

California Northstate University College of Medicine Off-Site Water Study

Prepared for:

California Northstate University

&

Sacramento County Water Agency

DRAFT SUBMITTAL

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I. INTRODUCTION

The California Northstate University College of Medicine (CNUCOM) is a private medical school located in the City of Elk Grove (City) near the intersection of Elk Grove Boulevard and Interstate 5. The California Northstate University College of Medicine has purchased neighboring parcels, and plans to redevelop them into classroom facilities. In addition, CNUCOM plans to build a 13-story hospital. Due to planned expansion of CNUCOM facilities, Wood Rodgers, Inc. (Wood Rodgers) was requested by the Sacramento County Water Agency (SCWA) to prepare an evaluation of the off-site water system based on the increased water demand and fire flow requirement.

The purposes of this report are to: 1) provide an analysis of SCWA's off-site water system to serve the expansion of CNUCOM facilities; 2) determine if the off-site system meets SCWA pressure and velocity criteria after the proposed expansion; and, 3) determine if off-site water distribution system improvements are needed.

II. PROPOSED WATER DEMANDS

Average Daily Water Demands for the proposed improvements were provided by Fong & Chan Architects. The CNUCOM water demands provided are the estimated demands after full build out of the proposed improvements, including removal of the water demands from buildings to be demolished (i.e. the net total). These demands can be seen below in **Table 1**.

Table 1 – Net Average Daily Water Demands after CNUCOM Improvement Project			
Existing Section (to remain)	Square Feet (sf)	gpd/sf	Average Water Demand (gpd)
SOM	109,800	0.2	22,000
Subtotals - Existing Sections	109,800		22,000
New Sections	Square Feet (sf)	gpd/sf	Average Water Demand (gpd)
PH1-CNUMC: Phase 1, Hospital, 12 stories above + 1 basement	596,800	0.20	111,000
PH1-CUP: Phase 1, Central Plant, 2 Stories	37,500	0.20	8,000
PH2-CNUMC: Phase 2, Hospital, East Tower Addition	136,500	0.20	27,000
PH2-Out-Patient: Phase 2, Out-Patient, 4 stories above + 1 basement	168,500	0.20	34,000
PH2-MOB: Phase 2, MOB, 5 stories above	100,000	0.20	20,000
PH2-RetailParking: Phase 2, Retail floor Estimation Only	54,400	0.15	8,000
PH3-Dorm: Phase 3, Dormitory, 5 stories above	120,000	0.15	18,000
PH3-RetailParking: Phase 3, Retail Floor Estimation Only	41,400	0.15	6,000
PH3-SOM: Phase 3, New School, 2 stories	109,800	0.20	22,000
PH3-Parking/Sport: Phase 3, Sport Floor Estimation Only	35,000	0.15	5,000
Subtotals - New Sections	1,399,900		259,000
Total CNSU Increase after Project	1,290,100		237,000

The maximum daily water demand is the highest demand expected on any given day throughout the year. Per the SCWA September 2016 Water System Infrastructure Plan Update Zone 40, the maximum daily water demand occurs in July and is to be estimated as twice the average daily demand. Given a peaking factor of 2, the maximum daily water demand after the project buildout is projected to be 474,000 gallons per day, or 330 gpm.

The fire flow requirement at the hydrants, with the proposed facilities, was confirmed by SCWA and the Cosumnes Fire Department to be 4,000 gpm, with the hospital being the critical component for the fire flow requirement. In addition to the hydrant flow, the sprinkler flow for the hospital was determined to be 1,000 gpm for indoor/standpipe/sprinkler requirements by the firm of tk1sc, the project sub-consultants who are designing the sprinklers for the buildings. The total fire flow requirement of 5,000 gpm will be evaluated under the proposed maximum daily water demand condition.

III. HYDRAULIC MODELING ANALYSIS

A. Pre-Project Condition

SCWA provided Wood Rodgers with their InfoWater hydraulic model that encompassed the area within the City of Elk Grove that serves the CNUCOM campus. The model boundaries include Interstate 5 to the west, Dwight Road to the north, the railroad tracks to the east, and the City boundary to the south. The pre-project water system is depicted in **Figure 1**.

Wood Rodgers utilized the existing SCWA hydraulic model to establish the baseline operating conditions (pressure and velocity). The existing system was modeled under a maximum daily demand scenario. Wood Rodgers confirmed with SCWA that the current primary water supply for this area is provided by two wells that pump water up to the Lakeside Water Treatment Plant (WTP) and Tank, listed in the hydraulic model as follows:

- RESERVOIR: W-075, West Taron (Elliott Ranch) Well: 9734 West Taron Drive
- RESERVOIR: W-056, Riparian Drive Well: 2623 Riparian Way

B. Post-Project Condition

Wood Rodgers utilized the hydraulic model to evaluate the proposed maximum daily demand plus fire flow condition after the completion of the proposed project. It is noted that the on-site water system improvements at the CNUCOM campus were not included in this analysis, and will be analyzed as a part of a separate study.

The 330 gpm of maximum daily water demand and the 5,000 gpm needed for fire flow identified in Section II were added at the location of the nearest node where the hospital is to be located. This is referred to as the “Proposed Maximum Daily Demand plus Fire Flow” scenario. **Figure 2** shows the location of this node, as well as the off-site pipes and nodes that are analyzed as a part of this report. Under the proposed maximum daily demand plus 5,000 gpm fire flow condition at CNUCOM, the Lakeside WTP booster pumps (5,000-gpm design point) were not able to meet this demand without added flow from other pump stations in the system. The 18,000-gpm pump station (six pumps in parallel at 3,000 gpm per pump) located at the Dwight Road Water Treatment Plant (WTP) (labeled as U-DWIGHT 1-6 in Figure 1), which was designed to meet excess demands when the Lakeside Booster Pumps reach maximum capacity, were all initially designated as closed (off) in the model. To meet the proposed maximum daily water and fire flow demands on the system, a new scenario was created that opens (turns on) two of the 3,000-gpm pumps at the Dwight Road WTP. SCWA confirmed that these pumps do serve the CNUCOM area when Reservoirs W-075 and W-056 do not meet the water demand.

The model was analyzed to determine if the existing off-site water infrastructure can supply the proposed project improvements while meeting SCWA operating criteria.

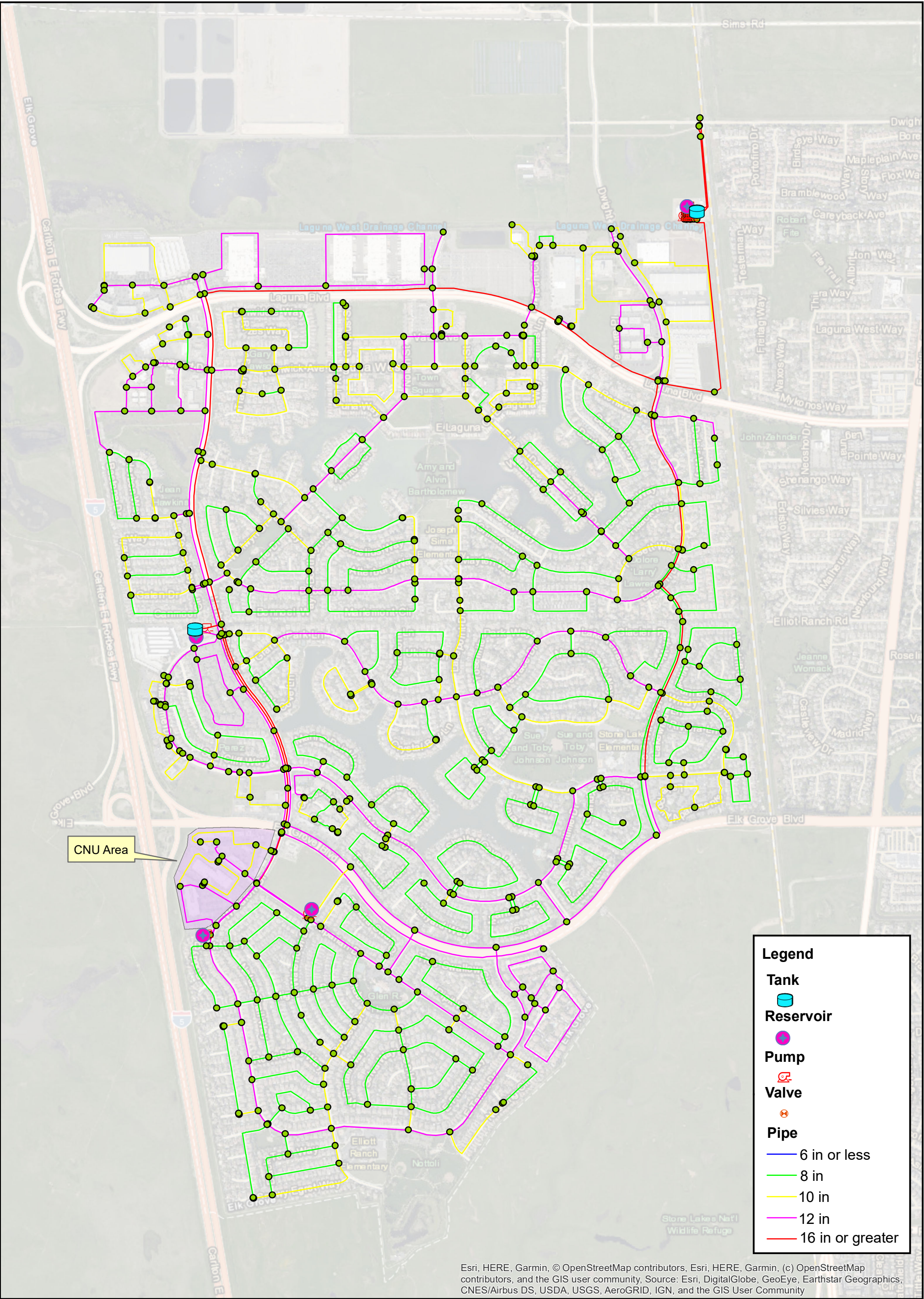
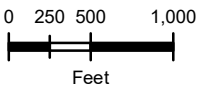


FIGURE 1
SCWA BUILDOUT INFOWATER MODEL
CNUCOM OFF-SITE WATER STUDY
ELK GROVE, CA
FEBRUARY 2020



PRELIMINARY



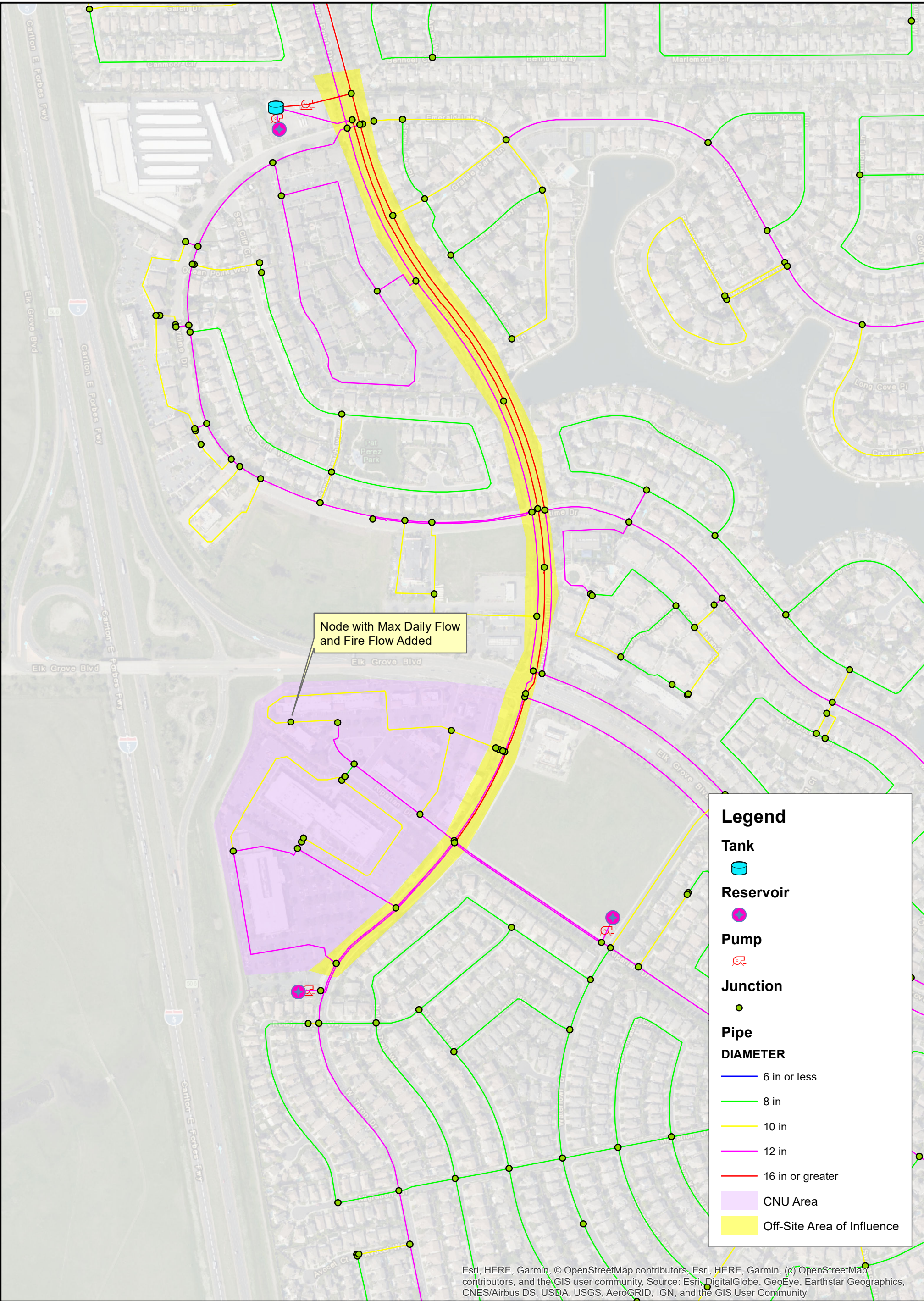



FIGURE 2
CNU AREA AND OFF-SITE AREA OF INFLUENCE
CNUCOM OFF-SITE WATER STUDY
ELK GROVE, CA
FEBRUARY 2020

02505001,000

Feet

NORTH

PRELIMINARY

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IV. HYDRAULIC MODELING RESULTS

A. Pressure Results

Pressure requirements are stated in Section 8-10A – Water Supply Pressure, of SCWA design standards, as follows;

Potable Water – Normal operating pressure in water transmission mains shall be 40 psi minimum to 90 psi maximum. Normal operating pressure in water distribution mains shall be 35 psi minimum to 90 psi maximum. The minimum pressure for domestic services, fire services, and irrigation services shall be 35 psi at the point where the service line connects to a distribution main. During periods of maximum day domestic demand plus fire demand, the pressure shall not be less than 20 psi at the location of the fire flow and no less than 10 psi elsewhere in the distribution system.

Pressure results for the pre-project (existing) maximum daily demand condition, as described in Section III, are summarized in **Table 2** and shown in **Figure 3**. Pressure results for the post-project maximum daily demand plus fire flow condition, as described in Section III, are summarized in **Table 3** and shown in **Figure 4**.

Table 2 – Pre-Project Condition Pressure Results				
Off-site Nodes				
Model ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J-388	8.9	16	109.5	40.5
J-389	5.2	14	109.4	41.4
J-390	3.1	16	109.4	40.5
J-802	14.2	16	111.1	41.2
J-984	7.6	16	111.9	41.6
J-985	0	18	111.1	40.4
J-1123	0	16	112.7	41.9
J-1126	4.3	16	112.3	41.7
J-1274	7.6	16	112.2	41.7
J-1338	20.2	18	109.8	39.8
J-1548	0	18	109.8	39.8
J-1945	4.9	16	110.4	40.9
J-1947	0	16	110.4	40.9
J-1953	0	18	109.8	39.8
J-2764	0	18	109.8	39.8
J-3532	7.6	16	110.8	41.1
J-4114	7.6	18	113.6	41.4
			min psi	39.8
			max psi	41.9
CNUCOM Nodes				
Model ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J-2760	4.7	16	109.5	40.5
J-2761	11.8	18	109.6	39.7
J-2763	7.7	16	109.5	40.5
J-2826	11.2	18	109.5	39.7
J-3444	4.6	16	109.5	40.5
J-3553	0	16	109.5	40.5
J-3554	0	16	109.5	40.5
J-3555	0	18	109.4	39.6
J-3556	0	18	109.4	39.6
J-387	0	18	109.4	39.6
J-407	9	18	109.4	39.6
			min psi	39.7
			max psi	40.5

Table 3 – Post-Project Condition Pressure Results				
Off-site Nodes				
Model ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J-388	8.9	16	125.8	47.6
J-389	5.2	14	125.6	48.4
J-390	3.1	16	125.8	47.6
J-802	14.2	16	145.3	56.0
J-984	7.6	16	149.8	58.0
J-985	0	18	145.3	55.2
J-1123	0	16	152.2	59.0
J-1126	4.3	16	151.9	58.9
J-1274	7.6	16	151.0	58.5
J-1338	20.2	18	128.3	47.8
J-1548	0	18	128.1	47.7
J-1945	4.9	16	137.7	52.8
J-1947	0	16	137.8	52.8
J-1953	0	18	128.2	47.8
J-2764	0	18	127.8	47.6
J-3532	7.6	16	141.9	54.5
J-4114	7.6	18	153.4	58.7
			min psi	47.6
			max psi	59.0
CNUCOM Nodes				
Model ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J-2760	4.7	16	123.6	46.6
J-2761	11.8	18	123.6	45.8
J-2763	7.7	16	113.6	42.3
J-2826	5,341.2	18	99.9	35.5
J-3444	4.6	16	119.8	45.0
J-3553	0	16	122.2	46.0
J-3554	0	16	122.0	45.9
J-3555	0	18	124.8	46.3
J-3556	0	18	124.8	46.3
J-387	0	18	124.8	46.3
J-407	9.0	18	124.8	46.3
			min psi	35.5
			max psi	46.6

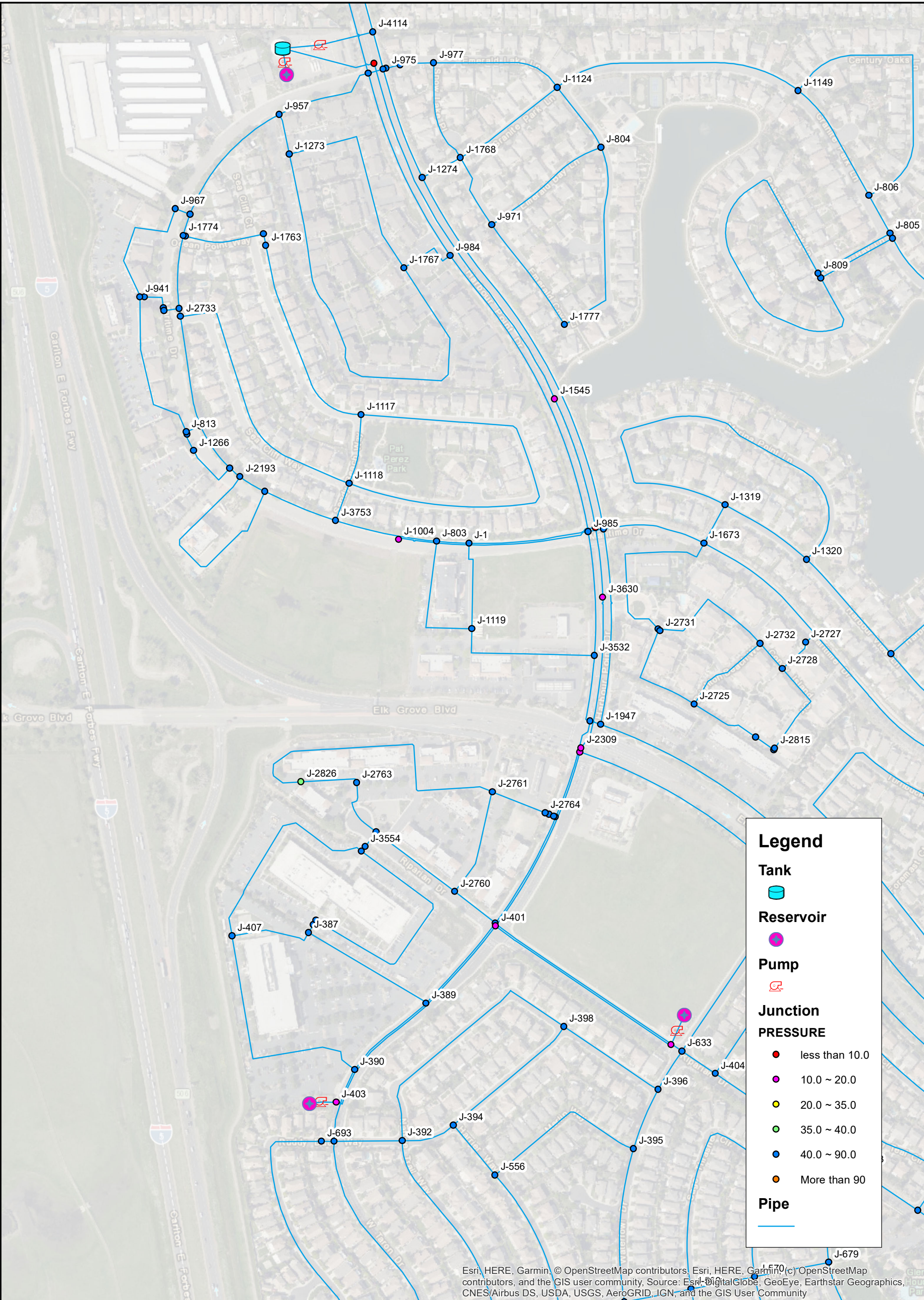



FIGURE 4
CNU POST-PROJECT CONDITION PRESSURE RESULTS
CNUCOM OFFSITE WATER STUDY
ELK GROVE, CA
FEBRUARY 2020

02505001,000

Feet

NORTH

PRELIMINARY

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B. Velocity Results

Velocity requirements are stated in Section 8-15 – Distribution Main Design, of SCWA design standards, as follows;

Velocity in distribution mains shall not exceed 7 feet per second at peak hour or 10 feet per second conveying fire flow.

Velocity results for the pre-project condition as described in Section III are summarized below in **Table 4** and shown in **Figure 5**. Velocity results for the post-project condition as described in Section III are summarized in **Table 5** and shown in **Figure 6**.

Table 4 – Pre-Project Condition Velocity Results			
Off-site Pipes			
Model ID	From Node	To Node	Velocity (ft/s)
P-1390	J-1947	J-802	1.6
P-1546	J-1126	J-984	1.2
P-1547	J-984	J-985	1.4
P-1739	J-1123	J-1126	4.5
P-1740	J-1123	J-1274	2.1
P-2045	J-1338	J-1945	2.2
P-2396	J-3532	J-985	1.4
P-2397	J-802	J-1274	1.7
P-2399	J-802	J-985	0.4
P-2856	J-1947	J-1945	0.1
P-2857	J-1953	J-1338	0.8
P-2858	J-1953	J-1548	0.8
P-3354	J-388	J-1338	1.3
P-4147	J-1548	J-2764	1.2
P-5555	J-1945	J-3532	2.1
P-5795	U-LAKESIDE	J-4114	5.9
P-5826	J-4114	J-1123	5.4
P-791	J-388	J-389	0.8
min velocity			0.1
max velocity			5.9
CNUCOM Pipes			
Model ID	From Node	To Node	Velocity (ft/s)
P-4142	J-2761	J-2760	0.8
P-4143	J-2761	J-2764	1.2
P-4144	J-2826	J-2761	0.4
P-4145	J-3444	J-2763	0.2
P-4146	J-2826	J-2763	0.4
P-4148	J-388	J-2760	0.3
P-4149	J-2760	J-3444	0.2
P-5596	J-3556	J-3553	0.3
P-5597	J-3554	J-3553	0.6
P-5598	J-407	J-3553	0.3
P-5599	J-3444	J-3554	1.0
P-5600	J-3556	J-3555	0.3
P-5601	J-387	J-3555	0.2
P-790	J-387	J-407	0.2
P-792	J-389	J-387	0.0
P-794	J-389	J-390	0.7
P-795	J-407	J-390	0.4
min velocity			0.0
max velocity			1.2

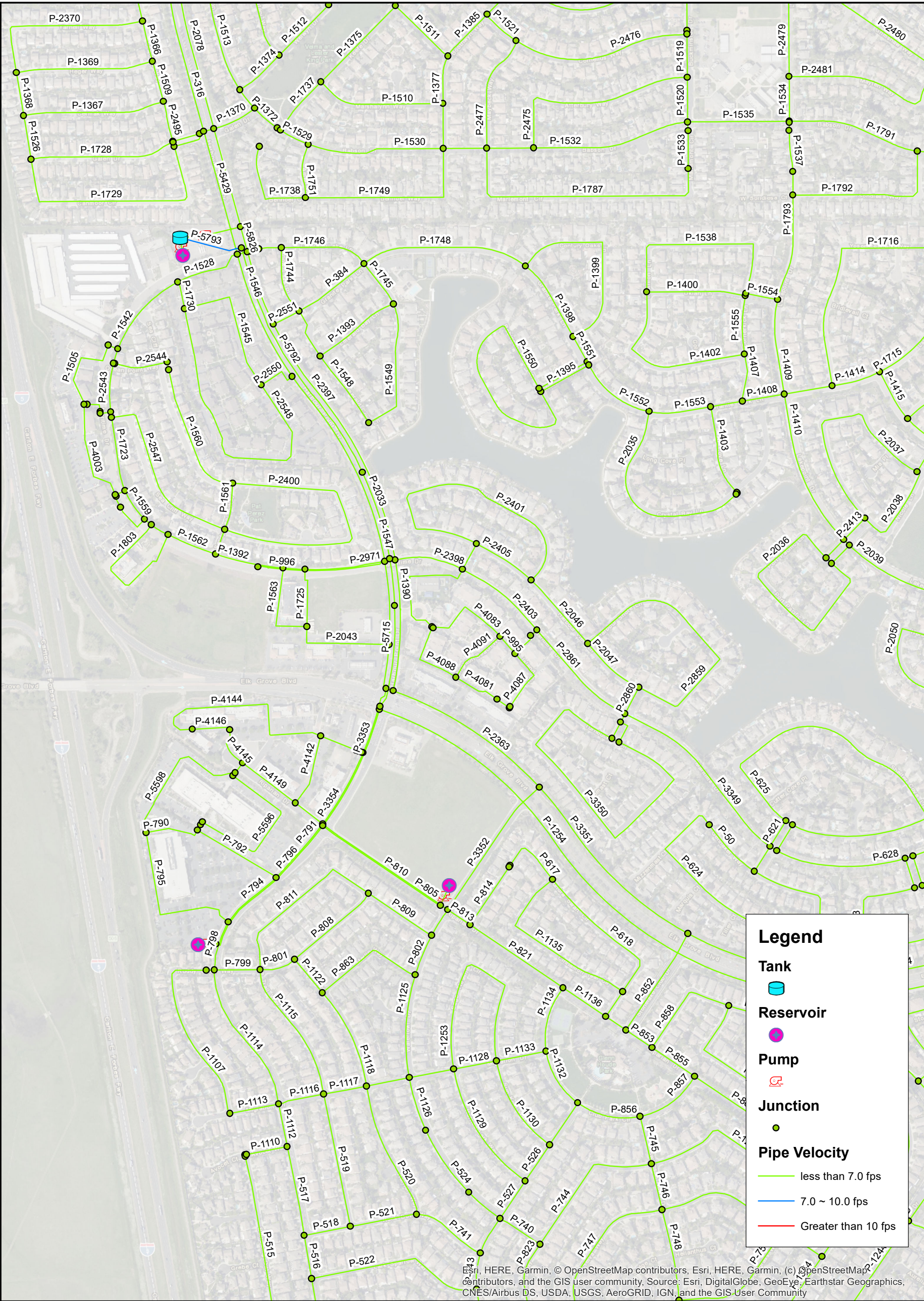
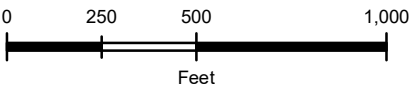


FIGURE 5
CNU PRE-PROJECT CONDITION VELOCITY RESULTS
CNUCOM OFF-SITE WATER STUDY
ELK GROVE, CA
FEBRUARY 2020



PRELIMINARY



Table 5 – Post-Project Condition Velocity Results			
Off-site Pipes			
ID	From Node	To Node	Velocity (ft/s)
P-1390	J-1947	J-802	5.9
P-1546	J-1126	J-984	2.9
P-1547	J-984	J-985	3.5
P-1739	J-1123	J-1126	4.2
P-1740	J-1123	J-1274	3.4
P-2045	J-1338	J-1945	9.5
P-2396	J-3532	J-985	5.0
P-2397	J-802	J-1274	4.2
P-2399	J-802	J-985	0.9
P-2856	J-1947	J-1945	2.0
P-2857	J-1953	J-1338	5.2
P-2858	J-1953	J-1548	5.2
P-3354	J-388	J-1338	4.2
P-4147	J-1548	J-2764	7.5
P-5555	J-1945	J-3532	7.5
P-5795	U-LAKESIDE	J-4114	3.2
P-5826	J-4114	J-1123	6.6
P-791	J-388	J-389	1.1
min velocity			0.9
max velocity			9.5
CNUCOM Pipes			
ID	From Node	To Node	Velocity (ft/s)
P-4142	J-2761	J-2760	0.3
P-4143	J-2761	J-2764	7.5
P-4144	J-2826	J-2761	7.7
P-4145	J-3444	J-2763	9.8
P-4146	J-2826	J-2763	14.1
P-4148	J-388	J-2760	6.2
P-4149	J-2760	J-3444	6.0
P-5596	J-3556	J-3553	2.6
P-5597	J-3554	J-3553	5.5
P-5598	J-407	J-3553	2.9
P-5599	J-3444	J-3554	8.5
P-5600	J-3556	J-3555	2.6
P-5601	J-387	J-3555	1.8
P-790	J-387	J-407	0.3
P-792	J-389	J-387	2.1
P-795	J-407	J-390	1.7
min velocity			0.3
max velocity			14.1

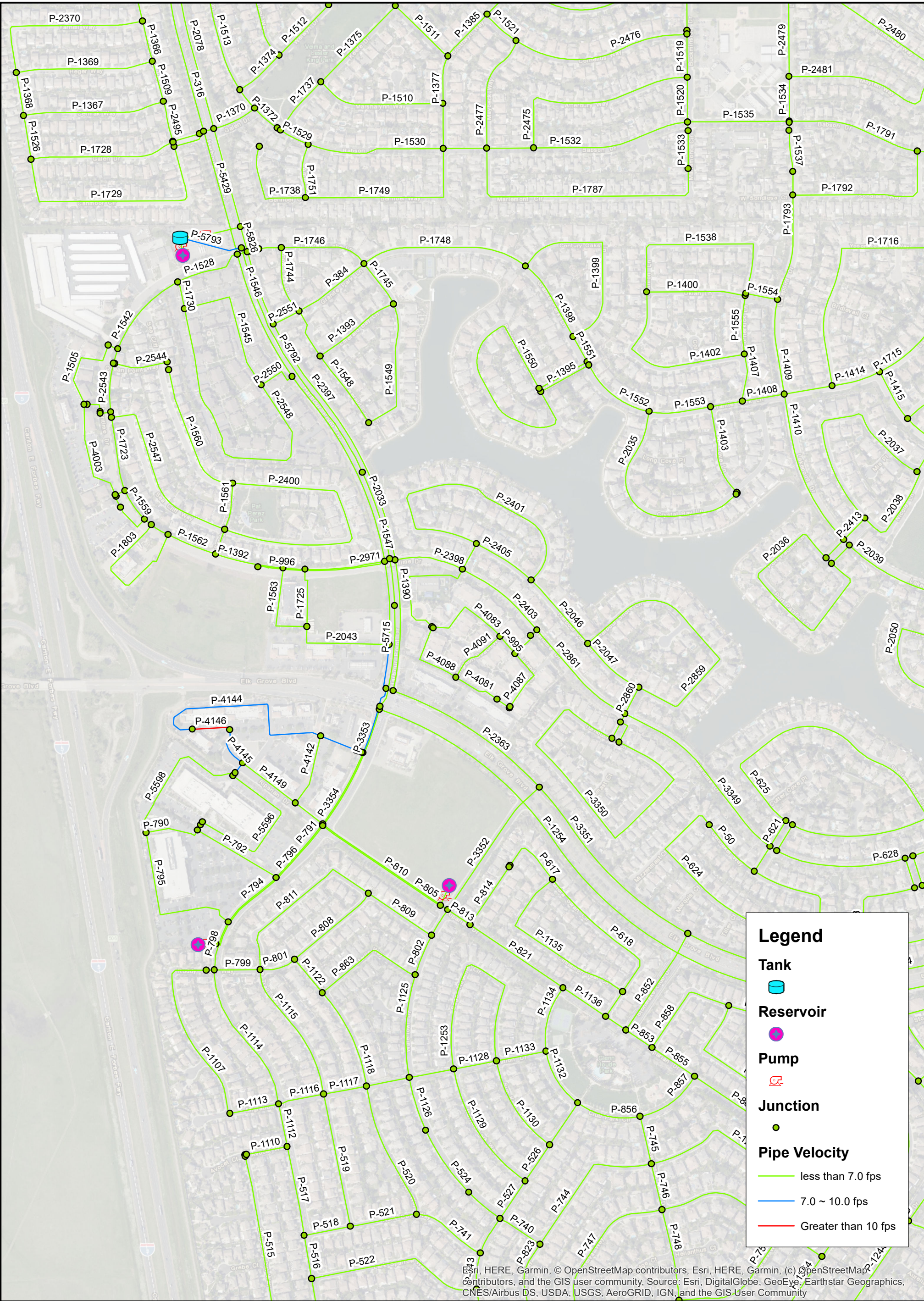


FIGURE 6
CNU POST-PROJECT CONDITION VELOCITY RESULTS
CNU OFF-SITE WATER STUDY
ELK GROVE, CA
FEBRUARY 2020

V. RECOMMENDATIONS/CONCLUSIONS

Based upon the hydraulic model results for pressure and velocity requirements, the existing off-site water distribution system can supply the proposed project maximum daily plus fire flow demand and meet the SCWA service criteria; therefore, no off-site improvements are required. It is noted that the Dwight Road WTP will need to be in operation to provide the supplemental flow needed to meet the 5,000-gpm fire flow demand. It is also noted that this analysis did not evaluate the improvements required on-site at the CNUCOM campus. It is recommended that the results are re-examined once new piping upgrades are completed on-site. This includes an examination of the on-site piping and sizing required to meet the SCWA service criteria.