APPENDIX PD-**2**
DOMESTIC WATER STUDY

North Watt Specific Plan
Domestic Water Study

October 7, 2026

Prepared for

SACRAMENTO COUNTY

Prepared by



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1.0 Introduction

The North Watt Specific Plan area (NWSP) is in the North Highlands area of Sacramento County. The NWSP extends along Watt Avenue from Antelope Road south to Interstate 80. The plan area is within the Sacramento Suburban Water District (SSWD) service area. The NWSP is located within SSWD's North Service Area. The NWSP will identify parcels within the plan area for future redevelopment. The NWSP goal is to revitalize the North Watt corridor and facilitate public-private development.

The purpose of this water study is to identify existing water infrastructure upgrades required to provide service to the North Watt Specific Plan parcels once they are redeveloped. This study will determine new water demand factors, evaluate system capacity constraints and propose water system upgrades.

1.1 Land Use

The NWSP area is primarily a commercial corridor. The plan area is comprised of 384 parcels over 638.68 acres, with retail/commercial, residential, office and industrial land uses. The existing land use summary is shown in Table 1. The existing land uses are shown on Figure 2 Existing Water Infrastructure in Appendix B.

Table 1: Existing Project Land Use
Source: AECOM

Land Use Designation	Acres	% of Acres
Retail/Commercial	135.94	21%
Restaurant	*14.99*	*2%*
Retail	*101.28*	*16%*
Vehicle-Oriented	*19.67*	*3%*
Residential	40.54	6%
Multi-Family	*32.81*	*5%*
Single-Family	*6.66*	*1%*
Hotel	*1.07*	*0%*
Office	28.07	4%
Industrial	205.00	32%
Church/Welfare	40.71	6%
Public/Utilities	2.31	0%
Recreational	3.40	1%
Miscellaneous	42.94	7%
Vacant	139.77	22%
Total	**638.68**	**100%**

The Specific Plan's purpose is to encourage infill development. In order to identify the water system improvements required to serve development within the Specific Plan Area, the planning team identified 160 parcels for assumed development, and assumptions for land use types and development intensity and density to guide the water system analysis. The proposed land uses are small lot multi-family, medium lot mixed use and large lot mixed use. The medium lot and large lot mixed use are proposed to have commercial and multi-family components. The multi-family portion will be apartment style dwelling units. The proposed redevelopment parcels and their respective land uses are shown on the Figure 1 Proposed Land Use Plan, in Appendix A. The residential unit densities vary depending on land use and parcel size. The densities range from 15 dwelling units per acre to 40 dwelling units per acre. The proposed redevelopment parcel, land use and densities are shown in Table 2.

Table 2: Proposed Redevelopment Parcel Land Use
Source: AECOM

Land Use	Area (acres)	Number of Parcels	Target Density (DU/acre)	Estimated Dwelling Units (DU)	Estimate Gross Square Feet (SF)
Small Lot Multi-Family	2.94	22	15	45	
Medium Lot Mixed-Use	47.65	81	25	1,192	518,906
Large Lot Mixed-Use	158.91	57	40	5,986	1,703,504
Total	**209.50**	**160**		**7,223**	**2,249,409**

2.0 Existing Water System Description

The existing SSWD system includes water supply and infrastructure. This study will briefly discuss water supply however the focus of the study is infrastructure.

2.1 Water Supply

SSWD is, by regulation, 100% reliant on groundwater to ensure continuous supply to its customers. SSWD has no surface water rights, only contract entitlements for surface water. In addition, the availability of surface water to SSWD has a history of being intermittent and unpredictable. Therefore, SSWD must maintain groundwater production capacity necessary to meet 100% of its customers' needs. According to SSWD, sufficient water supply is available to provide service to the NWSP area. Both groundwater and surface water are conveyed to the NWSP area. Groundwater wells are the primary source of water for the area.

2.2 Water Infrastructure

Existing water infrastructure within the plan area consists of 6-, 8-, 10-, 12-and 16-inch water mains, see Figure 2 Existing Water Infrastructure Exhibit in Appendix B. The plan area is broken into two separate distribution water systems: north of the Union Pacific Railroad and south of the railroad. The water system along Watt Avenue, north of the railroad, is comprised of predominantly 8-inch water mains. There is a 12-inch water main from Larry Way south to Karl Drive. SSWD requires minimum pipe sizes for water distribution mains to adequately deliver domestic and public fire protection to all new developments. The minimum water distribution main sizes are determined with reference to the Real Property Use Zones established by Sacramento County. Per SSWD Improvement Standards, Section D-2, a minimum 12-inch water main is required within a commercial corridor.

The existing water mains in the plan area south of the railroad vary in size from 6 to 16-inch. Some portions of this area have been redeveloped, and the water system has been upgraded to meet SSWD requirements. The water system within this area is looped throughout the properties to provide supporting facilities for fire protection.

3.0 Project Water Demands

The project water demands were determined by combining the residential demand and the commercial demand. The residential demands were determined by multiplying the daily demand factor by the number of dwelling units (DU). The commercial demand was determined by multiplying the daily demand factor by the acreage.

3.1 Water Demand Factors

SSWD maintains their own hydraulic model of their water system. For this study, we determined the proposed unit demand factors in collaboration with SSWD, and SSWD performed the necessary hydraulic modelling. The following resources were used to develop the unit water demand factors

- 2024 SSWD Water Supply Assessment (WSA) for Regional Housing Needs Allocation Rezone Project (2024WSA)
- 2020 SSWD Urban Water Management Plan (2020 UWMP)
- 2017 SSWD Water System Master Plan

The unit water demand factors represent average day demand (ADD) and are expressed in gallons per day per acre (gpd/ac) and gallons per day per dwelling unit (gpd/DU). The 2017 SSWD Water System Master Plan identified average day unit water demand factors at District buildout, which is projected in the year 2031.

The water demand factors include both indoor and outdoor demands. When calculating the mixed-use demand factors, the outdoor demand is accounted for in the non-residential portion. The unit water demand factors at buildout based on land use are shown in Table 3

Table 3: Average Day Unit Water Demand Factors at Buildout by Land Use
Source: 2017 SSWD Water System Master Plan

		Non-Residential Demand (gpd/ac)			Residential Demand (gpd/DU)		
Land Use	**Residential Density (DU/acre)**	**Indoor**	**Outdoor**	**Total**	**Indoor**	**Outdoor**	**Total**
Small Multi-Family	7-15	-	-	-	168	41	209
Medium Lot Mixed-Use	25	1,251	332	1,583	168	-	168
Large Lot Mixed-Use	40	1,251	332	1,583	168	-	168

3.2 Proposed Demands

The proposed water demands were determined by utilizing the average day demand factors shown in Table 2 and the number of dwelling units and commercial acreage shown in Table 1. For the model analysis performed by SSWD, the demand was converted from average day demand (ADD) to maximum day demand (MDD) using the following formula:

$$1.9 \times ADD = MDD^{1}$$

Proposed average day and maximum day demands are expressed in gallons per day (gpd) and gallons per minute (gpm). The proposed water demands are shown in Table 4.

[1] SSWD Water System Master Plan, prepared by Brown and Caldwell, 2017

Table 4: Proposed Water Demands

Land Use	Dwelling Units (DU)	Commercial (acres)	Water Demand				
			Average Day Demand (gpd)			Maximum Day Demand	
			Residential	Commercial	Total	(gpd)	(gpm)
Small Multi-Family	45	-	9,405	-	9,405	17,870	12
Medium Lot Mixed-Use	1,192	47.65	200,256	75,430	275,686	523,803	364
Large Lot Mixed-Use	5,986	158.91	1,005,648	251,551	1,257,199	2,388,678	1,659
Total	7,223	206.56	1,215,309	326,980	1,542,289	2,930,350	2,035

A detailed average day demand breakdown by parcel is shown in Appendix E

3.3 Existing Demands

The NWSP area consists of 384 parcels while only 160 parcels are proposed for redevelopment. Of the 160 redevelopment parcels, seventy-nine (79) are existing SSWD customers and their respective demands were removed from the water system hydraulic model and replaced with the proposed demands. There are eighty-one (81) redevelopment parcels which are not current SSWD customers[2]. The existing water demands are shown in Table 5.

Table 5: Existing Water Demands
Source: SSWD 2025 Water System Hydraulic Model

No. of Existing SSWD Parcels	Water Demand (gpm)	
	Average Day Demand	Maximum Day Demand
79	57	108

The 224 parcels within the NWSP area, which are not proposed to be redeveloped will retain existing demands currently in the SSWD 2025 water system hydraulic model.

4.0 System Evaluation

SSWD regulations set parameters for water main sizes based on various land use. The land use establishes the minimum fire flows required, which then dictates the size of the water main. A residential parcel has a lower fire flow requirement than a commercial or industrial parcel. SSWD requires a minimum 12-inch water main for service to commercial properties. The proposed redevelopment parcels, with mixed-use land use, will require minimum 12-inch water mains.

SSWD maintains the water system hydraulic model. The hydraulic model uses InfoWater Pro software to run both dynamic and steady state simulations. The dynamic model simulates the water system over a 24-hour period using a diurnal curve to simulate the water system's fluctuating demand and supply changes, such as water tanks emptying and filling. The diurnal curve uses hourly multipliers applied to the average daily demand to represent real time fluctuations. The steady state model is used to run fire flow conditions.

[2] North Watt Specific Plan Technical Memorandum, prepared by Brown and Caldwell

The existing water system was evaluated utilizing the SSWD 2025 water system hydraulic model simulated under the following conditions:

- Demand: MDD conditions with the NWSP redevelopment demands listed in Table 3
- Supply: Groundwater only

SSWD simulated multiple scenarios to evaluate the existing water system including:

- Run 1: This is the baseline scenario simulating the proposed conditions outlined above with a diurnal pattern simulating hourly demands to evaluate the system under peak hour demands,
- Run 2: Fire flow condition of Run 1,
- Run 1a: Baseline scenario described in Run 1 with proposed pipeline improvements,
- Run 2a: Fire flow condition described in Run 2 with proposed pipeline improvements.

4.1 Peak Hour Demand Evaluation Criteria

Based on the required evaluation criteria shown in Table 6, under peak hour demands, the SSWD system was evaluated with redevelopment demands.

Table 6: Evaluation Criteria
Source: SSWD Improvement Standards

Component	Criteria
Water Transmission Line Sizing (16-in diameter or greater)	
Minimum Pressure, (psi)	35 psi
Maximum Head Loss, (ft/kft)	7 ft/kft
Maximum Velocity, (fps)	7 fps
Water Distribution Line Sizing (Less than 16-in diameter)	
Minimum Pressure, (psi)	35 psi
Maximum Head Loss, (ft/kft)	10 ft/kft
Maximum Velocity, (fps)	5 fps

4.2 Fire Flow Requirements

The SSWD system was evaluated to meet fire flow requirements during maximum day demand conditions, using the redevelopment demands and based on the requirements shown in Table 6. The fire flow requirements are based on Sacramento Metro Fire District and California Fire Code minimum standards. The final fire flow requirements are based building square footage, height and construction type. For the purposes of this study we are assuming Sacramento Metro Fire District minimum fire flow requirements for multi-family and commercial projects. Individual parcel fire flow requirements may be different and will be determined at time of development. SSWD's water system hydraulic model does not include laterals to specific fire hydrants; therefore, SSWD assumes only 80 percent of the modeled fire flow is available at the fire hydrant. Table 7 details the minimum fire flow requirements at the fire hydrant and corresponding nearest modeled junction.

Table 7: Fire Flow Requirements
Source: SSWD Regulations and Sacramento Metro Fire District

NWSP Land Use Type	Equivalent SSWD Master Plan Building Type	Criteria at Fire Hydrant	Criteria at Nearest Modeled Junction
Small Multi-Family	Multi-Family Residential	2,500 gpm at 2 hrs.	3,125 gpm at 2 hrs.
Medium Lot Mixed-Use: Commercial and Multi-Family	Commercial	3,000 gpm at 3 hrs.	3,750 gpm at 3 hrs.
Large Lot Mixed-use: Commercial and Multi-Family	Commercial	3,000 gpm at 3 hrs.	3,750 gpm at 3 hrs.

4.3 Results

SSWD simulated multiple scenarios using the design criteria. The first scenario, Run 1, is the baseline scenario using maximum day demands and groundwater supply. This scenario uses a diurnal pattern simulating hourly demands to evaluate the system under peak hour demands. The modeling results indicate minimum pressures, maximum headloss, and maximum velocity criteria, listed in Table 6, are all met within the vicinity of NWSP area. The results are shown in the North Watt Specific Plan Modeling Technical Memorandum, by Brown and Caldwell, in Appendix D. Since no system deficiencies were found during Run 1, Run 1a was not needed.

The second scenario, Run 2, is the fire flow condition of Run 1. Multiple fire flow deficiencies were identified in localized areas. The results are shown in Appendix D. Since fire flow deficiencies were identified, Run 2a was necessary to identify and address potential system improvements.

5.0 Recommendations

The NWSP area is an existing commercial corridor that Sacramento County has identified as an area for redevelopment. The NWSP is intended to help facilitate public/private development opportunities to revitalize the North Watt Avenue corridor. The focus of this study is to evaluate the existing water distribution system, determine any system capacity constraints and propose any system upgrades necessary to meet SSWD requirements.

There are two criteria for the proposed system upgrades. The first, does the water system have the capacity to meet proposed demands, and the second, does the water system meet SSWD regulations based on the proposed redevelopment land uses. The water system hydraulic model results indicate the existing system meets peak hour demands, however there were capacity deficiencies identified when modelling maximum day plus fire flow demands. To meet fire flow requirements, parts of the existing water system require improvements. Those improvements and the affected parcels are listed in Table 8 and shown on Figure 3 Proposed Water Infrastructure.

Table 8: Proposed Water System Upgrades to Meet Fire Flow Requirements
Source: North Watt Specific Plan Technical Memorandum, dated February 28, 2026, prepared by Brown and Caldwell

Water System Upgrades	Parcels
Upsize existing 8-inch water main to 12-inch water main	27-30
Confirm existing water main is continuous. SSWD's GIS model indicates a water valve at this location, however there is a gap at this location. Fire flow requirements are met if this area is looped.	66
Install new 12-inch water main and hydrants, along Dudley Boulevard and Freedom Park Drive, and connect to the existing North Service Area mains. The McClellan Business Park Service Area is adjacent, and a cross connection is not proposed.	147, &151-152
Install new 12-inch water main in Watt Avenue from A Street to Poplar Drive and make connections to existing system to provide a looped system.	192-195, 200-204, 207 & 384
Upsize existing 6-inchwater main to 12-inch water main in Myrtle Avenue from Palomino Lane to Watt Avenue, and in Watt Avenue from Myrtle Avenue to Oakdell Avenue.	266, 268, 271, 273, 275, 276, & 304

Note: These improvements will affect parcels not included in the redevelopment plan.

SSWD regulations state that commercial corridors be served by a minimum 12-inch water main. Per, Brown and Caldwell's Technical Memorandum, the additional improvements, listed in Table 9, are not required to meet water system hydraulic standards, however they are required to meet SSWD regulations. Those improvements and the affected parcels are listed in Table 9 and in the Proposed Water System Exhibit.

Table 9: Proposed Water System Upgrades to Meet SSWD Regulations
Source: North Watt Specific Plan Technical Memorandum, dated February 28, 2026, prepared by Brown and Caldwell

Water System Upgrades	Parcels
Upsize existing 8-inch water main to 12-inch water main in Watt Avenue from Antelope Road to Larry Way.	3, 9, 12-15, 17, 23, 26, 31-34, 37-38, 49-50, 67-68, 73, & 75-79
Upsize existing 8-inch water main to 12-inch water main in Watt Avenue, from Karl Drive to just south of James Way.	165-168, 170, 180, 185, 188, & 190-192

Note: These improvements will affect parcels not included in the redevelopment plan.

These improvements will provide adequate fire flow and meet SSWD regulations for their water system in a commercial corridor

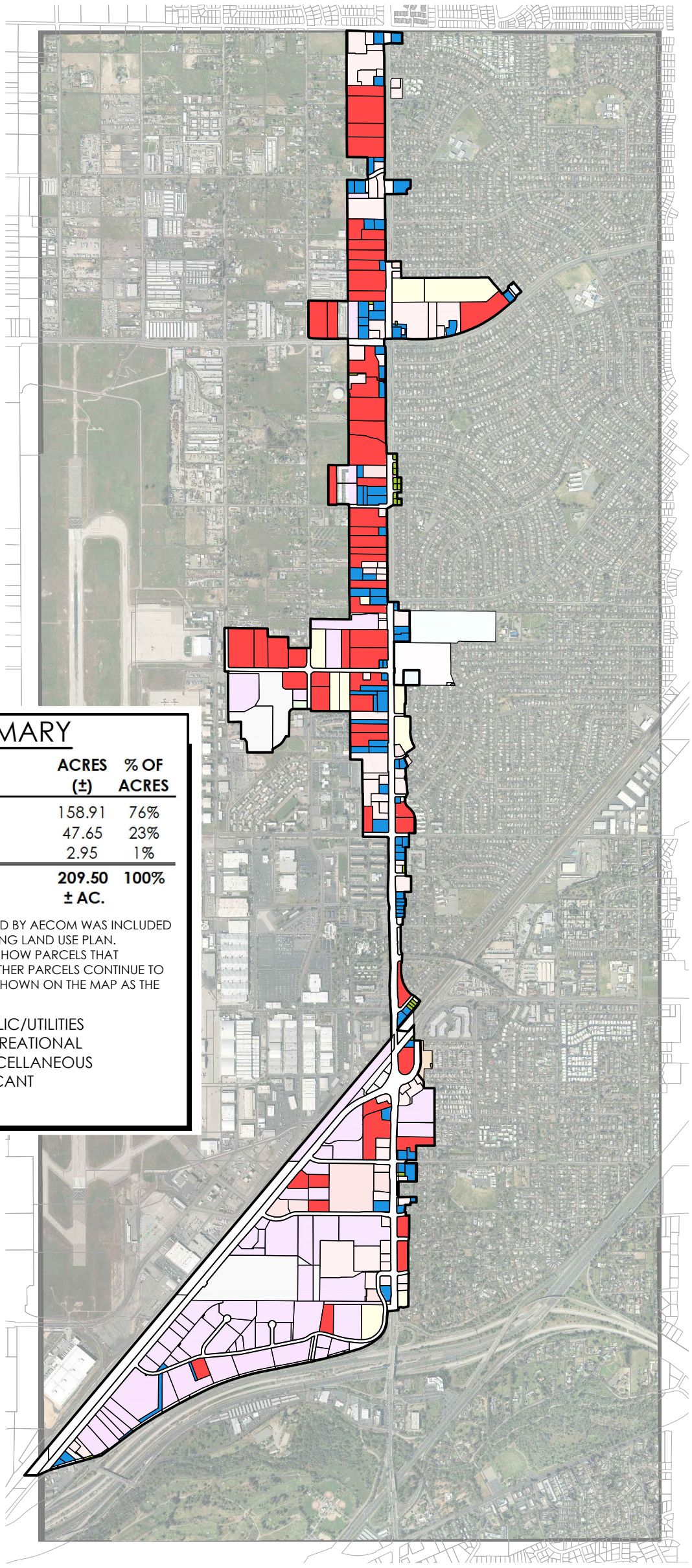
APPENDIX A: Land Use Plan

FIGURE 1 - PROPOSED LAND USE PLAN

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CALIFORNIA

AUGUST 2026



LAND USE SUMMARY

LAND USE DESIGNATION	ACRES (±)	% OF ACRES
LARGE LOT MIXED-USE	158.91	76%
MEDIUM LOT MIXED-USE	47.65	23%
SMALL MULTI-FAMILY	2.95	1%
Total	**209.50 ± AC.**	**100%**

NOTE 1: ONLY PARCEL INFORMATION PROVIDED BY AECOM WAS INCLUDED IN THE ACREAGE CALCULATION FOR THE EXISTING LAND USE PLAN.
NOTE 2: ALL LAND USE DESIGNATIONS ABOVE SHOW PARCELS THAT PROPOSED NEW DEVELOPMENT ONSITE. ALL OTHER PARCELS CONTINUE TO HAVE THE SAME EXISTING LAND USE AND ARE SHOWN ON THE MAP AS THE COLORS BELOW:

- RETAIL/COMMERCIAL
- RESIDENTIAL
- OFFICE
- INDUSTRIAL
- CHURCH/WELFARE
- PUBLIC/UTILITIES
- RECREATIONAL
- MISCELLANEOUS
- VACANT

NORTH

0 2000 1000 4000

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PROPOSED LAND USE PLAN - NORTH WATT SPECIFIC PLAN

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APPENDIX B: Existing Water Infrastructure

FIGURE 2 - EXISTING WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026

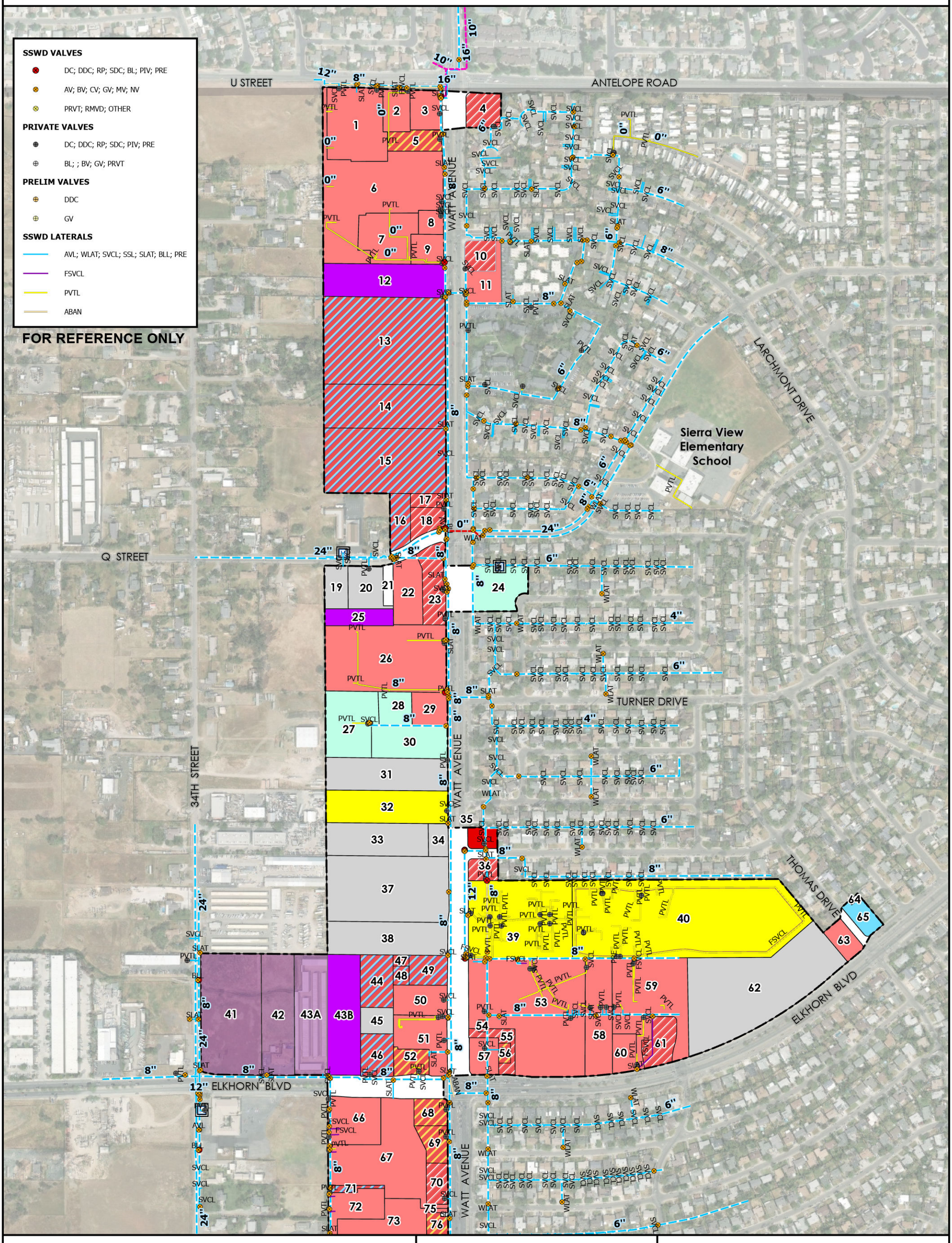


FIGURE 2 - EXISTING WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026

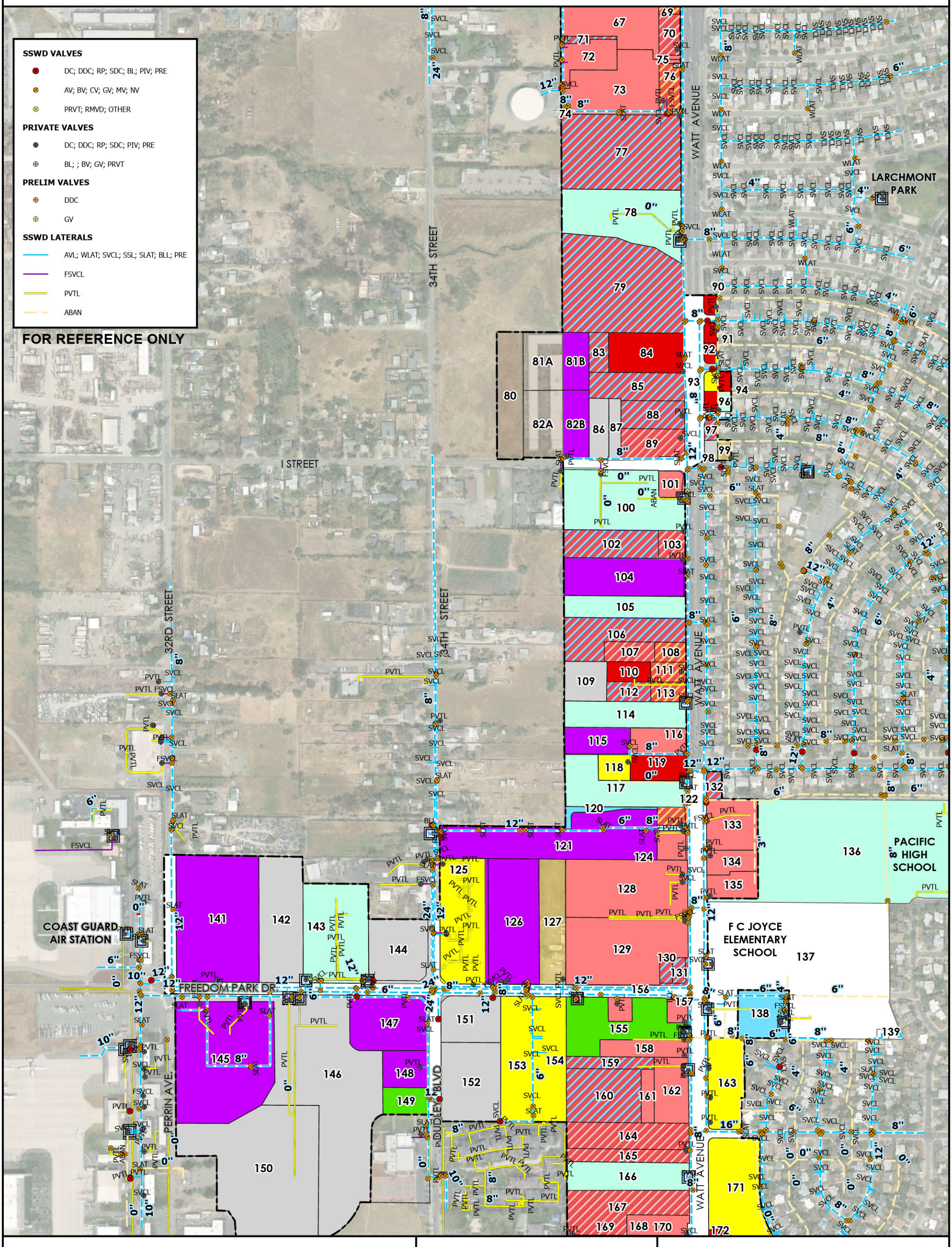
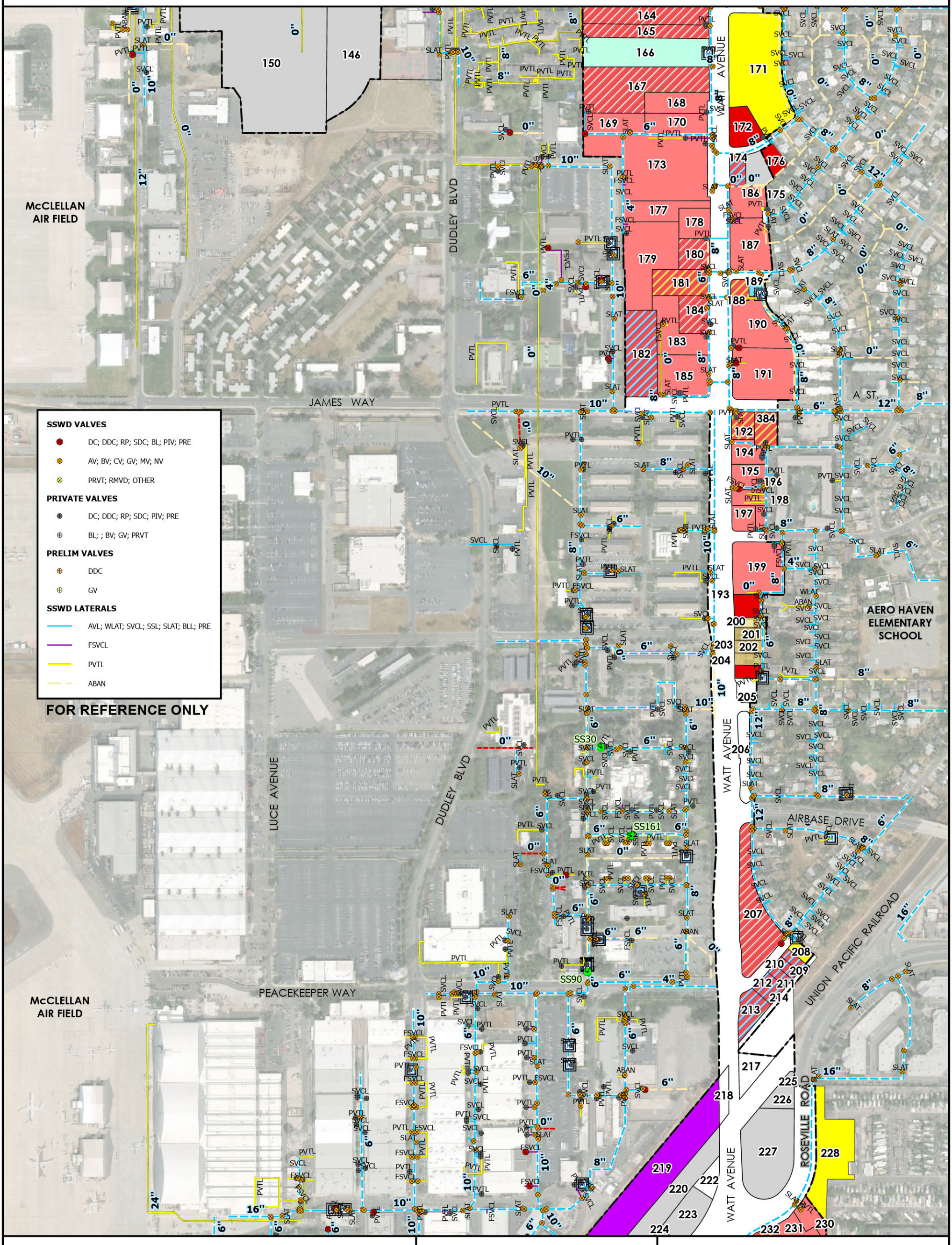


FIGURE 2 - EXISTING WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026



SOURCES:
* EXISTING WATER FACILITIES PROVIDED BY SACRAMENTO SUBURBAN WATER DISTRICT GIS.
* NORTH WATT SPECIFIC PLAN BOUNDARY PROVIDED BY AECOM

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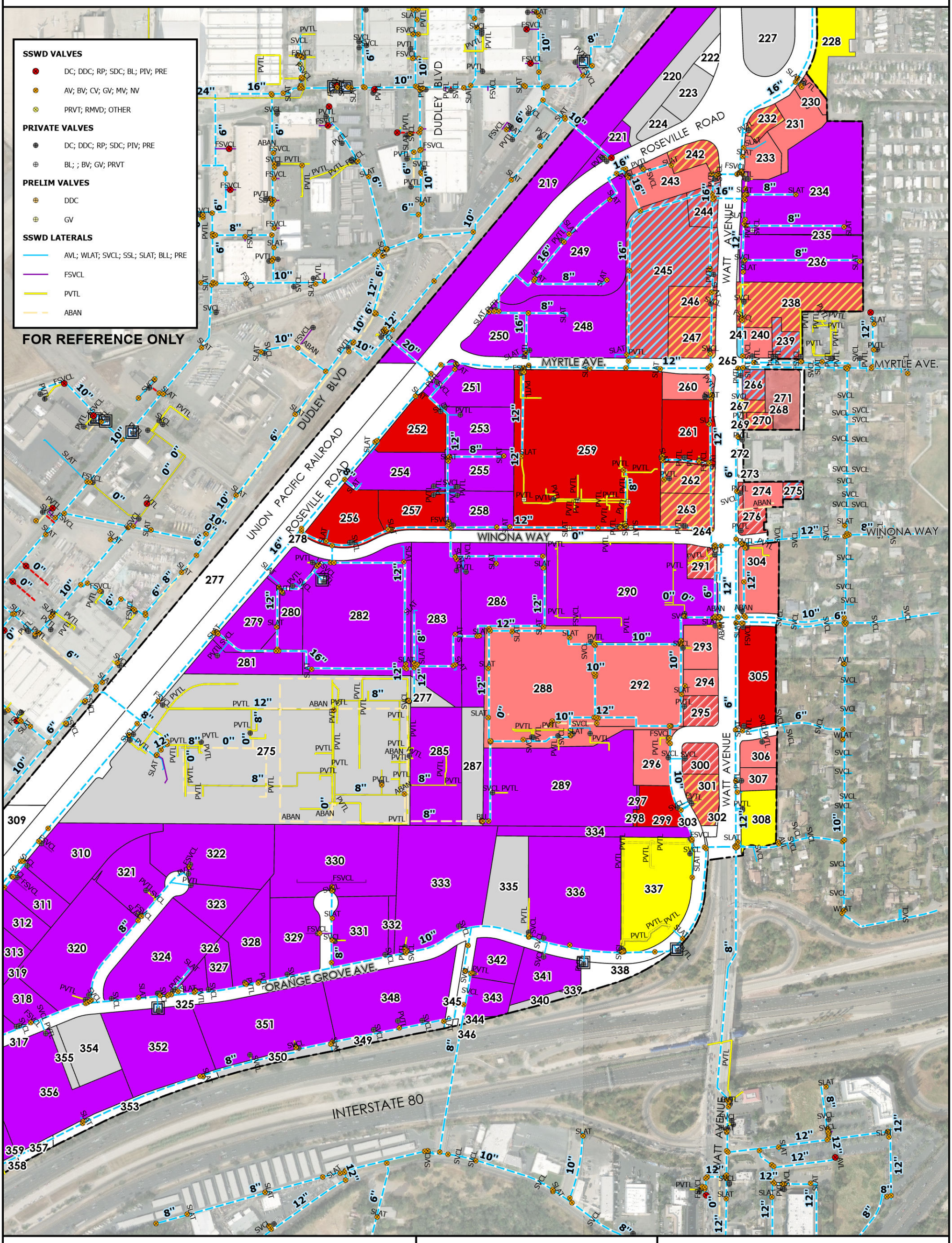
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FIGURE 2 - EXISTING WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026



WATER MAIN TYPE:
- WATER MAIN
- DIAMETER = 0-INCH
- CAL-AM
- PRIVATE
- ABANDONED

- CHURCH/ WELFARE
- INDUSTRIAL
- MISCELLANEOUS
- OFFICE
- PUBLIC/ UTILITIES
- RECREATIONAL
- RESIDENTIAL
- RETAIL/ COMMERCIAL
- RESTAURANT
- RETAIL/ COMMERCIAL
- VEHICLE ORIENTED
- NORTH WATT SPECIFIC PLAN
- WATER METER (PUBLIC)
- SAMPLING STATION

SOURCES:
* EXISTING WATER FACILITIES PROVIDED BY SACRAMENTO SUBURBAN WATER DISTRICT GIS.
* NORTH WATT SPECIFIC PLAN BOUNDARY PROVIDED BY AECOM

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SHEET 4 OF 5

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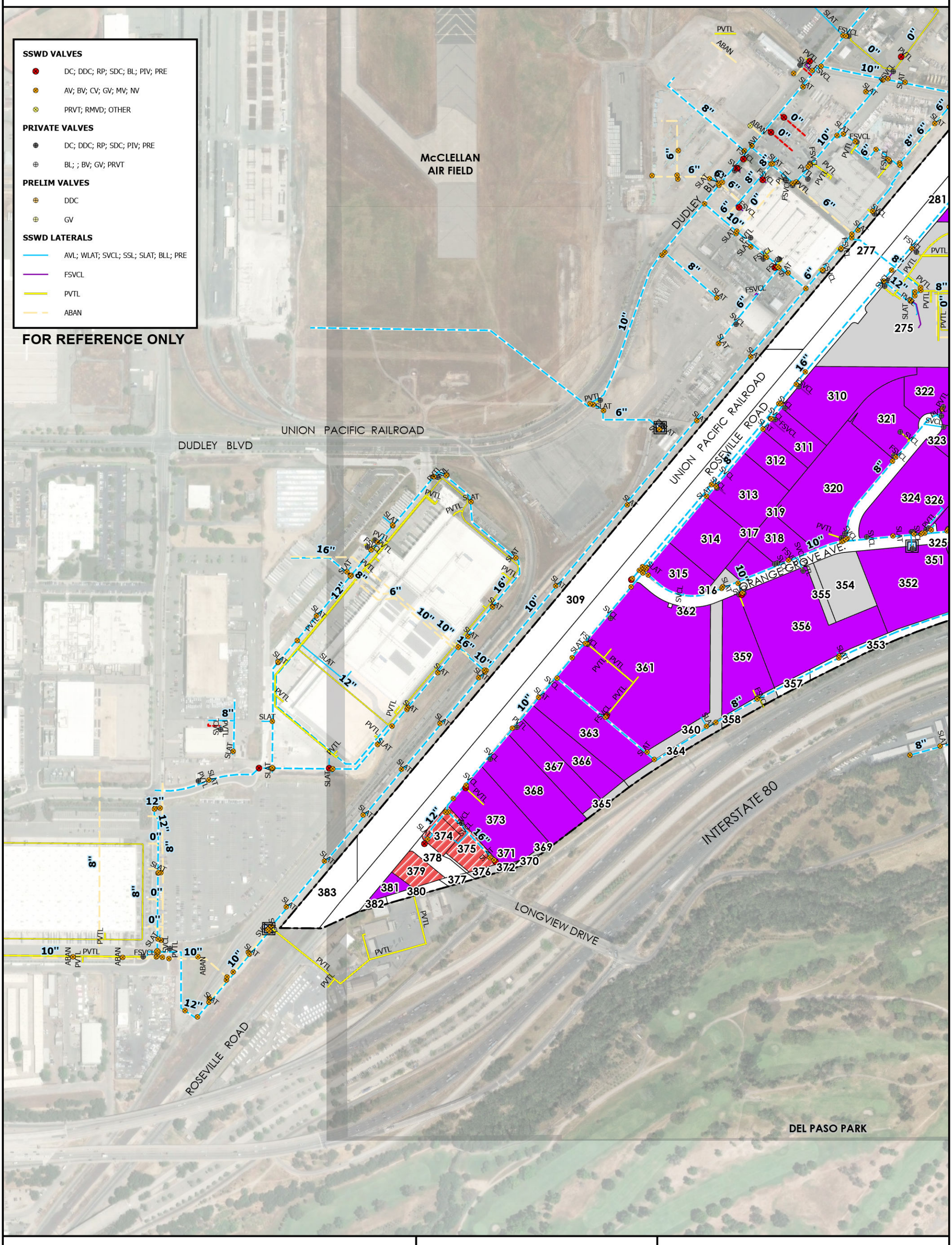
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FIGURE 2 - EXISTING WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026



WATER MAIN TYPE:			
WATER MAIN	CHURCH/ WELFARE	RECREATIONAL	RETAIL/ COMMERCIAL
DIAMETER = 0-INCH	INDUSTRIAL	RESIDENTIAL	VEHICLE ORIENTED
CAL-AM	MISCELLANEOUS	RETAIL/ COMMERCIAL	NORTH WATT SPECIFIC PLAN
PRIVATE	OFFICE	VACANT	WATER METER (PUBLIC)
ABANDONED	PUBLIC/ UTILITIES	RESTAURANT	SAMPLING STATION

SOURCES:
* EXISTING WATER FACILITIES PROVIDED BY SACRAMENTO SUBURBAN WATER DISTRICT GIS.
* NORTH WATT SPECIFIC PLAN BOUNDARY PROVIDED BY AECOM

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SHEET 5 OF 5

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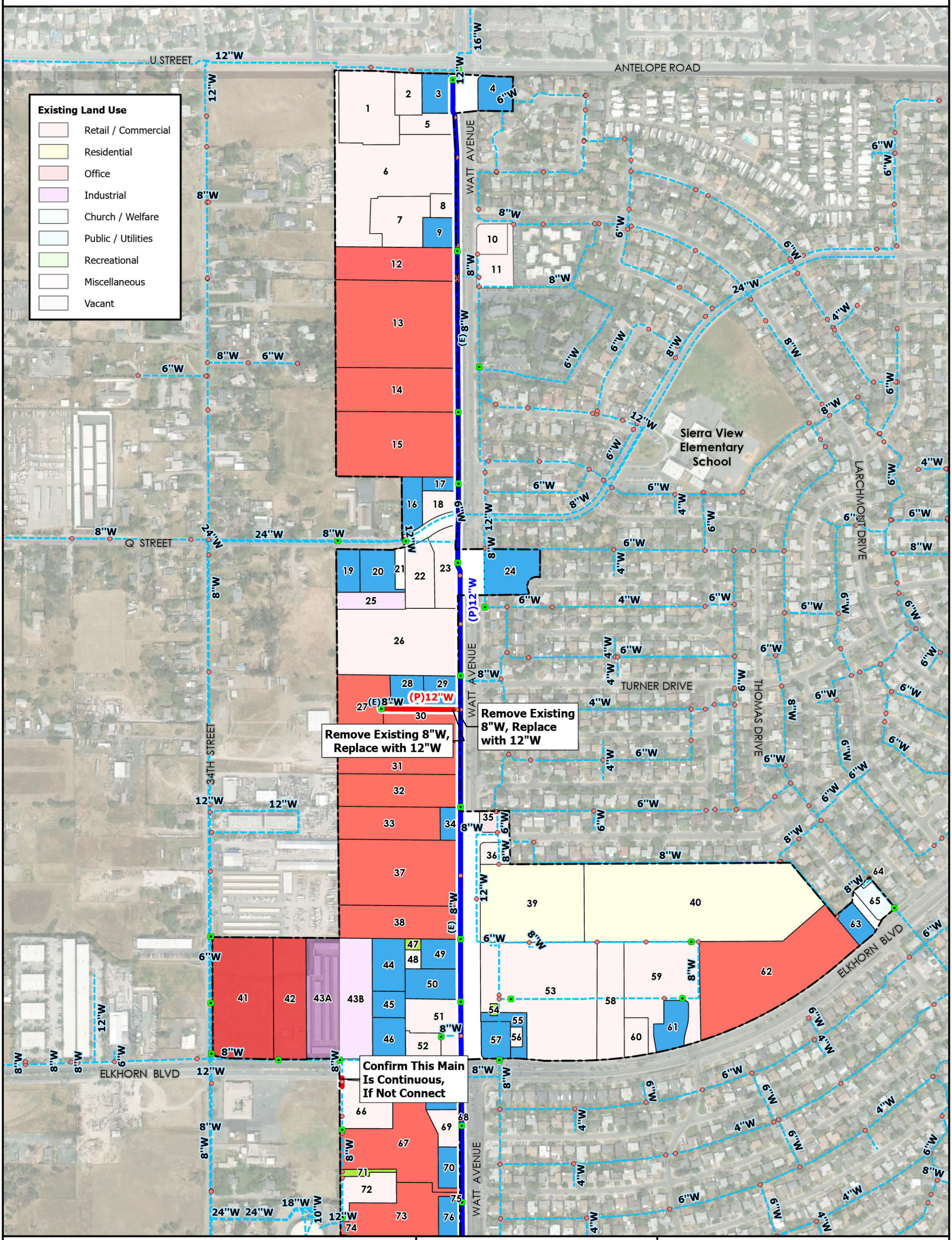
APPENDIX C: Proposed Water Infrastructure

FIGURE 3 - PROPOSED WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026



SOURCES:
* WATER FACILITIES PROVIDED BY SACRAMENTO SUBURBAN WATER DISTRICT GIS.
* NORTH WATT SPECIFIC PLAN BOUNDARY PROVIDED BY AECOM

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SHEET 1 OF 5

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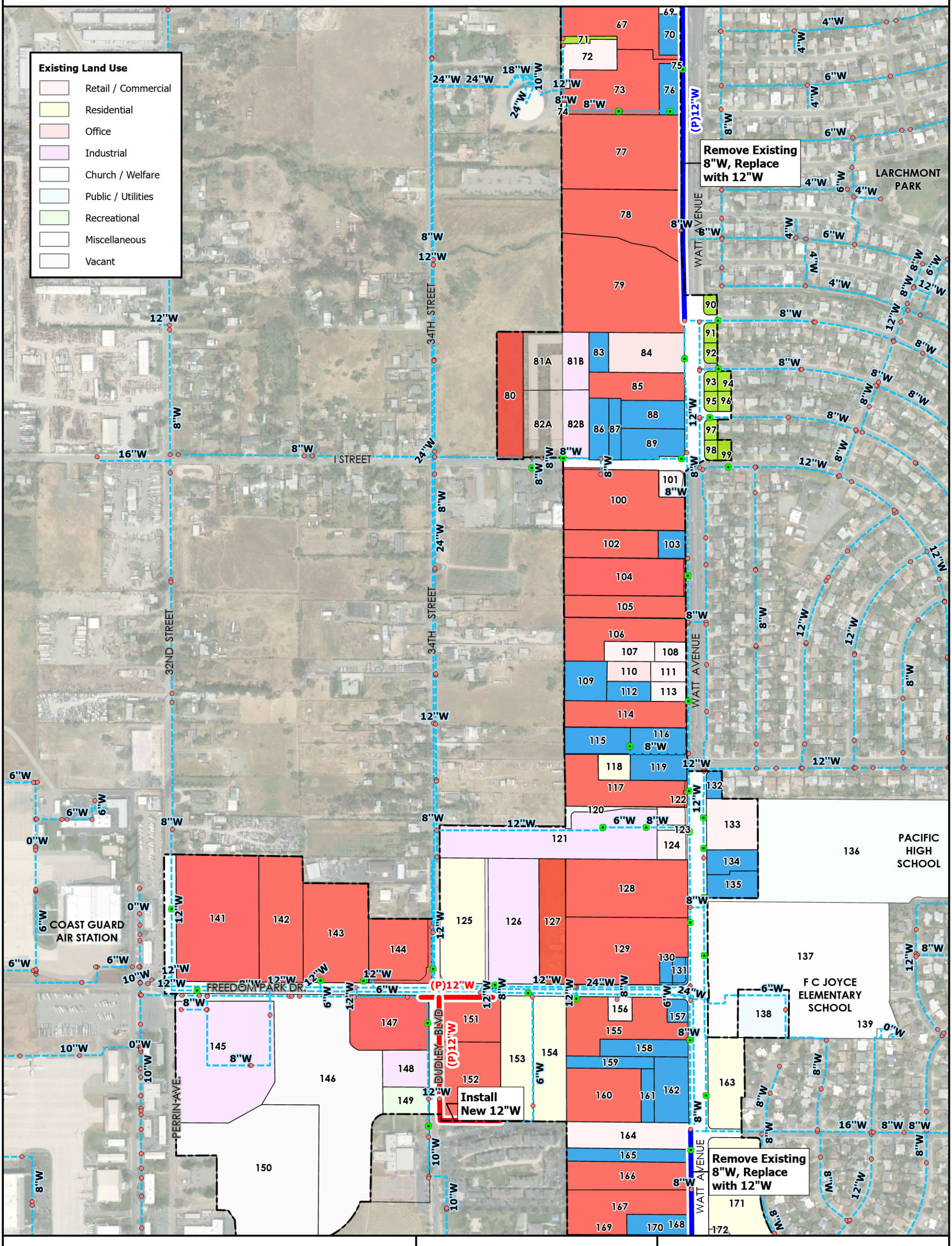
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FIGURE 3 - PROPOSED WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026



HYDRANT
VALVE

WATER MAIN
EXISTING

PROPOSED WATER MAIN
REQUIRED TO MEET FIRE FLOW
REQUIRED TO MEET SSWD STANDARDS

PROPOSED LAND USE
LARGE LOT MIXED-USE
MEDIUM LOT MIXED-USE
SMALL MULTI-FAMILY
NORTH WATT SPECIFIC PLAN

SOURCES:
* WATER FACILITIES PROVIDED BY SACRAMENTO SUBURBAN WATER DISTRICT GIS.
* NORTH WATT SPECIFIC PLAN BOUNDARY PROVIDED BY AECOM

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SHEET 2 OF 5

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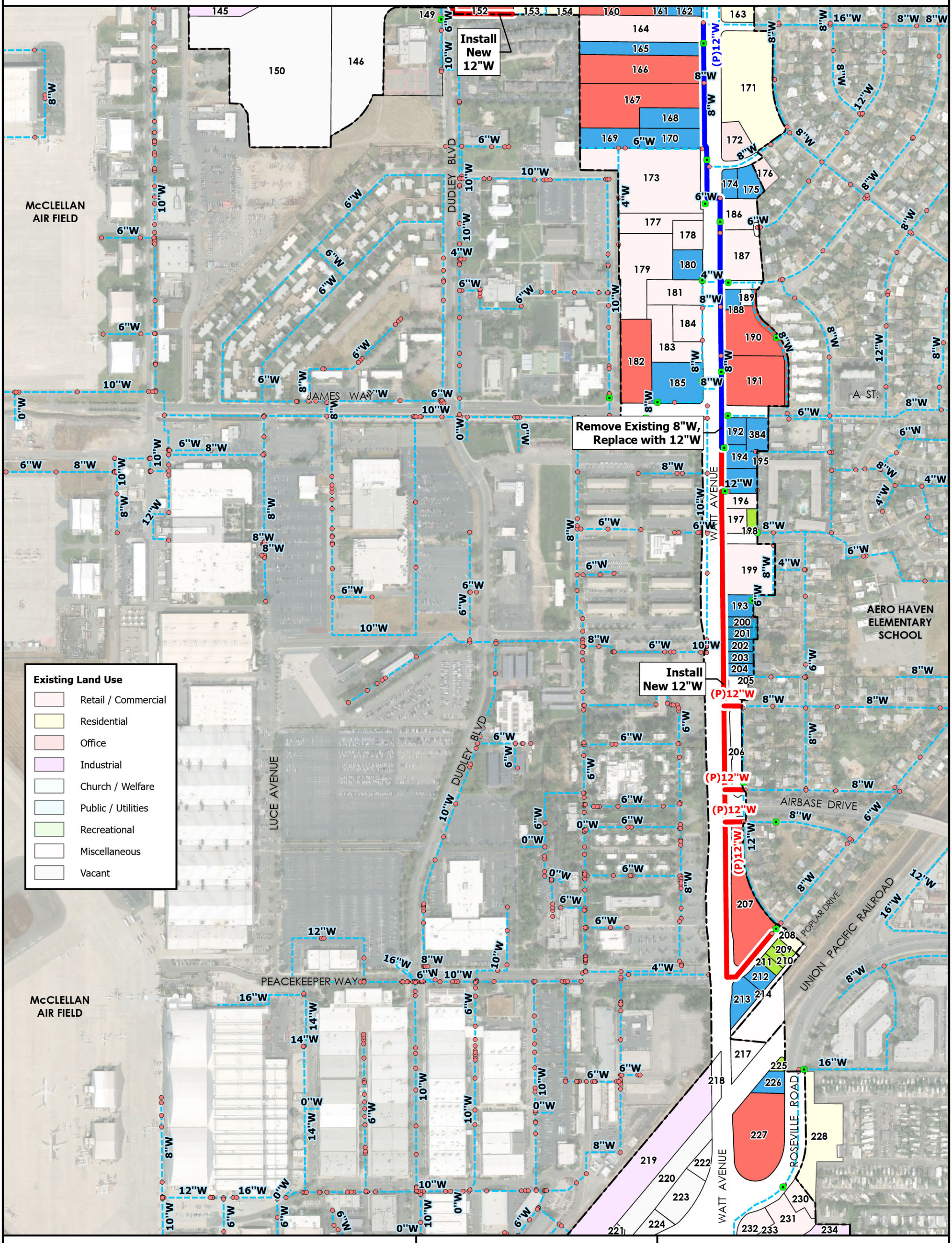
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FIGURE 3 - PROPOSED WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026



SOURCES:
* WATER FACILITIES PROVIDED BY SACRAMENTO SUBURBAN WATER DISTRICT GIS.
* NORTH WATT SPECIFIC PLAN BOUNDARY PROVIDED BY AECOM

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SHEET 3 OF 5

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FIGURE 3 - PROPOSED WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026

Existing Land Use

- Retail / Commercial
- Residential
- Office
- Industrial
- Church / Welfare
- Public / Utilities
- Recreational
- Miscellaneous
- Vacant

McCLELLAN AIR FIELD

DUDLEY BLVD

UNION PACIFIC RAILROAD

ROSEVILLE ROAD

MYRTLE AVE.

WINONA WAY

ORANGE GROVE AVE.

INTERSTATE 80

WATT AVENUE

(P)12"W

Remove Existing 6"W, Replace with 12"W

(E) 6"W

HYDRANT

VALVE

WATER MAIN

EXISTING

PROPOSED WATER MAIN

REQUIRED TO MEET FIRE FLOW

REQUIRED TO MEET SSWD STANDARDS

PROPOSED LAND USE

LARGE LOT MIXED-USE

MEDIUM LOT MIXED-USE

SMALL MULTI-FAMILY

NORTH WATT SPECIFIC PLAN

SOURCES:
* WATER FACILITIES PROVIDED BY SACRAMENTO SUBURBAN WATER DISTRICT GIS.
* NORTH WATT SPECIFIC PLAN BOUNDARY PROVIDED BY AECOM

NORTH

0 112.5 225 450

Feet

SHEET 4 OF 5

WOOD RODGERS

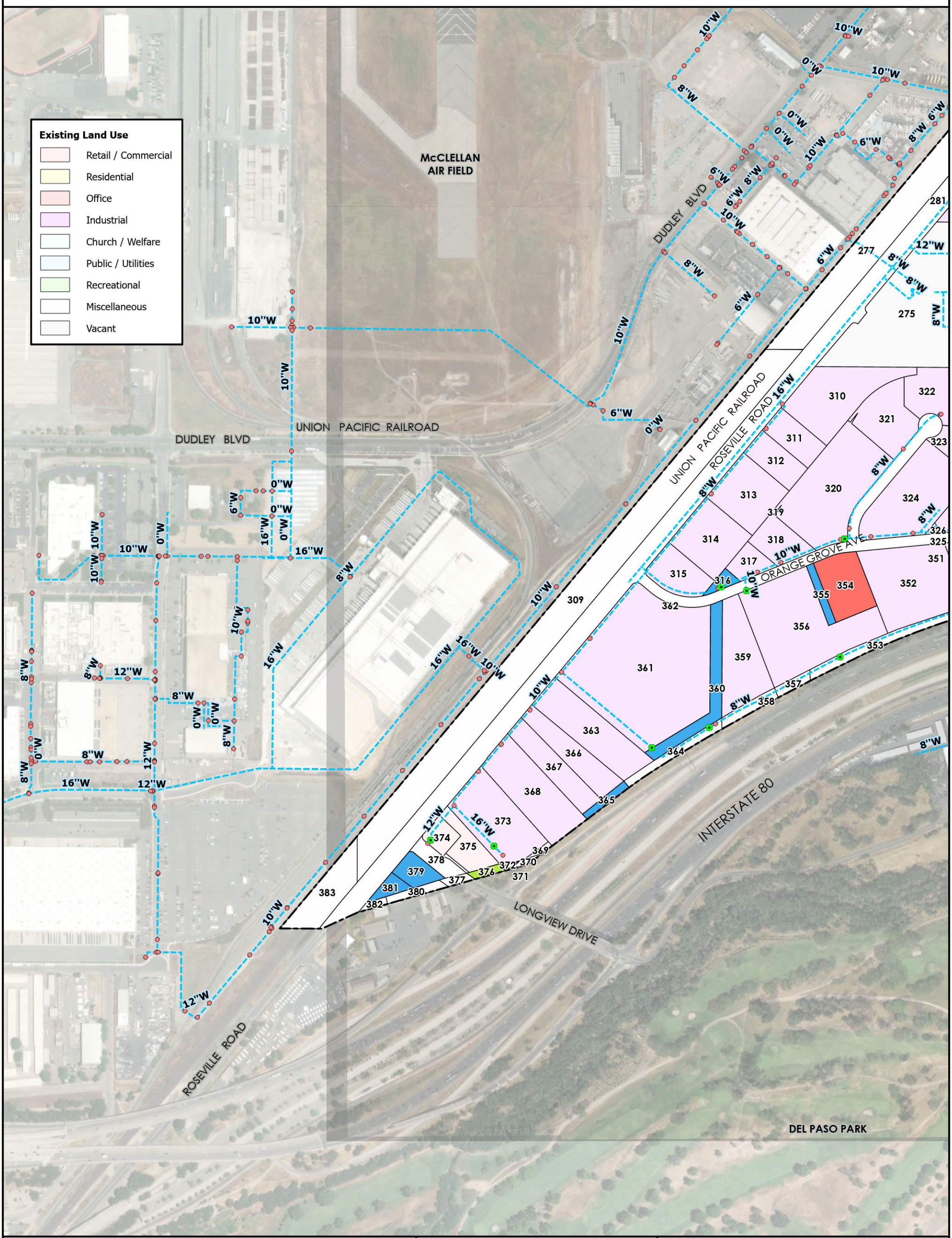
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FIGURE 3 - PROPOSED WATER INFRASTRUCTURE

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CA

AUGUST 2026



SOURCES:
* WATER FACILITIES PROVIDED BY SACRAMENTO SUBURBAN WATER DISTRICT GIS.
* NORTH WATT SPECIFIC PLAN BOUNDARY PROVIDED BY AECOM

NORTH

0 112.5 225 450

Feet

SHEET 5 OF 5

WOOD RODGERS

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APPENDIX D: Modelling Results

Brown AND Caldwell

11020 White Rock Road. Suite 200
Rancho Cordova, CA 95670

T: 301.479.1250

Technical Memorandum

DRAFT

Prepared for: Sacramento Suburban Water District

Project No.: 152854

Technical Memorandum

Subject: North Watt Specific Plan Modeling

Date: February 28, 2026

To: Karen Holcombe, Senior Project Manager

From: Melanie Holton

Prepared by: _____
Lauren Starosta, P.E., TX License No. 106329
Project Engineer

Reviewed by: _____
Melanie Holton, P.E., CA License No. 64983

Reviewed by: _____
Colin Ricks, P.E., UT License No. 9339073-2202

Limitations:

This is a draft memorandum and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report.

This document was prepared solely for Sacramento Suburban Water District in accordance with professional standards at the time the services were performed and in accordance with the contract between Sacramento Suburban Water District and Brown and Caldwell dated Date. This document is governed by the specific scope of work authorized by Sacramento Suburban Water District; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Sacramento Suburban Water District and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 1: Introduction

Sacramento County is redeveloping the north Watt Avenue commercial corridor and needs to identify the water system infrastructure improvements to serve this redevelopment. Sacramento County has developed the North Watt Specific Plan (NWSP). The NWSP identifies parcels planned for redevelopment as shown in Attachment A. These parcels are all within the Sacramento Suburban Water District (SSWD) service area. Brown and Caldwell (BC) was tasked to confirm the NWSP water demands estimated by Sacramento County and run the SSWD hydraulic model with those demands so that Sacramento County could propose improvements to address SSWD deficiencies identified given the change in demand. This technical memorandum (TM) documents the confirmation of the NWSP demand review and water system hydraulic modeling of the NWSP redevelopment added to the SSWD water distribution system. The TM also informs SSWD of improvements that would address the deficiencies; however, the final improvements are to be proposed by Sacramento County through discussions with SSWD.

Section 2: Water Demand

Sacramento County developed estimates of future water demand based on the redevelopment plan for the NWSP. BC reviewed the NWSP demand and estimated the SSWD existing customers demands currently being served in the NWSP area.

2.1 NWSP Water Demand

Table 1 summarizes the land use types as shown in the NWSP redevelopment plan shown in Attachment A and the selected unit water demand factors used to estimate water demand for the NWSP redevelopment parcels. The following resources were used for the unit water demand factors for the NWSP land uses:

- 2024 SSWD Water Supply Assessment (WSA) for Regional Housing Needs Allocation Rezone Project (2024 WSA)
- 2020 SSWD Urban Water Management Plan (2020 UWMP)
- 2017 SSWD Water System Master Plan

The unit water demand factors represent average day demand (ADD). Unit water demand factors are expressed in gallons per day per acre (gpd/ac) and gpd per dwelling unit (gpd/DU).

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NWSP Redevelopment Evaluation_TM_DRAFT2

Table 1. Average Day Unit Water Demand Factors by Land Use							
Land Use or Customer Sectors in NWSP	Residential density (dwelling units (DU) per acre)	Non-Residential Demand (gpd/ac)			Residential Demand (gpd/DU)		
		Indoor [a]	Outdoor [b]	Total	Indoor [a]	Outdoor [b]	Total
Small Multi-Family	7-15	--	--	--	168	41	209
Medium Lot Mixed Use: Commercial and Multi Family	25	1,251	332	1,583	168	-- [c]	168
Large Lot Mixed Use: Commercial and Multi Family	40	1,251	332	1,583	168	-- [c]	168

a. *Commercial outdoor estimate based on the SSWD 2020 UWMP (21% outdoor usage).*

b. *Multi-family outdoor water use estimate based on assumptions in 2024 WSA for the SSWD portion of the Sac County RHNA Rezone project. Assumed 15% irrigated landscape area per acre, based on net evapotranspiration (ETo) of 58-in/year, with a 70% ETo factor. The net ETo is from SSWD's 2024 Urban Water Use Objective Report to DWR. Unit water used in gpd per DU is assumed to be proportional to gpd/acre for outdoor usage (20%). This is close to the 29% outdoor usage for multi-family customers in the 2020 UWMP but likely lower because 20% is based on Urban Water Use Objectives defined since the 2020 UWMP.*

c. *Outdoor use is already accounted for in the non-residential (i.e., commercial) portion of the unit demand.*

Sacramento County provided acres of each type of land use and the expected number of dwelling units for each parcel as a GIS shapefile. The resulting redevelopment and water demands are summarized in Table 2. For the model analysis the demand was converted from ADD to maximum day demand (MDD) based on a ratio of 1.9 MDD to ADD per the SSWD Water System Master Plan (Brown and Caldwell, 2017). Demands are expressed in gallons per day (gpd) and gallons per minute (gpm).

Table 2. NWSP Redevelopment Dwelling Units, Commercial Acreage, and Water Demand							
Land Use or Customer Sectors	Dwelling Units	Commercial Area (acres)	Water Demand [a]				
			Average Day Demand (gpd)			Maximum Day Demand	
			Residential	Commercial	Total	(gpd)	(gpm)
Small Multi-Family	45	--	9,405	--	9,405	17,870	12
Medium Lot Mixed Use: Commercial and Multi Family	1,192	47.7	200,256	75,430	275,686	523,803	364
Large Lot Mixed Use: Commercial and Multi Family	5,986	158.9	1,005,648	251,551	1,257,199	2,388,678	1,659
TOTAL	7,223	206.6	1,215,309	326,980	1,542,289	2,930,350	2,035

a. *Resulting demands are consistent with the Maddaus projections.*

2.2 Existing Demands

SSWD existing water system customers were correlated to 79 of the 160 parcels in the NWSP redevelopment area as shown in Table 3. These SSWD existing customer water demands were removed from the water system hydraulic model before applying the NWSP redevelopment water demands. As shown in Table 3 existing average day demand in the NWSP is 57 gpm, approximately 5 percent of the proposed redevelopment demand.

Table 3. Existing SSWD Water Demands in NWSP Parcels			
		Water Demand [a] (gpm)	
Method to Correlate SSWD Customers with NWSP Parcel	No. of Parcels	Average Day Demand	Maximum Day Demand
Using SSWD customer address	70	--	--
Using Google Earth aerial image	9	--	--
TOTAL	79	57	108

a. *Existing water demands in the NWSP are based on water demands in the SSWD 2025 water system hydraulic model.*

NWSP parcels with no SSWD existing customers identified are as follows:

A. 67 parcels are vacant or used for parking based on Google Earth aerial imagery review
B. Five parcels do not have an SSWD service account but there is a demand at a junction near the parcel in the water system hydraulic model that could not be matched to an SSWD service accounts. Total demand for these junctions was 6 gpm average day demand.
C. Nine parcels do not have an SSWD service account and there is no modeled demand for them

For parcels identified in category A and C, there is no existing demand that needs to be removed before adding the NWSP redevelopment demand. For category B, it is uncertain if the demands relate to the redevelopment parcels are another demand; therefore, the demands at those junctions were kept in the model to be conservative.

2.3 Demand Summary

The process for updating the demand in the model for the NWSP redevelopment analysis is summarized in Table 4.

Table 4. SSWD Hydraulic Model Demand Summary		
	Water Demand (gpm)	
Demand Update Process	Average Day	Maximum Day
Total existing conditions model demand	19,641	37,318
Existing demand removed from NWSP redevelopment area (-)	(57)	(108)
Redevelopment demand added for NWSP	1,071	2,035
Total model demand with NWSP redevelopment	20,655	39,245

Section 3: Model Evaluation

The SSWD 2025 water system hydraulic model was simulated under the following conditions:

- Demand: MDD conditions with the NWSP redevelopment demands
- Supply: Groundwater only

The system was evaluated during peak hour demand during MDD conditions and for fire flow during MDD conditions. Improvements were identified to address deficiencies. The specific scenarios simulated that represent this evaluation process are described as follows:

- Run 1: This is the baseline scenario simulating the conditions outlined above with a diurnal pattern simulating hourly demands to evaluate the system under MDD conditions with peak hour demands. The results showed no deficiencies that needed improvement; therefore, no additional runs were needed under these conditions.
- Run 2: Fire flow condition (MDD plus fire flow) of Run 1. Deficiencies were identified.
- Run 2a: Run 2 with recommended pipeline improvements

The SSWD system in the vicinity of the NWSP redevelopment was evaluated under these scenarios according to the criteria outlined below.

3.1 Evaluation Criteria for Peak Hour Demand

For Run 1, the SSWD system was evaluated with the redevelopment demands based on the criteria shown in Table . These criteria are from the SSWD Water System Master Plan.

Table 5. Evaluation Criteria for Peak Hour Demands

Component	Criteria
Water Transmission Line Sizing (16-in diameter or greater)	
Minimum Pressure, psi	35 psi
Maximum Head Loss, ft/kft	7 ft/kft
Maximum Velocity, fps	7 fps
Water Distribution Line Sizing (Less than 16-in diameter)	
Minimum Pressure, psi	35 psi
Maximum Head Loss, ft/kft	10 ft/kft
Maximum Velocity, fps	5 fps

psi: pounds per square inch
ft/kft: feet per thousand feet of pipe
fps: feet per second

3.2 Fire Flow Requirements

For Run 2, the SSWD system was evaluated to meet fire flow requirements during MDD conditions with the NWSP redevelopment demands based on the criteria shown in Table 5. These criteria are from the SSWD Water System Master Plan. The water system hydraulic model does not include laterals to specific hydrants; therefore, SSWD assumes only 80 percent of the modeled fire flow is available at the hydrant. The required modeled fire flows to meet the criteria at the hydrant are also shown in Table 5.

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Table 6. Evaluation Criteria for Fire Flow			
Land Use Type	Equivalent SSWD Master Plan Building Type	Criteria at Hydrant [a]	Criteria at Nearest Modeled Junction [b]
Small Multi-Family	Multi-Family Residential	2,500 gpm @ 2 hrs.	3,125 gpm @ 2 hrs.
Medium Lot Mixed Use: Commercial and Multi Family	Commercial	3,000 gpm @ 3 hrs.	3,750 gpm @ 3 hrs.
Large Lot Mixed Use: Commercial and Multi Family	Commercial	3,000 gpm @ 3 hrs.	3,750 gpm @ 3 hrs.

a. *Residual pressure requirement: 20 psi*

b. *SSWD assumes only 80 percent of the modeled fire flow is available at the hydrant; therefore, these values at the modeled junction would meet the criteria at the hydrant*

3.3 Results

The results and potential improvements are shown in exhibits as part of Attachment B.

The SSWD system in the vicinity of the NWSP redevelopment meets the evaluation criteria for peak hour demand during MDD (Run 1). Minimum pressures, maximum headloss, and maximum velocity criteria are all met within the vicinity of the NWSP redevelopment area. This excludes connections at pumps and wells.

Fire flow deficiencies were identified in localized areas (Run 2). Potential improvements were identified to address the fire flow deficiencies, and these improvements were included in Run 2a to confirm that the improvements resolve the deficiencies .

The final set of exhibits in Attachment B show additional improvements needed to meet the SSWD requirement that a minimum 12-in diameter pipeline is needed to serve mixed use development. These additional improvements were not included in Run 2a because they were not needed to meet the hydraulic requirements.

References

Brown and Caldwell. 2020 Urban Water Management Plan. June 2021.

Brown and Caldwell. 2024 SSWD Water Supply Assessment for Regional Housing Needs Allocation Rezone Project. 2024.

Brown and Caldwell, Water System Master Plan, Section 11, “Hydraulic Modeling”, Prepared for Sacramento Suburban Water District, 2017.

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NWSP Redevelopment Evaluation_TM_DRAFT2

Attachment A: Proposed Land Use Plan

North Watt Specific Plan exhibit prepared by Wood Rodgers

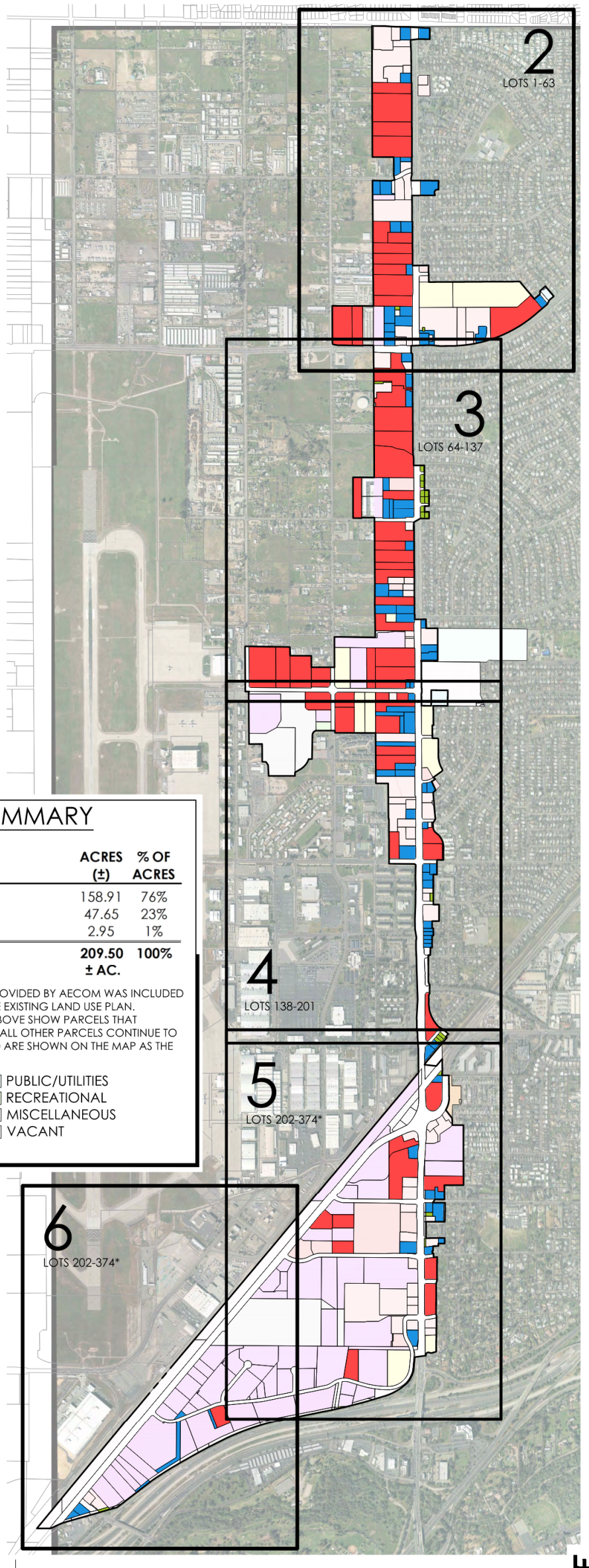
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PROPOSED LAND USE PLAN

NORTH WATT SPECIFIC PLAN

COUNTY OF SACRAMENTO, CALIFORNIA

NOVEMBER 13, 2025



LAND USE SUMMARY

LAND USE DESIGNATION	ACRES (±)	% OF ACRES
LARGE LOT MIXED-USE	158.91	76%
MEDIUM LOT MIXED-USE	47.65	23%
SMALL MULTI-FAMILY	2.95	1%
Total	**209.50 ± AC.**	**100%**

NOTE 1: ONLY PARCEL INFORMATION PROVIDED BY AECOM WAS INCLUDED IN THE ACREAGE CALCULATION FOR THE EXISTING LAND USE PLAN.
NOTE 2: ALL LAND USE DESIGNATIONS ABOVE SHOW PARCELS THAT PROPOSED NEW DEVELOPMENT ONSITE. ALL OTHER PARCELS CONTINUE TO HAVE THE SAME EXISTING LAND USE AND ARE SHOWN ON THE MAP AS THE COLORS BELOW:

- RETAIL/COMMERCIAL
- RESIDENTIAL
- OFFICE
- INDUSTRIAL
- CHURCH/WELFARE
- PUBLIC/UTILITIES
- RECREATIONAL
- MISCELLANEOUS
- VACANT

NORTH 0 800 1600 3200

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
3301 C St, Bldg. 100-B
Sacramento, CA 95816
Tel 916.341.7760
Fax 916.341.7767

SHEET 1 OF 6

PROPOSED LAND USE PLAN - NORTH WATT SPECIFIC PLAN

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NWSP Redevelopment Evaluation_TM_DRAFT2

Attachment B: Modeling Results and Proposed Improvements

Exhibits outlining the results and proposed projects

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NWSP Redevelopment Evaluation_TM_DRAFT2

Attachment B

North Watt Specific Plan (NWSP) Modeling

Modeling Results

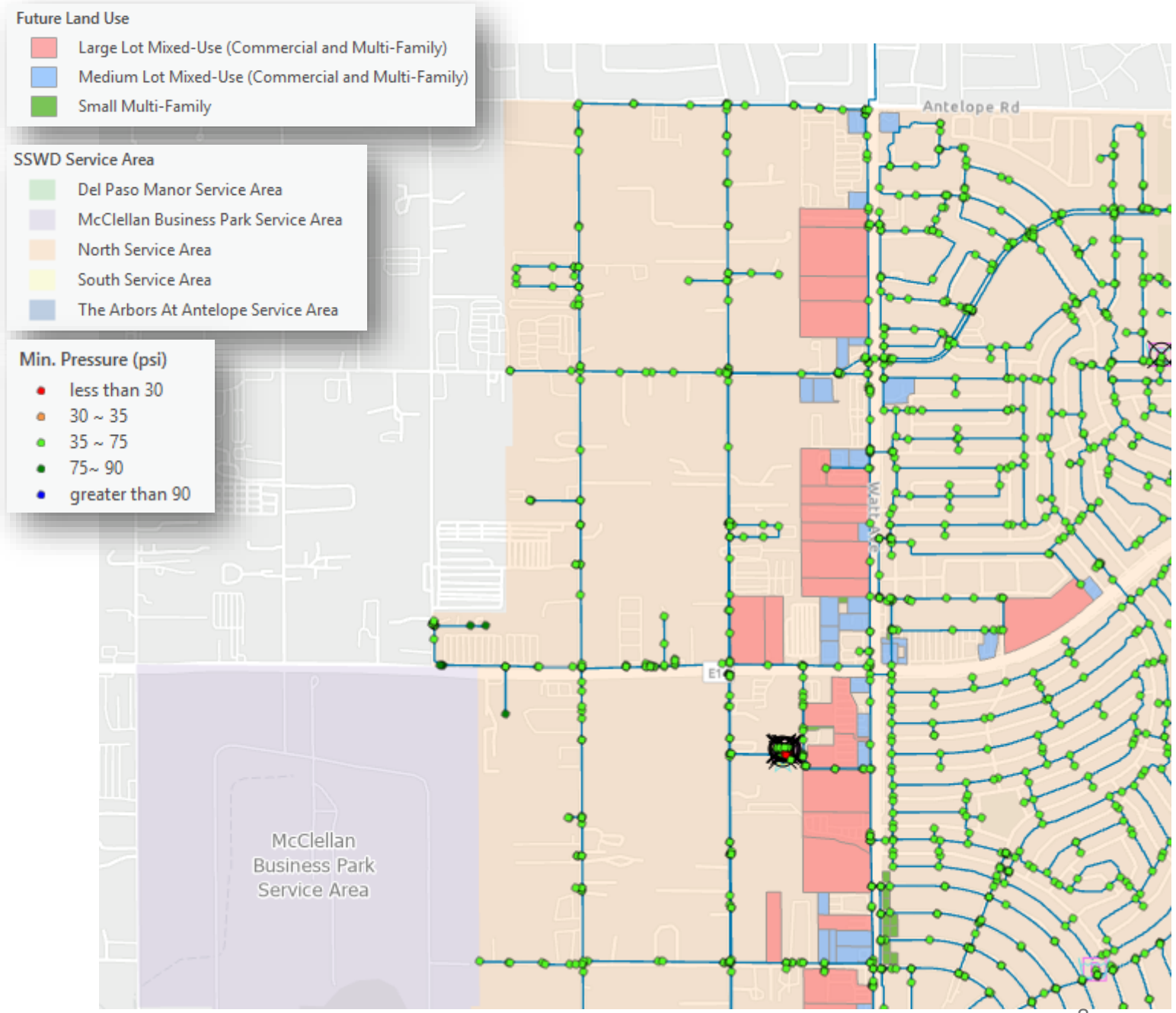
Run 1: This is the baseline scenario simulating the conditions outlined above with a diurnal pattern simulating hourly demands to evaluate the system under peak hour demands during maximum day demand (MDD)

Run 2: Fire flow condition of Run 1 (MDD + fire flow)

Run 1. Peak Hour Demand Results (pressures)

Results: No deficiencies identified for pressure (all > 35 psi)

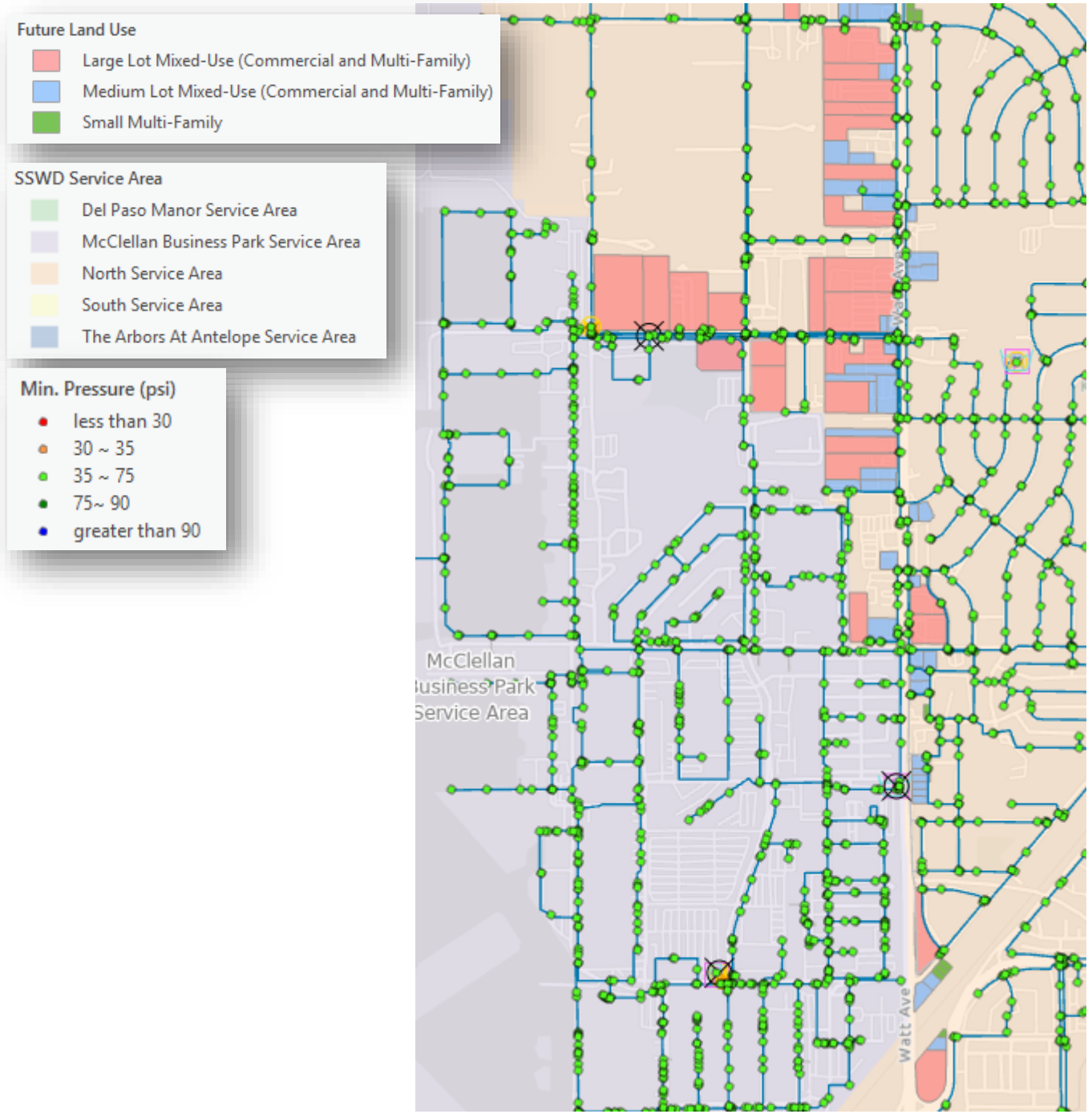
A. Antelope Rd to I St



Run 1. Peak Hour Demand Results (pressures)

Results: No deficiencies identified for pressure (all > 35 psi)

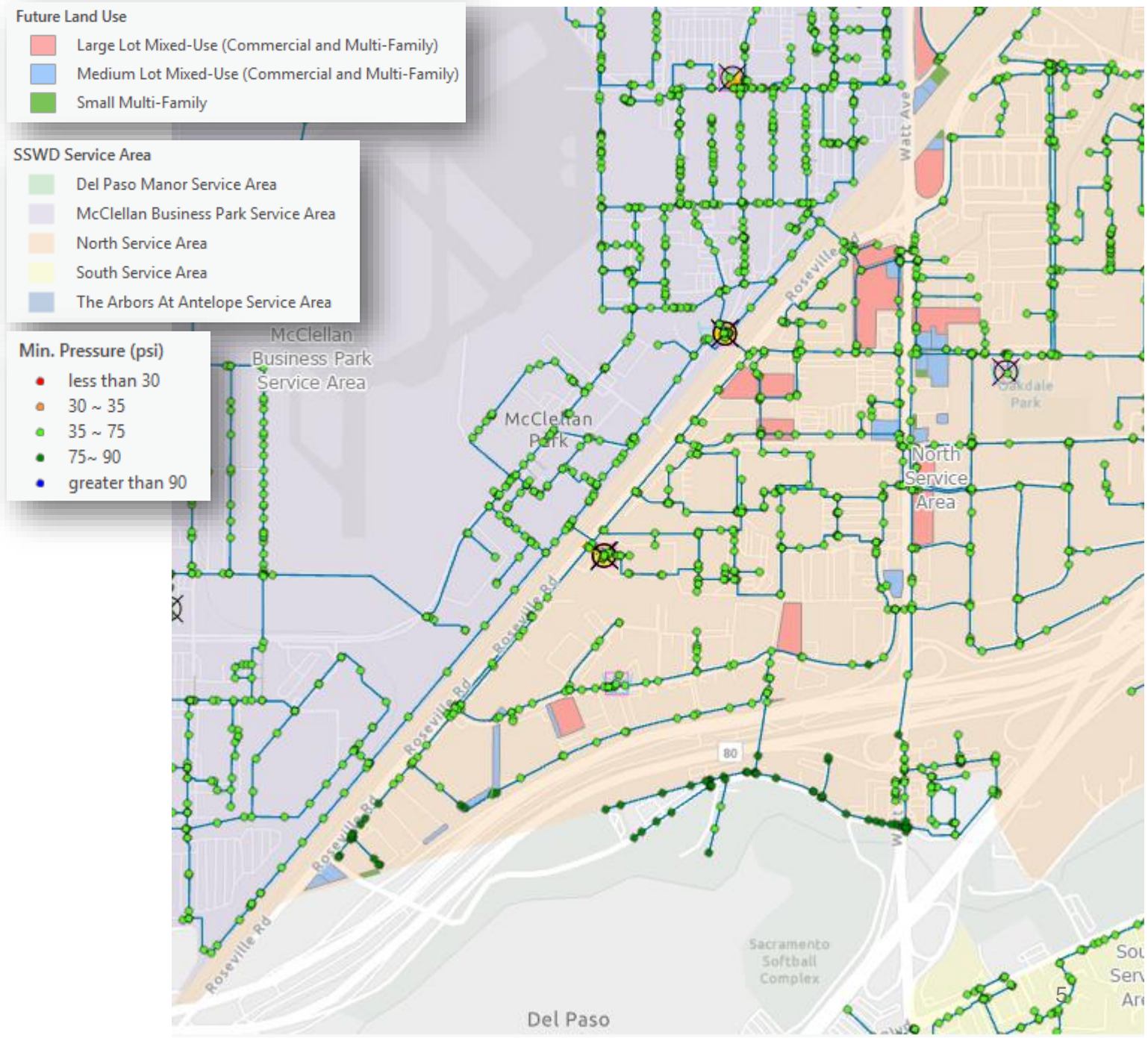
B. I St to Railroad



Run 1. Peak Hour Demand Results (pressures)

Results: No deficiencies identified for pressure (all > 35 psi)

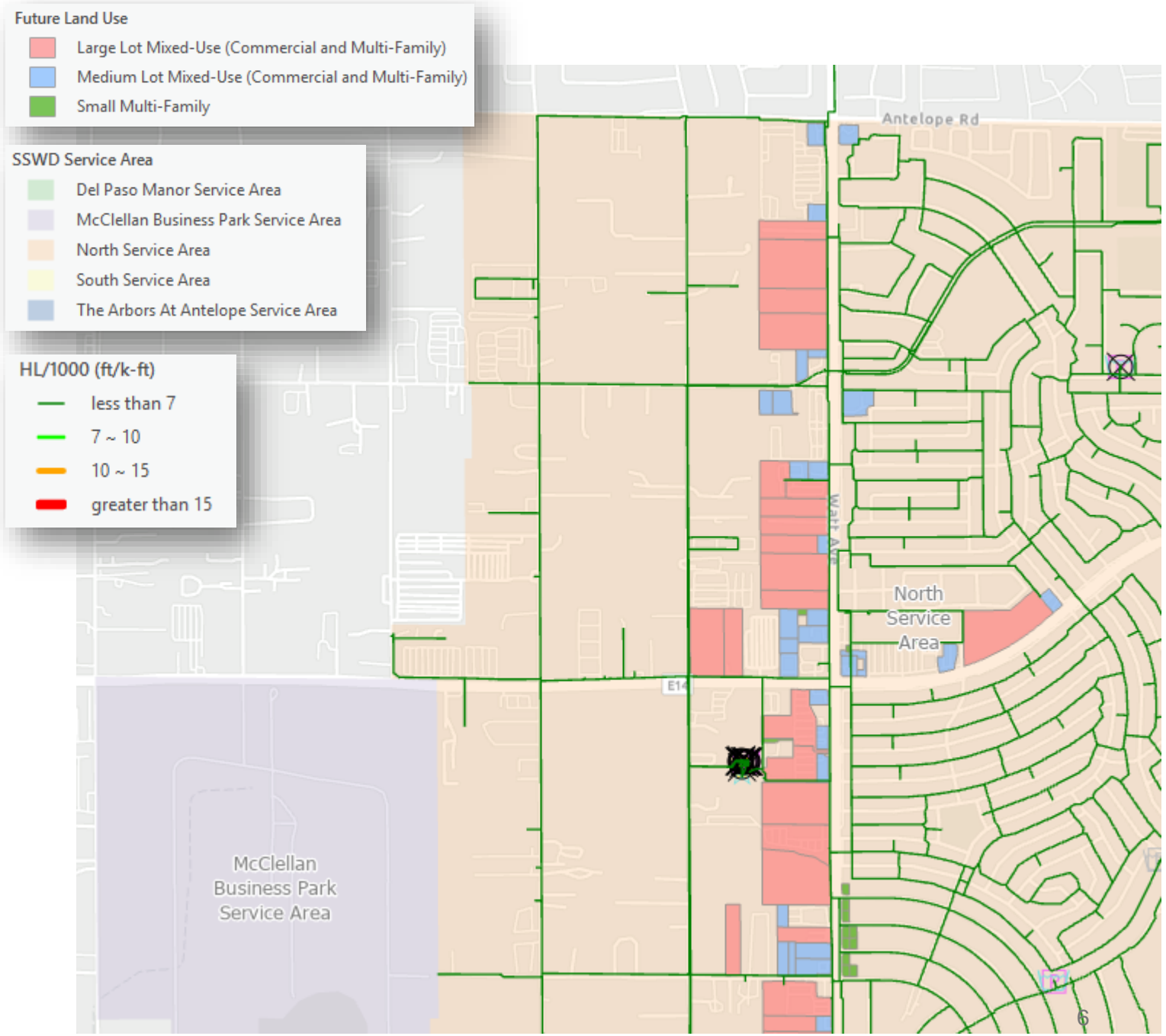
C. Railroad to I-80



Run 1. Peak Hour Demand Results (unit headloss)

Result: No deficiencies identified for unit headloss (all < 7 ft/k-ft)

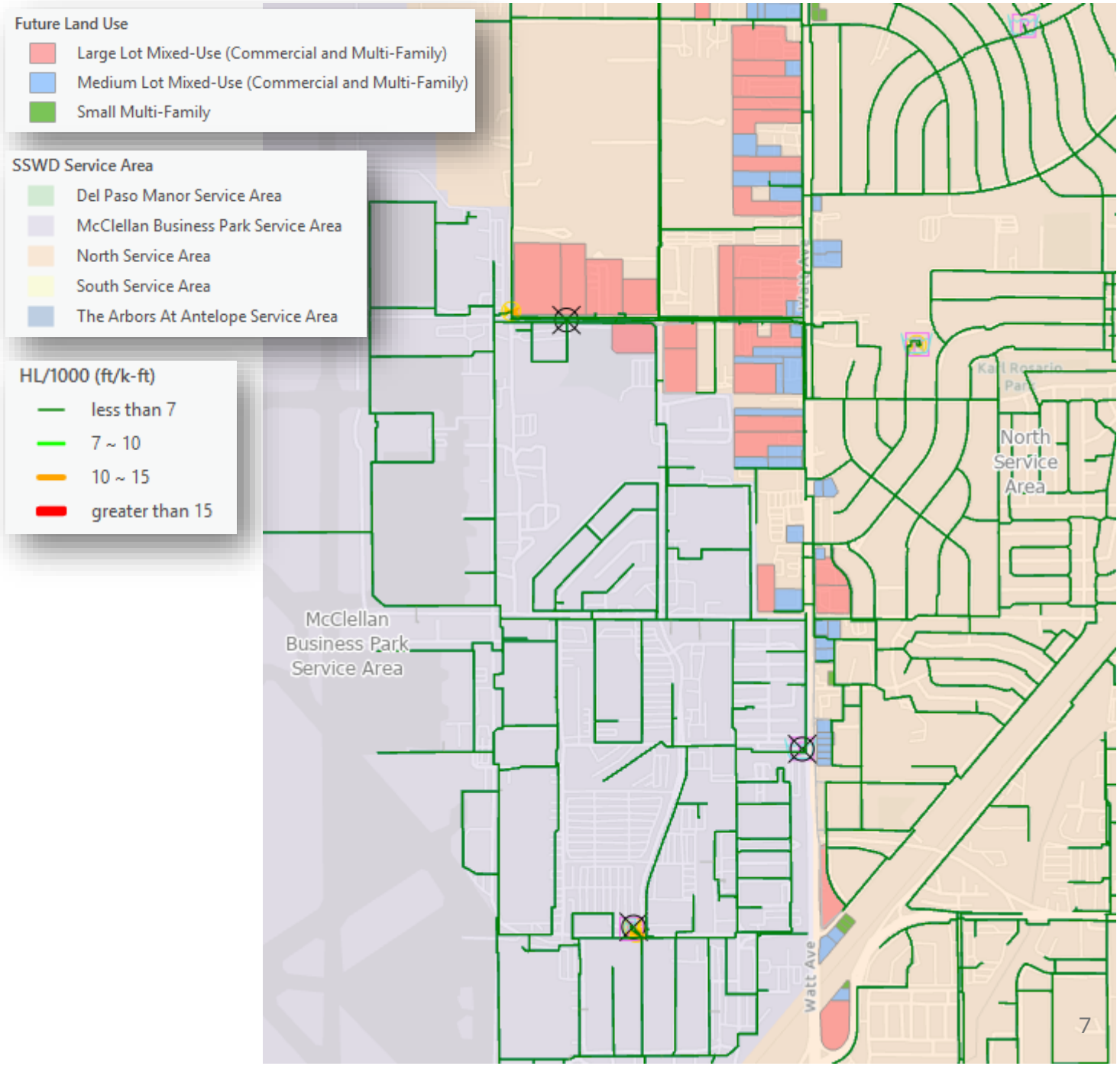
A. Antelope Rd to I St



Run 1. Peak Hour Demand Results (unit headloss)

Result: No deficiencies identified for unit headloss (all < 7 ft/k-ft)

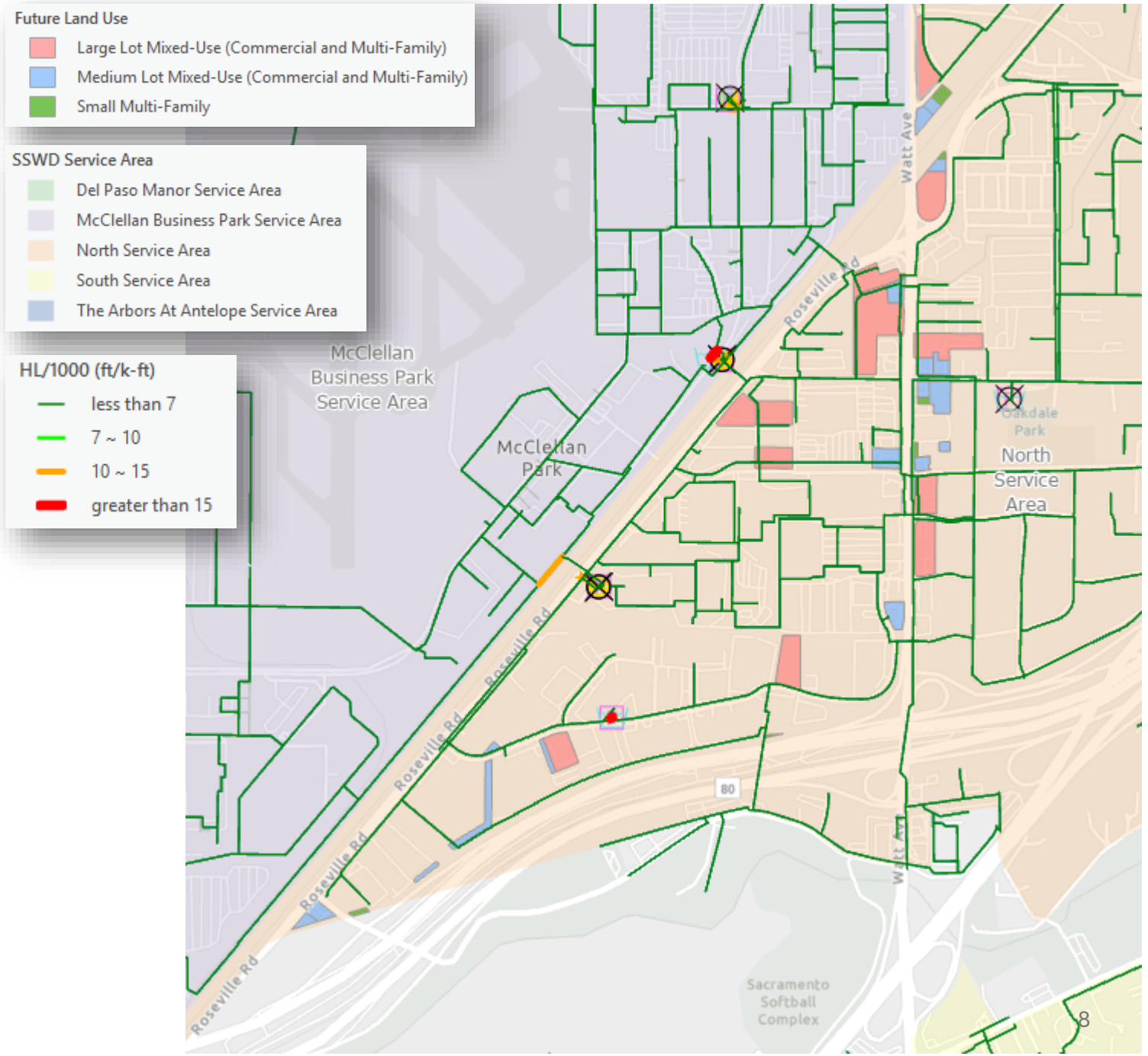
B. I St to Railroad



Run 1. Peak Hour Demand Results (unit headloss)

Result: No deficiencies identified for Headloss (all < 7 ft/k-ft)

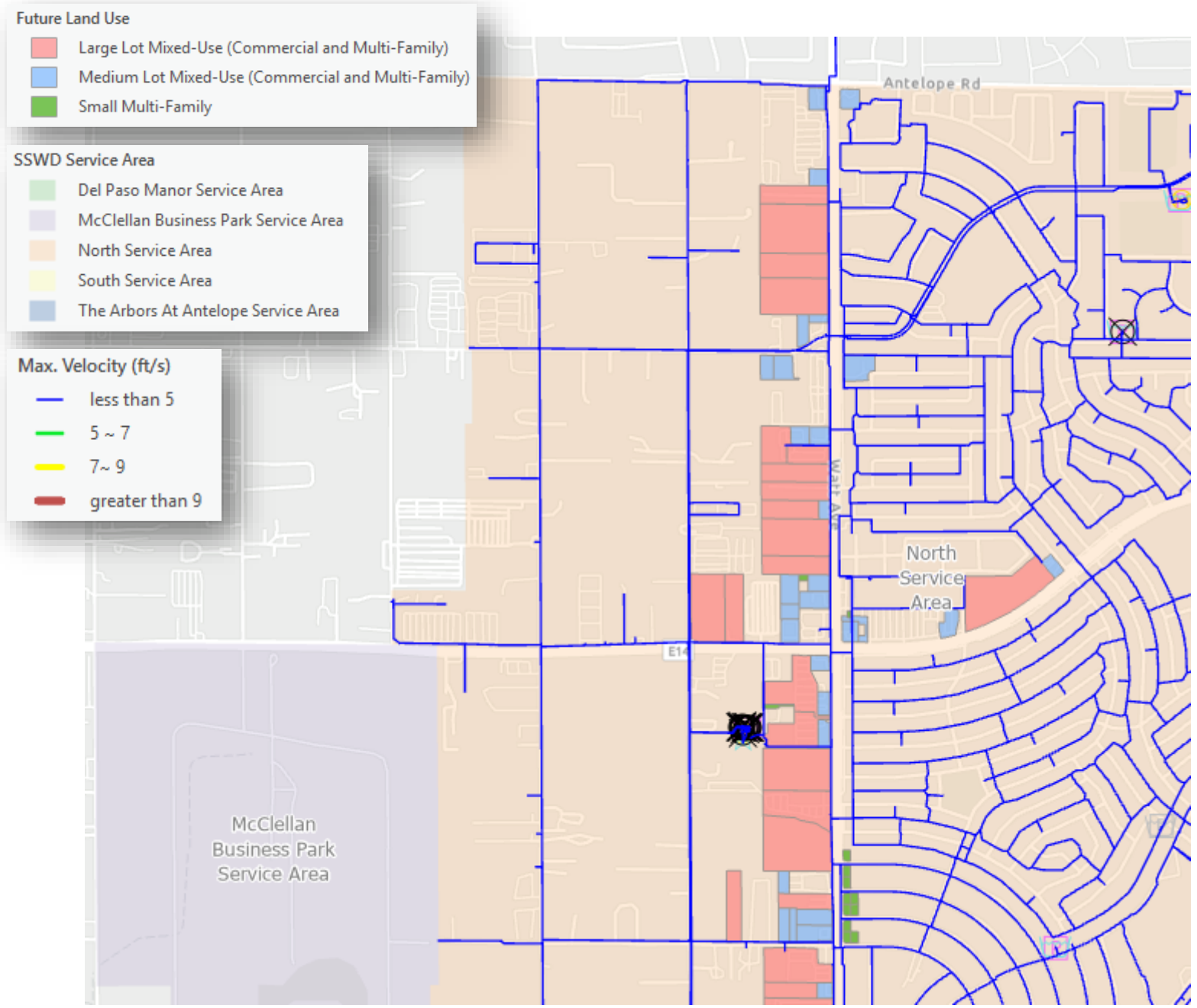
C. Railroad to I-80



Run 1. Peak Hour Demand Results (velocity)

Results: No deficiencies identified for Velocity (all < 5 fps)

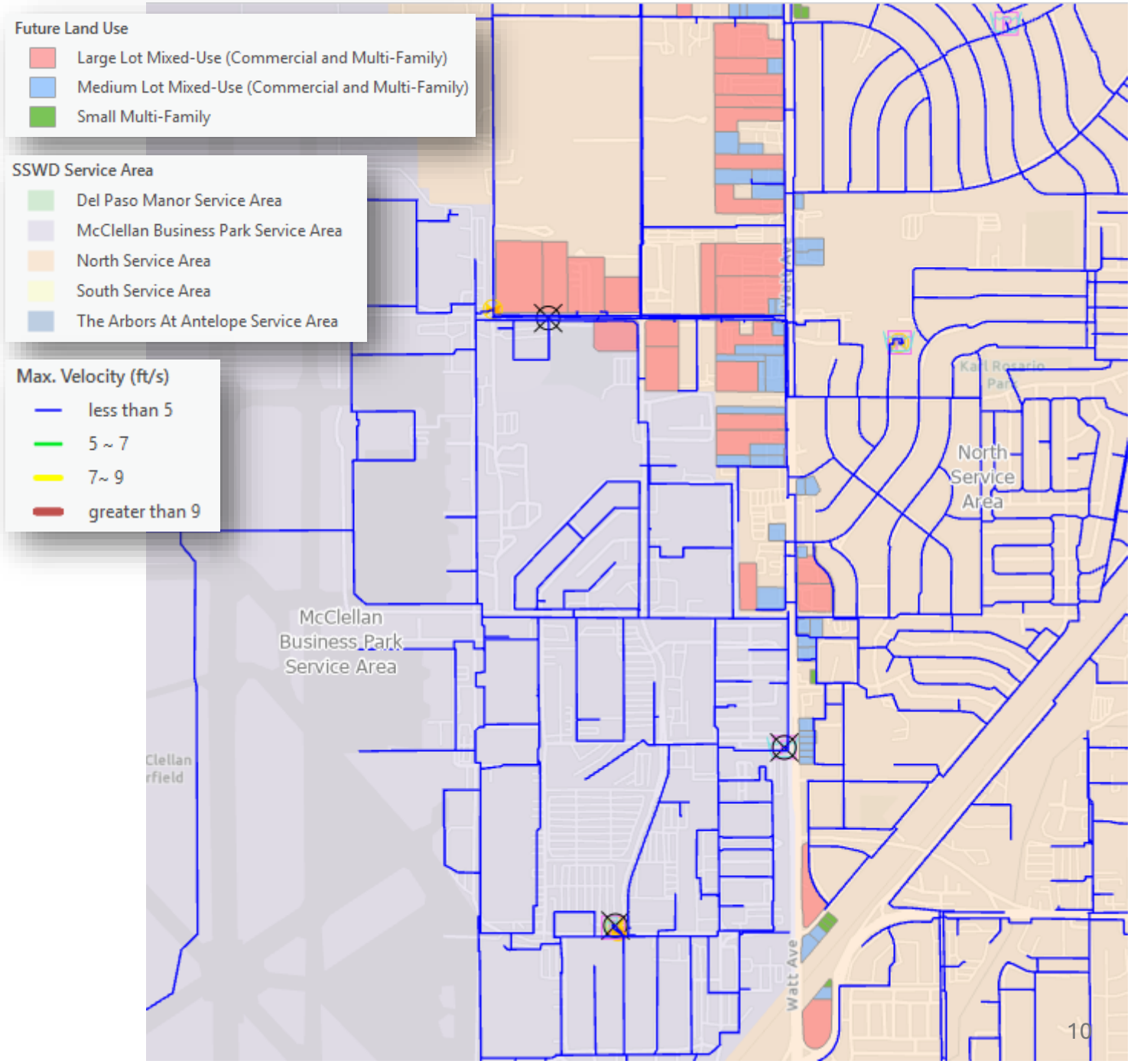
A. Antelope Rd to I St



Run 1. Peak Hour Demand Results (velocity)

Results: No deficiencies identified for Velocity (all < 5 fps)

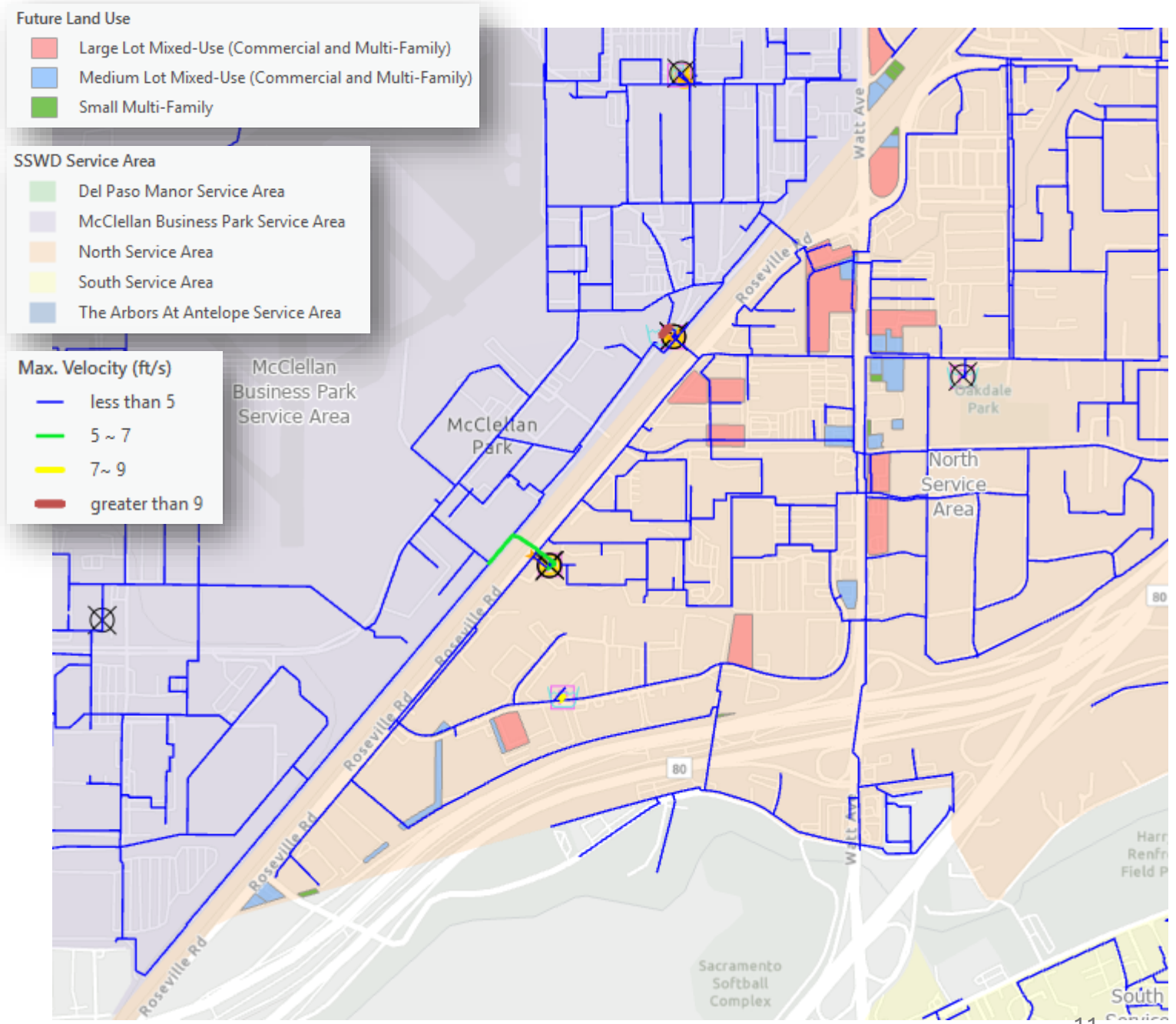
B. I St to Railroad



Run 1. Peak Hour Demand Results (velocity)

No deficiencies identified for Velocity (all < 5 fps)

C. Railroad to I-80

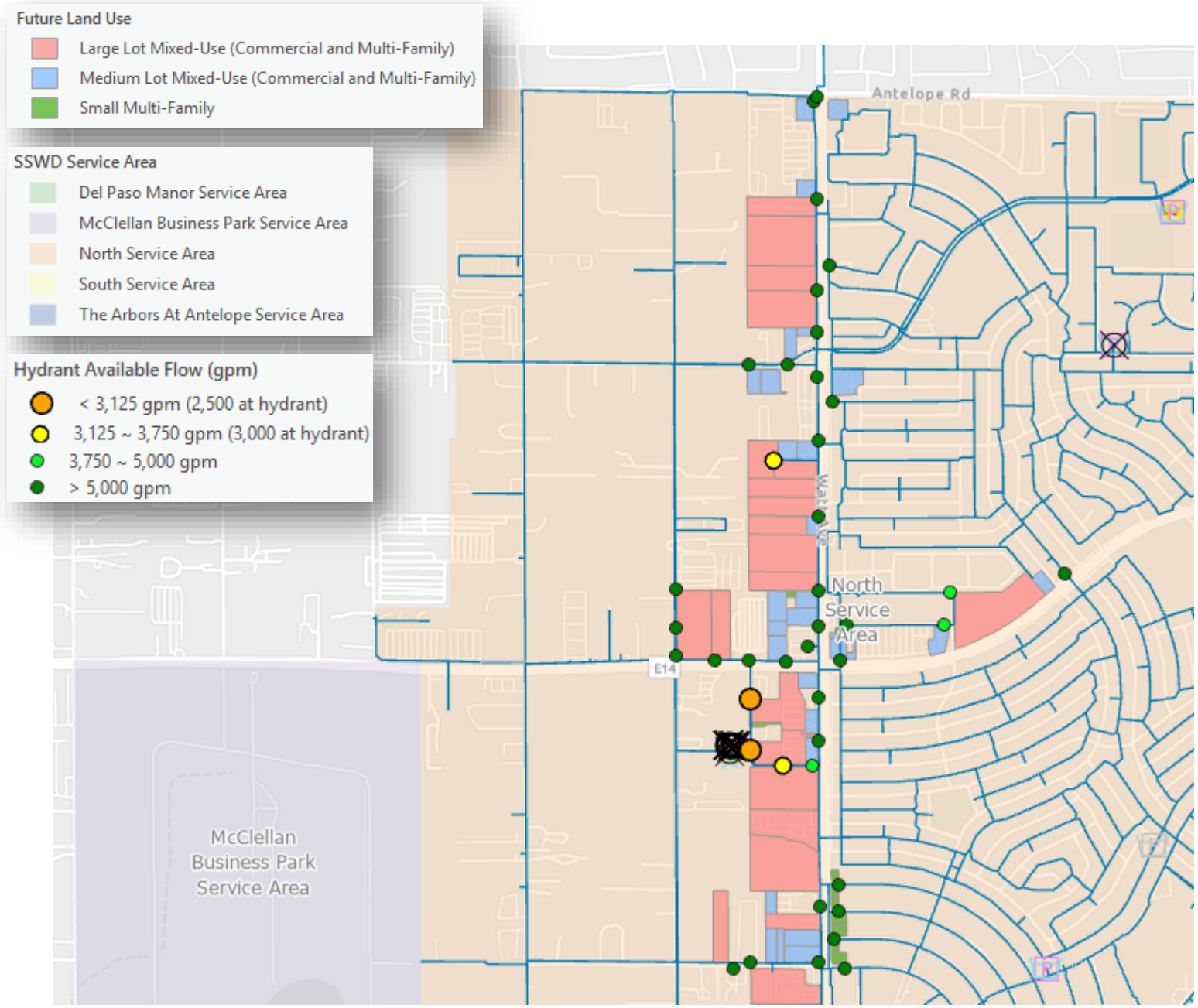


Run 2. Fire Flow Results

Results: Results shown at nearest modeled junction to a hydrant

Deficiencies identified as shown

A. Antelope Rd to I St

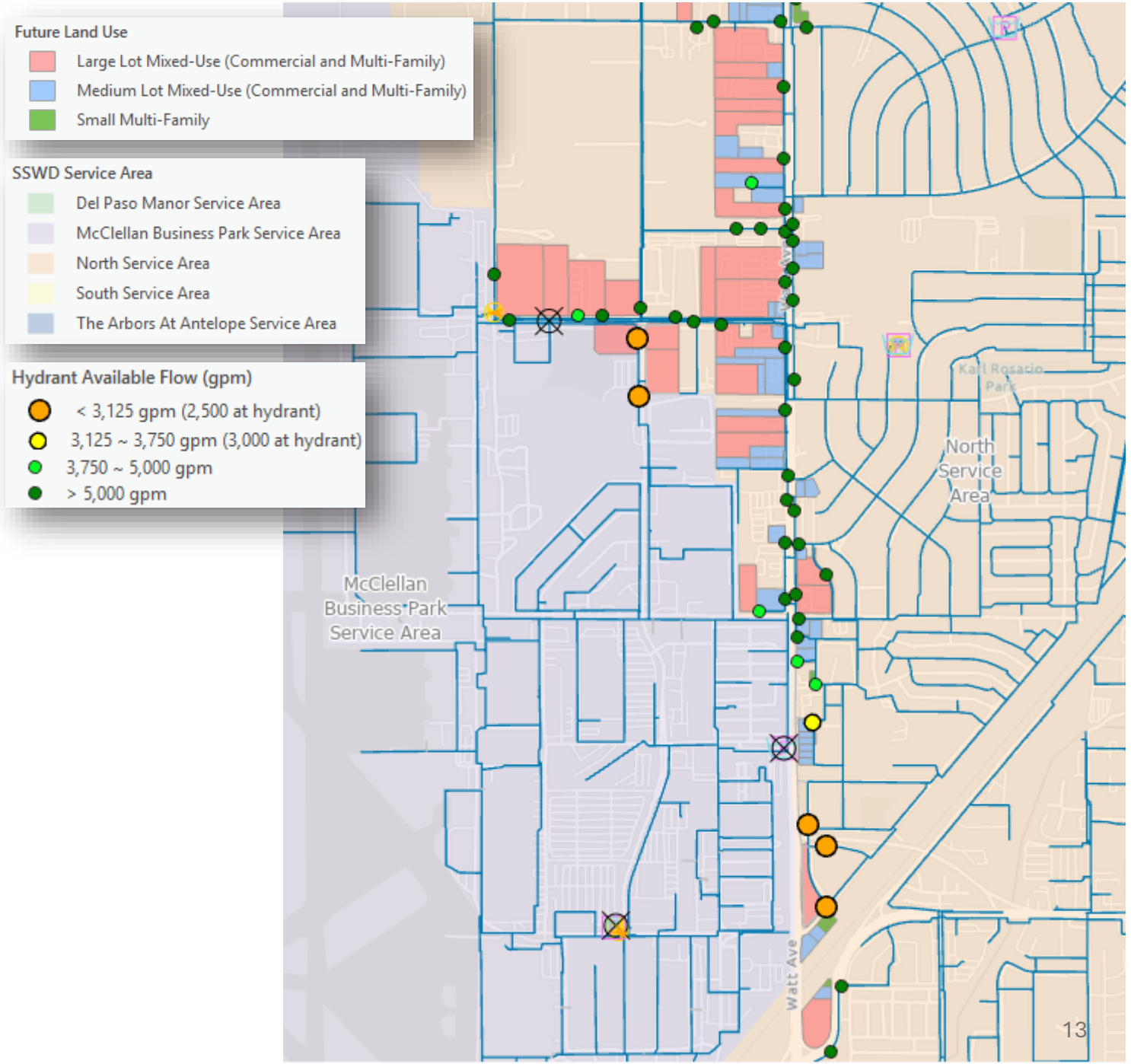


Run 2. Fire Flow Results

Results: Results shown at nearest modeled junction to a hydrant

Deficiencies identified as shown

B. I St to Railroad

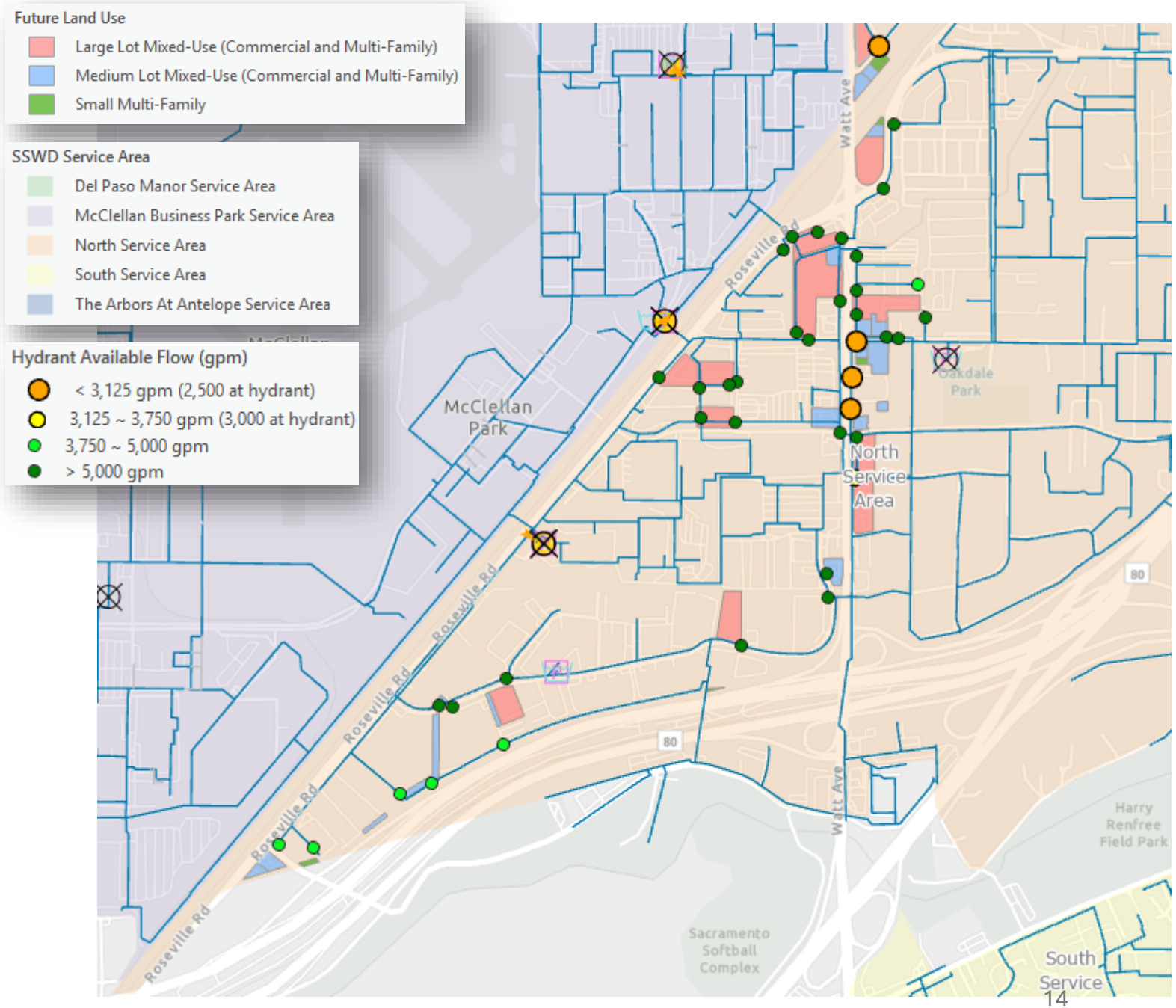


Run 2. Fire Flow Results

Results: Results shown at nearest modeled junction to a hydrant

Deficiencies identified as shown

C. Railroad to I-80



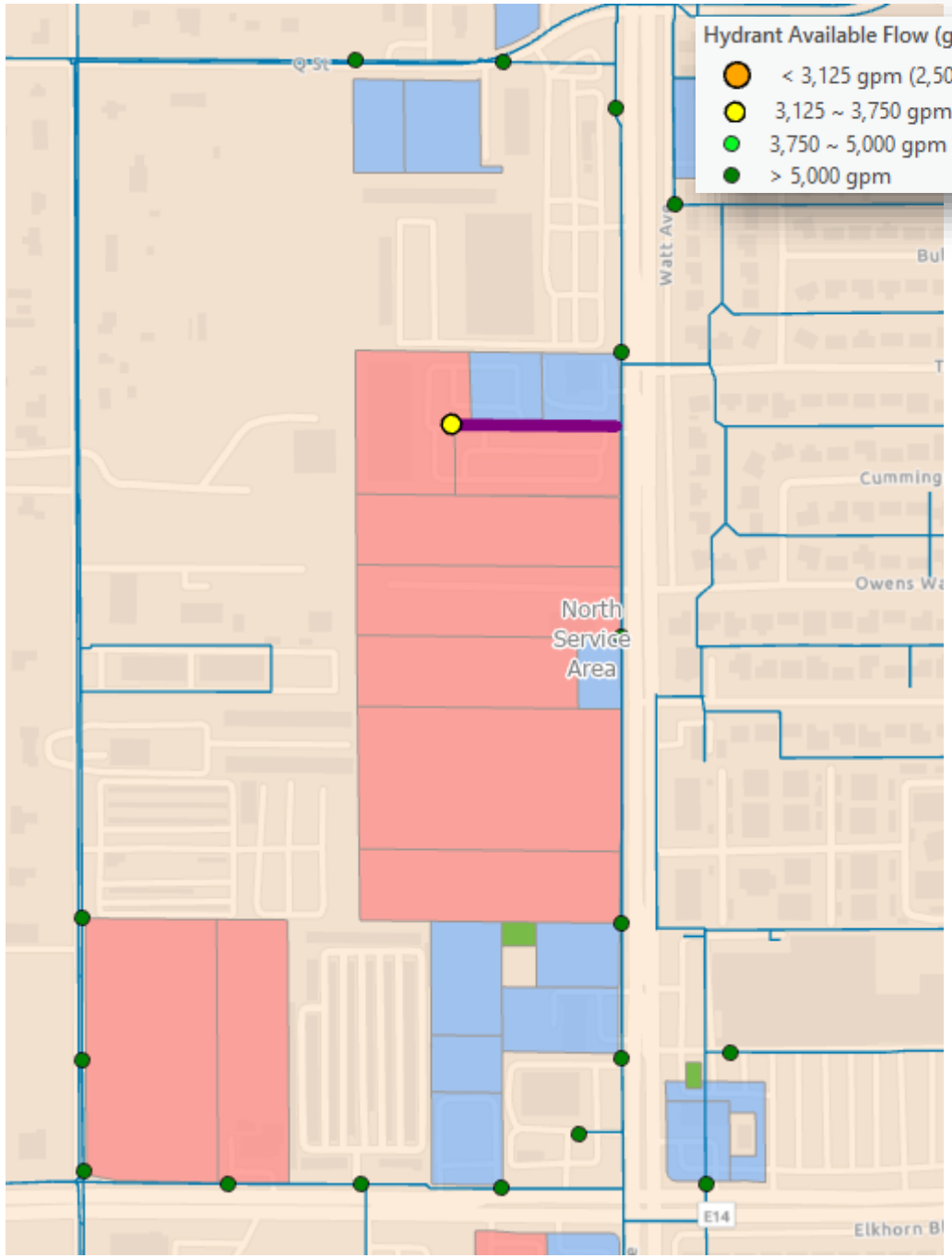
Suggested Improvements to Meet Hydraulic Requirements

Run 2a: Run 2 with pipeline improvements

Modeling from Run 2a confirmed that proposed improvements resolve fire flow deficiencies identified from Run 2

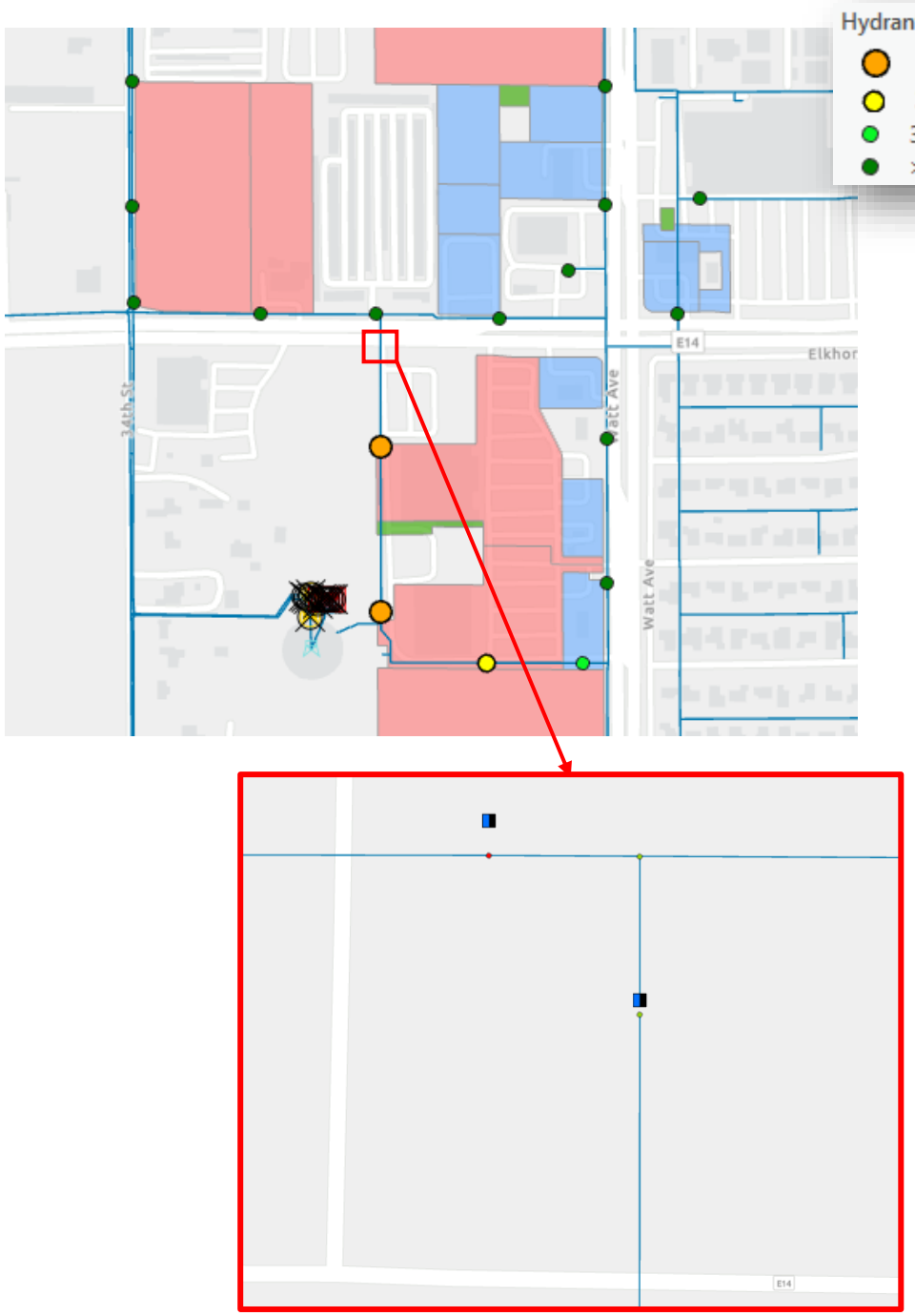
Run 2a. Potential Improvements to Meet Fire Flow

- Deficient fire flow south of Q St as shown. 8-in diameter pipelines limit the fire flow.
- Proposed improvements: Upsize 8-in pipe to 12-in diameter as shown (purple line).



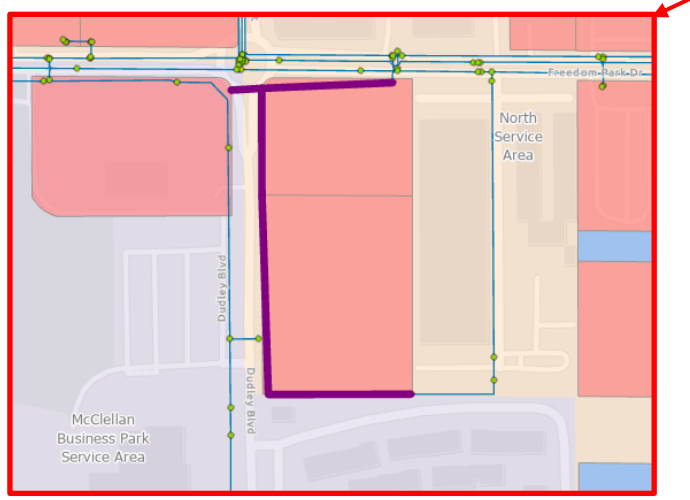
Run 2a. Potential Improvements to Meet Fire Flow

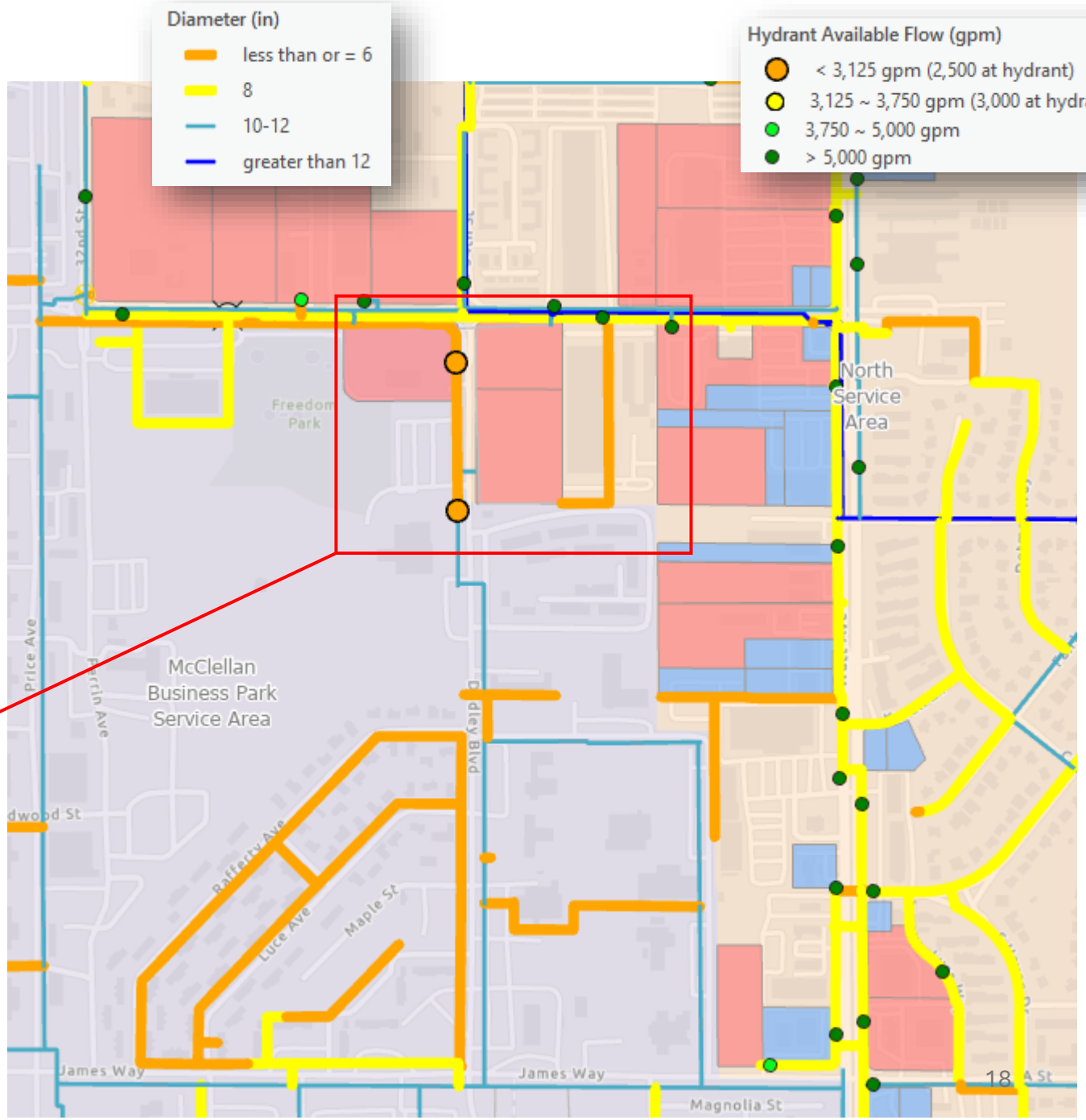
- Limited fire flow at southwest corner of Watt Ave and Elkhorn Blvd (E14)
- Issue due to a gap in the pipe system at red box (in GIS and model)
  - Gap is in the GIS data (8/16/21) and the model
  - GIS data indicates there is a valve at this location
- Fire flow criteria is met in this area if the gap is eliminated creating a looped system



Run 2a. Potential Improvements to Meet Fire Flow

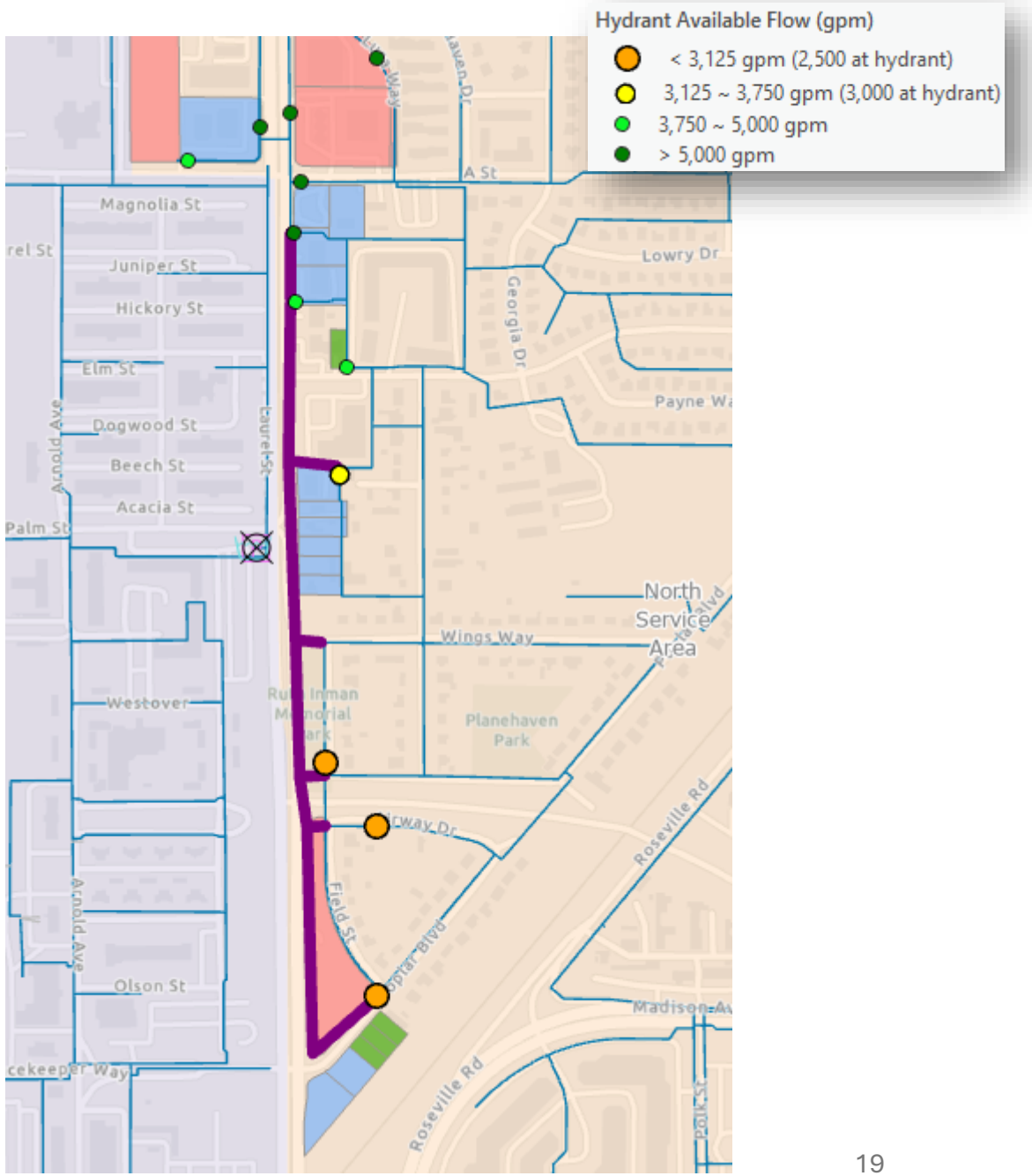
- Limited fire flow along Dudley Blvd along 6-in diameter pipes and connected to the McClellan Business Park Service Area (mostly 10-in diameter pipelines) cannot be improved without upsizing the entire loop to 12-in diameter
- Proposed Improvements: Install new 12-in diameter mains and hydrants connected to North Service Area mains as shown below (purple lines). Do not cross connect with McClellan.





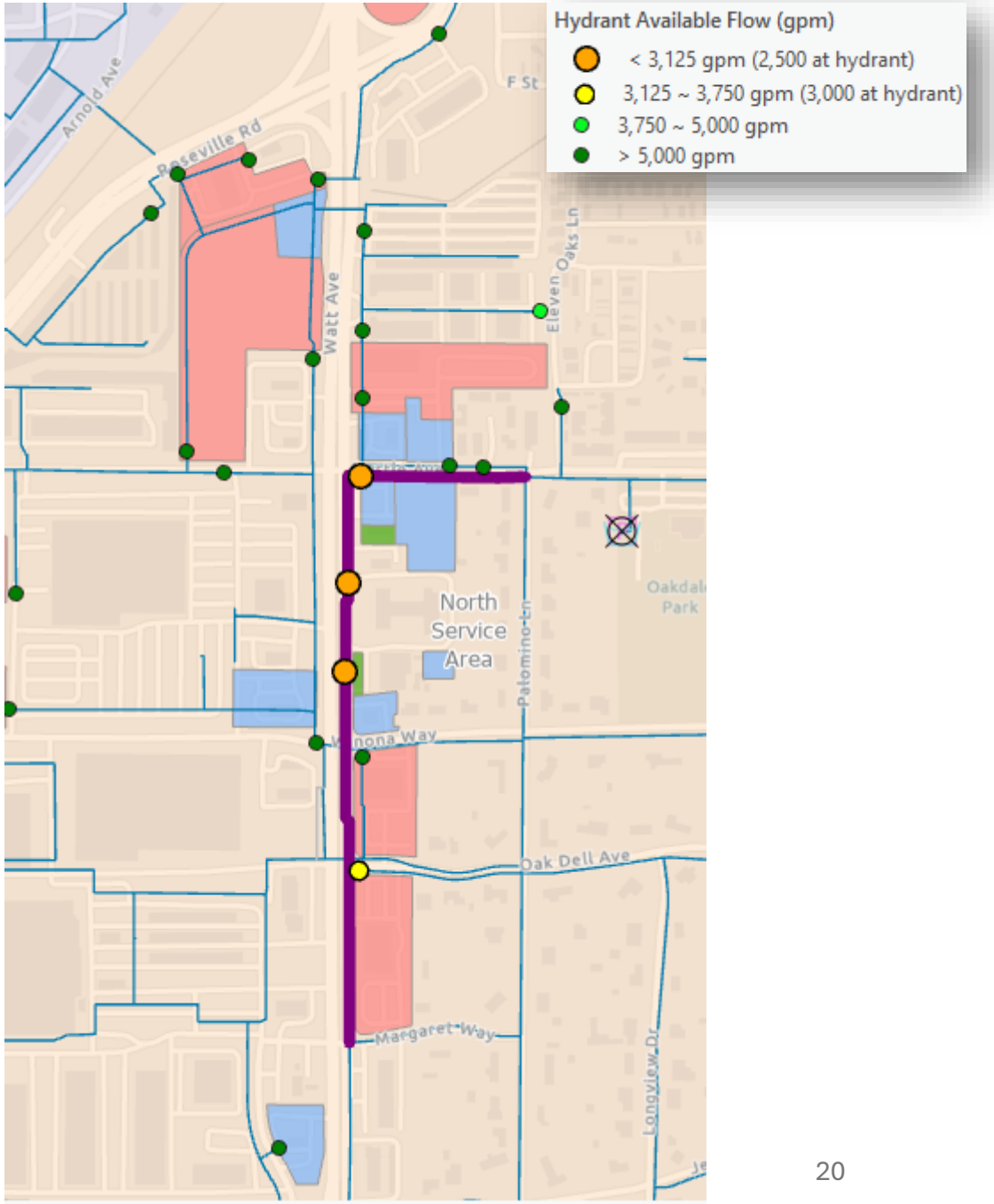
Run 2a. Potential Improvements to Meet Fire Flow

- Limited fire flow along Watt Ave between A St and the Railroad. There is no existing pipe along Watt Ave in this area and the existing network is insufficient to provide enough fire flow.
- Proposed improvements: Install new 12-in diameter mains along Watt Ave (purple lines). Connect to existing network as shown.



Run 2a. Potential Improvements to Meet Fire Flow

- Limited fire flow along Watt Ave south of the Railroad. The 6-in diameter pipes along Watt Ave are insufficient to provide fire flow.
- Proposed improvements: Upsize 6-in diameter pipes to 12-in along Watt Ave as shown (purple lines).



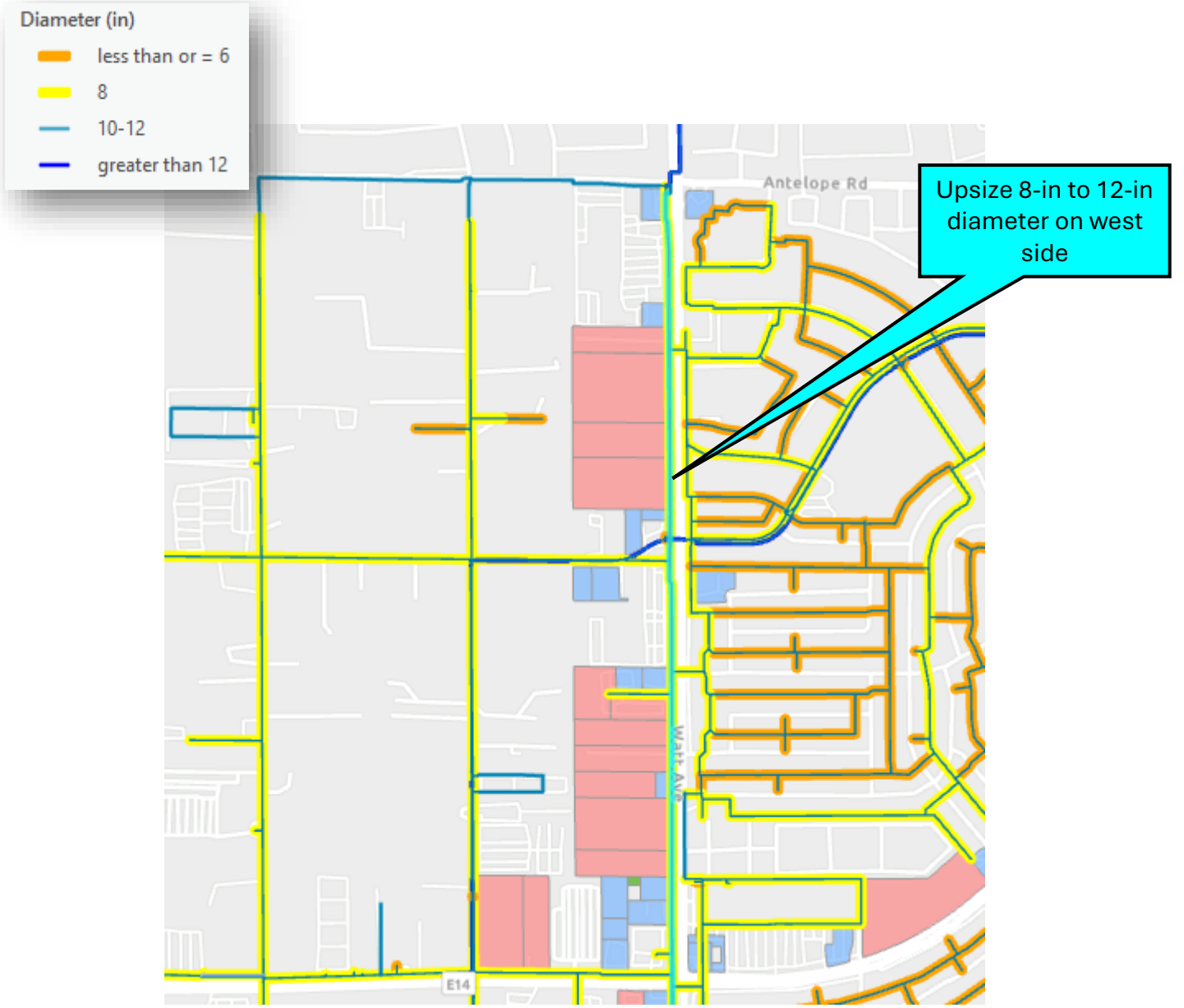
Watt Avenue Required Improvements

Additional improvements along Watt Ave that may be needed to meet the SSWD requirement of a minimum 12-in diameter for mixed use development

Only the improvements needed to meet hydraulic requirements were included in Run 2a as shown in the previous section. This section shows the additional improvements needed to cover the SSWD requirement along the entire length of Watt Ave.

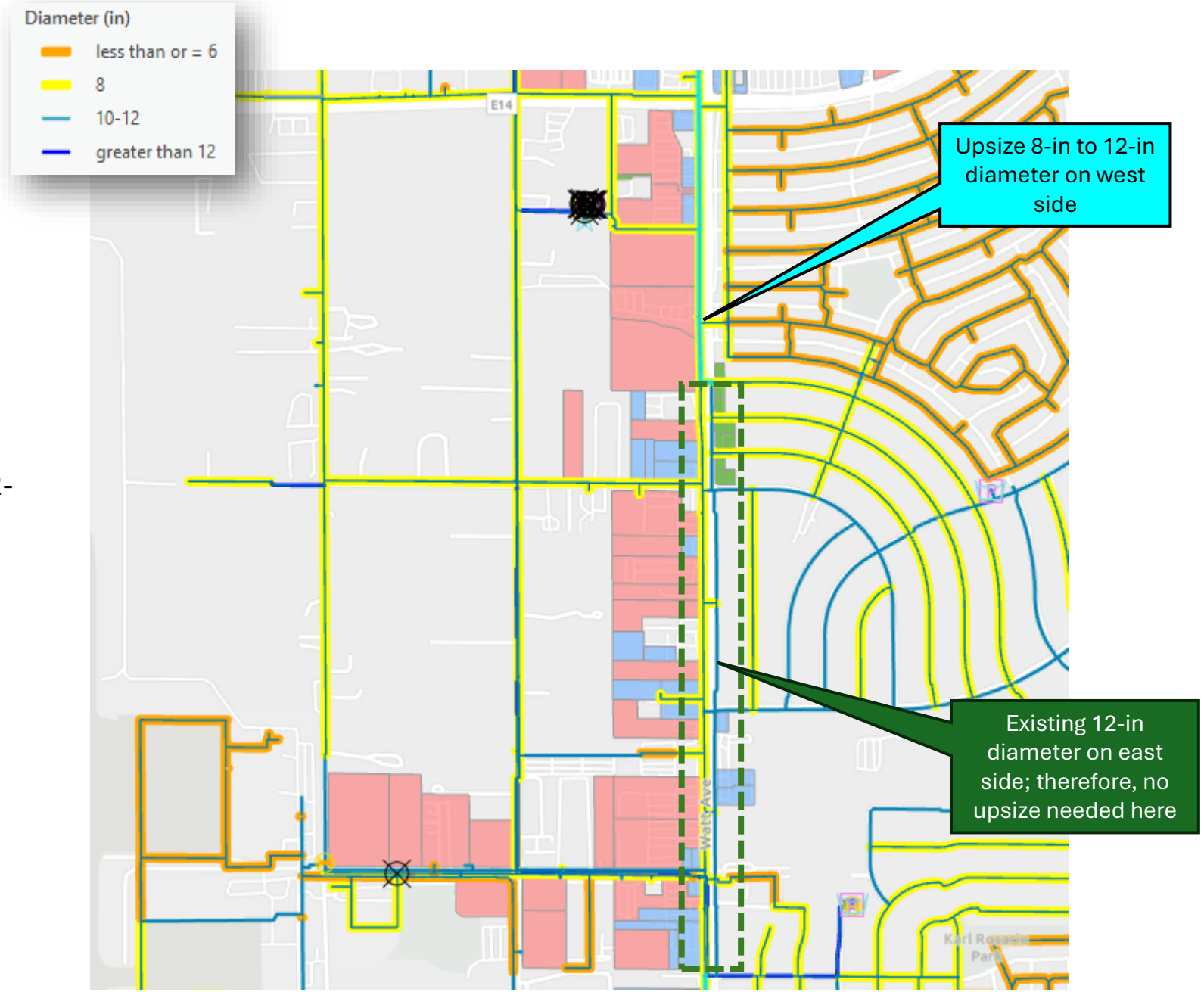
SSWD Required Improvements for Watt Ave

- Pipelines highlighted in cyan would need to be upsized from 8-in to 12-in diameter



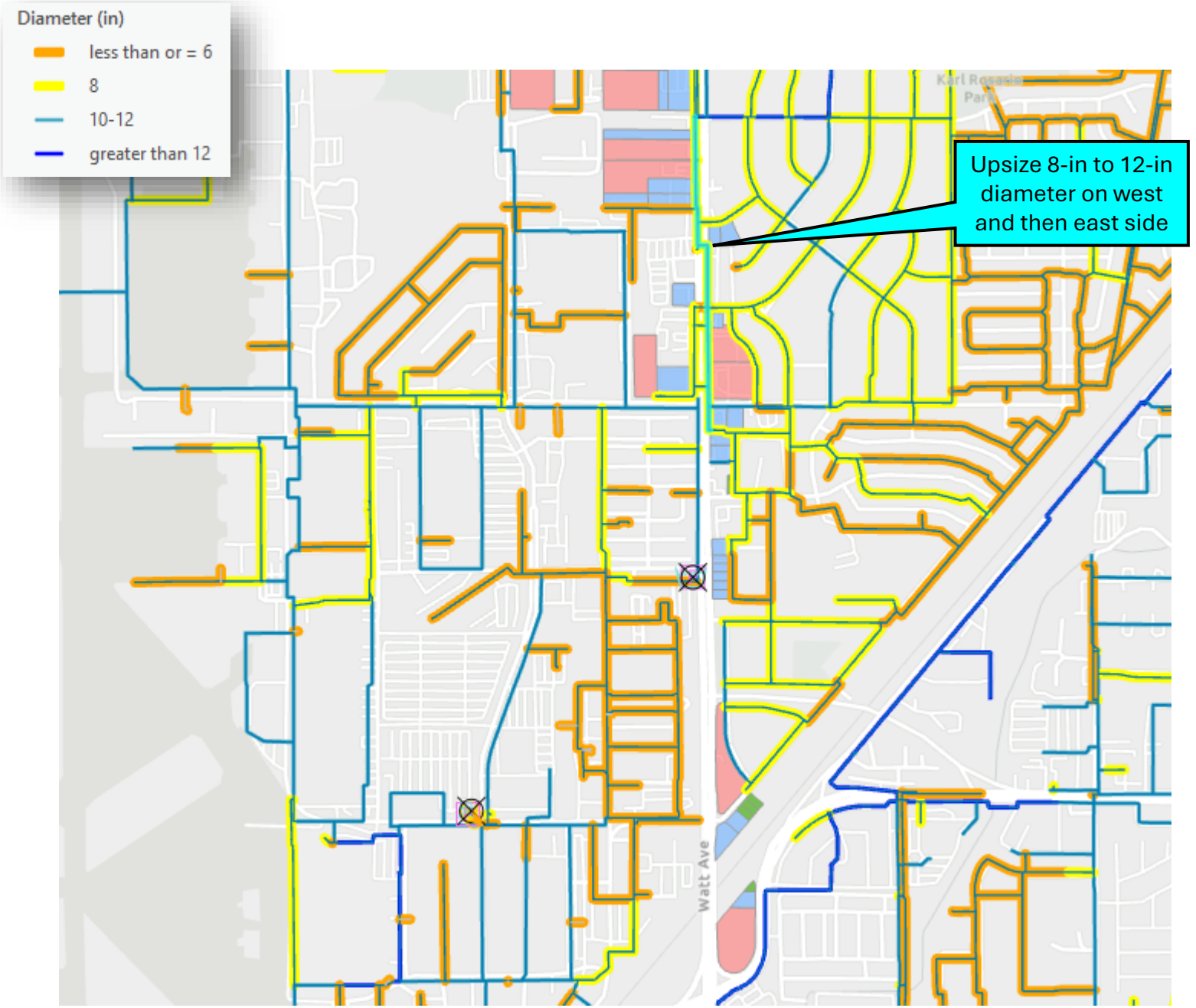
SSWD Required Improvements

- Pipelines highlighted in cyan would need to be upsized from 8-in to 12-in diameter
- There is a portion of pipeline along the east side of Watt Ave that is already 12-in diameter



SSWD Required Improvements

- Pipelines highlighted in cyan would need to be upsized from 8-in to 12-in diameter



APPENDIX E: Average Day Demands

Parcel Number Key	APN	General Land Use	Gross Acres	Gross Lot SF	Gross Building SF	Building SF	Units	Residential Demand Factor (gpd)	Commercial Demand Factor (gpd)	Residential Demand (gpd)	Commercial Demand (gpd)	Total Demand (gpd)
3	20801220390000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.73	31,930	7,983	6,785	18	168	1,583	3,024	1,160	4,184
4	21902200540000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.70	30,363	7,591	6,452	17	168	1,583	2,856	1,103	3,959
9	20801220550000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.58	25,066	6,267	5,327	14	168	1,583	2,352	911	3,263
12	20801220090000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.34	101,999	25,500	21,675	94	168	1,583	15,792	3,707	19,499
13	20801220670000	Large Lot Mixed-Use (Commercial and Multi-Family)	6.15	267,789	66,947	56,905	246	168	1,583	41,328	9,732	51,060
14	20801220660000	Large Lot Mixed-Use (Commercial and Multi-Family)	3.09	134,587	33,647	28,600	124	168	1,583	20,832	4,891	25,723
15	20801320080000	Large Lot Mixed-Use (Commercial and Multi-Family)	4.58	199,352	49,838	42,362	183	168	1,583	30,744	7,245	37,989
16	20801320290000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.64	27,932	6,983	5,935	16	168	1,583	2,688	1,015	3,703
17	20801320280000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.28	12,199	3,050	2,592	7	168	1,583	1,176	443	1,619
19	20801330110000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.58	25,482	6,371	5,415	15	168	1,583	2,520	926	3,446
20	20801330180000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.88	38,423	9,606	8,165	22	168	1,583	3,696	1,396	5,092
24	20000310140000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.35	58,772	14,693	12,489	34	168	1,583	5,712	2,136	7,848
27	20801420320000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.90	82,641	20,660	17,561	47	168	1,583	7,896	3,003	10,899
28	20801420340000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.64	27,917	6,979	5,932	16	168	1,583	2,688	1,015	3,703
29	20801420350000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.69	29,928	7,482	6,360	17	168	1,583	2,856	1,088	3,944
30	20801420330000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.44	62,920	15,730	13,370	58	168	1,583	9,744	2,287	12,031
31	20801420040000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.28	99,487	24,872	21,141	91	168	1,583	15,288	3,615	18,903
32	20801420050000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.31	100,432	25,108	21,342	92	168	1,583	15,456	3,650	19,106
33	20801420200000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.94	84,347	21,087	17,924	77	168	1,583	12,936	3,065	16,001
34	20801420220000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.38	16,492	4,123	3,505	9	168	1,583	1,512	599	2,111
37	20801420300000	Large Lot Mixed-Use (Commercial and Multi-Family)	4.63	201,794	50,449	42,881	185	168	1,583	31,080	7,333	38,413
38	20801420360000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.30	100,202	25,050	21,293	92	168	1,583	15,456	3,641	19,097
41	20801520110000	Large Lot Mixed-Use (Commercial and Multi-Family)	4.25	184,933	46,233	39,298	170	168	1,583	28,560	6,721	35,281
42	20801520100000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.31	100,667	25,167	21,392	92	168	1,583	15,456	3,658	19,114
44	20801520280000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.00	43,441	10,860	9,231	25	168	1,583	4,200	1,579	5,779
45	20801520300000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.50	21,736	5,434	4,619	12	168	1,583	2,016	790	2,806
46	20801520310000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.81	35,204	8,801	7,481	20	168	1,583	3,360	1,279	4,639
47	20801520360000	Small Multi-Family	0.10	4,419			2	209		418		418
49	20801520370000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.66	28,748	7,187	6,109	16	168	1,583	2,688	1,045	3,733
50	20801520150000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.94	40,944	10,236	8,701	23	168	1,583	3,864	1,488	5,352
54	20002200200000	Small Multi-Family	0.05	2,160			2	209		418		418
55	20002200160000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.44	19,193	4,798	4,079	11	168	1,583	1,848	698	2,546
57	20002200180000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.62	27,075	6,769	5,753	16	168	1,583	2,688	984	3,672
61	20002200240000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.78	34,174	8,544	7,262	20	168	1,583	3,360	1,242	4,602
62	20004000040000	Large Lot Mixed-Use (Commercial and Multi-Family)	6.29	273,964	68,491	58,217	252	168	1,583	42,336	9,956	52,292
63	20004000050000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.49	21,304	5,326	4,527	12	168	1,583	2,016	774	2,790
67	20801530190000	Large Lot Mixed-Use (Commercial and Multi-Family)	3.64	158,754	39,688	33,735	91	168	1,583	15,288	5,769	21,057
68	20801530220000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.52	22,779	5,695	4,841	13	168	1,583	2,184	828	3,012
70	20801530150000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.51	22,239	5,560	4,726	13	168	1,583	2,184	808	2,992
71	20801530250000	Small Multi-Family	0.17	7,312			3	209		627		627
73	20801530240000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.90	126,201	31,550	26,818	116	168	1,583	19,488	4,586	24,074
76	20801530200000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.62	27,041	6,760	5,746	16	168	1,583	2,688	983	3,671
77	20801620180000	Large Lot Mixed-Use (Commercial and Multi-Family)	5.17	225,395	56,349	47,896	207	168	1,583	34,776	8,191	42,967
78	20801620240000	Large Lot Mixed-Use (Commercial and Multi-Family)	3.65	159,126	39,782	33,814	91	168	1,583	15,288	5,783	21,071
79	20801620270000	Large Lot Mixed-Use (Commercial and Multi-Family)	6.31	274,918	68,730	58,420	252	168	1,583	42,336	9,991	52,327
80	20801720020000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.94	84,291	21,073	17,912	77	168	1,583	12,936	3,063	15,999
83	20801720190000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.45	19,634	4,909	4,172	11	168	1,583	1,848	714	2,562
85	20801720200000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.50	65,476	16,369	13,914	60	168	1,583	10,080	2,379	12,459
86	20801720070000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.70	30,635	7,659	6,510	18	168	1,583	3,024	1,113	4,137
87	20801720080000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.43	18,808	4,702	3,997	11	168	1,583	1,848	684	2,532
88	20801720210000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.03	44,956	11,239	9,553	26	168	1,583	4,368	1,634	6,002

Parcel Number Key	APN	General Land Use	Gross Acres	Gross Lot SF	Gross Building SF	Building SF	Units	Residential Demand Factor (gpd)	Commercial Demand Factor (gpd)	Residential Demand (gpd)	Commercial Demand (gpd)	Total Demand (gpd)
89	20801720220000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.10	47,757	11,939	10,148	27	168	1,583	4,536	1,736	6,272
90	21700110330000	Small Multi-Family	0.15	6,546			2	209		418		418
91	21700120010000	Small Multi-Family	0.15	6,685			2	209		418		418
92	21700120290000	Small Multi-Family	0.16	6,808			2	209		418		418
93	21700210010000	Small Multi-Family	0.15	6,670			2	209		418		418
94	21700210020000	Small Multi-Family	0.16	6,788			2	209		418		418
95	21700210220000	Small Multi-Family	0.16	6,782			2	209		418		418
96	21700210210000	Small Multi-Family	0.16	6,820			2	209		418		418
97	21700220280000	Small Multi-Family	0.15	6,739			2	209		418		418
98	21700220270000	Small Multi-Family	0.15	6,653			2	209		418		418
99	21700220260000	Small Multi-Family	0.16	7,109			2	209		418		418
100	21500620540000	Large Lot Mixed-Use (Commercial and Multi-Family)	3.88	169,130	42,283	35,940	97	168	1,583	16,296	6,146	22,442
102	21500620300000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.52	66,419	16,605	14,114	61	168	1,583	10,248	2,414	12,662
103	21500620250000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.44	19,209	4,802	4,082	11	168	1,583	1,848	698	2,546
104	21500620400000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.64	114,972	28,743	24,432	106	168	1,583	17,808	4,178	21,986
105	21500620560000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.57	68,331	17,083	14,520	39	168	1,583	6,552	2,483	9,035
106	21500620570000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.10	91,602	22,901	19,465	84	168	1,583	14,112	3,329	17,441
109	21500620110000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.97	42,453	10,613	9,021	24	168	1,583	4,032	1,543	5,575
112	21500620420000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.50	21,898	5,475	4,653	13	168	1,583	2,184	796	2,980
114	21500620100000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.87	81,393	20,348	17,296	47	168	1,583	7,896	2,958	10,854
115	21500720140000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.03	44,872	11,218	9,535	26	168	1,583	4,368	1,631	5,999
116	21500720150000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.87	37,753	9,438	8,023	22	168	1,583	3,696	1,372	5,068
117	21500720230000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.36	102,648	25,662	21,813	59	168	1,583	9,912	3,730	13,642
119	21500720220000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.85	37,030	9,257	7,869	21	168	1,583	3,528	1,346	4,874
127	21500720070000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.92	83,844	20,961	17,817	77	168	1,583	12,936	3,047	15,983
128	21500800010000	Large Lot Mixed-Use (Commercial and Multi-Family)	4.08	177,686	44,421	37,758	163	168	1,583	27,384	6,457	33,841
129	21500800020000	Large Lot Mixed-Use (Commercial and Multi-Family)	4.32	188,092	47,023	39,969	173	168	1,583	29,064	6,835	35,899
130	21500800050000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.21	8,965	2,241	1,905	5	168	1,583	840	326	1,166
131	21500800040000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.24	10,627	2,657	2,258	6	168	1,583	1,008	386	1,394
132	21700460010000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.24	10,659	2,665	2,265	6	168	1,583	1,008	387	1,395
134	21701100100000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.67	29,367	7,342	6,241	17	168	1,583	2,856	1,067	3,923
135	21701100090000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.75	32,679	8,170	6,944	19	168	1,583	3,192	1,188	4,380
141	21500920010000	Large Lot Mixed-Use (Commercial and Multi-Family)	6.05	263,435	65,859	55,980	242	168	1,583	40,656	9,573	50,229
142	21500920020000	Large Lot Mixed-Use (Commercial and Multi-Family)	3.20	139,409	34,852	29,624	128	168	1,583	21,504	5,066	26,570
143	21500920110000	Large Lot Mixed-Use (Commercial and Multi-Family)	3.76	163,638	40,909	34,773	94	168	1,583	15,792	5,947	21,739
144	21500920080000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.33	101,464	25,366	21,561	93	168	1,583	15,624	3,687	19,311
147	21500930010000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.50	109,048	27,262	23,173	100	168	1,583	16,800	3,963	20,763
151	21501820010000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.60	69,648	17,412	14,800	64	168	1,583	10,752	2,531	13,283
152	21501820040000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.71	118,195	29,549	25,116	109	168	1,583	18,312	4,295	22,607
155	21501820170000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.67	116,490	29,122	24,754	107	168	1,583	17,976	4,233	22,209
157	21501820190000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.28	12,071	3,018	2,565	7	168	1,583	1,176	439	1,615
158	21501820160000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.87	38,103	9,526	8,097	22	168	1,583	3,696	1,385	5,081
159	21501820280000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.61	26,622	6,655	5,657	15	168	1,583	2,520	967	3,487
160	21501820320000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.31	100,564	25,141	21,370	92	168	1,583	15,456	3,655	19,111
161	21501820310000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.41	17,650	4,412	3,751	10	168	1,583	1,680	641	2,321
162	21501820220000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.30	56,799	14,200	12,070	33	168	1,583	5,544	2,064	7,608
165	21501820130000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.93	40,526	10,131	8,612	23	168	1,583	3,864	1,473	5,337
166	21501820120000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.99	86,566	21,642	18,395	50	168	1,583	8,400	3,146	11,546
167	21501820270000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.43	105,911	26,478	22,506	97	168	1,583	16,296	3,849	20,145
168	21501820110000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.72	31,434	7,858	6,680	18	168	1,583	3,024	1,142	4,166
169	21501820240000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.70	30,284	7,571	6,435	17	168	1,583	2,856	1,101	3,957

Parcel Number Key	APN	General Land Use	Gross Acres	Gross Lot SF	Gross Building SF	Building SF	Units	Residential Demand Factor (gpd)	Commercial Demand Factor (gpd)	Residential Demand (gpd)	Commercial Demand (gpd)	Total Demand (gpd)
170	21501820100000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.69	30,268	7,567	6,432	17	168	1,583	2,856	1,100	3,956
174	21801510080000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.27	11,571	2,893	2,459	7	168	1,583	1,176	421	1,597
175	21801510090000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.41	17,719	4,430	3,765	10	168	1,583	1,680	644	2,324
180	21501900110000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.52	22,725	5,681	4,829	13	168	1,583	2,184	826	3,010
182	21501900510000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.50	65,309	16,327	13,878	60	168	1,583	10,080	2,373	12,453
185	21501900530000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.21	52,689	13,172	11,196	30	168	1,583	5,040	1,915	6,955
188	21801610010000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.21	9,081	2,270	1,930	5	168	1,583	840	330	1,170
190	21801610270000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.51	65,892	16,473	14,002	61	168	1,583	10,248	2,395	12,643
191	21801610260000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.73	75,398	18,850	16,022	69	168	1,583	11,592	2,740	14,332
192	21802310010000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.34	14,973	3,743	3,182	9	168	1,583	1,512	544	2,056
384	21802310080000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.42	18,463	4,616	3,923	11	168	1,583	1,848	671	2,519
193	21802330170000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.35	15,101	3,775	3,209	9	168	1,583	1,512	549	2,061
194	21802310020000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.42	18,235	4,559	3,875	10	168	1,583	1,680	663	2,343
195	21802310030000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.47	20,688	5,172	4,396	12	168	1,583	2,016	752	2,768
198	21802310060000	Small Multi-Family	0.15	6,456			2	168		336		336
200	21802330160000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.18	7,954	1,988	1,690	5	168	1,583	840	289	1,129
201	21802330150000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.21	9,343	2,336	1,985	5	168	1,583	840	340	1,180
202	21802330140000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.19	8,325	2,081	1,769	5	168	1,583	840	303	1,143
203	21802330130000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.18	7,977	1,994	1,695	5	168	1,583	840	290	1,130
204	21802330120000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.19	8,443	2,111	1,794	5	168	1,583	840	307	1,147
207	21802810010000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.81	78,938	19,734	16,774	72	168	1,583	12,096	2,869	14,965
209	21802830060000	Small Multi-Family	0.13	5,777			2	209		418		418
210	21802830050000	Small Multi-Family	0.13	5,784			2	209		418		418
211	21802830200000	Small Multi-Family	0.13	5,791			2	209		418		418
212	21802830190000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.30	12,876	3,219	2,736	7	168	1,583	1,176	468	1,644
213	21802830010000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.51	22,181	5,545	4,714	13	168	1,583	2,184	806	2,990
225	22801740010000	Small Multi-Family	0.08	3,475			2	209		418		418
226	22801740020000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.32	13,932	3,483	2,961	8	168	1,583	1,344	506	1,850
227	22801740030000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.27	99,007	24,752	21,039	91	168	1,583	15,288	3,598	18,886
238	22802510530000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.56	111,498	27,875	23,693	102	168	1,583	17,136	4,052	21,188
239	22802510540000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.52	22,451	5,613	4,771	13	168	1,583	2,184	816	3,000
240	22802510340000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.51	22,100	5,525	4,696	13	168	1,583	2,184	803	2,987
243	24006600140000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.64	71,620	17,905	15,219	66	168	1,583	11,088	2,603	13,691
244	24006600110000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.65	28,400	7,100	6,035	16	168	1,583	2,688	1,032	3,720
245	24006600100000	Large Lot Mixed-Use (Commercial and Multi-Family)	5.42	235,978	58,994	50,145	217	168	1,583	36,456	8,576	45,032
252	24005500610000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.55	67,483	16,871	14,340	62	168	1,583	10,416	2,452	12,868
253	24005500630000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.57	68,386	17,097	14,532	63	168	1,583	10,584	2,485	13,069
258	24005500650000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.45	63,347	15,837	13,461	58	168	1,583	9,744	2,302	12,046
263	24005500530000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.08	46,999	11,750	9,987	27	168	1,583	4,536	1,708	6,244
266	24000110200000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.35	15,400	3,850	3,272	9	168	1,583	1,512	560	2,072
268	24000110280000	Small Multi-Family	0.15	6,398			2	209		418		418
271	24000110290000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.20	52,263	13,066	11,106	30	168	1,583	5,040	1,899	6,939
273	24000110320000	Small Multi-Family	0.09	4,100			2	209		418		418
275	24000110170000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.20	8,515	2,129	1,809	5	168	1,583	840	309	1,149
276	24000110370000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.38	16,387	4,097	3,482	9	168	1,583	1,512	595	2,107
301	24005500080000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.81	35,297	8,824	7,501	20	168	1,583	3,360	1,283	4,643
304	24000810120000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.51	65,567	16,392	13,933	60	168	1,583	10,080	2,383	12,463
305	24000840190000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.01	87,624	21,906	18,620	80	168	1,583	13,440	3,184	16,624
316	24004800130000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.22	9,611	2,403	2,042	6	168	1,583	1,008	349	1,357
335	24005400750000	Large Lot Mixed-Use (Commercial and Multi-Family)	2.04	88,916	22,229	18,895	82	168	1,583	13,776	3,231	17,007
344	24005400990000	Small Multi-Family	0.05	2,370			2	209		418		418

Parcel Number Key	APN	General Land Use	Gross Acres	Gross Lot SF	Gross Building SF	Building SF	Units	Residential Demand Factor (gpd)	Commercial Demand Factor (gpd)	Residential Demand (gpd)	Commercial Demand (gpd)	Total Demand (gpd)
354	24005401020000	Large Lot Mixed-Use (Commercial and Multi-Family)	1.59	69,291	17,323	14,724	64	168	1,583	10,752	2,518	13,270
355	24005401010000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.29	12,429	3,107	2,641	7	168	1,583	1,176	452	1,628
360	24005400710000	Medium Lot Mixed-Use (Commercial and Multi-Family)	1.27	55,252	13,813	11,741	32	168	1,583	5,376	2,008	7,384
365	24005400850000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.23	10,050	2,512	2,136	6	168	1,583	1,008	365	1,373
376	24005400900000	Small Multi-Family	0.15	6,743			2	209		418		418
379	24005400470000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.58	25,453	6,363	5,409	15	168	1,583	2,520	925	3,445
381	24005400460000	Medium Lot Mixed-Use (Commercial and Multi-Family)	0.31	13,298	3,324	2,826	8	168	1,583	1,344	483	1,827