Appendix P-3

Water, Recycled Water, Sewer Analysis

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FINAL TECHNICAL MEMORANDUM

To:	Karl Francis, WMWD; Derek Kawaii, WMWD
From:	Elizabeth Caliva, Dudek; Kate Palmer, Dudek; Jenny Li, Dudek
Subject:	Meridian Upper Plateau Water, Recycled Water, Sewer Development Analysis
Date:	January 18, 2023
cc:	Chris McKee, DRC Engineering; Adam Collier & Timothy Reeves, Lewis Retail Centers

1 Background, Goals & Objectives

The Riverside Service Area 2020 Facilities Master Plan (2020 FMP) for Western Municipal Water District (Western) was completed in November 2021. The 2020 FMP considered a large open space parcel in the northern portion of the service area to be developed as soccer fields, requiring recycled water service only. In 2022, a new specific plan was developed, called the Meridian West Upper Plateau (MWUP) Project for development in the near-term planning horizon, which would utilize the potable water, recycled water and sewer collection facilities of Western. No previous master plan or report had considered the impacts of the MWUP development on Western facilities. This report provides an update to the hydraulic models, applying specific water, recycled water and sewer demands and loadings based on the updated land use for the site.

The goal of this analysis is to identify the immediate and long-term project-specific needs of accommodating the MWUP development as well as determine the timing and sizing impact on the stated CIP project recommendations from the 2020 FMP. The objectives of this project include the following:

1. Update the three FMP hydraulic models with the most recent available information on the specific development plan for the MWUP development.

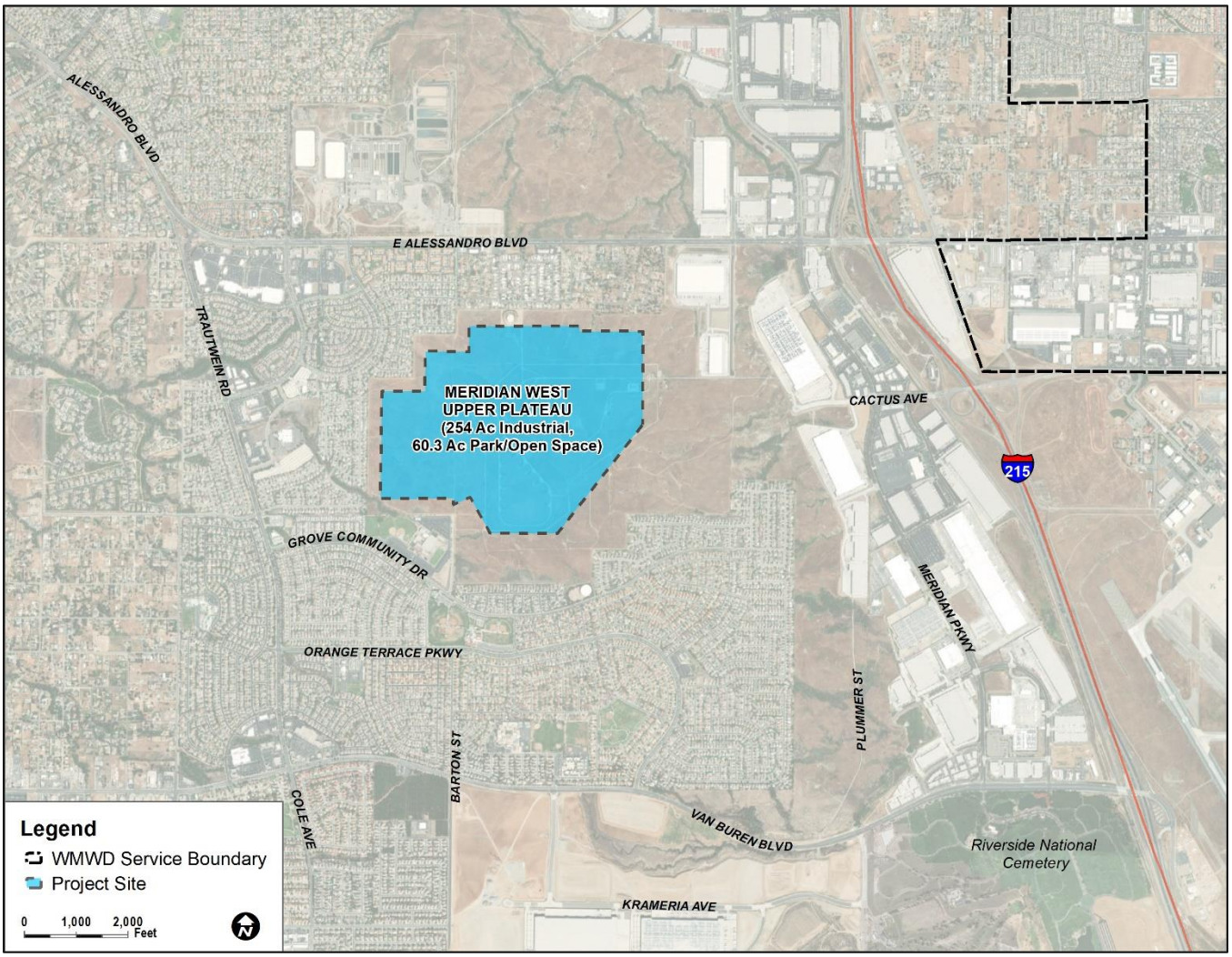
2. Determine if any improvements to the Western water, recycled water, and sewer facilities are required for immediate accommodation of the MWUP development.

3. Determine changes to recommended CIP project timing and sizing from the 2020 FMP as a result of accommodating the MWUP development.

2 Updated Land Use

The MWUP project is being developed on currently undeveloped land. In the 2020 FMP, the proposed land use type for the property was assumed to be soccer fields, with recycled water demand only. The updated proposed land use for the site includes 254 acres of Industrial and 60.3 acres of Park/Open Space. The location of the site is shown in Figure 1. Details of the site layout are included in Attachment A.

Figure 1. Location Map



3 Hydraulic Analyses

The following sections detail the potable water, recycled water and sewer analyses and results

3.1 Potable Water Analysis

The proposed MWUP project would be served by the 1900 pressure zone (PZ). The potable water hydraulic analysis includes consideration of six (6) demand scenarios:

Demand Condition	Maximum Day Demand	Maximum Day Demand + Fire Flow
Existing (2020)	Scenario 1	Scenario 2
Near Term (2030)	Scenario 3	Scenario 4
Buildout	Scenario 5	Scenario 6

Three analyses will be performed to update the potable water system results from the 2020 FMP, including a storage analysis, a distribution system analysis and a pump station analysis. **Table 1** presents the updated net water use projections for the project site used for the analyses.

Table 1. Updated Net Water Use Projections for the Project Site

Proposed Land Use	Acreage	Previous PW Demand (gpm)[1]	Proposed PW Average Day Demand (gpm)	Net ADD (gpm)	Net MDD (gpm)[2]
Industrial	254	0	352.8[3]	352.8	529.1
Park/Open Space	60.3	0	25.1[4]	25.1	37.7
			Total Net Increase in PW Demand:	**377.9**	**566.8**

Notes:
[1] In the 2020 FMP, the project site was anticipated to be developed into soccer fields in the Ultimate Buildout scenario only with no potable water demand anticipated for the site.
[2] MDD peaking factor is equal to 1.5 x ADD, per Table 3-3 of the 2020 FMP.
[3] Industrial potable water demand estimated using a water use factor of 2,000 gpd/acre.
[4] Park/Open Space potable water demand estimated using a water use factor of 600 gpd/acre.

3.1.1 Storage Analysis

Using the demand values from Table 1, an updated storage analysis was performed for the 1900 PZ. The results of the storage analysis for Existing, Near-Term and Buildout are presented in **Table 2**.

Table 2. Potable Water Storage Analysis for 1900 PZ

						Fire Storage				
Scenario	Pressure Zone	Existing Storage (MGD)	MDD (MGD)	Equalization 25% MDD (MG)	Emergency 100% MDD (MG)	Fire Flow (gpm)	Duration (hours)	Total (MGD)	Total Required (MG)	Surplus/ (Deficit) (MG)
Existing (2020)[1]	1900	13.6	6.75	1.69	6.75	3,000	3	0.54	8.98	4.63
Existing (2020) + MWUP	1900	13.6	7.57	1.89	7.57	4,000	4	0.96	10.42	3.18
Near-Term (2030) [2]	1900	13.6	8.75	2.19	8.75	3,000	3	0.54	11.48	2.12
Near-Term (2030) + MWUP	1900	13.6	9.57	2.39	9.57	4,000	4	0.96	12.92	0.68
Ultimate[3]	1900	13.6	10.96	2.74	10.96	3,000	3	0.54	14.24	(0.63)
Ultimate + MWUP	1900	13.6	11.78	2.94	11.78	4,000	4	0.96	15.68	(2.08)

Notes:

[1] Data from Table 6-1 of the 2020 FMP.

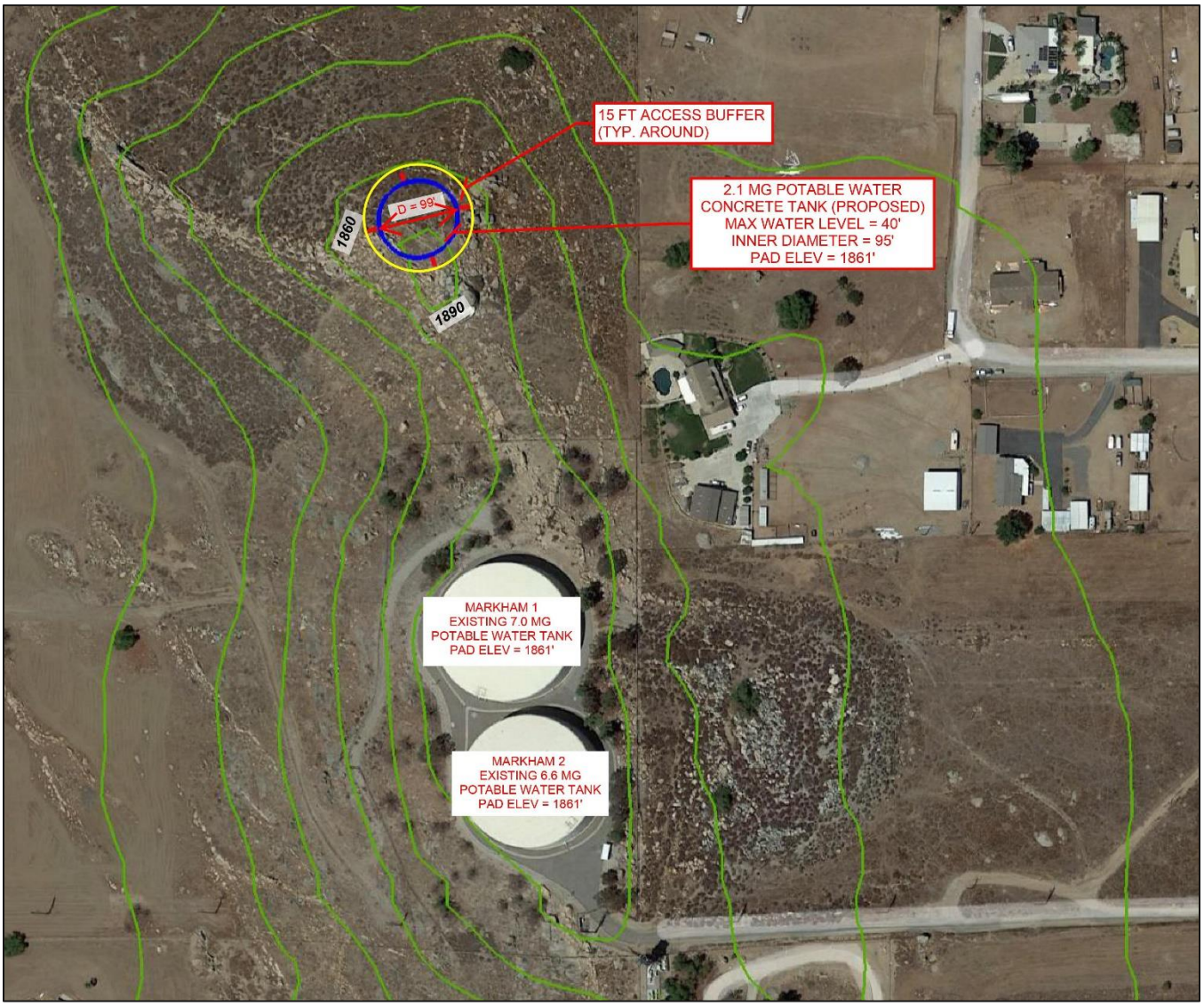
[2] Data from Table 6-4 of the 2020 FMP.

[3] Data from Table 6-6 of the 2020 FMP.

The above results indicate that there is sufficient storage anticipated in the Existing and Near-Term scenarios to accommodate the new MWUP development. However, the Ultimate Buildout scenario was previously anticipating a storage deficit in the 2020 FMP that would be further exacerbated by the MWUP development. The resulting storage deficit anticipated for Ultimate Buildout is increased to 2.08-MG, an increase of 1.45-MG from the 2020 FMP analysis, as a result of the new demands anticipated by the MWUP development.

Potential siting of a new 2.1-MG tank was evaluated as part of this study. **Figure 2** presents a potential location north of the existing Markham Tanks. Constructability would need to be addressed; location shown for potential siting purposes only.

Figure 2. Potential Siting of New 2.1-MG Reservoir for 1900 PZ



There are options to reduce storage needs, such as using reservoir management systems (RMSs) to maximize tank levels to minimize equalization volume requirements; however, this would require increased pumping during high

time of use (TOU) hours. Western is exploring purchasing Tesla batteries for energy during high TOU times and this may be an option to consider for this application as well in an effort to use RMS to reduce equalization storage needs while also reserving pumping times for low TOU rate hours (overnight).

3.1.2 Distribution System Analysis

A MDD of 566.8 gpm was point loaded on model junction ID N512 at the intersection of Grove Community Drive and Deercreek Drive, which is the anticipated tie-in of the MWUP development to Western's potable water system to the 1900PZ. The parallel 12-inch piping considered by the developer for this tie-in location was not added to the model as it is anticipated one of the lines is for backup supply in case of a line break of the primary supply line. A 24-hour extended period simulation (EPS) was run in the model for MDD and MDD plus fire flow for the Existing (2020), Near-Term (2030) and Ultimate Buildout scenarios and results compared to District evaluation criteria, including a minimum service pressure of 40 psi during MDD, minimum residual pressure of 20 psi during fire flow, and a maximum pipeline velocity of 7.5 fps during either condition. The Near-Term and Buildout modeling scenarios included the improvements recommended as part of the 2020 FMP.

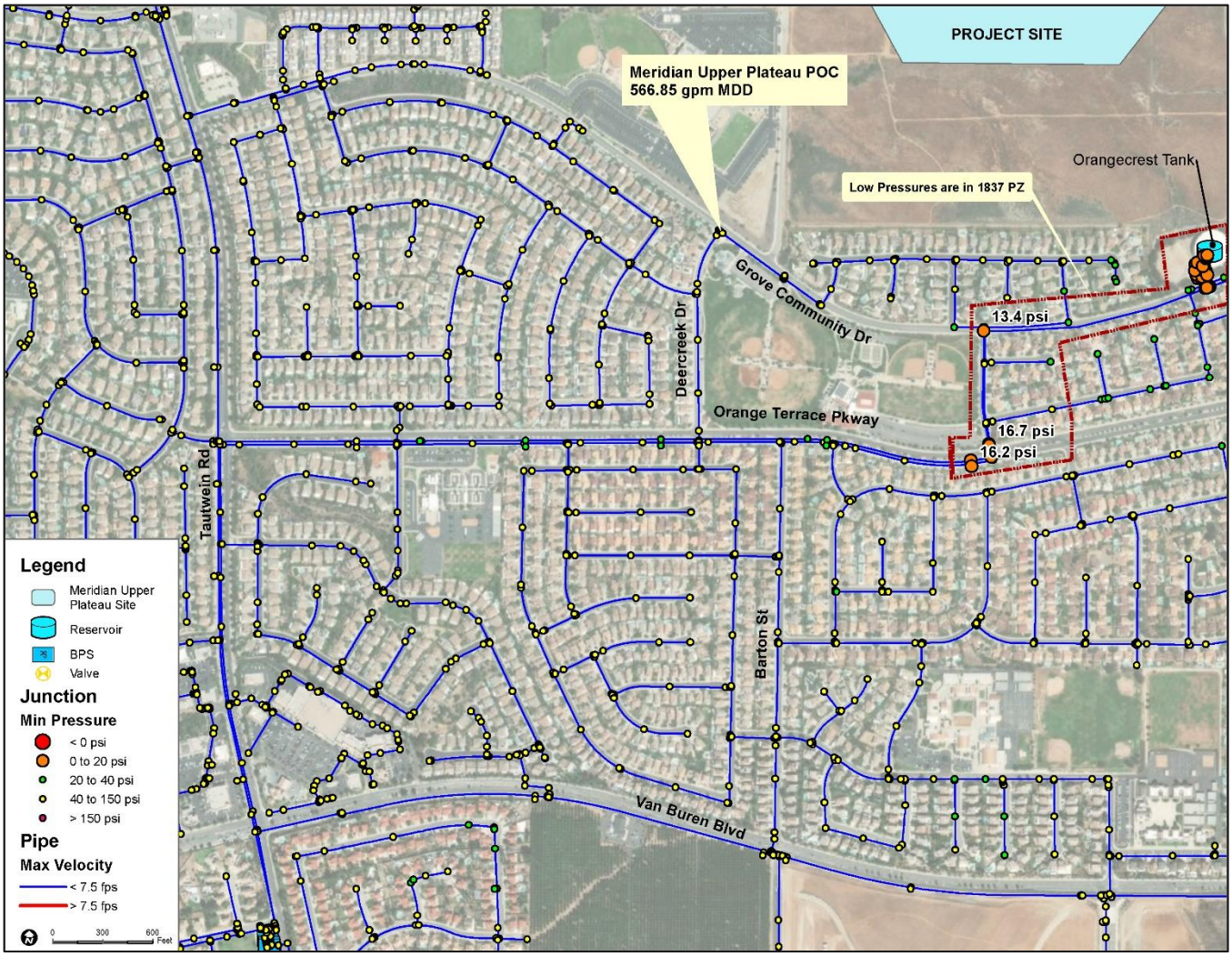
The goal of this analysis was to (1) identify what improvements the developer would need to construct as part of the initial MWUP development for potable water service within District criteria and (2) identify if any previously recommended projects from the master plan become triggered for earlier construction due to the additional demand of the development.

The following subsections provide the results of each scenario.

3.1.2.1 Scenario 1: Existing MDD

The existing MDD scenario results indicated that the 1900 PZ could accommodate the additional demand for the MWUP within design criteria. Minimum service pressure and maximum pipeline velocities are shown graphically on **Figure 3**. Note, the low pressures seen in Figure 4 southwest of the existing Orangecrest Tank are within the 1837 pressure zone and are unrelated to the MWUP development project.

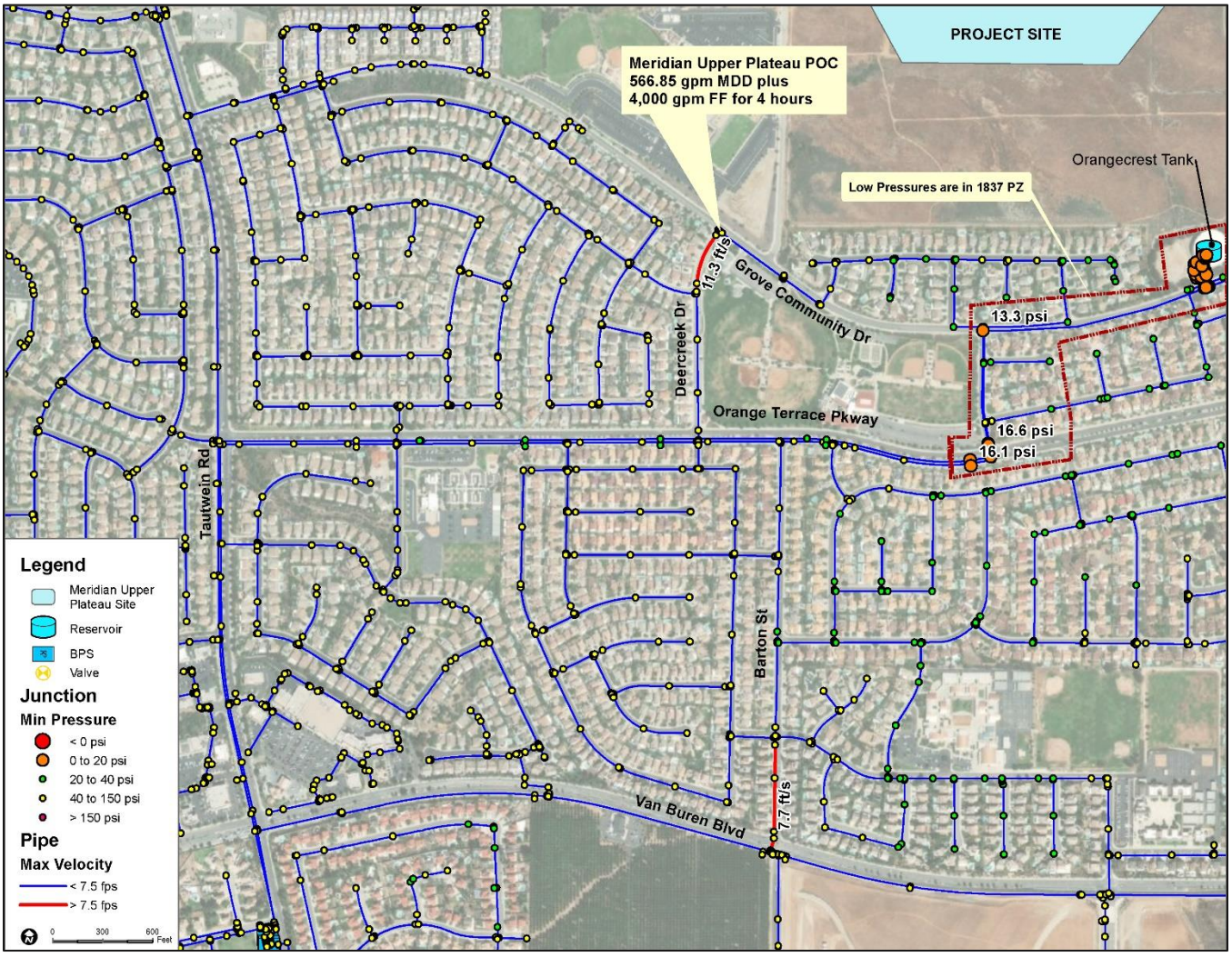
Figure 3. Potable Water Existing (2020) with MWUP – MDD Minimum Pressures and Maximum Velocities



3.1.2.2 Scenario 2: Existing MDD plus Fire Flow

The existing MDD plus fire flow scenario results indicates two pipelines within the 1900 PZ are anticipated to exceed Western maximum pipeline velocity requirements, as shown graphically on **Figure 4**. The model indicated the existing 12-inch pipeline at the tie-in location is anticipated to have maximum pipeline velocities in excess of 11 fps. Additionally, an existing 12-inch pipeline in Barton Street north of Van Buren Blvd is anticipated to have maximum velocities during fire flow at 7.7 fps, which exceeds the district criteria of 7.5 fps.

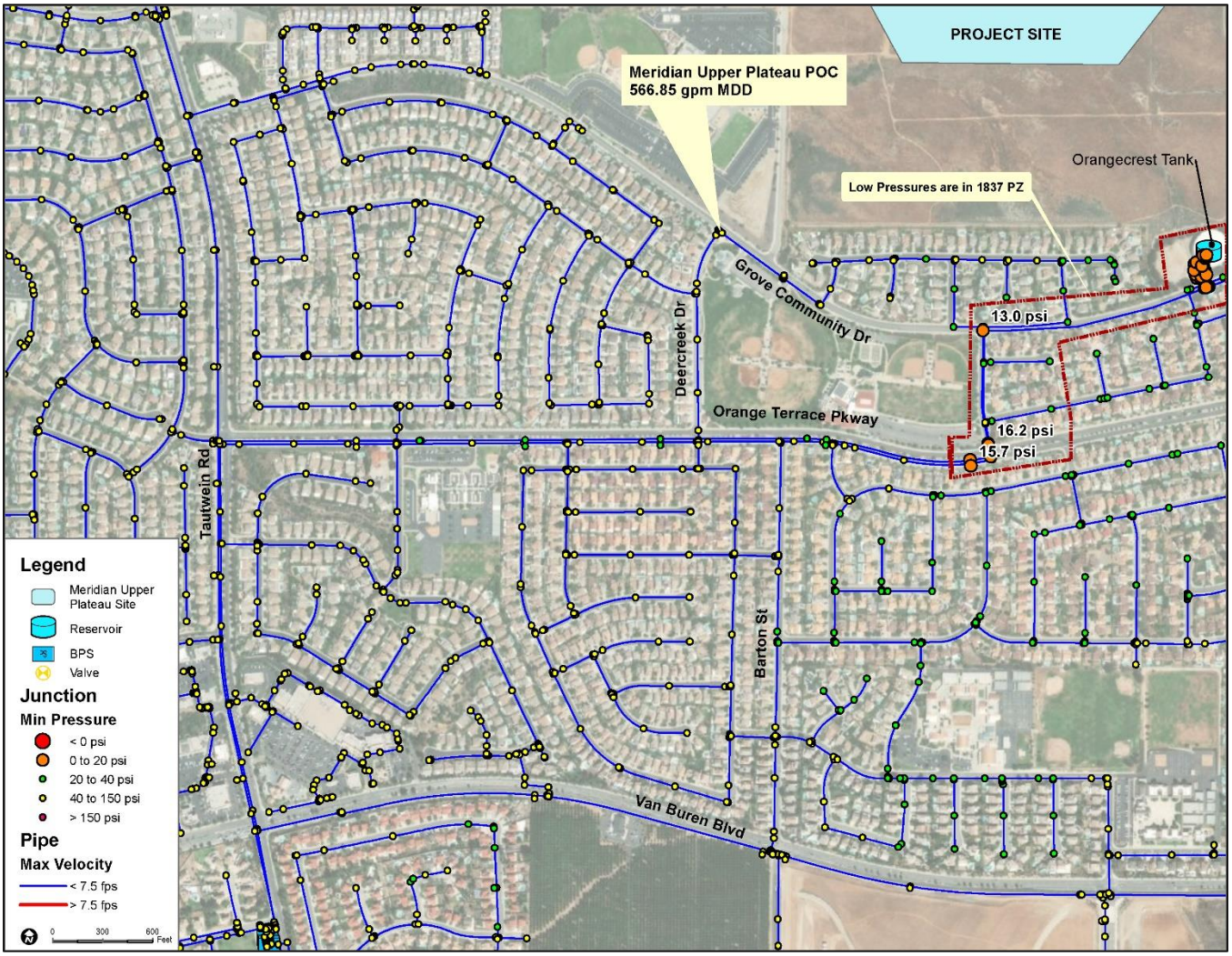
Figure 4. Existing (2020) with MWUP – MDD plus Fire Flow Minimum Pressures and Maximum Velocities



3.1.2.3 Scenario 3: Near-Term MDD

Under the Near-term MDD demand scenario, no potable water facilities are anticipated to exceed Western criteria, as shown in **Figure 5**. Note, the low pressures seen in Figure 4 are within the 1837 pressure zone and are unrelated to the MWUP development project.

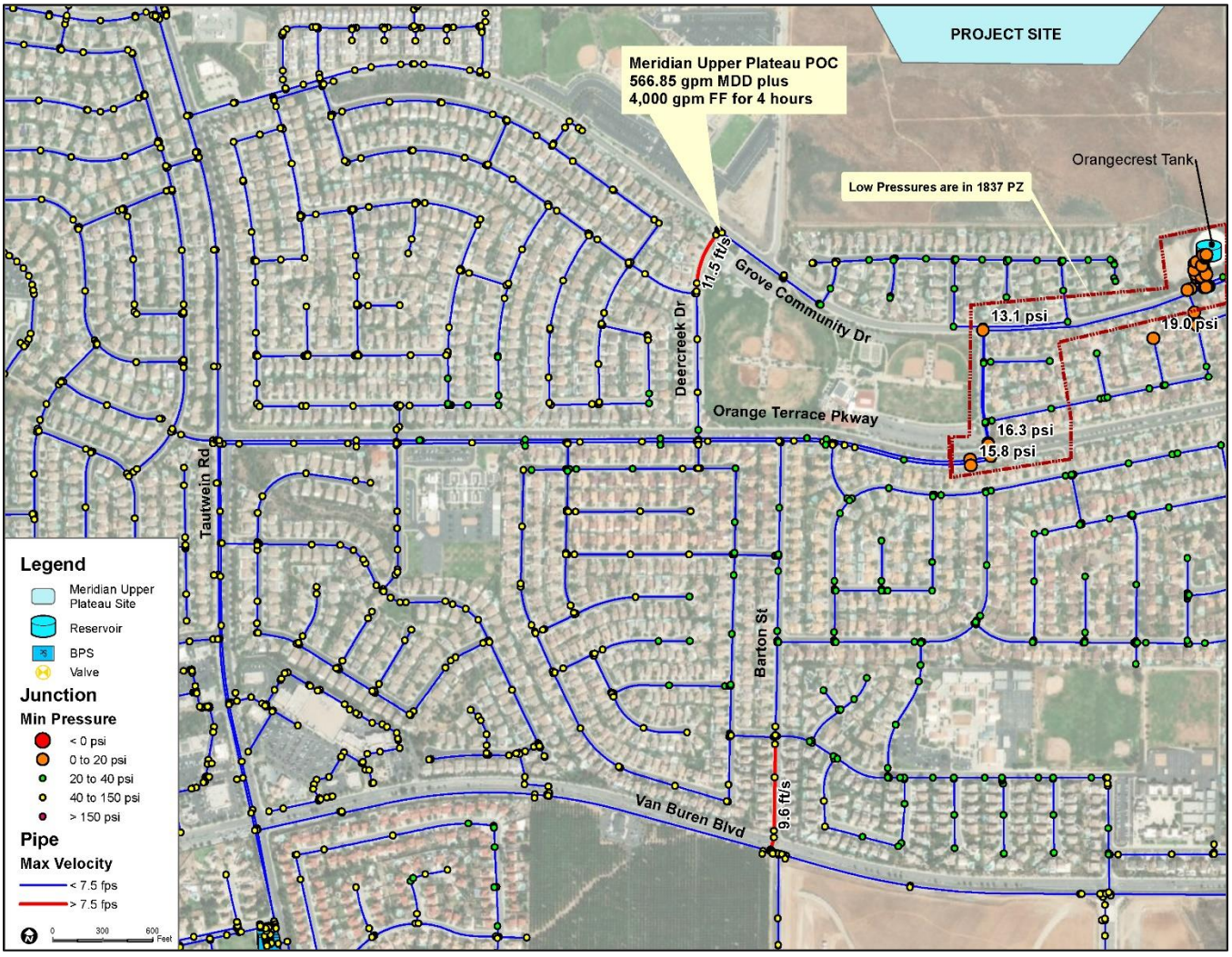
Figure 5. Potable Water Near-Term (2030) with MWUP – MDD Minimum Pressures and Maximum Velocities



3.1.2.4 Scenario 4: Near-Term MDD plus Fire Flow

The Near-Term MDD plus fire flow scenario results indicates two pipelines within the 1900 PZ are anticipated to exceed Western maximum pipeline velocity requirements, as shown graphically on **Figure 6**. The model indicated the existing 12-inch pipeline at the tie-in location is anticipated to have maximum pipeline velocities in excess of 11 fps. Additionally, an existing 12-inch pipeline in Barton Street north of Van Buren Blvd is anticipated to have maximum velocities during fire flow at approximately 9.6 fps.

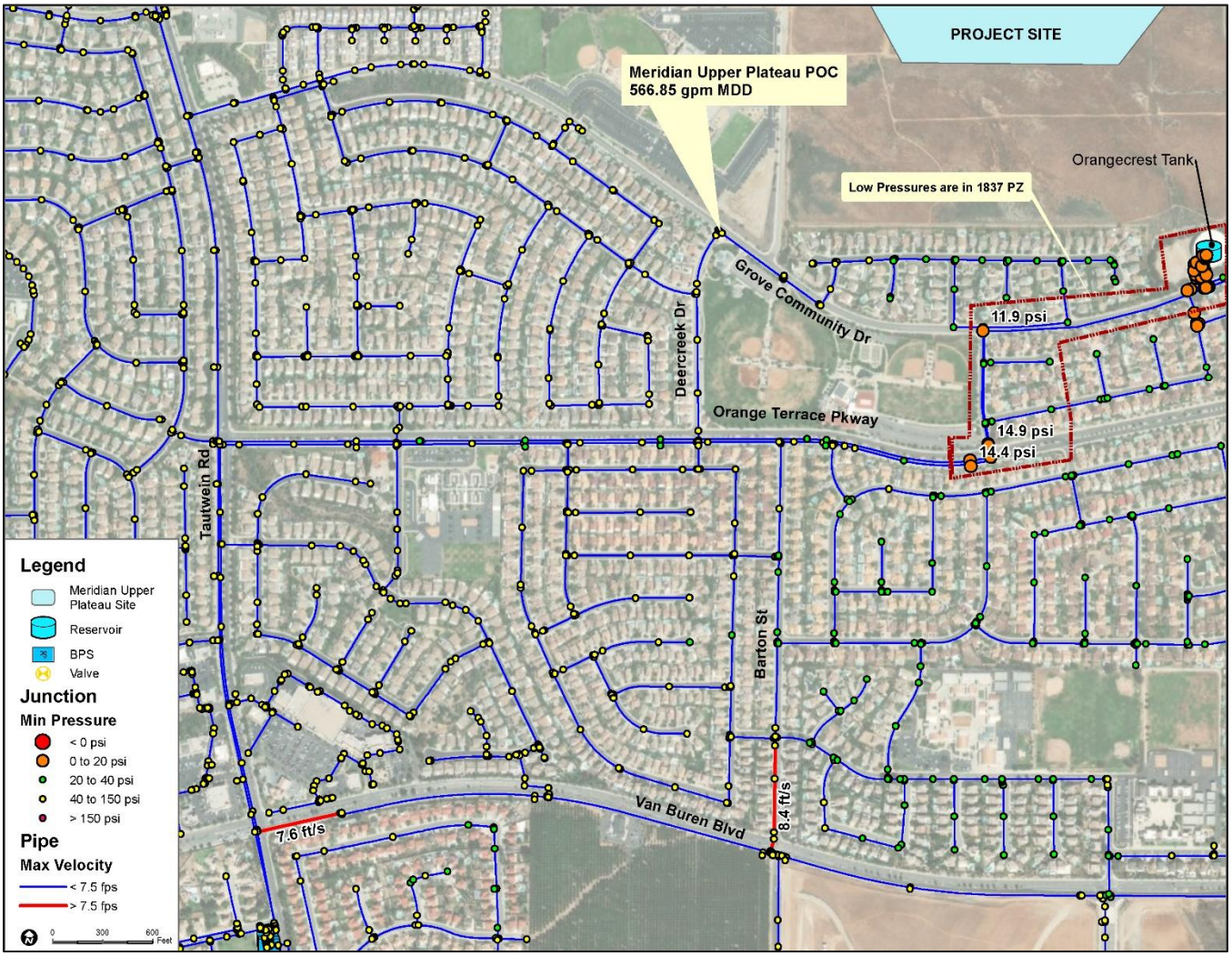
Figure 6. Near-Term (2030) with MWUP – MDD plus FF Minimum Pressures and Maximum Velocities



3.1.2.5 Scenario 5: Ultimate Buildout MDD

The Ultimate Buildout MDD scenario results indicate two pipelines within the 1900 PZ are anticipated to exceed Western maximum pipeline velocity requirements, as shown graphically on **Figure 7**. The model indicated the existing 12-inch pipeline in Barton Street north of Van Buren Blvd is anticipated to have maximum velocities during fire flow at approximately 8.4 fps. Additionally, an existing 18-inch pipeline in Van Buren Blvd just east of Tautwein Road is anticipated to slightly exceed the maximum velocity requirement of 7.5 fps.

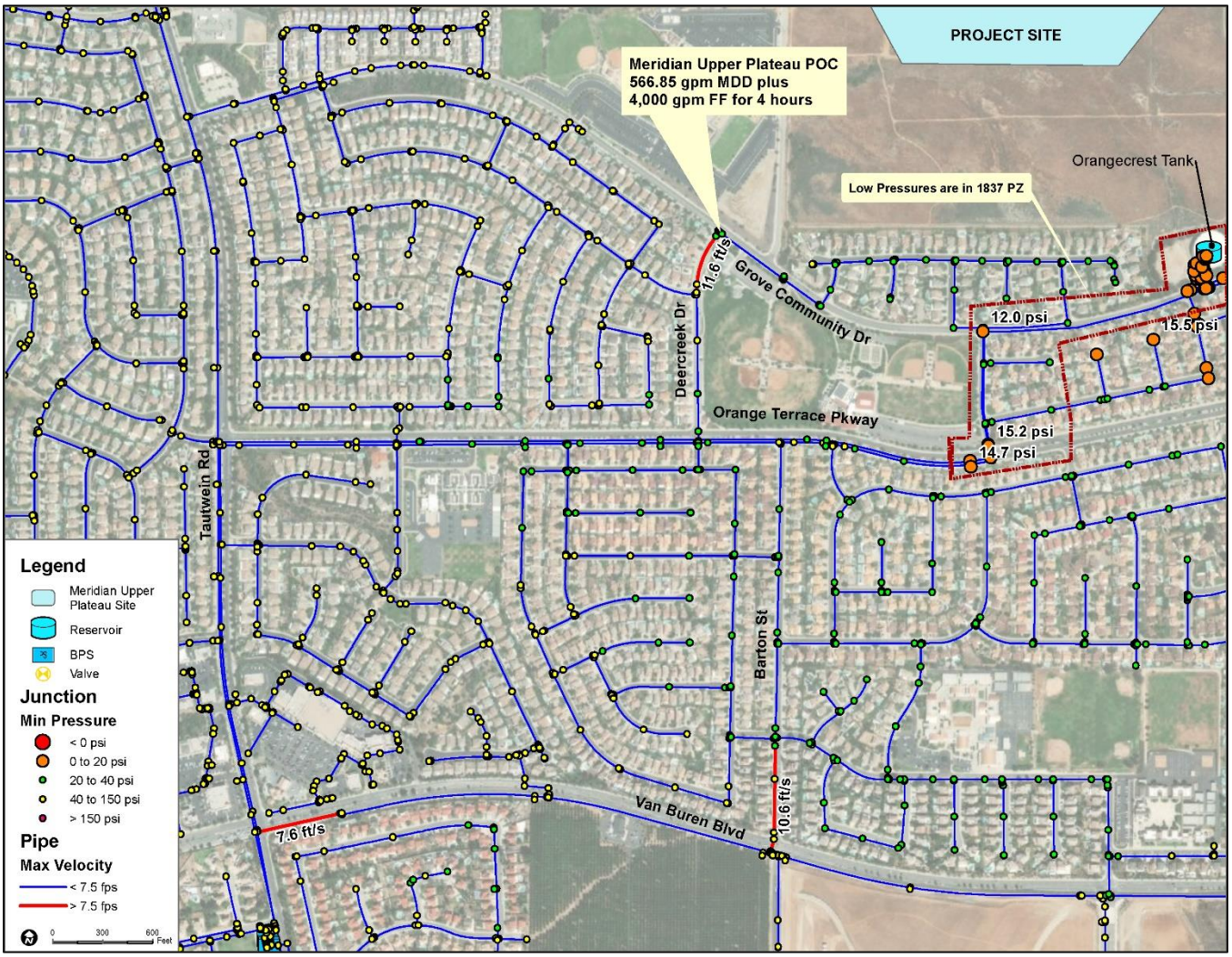
Figure 7. Ultimate Buildout with MWUP – MDD Minimum Pressures and Maximum Velocities



3.1.2.6 Scenario 6: Ultimate Buildout MDD plus Fire Flow

The Ultimate Buildout MDD plus fire flow scenario results indicates three pipelines within the 1900 PZ are anticipated to exceed Western maximum pipeline velocity requirements, as shown graphically on **Figure 8**. The model indicated the existing 12-inch pipeline at the tie-in location is anticipated to have maximum pipeline velocities in excess of 11 fps. An existing 12-inch pipeline in Barton Street north of Van Buren Blvd is anticipated to have maximum velocities in excess of 10 fps. Additionally, the existing 18-inch pipeline in Van Buren east of Tautwein Road is anticipated to slightly exceed the maximum velocity requirement of 7.5 fps.

Figure 8. Ultimate Buildout with MWUP – MDD plus FF Minimum Pressures and Maximum Velocities



3.1.2.7 Results with Improvements

System improvements were evaluated to maintain facilities within Western design criteria under MDD plus fire flow conditions for the Existing (2020), Near-Term (2030) and Ultimate Buildout demand scenarios. The following improvements are recommended for the potable water system:

- Upsize 1,300 LF of 12-inch on Deercreek Drive to 16-inch
- Upsize 700 LF of 12-inch on Barton St to 20-inch
- Upsize 600 LF of existing 18-inch on Van Buren Blvd to 20-inch (scenarios 2030 and Buildout only)

The results of the system analyses with improvements are shown in **Figures 9**, **10** and **11**.

Figure 9. Existing (2020) with MWUP – MDD plus Fire Flow with Improvements

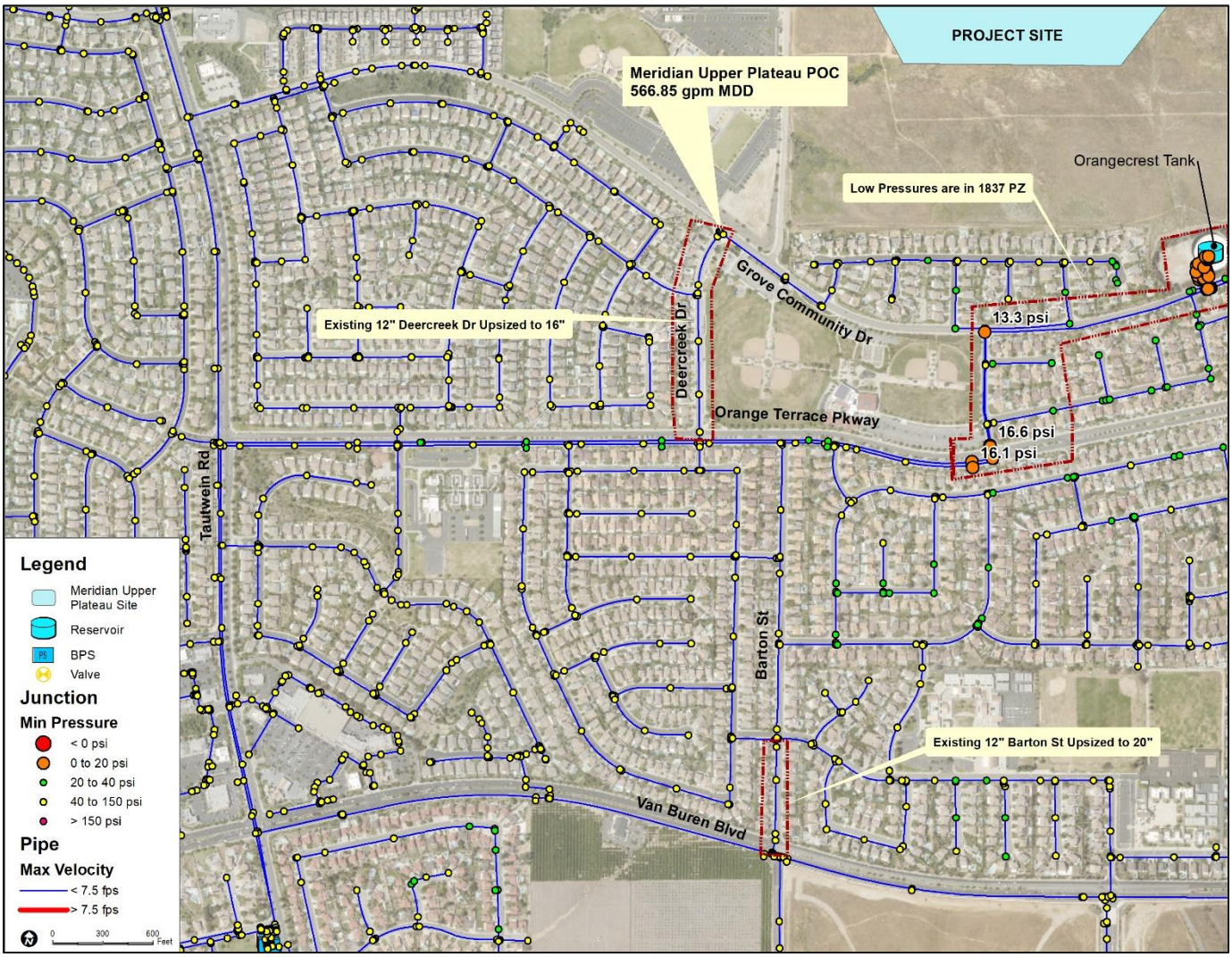


Figure 10. Near-Term (2030) with MWUP – MDD plus FF with Improvements

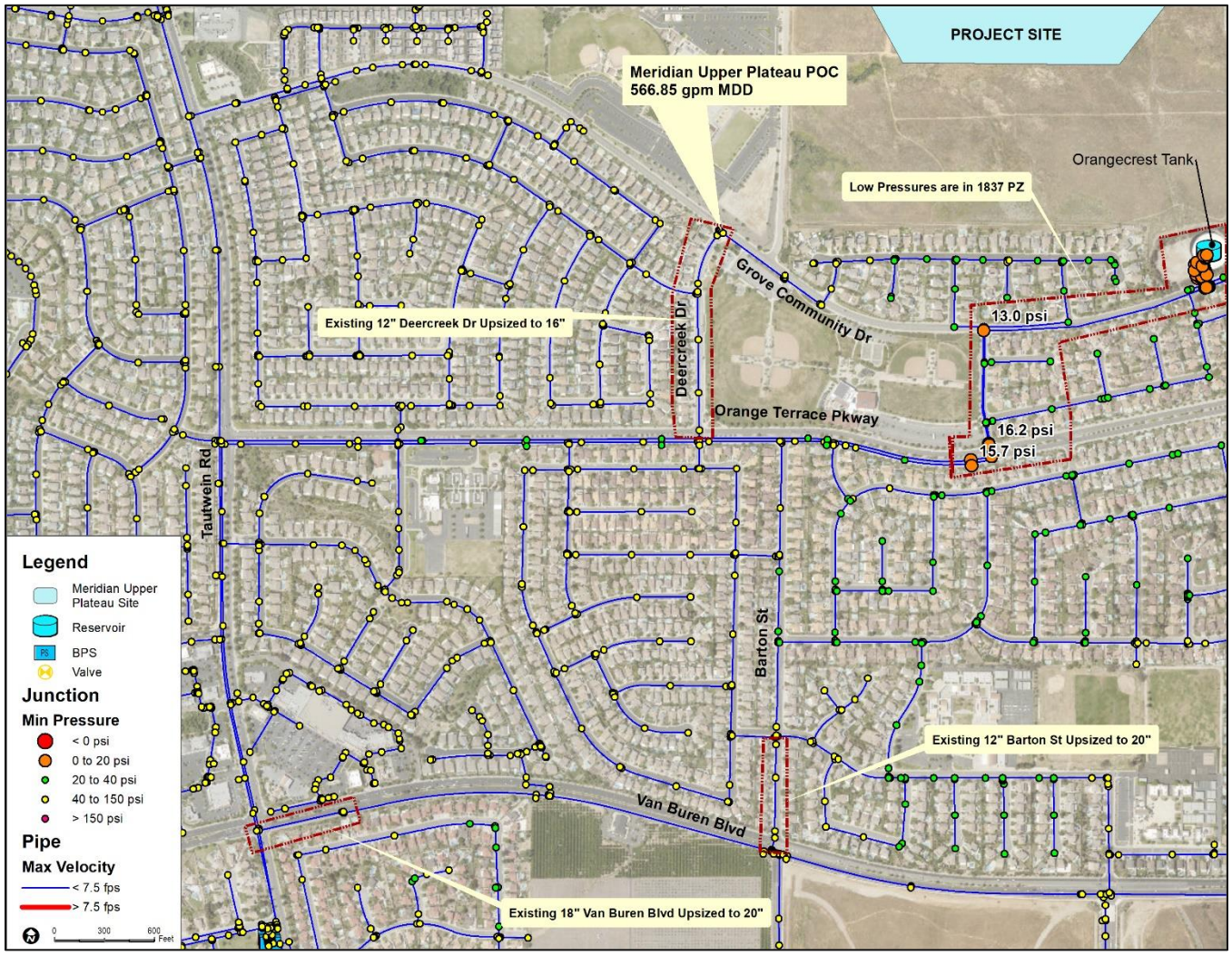
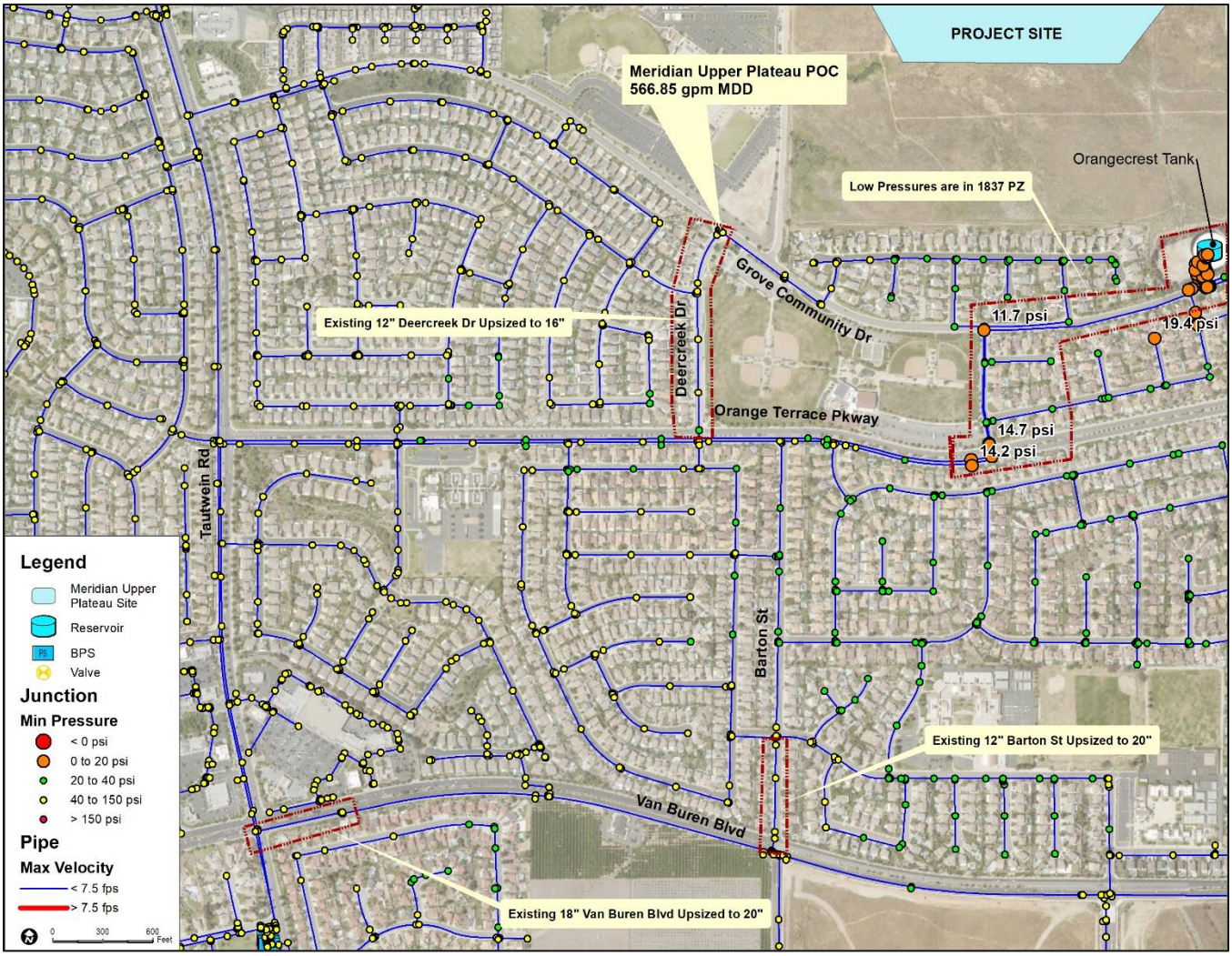


Figure 11. Ultimate Buildout with MWUP – MDD plus FF with Improvements



3.1.3 Potable Water Pump Station Analysis

An updated pump station analysis was performed for the Bergamont Pump Station, which supplies the 1900PZ from the 1837 PZ. The pump station currently has four (4) pumps with a total pumping capacity of 18,900 gpm and a firm capacity (largest pump out of service) of 12,000 gpm. The design criteria for potable water pump stations requires that the firm pumping capacity meet the MDD for each pressure zone. As shown in **Table 3**, the results of the analysis indicate that the Bergamont Pump Station is anticipated to have sufficient capacity to accommodate the MWUP through Buildout with no improvements required.

Table 3. Potable Water Pump Station Analysis for the 1900PZ

Scenario	Pressure Zone	Zone MDD (MGD)	Zone MDD (gpm)	Bergamont Firm Capacity (gpm)1	Surplus (gpm)
Existing (2020)	1900	6.75	4,700	12,000	7,300
Existing (2020) + MWUP	1900	7.57	5,300	12,000	6,700
Near-Term (2030)	1900	8.75	6,100	12,000	5,900
Near-Term (2030) + MWUP	1900	9.57	6,600	12,000	5,400
Ultimate	1900	10.96	7,600	12,000	4,400
Ultimate + MWUP	1900	11.78	8,200	12,000	3,800

Notes:
[1] Assumes largest pump out of service. Value from Table 6-3 of the 2020 FMP.

3.1.4 Potable Water Analysis Summary

The results of the potable water analysis indicate that several existing waterlines are anticipated to exceed Western evaluation criteria with the addition of the MWUP demand. The following water system pipeline improvements are recommended to maintain maximum waterline velocities below the design criteria of 7.5 fps.

The following potable water improvements are required to accommodate the immediate construction of the MWUP development:

- Upsize 1,300 LF of 12-inch on Deercreek Drive from Grove Community Drive to Orange Terrace Parkway to 16-inch.
- Upsize 700 LF of 12-inch on Barton St north of Van Buren to 20-inch.

The following are additional future (2030 and Buildout) potable water system recommendations not previously included in the 2020 FMP necessary to accommodate the MWUP development:

- Upsize 600 LF of existing 18-inch on Van Buren Blvd east of Tautwein Rd to 20-inch (for future scenarios 2030 and Buildout only).
- Accommodate increased deficit of 1.45-MG in Ultimate Buildout demand condition due to the MWUP development demands.

3.2 Recycled Water Analysis

The MWUP project is proposed to be served by the 1815 PZ. The recycled water hydraulic analysis includes maximum day demand (MDD) be evaluated for the Existing (2020), Near-Term (2030) and Buildout scenarios. Three analyses will be performed to update the recycled water system results from the 2020 FMP, including a storage analysis, a distribution system analysis, and a pump station analysis. **Table 4** presents the updated net recycled water use projections for the project site used for the analyses.

Table 4. Updated Net Recycled Water Use Projections for the Project Site

Proposed Land Use	Acreage	Previous RW Demand (gpm)[1]	Proposed RW Average Day Demand (gpm)	Net ADD Increase (gpm)	Net MDD Increase (gpm)[2]
Industrial	254	0	39.7[4]	39.7	99.2
Park/Open Space	78.1[3]	45.8	72.9[5]	27.1	67.9
			Total Net Increase in RW Demand:	**66.8**	**167.1**

Notes:

[1] In the 2020 FMP, the project site was anticipated to be developed into 30 acres of soccer fields in the Buildout scenario only.

[2] MDD peaking factor is equal to 2.5 x ADD, per Table 3-11 of the 2020 FMP.==

[3] This acreage value varies from the Park/Open Space acreage values for potable water and sewer because it includes some Landscape and Lighting Maintenance District (LLMD) areas (slope/landscape areas/maintenance roads) that would not have development but would have landscaping requiring a recycled water demand.

[4] Industrial recycled water demand estimated using a water use factor of 225 gpd/acre. Note: the water use factor provided by the developer used during the West Campus study in 2017/2018, which was 450 gpd/acre for Industrial for maximum month. The maximum month peaking factor in the 2020 FMP for recycled water is 2.0. Therefore, the average day demand water use factor assumed herein is 225 gpd/acre.

[5] Park/Open Space recycled water demand estimated using a water use factor of 1,345 gpd/acre. Note: the water use factor provided by the developer used during the West Campus study in 2017/2018, which was 2,690 gpd/acre for Park/Open Space for maximum month. The maximum month peaking factor in the 2020 FMP for recycled water is 2.0. Therefore, the average day demand water use factor assumed herein is 1,345 gpd/acre.

3.2.1 Storage & Siting Analysis

As discussed in the 2020 FMP, recycled storage in the 1815 PZ is currently in deficit by approximately 2.4MG. As a part of development, the MWUP project will be constructing a temporary bolted steel reservoir to accommodate the storage required for their development. Per the 2020 FMP, required recycled water storage is equal to one MDD. Therefore, the required storage for the MWUP is a minimum of 0.41-MG.

Two sites were proposed for the tank, including one site with a pad elevation of 1734 ft within the development and the existing Orangecrest site, with a pad elevation of 1799 ft. It was assumed a bolted steel tank with a maximum height of 32-ft would be constructed for the temporary storage. The site with the pad elevation of 1734-ft is unable to match the HGL of the existing Lurin Tank of 1815 ft. Therefore, the Orangecrest site is the preferred site for the temporary storage tank. In discussion with Western and the Developer, a tank with a diameter of 53.5 feet and maximum depth of 30 feet (total volume 0.5-MG) was assumed for the hydraulic analysis.

Using the updated recycled water demand values from Table 3, an updated storage analysis was performed for the 1815 PZ. The results of the storage analysis for Existing, Near-Term and Buildout are presented in **Table 5**. Note that the "Existing Storage" column for the Existing + MWUP scenario includes the temporary 0.5-MG tank constructed as part of the MWUP project. The Results indicate that the storage deficit predicted for the Ultimate Buildout demand condition will be exacerbated by the MWUP project.

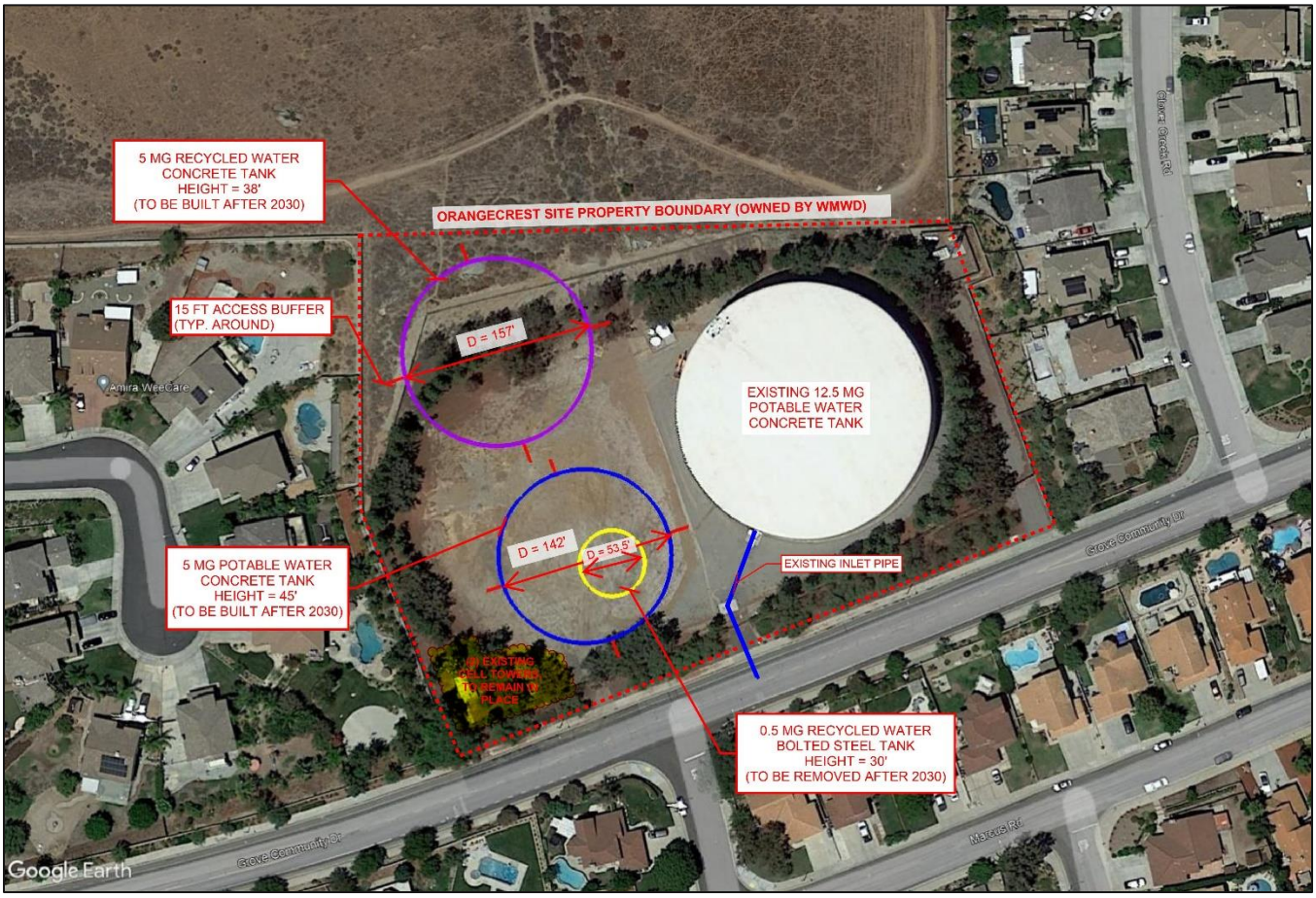
Table 5. Recycled Water Storage Analysis for the 1815PZ

Scenario	Pressure Zone	Existing Storage (MGD)	MDD (MGD)	Required Storage (MG)	Surplus/ (Deficit) (MG)
Existing (2020)	1815	0.3	2.67	2.67	(2.37)
Existing (2020) + MWUP	1815	0.8[1]	3.08	3.08	(2.28)
Near-Term (2030)	1815	5.3[2]	4.63	4.63	0.67
Near-Term (2030) + MWUP	1815	5.3[2]	5.04	5.04	0.26
Ultimate	1815	5.3[2]	6.54	6.54	**(1.24)**
Ultimate + MWUP	1815	5.3[2]	6.95	6.95	**(1.65)**

Notes:
[1] Includes the 0.3-MG existing Lurin Tank and the 0.5-MG planned temporary MWUP tank are both in operation.
[2] Assumes the new 5.0-MG tank at the Orangecrest site is constructed by 2030 per the 2020 FMP. The temporary 0.5-MG MWUP storage tank would be taken offline and relocated.

Placement of the tanks within the existing Orangecrest site were also evaluated to confirm the temporary 0.5-MG tank could remain during construction of the proposed 5-MG recycled water tank anticipated to be constructed by 2030. **Figure 12** provides a conceptual siting evaluation for the proposed 0.5-MG temporary recycled water tank, the proposed 5-MG permanent recycled water tank as well as the proposed 5-MG potable water tank, which would be constructed after removal of the temporary 0.5-MG recycled water tank in the 2030 timeframe.

Figure 12. Ultimate Buildout with MWUP – MDD plus FF with Improvements



3.2.2 Distribution System Analysis

The proposed recycled water lines for the project site were added to Western's most recent recycled water model. The project site's MDD of 281.5 gpm was split evenly between the nine (9) nodes in the proposed MWUP system. The previous water demand of 114.5 gpm and proposed pipelines for the soccer fields were removed from the hydraulic model. A 48-hour extended period simulation (EPS) was run in the model for MDD for the Existing (2020), Near-Term (2030) and Ultimate Buildout scenarios and results compared to District evaluation criteria, including a minimum service pressure of 40 psi during MDD, minimum residual pressure of 20 psi during fire flow, and a maximum pipeline velocity of 7.5 fps during any condition.

The following subsections provide the results of each scenario.

3.2.2.1 Existing MDD

Analysis of the originally-proposed single 8-inch service line in Cactus to the temporary 0.5-MG tank determined that the proposed infrastructure does not provide sufficient capacity for flows from the temporary in the event that the Oleander booster pump station is not pumping when the large RNC demand hits the 1815 zone, as shown in **Figure 13**. Maximum pipeline velocities are anticipated to exceed District criteria and minimum pressures could drop below zero psi. However, analysis indicates that upsizing the main supply line from 8-inch to 12-inch from the tie-in on Cactus Ave to the temporary tank is anticipated to provide sufficient capacity to utilize storage volumes at the temporary tank in the event Oleander PS is not pumping when demands significantly increase in the zone. These results are shown graphically in **Figure 14**. Therefore, it is recommended that the supply line be upsized to 12-inch diameter from Cactus to the temporary 0.5-MG tank.

Figure 13. Recycled Water Existing MDD – 8" Service from Cactus Ave

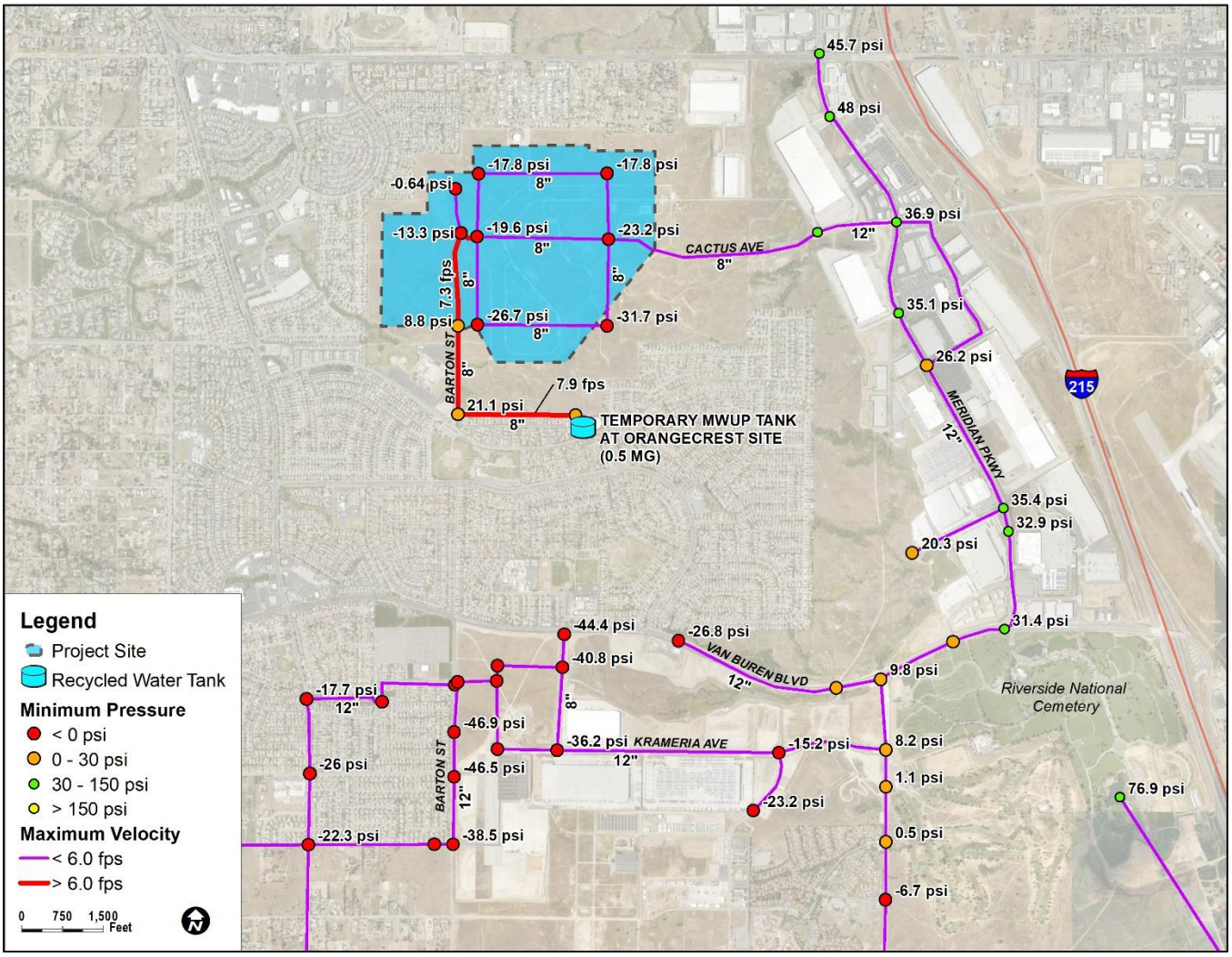
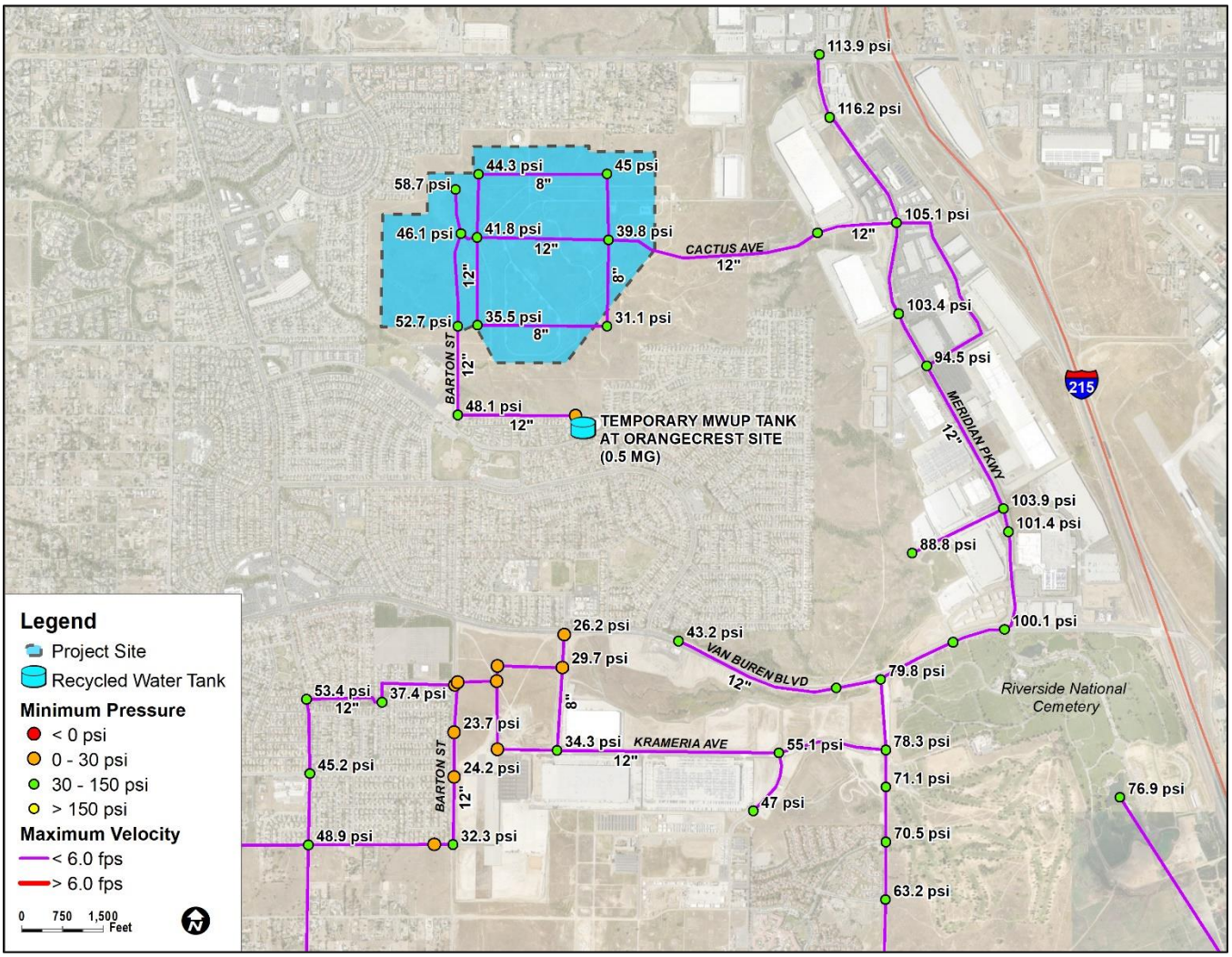


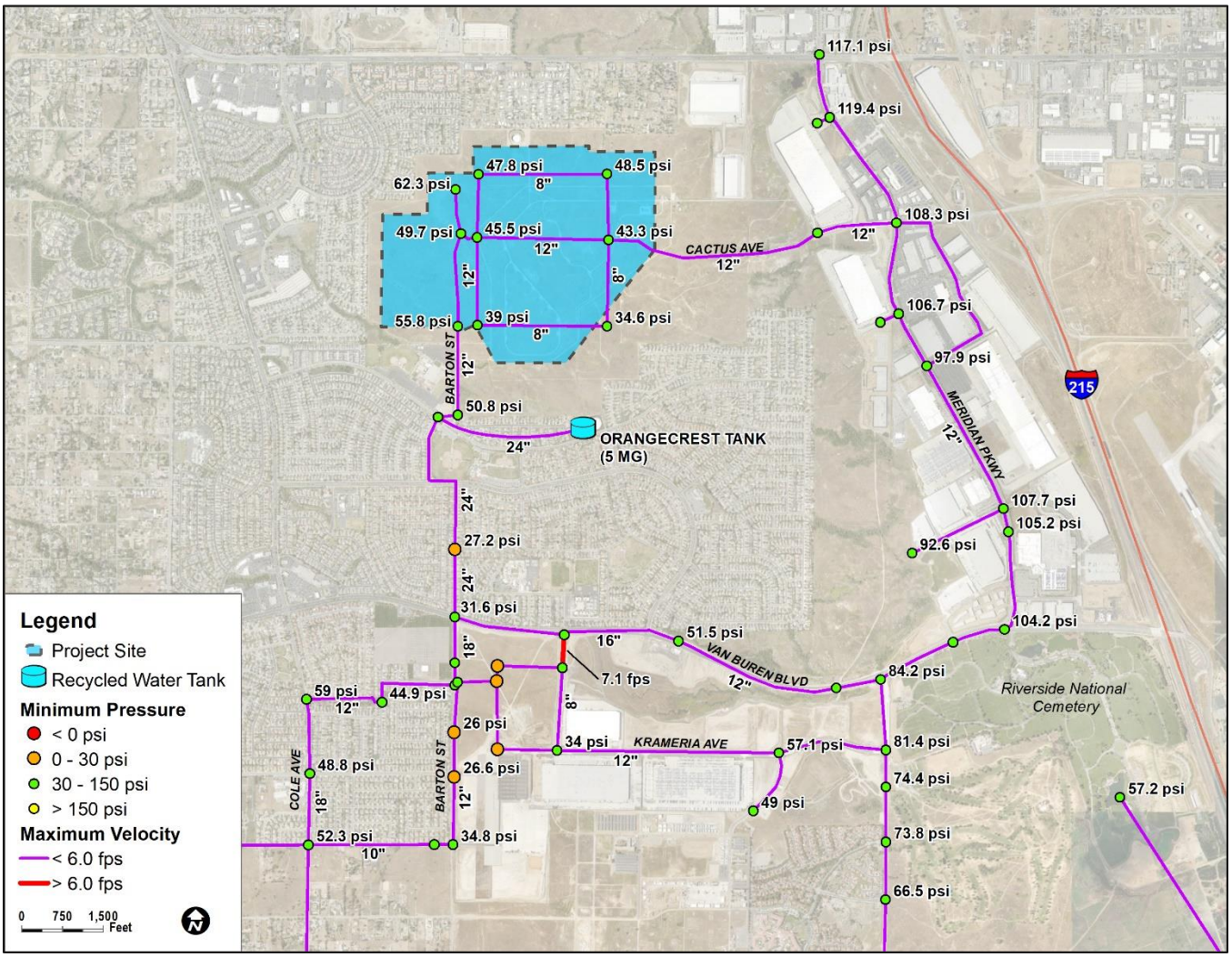
Figure 14. Recycled Water Existing MDD – 12" Service from Cactus Ave



3.2.2.2 Near-Term MDD

For the Near-Term MDD analysis with looped supply to the MWUP development with the 12-inch supply line in Cactus and Barton to the tank from the north, the results indicate minimum pressures in the development being maintained above 30 psi, as shown in **Figure 15**. One short (610 LF) portion of existing 8-inch in Coyote Bush Road just south of Van Buren Blvd reaches a maximum velocity of 7.4 fps, which exceeds the District maximum velocity criteria of 6 fps. No other new low pressure areas or high velocity pipelines were identified.

Figure 15. Recycled Water Near-Term MDD – Looped Service from Cactus Ave & Barton Dr

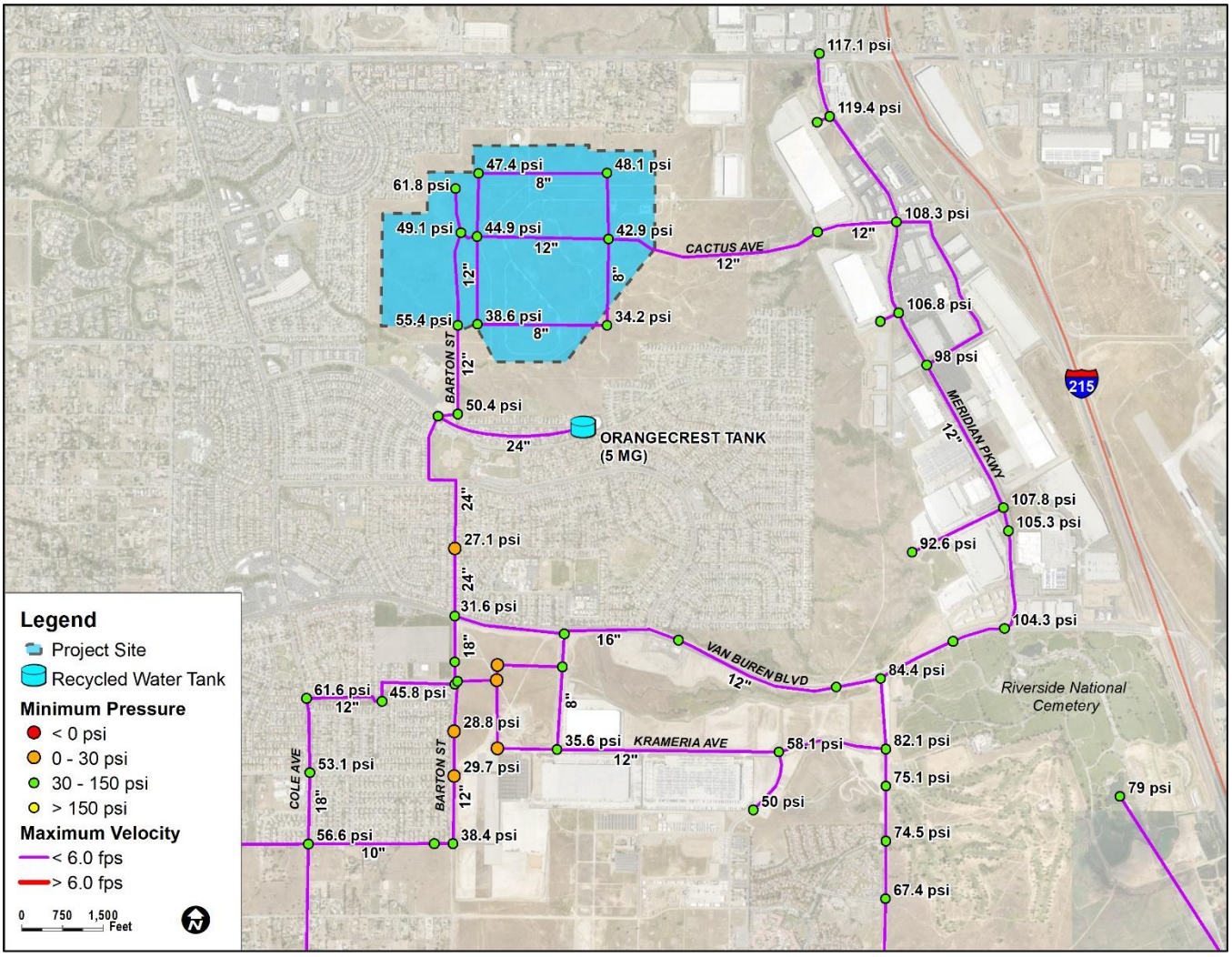


Note that modeling indicates that the infrastructure shown in Figure 15 with service to the new 5-MG Orangecrest tank via a 24-inch supply line in the south is required once demand levels in the zone, predominantly those of the Riverside National Cemetery, reach 2030 anticipated levels as the larger diameter pipeline is required to more efficiently move water in and out of the new 5-MG Orangecrest Reservoir.

3.2.2.3 Ultimate Buildout MDD

For the Ultimate Buildout MDD analysis with looped supply to the MWUP development, the results indicate minimum pressures in the development being maintained, as shown in **Figure 16.** No pipelines were found to exceed the District maximum velocity criteria of 6 fps. System pressures int the remainder of the 1815 zone were consistent with the findings of the 2020 FMP.

Figure 16. Recycled Water Ultimate Buildout MDD – Looped Service from Cactus Ave & Barton Dr



3.2.3 Recycled Water Pump Station Analysis

An updated pump station analysis was performed for the 1815 zone, which receives water from both the WWRF and Oleander pump stations. As shown in **Table 6**, the results of the analysis indicate that the 1815 zone is anticipated to have sufficient capacity to accommodate the MWUP through Buildout with no improvements required. Note that in the Ultimate demand scenario, supply from the Colorado River Aqueduct is anticipated to be required to satisfy the MDD of the zone.

Table 6. Recycled Water Pump Station Analysis for the 1815PZ

Scenario	Pressure Zone	Zone MDD (gpm)	Zone Total Pumping Capacity (gpm)[1]	Zone Firm Pumping Capacity (gpm)[2]	Surplus (gpm)
Existing (2020) + MWUP	1815	2,140	11,940	7,580	5,440
Near-Term (2030) + MWUP	1815	3,500	11,940	7,580	4,080
Ultimate + MWUP	1815	5,480[3]	11,940	7,580	2,100

Notes:
[1] Total capacity value shown is sum of all pumps at Oleander and WWRF pump stations, per Table 2-9 of the 2020 FMP.
[2] Firm pumping capacity assumes largest pump in each pump station is out of capacity. Values are some of firm pumping capacities of both Oleander and WWRF pump stations, per Table 2-9 of the 2020 FMP.
[3] Supply from the Colorado River Aqueduct (CRA) is anticipated to be required to satisfy the Ultimate demand in the zone. Maximum supply from the Riverside Canal was estimated at 11.1 CFS in the 2020 FMP and it was noted that, even prior to the Upper Plateau development, supply from the CRA would be required to satisfy the zone's demand needs.

3.2.4 Recycled Water Analysis Summary

The results of the recycled water analysis indicate that a 0.5-MG temporary bolted steel tank is required for the development at the Orangecrest location to maximize pressures within the development. Due to the distance between the Lurin Tank and a new tank at the Orangecrest site, the initial onsite recycled water system will require a 12-inch supply line from the tie-in on Cactus Ave to the new 0.5-MG temporary tank. In the near-term (~2030) with the construction of the full 5-MG Reservoir and 24-inch supply line from the south, there still may be some portions of the development that have pressures below 30 psi, which will require irrigation pumps.

The following recycled water improvements are required to accommodate the immediate construction of the MWUP development:

- Construct temporary 0.5-MG bolted steel tank at Orangecrest Tank site.
- Increase the size of the main supply line from the Cactus tie-in to the temporary tank to 12-inches

The following are additional future (2030 and Buildout) recycled water system recommendations not previously included in the 2020 FMP necessary to accommodate the MWUP development:

- Irrigation pumps required anywhere pressures drop below 30 psi.
- Recycled water storage deficit for 1815 PZ in Ultimate Buildout scenario of 1.65-MG, an increase of 0.41-MG from 2020 FMP analysis due the MWUP development.

- It is important Western construct the southern supply to the new 5-MG tank prior to the RNC reaching its anticipated 2030 demands in order to efficiently distribute water from the tank into the zone.

3.3 Sewer Analysis

The MWUP project will discharge into the existing Meridian trunk sewer that flows directly into the WWRF from the north. Per the developer, the anticipated average dry weather flow (ADWF) for the project is 448,000 gallons per day (0.45 MGD) using the Industrial sewer generation factor of 2,000 gpd/acre from Table 3-21 of the 2020 FMP and 224 acres tributary to the Western Riverside sewer collection system (the remaining 30 acres being tributary to the City of Riverside system). Note that the sewer generation factor of 2,000 gpd/acre is likely conservative for the MWUP development given light industrial is anticipated to be the typical tenet type, where sewer generation is often significantly lower than the 2,000 gpd/acre value used herein. The updated sewer analysis includes peak wet weather flow (PWWF) scenarios evaluated for the Existing (2020), Near-Term (2030) and Buildout scenarios. Three analyses will be performed to update the sewer system results from the 2020 FMP, including a treatment analysis, a collection system analysis and a lift station analysis.

3.3.1 Treatment Analysis

An updated treatment analysis was developed for this Study. Treatment plant capacity is based on average dry weather flows (ADWF). **Table 7** presents the updated ADWF projections for the WWRF, which has a current treatment capacity of 3.0 MGD. The results indicate that the MWUP development is projected to result in the capacity of the WWRF to be exceeded in the Ultimate Buildout by 1.07 MGD based on current conservative estimates. The totals shown below include a 0.35 MGD diversion flow from City of Riverside. One partial mitigation option would be to end the agreement with City of Riverside as flows at WWRF approach capacity to extend the life of the existing 3.0 MGD WWRF capacity.

Table 7. Average Daily Flows at WWRF

Scenario	WWRF Influent Flow Rate (MGD)	Surplus/(Deficit) Capacity (MGD)
Existing (2020)[1]	1.15	1.85
Existing (2020) + MWUP	1.60	1.40
Near-Term (2030) [1]	2.32	0.68
Near-Term (2030) + MWUP	2.77	0.23
Ultimate[1]	3.62	(0.62)
Ultimate + MWUP	4.07	(1.07)
Ultimate + MWUP without 0.35 MGD Riverside Diversion	3.72	(0.72)

Notes:
[1] Data from Table 3-24 of the 2020 FMP; includes 0.35 MGD scalped flow from City of Riverside.

3.3.2 Collection System Analysis

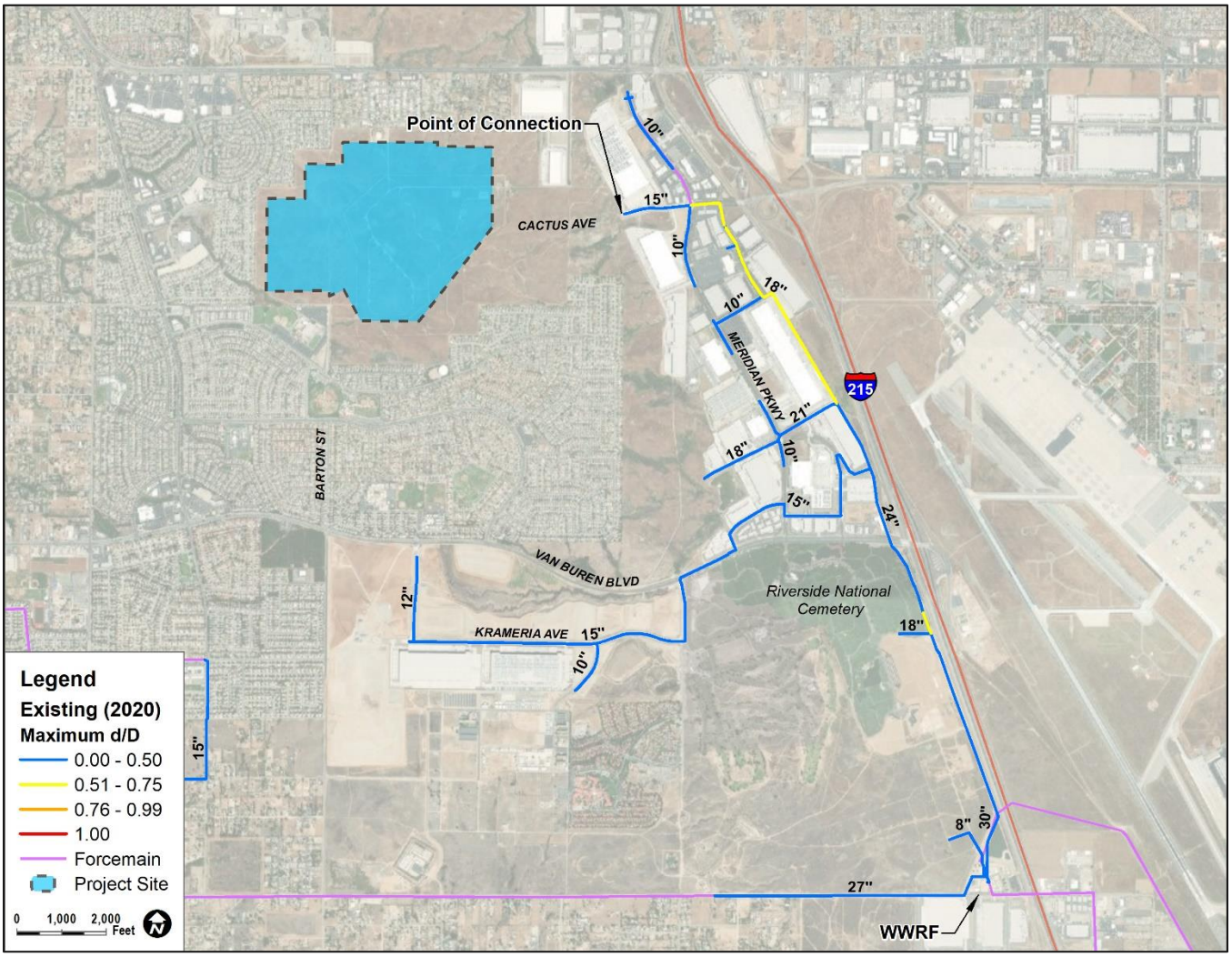
For the 2020 PWWF scenario for the 2020 FMP, a singular wet weather diurnal flow pattern was developed for the unmetered areas tributary to the WWRF for model calibration. As a part of this study, Dudek upgraded the hydraulic model by creating a new wet weather diurnal pattern to improve calibration at WWRF. A revised diurnal pattern with a peak of 2.6 resulted in modeled flows at WWRF being within 2% of measured average flows and within 6% of measured peak flows, an improvement from the calibration results in the 2020 FMP. This refined diurnal pattern was utilized for the unmonitored areas tributary to the Meridian trunk sewer for the PWWF scenarios for Existing (2020), Near-Term (2030) and Ultimate Buildout in the collection system analysis.

The average load of 311.1 gpm (448,000 gpd) provided by the developer was loaded onto the existing sewer model at manhole junction ID T36042100, which discharges into the existing 15-inch pipeline on Cactus Avenue prior to conveyance via the Meridian Trunk sewer for discharge into the WWRF. A 24-hour EPS was run for the Existing (2020), Near-Term (2030) and Ultimate Buildout scenarios in the hydraulic model. Maximum depth over diameter (d/D) ratio results from the model were compared against the Western maximum d/D criteria of 0.75 for pipelines 15-inches in diameter and greater to evaluate if the addition of the MWUP sewer loading is anticipated to result in sewerline capacity deficiencies.

3.3.2.1 Existing (2020) PWWF Analysis

Results of the Existing PWWF scenario with the addition of the MWUP load at the north end of the Meridian trunk sewer results in no new sewerline deficiencies (maximum d/D less than 0.75). The results are shown graphically in **Figure 17**.

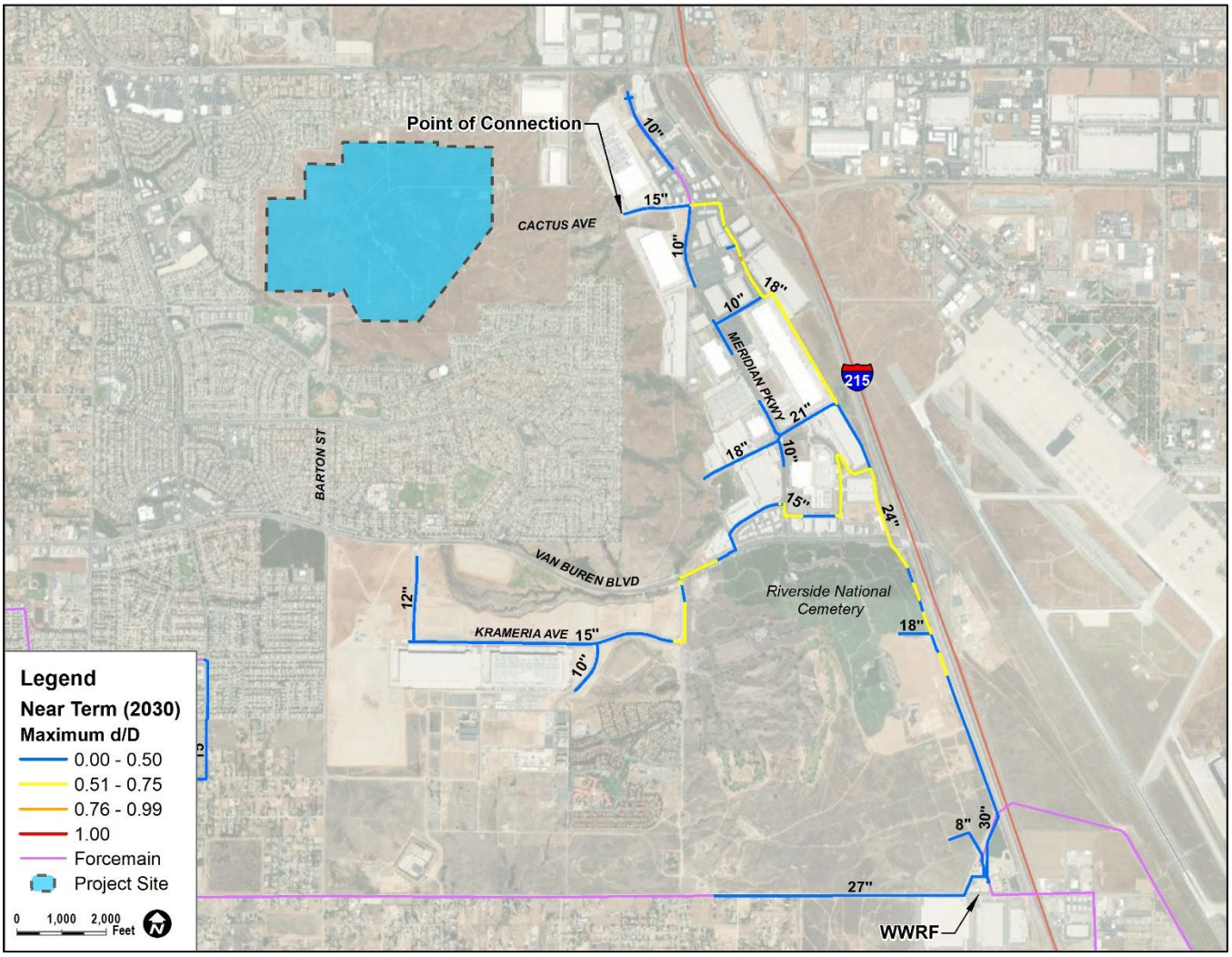
Figure 17. Sewer Existing (2020) PWWF Results – Maximum d/D



3.3.2.2 Near-Term (2030) PWWF Analysis

Results of the Near-Term PWWF scenario with the addition of the MWUP load at the north end of the Meridian trunk sewer results in no new sewerline deficiencies (maximum d/D less than 0.75). The results are shown graphically in **Figure 18**.

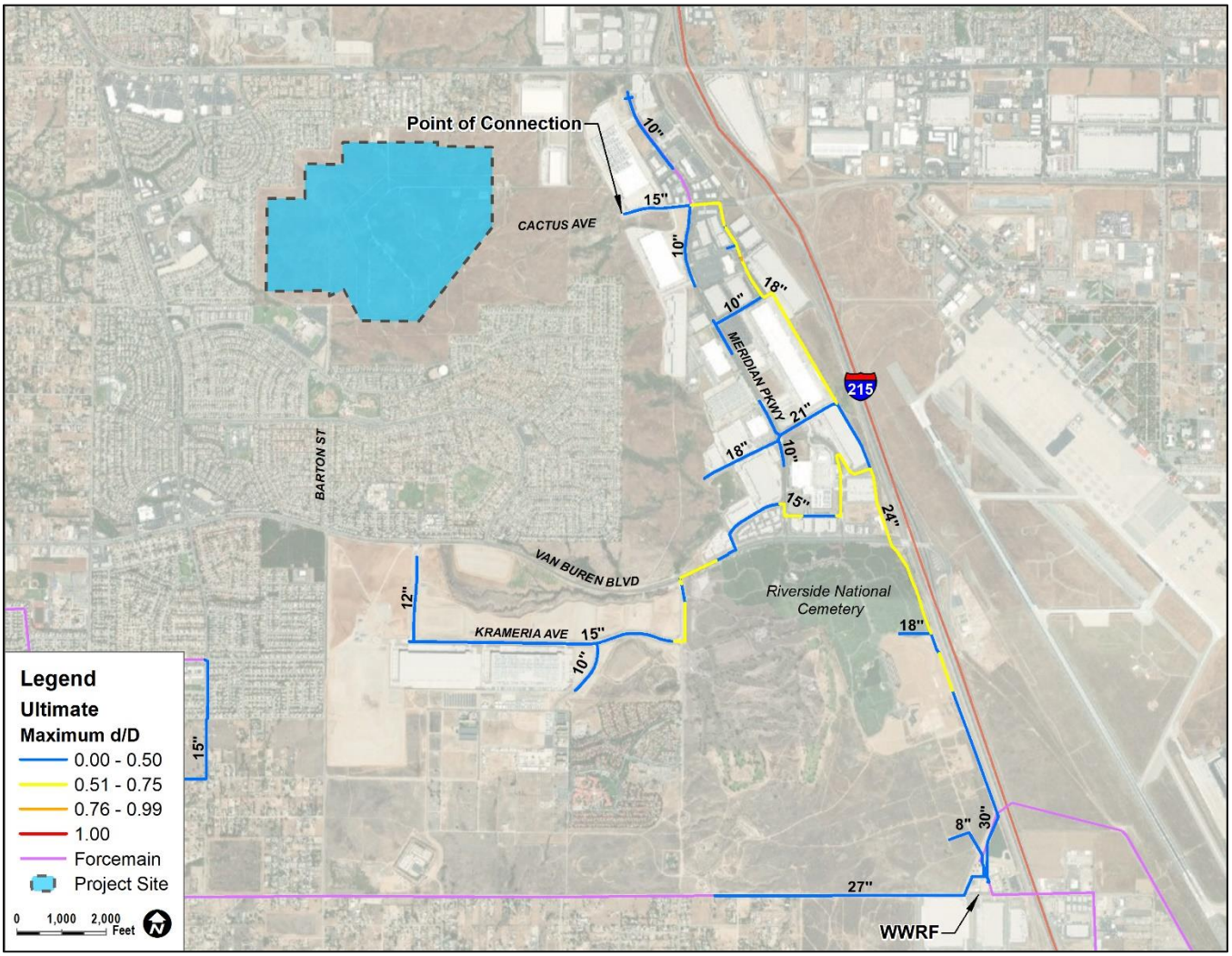
Figure 18. Sewer Near-Term (2030) PWWF Results – Maximum d/D



3.3.2.3 Ultimate Buildout PWWF Analysis

Results of the Ultimate Buildout PWWF scenario with the addition of the MWUP load at the north end of the Meridian trunk sewer results in no new sewerline deficiencies (maximum d/D less than 0.75). The results are shown graphically in **Figure 19**.

Figure 19. Sewer Ultimate Buildout PWWF Results – Maximum d/D



3.3.3 Lift Station Analysis

The sewer flow from the MWUP will not intercept any lift stations; therefore, a lift station analysis was not performed for this study.

3.3.4 Sewer Analysis Summary

The sewer analysis found that the addition of the MWUP sewer load is anticipated to result in an ultimate treatment capacity deficiency at WWRF of 1.07 MGD with the City of Riverside diversion into the Western system and 0.72 MGD without the City of Riverside diversion. No collection system deficiencies are anticipated with the development of the MWUP project assuming discharge into the existing 15-inch sewerline in Cactus Ave. Per the developer, the first flows from the development are anticipated in the next 3 to 4 years, with buildout anticipated within the next 10 years, depending on market conditions.

4 Findings & Recommendations

The following summarizes the findings and recommendations from this analysis. Note the findings for each system are broken into those improvements required to accommodate the immediate construction of the MWUP development and those required for future (2030 and Build out time frames) accommodation of the development.

<u>Immediate System Improvement Requirements:</u>

- Potable Water System:
    a. Upsize 1,300 LF of 12-inch on Deercreek Drive from Grove Community Drive to Orange Terrace Parkway to 16-inch (Note: if space is available for the parallel 12-inch pipeline proposed by the developer, the recommendation for this upsizing changes to the following: Upsize 350 LF of 8-inch on Grove Community Drive to Deercreek Drive to 12-inch [assumes sufficient space exists to construct parallel 12-inch on Deercreek and Grove Community Drive]).
    b. Upsize 700 LF of 12-inch on Barton St north of Van Buren to 20-inch.
- Recycled Water System:
    a. Construct temporary 0.5-MG bolted steel tank at Orangecrest Tank site.
    b. Upsize the main supply line from the Cactus Avenue tie-in to the temporary tank to 12-inch diameter.
- Sewer System: None

<u>Future System Improvements and Recommendations:</u>

- Potable Water
    a. Upsize 600 LF of existing 18-inch on Van Buren Blvd east of Tautwein Rd to 20-inch (scenarios 2030 and Buildout only).

b. Potable water storage deficit in 1900 PZ in Ultimate Buildout of 2.08 MG, an increased deficit of 1.45-MG from 2020 FMP analysis. Recommend either contribution to the construction of 2.1-MG of additional storage (1.45-MG attributable to MWUP) or an alternative method of reducing the equalization storage requirement for the zone, such as a reservoir management system (RMS) with a Tesla battery to accommodate the increased high-TOU pumping required to maintain reservoir levels during peak daytime demand hours.

- Recycled Water System:

  a. Irrigation pumps are required anywhere pressures drop below 30 psi, potentially in the southeast corner of property.

  b. Recycled water storage deficit for 1815 PZ in Ultimate Buildout scenario of 1.65-MG, an increase of 0.41-MG from 2020 FMP analysis due to MWUP development. Recommend contribution of 0.41-MG of buildout storage once buildout storage needs are determined and required.

- Sewer System:

  a. Ultimate Buildout sewage treatment anticipated deficit of 1.07-MGD at WWRF with the City of Riverside diversion into the Western system and 0.72-MGD without, which is an additional 0.1-MGD increased deficit due to the MWUP development. Recommend Western discuss removing 0.35 MGD City of Riverside diversion to WWRF as plant flows approach capacity to extend the life of the existing 3.0-MGD WWRF capacity. The additional ultimate buildout treatment deficit anticipated to result from MWUP and other future contributors is considered a long-term increase in treatment capacity needs that will be included in the future treatment capacity charges that will be equitably collected from all contributors to accommodate the increased treatment capacity needs at WWRF.

  b. No collection system pipeline improvements anticipated.