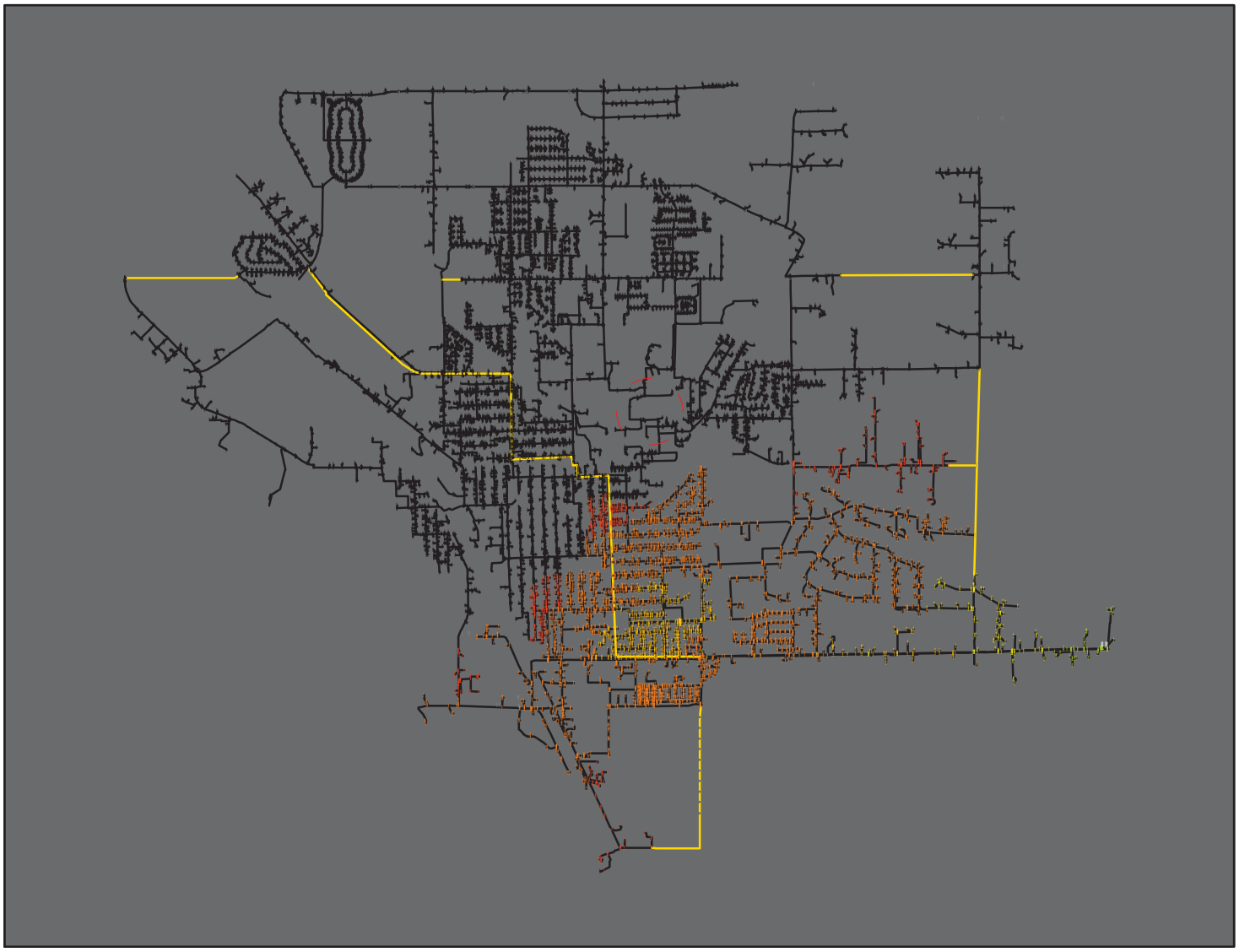
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2565)
Enabled (17640)	< 20.00 (2)
Disabled (2564)	20.00 - 25.00 (1)
Proposed (20)	25.00 - 30.00 (12109)
Retired (0)	30.00 - 35.00 (2183)
	35.00 - 40.00 (2977)
	40.00 - 45.00 (146)
	> 45.00 (50)

Improvement 6 - East 11th Avenue Upgrade
Scenario 2



0 2,250 4,500 6,750 9,000 Feet

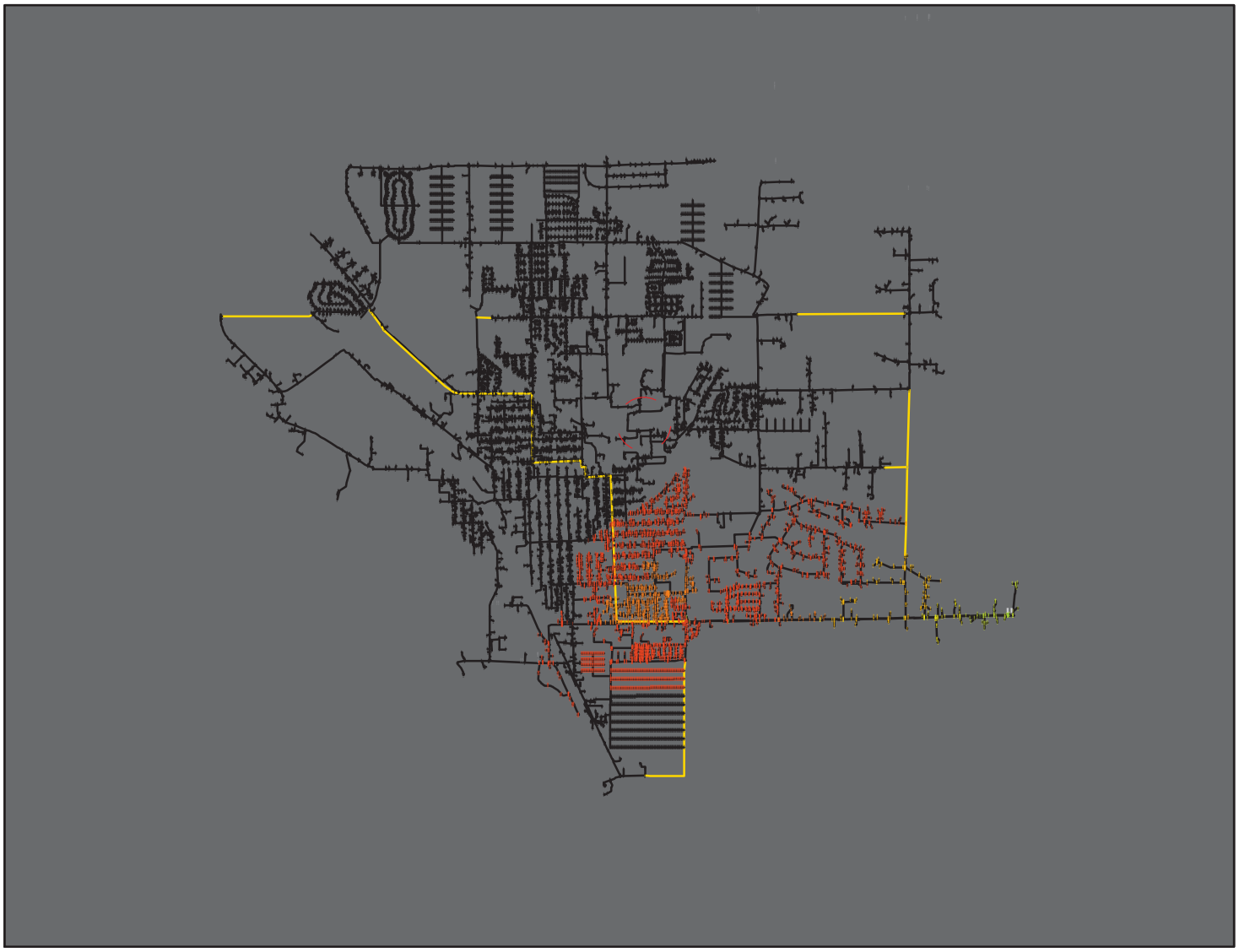
Scale: 1 = 54,950

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,075

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (2565)
.	Enabled (17640)	!	< 20.00 (12249)
.	Disabled (2563)	!	20.00 - 25.00 (725)
.	Proposed (21)	!	25.00 - 30.00 (3499)
.	Retired (0)	!	30.00 - 35.00 (772)
		!	35.00 - 40.00 (136)
		!	40.00 - 45.00 (55)
		!	> 45.00 (32)

Improvement 6 - East 11th Avenue Upgrade
Scenario 3



0 2,750 5,500 8,250 11,000 Feet

Scale: 1 = 68,190

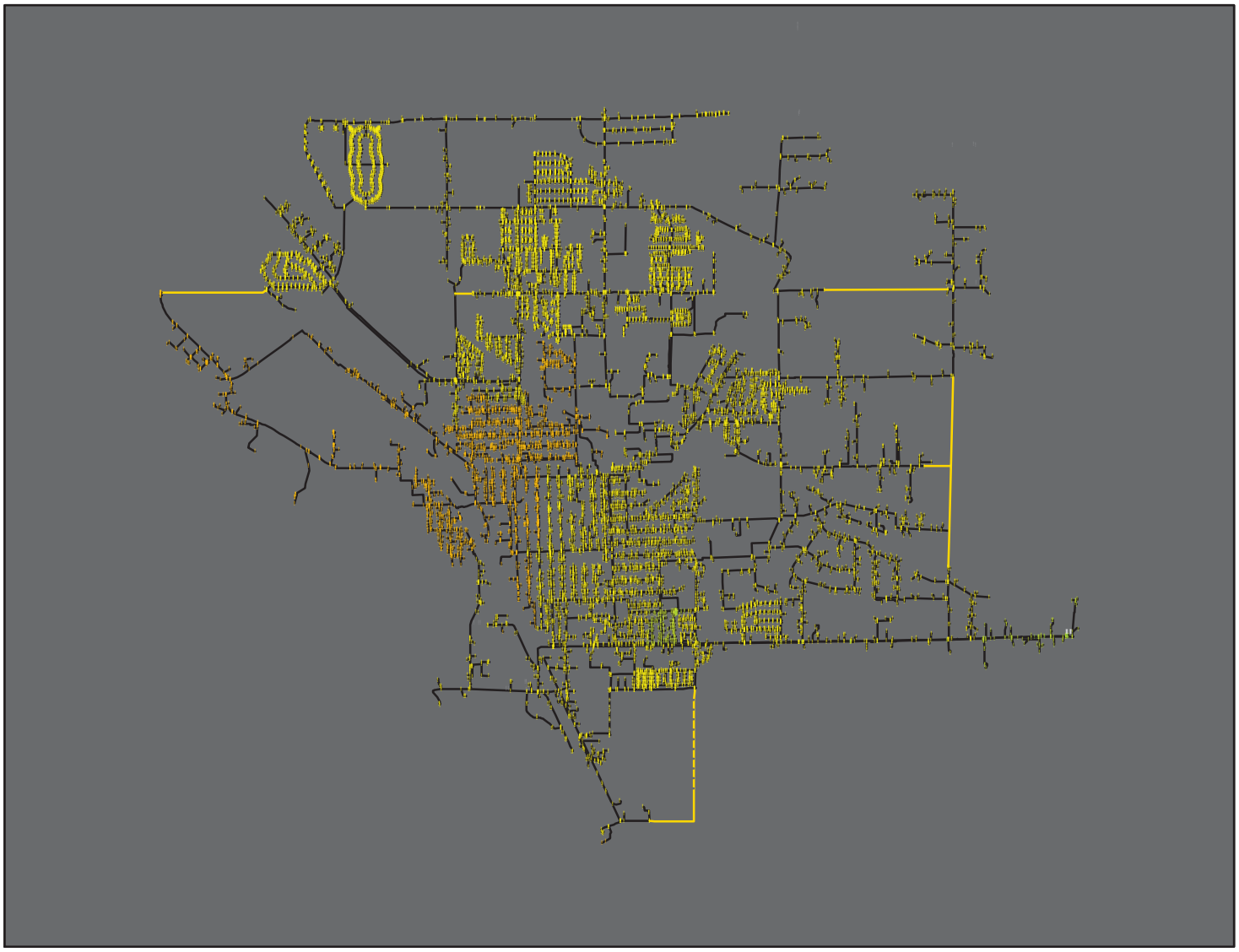
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,606

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (35)
Enabled (20179)	< 20.00 (15402)
Disabled (24)	20.00 - 25.00 (3647)
Proposed (21)	25.00 - 30.00 (679)
Retired (0)	30.00 - 35.00 (141)
	35.00 - 40.00 (42)
	40.00 - 45.00 (55)
	> 45.00 (32)

Appendix C.07 – Improvement 7 Result Exhibits

Improvement 7 - Northwest Regulator Station
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

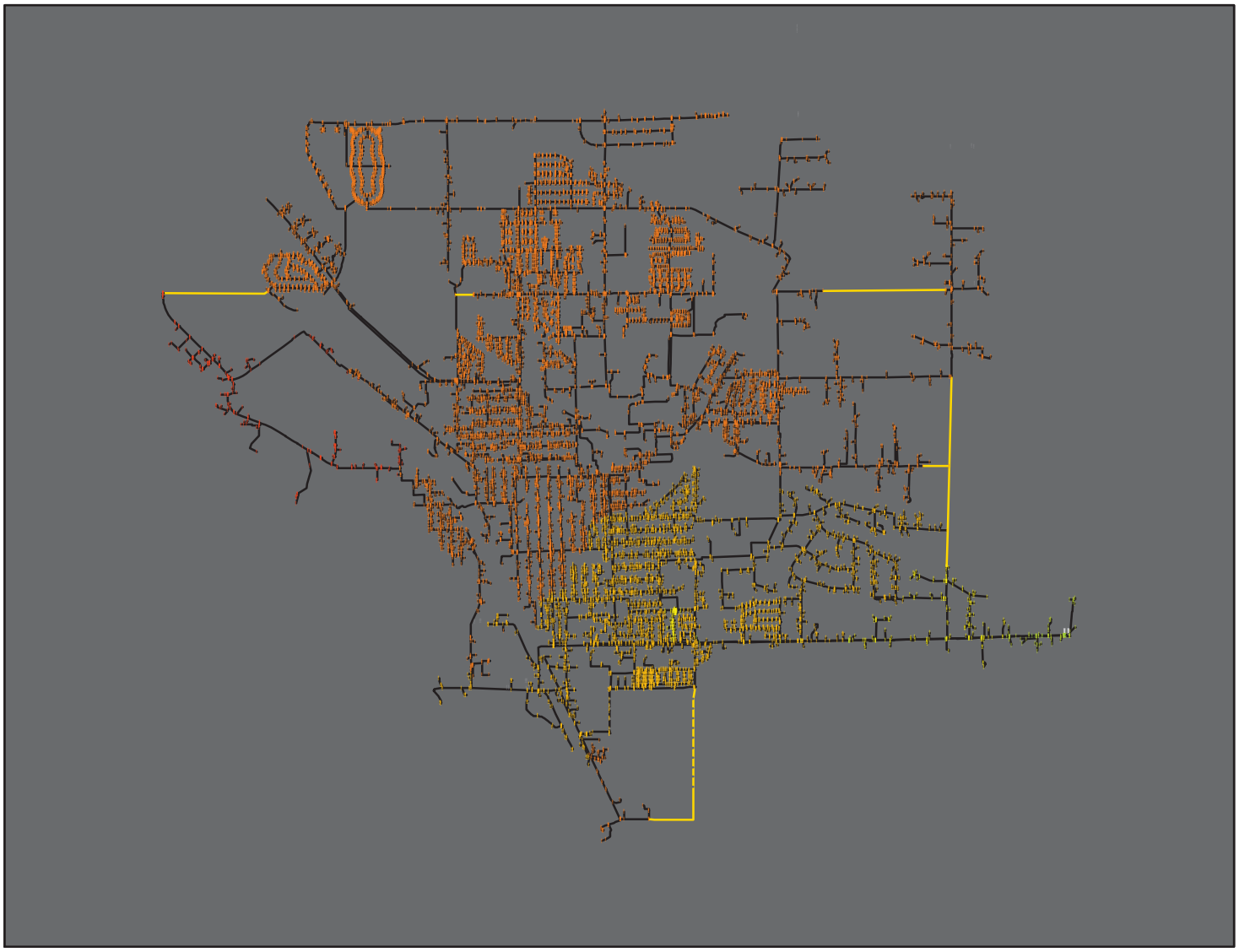
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (2562)
.	Enabled (17643)	!	< 20.00 (2)
.	Disabled (2563)	!	20.00 - 25.00 (0)
.	Proposed (18)	!	25.00 - 30.00 (0)
.	Retired (0)	!	30.00 - 35.00 (2590)
		!	35.00 - 40.00 (14512)
		!	40.00 - 45.00 (317)
		!	> 45.00 (50)

Improvement 7 - Northwest Regulator Station
Scenario 2



0 2,400 4,800 7,200 9,600 Feet

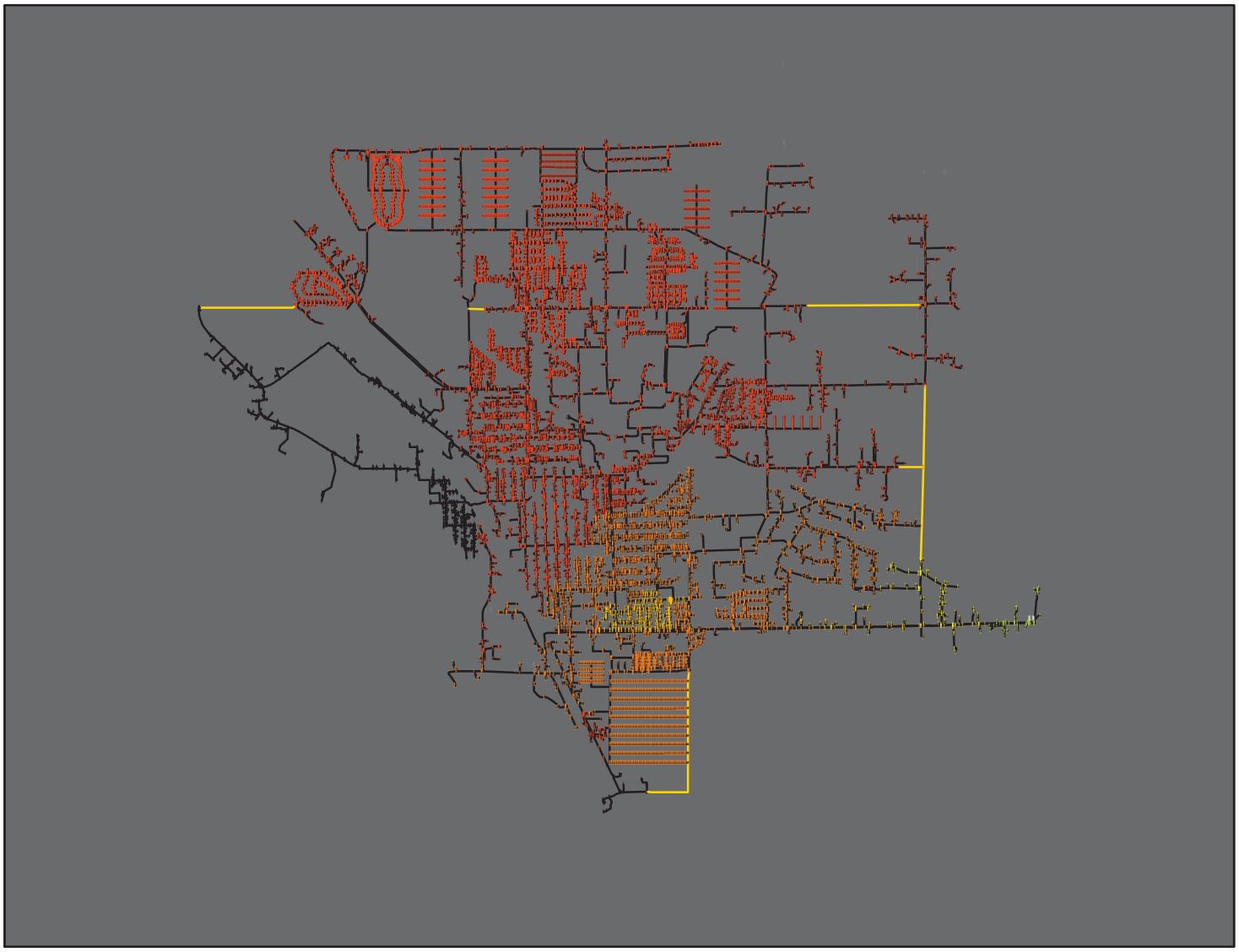
Scale: 1 = 59,550

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2562)
Enabled (17643)	< 20.00 (2)
Disabled (2563)	20.00 - 25.00 (267)
Proposed (18)	25.00 - 30.00 (12532)
Retired (0)	30.00 - 35.00 (4288)
	35.00 - 40.00 (286)
	40.00 - 45.00 (64)
	> 45.00 (32)

Improvement 7 - Northwest Regulator Station
Scenario 3



0 2,600 5,200 7,800 10,400 Feet

Scale: 1 = 64,660

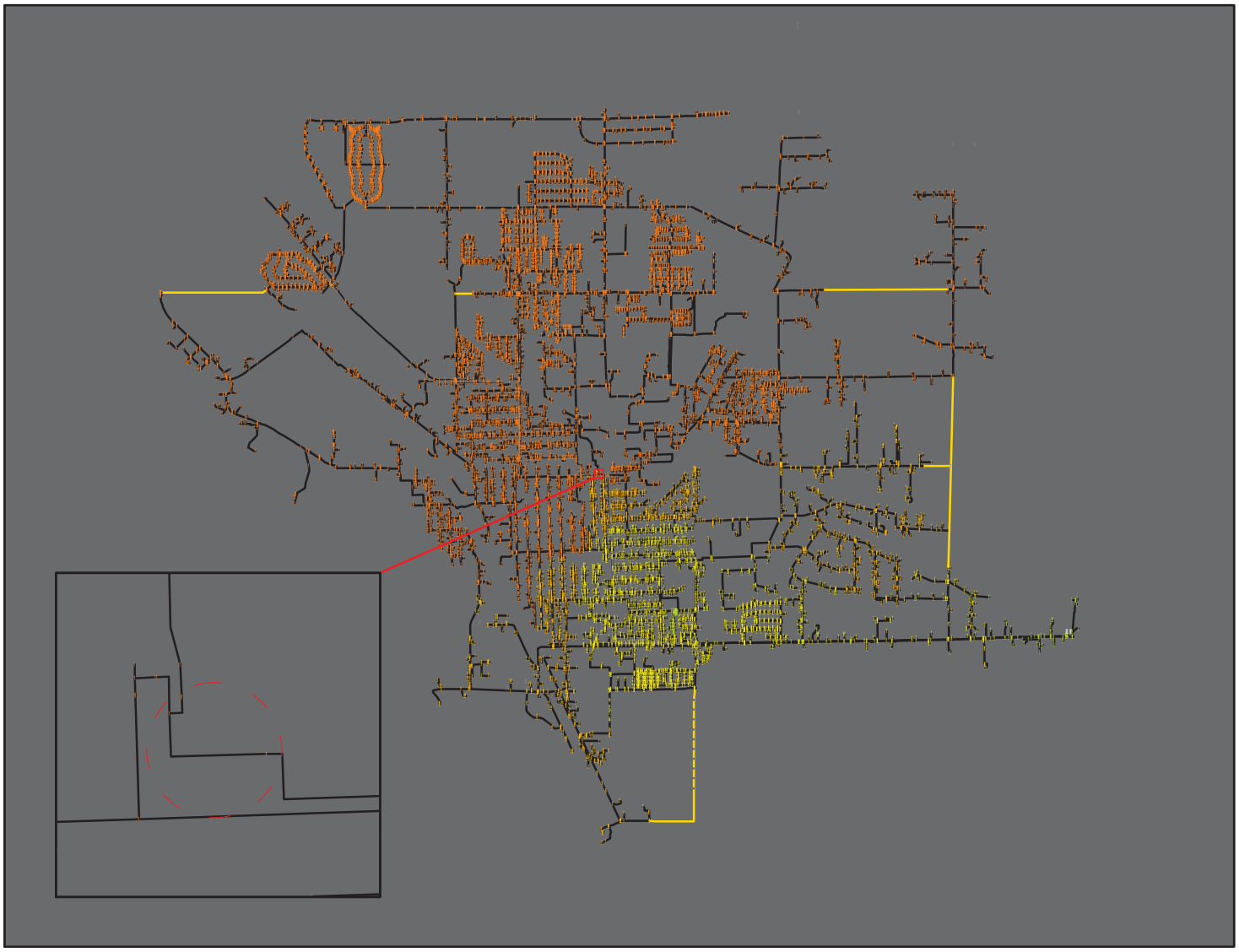
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 250

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (32)
.	Enabled (20182)	!	< 20.00 (755)
.	Disabled (24)	!	20.00 - 25.00 (13410)
.	Proposed (18)	!	25.00 - 30.00 (5059)
.	Retired (0)	!	30.00 - 35.00 (567)
		!	35.00 - 40.00 (124)
		!	40.00 - 45.00 (54)
		!	> 45.00 (32)

Appendix C.08 – Improvement 8 Result Exhibits

Improvement 8 - East 7th Avenue Upgrade
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

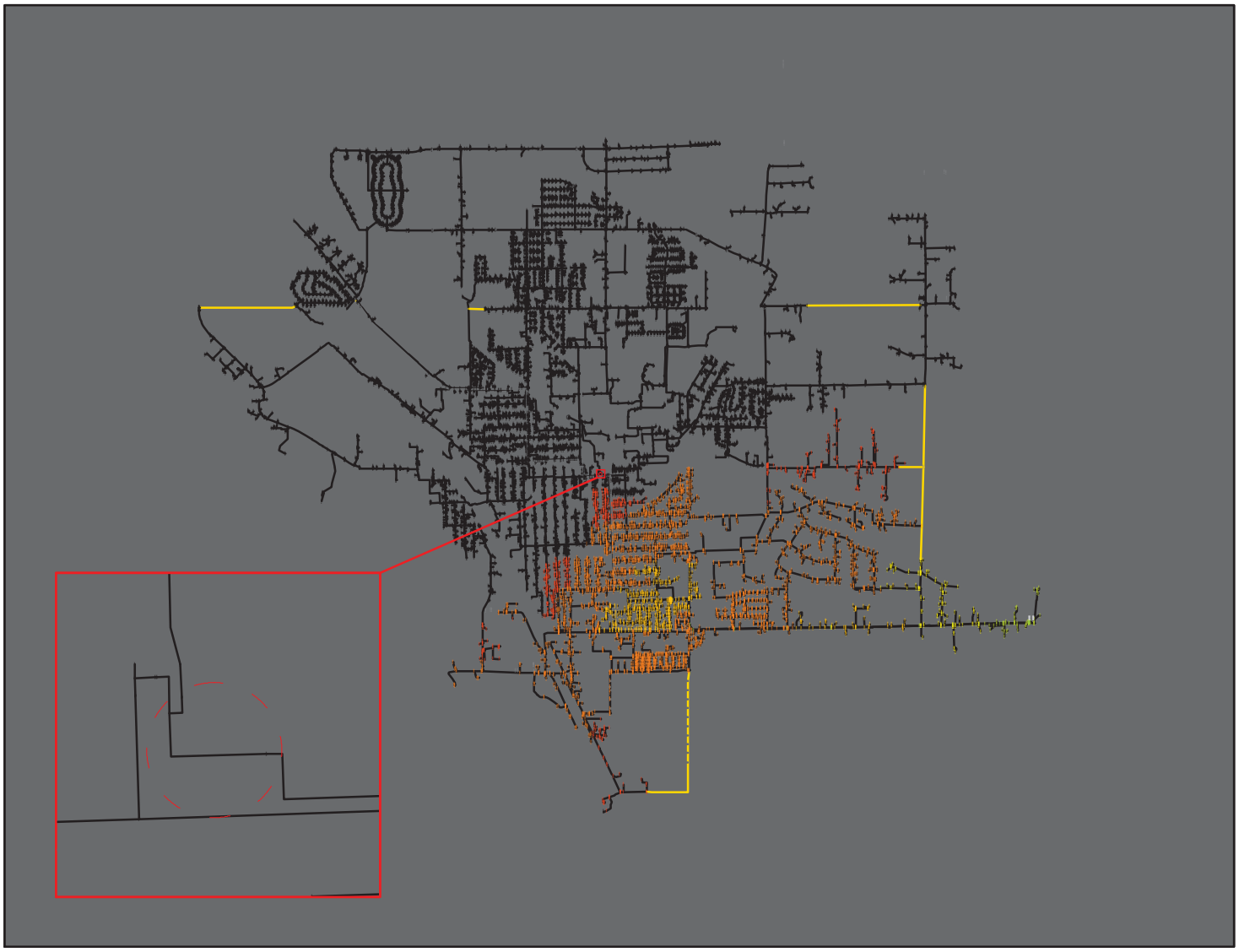
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2565)
Enabled (17640)	< 20.00 (2)
Disabled (2564)	20.00 - 25.00 (0)
Proposed (20)	25.00 - 30.00 (12070)
Retired (0)	30.00 - 35.00 (2173)
	35.00 - 40.00 (3023)
	40.00 - 45.00 (150)
	> 45.00 (50)

Improvement 8 - East 7th Avenue Upgrade
Scenario 2



0 2,900 5,800 8,700 11,600 Feet

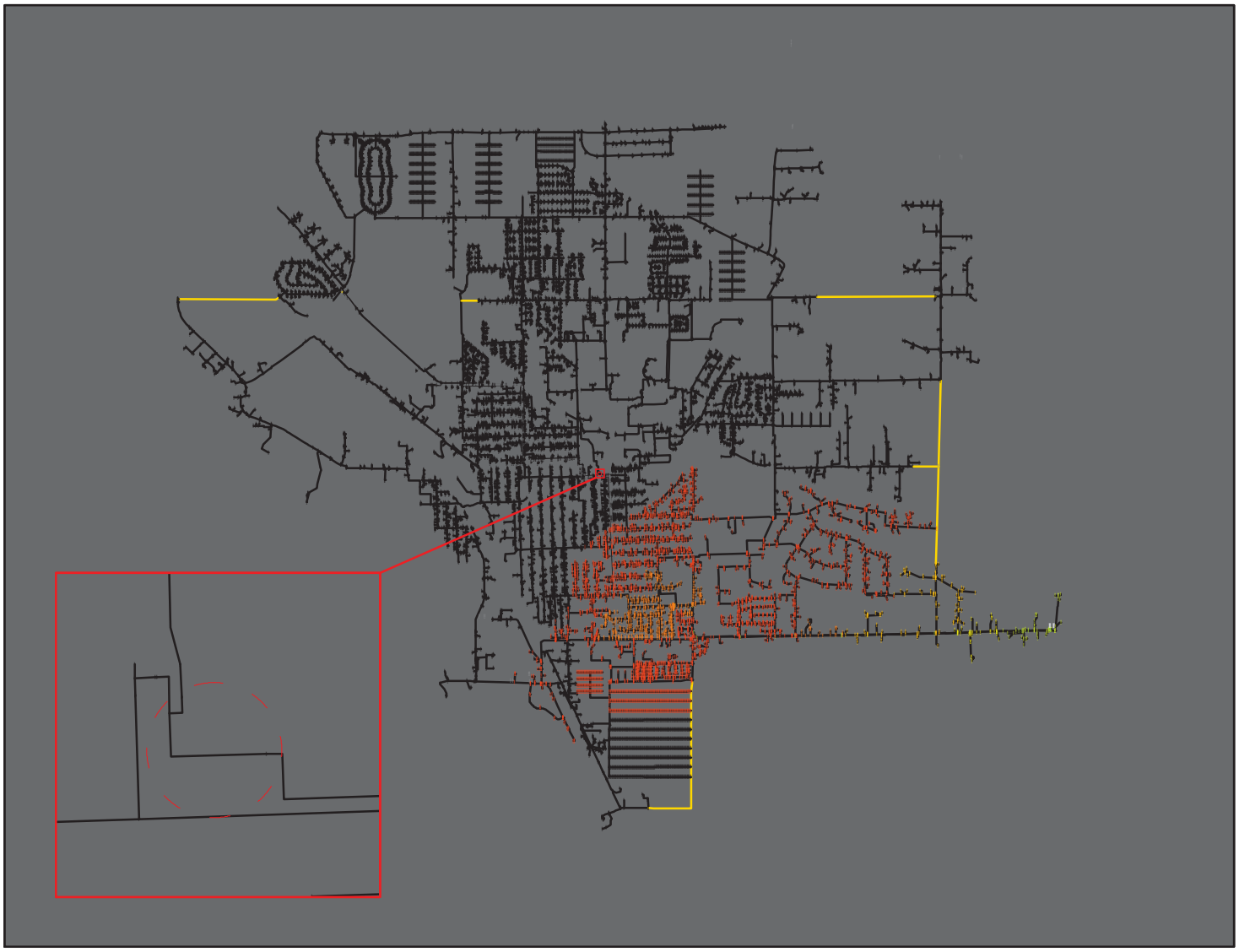
Scale: 1 = 64,660

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,065

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2565)
Enabled (17640)	< 20.00 (12209)
Disabled (2564)	20.00 - 25.00 (754)
Proposed (20)	25.00 - 30.00 (3510)
Retired (0)	30.00 - 35.00 (770)
	35.00 - 40.00 (138)
	40.00 - 45.00 (55)
	> 45.00 (32)

Improvement 8 - East 7th Avenue Upgrade
Scenario 3



0 2,400 4,800 7,200 9,600 Feet

Scale: 1 = 61,550

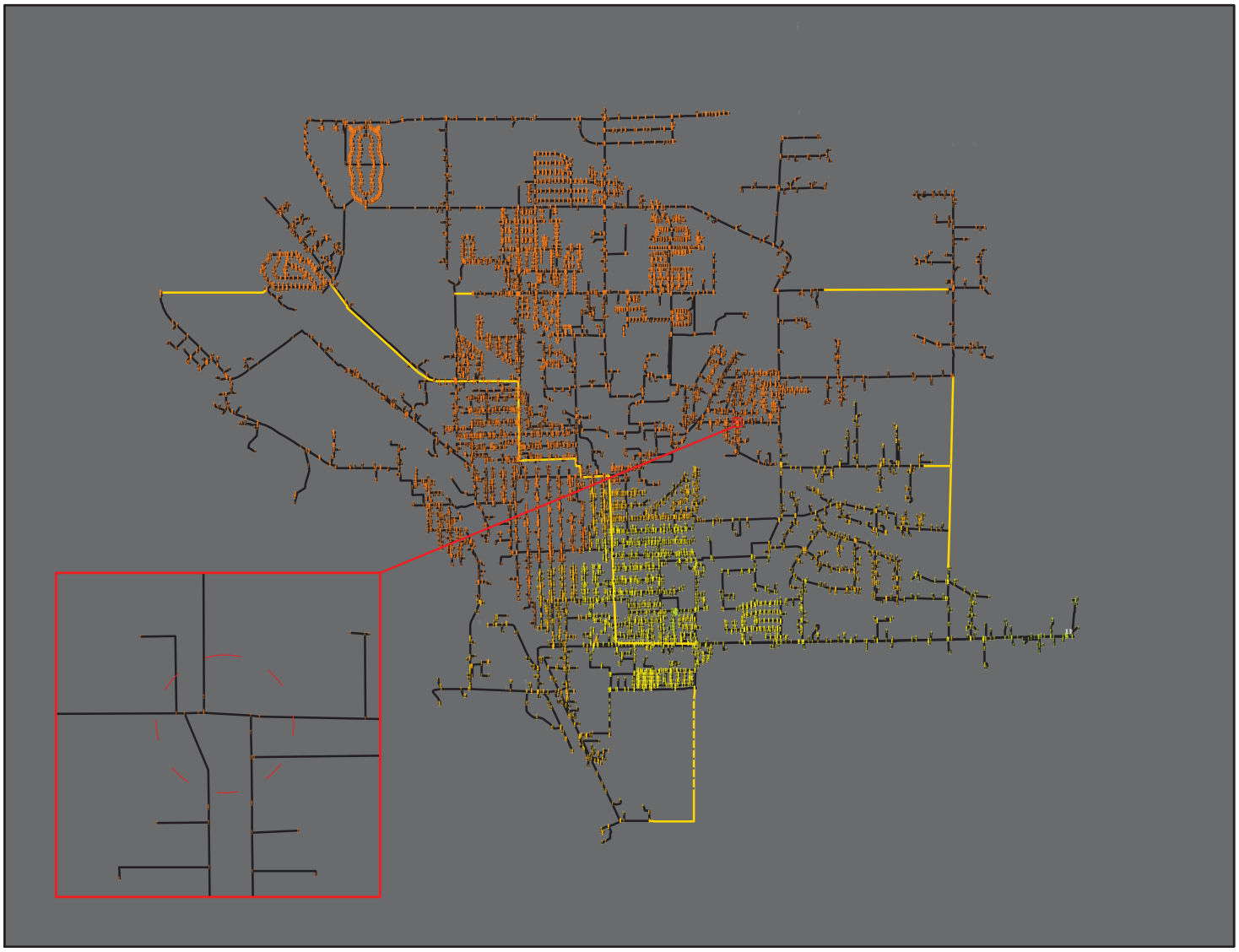
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,591

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (35)
Enabled (20179)	< 20.00 (15339)
Disabled (25)	20.00 - 25.00 (3711)
Proposed (20)	25.00 - 30.00 (676)
Retired (0)	30.00 - 35.00 (143)
	35.00 - 40.00 (42)
	40.00 - 45.00 (55)
	> 45.00 (32)

Appendix C.09 – Improvement 9 Result Exhibits

Improvement 9 - Radio Road Upgrade
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

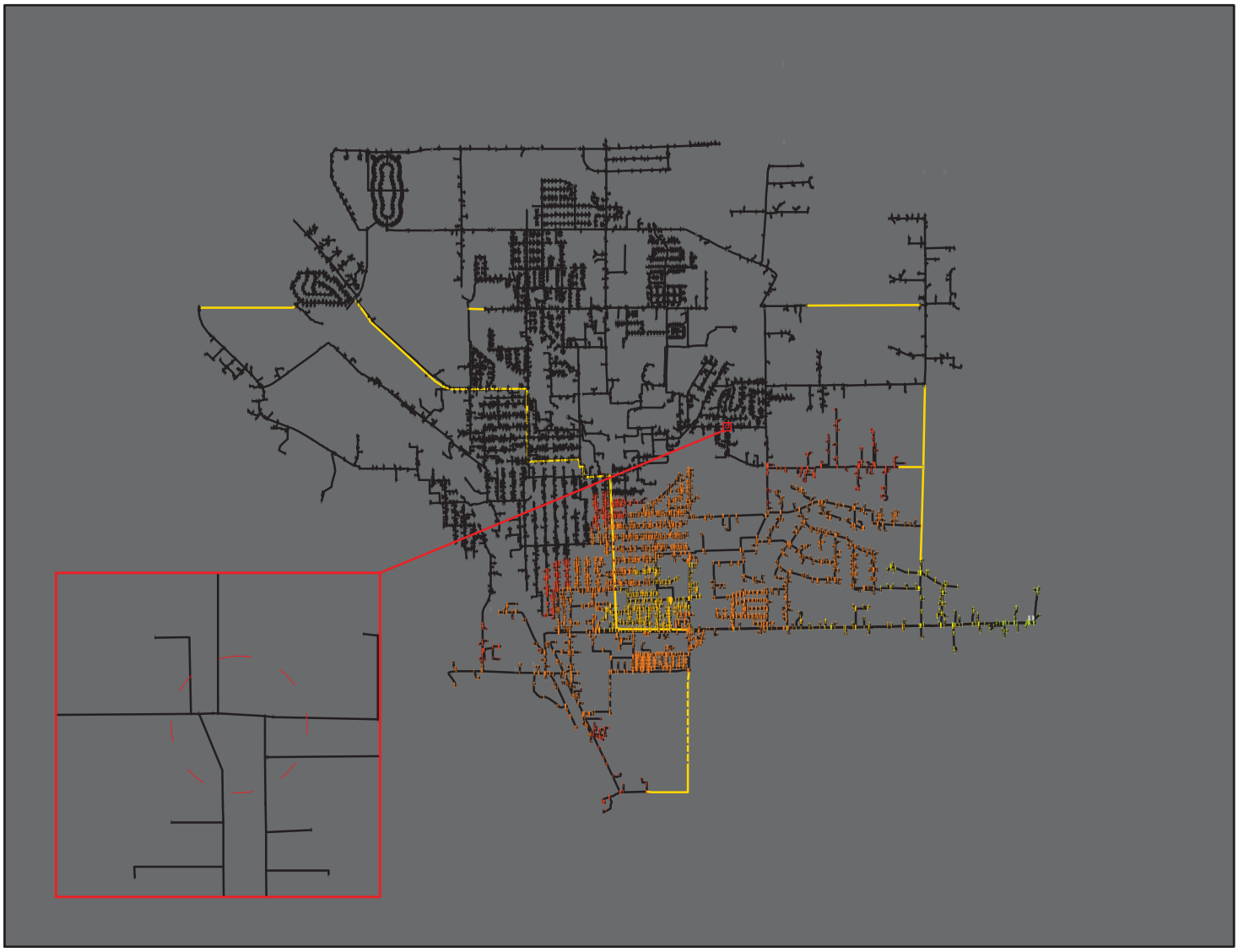
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2565)
Enabled (17640)	< 20.00 (2)
Disabled (2563)	20.00 - 25.00 (1)
Proposed (21)	25.00 - 30.00 (12105)
Retired (0)	30.00 - 35.00 (2197)
	35.00 - 40.00 (2967)
	40.00 - 45.00 (146)
	> 45.00 (50)

Improvement 9 - Radio Road Upgrade
Scenario 2



0 2,900 5,800 8,700 11,600 Feet

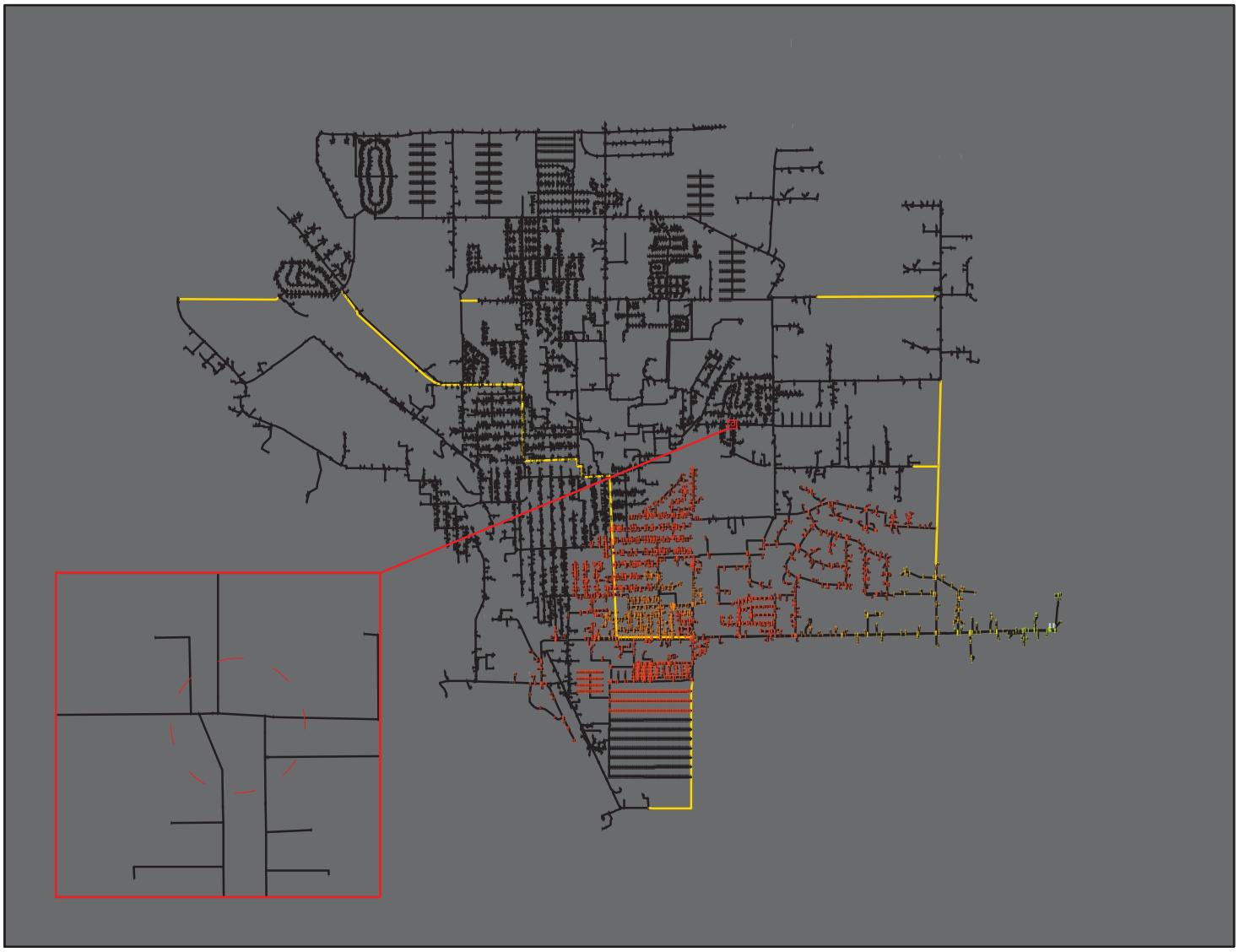
Scale: 1 = 64,660

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,076

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2565)
Enabled (17640)	< 20.00 (12246)
Disabled (2563)	20.00 - 25.00 (724)
Proposed (21)	25.00 - 30.00 (3498)
Retired (0)	30.00 - 35.00 (777)
	35.00 - 40.00 (136)
	40.00 - 45.00 (55)
	> 45.00 (32)

Improvement 9 - Radio Road Upgrade
Scenario 3



0 2,400 4,800 7,200 9,600 Feet

Scale: 1 = 61,550

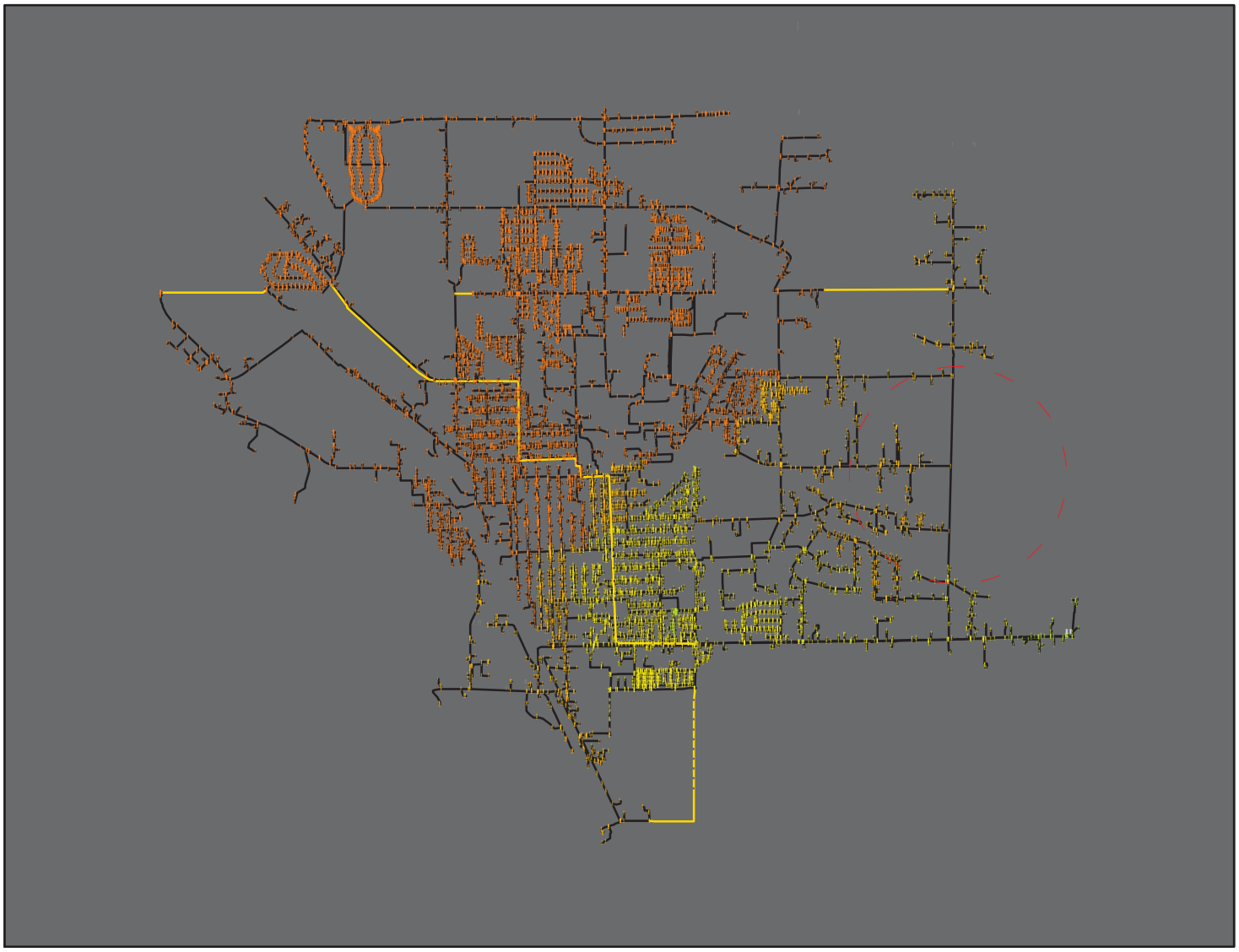
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 3,608

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (35)
.	Enabled (20179)	!	< 20.00 (15419)
.	Disabled (24)	!	20.00 - 25.00 (3628)
.	Proposed (21)	!	25.00 - 30.00 (681)
.	Retired (0)	!	30.00 - 35.00 (141)
		!	35.00 - 40.00 (42)
		!	40.00 - 45.00 (55)
		!	> 45.00 (32)

Appendix C.10 – Improvement 10 Result Exhibits

Improvement 10 - Wilson Creek Road Extension
Scenario 1



0 2,400 4,800 7,200 9,600 Feet

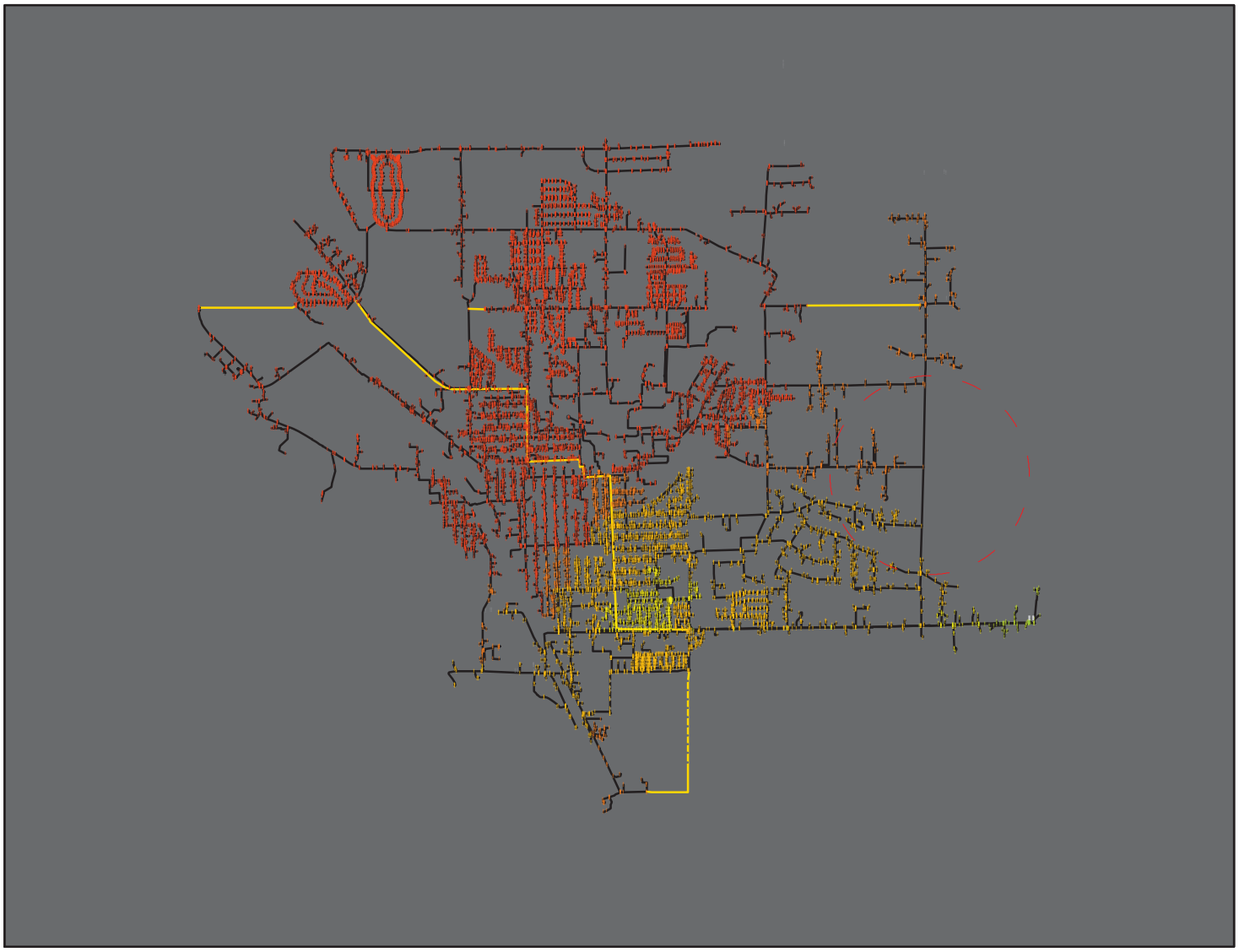
Scale: 1 = 59,250

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2564)
Enabled (17644)	< 20.00 (2)
Disabled (2563)	20.00 - 25.00 (0)
Proposed (17)	25.00 - 30.00 (11133)
Retired (0)	30.00 - 35.00 (2670)
	35.00 - 40.00 (3464)
	40.00 - 45.00 (150)
	> 45.00 (50)

Improvement 10 - Wilson Creek Road Extension
Scenario 2



0 2,500 5,000 7,500 10,000 Feet

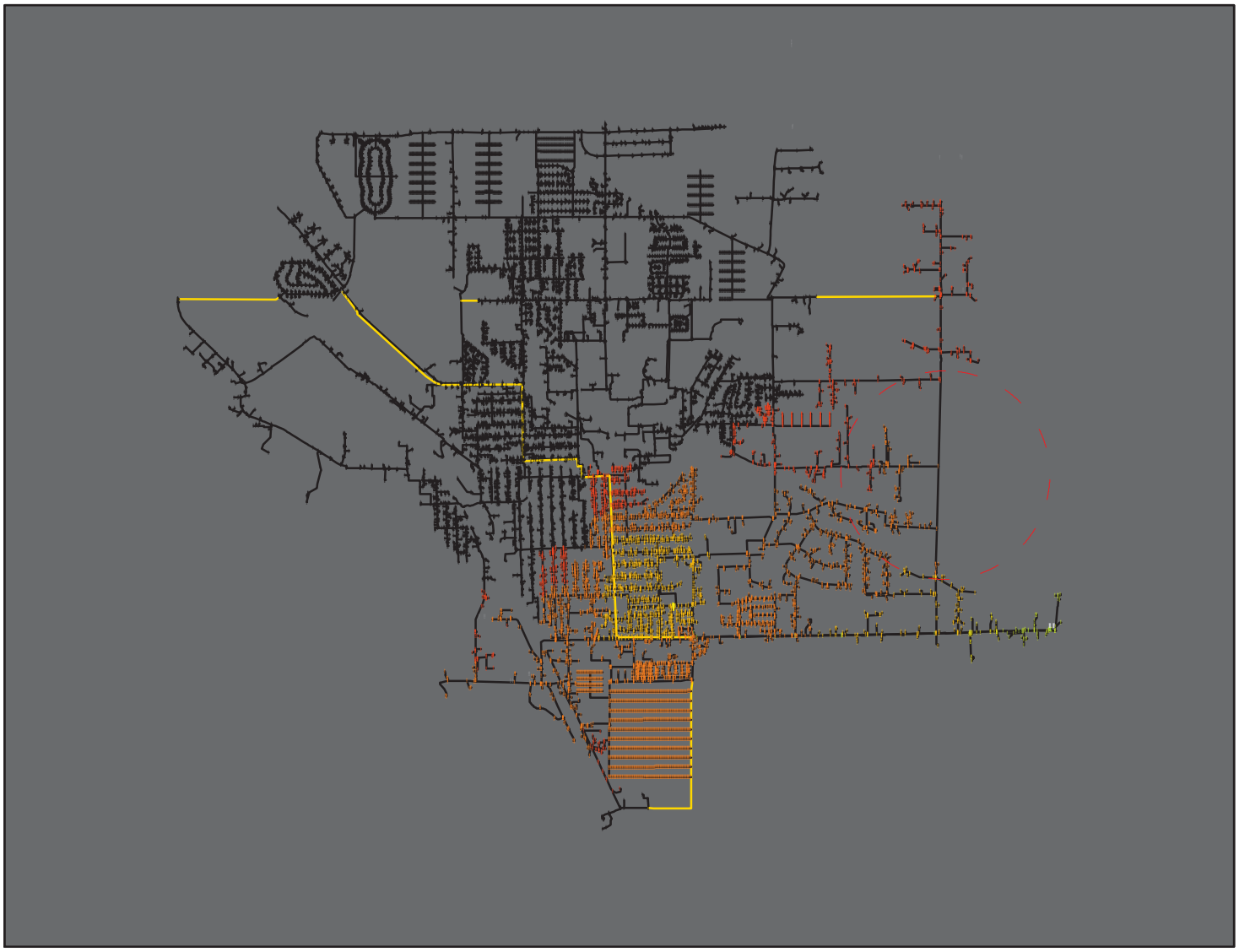
Scale: 1 = 64,660

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 10

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2564)
Enabled (17644)	< 20.00 (10)
Disabled (2563)	20.00 - 25.00 (11550)
Proposed (17)	25.00 - 30.00 (1358)
Retired (0)	30.00 - 35.00 (3786)
	35.00 - 40.00 (673)
	40.00 - 45.00 (59)
	> 45.00 (33)

Improvement 10 - Wilson Creek Road Extension
Scenario 3



0 2,400 4,800 7,200 9,600 Feet

Scale: 1 = 61,550

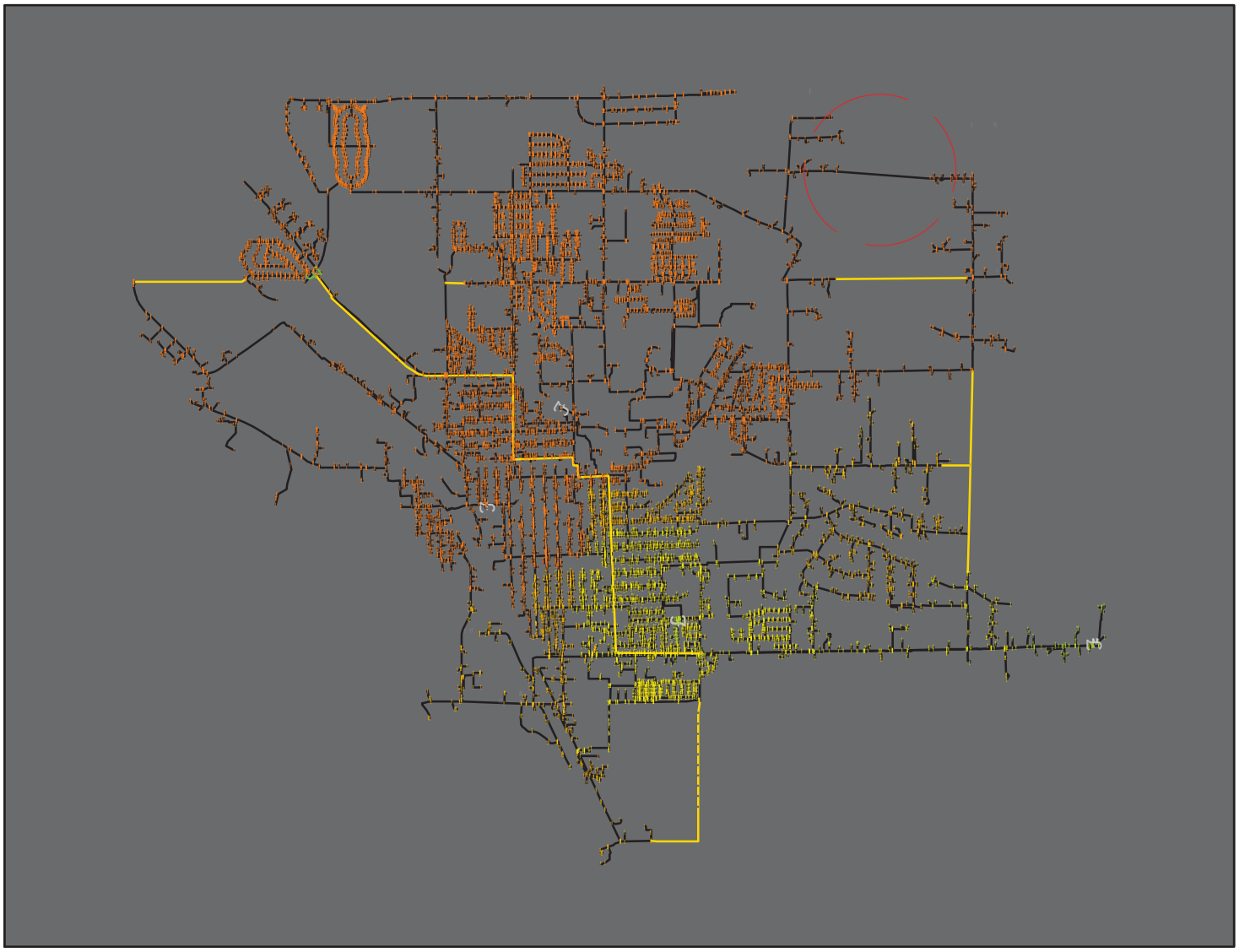
Improved Piping Information

Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2,997

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (34)
Enabled (20183)	< 20.00 (12722)
Disabled (24)	20.00 - 25.00 (1350)
Proposed (17)	25.00 - 30.00 (4341)
Retired (0)	30.00 - 35.00 (1417)
	35.00 - 40.00 (82)
	40.00 - 45.00 (55)
	> 45.00 (32)

Appendix C.11 – Improvement 12 Result Exhibits

Improvement 12 - Meadowbrook Lane to Willowdale Road Extension Scenario 1



0 3,250 6,500 9,750 13,000 Feet

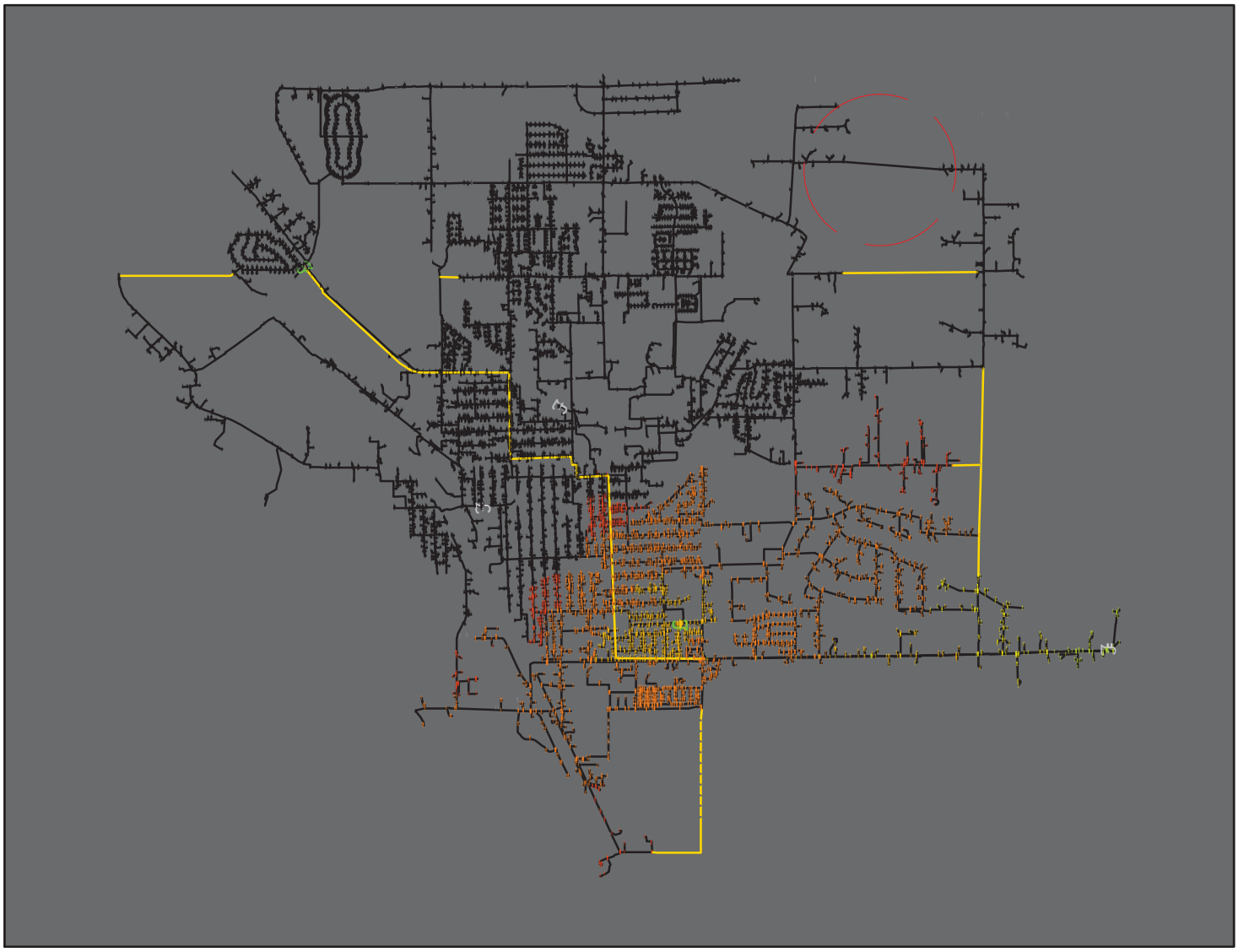
Scale: 1 = 55,980

Improved Piping Information

Services: 2020 Current
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (2565)
.	Enabled (17641)	!	< 20.00 (2)
.	Disabled (2564)	!	20.00 - 25.00 (0)
.	Proposed (20)	!	25.00 - 30.00 (12104)
.	Retired (0)	!	30.00 - 35.00 (2161)
		!	35.00 - 40.00 (3005)
		!	40.00 - 45.00 (146)
		!	> 45.00 (50)

Improvement 12 - Meadowbrook Lane to Willowdale Road Extension Scenario 2



0 3,200 6,400 9,600 12,800 Feet

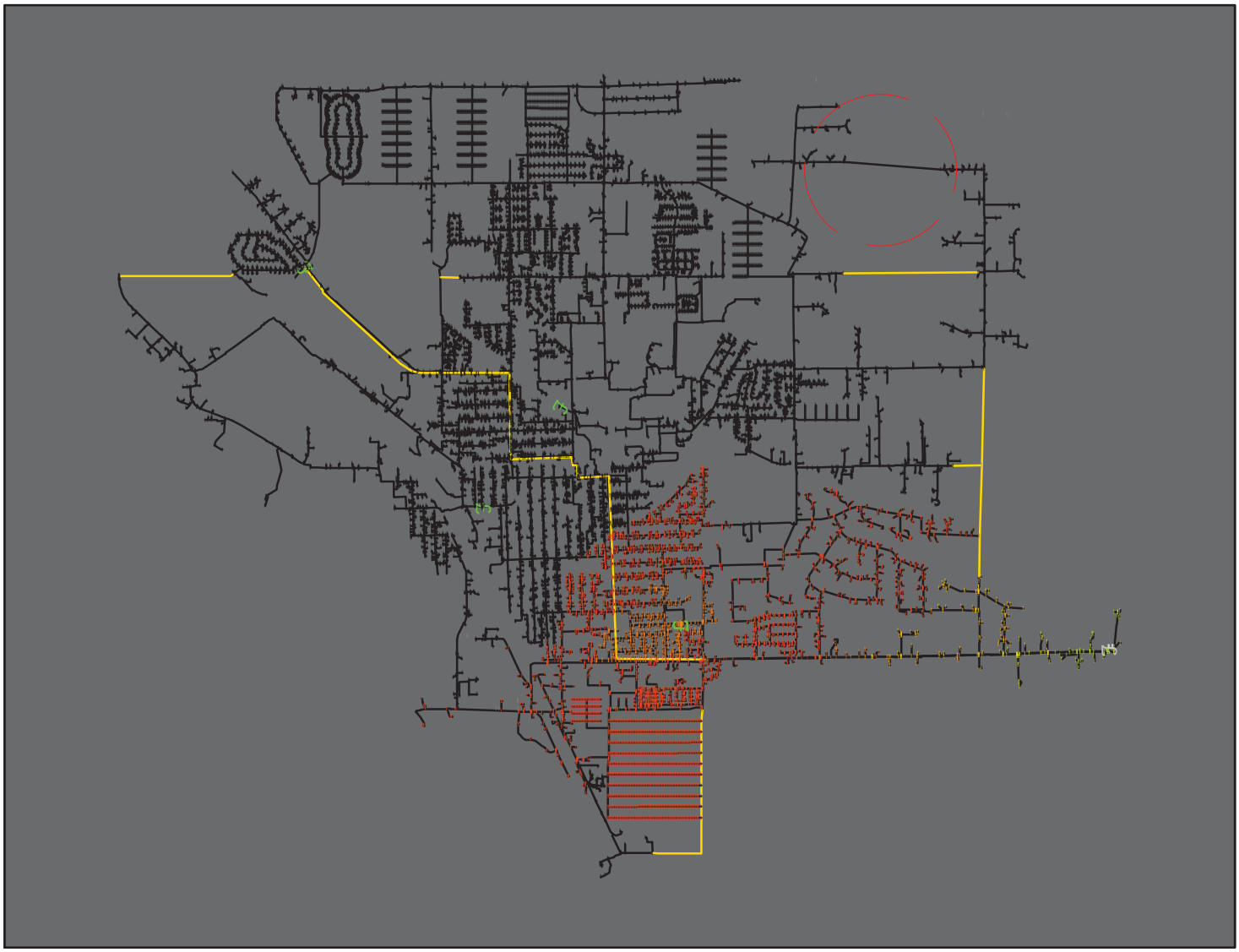
Scale: 1 = 54,310

Improved Piping Information

Services: 2026 Medium
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 4,338

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2565)
Enabled (17641)	< 20.00 (12243)
Disabled (2564)	20.00 - 25.00 (703)
Proposed (20)	25.00 - 30.00 (3517)
Retired (0)	30.00 - 35.00 (782)
	35.00 - 40.00 (136)
	40.00 - 45.00 (55)
	> 45.00 (32)

Improvement 12 - Meadowbrook Lane to Willowdale Road Extension Scenario 3



0 3,200 6,400 9,600 12,800 Feet

Scale: 1 = 54,310

Improved Piping Information

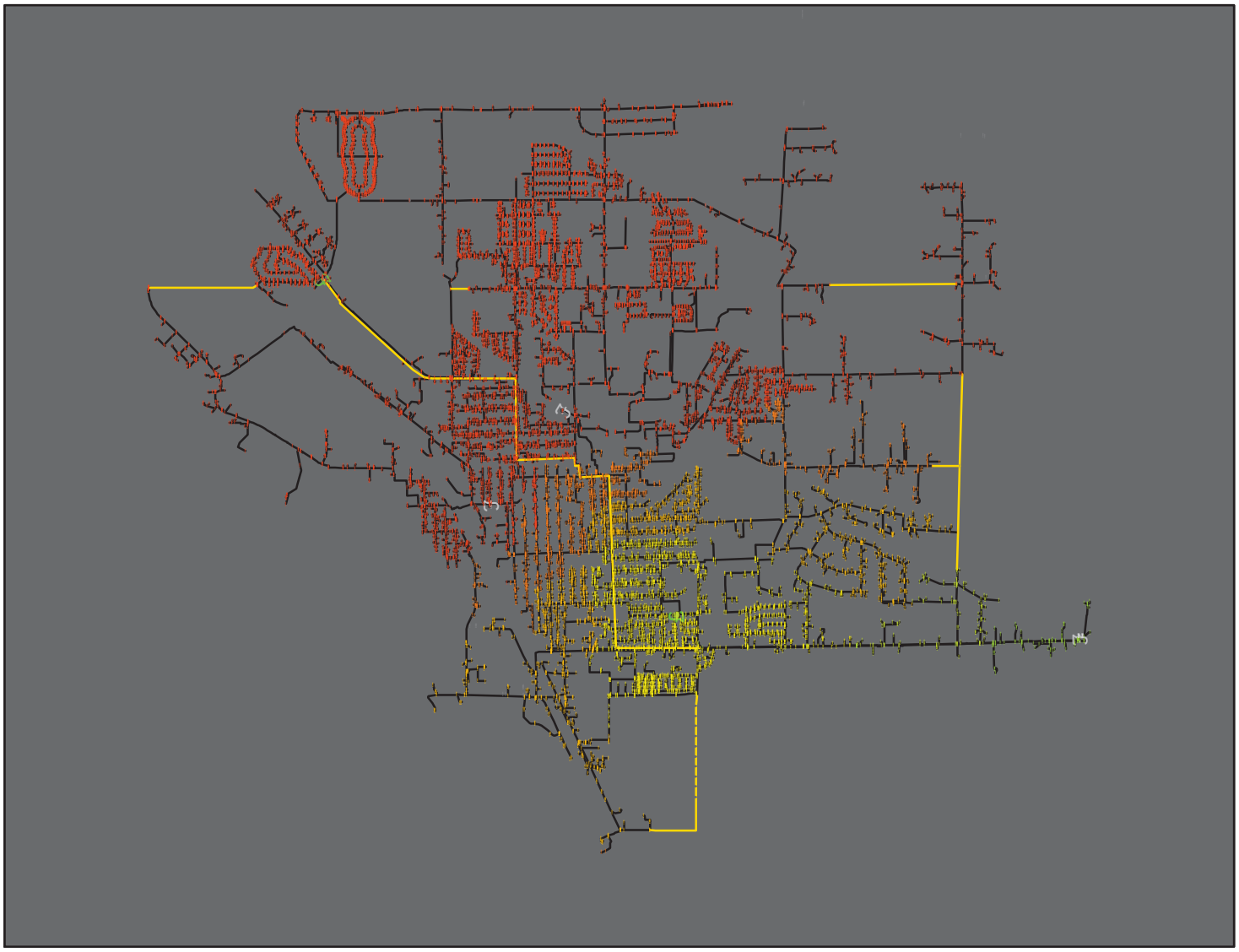
Services: 2026 High
HDD: 60
CWU Service: Active
Supply Pressure: 41 PSIG
Services Below 20 PSIG: 1,408

Facilities Color By
Service State
- Not Applicable (0)
- Enabled (20180)
- Disabled (25)
- Proposed (20)
- Retired (0)

Nodes Color By
Pressure (psig)
- Not Applicable (35)
- < 20.00 (14454)
- 20.00 - 25.00 (4593)
- 25.00 - 30.00 (681)
- 30.00 - 35.00 (141)
- 35.00 - 40.00 (42)
- 40.00 - 45.00 (55)
- > 45.00 (32)

Appendix D – Minimum Improvements Result Exhibits

Minimum Improvements to Maintain Performance
2026 Medium Growth | CWU Active

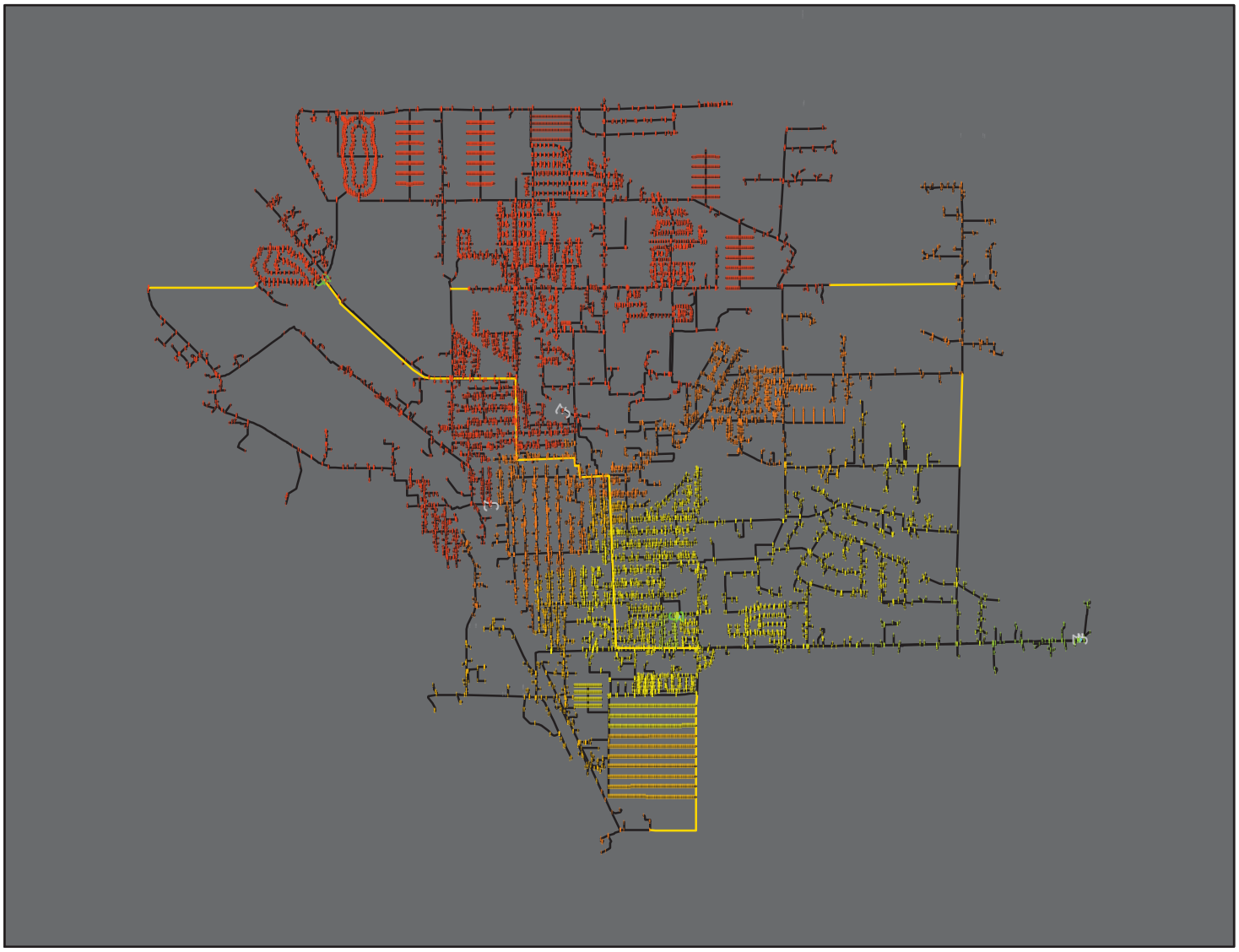


Minimum Improvements Information

Improvements Active: 11
Services: 2026 Medium
HDD: 60
CWU Service: Active
Total Supply Flow: 462,262.60 SCFH
Supply Pressure: 49 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (2565)
.	Enabled (17640)	!	< 20.00 (2)
.	Disabled (2564)	!	20.00 - 25.00 (11016)
.	Proposed (20)	!	25.00 - 30.00 (1526)
.	Retired (0)	!	30.00 - 35.00 (2043)
		!	35.00 - 40.00 (2547)
		!	40.00 - 45.00 (213)
		!	> 45.00 (121)

Minimum Improvements to Maintain Performance
2026 High Growth | CWU Active

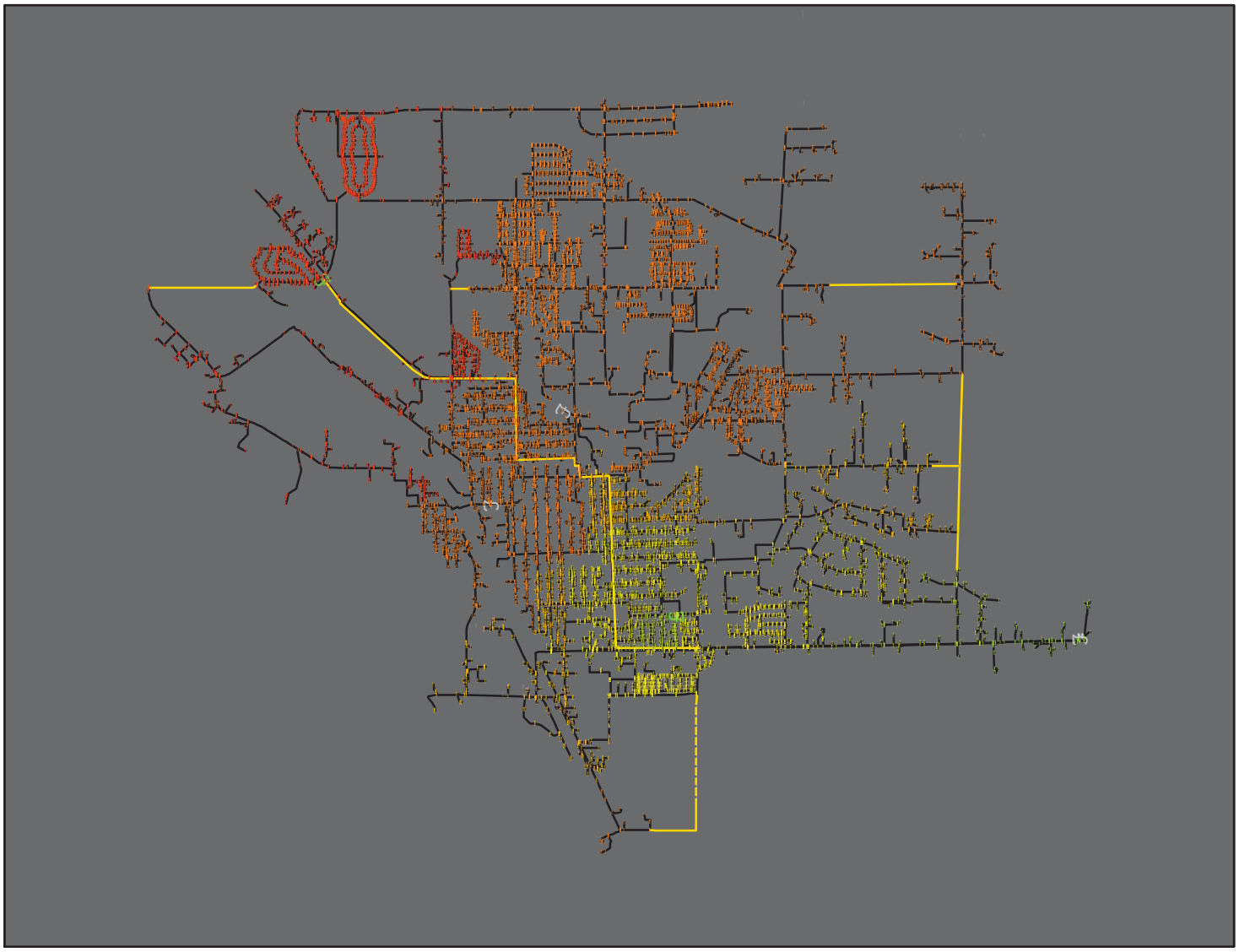


Minimum Improvements Information

Improvements Active: 4 and 11
Services: 2026 High
HDD: 60
CWU Service: Active
Total Supply Flow: 480,582.02 SCFH
Supply Pressure: 50 PSIG
Services Below 20 PSIG: 2*
*CWU & TCF are supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State		Nodes Color By Pressure (psig)	
.	Not Applicable (0)	!	Not Applicable (34)
.	Enabled (20182)	!	< 20.00 (2)
.	Disabled (25)	!	20.00 - 25.00 (10491)
.	Proposed (17)	!	25.00 - 30.00 (3152)
.	Retired (0)	!	30.00 - 35.00 (1783)
		!	35.00 - 40.00 (4140)
		!	40.00 - 45.00 (312)
		!	> 45.00 (119)

Minimum Improvements to Maintain Performance
2026 Medium Growth | CWU Inactive



0 2,500 5,000 7,500 10,000 Feet

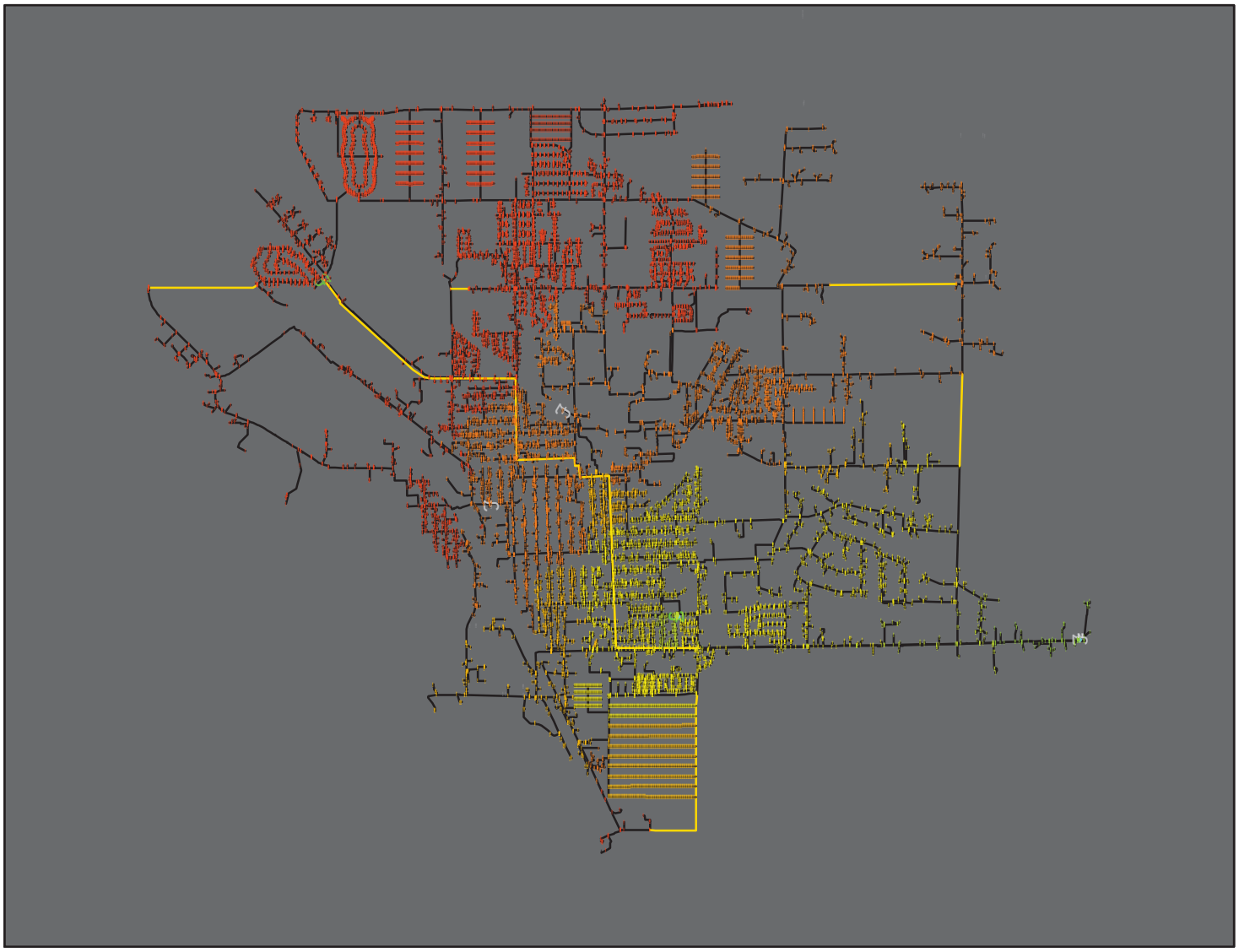
Scale: 1 = 57,720

Minimum Improvements Information

Improvements Active: 11
Services: 2026 Medium
HDD: 80
CWU Service: Inactive
Total Supply Flow: 462,262.60 SCFH
Supply Pressure: 49 PSIG
Services Below 20 PSIG: 1*
*TCF is supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State	Nodes Color By Pressure (psig)
Not Applicable (0)	Not Applicable (2566)
Enabled (17639)	< 20.00 (1)
Disabled (2565)	20.00 - 25.00 (2635)
Proposed (20)	25.00 - 30.00 (9415)
Retired (0)	30.00 - 35.00 (1779)
	35.00 - 40.00 (3025)
	40.00 - 45.00 (491)
	> 45.00 (121)

Minimum Improvements to Maintain Performance
2026 High Growth | CWU Inactive



0 2,500 5,000 7,500 10,000 Feet

Scale: 1 = 57,720

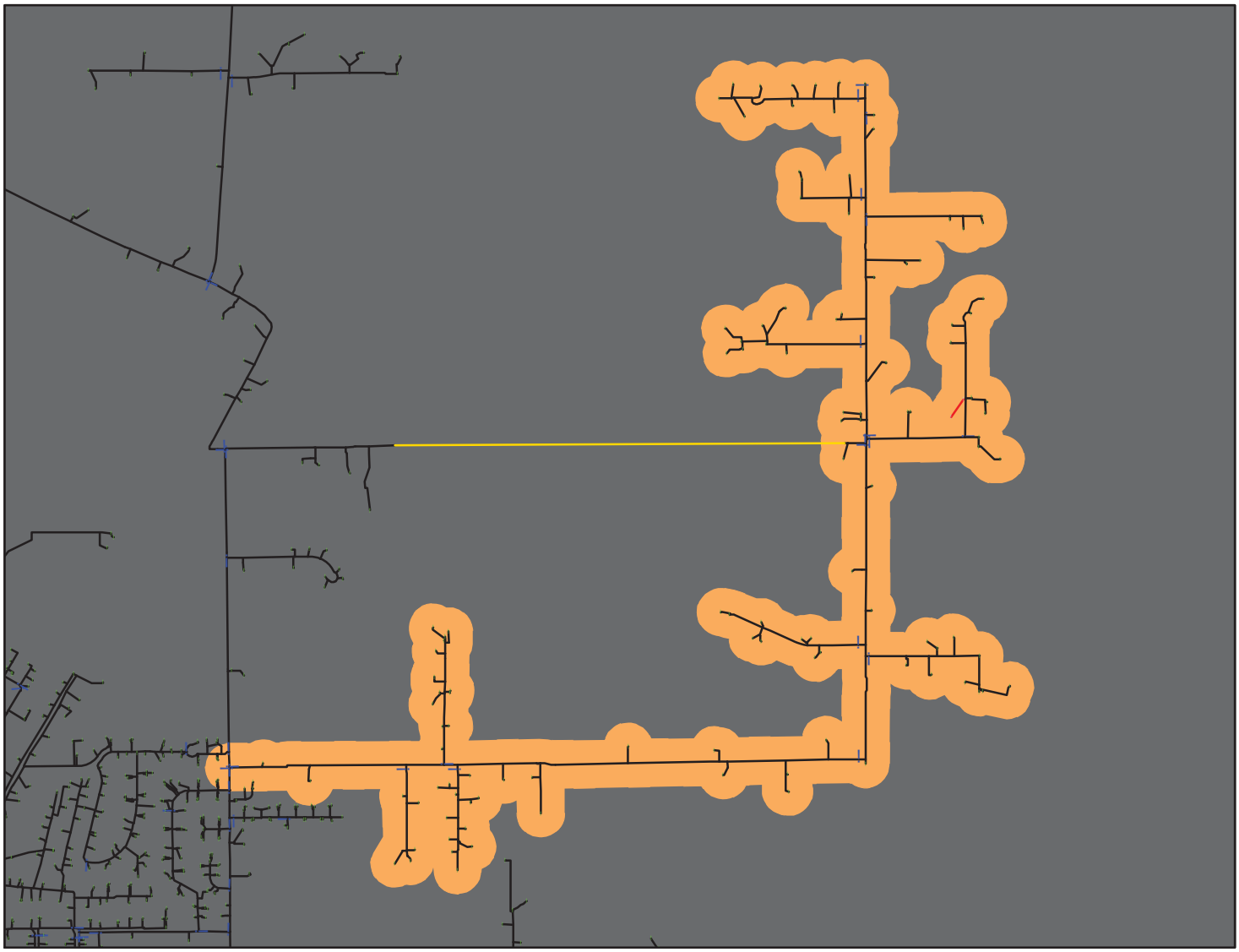
Minimum Improvements Information

Improvements Active: 4 and 11
Services: 2026 High
HDD: 80
CWU Service: Inactive
Total Supply Flow: 482,241.02 SCFH
Supply Pressure: 50 PSIG
Services Below 20 PSIG: 1*
*TCF is supplied by >20 PSIG and is regulated to 10 PSIG

Facilities Color By Service State		Nodes Color By Pressure (psig)	
Not Applicable	(0)	Not Applicable	(35)
Enabled	(20181)	< 20.00	(2)
Disabled	(26)	20.00 - 25.00	(8587)
Proposed	(17)	25.00 - 30.00	(4919)
Retired	(0)	30.00 - 35.00	(2087)
		35.00 - 40.00	(3992)
		40.00 - 45.00	(303)
		> 45.00	(108)

Appendix E – Single-Feed Branch Model Exhibits

Single Feed 1A



Single Feed Information

Feed Main ID: 899-115

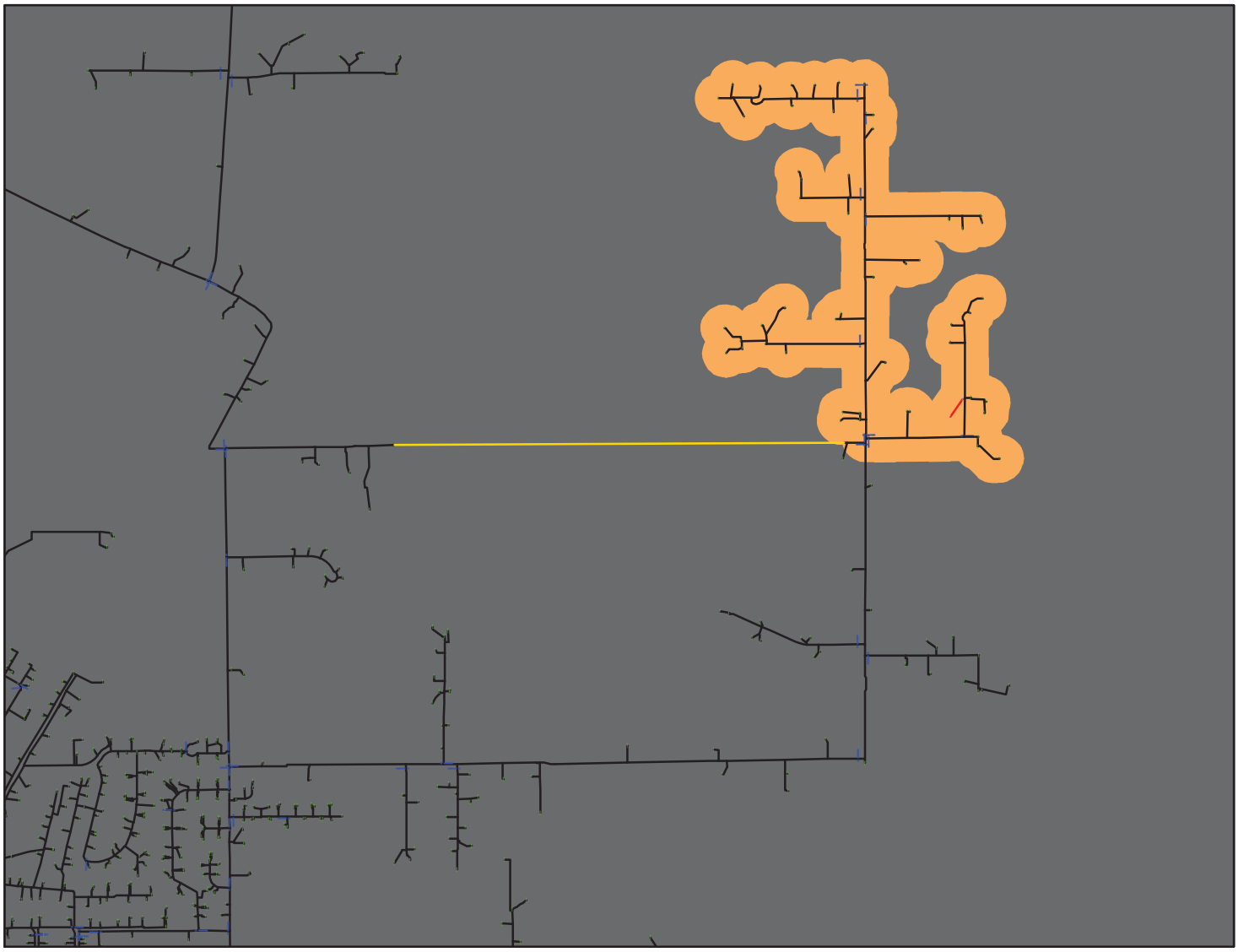
Active Service Count: 83

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 1B



Single Feed Information

Feed Main ID: 899-115

Active Service Count: 34

Note: Planned project will result in this configuration

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 2

Single Feed Information

Feed Main ID: 896-027

Active Service Count: 63

Note: Planned project will eliminate this single feed

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 3

Single Feed Information

Feed Main ID: 856-114

Active Service Count: 50

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 4

Single Feed Information

Feed Main ID: 856-054

Active Service Count: 50

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 5

Single Feed Information

Feed Main ID: 856-056

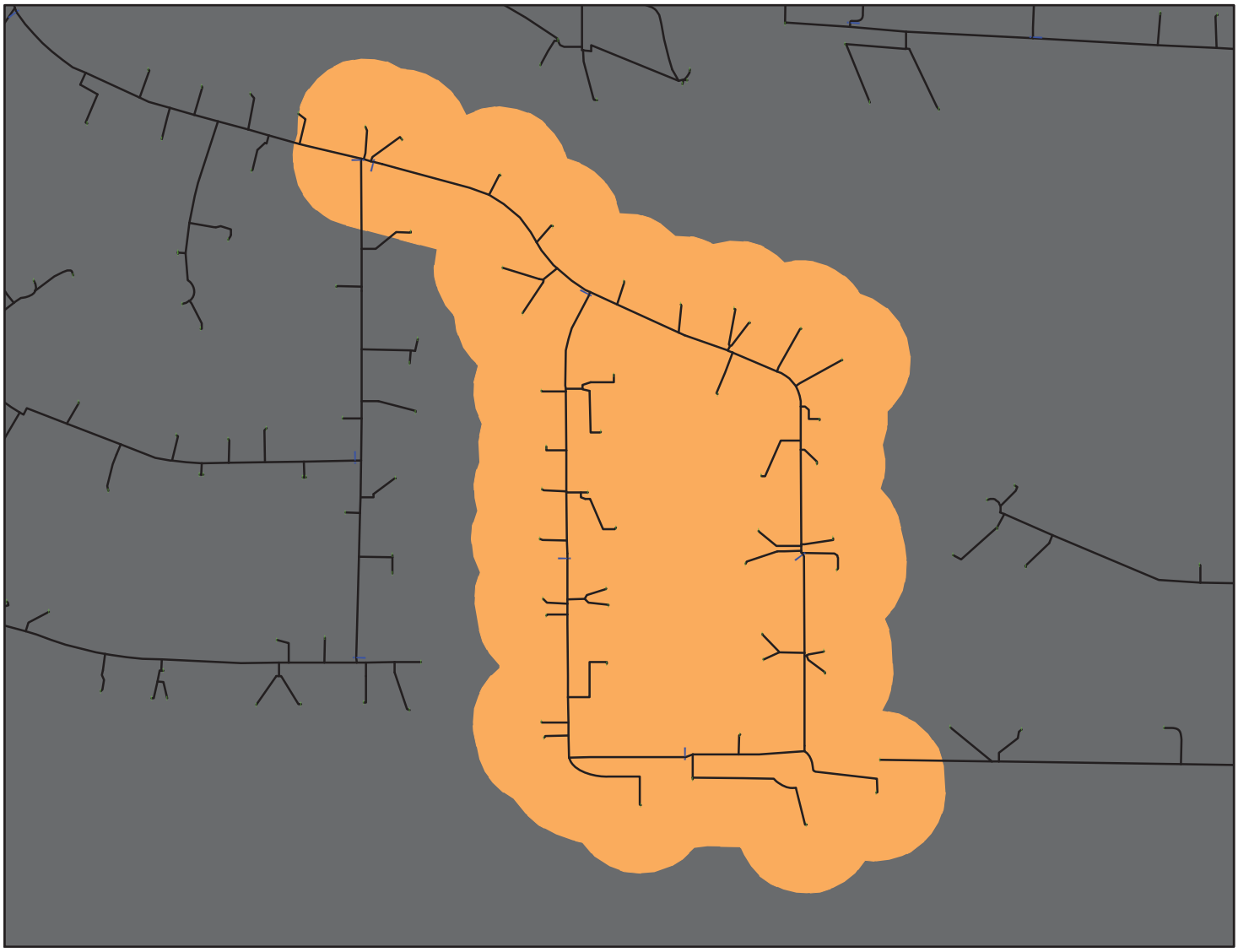
Active Service Count: 49

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By
Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 6



0 140 280 560 840 1,120 Feet

Scale: 1 = 5,681

Single Feed Information

Feed Main ID: 5-1968

Active Service Count: 43

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 7

Single Feed Information

Feed Main ID: 895-004

Active Service Count: 35

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By
Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 8

Single Feed Information

Feed Main ID: 856-040

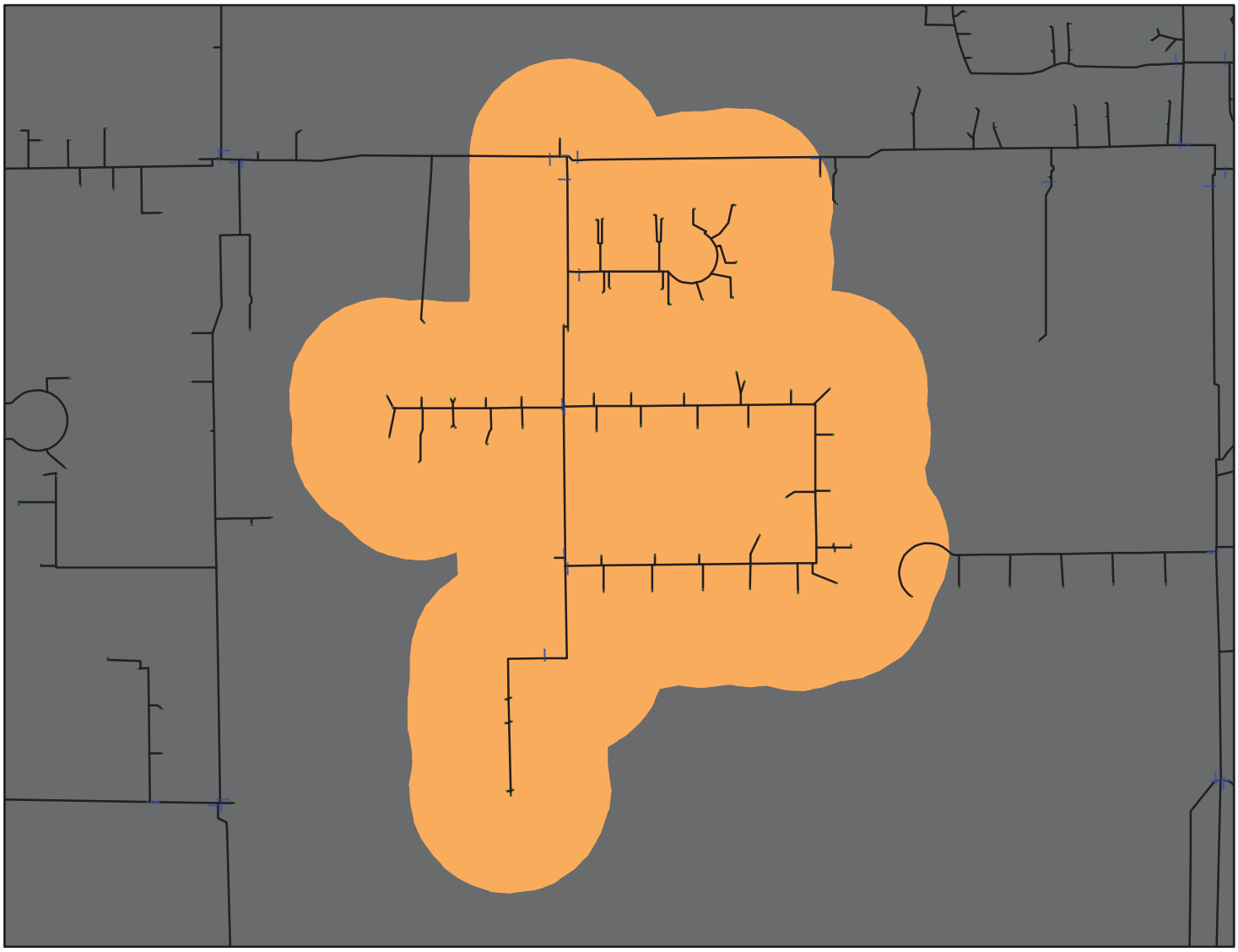
Active Service Count: 34

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By
Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 09



Single Feed Information

Feed Main ID: 899-069

Active Service Count: 33

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 10

Single Feed Information

Feed Main ID: 890-136

Active Service Count: 33

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 11

Single Feed Information

Feed Main ID: 898-125

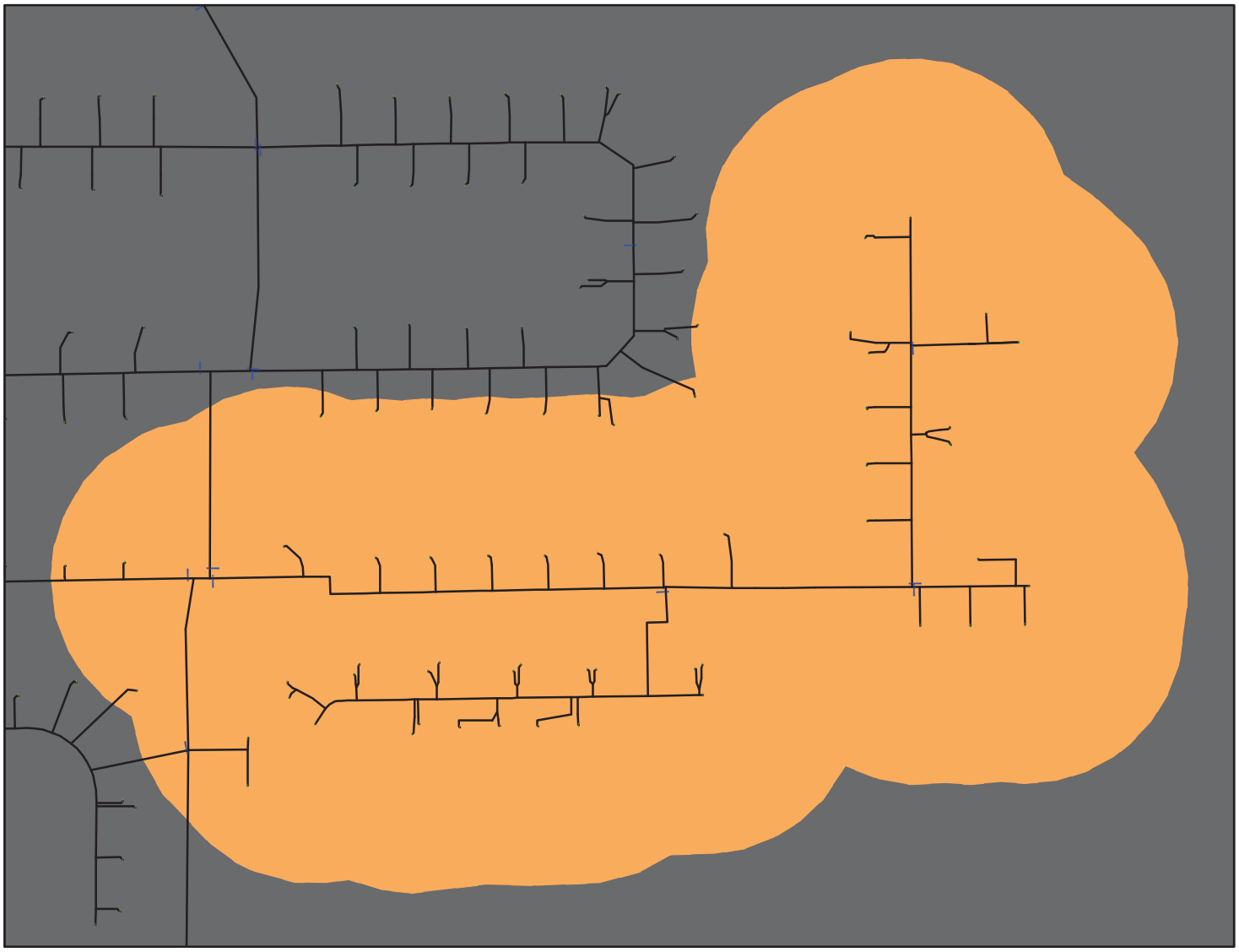
Active Service Count: 31

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By
Service State
Not Applicable (0)
Enabled (17639)
Disabled (3)
Proposed (0)
Retired (0)

Single Feed 12



Single Feed Information

Feed Main ID: 4-1955

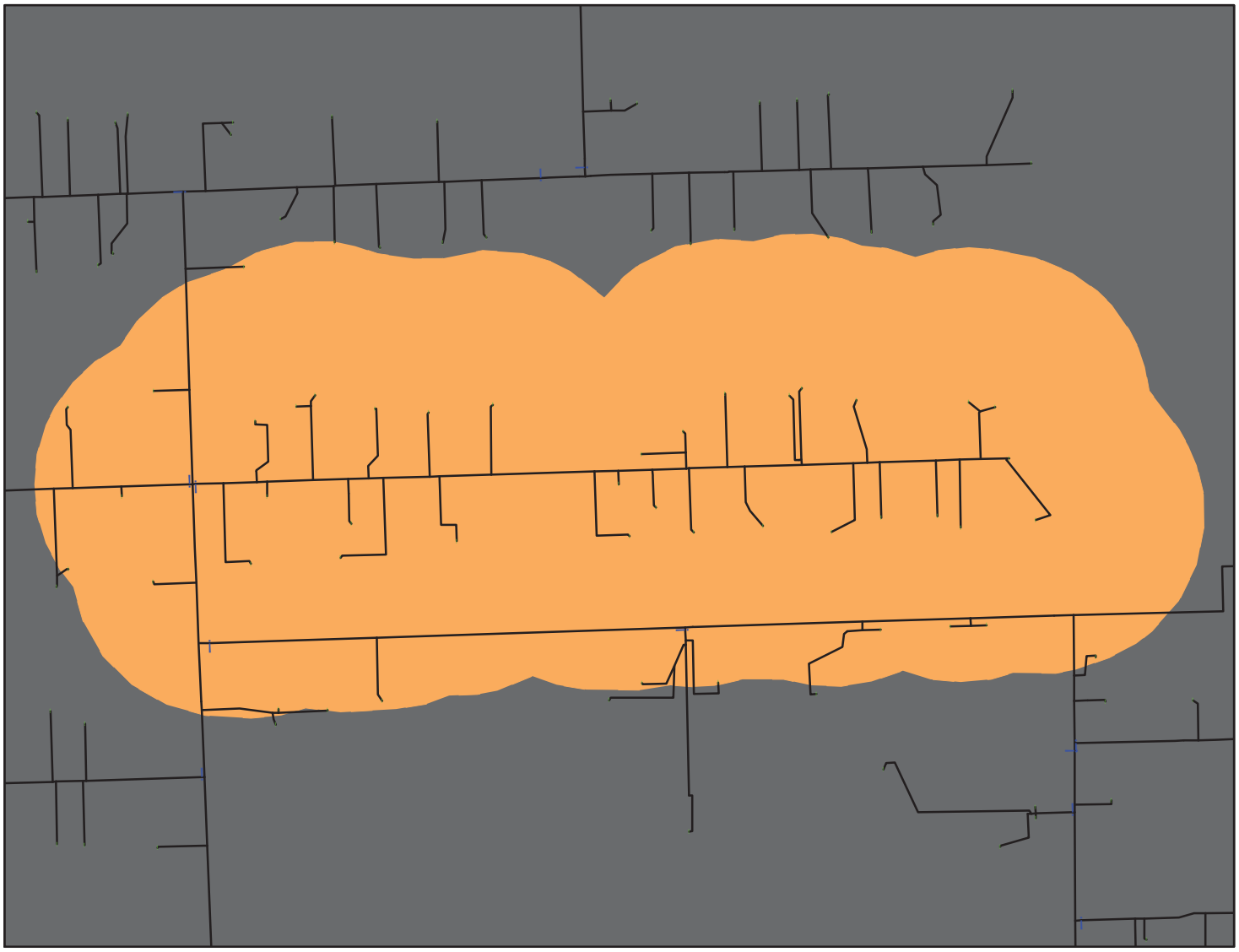
Active Service Count: 29

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By
Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 13



Single Feed Information

Feed Main ID: 856-025

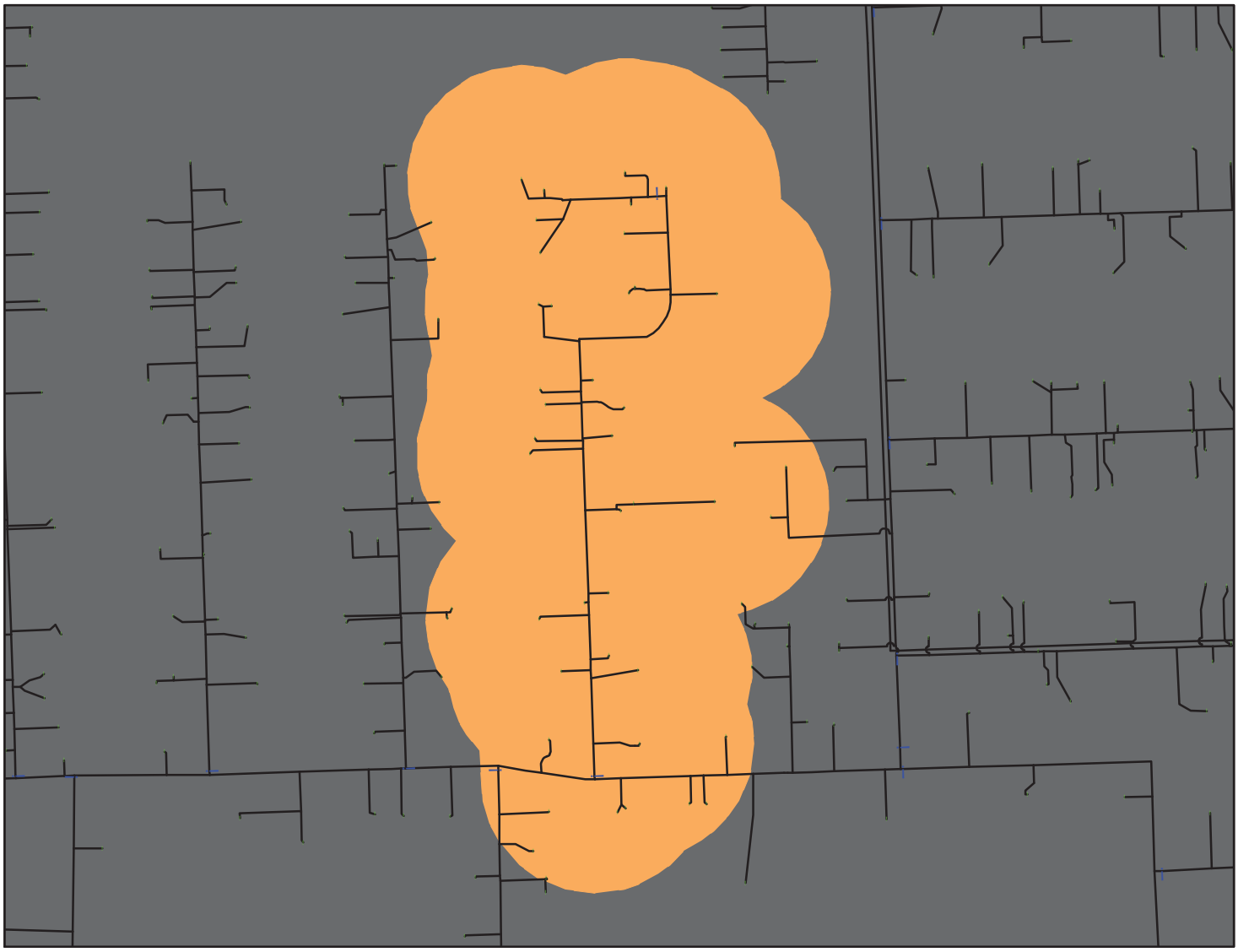
Active Service Count: 29

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 14



Single Feed Information

Feed Main ID: 856-026

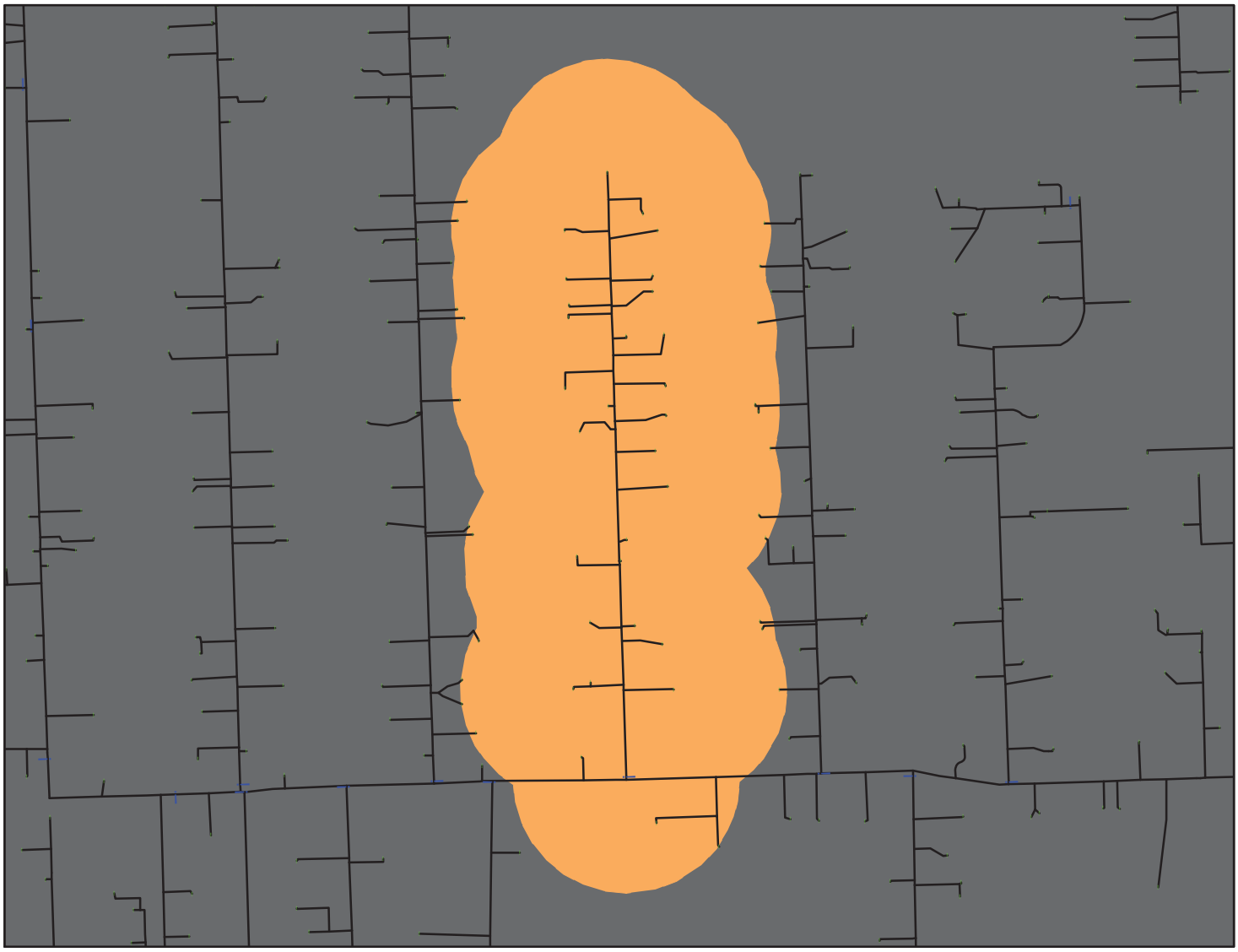
Active Service Count: 24

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By
Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 15



Single Feed Information

Feed Main ID: 856-028

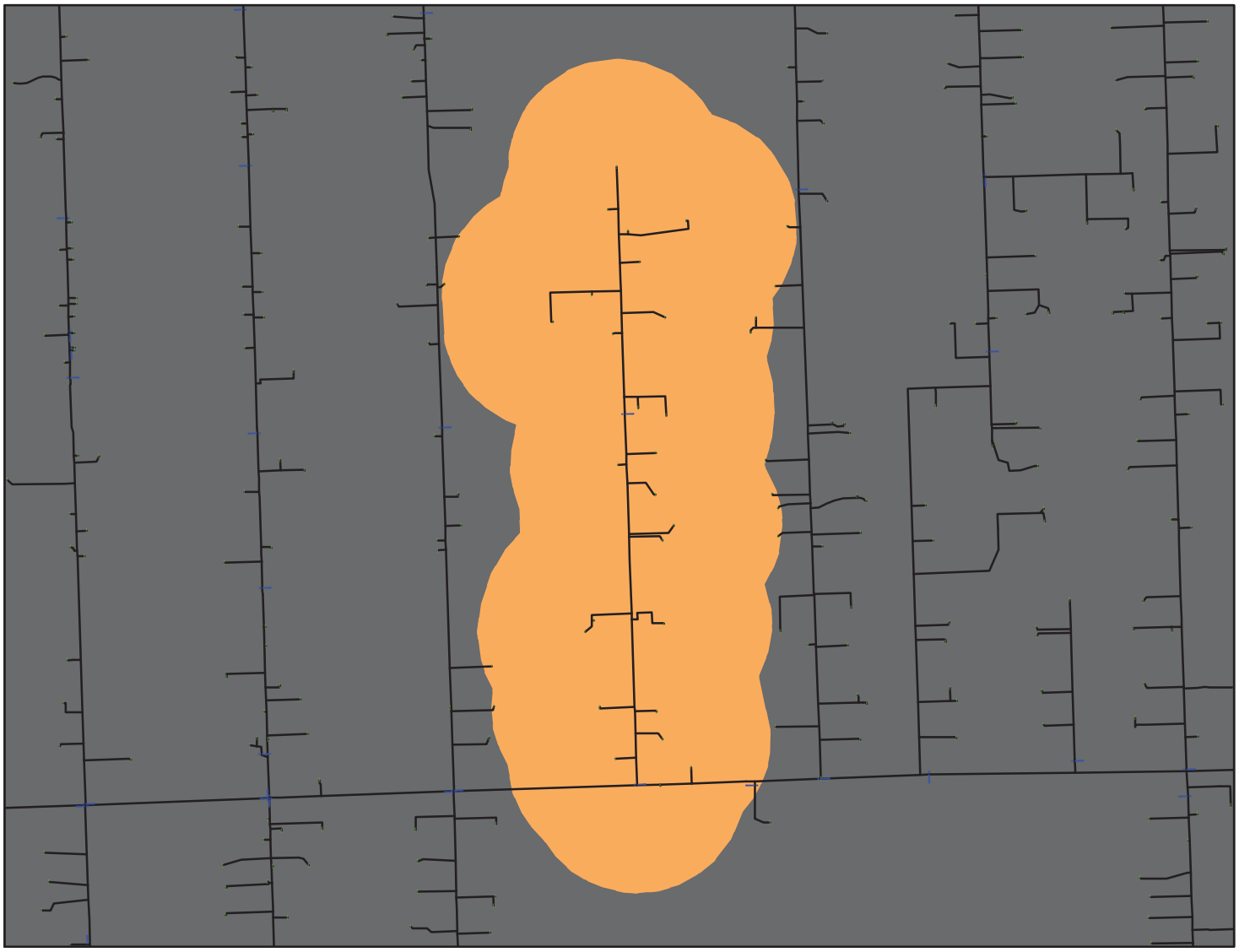
Active Service Count: 24

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By
Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 16



Single Feed Information

Feed Main ID: 856-044

Active Service Count: 24

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Single Feed 17

Single Feed Information

Feed Main ID: 856-079

Active Service Count: 23

Polygons Symbols
Single Feed

Facilities Symbols
Pipe
Regulator
Valve

Facilities Color By
Service State
Not Applicable (0)
Enabled (17630)
Disabled (29)
Proposed (16)
Retired (0)

Appendix F – Telemetry System Upgrade Scope of Work

ENautomation
a division of EN Engineering, LLC

Telemetry System Upgrade Scope of Work

City of Ellensburg, WA

Telemetry System Analysis

Project 2008119.00

Revision Number	Release Date	Remarks
00	12-Feb-2021	Initial Preliminary Release

1 Executive Summary

An analysis of the City of Ellensburg (COE) telemetry system related to the tap station, regulator station(s) and pressure recorders was performed by EN Engineering (EN). This document serves as guidance on replacing and upgrading the telemetry system with considerations to see live data and remote integration of small pressure recorders.

2 Existing System Functionality

The stations reviewed in the assessment and their associated instrumentation are listed in Table 1. Currently, the City uses Dial-Up messenger modems to remotely monitor data from Mercury Mini-AT Volume Correctors located at three (3) Regulator stations. Pressure recorder data from the Seattle Regulator Station is monitored via cellular connection. Pressure recorder data from University Auto and WWTP sites are not remotely monitored.

Table 1 - COE Stations and Existing Equipment

Station Name	Equipment
City Hall Headquarters (HQ)	Desktop interface
Central Washington University (CWU) Regulator Station	Mercury Mini-AT Volume Corrector connected to Dial-Up service
Seattle Regulator Station	Heath Data Recorder (HDR) connected to RV-50 wireless transmitter
Kittitas Regulator and Tap Station	NJEX 7300G Odorizer System, Pressure Chart Recorder, Mercury Mini-AT Volume Corrector connected to Dial-Up service
Twin City Foods (TCF) Regulator Station	Mercury Mini-AT Volume Corrector connected to Dial-Up service
University Auto Pressure Recorder	Heath Data Recorder (HDR)
Wastewater Treatment Plant (WWTP) Pressure Recorder	Heath Data Recorder (HDR)

3 Functional Requirements

The proposed project scope of services consists of replacing and upgrading the telemetry system for the City of Ellensburg, WA. The upgraded telemetry system shall use radio or cellular routers at each remote terminal unit (RTU) to transmit data to a master telemetry unit (MTU) located at HQ. The line-of-sight and distance between the RTU and the MCU should be assessed at each site for appropriate wireless transmission method.

In addition to supplying power to the wireless radio equipment, an external source must be provided to the measurement device when connecting to an external modem. If appropriate power is not available at the device location, an alternative power source shall be installed on a permanent outdoor structure.

The system shall provide secure web-based view of live and historical data. The system must be designed in an extensible architecture for expansion into additional stations.

3.1 System Description

This section is intended to specify the main components of the instrumentation and control system and the general requirements for the construction and arrangement of the associated equipment and field instrumentation.

- HQ
  - Provide Master Telemetry Unit (MTU)
  - To the extent possible, the process monitoring network shall be physically isolated from all other networks including administration networks.
  - Provide dedicated historian workstation running compatible historian software.
  - Configure web-based monitoring interface.
  - Appropriate training shall be provided to the City for all hardware and software.
- Remote sites
  - Integrator shall provide radio or cellular communication to the four (4) Regulator Stations and two (2) City pressure monitoring sites including University Auto and WWTP.
  - An initial software radio analysis to determine the feasibility and reliability of the proposed radio system.
    - These results shall be verified with a physical radio coverage analysis.
  - Antennas, cable, and height adjustment(s) shall be furnished and installed according to the radio system study. Line of sight shall be reviewed during proposal stage to include the cost of any antenna height adjustments.

4 Regulatory Considerations for System Upgrade

The proposed system must conform to all rules, regulations, ordinances, laws, or directives set forth by the City of Ellensburg and/or the State of Washington. The Integrator who is awarded this project is required to obtain all necessary permits, licenses, approvals, and other arrangements to perform work within the City of Ellensburg.

The following minimum regulatory considerations must be followed:

- The proposed system must be compliant with all FCC regulations for over the air data transmission. Only FCC approved antennas may be used.
- Electrical work shall be executed in accordance with the latest edition of the National Electric Code (NEC) and local ordinances and regulations.
- All materials and equipment shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

5 Upgrade Project List of Deliverables

The scope of the project shall include:

- System Requirements Workshop – Project team members will be assembled to review and discuss the project goals, approach, budget, and schedule. The accuracy of the documentation previously provided by the City will be discussed so that the project team understands any related limitations.
- Site Visits/Field Investigation – Before planning for any changes to the existing facilities, a complete understanding of the facilities and existing conditions must be investigated. The Integrator shall perform site visits, interviews, and review pertinent existing documents. The purpose of the site visits will be to develop familiarity with each individual site and its unique characteristics. The project team will develop an inventory of existing hardware and software at each site.
- Pre-Design Report - A Pre-Design Report (PDR) shall be submitted to provide a recommendation for a reliable and secure system for system-wide process monitoring.
- Detailed Design - Detailed design shall commence following City approval of the Final PDR. There are three deliverables associated with this task.
- Integration and Installation Services - Equipment and services shall be provided for installation of a complete, fully functioning monitoring system.
- Project Close-out - A final walk-through will be required by the City to provide feedback in the form of a punch list identifying any incomplete work. The Integrator shall submit the following documentation to the City for the project to be considered substantially complete.
    - Final O&Ms including equipment BOM, wiring diagrams and panel layouts based upon as-built conditions.

6 Recommended Integrator Qualifications

The City of Ellensburg may make such investigations as deemed necessary to determine the ability of the integrator to perform the work. The integrator shall furnish all requested information and data for this purpose. The integrator should meet the following minimum criteria to be considered qualified:

- All companies shall be licensed, insured, and bonded and shall furnish satisfactory evidence to the City that they have previously performed/provided the types of services specified.
- Minimum of five years recent experience in the design, construction, installation, and successful startup of SCADA systems of comparable size, type, and complexity to the proposed projects.
- The System Integrator shall also exhibit experience in integrating and installing Wireless Telemetry Systems.

AGENDA REPORT

Meeting Date: June 17, 2021

Agenda Subject: Water Division Strategic Energy Management Report

Submitted by: Mike Helgeson Public Works & Utilities

Recommended Action or Motion: Informational update

Background/Summary: In April of 2019 the Water Division engaged with Energy Smart Industrial, with funding provided by BPA, in a two (2) year Strategic Energy Management plan to maximize energy efficiency within the City's water system. Through this cooperative effort, some measures were identified and implemented in an effort to maximize energy efficiency in the production and distribution of the City's potable water supply. Some energy savings were realized through this process, especially in year one of the program. The year two results were also positive, but the challenges caused by the pandemic and some other factors led to less energy savings. The measures that were identified to increase efficiency will continue to be followed moving forward. Staff will be looking for more ways to increase energy savings in the future.

Staff will present the report to the Utility Advisory Committee and be available to answer any questions that they might have.

Previous Council Action: N/A

Analysis: Staff will present the findings of the report at the meeting.

Financial Impact: N/A

Attachments:
CompletionReport_CityofEllensburg_Yr2.pdf

Energy Smart Industrial

Strategic Energy Management Completion Report

Reporting Period Year 2

Presented to:

City of Ellensburg Water
501 N. Anderson St
Ellensburg, WA 98926

Sponsored by:

Energy Smart Industrial

and

City of Ellensburg Washington

May 20, 2021

Disclaimer

The intent of this Strategic Energy Management (SEM) Completion Report is to provide a final analysis of the actual energy savings and implementation costs associated with the SEM reporting year. Appropriate detail is included in this report.

City of Ellensburg Water shall independently evaluate the results of any recommendations provided in this report. In no event will City of Ellensburg and/or the Bonneville Power Administration (BPA) be liable for the failure of the customer to achieve a specified amount of energy savings, the operation of customer's facilities, or any incidental or consequential damages of any kind in connection with this report or the implementation of recommended measures.

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TABLE OF CONTENTS

1.0 Executive Summary

This report outlines the documented energy savings associated with the second year of the Strategic Energy Management (SEM) effort at City of Ellensburg Water in Ellensburg, WA. SEM was offered by City of Ellensburg Electric as part of the Bonneville Power Administration's (BPA) Energy Smart Industrial (ESI) program.

Table 1. Project Milestones

Project Phase	Start Date	End Date
Baseline Period	8/1/2015	7/31/2018
Year 1 Reporting Period	4/1/2019	3/31/2020
Year 2 Reporting Period	4/1/2020	3/31/2021

Prior to the start of their SEM engagement, City of Ellensburg Water did not have a history of organized energy efficiency efforts. However, the city conducts a leak audit of half of their water system each year and is proactive in monitoring for unaccounted water losses. Identified water leaks are promptly repaired. In addition, early in 2018, the city compared the production and energy use of their various wells to determine the energy efficiency of each water source.

The following table summarizes City of Ellensburg's performance during the SEM engagement. Details as to how these values have been calculated are provided in Section 3.

Table 2. Overall Performance

Description	Year 1	Year 2
Gross Energy Savings	238,746 kWh	11,471 kWh
Net Energy Savings	238,746 kWh	11,471 kWh
Percent Energy Savings	8.2%	0.4%
City of Ellensburg Savings*	73,808 kWh	0 kWh
Incentive	$2,012.30	$0.00
Avoided Energy Cost	$11,937.32	$573.55
Total SEM Financial Benefit	$13,949.64	$573.55

**Excludes savings from wells served by Puget Sound Energy.*

2.0 Summary of Energy Management Goals and Achievements

2.1 Energy Management Objectives

The team set their savings goal of 15% for Year 2 of their SEM engagement. There was strong support from management from both the Public Works/Utility Director, Ryan Lyyski, and the new Assistant Public Works Director, Mike Helgeson, who replaced Rod Paul upon his retirement in early 2021.

2.2 Energy Team Achievements

The energy team comprises five members, led by Mike Helgeson serving as energy champion (Table 3). The energy team met sporadically in a formal setting, but energy efficiency was a focus in daily operations.

Table 3. Energy Team

Name	Site Role	SEM Role
Ryan Lyyski	Public Works/Utility Director	Executive Sponsor
Mike Helgeson	Assistant Public Works Director	Energy Champion
Tony Malella	Operations Analyst	Data Master
Russ Palmer	Plant Maintenance	Team Member
Art Sinclair	Foreperson	Team Member

While the City of Ellensburg Water Department did not add any new measures to their activity register in Year 2, they continued to maintain a focus on practices and strategies they began in Year 1. The city had their entire city system checked for leak detection with all major leaks repaired. They also identified a location in the upper zone for a new high-volume well that will be installed by the end of 2021. Operations continued to maintain a focus on temperature settings in the summer and winter months and has continued to use the lowest cost water sources first.

Table 4. Summary of Energy Efficiency Measures

Measure Description	Measure Category				Date Complete
	Operations	Maintenance	Capital	Awareness	
Prioritize most efficient wells. Reduce frequent pump start/stops	X				04/12/2019
Identify and repair water leaks		X			Ongoing
Optimize heating/cooling in BPS and well houses	X				04/12/2019
Coordinate with Parks to optimize irrigation water use				X	1/21/2020
Exercise wells while load testing generators	X				1/21/2020
Retrofit well houses with insulation; develop winterizing SOP		X			1/21/2020

2.3 KEY CHALLENGES

The City of Ellensburg Water faced challenges related to changes in the water operation management with Rod Paul retiring and Mike Helgeson taking over the group. COVID-19 also made it difficult to coordinate work efforts and limited availability of some operators. Additionally, the water system had a number of significant water main breaks that caused water loss and damage.

3.0 Calculation of Energy Savings and Performance Incentive

3.1 Energy Model Specification

The version 2 energy model is used for this engagement. This model uses the electrical energy use provided by the electric department.

Well production is the primary driver of energy use since the wells are hundreds of feet deep and require significant energy to pump the water to the surface. Well production is a strong indicator and therefore was included in the model.

This single-variable, regression-based model provides a monthly prediction of energy use using the average daily well production. The model equation is:

$$\boldsymbol{Predicted\ Energy}\left(\frac{\boldsymbol{kWh}}{\boldsymbol{period}}\right) = \ (\boldsymbol{\beta_0} + \boldsymbol{\beta_1} \times \boldsymbol{Avg.Well\ Production}) \times \frac{\boldsymbol{days}}{\boldsymbol{period}}$$

Further details of model developments are located in the *Energy Model Report* version 2 dated May 7, 2020.

3.2 Review of Data

Energy data was of good quality, however two meters had final read dates slightly before the others, which were read on April 1, 2021. Meter E03725 (Rodeo Well) had a final reading of 1,680 kWh on 3/29/2021. Meter E10959 (Vuecrest Booster Station) had a final reading of 13,840 kWh on 3/30/2021. Because the impact on savings is limited, energy use was extrapolated from this final month for the remaining days of Year 2.

Well production data was complete and appears to be of good quality. Residuals (actual minus predicted energy) were also reviewed for any outliers that fall outside ±3 standard deviations from the mean, and no outliers were identified.

It should be noted that four major non-routine events occurred during Year 2:

- 10/12/2020: A water main broke near 2nd Street and Kittitas Street.
- 2/12/2021: Pilot Trucking pipe break; 6” main was open for over an hour.
- 2/20/2021: A third broken water main; it was shut off that day, then repaired several weeks later.
- February-March 2021: The Rodeo well pump had to be removed and inspected.

While water main breaks may have affected system efficiency, the impact should be small since the baseline model is normalized for flow. Moreover, residuals for October and February were very normal for Year 2. March 2021 had the highest savings of any month in Year 2. Therefore, no non-routine adjustment has been made for these events, since savings achieved in the rest of Year 2 is very small, and the impact of these events on the savings would likewise be small. All months in Year 2 have been accepted as valid observations.

3.3 Adjustments for Concurrent Incentivized Projects

City of Ellensburg did not implement any incentivized projects in Year 2 of this engagement.

3.4 Program Savings and Performance Incentive

Both the City of Ellensburg (Electric) and Puget Sound Energy (PSE) provide electricity to City of Ellensburg (Water). The energy model used for this engagement includes energy use from both utilities. Well efficiencies were used to break out the portion of savings that could be attributed to each utility. While efficiency improved for both sets of wells in Year 1, system efficiency returned to near-baseline levels for wells served by both utilities in Year 2. Only wells served by PSE showed a slight improvement in efficiency relative to the baseline period. Therefore, all savings from Year 2 are attributed to PSE wells and are therefore not eligible for incentives from City of Ellensburg Electric.

Table 5. Summary of Well Efficiency by Serving Utility

Description	Baseline	Year 1	Year 2
City of Ellensburg (Electric)			
① Electricity Use	1,740,484 kWh	1,925,372 kWh	2,161,978 kWh
② Well Production (Q)	872 MG	1,002 MG	1,083 MG
③ Well Efficiency (② ÷ ① $\times 10^6$)	501 gal/kWh	520 gal/kWh	501 gal/kWh
④ Efficiency Change from Baseline	NA	+19 gal/kWh	0 gal/kWh
⑤ % of Total Savings	NA	31%	0%
Puget Sound Energy			
⑥ Electricity Use	1,275,320 kWh	759,730 kWh	702,620 kWh
⑦ Well Production	611 MG	448 MG	338 MG
⑧ Well Efficiency (② ÷ ① $\times 10^6$)	479 gal/kWh	590 gal/kWh	481 gal/kWh
⑨ Efficiency Change from Baseline	NA	+111 gal/kWh	+3 gal/kWh
⑩ % of Total Savings	NA	69%	100%

A summary of City of Ellensburg's performance for the two-year engagement is shown in the table below, and a performance plot for the two-year engagement is provided in Appendix A.

Table 6. Summary of SEM Savings and Financial Benefit

Description	Year 1	Year 2
Period Start: Period End:	**4/1/2019** **3/31/2020**	**4/1/2020** **3/31/2021**
① Predicted Energy	2,923,848 kWh	2,876,069 kWh
② Non-Routine Adjustments	0 kWh	0 kWh
③ Actual Energy	2,685,102 kWh	2,864,598 kWh
④ Gross Energy Savings (① + ② − ③)	238,746 kWh	11,471 kWh
⑤ Incentivized Projects	0 kWh	0 kWh
⑥ Net Savings (④ − ⑤)	238,746 kWh	11,471 kWh
⑦ Net Percent Savings (⑥ ÷ ①)	8.2%	0.4%
⑧ Savings Attributed to City of Ellensburg (Electric)	73,808 kWh	0 kWh
⑨ Busbar adjusted Savings (⑦ × 1.09056)	80,492 kWh	0 kWh
⑩ Incentive ($0.025 /kWh × ⑧)	$2,012.30	$0.00
⑪ SEM-related Electrical Energy Cost Savings (rate × ⑥)	$11,937.32	$573.55
⑫ Total SEM Financial Benefit (⑩ + ⑪)	$13,949.63	$573.55

4.0 Performance Tracking System

City of Ellensburg Water uses SENSEI, a cloud-based energy management platform, to manage their projects and access WSOC cohort resources. The cost of the software is fully funded for the duration of this two-year engagement, so Ellensburg did not incur any costs for performance tracking system maintenance. Screenshots of their project tracking are provided in Appendix C.

5.0 Next Steps

5.1 Plans for Continuous Improvement

City of Ellensburg Water is encouraged to maintain the energy champion and energy team functions and to actively plan, prioritize, and communicate energy-related activities. As the second year of SEM ends, the city plans on the following energy efficiency continuous improvement activities.

- Finish the Illinois Well in the upper pressure zone. This will eliminate the need to regularly boost water from the lower zone into the upper zone and will significantly reduce dependence on the Brooklane Well.
- Explore the increased use of the City Well. This will include obtaining additional water rights and identifying a method to treat the water due to surface water influence.
- Continue to survey the water system for leaks on an annual basis.
- Maintain a focus on using the lowest cost water sources first.
- Continue to use the generator to “bump” wells during the off season.

5.2 Overall Program Benefit and Next Steps

Since this engagement began in 2019, the City of Ellensburg and ESI provided City of Ellensburg Water:

- An Energy Scan at the beginning of Year 1
- Five workshops in Year 1 and two more in Year 2
- An Energy Sensei account, which they used to track implementation of key action items.
- Evaluation of a hydraulic model by Hansen, Allen, & Luce, Inc.
- Follow-up site visits and remote support calls throughout the two-year engagement.

All of the above was funded through the City of Ellensburg, and the ESI program provided additional value.

Delivery of this Completion Report marks the conclusion of the two-year enrollment period for WEC. The City of Ellensburg and ESI encourage City of Ellensburg Water to continue to fine-tune their operating and maintenance strategies and develop their energy management program. If City of Ellensburg Water is interested in pursuing capital project opportunities, they should contact their Energy Smart Industrial Partner (ESIP) or local utility representative.

APPENDIX A. ENERGY PERFORMANCE TRACKING

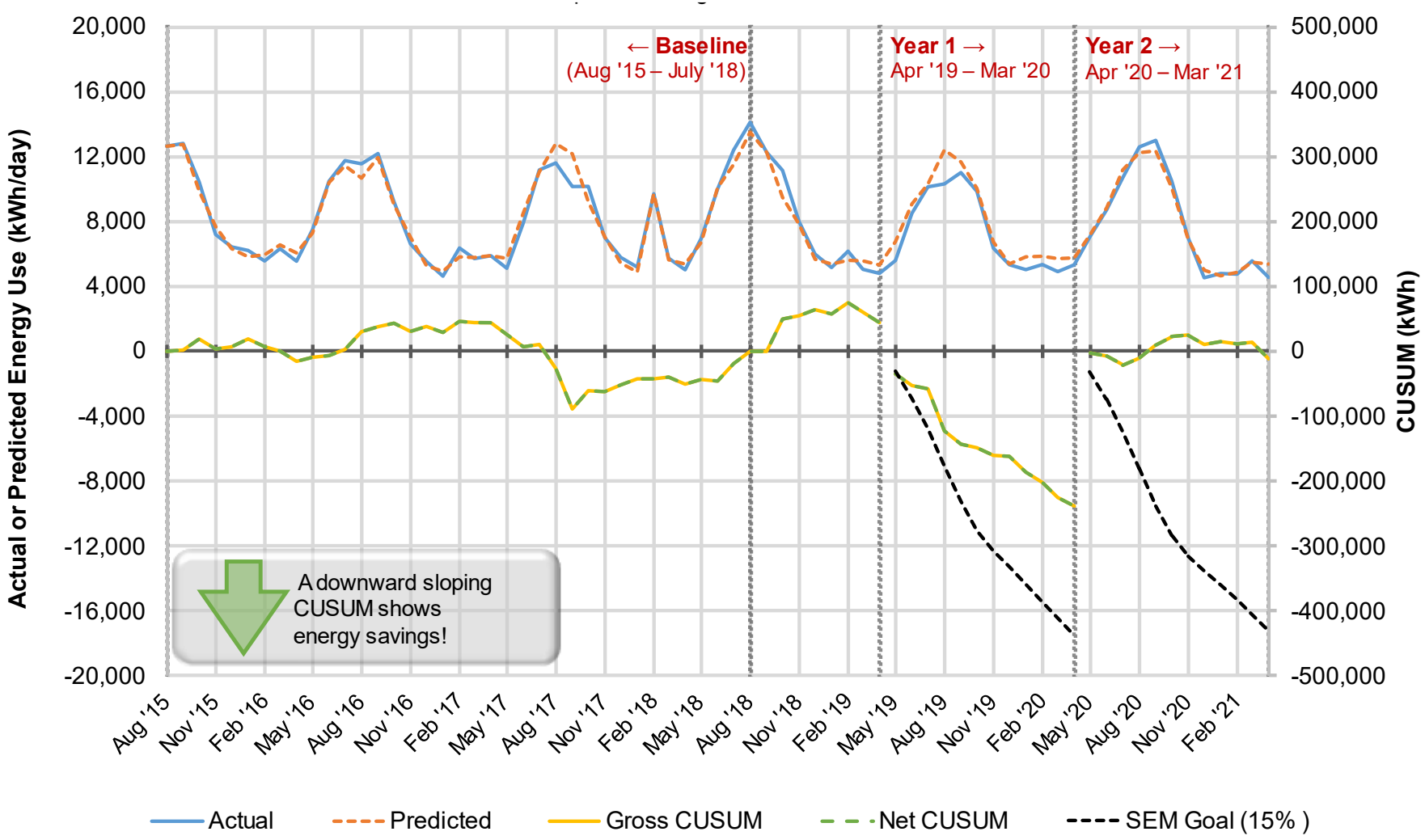

Figure 1. Performance through the end of Year 2.

APPENDIX B. YEAR 2 COMPLETION REPORT SAVINGS SUMMARY

All reported savings in Table 7 are site-based values.

Table 7. Year-over-year Savings Summary

Year	Description	Result
1	City of Ellensburg Electric Only	
	① SEM Savings: City of Ellensburg Electric Only*	73,808 kWh
	Total System (City of Ellensburg + PSE)	
	② SEM Savings: Total (City of Ellensburg + PSE)	238,746 kWh
	③ Year 1 Percent SEM Total Savings	8.2%
2	City of Ellensburg Electric Only	
	④ SEM Savings: City of Ellensburg Electric Only*	0 kWh
	⑤ Change from Previous Year (④ − ①)l	−73,808 kWh
	Total System (City of Ellensburg + PSE)	
	⑥ SEM Savings: Total	11,471 kWh
	⑦ Change from Previous Year (⑥ − ②)l	−227,276 kWh
	⑧ Year 2 Percent SEM Total Savings	0.4%

**Excludes savings from wells served by Puget Sound Energy.*

APPENDIX C. PERFORMANCE TRACKING SYSTEM SCREENSHOT

The following screenshots provide an example of how City of Ellensburg Water used Energy Sensei to track progress on planning and completing action items.

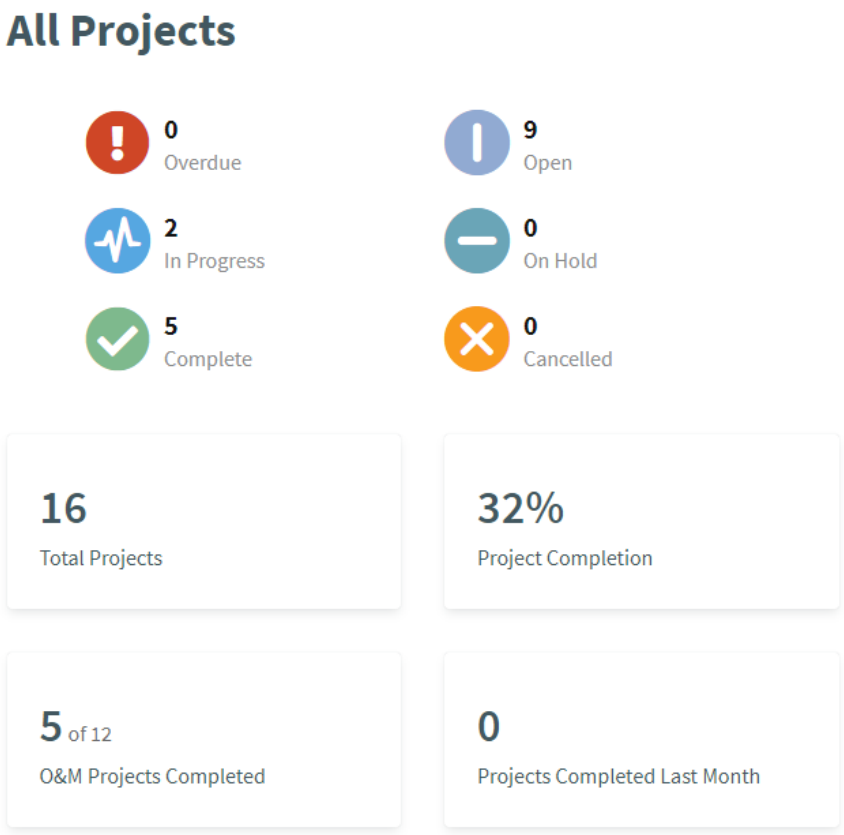

Figure 2. SENSEI project summary.

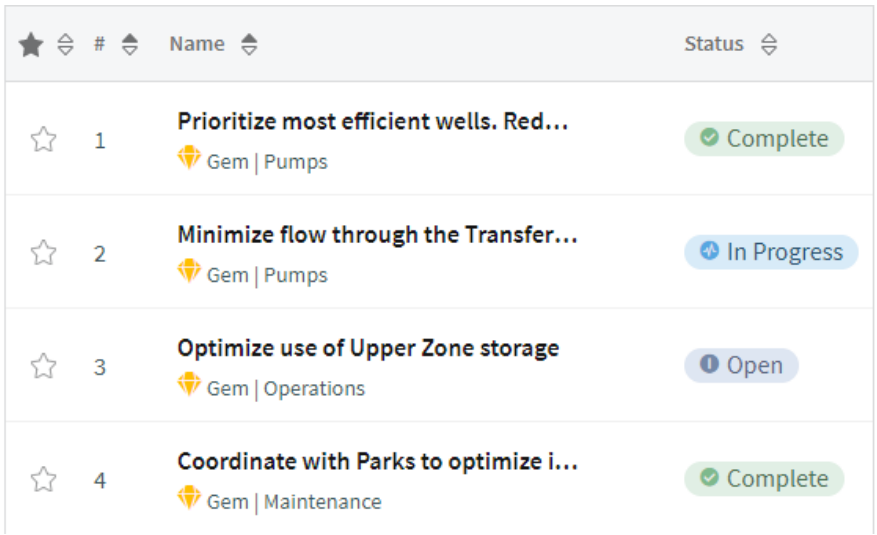

Figure 3. SENSEI project tracking.

APPENDIX D. ENERGY MODEL DATA ANALYSIS AND ADJUSTMENTS

REVIEW OF VALID RANGE

Well production in Year 2 was within the valid range of the model and similar to the values observed in the baseline, as shown in the figure below.

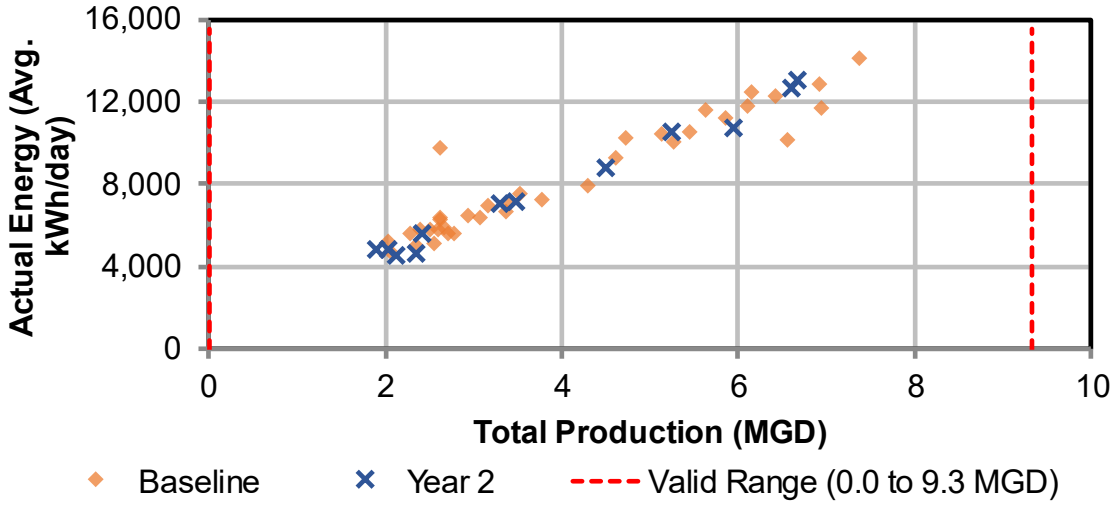

Figure 4. Actual energy vs. total well production.

REVIEW OF ENERGY SAVINGS

Energy savings were reviewed relative to ±3σ control limits. All savings appeared reasonable and no further inspection of savings was required.

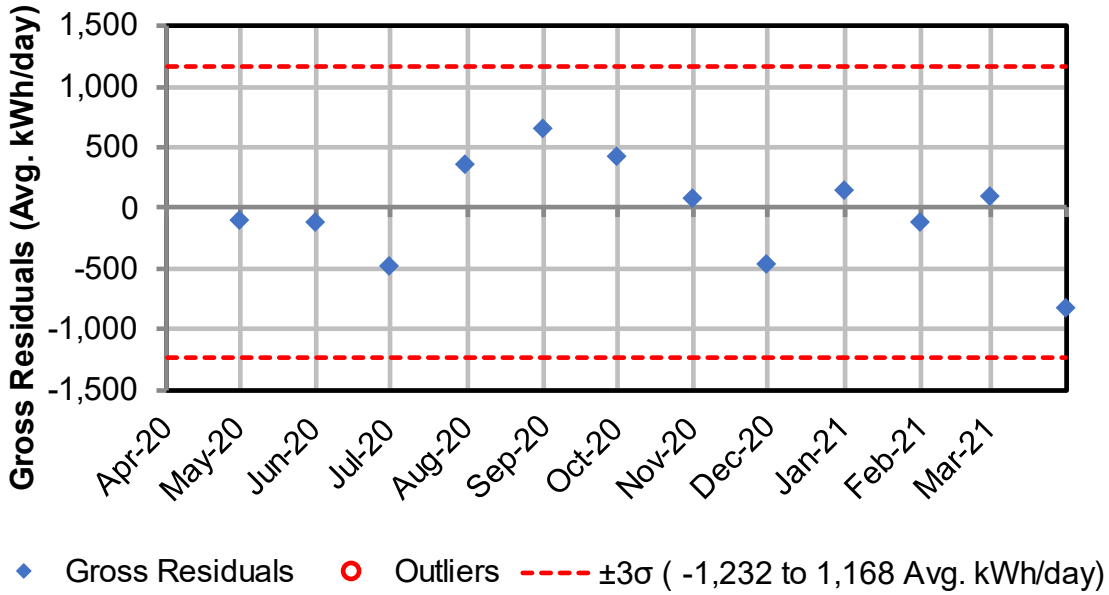

Figure 5. Gross Residuals (Actual – Predicted)

NON-ROUTINE ADJUSTMENTS

Non-routine adjustments were not required in Year 2.

Ellensburg Utility Advisory Committee
Public Works & Utilities Issues and Updates
June 17, 2021

Consent Items

Agenda Reports for items approved by the City Council since our last meeting are attached.

All Utilities

- Bull Road utility project began on Monday, March 15th. All utilities have been installed between I-90 and Mtn. View Avenue, with Bull Rd. scheduled to be repaved mid/late June. After paving and restoration North of I-90, the contractor will move south of I-90 and begin the utility installation in Berry Road. This phase will include the replacement of the bridge in Berry Road over Wilson Creek.
- Staff is currently working with FCS Group on a contract updating cost of service analysis for Light, Gas, Water, and Sewer utilities. Staff will return to UAC with a proposed contract at the next meeting.

Sewer

- Collections crews are training the new Collections Serviceperson.
- Collections crews are continuing work on the Spring Jet List, inspections, and locates.
- Crews are continuing grounds maintenance projects at the WWTF.
- WWTF staff are monitoring the performance of the four new recently installed aerators.
- As discussed in the May UAC meeting, staff completed and submitted for earmark funding through Senator Cantwell's office for the following projects:
    - Renewable Natural Gas project at the Waste Water Treatment Facility (WWTF) to reclaim the methane produced at the WWTF through normal plant operations and to scrub and inject into the City's natural gas system instead of flaring off the methane.
    - Anderson Road Sewer and Fiber/Telecom Extension from the current utilities end in Umptanum Road, west to Anderson Road, then north in Anderson Road to 1st Ave. This project would provide these needed utilities to currently undeveloped Industrial zoned property and allow for the removal of the existing sewer lift/pump station. This project is consistent with goals outlined in our current Comprehensive Plan.
    - Downtown Park and downtown WIFI.

Water

- Water pumped for May 2021 was 146,724,770 compared to May 2020 which was 139,782,662.
- Crews are repairing leaks discovered during phase 1 of leak survey.
- Staff is working with Coho Water Resources on various water resource items.
- The water utility continues its work with Conley Engineering on replacement of the telemetry system software.
- Crews are continuing valve and hydrant maintenance, and changing out meters.
- The City of Ellensburg has received a $20,000 grant to complete a pre-feasibility study for an Aquifer Storage and Recovery (ASR) evaluation. This grant will allow for a preliminary analysis to determine if a complete ASR Pilot Study project is recommended. If preliminary findings are promising, staff will pursue additional grant funding from the Dept. of Ecology for the ASR Pilot Project.

Storm

- Gateway I design is on hold while staff and City Attorney works with communications companies. The project may bid in the fall of 2021 if agreements can be reached with the communications folks.
- Gateway II, staff will interview consultants next week and make a selection to begin design.
- Bridge levee re-design is completed at 100% and the bridge could go out to bid late fall. Alongside this effort is the certification work that Aspect Engineering is performing to meet FEMA standards.
- Summer maintenance and inspection is on schedule.
- Staff will prepare to jointly write a grant application to help with flooding on East Wilson and West Wilson late summer early fall.
- The new outreach and effectiveness study conducted by Osborne Consulting is underway and on schedule.

Electric

- A Journeyman Lineman position is still vacant and being advertised as well as a Temporary Lineman.
- Crews are focusing on a large Capital underground project on North Walnut.
- The installations and energization of the permanent electrical service for the new Mt. Stuart Elementary School has been completed.
- Work on the Cora St electrical improvements and at the new elementary school is ongoing.
- Installation of conduits for the north portion of Bull Rd. is in progress. The installation of casings at the I-90 crossing is complete and the concrete installation in in progress.
- City Council at the June 7th meeting approved the award of RFQ R21-18 Currier Creek - Reecer Creek Primary Extension to the lowest responsive bidder Titan Power in the amount of $53,991.80. Staff received a total of 4 bids.
- Staff is completing the Request for Qualifications for consultant services for the Dolarway Substation Improvements and will be returning to the UAC with recommendations for a consultant.
- Staff is notifying UAC, as required by Chapter 9.80 of the ECC, of the sale of power to Chelan PUD. The remaining 1 MW purchase for delivery dates of 10/01/2021 to 9/15/2022 was remarketed to Chelan PUD for $39.30 per MWh for a total contract price of $330,120. The City's 1 MW purchase from Chelan began October 1, 2019 through September 15, 2022 at a fixed price of $33.65/MWh. 1 MW for FY2020 was sold back to Chelan PUD at $23.15/MWh. The FY2021 sell back of 1 MW was remarketed to Chelan PUD at $28.90/MWh.

Gas

- Crews are working on the annual regulator station maintenance and valve maintenance as well as other scheduled construction and maintenance projects. After the annual regulator station maintenance and valve maintenance is complete, crews will move onto annual leak survey.
- The Washington Utilities & Transportation Commission (UTC) will be auditing our Damage Prevention & Public Awareness Program on June 23rd. They will also be performing an Annual System Review of our gas system and records.
- Each year the City Gas Division conducts a phone survey to measure the effectiveness of the natural gas Public Awareness Program. As part of the Public Awareness Program, the City provides safety messages in utility bills, on the City's website, on the radio and in the newspaper to make sure customers and citizens know what to do in case of a natural gas emergency. This year's phone survey began on May 17, 2021. Results of the survey will be presented to the UAC when available.

Telecommunications

- Attended construction meetings for the ESD 401 new schools.
- Central Connect a newer Wireless ISP Gigabit internet services from City Fiber Installation completed.
- The Telecom subgroup conducted a study session to discuss feedback from the UAC April Meeting.
- City Fiber construction jobs are starting to pick up.
- Telecom is working with Public Works on the Gateway 1 & 2 Projects. Telecom will be relocating fiber in both projects. In support of "Dig Once" the Telecom will be utilizing common trenching and installing conduit for future use where viable.