Murrieta Retail Area
Water Master Plan Update

Prepared for

Western Municipal Water District

November 2021

WEST YOST ASSOCIATES
Consulting Engineers

785-12-18-02

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WATER WASTEWATER STORMWATER

Murrieta Retail Area Water Master Plan Update

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Western Municipal Water District

Project No. 785-12-18-02

Project Manager: Robert Reid, PE — 11-16-21 Date

Polly L. Boissevain — 11-16-21

QA/QC Review: Polly L. Boissevain, PE — Date

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CHAPTER 1
Introduction

1.1 INTRODUCTION AND PURPOSE

This Water Master Plan (WMP) has been prepared to update Western Municipal Water District's (WMWD, District) Murrieta Retail Service Area Water Master Plan. The current WMP for the Murrieta Retail Service Area was developed in 2014. Since completion of that document, the District has invested considerable effort in refining potential development scenarios, water demand projections, and developing potential future water supply alternatives for the Murrieta Retail Service Area. This WMP will integrate recent planning work and system upgrades to evaluate the ability of the existing system and all identified future supply alternatives to meet anticipated storage, transmission, and distribution requirements under a build-out planning horizon.

The following work tasks were performed as part of this Plan:

- Review of existing data and studies
- Review of GIS for the Murrieta Service Area to identify recent upgrades to the water system infrastructure
- Update of the existing InfoWater hydraulic model to correspond to the updated GIS
- Update of existing InfoWater demands to 2018 demand projections
- Update of InfoWater supply scenarios
- Hydraulic capacity evaluation of existing water system infrastructure under various supply and demand scenarios
- Development of a capital improvement program and conceptual level cost estimates for each supply alternative

This WMP will be used as a guide for planning short- and long-term water system improvements for the Murrieta Retail Area, and as a basis for evaluating the various rate and financial impacts for existing customers and future development.

1.2 REPORT ORGANIZATION

This Water Master Plan is organized into the following chapters:

- Chapter 1. Introduction
- Chapter 2. Existing Service Area and Water System
- Chapter 3. Water System Planning and Design Criteria
- Chapter 4. Existing System Evaluation
- Chapter 5. Future System Evaluation
- Chapter 6. Capital Improvement Program
- Chapter 7. References

CHAPTER 2
Existing Service Area and Water System

This chapter describes the Murrieta Retail Service Area's characteristics and its existing water distribution system.

2.1 EXISTING SERVICE AREA DESCRIPTION

The Murrieta Retail Service Area is 6.5 square miles in size and lies within the City of Murrieta. In 2006, WMWD took over ownership of the Murrieta Retail Area from the Murrieta County Water District and incorporated it into WMWD. The area is contained by Interstate 15 to the northeast and the Santa Rosa Plateau to the southeast. It is on the south end of the WMWD service area boundary, bordered by Eastern Municipal Water District (EMWD) to the northeast and Elsinore Valley Municipal Water District (EVMWD) to the Northwest. The area is essentially surrounded by Rancho California Water District (RCWD). Figure 2-1 illustrates the location of the Murrieta Retail Area.

2.2 EXISTING WATER SYSTEM DESCRIPTION

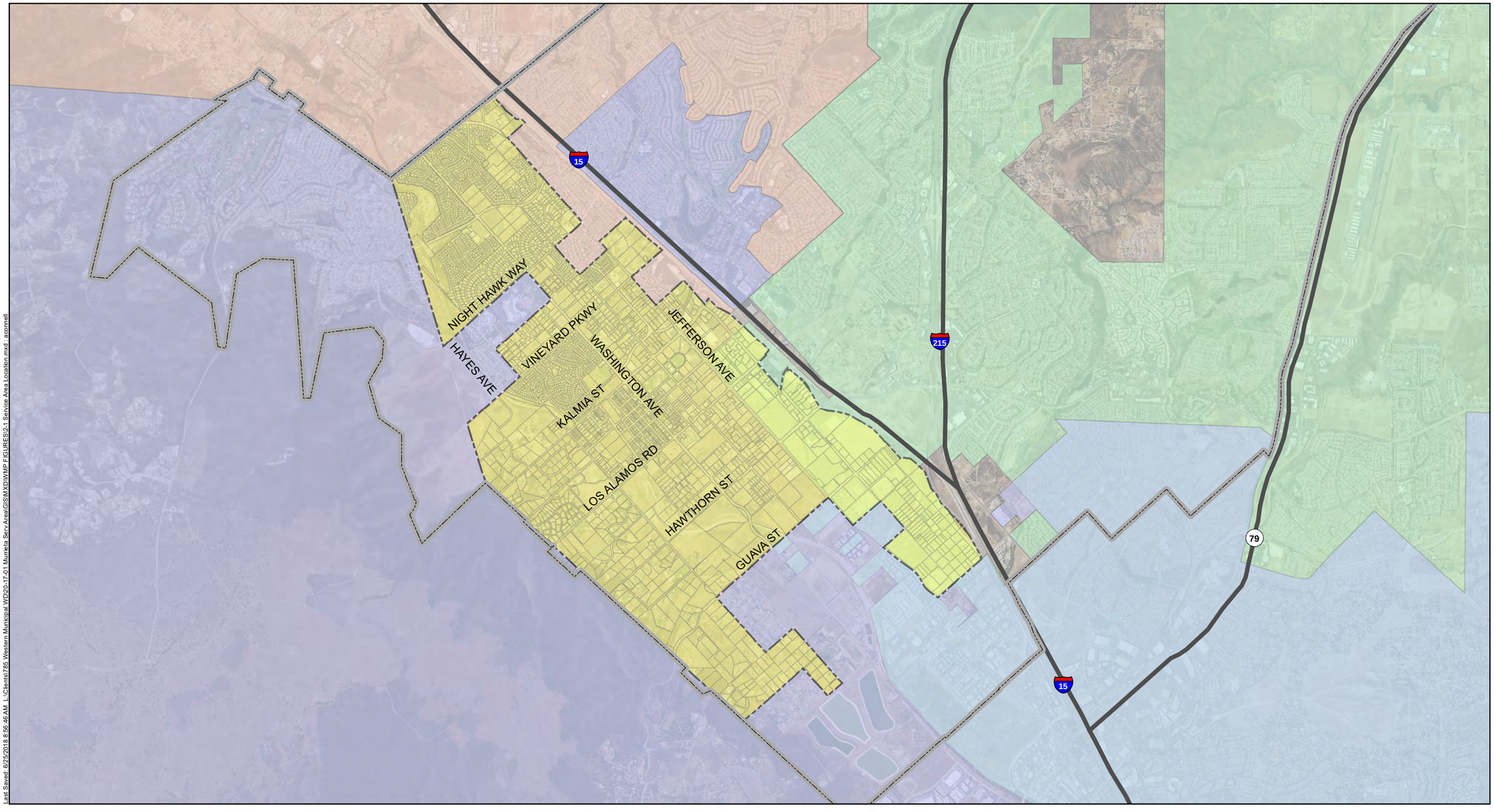
The Murrieta Area water system consists of approximately 2,800 potable water connections served by over 52 miles of potable water pipelines, four potable water tanks, one booster station, and one PRV station. The existing system facilities can be found on Figure 2-2.

Due to elevation changes, the service area is split into two pressure zones: the 1280 Zone and the 1430 Zone. The 1280 Zone is the larger of the two zones, containing almost 42 miles of water pipelines and serving residential, commercial, and industrial customers. Two tanks, located at the Olga Gordon site on the southern edge of the system, store water for the zone. The two tanks both have a low water level of 1,250', a high-water level of 1,282', and a radius of 45 ft, giving them both a capacity of 1.5 million gallons (MG). The 1430 Zone serves the more elevated, northwest portion of the system. It contains almost 11 miles of water pipelines and exclusively serves residential customers. The zone currently has existing storage capable of holding 1.7 MG of potable water at the Grizzly Ridge 2 site. Grizzly Ridge 1 is 0.5 MG, but is currently offline and non-operable.

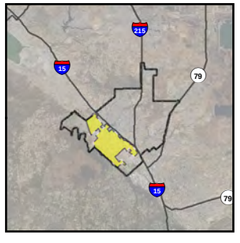
The only source of water for Zone 1430 currently is from the lower 1280 Zone. Water must be pumped up through the existing Alson Booster Pump Station, located on Washington Ave just southeast of Alexandria Dr. The Alson Booster Pump Station currently houses three 60 HP pumps, each with a capacity to pump 800 gallons per minute (gpm). This means the stations total pumping capacity is 2,400 gpm and its firm pumping capacity is 1,600 gpm.

Only one well, New Clay Well, is currently active and producing water for the Murrieta Service Area. WMWD is currently working to bring a replacement for the North Well, a previously inactivated well, online in the near future. New Clay Well currently produces 450 gpm for the system and the North Well is expected to produce 700 gpm, making the total well production 1,150 gpm.

An intertie to EMWD where Los Alamos Rd crosses over the I-5, referred to as the "Los Alamos connection," provides the rest of the supply to the service area under existing conditions. An emergency intertie connects the system to EVMWD in the 1430 Zone on Washington Ave near Palomar street.



Last Saved: 6/25/2018 8:56:46 AM L:\Clients\785 Western Municipal WD\20-17-01 Murrieta Serv Area\GIS\MXD\WMP FIGURES\2-1 Service Area Location.mxd - arcornell



Symbology

- Murrieta Retail Service Area
- **Water Districts**
  - RCWD
  - EVMWD
  - EMWD
- Highway
- Land Parcels
- Murrieta City Limits

N

0 2,000 4,000

Scale in Feet

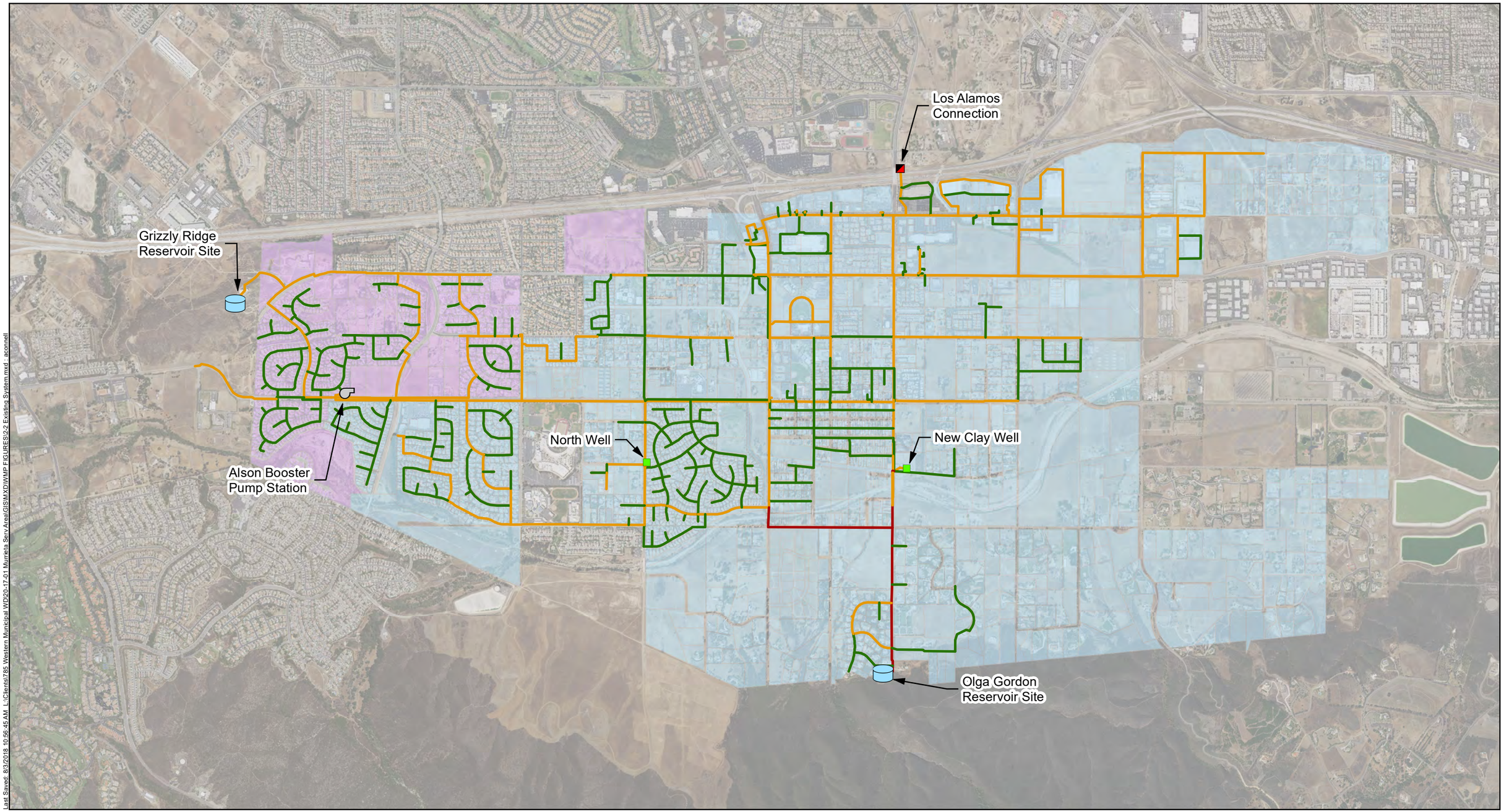
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 2-1

Murrieta Service Area Location

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



Last Saved: 8/3/2018 10:56:45 AM L:\Clients\785 Western Municipal WD\20-17-01 Murrieta Serv Area\GIS\MXD\WMP FIGURES\2-2 Existing System.mxd - aconnell

Symbology

- Reservoir Site
- Interconnection Point
- Production Well
- Booster Pump Station
- 4-10 in
- 12-16 in
- 24 in

Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

WESTERN MUNICIPAL WATER DISTRICT

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Figure 2-2

Existing System

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update

The following sections of this chapter describe the basis for how the system was evaluated.

3.1 DEMAND

A demand projection report (demand report) for the Murrieta service area was completed in July of 2017 by Kennedy/Jenks Consultants (KJ) before the start of this WMP update. The report analyzed population growth estimates and past water use trends for different water use sectors in order to produce existing and projected water demands. Due to the relatively small size and land use characteristics of the Murrieta Service Area, the projected horizon year for the area was assumed to be build-out conditions. The report produced values for average year, high year, and low year calculations for existing demands, as well as base/2016, average year, high year, and low year projected build out demands. For the analysis in this WMP, West Yost used the average year demands for both existing and build-out scenarios. The demand report is included as Appendix A of this WMP update report.

3.1.1 Existing Demand

Existing demand was developed by KJ using the Riverside County parcel GIS data, WMWD land use data, the WMWD water meter GIS data, and 2016 water meter readings. The 2016 water meter readings were linked to the WMWD water meter GIS data using APNs and location addresses. The readings were then transferred over to the Riverside County parcel GIS data which had been clipped to include only the parcels within the Murrieta service area. Next, the parcels were assigned land use data by combining them with the WMWD land use GIS data. Parcels that were matched up with meter readings were designated as "developed" while parcels that did not have any meter readings associated with them were designated as "undeveloped". At the completion of this process, adjustments were made for actual water use and demands.

The existing Maximum Day Demand (MDD) values in gallons per minute (gpm) and cubic feet per second (cfs) are shown in Table 3-1.

Table 3-1. Existing Maximum Day Demand

Land Use	Pressure Zone 1280, gpm	Pressure Zone 1280, cfs	Pressure Zone 1430, gpm	Pressure Zone 1430, cfs	MDD Total, gpm	MDD Total, cfs
Residential	1741	3.88	781	1.74	2522	5.62
Commercial & Industrial	819	1.82	0	0.00	819	1.82
Parks	139	0.31	16	0.04	155	0.35
Total	2,699	6.01	797	1.77	3,496	7.79

3.1.2 Build-Out Demand

At the completion of the process described in section 3.1.1, all parcels that were designated as developed had a water demand value associated with them. All parcels that were designated as undeveloped did not have any demand associated with them. Build-out demands were calculated by assigning projected demand values to the undeveloped parcels and not changing demand assigned to

the developed parcels. This was done by calculating developed parcel unit demands per land use. The total demand for developed parcels of each land use was summed and divided by the total area of parcels for that particular land use. This resulted in unit demands with units of acre-feet per year per acre of land (AFY/Ac). Next, the area of each undeveloped parcel was multiplied by the corresponding land use unit demand to produce a projected undeveloped demand. Undeveloped parcel's projected demands were then summed with the developed parcels existing demand to create the total projected build-out demand for the system. Where previous studies had been completed to assess water demands for higher densities than currently seen, the results from these studies was used to generate parcel demand.

The method described above resulted in a 2016 baseline projected build out demand of 3,712 AF. Future MDD values based upon these values as provided to West Yost can be seen in Table 3-2.

Table 3-2. Future Maximum Day Demand

Land Use	Pressure Zone 1280, gpm	Pressure Zone 1280, cfs	Pressure Zone 1430, gpm	Pressure Zone 1430, cfs	MDD Total, gpm	MDD Total, cfs
Residential	3,617	8.06	1,169	2.60	4,785	10.66
Commercial & Industrial	1,558	3.47	29	0.06	1,587	3.53
Parks	290	0.65	89	0.20	379	0.84
Total	5,465	12.18	1,286	2.86	6,750	15.04

3.2 SUPPLY

The following sections describe the existing and future water supplies for the Murrieta Retail Service Area.

3.2.1 Existing Supply

Currently for the existing system, water is supplied to the 1280 Zone through the Los Alamos connection and by one active groundwater well, the New Clay Well, located within the Murrieta Retail Service Area. Well production has a capacity of 450 gpm (although current production is actually 260 gpm), and the remaining supply comes from the Los Alamos connection to EMWD which is sometimes forced to provide more that the allotted 2,244 gpm (5 cfs) for MDD conditions. With the North Well expected to be replaced and producing 700 gpm, the supply from the Los Alamos connection can go back down below 2,244 gpm (5 cfs) for existing MDD conditions. However, once the service area starts to become more developed and demands increase, the system will not have enough supply to support the new demand and the Los Alamos connection will once again be forced to provide more than 5 cfs during MDD conditions until future supplies are secured via more wells or new interconnections with EVMWD, RCWD, or EMWD. The existing Los Alamos interconnection currently has hydraulic capacity to supply more than the 5 cfs assigned to Western's Murrieta Division; however, this additional capacity is reserved for future development within EMWD's service area.

There is also an emergency connection to Elsinore Valley Municipal Water District (EVMWD) located on Washington Road in the 1430 Zone. This connection is not assumed to be active under normal operation.

3.2.2 Future Supply Alternatives

WMWD is looking to explore different potable supply sources to the Murrieta Retail Service Area. As part of this WMP update, West Yost was tasked with analyzing and evaluating three future supply alternatives developed by WMWD. During the hydraulic evaluation process, a fourth supply alternative was identified and analyzed along with the three other supply alternatives.

A supply hierarchy was developed which determined what water sources would take priority over others to meet the total required supply at a given time. For each supply alternative, the associated supply sources were analyzed and prioritized for use based on the cost of the source water. Wells were prioritized to provide their maximum capacity before any other water source. After that the proposed connection points RCWD and/or EVMWD would be used to maximum capacity before the Los Alamos connection was used. Table 3-3a and 3-3b below describe how the supplies are allocated for each alternative evaluated. All supply alternatives are listed below and are further described in the following sections.

- Status Quo Supply
- Elsinore Valley Municipal Water District (EVMWD) Supply Alternative
- Rancho California Water District (RCWD) Supply Alternative
- Hybrid Supply Alternative

All future maximum supply values were developed based off the projected MDD for the built-out system. Demands for any particular time that exceed the MDD values, peak hour demand (PHD) for instance, are expected to be supplied from storage within the system.

Table 3-3a. Scenario Supply Descriptions, gpm

Scenario	Total Demand	Well Supply	Los Alamos Supply	EVMWD Supply	RCWD Supply	Demand vs Supply Difference
Existing Supply Alternative						
BO MDD	6,750	1,150	5,600	-	-	-
BO PHD	10,125	1,150	5,600	-	-	-3,375
EX MDD	3,496	1,150	2,346	-	-	-
EX PHD	5,244	1,150	2,346	-	-	-1,748
EVMWD Supply Alternative						
BO MDD	6,750	1,150	661	4,939	-	-
BO PHD	10,125	1,150	661	4,939	-	-3,375
EX MDD	3,496	1,150		2,346	-	-
RCWD Supply Alternative						
BO MDD	6,750	1,150	-	-	5,600	-
BO PHD	10,125	1,150	-	-	5,600	-3,375
EX MDD	3,496	1,150	-	-	2,346	-
Hybrid Supply Alternative						
BO MDD	6,750	1,150	-	1,286	4,314	-
BO PHD	10,125	1,150	-	1,286	4,314	-3,375
EX MDD	3,496	1,150	-	797	1,549	-

Note: Due to prices of water, demand is first assigned to the proposed connection points until they are maxed out, then the leftover demand is assigned to the wells, then the Los Alamos connection.

Table 3-3b. Scenario Supply Descriptions (cfs)

Scenario	Total Demand	Well Supply	Los Alamos Supply	EVMWD Supply	RCWD Supply	Demand vs Supply Difference
Existing Supply Alternative						
BO MDD	15.0	2.6	12.5	-	-	-
BO PHD	22.6	2.6	12.5	-	-	7.5
EX MDD	7.8	2.6	5.2	-	-	-
EX PHD	11.7	2.6	5.2	-	-	3.9
EVMWD Supply Alternative						
BO MDD	15.0	2.6	1.5	11.0	-	-
BO PHD	22.6	2.6	1.5	11.0	-	7.5
EX MDD	7.8	2.6	-	5.2	-	-
RCWD Supply Alternative						
BO MDD	15.0	2.6	-	2.9	9.6	0.0
BO PHD	22.6	2.6	-	2.9	9.6	7.5
EX MDD	7.8	2.6	-	1.8	3.5	0.0
Hybrid Supply Alternative						
BO MDD	15.0	2.6	-	2.9	9.6	0.0
BO PHD	22.6	2.6	-	2.9	9.6	7.5
EX MDD	7.8	2.6	-	1.8	3.5	0.0

Note: Due to prices of water, demand is first assigned to the proposed connection points until they are maxed out, then the leftover demand is assigned to the wells, then the Los Alamos connection.

3.2.2.1 Status Quo Supply

The status quo supply will have the same supply sources as the existing system. For build-out conditions, the increased demand was loaded onto the Los Alamos connection. Figure 3-1 shows the status quo supply.

3.2.2.2 EVMWD Supply Alternative

One of the alternative supply options identified by WMWD staff involved wheeling water through EVMWD. After wheeling the water through EVMWD, it would be provided to the Murrieta Service Area through two connection points; a connection that already exists as an emergency connection on Washington Ave and a proposed connection to the existing Grizzly Ridge tank in WMWD's 1430 zone. The existing connection on Washington Ave would be capable of delivering 2,000 gpm, while the proposed connection to the Grizzly Ridge tank would be capable of delivering 2,939 gpm. This second connection would require an estimated 3,000 ft of pipeline to be constructed along Wyman Road from the connection to EVMWD to the Grizzly Ridge Tank. With the wells already maxed out, this additional 4,939 gpm would not be enough to satisfy projected built-out demand. Therefore, the existing Los Alamos connection would need to continue to supply a small amount of water during build out MDD conditions.

Currently, the 1430 Zone is only designed to receive the relatively small amount of water to meet its demand. Under this proposed supply scenario, it would have to be redesigned to convey a significant amount of the supply for the 1280 Zone. The 1430 Zone is far smaller than the 1280 Zone in both area and demand, and is currently supplied all its water from the 1280 Zone by way of the existing Alson Booster Pump Station. Relying on the proposed EVMWD connections in the 1430 Zone as the primary future source of water for the study area would require the connection point between pressure zones to be transformed from an existing pump station to a pressure reducing valve. This would require new pipe and new equipment at the point of connection between zones. West Yost analyzed the two zones and determined the best location for this connection would be at the existing pump station location. The pump station would be bypassed and water would flow the opposite way through a pressure reducing valve into the lower pressure zone. As will be discussed later in this report, significant pipeline upgrades are required for this alternative.

The full EVMWD water wheeling report is included as Appendix B of this report. Figure 3-2 shows the EVMWD supply alternative.

3.2.2.3 RCWD Supply Alternative

The other supply alternative identified for this WMP update involved wheeling water through RCWD. RCWD analyzed their capacity to supply water and determined that they would be able to supply up to 11 cfs (4,937 gpm) during average day conditions and up to 22 cfs (9,874 gpm) during max day conditions through the connection point located in the heart of the Murrieta service area. The 22 cfs (9,874 gpm) that RCWD is capable of delivering is enough to satisfy the projected build-out MDD, meaning the Los Alamos connection will not have to be used in this supply alternative.

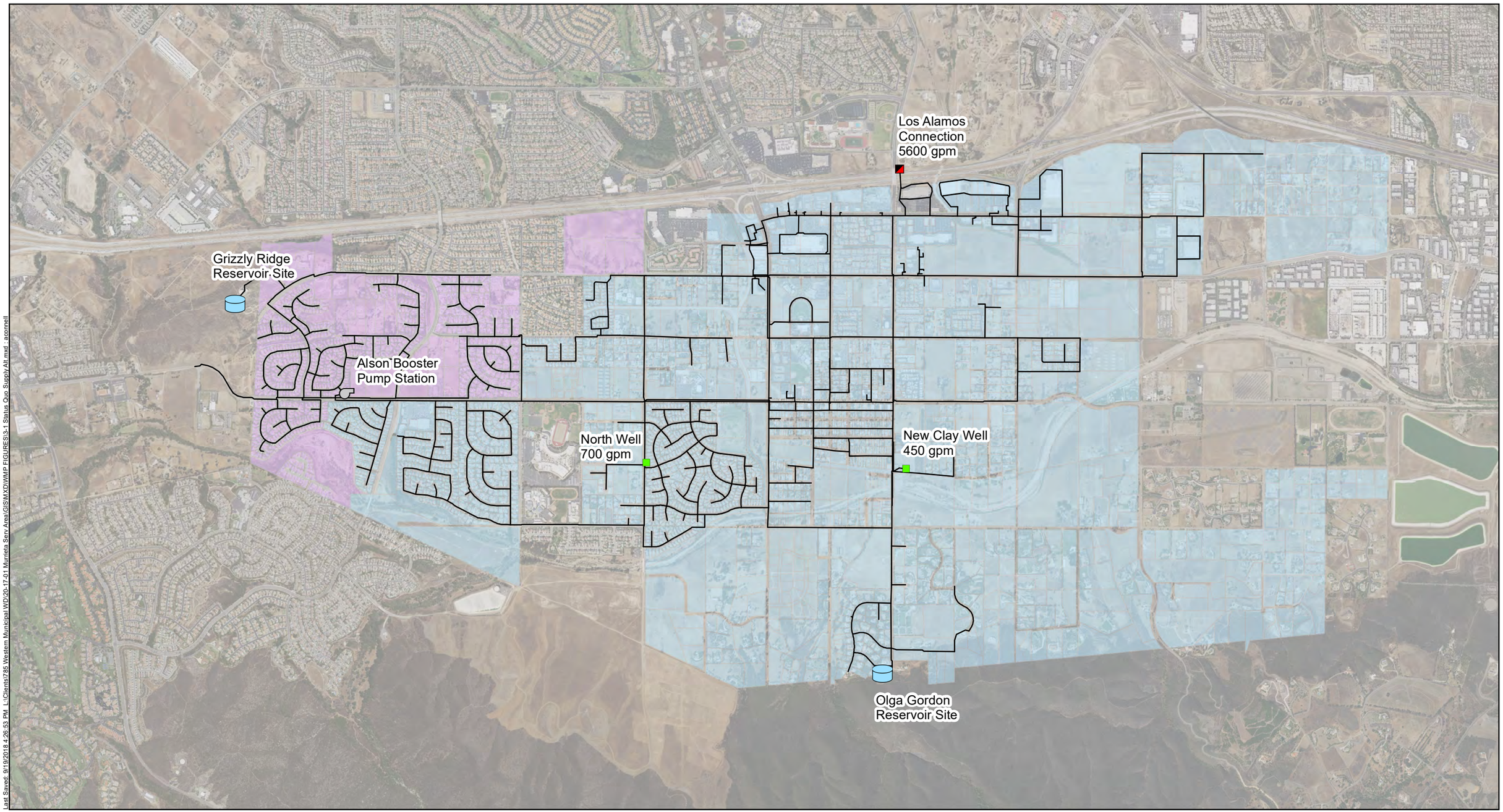
A location for the connection point between the RCWD 1305 Zone and the WMWD Murrieta Service Area 1280 Zone was chosen close to an RCWD pipe where there would be the smallest length of

deficient pipe during built-out PHD for the new supply. Like the status quo supply scenario, water would still need to be pumped up to the 1430 Zone.

The full RCWD water wheeling report is included in Appendix B of this report. Figure 3-3 shows the RCWD supply alternative.

3.2.2.4 Hybrid Supply Alternative

During the analysis of the other three supply alternatives, a fourth supply alternative that combines the EVMWD and RCWD supply alternatives was created. The lower 1280 Zone would be supplied by a combination of the two wells and the proposed RCWD connection while the 1430 Zone would be completely supplied by the existing EVMWD connection. This alternative reduces the need for a second connection to EVMWD because the 2,000 gpm that the existing connection is capable of delivering would be sufficient to fulfill the build-out MDD of the 1430 Zone, which is only 1,286 gpm. Also, because the two zones would each receive their own separate external supply, this alternative eliminates the need for a pump station or a pressure reducing valve station between pressure zones, except in emergency situations. The pump station would be kept active for emergency scenarios. Figure 3-4 shows the hybrid supply alternative.



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Symbology

- Reservoir Site
- Interconnection Point
- Production Well
- Booster Pump Station
- Existing Water Main

Parcel Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

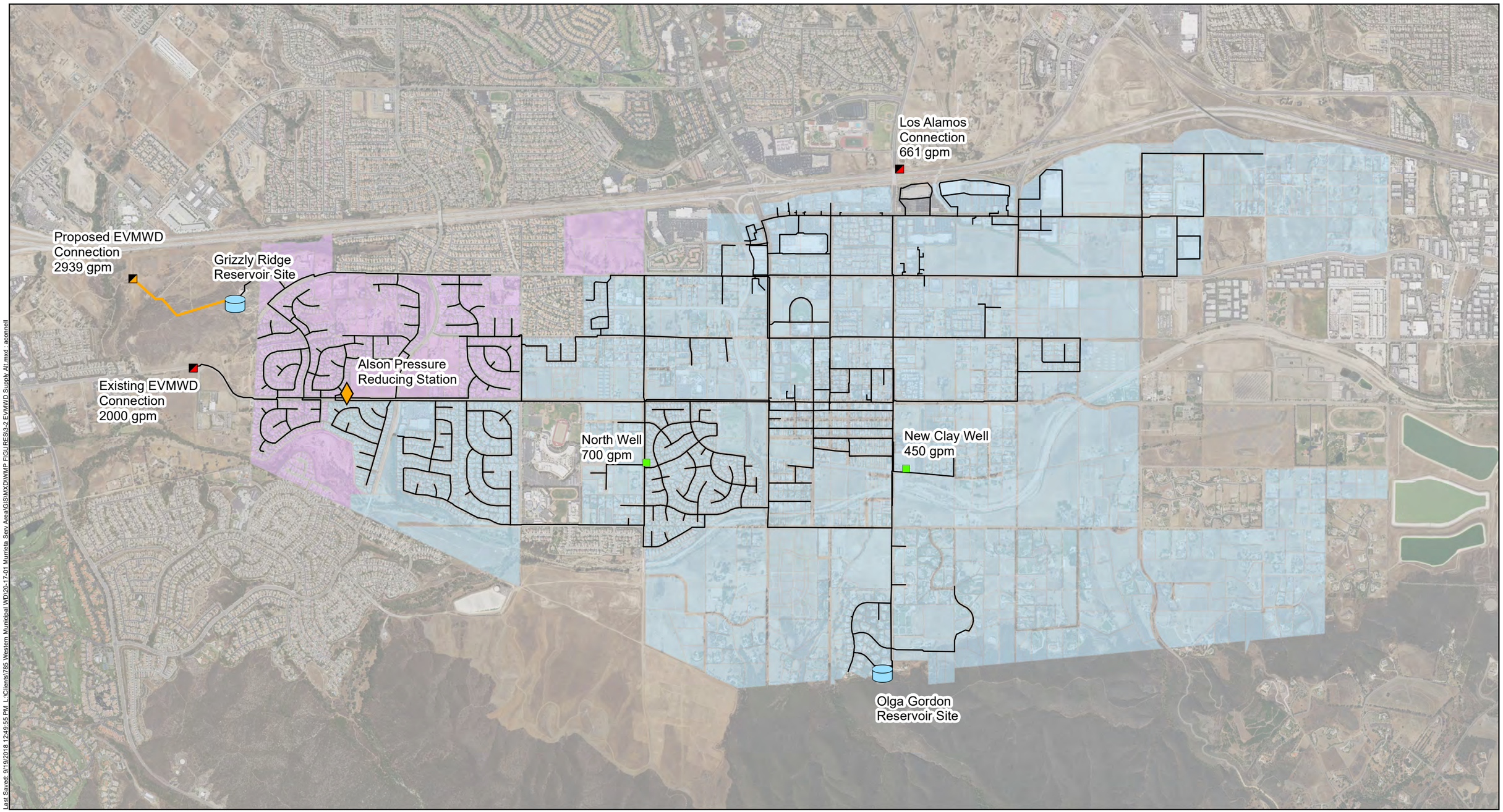
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 3-1

Status Quo Supply

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



Last Saved: 9/19/2018 12:49:55 PM L:\Clients\765 Western Municipal WD\20-17-01 Murrieta Serv Area\GIS\MXD\WMP FIGURES\3-2 EVMWD Supply Alt.mxd aconnell

Symbology

- Reservoir Site
- Exisitng Interconnection
- Proposed Interconnection
- Production Well
- Alson Pressure Reducing Station
- New Pipe to EVMWD Connection
- Existing Water Main

Parcel Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

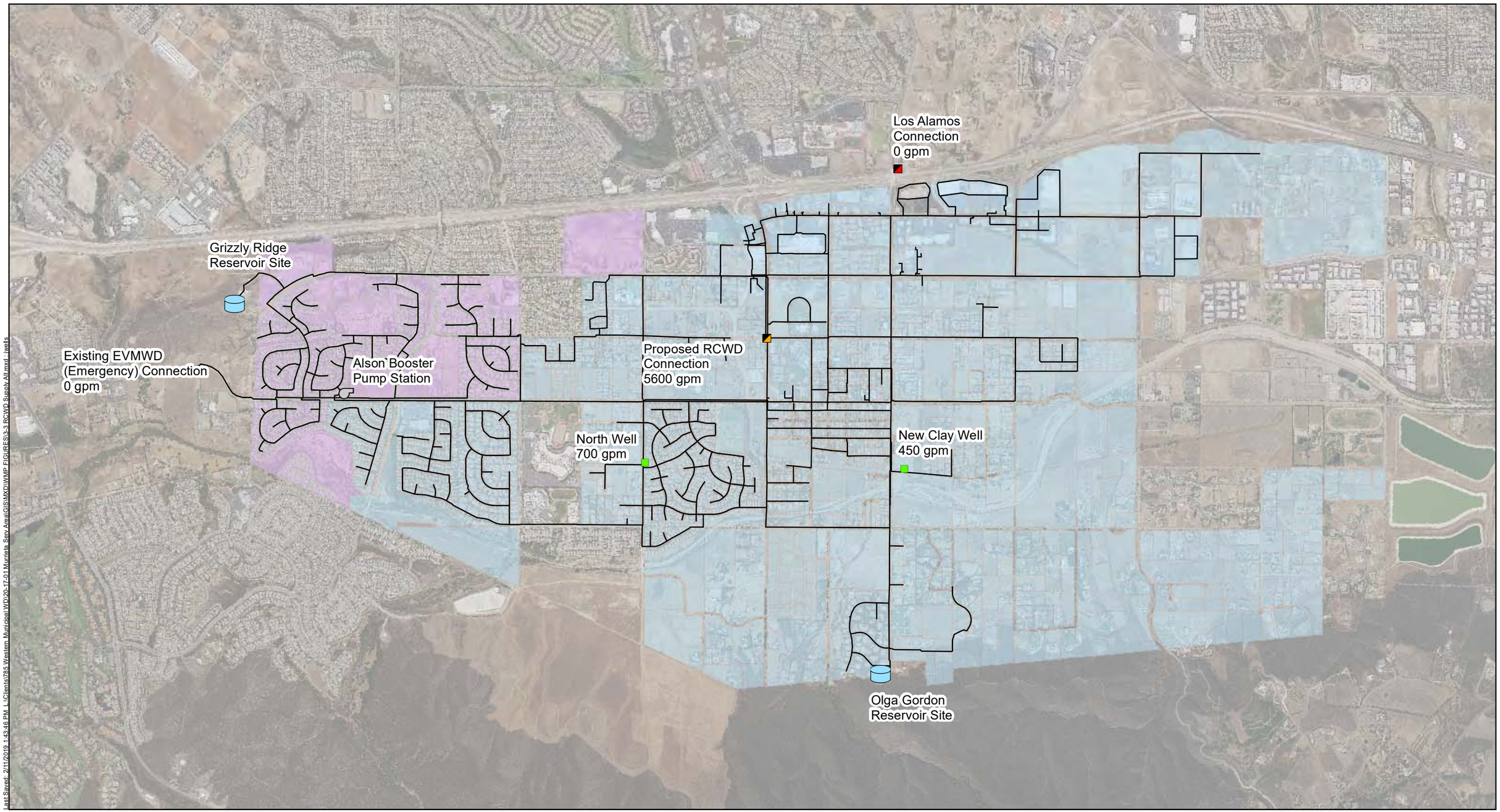
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 3-2

EVMWD Supply Alternative

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Reservoir Site
- Existing Interconnection
- Proposed Interconnection
- Production Well
- Booster Pump Station
- Existing Water Main

Parcel Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

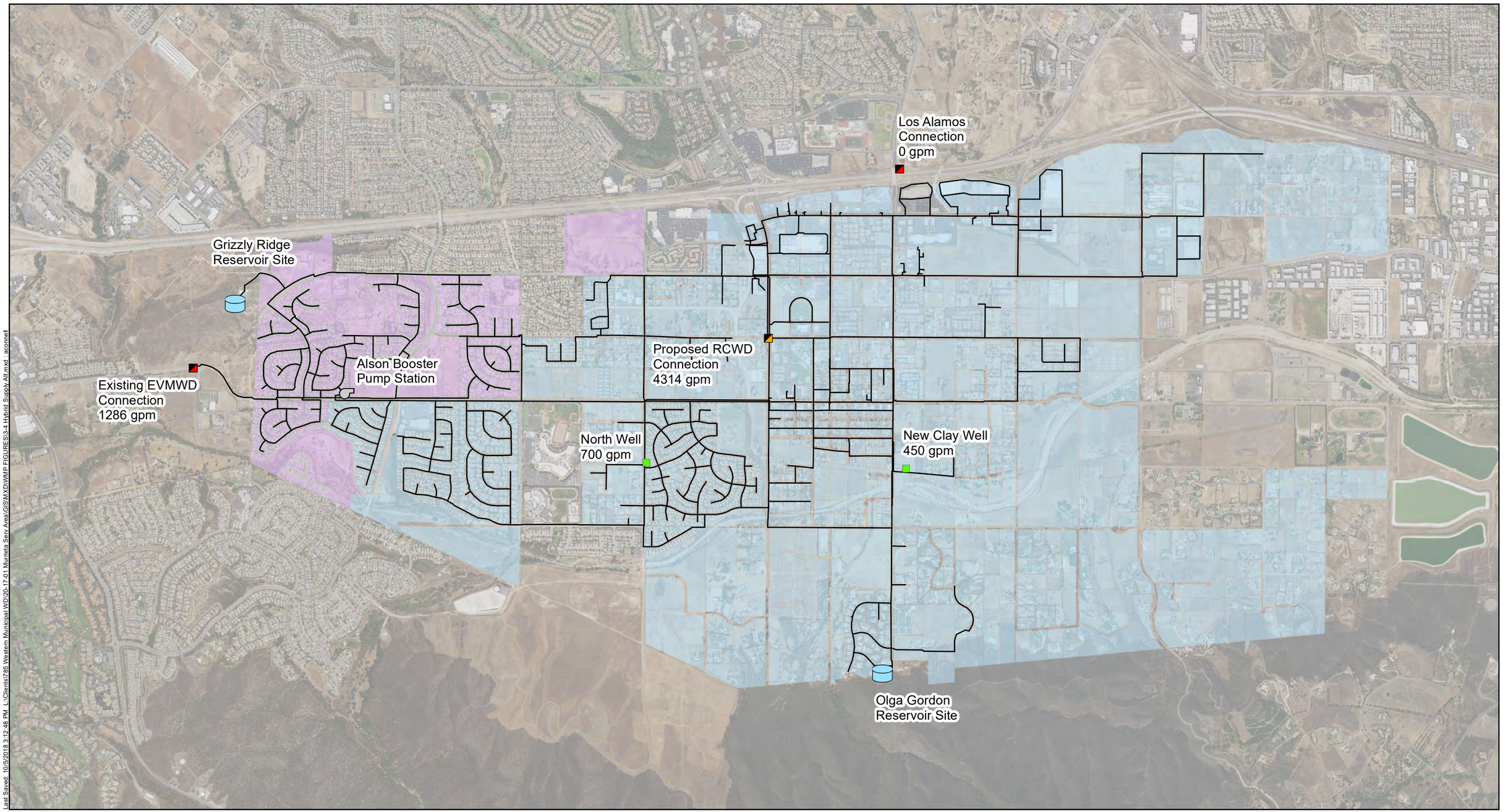
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 3-3

RCWD Supply Alternative

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Reservoir Site
- Existing Interconnection
- Proposed Interconnection
- Production Well
- Booster Pump Station
- Existing Water Main

Parcel Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

WESTERN MUNICIPAL WATER DISTRICT

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Figure 3-4

Hybrid Supply Alternative

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update

3.3 CRITERIA

The operational criteria used to evaluate the pipelines, pumps, and storage of the system is consistent with 2014 WMP and further described in the sections below.

3.3.1 Pumps

The ultimate pumping requirements used to analyze the build-out system are consistent with previous master plans. The pumping requirement states that the firm capacity of the pump station must be capable of meeting the MDD of the zone it is serving. Firm capacity of a pump station is defined as the total pumping capacity with the largest pump at the site out of service. Currently, the only pump station in the system is the Alson Booster Station that pumps water from the 1280 Zone into the 1430 Zone, which means the station must have a firm capacity to match the MDD of the 1430 Zone.

3.3.2 Storage

The ultimate storage requirements used in this analysis are consistent with previous master plans. Storage for each zone must be able to meet the sum of the multiple criteria listed below.

3.3.2.1 Equalization Storage

Pumping facilities in the system have been designed to meet build-out MDD as described below in section 3.3.3. This means that anytime the demand in the system goes beyond MDD, the system storage must be able to provide the supply deficit. The equalization storage deemed necessary to account for these peak supply deficits was determined to be 25 percent of the MDD within each pressure zone.

3.3.2.2 Fire Flow Storage

System storage also must account for any fire flow through the system. The fire flow storage requirements, found in Table 3-4 below, were updated by the City of Murrieta Fire Department in April of 2014.

Table 3-4. Fire Flow Criteria

Property Classification	Flow and Time Requirement	Corresponding Volume Needed, MG
One- & two-family dwellings	1,500 gpm at 20 psi for 2 hours	0.18
Multi-family dwellings	2,500 gpm at 20 psi for 2 hours	0.30
Commercial buildings/occupancies	3,000 gpm at 20 psi for 3 hours	0.54
Industrial buildings/occupancies	3,000 gpm at 20 psi for 4 hours	0.72

The 1280 Zone contains buildings in all the categories listed above, therefore the requirement that was used for the 1280 Zone was the "Industrial buildings/ occupancies" requirement of 3,000 gpm at 20 psi for 4 hours which equates to 0.72 million gallons (MG)

The 1430 Zone only contains residential customers, including a couple of parcels zoned for multi-family residential. Therefore the "multi-family dwellings" requirement of 2,500 at 20 psi for 2 hours was used which equates to 0.30 MG

3.3.2.3 Emergency Storage

Emergency storage capacity would be needed to sustain the water needs during periods of total or partial shutdown of the water supply facilities. One-half (50%) of the MDD is used to calculate the emergency storage of each pressure zone.

3.3.2.4 Total Storage

The total existing and build out storage required for each pressure zone is presented in Table 3-5.

Table 3-5. Storage Criteria, MG

Zone	Equalization Storage	Fire Flow Storage	Emergency Storage	Total Storage Required
Existing Conditions				
1280	0.97	0.72	1.94	3.64
1430	0.29	0.24	0.57	1.16
Build Out Conditions				
1280	1.97	0.72	3.93	6.62
1430	0.46	0.30	0.93	1.69
Total	2.43	1.02	4.86	8.31

3.3.3 Pipelines

The performance criteria used to analyze and later size the transmission pipeline network is consistent with criteria used in previous Master Plans as well as the District's current design criteria contained in the District's "Developer Handbook and Standard Drawings" manual. The performance criteria used is summarized below.

- Maximum velocity of 6ft/sec in transmission pipelines under replenishment conditions
- Maximum friction loss of 3.5ft/1,000 ft of transmission line under replenishment conditions
- Maximum velocity of 7.5 ft/sec in any water pipelines during peak hour or maximum day demand (MDD) plus emergency fire flow conditions
- Transmission pipelines shall be no smaller than 12-in diameter

3.3.4 Fire Flow

Fire flow criterion for each land use was outlined in a document provided by the City of Murrieta Fire Department and summarized below in Table 3-6. The criteria for amount of flow needed at each point throughout the system is the same criteria that was used to calculate the amount of fire flow storage necessary, as described in section 3.3.2.2. The system was analyzed using these criteria, which were developed in 2013. It should be noted that hydrants may have been constructed before 2013 with different criteria.

Table 3-6. Fire Flow Criteria, gpm

Property Classification	Flow Requirements
One- & Two-Family Dwellings	1,500
Multi-family dwellings	2,500
Commercial buildings / occupancies	3,000
Industrial building / occupancies	3,000

One of the performance criteria for pipelines is a "maximum velocity of 7.5 ft/sec in any water pipelines during peak hour or maximum day demand (MDD) plus emergency fire flow conditions." This criteria does not make it possible for an 8-inch pipe to serve a residential cul-de-sac, which is standard in the existing system, and therefore was not applied to the existing pipelines. However, during the fire flow analysis of the future built-out system this criteria was applied to the proposed expansion pipelines described by CIP #2 and CIP #3 in Chapter 6.

4.1 UPDATE OF THE HYDRAULIC MODEL

West Yost was provided an existing InfoWater model by WMWD that was last updated in 2014. The first step in evaluating the system was to update the model with the most accurate infrastructure and demand information. A comprehensive excel file detailing the approach to updating the model was created and continually updated throughout the process. This excel file is summarized below in sections 4.1.1 and 4.1.2 and included as a table in Appendix C. The excel file also documented all the info received from WMWD.

4.1.1 Infrastructure

The first step to updating the InfoWater model was to update the physical components of the model like the pipelines, storage tanks, pump stations, and connection points. WMWD provided GIS data which contained updated information of all the infrastructure in the system. The GIS infrastructure data was brought into the model and overlaid on top of the model infrastructure. The two were manually checked for discrepancies like different pipe diameter, different pipe alignments, pipes that existed in the GIS data but not the model and vice versa. Discrepancies between the GIS data and the existing model were manually recorded in an excel spreadsheet which is included in Appendix C. The model was then updated to match the GIS data. All changes to the model were also documented in the table found in Appendix C.

All excel files and figures made throughout the model infrastructure update process can be found in Appendix C.

4.1.2 Demands

After the model infrastructure had been updated the next step was to update the demands to accurately reflect the new demand study described in section 3.1. Demands were uploaded to the InfoWater model using the GIS parcel data and the demand spreadsheet. The process in which demands were uploaded to the model is described in Appendix C.

4.2 DAILY OPERATIONS

4.2.1 Existing Pump Capacity Evaluation

The pumping requirements used to analyze the build-out system are defined in Section 3.3.1. The pumping requirement states that the firm capacity of the pumping station must be capable of meeting the MDD of the zone it is serving. Firm capacity of a pumping station is defined as the total pumping capacity with the largest pump at the site out of service. Currently, the only pump station in the system is the Alson Booster Pump Station that pumps water from the 1280 Zone into the 1430 Zone, which means the station must have a firm capacity to match the MDD of the 1430 Zone. The existing pump station contains a total of three 60 HP pumps each capable of pumping 800 gpm, giving it a firm capacity of 1,600 gpm, or 3.6 cfs. A Variable Frequency Drive (VFD) has been recommended for the pump station to reduce the velocity in pipelines that serve the pump station.

The 1430 Zone has an existing MDD of 797 gpm, or 1.78 cfs which is below the firm capacity of the existing Alson Booster Pump Station. No upgrades to the booster station (with the exception of the VFD described above) are required for existing conditions.

4.2.2 Existing Storage Capacity Evaluation

Table 4-1 below presents the existing storage capacity for both pressure zones along with the amount of storage required as described in Chapter 3.

Table 4-1. Existing Storage Summary

Zone	Equalization Storage, MG	Fire Flow Storage, MG	Emergency Storage, MG	Storage Required, MG	Existing Storage, MG	Additional Storage Required, MG	Additional Storage Required, ft^3
1280	0.97	0.30	1.94	3.22	3.00	0.22	28,778[(a)]
1430	0.29	0.24	0.57	1.10	1.70	-	-
Total	1.26	0.54	2.52	4.32	4.70	-	-

(a) As stored water is able to feed back-fed from the 1430 Zone to the 1280 Zone and more than this volume of excess storage volume is available in the 1430 Zone, no additional storage is required for the existing condition.

Using the existing MDD to calculate the existing storage requirements, the 1280 Zone is currently short by 0.22 MG. However, no new storage for the 1280 Zone is required as more than this volume of excess storage is available and can be back-fed from the 1430 Zone.

4.2.3 Existing System Hydraulic Evaluation

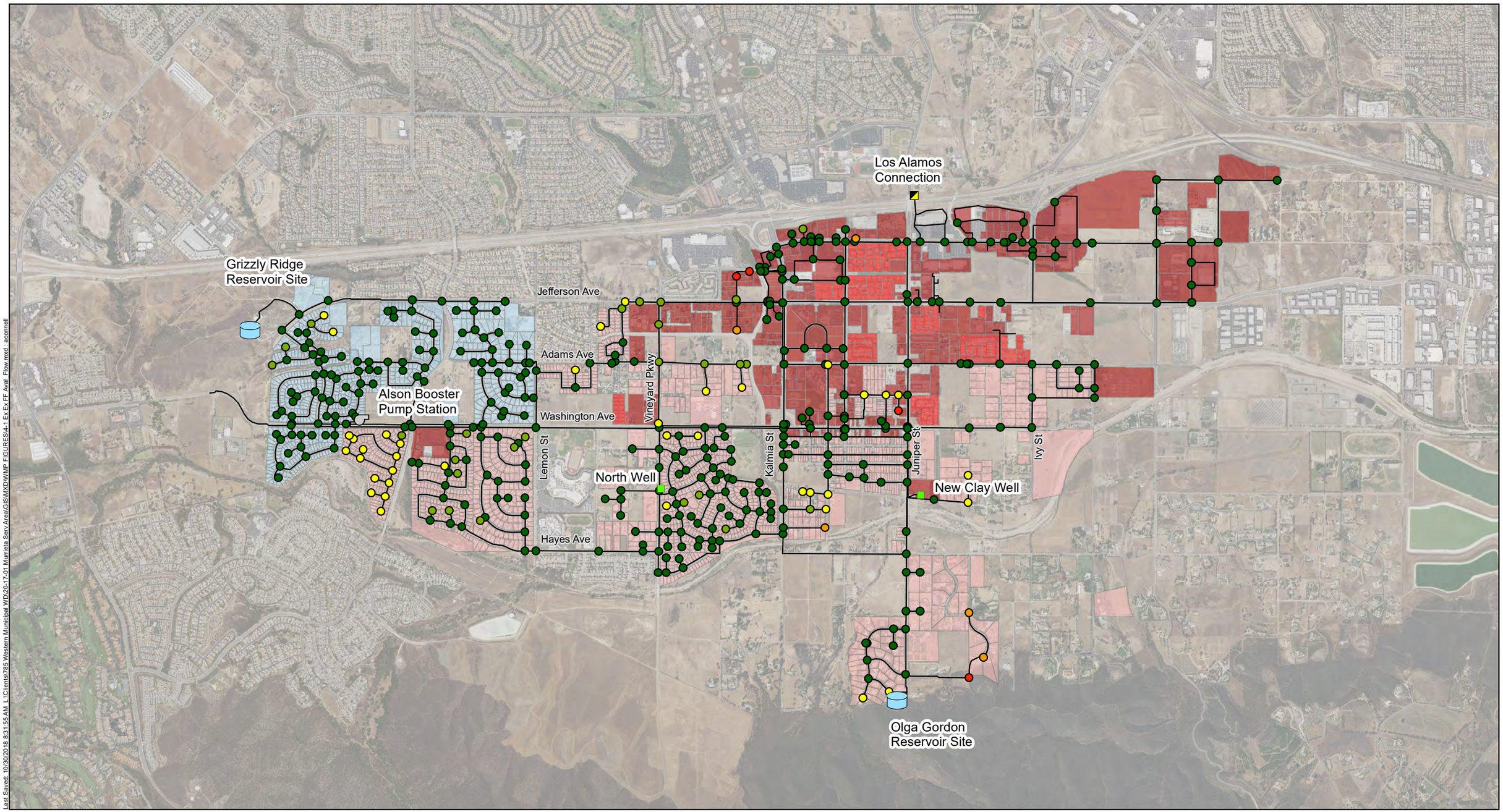
The model was run with the existing system, existing PHD, and the status quo supply to determine if any deficiencies currently existed in the system. After running hydraulic analysis, it was found no hydraulic deficiencies exist in the current system.

4.3 FIRE FLOW

4.3.1 Existing Model Fire Flow Hydraulic Evaluation

The intention of running a fire flow analysis is to determine the system's ability to provide a given amount of flow at any specific point in the system and compare that to the City of Murrieta's fire flow criteria. Every location in the existing system capable of having a fire hydrant was tested to see if it met the fire flow criteria for the type of land served by the system at that location. The amount of flow available at each of these locations is limited by the residual pressure in the rest of the system. The model measures the amount of flow that the system is capable of producing at any location while every other connection in the system maintains a minimum residual pressure of 20 psi.

A fire flow analysis was run on the existing system for both the status quo supply and for the RCWD supply scenario. This alternative is described in more detail in Section 3.2.2.3. Results in terms of available fire flow are shown on Figure 4-1 and Figure 4-2. CIP projects that are required to increase the fire flow will be presented in Chapter 6.



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Symbology

- Existing Reservoir Site
- Los Alamos Connection
- Production Well
- Booster Pump Station
- Pressure Pipe

Zone 1280

- 1500 gpm - Single Family Residential
- 2500 gpm - Multi Family Residential
- 3000 gpm - Commercial & Industrial

Zone 1430

- 1500 gpm - Single Family Residential
- 2500 gpm - Multi Family Residential
- 3000 gpm - Commercial & Industrial

Available Flow

- 3001+ gpm
- 2501 gpm - 3000 gpm
- 1501 gpm - 2500 gpm
- 1001 gpm - 1500 gpm
- 400 gpm - 1000 gpm

0 1,000 2,000

Scale in Feet

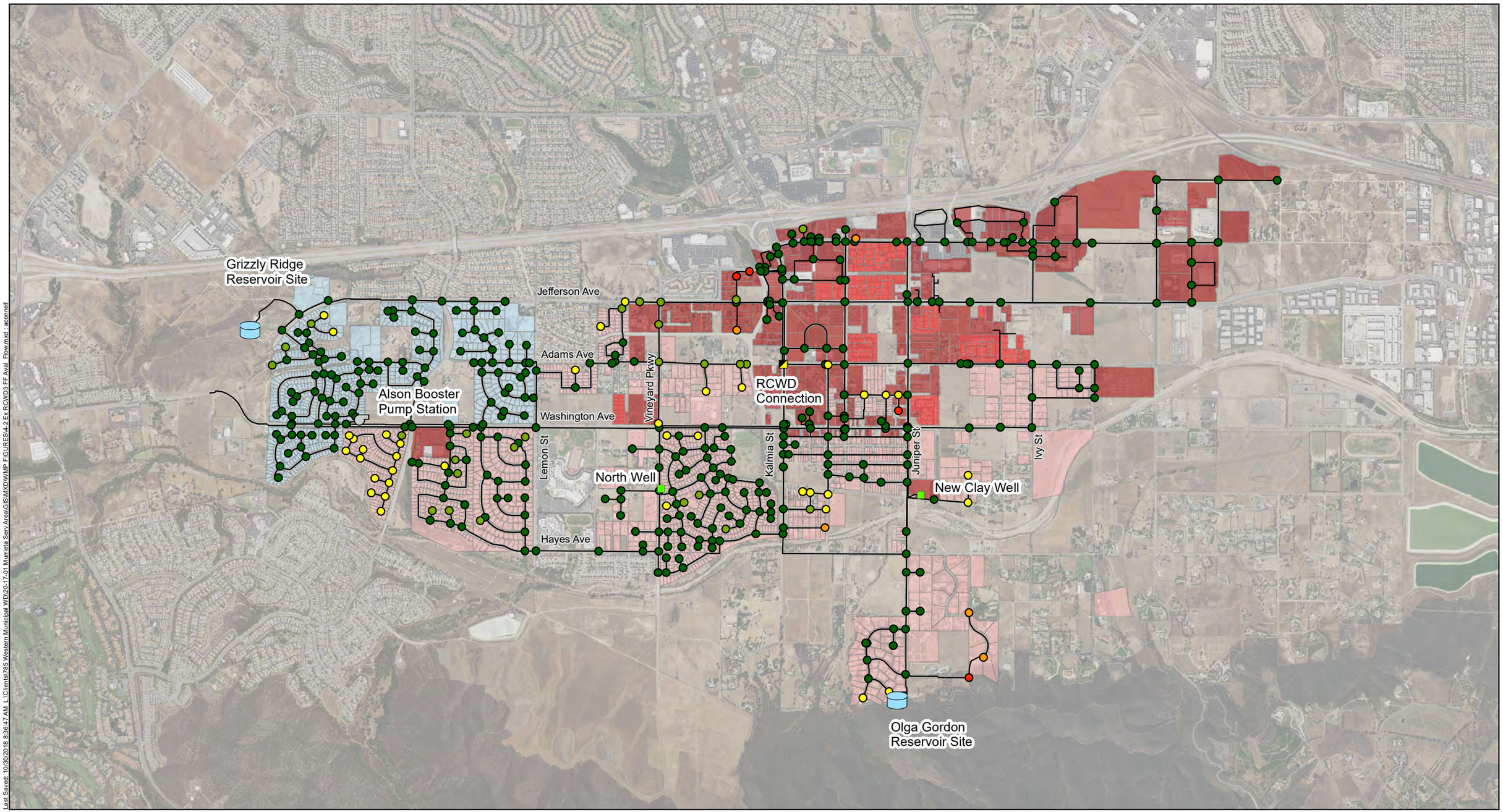
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 4-1 Fire Flow Results

Status Quo Supply
Existing Max Day Demand

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Existing Reservoir Site
- Production Well
- Proposed RCWD Connection
- Booster Pump Station
- Pressure Pipe

Zone 1280

- 1500 gpm - Single Family Residential
- 2500 gpm - Multi Family Residential
- 3000 gpm - Commercial & Industrial

Zone 1430

- 1500 gpm - Single Family Residential
- 2500 gpm - Multi Family Residential
- 3000 gpm - Commercial & Industrial

Available Flow

- 3000+ gpm
- 2501 gpm - 3000 gpm
- 1501 gpm - 2500 gpm
- 1001 gpm - 1500 gpm
- 400 gpm - 1000 gpm

0 1,000 2,000

Scale in Feet

WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 4-2 Fire Flow Results

RCWD Supply Alternative Existing Max Day Demand

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update

5.1 HYDRAULIC MODEL SETUP

After the existing model was updated as described in Chapter 4, the model was modified and used to evaluate the future scenarios. All future scenarios were set up to convey build-out demands.

5.1.1 Infrastructure

The first step in updating the model to reflect build-out conditions was to expand the piping infrastructure to serve undeveloped parcels that will require water service under build-out conditions. The InfoWater model provided by WMWD contained a preliminary build-out system of proposed pipes. This preliminary proposed system was determined to be adequate to serve the future parts of the system. Pipes would later be sized to accommodate build-out MDD plus fire flows.

5.1.2 1280 Zone Storage Upgrade

Based on the criteria presented in Section 3.3, the 1280 Zone does not meet the required storage capacity for the built-out system. The zone currently has 3 MG of total storage at the Olga Gordon Reservoir Site and needs an additional 3.6 MG of storage to meet the criteria. The Olga Gordon site, however, is built-out and does not have any room for construction of the new storage. A new site approximately 4,000 ft northwest and sharing the same elevation as the Olga Gordon site was identified using GIS elevation data received in 2015 from the County of Riverside.

After the new tanks were added into the model, the tanks were connected and the existing transmission mains to the tanks had to be reconfigured to ensure that both sites would be drained and replenished at the same rate. The 24-in pipeline connecting the Olga Gordon tanks to the existing system was disabled and a new connection point between the system and the two reservoir sites was made halfway in between the two sites. The proposed 4 MGD site was connected to the new connection point via a 24-inch diameter line and the existing 3 MGD site was connected via a 20-inch diameter line. Because of the difference in surface area at both tank sites, the difference in pipe diameter is necessary to ensure that the water level at both sites stay the same throughout the daily highs and lows.

The proposed storage configuration was tested using an extended period simulation (EPS) that simulated the peaks and lows of typical daily demands to ensure that both tanks cycle at the same rate. After simulating the daily demand cycle over 96 hours, it was confirmed that both tanks empty and refill at the same rate.

5.1.3 Scenarios

After the future infrastructure was integrated with the existing model, model scenarios had to be set up to reflect the future supply alternatives described in Section 3.2.2. Three scenarios were created for each supply alternative to allow evaluation of different flow conditions;

- Existing MDD
- Build-out MDD
- Build-out PHD

5.2 DAILY OPERATIONS

5.2.1 Build Out Pump Capacity Evaluation

The ultimate pumping requirements used to analyze the build-out system are described in Section 3.3.1. The pumping requirement states that the firm capacity of the pump station must be capable of meeting the MDD of the zone it is serving. Firm capacity of a pump station is defined as the total pumping capacity with the largest pump at the site out of service. Currently, the only pump station in the system is the Alson Booster Station that pumps water from the 1280Zone into the 1430 Zone, which means the station must have a firm capacity to match the MDD of the 1430 Zone. The booster station contains a total of three 60 HP pumps each capable of pumping 800 gpm, giving it a firm capacity of 1,600 gpm, or 3.6 cfs.

The 1430 Zone has a build-out MDD of 1,286 gpm, or 2.86 cfs which is below the firm capacity of the existing Alson Booster Pump Station. No upgrades to the booster station are required in the future.

5.2.2 Build Out Storage Capacity Evaluation

Table 5-1 below presents the existing storage capacity for both pressure zones along with the amount of storage required for build out conditions as described in Chapter 3.

Table 5-1 Build-Out Storage Summary

Zone	Equalization Storage, MG	Fire Flow Storage, MG	Emergency Storage, MG	Ultimate Storage Required, MG	Existing Storage, MG	Additional Storage Required, MG	Additional Storage Required, ft^3
1280	1.97	0.72	3.93	6.62	3.00	3.62	484,147
1430	0.46	0.30	0.93	1.69	1.70	-	-
Total	2.43	1.02	4.86	8.31	4.70	3.62	484,147

Using the projected built out demands to calculate the required storage, an additional 3.62 MG of storage will be needed in the 1280 zone. The additional storage is proposed in CIP #1, described in Chapter 6.

5.2.3 Build-out System Hydraulic Evaluation

After the model was set up to evaluate each of the future supply alternatives it was run and the outputs were compared to the performance criteria explained in Section 3.3. Results and deficiencies are further discussed in the sections below.

5.2.3.1 Status Quo Supply

The results of the hydraulic analysis for the status quo supply are found in figure 5-1 below. The majority of the deficient pipes are located directly downstream of the Los Alamos connection to EMWD. The supply for that connection was set to 5,300 gpm, more than twice the amount of flow that is currently being drawn for existing demands.

5.2.3.2 EVMWD Supply Alternative

The results of the hydraulic analysis for the EVMWD supply alternative are found in figure 5-2 below. As expected, many of the deficiencies are located in the 1430 Zone in pipes that were designed to only be serving small residential areas but are now conveying most of the flow for the entire system.

5.2.3.3 RCWD Supply Alternative

The results of the hydraulic analysis for the RCWD supply alternative are found in figure 5-3 below. Most of the deficiencies are located at the proposed connection point to the RCWD system. Due to the large amount of flow coming into the system at one point, there are several deficiencies around the proposed connection point to RCWD on Washington Ave.

5.2.3.4 Hybrid Supply Alternative

The results of the hydraulic analysis for the hybrid supply alternative are found in figure 5-4 below. The deficiencies for the hybrid supply alternative are similar but less severe than the deficiencies of the RCWD supply alternative. Most deficient pipes are located around the proposed connection to RCWD on Washington Ave. Since the EVMWD connection is only serving the 1430 Zone, the amount of water entering the system at that point is only a fraction of what is entering the system in the EVMWD supply alternative. This means the existing pipes at the connection are adequately sized to handle the flow and no deficiencies are found in the 1430 Zone.

Los Alamos
Connection
5600 gpm

Grizzly Ridge
Reservoir Site

Alson Booster
Pump Station

North Well
700 gpm

New Clay Well
450 gpm

Olga Gordon
Reservoir Site

Proposed
Reservoir Site

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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Interconnection Point
- Production Well
- Alson Booster Pump Station
- Existing Water Main
- Hyraulic Deficiencies
- New Pipe to EVMWD Connection
- Pipe to Proposed New Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek

Parcel
Pressure Zone

- 1280
- 1430

0 1,000 2,000
Scale in Feet

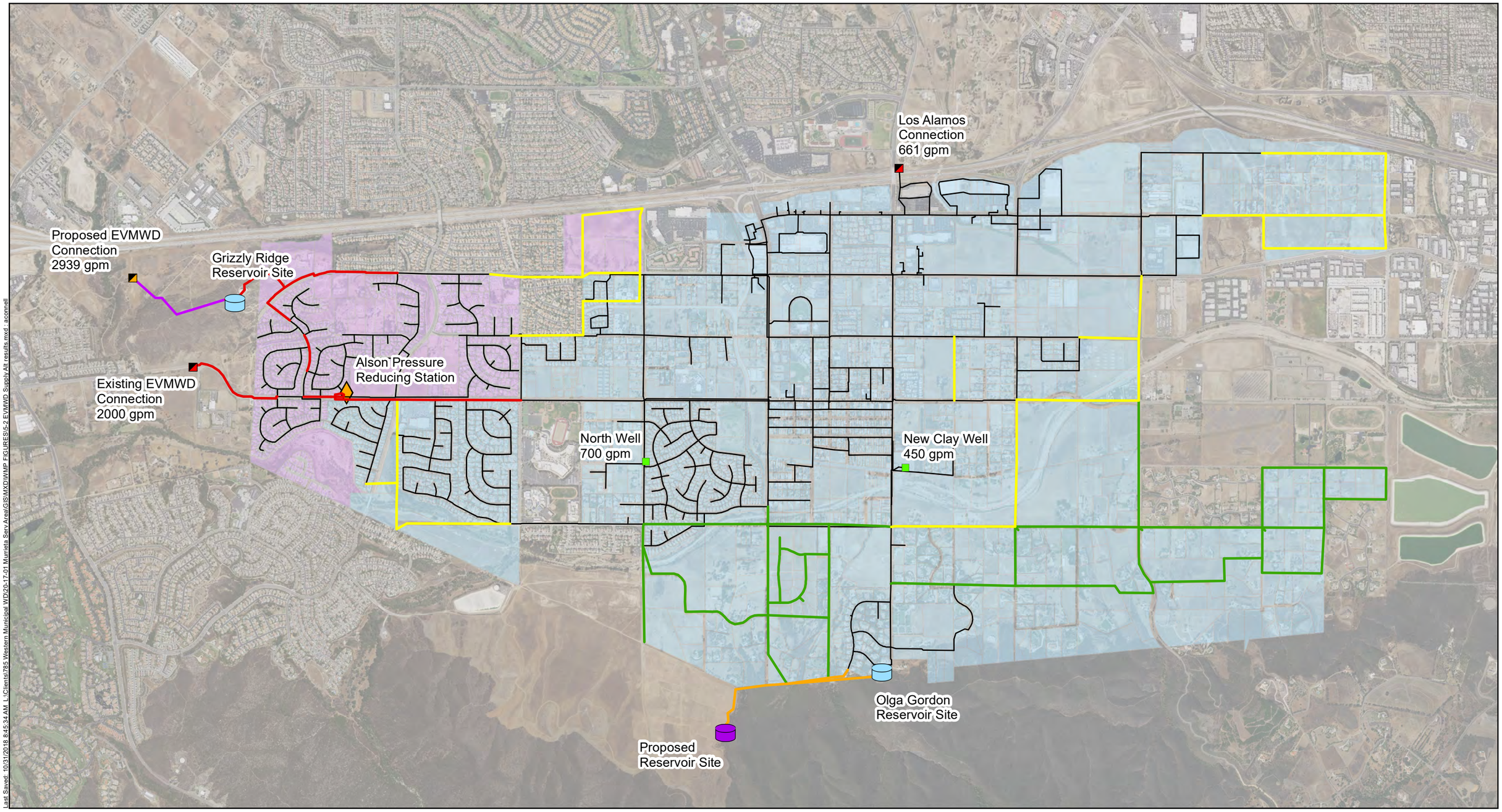
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 5-1

Status Quo Supply Hydraulic Results

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Existing Interconnection
- Proposed Interconnection
- Production Well
- New Alson PRV Station
- Existing Water Main
- Hyraulic Deficiencies
- New Pipe to EVMWD Connection
- Pipe to Proposed New Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek

Parcel Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

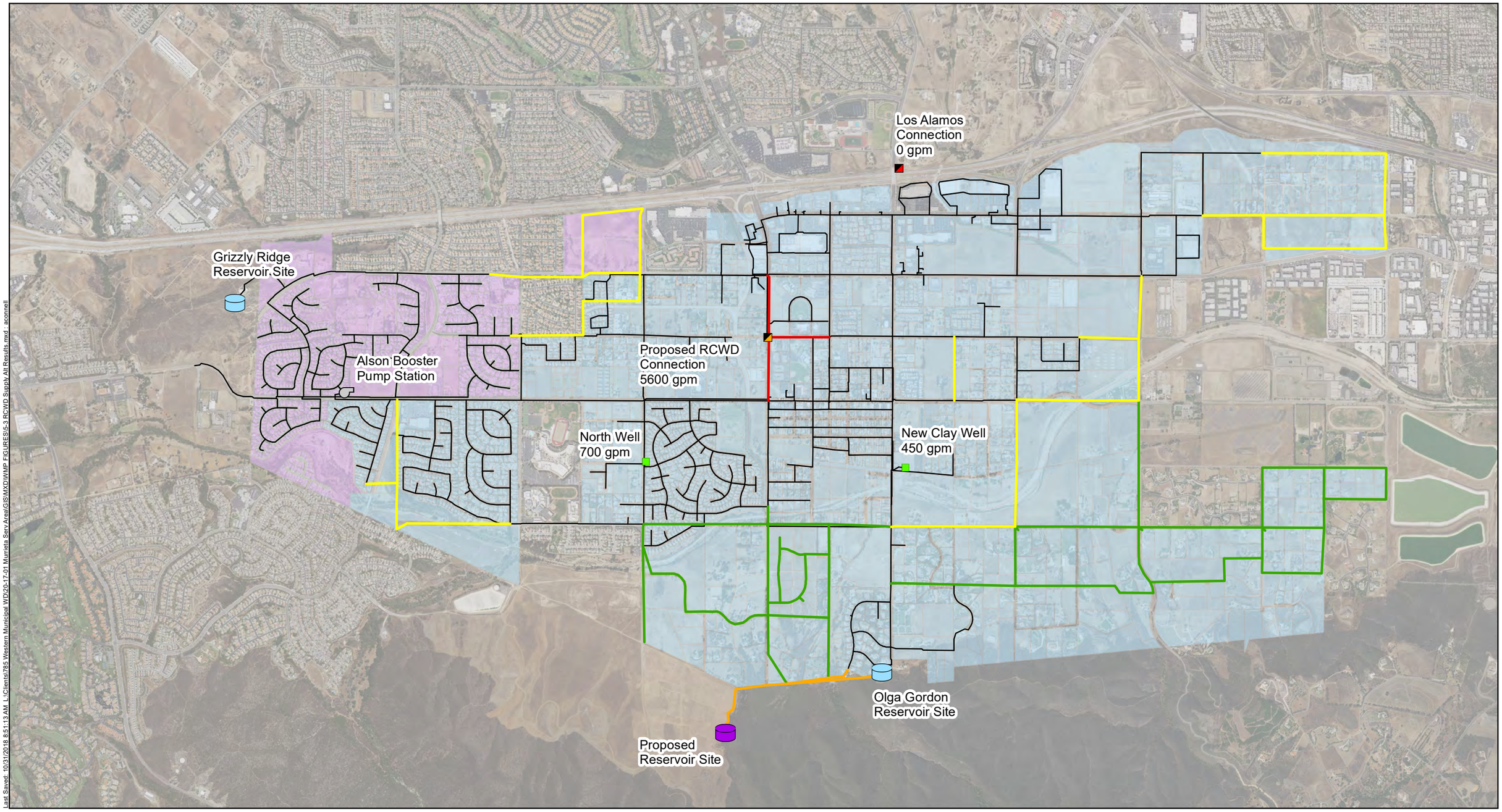
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 5-2

EVMWD Supply Alternative Hydraulic Results

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Existing Interconnection
- Proposed Interconnection
- Production Well
- Alson Booster Pump Station
- Existing Water Main
- Hyraulic Deficiencies
- New Pipe to EVMWD Connection
- Pipe to Proposed New Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek

Parcel Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

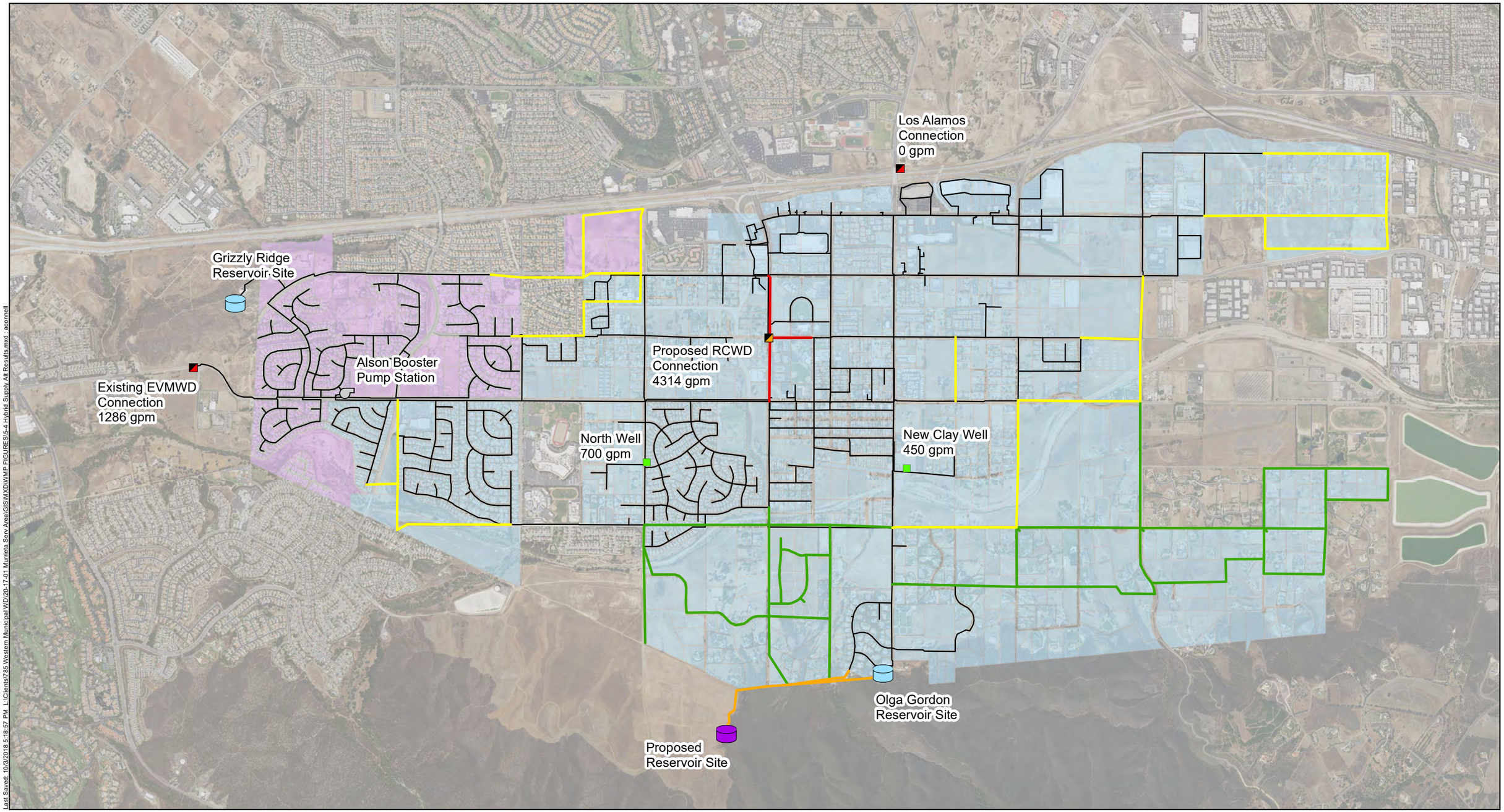
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 5-3

RCWD Supply Alternative Hydraulic Results

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Existing Interconnection
- Proposed Interconnection
- Production Well
- Alson Booster Pump Station
- Existing Water Main
- Hyraulic Deficiencies
- New Pipe to EVMWD Connection
- Pipe to Proposed New Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek

Parcel Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 5-4

Hybrid Supply Alternative Hydraulic Results

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update

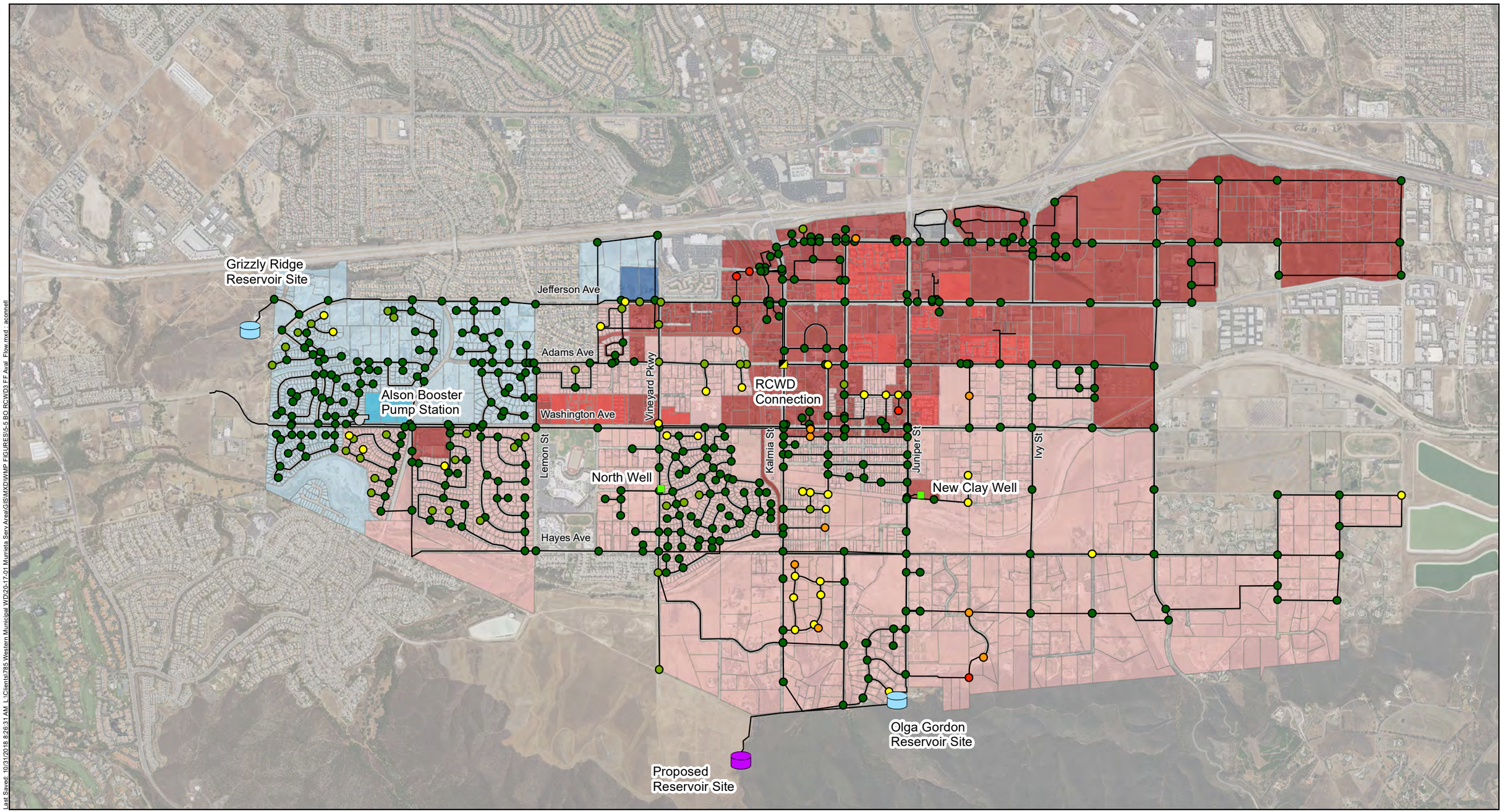
5.3 FIRE FLOW

5.3.1 Build Out System Fire Flow Hydraulic Evaluation

A fire flow analysis was run for the entire built out system using the supply configuration described by the RCWD alternative. The intention of running a fire flow analysis is to determine the system's ability to provide a given amount of flow at any specific point in the system and compare that to the City of Murrieta's fire flow criteria. Every location in the built-out system capable of having a fire hydrant was tested to see if it met the fire flow criteria for the type of land it is serving. The amount of flow available at each of these locations is limited by the residual pressure in the rest of the system as well as the velocity in the proposed expansion pipes. The model measures the amount of flow that the system is capable of producing while every other connection in the system maintains a minimum residual pressure of 20 psi and the velocity in the expansion pipes is below 7.5 fps.

One of the performance criteria for pipelines is a "maximum velocity of 7.5 ft/sec in any water pipelines during peak hour or maximum day demand (MDD) plus emergency fire flow conditions." During the fire flow analysis of the future built-out system this criteria was applied to the proposed expansion pipelines described by CIP #2 and CIP #3 in Chapter 6.

A fire flow analysis was run for the RCWD supply scenario. Results of the analysis are provided on Figure 5-5. CIP projects will be presented in Chapter 6 that increase the flow at the nodes that do not provide adequate fire flow.



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Symbology

- Proposed Reservior Site
- Existing Reservoir Site
- Production Well
- Proposed RCWD Connection
- Booster Pump Station
- Pressure Pipe

Zone 1280

- 1500 gpm - Single Family Residential
- 2500 gpm - Multi Family Residential
- 3000 gpm - Commercial & Industrial

Zone 1430

- 1500 gpm - Single Family Residential
- 2500 gpm - Multi Family Residential
- 3000 gpm - Commercial & Industrial

Available Flow

- 3001 + gpm
- 2501 gpm - 3000 gpm
- 1501 gpm - 2500 gpm
- 1001 gpm - 1500 gpm
- 400 gpm - 1000 gpm

0 1,000 2,000

Scale in Feet

WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 5-6 Fire Flow Results

RCWD Supply Alternative Built Out System Max Day Demand

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update

CHAPTER 6
Capital Improvement Projects

This chapter presents the Capital Improvement Program (CIP) developed for each proposed supply alternative. Each CIP contains the projects necessary to eliminate the deficiencies identified as a result of the evaluations described in Chapter 5. Along with a summary of the required capital improvement projects; estimates of probable construction costs and the methodology used to develop them are provided.

6.1 DESIGN CRITERIA

The design criteria used when sizing pipes during the development of the CIPs is the same criteria as the performance criteria used to meet the design standards during the hydraulic analysis. The criteria can be found in Section 3.3.

6.2 COST ESTIMATING ASSUMPTIONS

Estimated construction costs are presented in April 2018 dollars based on an Engineering News Record (ENR) Construction Cost Index (CCI) of 10, 971 (20-Cities Average). Construction costs were developed based on bids from other water system design projects and from standard cost estimating guides.

The recommended CIPs identify improvement costs at a master plan level and are generally inclusive of the following: labor and materials, mobilization/demobilization, bonds and insurance, traffic control, grading, pavement restoration, yard piping, potholing, instrumentation, and related appurtenances such as valves, hydrants, and fittings. Subsequent detailed design is required to determine the exact sizes and locations of recommended improvements. It is assumed that recommended distribution system facilities will be developed in public rights-of-way or on public property; therefore, land acquisition costs have not been included. The construction cost estimates do not include costs for annual operation and maintenance.

A design and construction contingency of 30 percent of the base construction costs is used based upon the conceptual level of the planning performed for this analysis. Markups for professional services during design and construction are 30 percent of the base construction costs, plus the design and construction contingency. Professional services include design, construction management and inspection, permitting and regulatory compliance, and WMWD administration. The cost estimates have an expected accuracy of -30% to +50%.

6.3 EXPANSION

One of the assumptions of this master plan update is for the future scenario, the service area will be completely built out and all parcels will require water service. CIPs Numbers 1-3 describe the necessary improvements that must be constructed outside of the existing system to accommodate this built-out scenario.

6.3.1 CIP Number 1: 1280 Zone Storage Upgrade

CIP Number 1 involves the construction of the new storage required to satisfy the build-out storage requirements for the 1280 zone.

Based on the criteria presented in Section 3.3, the 1280 Zone does not meet the required storage capacity for the built-out system. The zone currently has 3 MG of total storage at the Olga Gordon

Reservoir Site and needs an additional 3.6 MG of storage to meet the criteria. The Olga Gordon site, however, is built-out and does not have any room for construction of the new storage. A new site approximately 4,000 ft northwest and sharing the same elevation as the Olga Gordon site was identified with the help of WMWD staff using GIS elevation data received in 2015 from the County of Riverside.

The new tank proposed to be constructed is a 4 MG steel tank with radius of 73 ft and a height of 32 ft. Around 2,100 ft of 24-inch diameter pipe and 2,100 ft of 21-inch diameter pipe will be required to connect the existing Olga Gordon tanks with the proposed tank. A junction will be made halfway between the tanks and an extra 1380 ft of 24-inch pipe is required to connect the junction to the existing system. Once both of the reservoir sites are connected to the existing system, 825 ft of existing 8-inch pipe will have to be upsized to 24-inches. Table 6-1 describes the necessary lengths and costs of pipe by diameter. Figure 6-1 shows the proposed reservoir site along with all the necessary piping required to connect it to the system.

The proposed alignment of the recommended storage and pipelines to connect that storage to the distribution system would be difficult to permit and construct. However, there are very few sites available that meet the topographic constraints necessary for storage in the 1280 Zone. The proposed storage location will allow WMWD to budget and plan for future required storage will exploring alternatives to provide adequate storage to the 1280 Zone.

Table 6-1. CIP No. 1 – Proposed Storage

Diameter, inches	Length, feet	Cost, $
Proposed Pipe		
20	2,106	741,000
24	4,284	1,719,000
	Construction Subtotal	**2,460,000**
	Contingency and Soft Cost Subtotal	**1,697,000**
	Total	**$4,157,000**
Proposed Storage		
	4 MG Steel Tank	4,340,000
	Construction Subtotal	**4,340,000**
	Contingency and Soft Cost Subtotal	**2,995,000**
	Total	**$7,335,000**

6.3.2 CIP Number 2: North of Murrieta Creek

Currently, only about 40 percent of the entire service area is being served water by WMWD. Most of the area not being served is at the southeast section of the service area and is split by Murrieta Creek, which runs northwest to southeast through the city. The unserved area north of the creek is currently undeveloped free space. The unserved area south of Murrieta Creek is developed with single family homes that have their own well supply for daily use and only require water service from WMWD for fire purposes.

The criteria for the hydraulic analysis performed in this master plan update assumes that the entire service area will be built out and require water service. CIP Number 2 consists of the new pipes that are required to serve the undeveloped areas north of Murrieta Creek. CIP Number 2 pipes are sized to handle MDD plus fire flows.

Table 6-2 presents the estimated cost of CIP Number 2. The infrastructure is shown on Figure 6-2.

Table 6-2. CIP No. 2 – North of Murrieta Creek

Diameter, inches	Length, feet	Cost ($)
Proposed Pipe		
8	6,071	1,135,000
12	36,359	8,995,000
	Construction Subtotal	**10,130,000**
	Contingency and Soft Cost Subtotal	**6,990,000**
	Total	**$17,120,000**

6.3.3 CIP Number 3: South of Murrieta Creek

Currently, only about 40 percent of the entire service area is being served water by WMWD. Most of the area not being served is at the southeast section of the service area and is split by Murrieta Creek, which runs northwest to southeast through the city. The unserved area north of the creek is currently undeveloped free space. The unserved area south of Murrieta Creek is developed with single family homes that have their own well supply for daily use and only require water service from WMWD for fire purposes.

The criteria for the hydraulic analysis performed in this master plan update assumes that the entire service area will be built out and require water service. CIP Number 3 consists of the new pipes sized for MDD plus fire flows that will only be used for possible fire service to the developed areas south of Murrieta Creek that are currently served by private wells. The infrastructure required is summarized in Table 6-3 and shown on Figure 6-2.

Table 6-3. CIP No. 3 – South of Murrieta Creek

Diameter, inches	Length, feet	Cost ($)
Upsize Pipe		
8	29,673	5,546,000
12	26,347	6,518,000
	Construction Subtotal	**12,064,000**
	Contingency and Soft Cost Subtotal	**8,324,000**
	Total	**$20,388,000**

DRAFT

6.4 IMPROVEMENTS TO EXISTING FACILITIES

The following CIP projects describe necessary improvements to the existing system to accommodate the projected flows for build out conditions.

6.4.1 CIP Numbers 4a–d: Future Supply Alternatives

CIP Numbers 4a through 4d lay out the improvements to the existing system necessary to mitigate all the deficient pipes resulting from the proposed potential supply connections:

1. Status Quo Supply
2. EVMWD Supply
3. RCWD Supply
4. Hybrid Supply

6.4.1.1 CIP Number 4a – Status Quo Supply

For the built-out system with the status quo supply, the well production was kept the same and the supply at the Los Alamos connection was increased to almost 12 cfs meet the built-out, peak hour demand. This meant that although the transmission lines at the connection were adequately sized for existing conditions, the increase in demand will require upsizing of those pipes. The infrastructure required is summarized in Table 6-4 and shown on Figure 6-3.

Table 6-4. CIP No. 4a – Status Quo Supply Scenario

Diameter, inches	Length, feet	Cost ($)
Proposed Pipe		
16	1,295	391,000
20	268	94,000
24	1,045	419,000
	Construction Subtotal	**904,000**
	Contingency and Soft Cost Subtotal	**624,000**
	Total	**$1,528,000**
	VFD at Alson Booster Pump Station	130,000
	Construction Subtotal	**85,000**
	Contingency and Soft Cost Subtotal	**$215,000**

6.4.1.2 CIP Number 4b – EVMWD Supply Alternative

Many of the CIP projects for this supply alternative are located downstream of the two connection points to the EVMWD system.

Although all the pipes in the EVMWD have enough capacity to handle the extra flow, the Auld Valley Pump Station will have to be upgraded to provide capacity for the water wheeling to WMWD through the EVMWD system. The current pump station is sized for only the EVMWD system and does not have

the ability to supply the Murrieta service area as well. The upgrades to the pump station include two new pumps which must be funded by WMWD but will exclusively be used for WMWD wheeling.

This alternative also involves transforming the existing Alson Booster Pump Station into a pressure reducing station. This will require around 100 ft of new piping and new pressure reducing equipment. The infrastructure required is summarized in Table 6-5 and shown on Figure 6-4. It should be noted that this infrastructure does not include any of the improvements required within the EVMWD system to provide water to the service area. Those improvements and associated costs are identified in other documents.

Table 6-5. CIP No. 4b – EVMWD Supply Scenario

Diameter, inches	Length, feet	Cost ($)
Proposed Pipe		
18	3,000	990,000
Upsize Pipe		
16	10,058	3,041,000
18	3,460	1,141,000
20	102	36,000
	Construction Subtotal	**5,208,000**
	Contingency and Soft Cost Subtotal	**3,594,000**
	Total	**$8,802,000**
	PRS at Alson Booster Pump Station	150,000
	Contingency and Soft Cost Subtotal	**104,000**
	Total	**$254,000**

6.4.1.3 CIP Number 4c – RCWD Supply Alternative

Due to the location of the connection and the high amount of flow projected to be entering the system at that point, many of the pipes downstream of the connection need to be upsized. The infrastructure required is summarized in Table 6-6 and shown on Figure 6-5.

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Table 6-6. CIP No. 4c – RCWD Supply Scenario		
Diameter, inches	Length, feet	Cost ($)
Upsize Pipe		
16	3,991	1,207,000
	Construction Subtotal	1,207,000
	Contingency and Soft Cost Subtotal	**833,000**
	Total	**$2,040,000**
	RCWD Interconnection	100,000
	Contingency and Soft Cost Subtotal	**69,000**
	Total	**$169,000**

6.4.1.4 CIP Number 4d – Hybrid Supply Alternative

The hybrid supply alternative CIP is very similar to the RCWD CIP. All of the deficient pipes are located at the connection point to RCWD. The amount of flow being supplied through the EVMWD connection in the 1430 Zone is small enough that the existing pipes are adequate in that area. The infrastructure required is summarized in Table 6-7 and shown on Figure 6-6.

Table 6-7. CIP No. 4d – Hybrid Supply Scenario		
Diameter, inches	Length, feet	Cost ($)
Upsize Pipe		
16	3,582	1,083,000
	Construction Subtotal	1,083,000
	Contingency and Soft Cost Subtotal	**747,000**
	Total	**$1,830,000**
	RCWD Interconnection	100,000
	Contingency and Soft Cost Subtotal	**69,000**
	Total	**$169,000**

6.4.2 CIP Number 5: Fire Flow

The build-out fire flow analysis described in section 5.5 identified areas of the system unequipped to handle fire flows for the RCWD future supply alternative. This section presents the corrective action proposed to solve those fire flow deficiencies. Table 6-8contains the CIPs for the existing system to comply with the fire flow requirements. Figure 6-7 presents the CIPs necessary for the existing system required to meet fire flow requirements.

Table 6-8. CIP No. 5 – Fire Flow Improvements for Existing Pipes

Diameter, inches	Length, feet	Cost ($)
Proposed/Upsize Pipe		
8	5,989	1,119,380
10	849	190,937
12	6,535	1,616,579
	Construction Subtotal	**2,927,000**
	Contingency and Soft Cost Subtotal	**2,020,000**
	Total	**$4,947,000**

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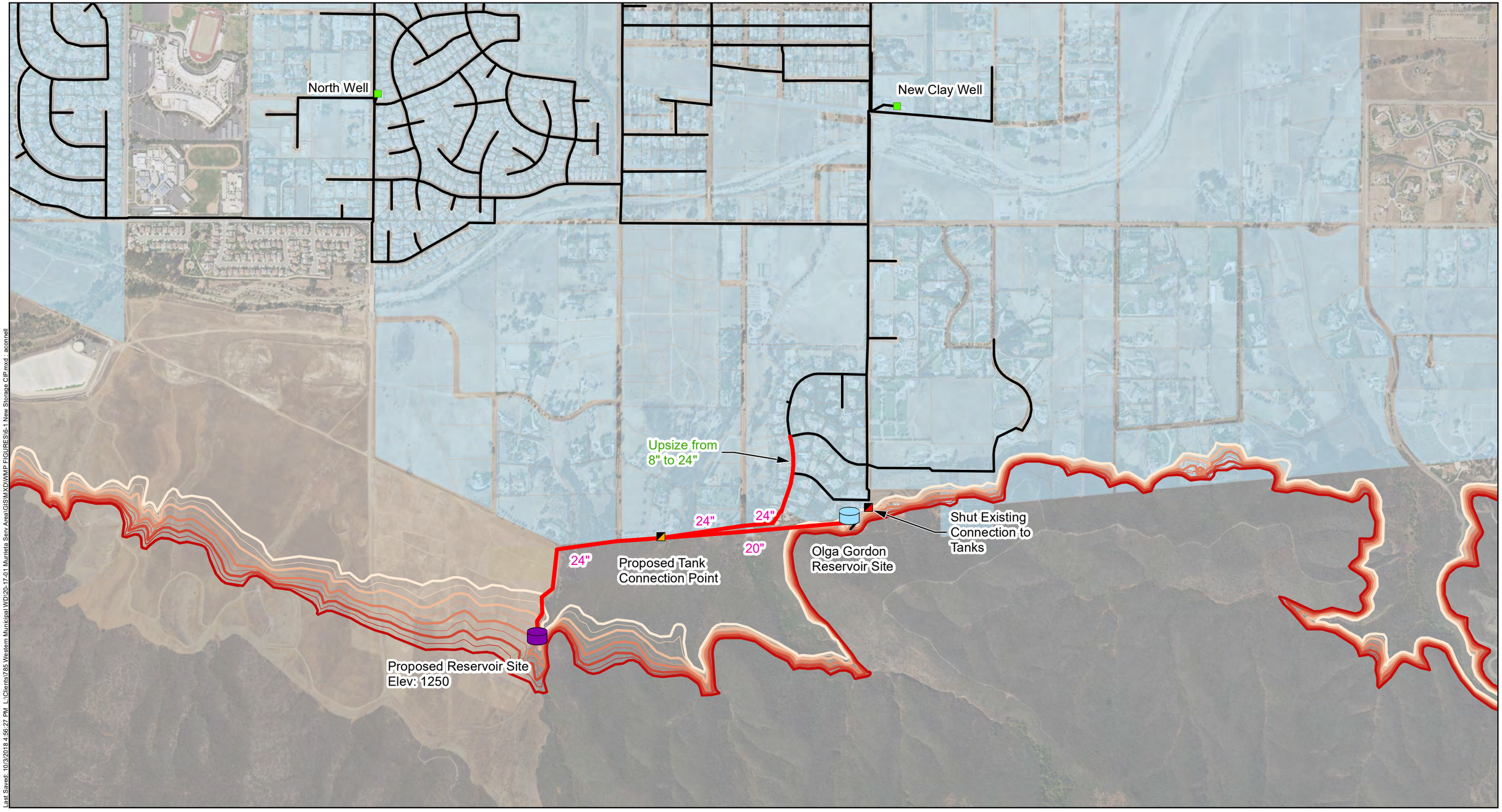

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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Production Well
- Existing Connection to Tanks
- Proposed Connection to Tanks
- Required Pipe to Proposed Reservoir
- Existing Pipe

Pressure Zone

- 1280
- 1430

Elevation

- 1240
- 1245
- 1250
- 1255
- 1260
- 1265
- 1270
- 1275
- 1280

0 500 1,000

Scale in Feet

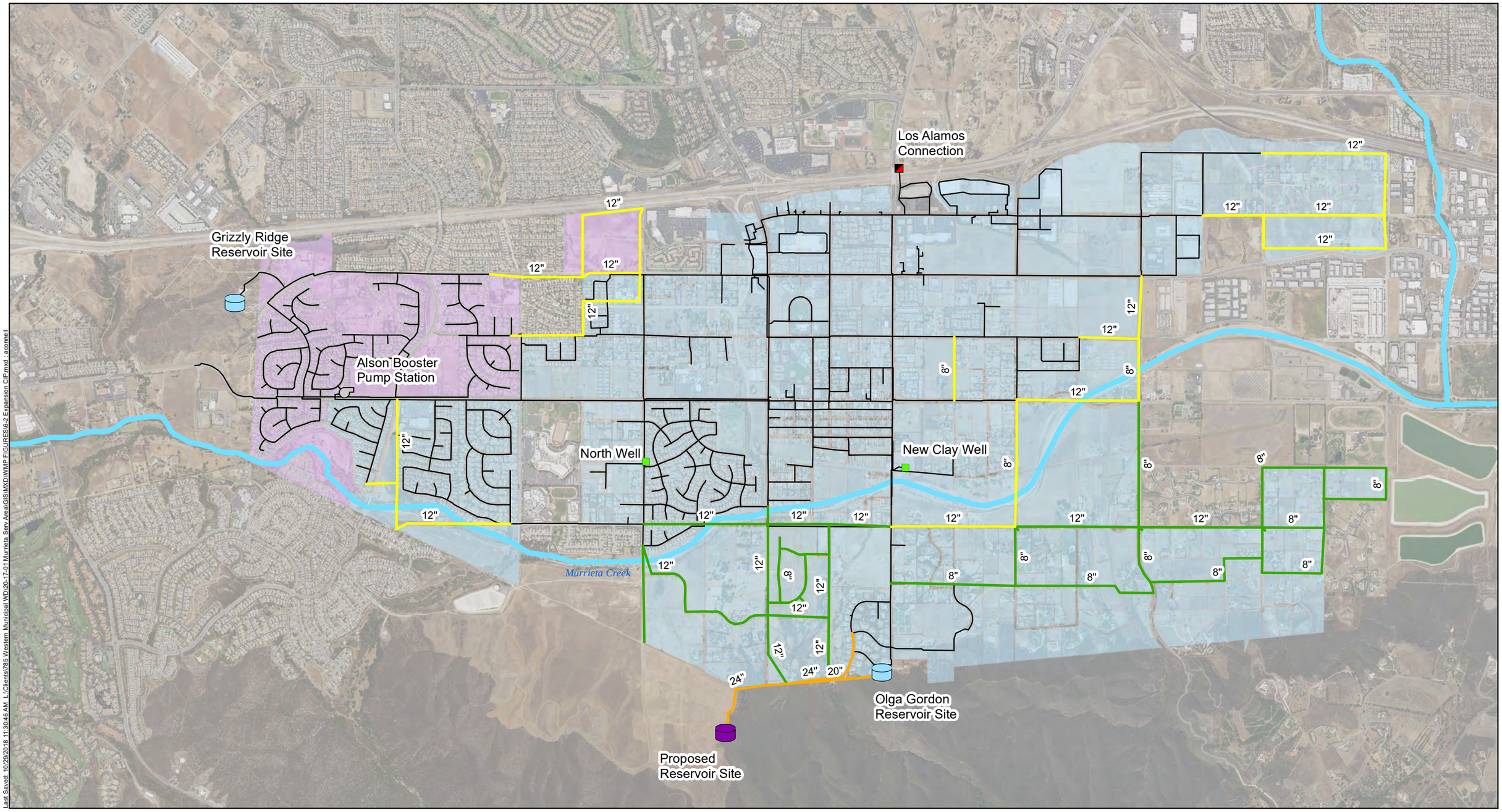
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 6-1

CIP #1
Proposed Storage

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Interconnection
- Production Well
- Booster Pump Station
- Existing Water Main
- CIP #1: Proposed Water Main to New Storage
- CIP #2: Proposed Water Main North of Murrieta Creek
- CIP #3: Proposed Water Main South of Murrieta Creek
- Murrieta Creek

Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

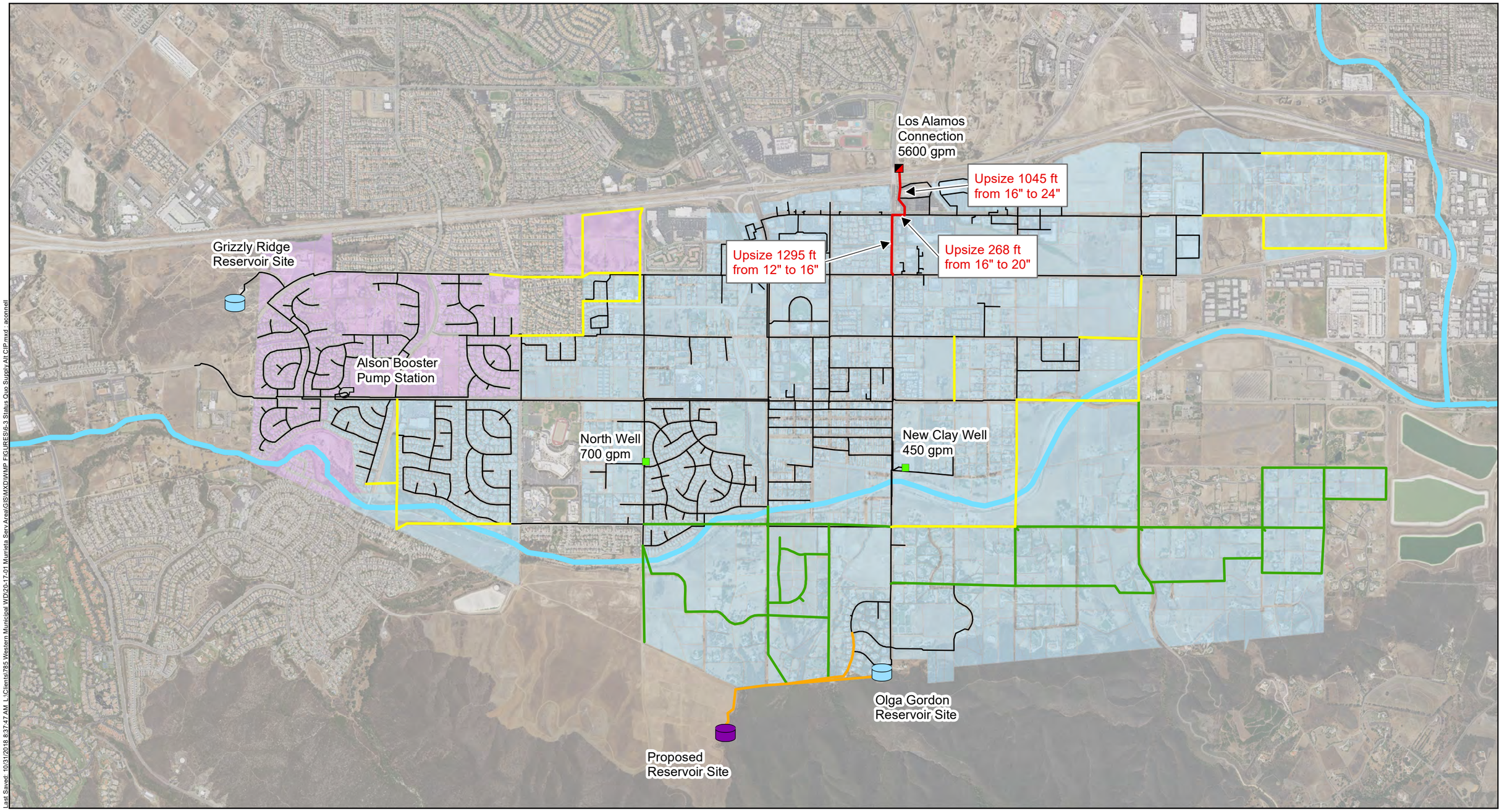
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 6-2

Expansion CIP #2 & #3

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Interconnection
- Production Well
- Booster Pump Station
- Existing Water Main
- Pipe to Proposed Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek
- Status Quo Supply CIP
- Murrieta Creek

Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

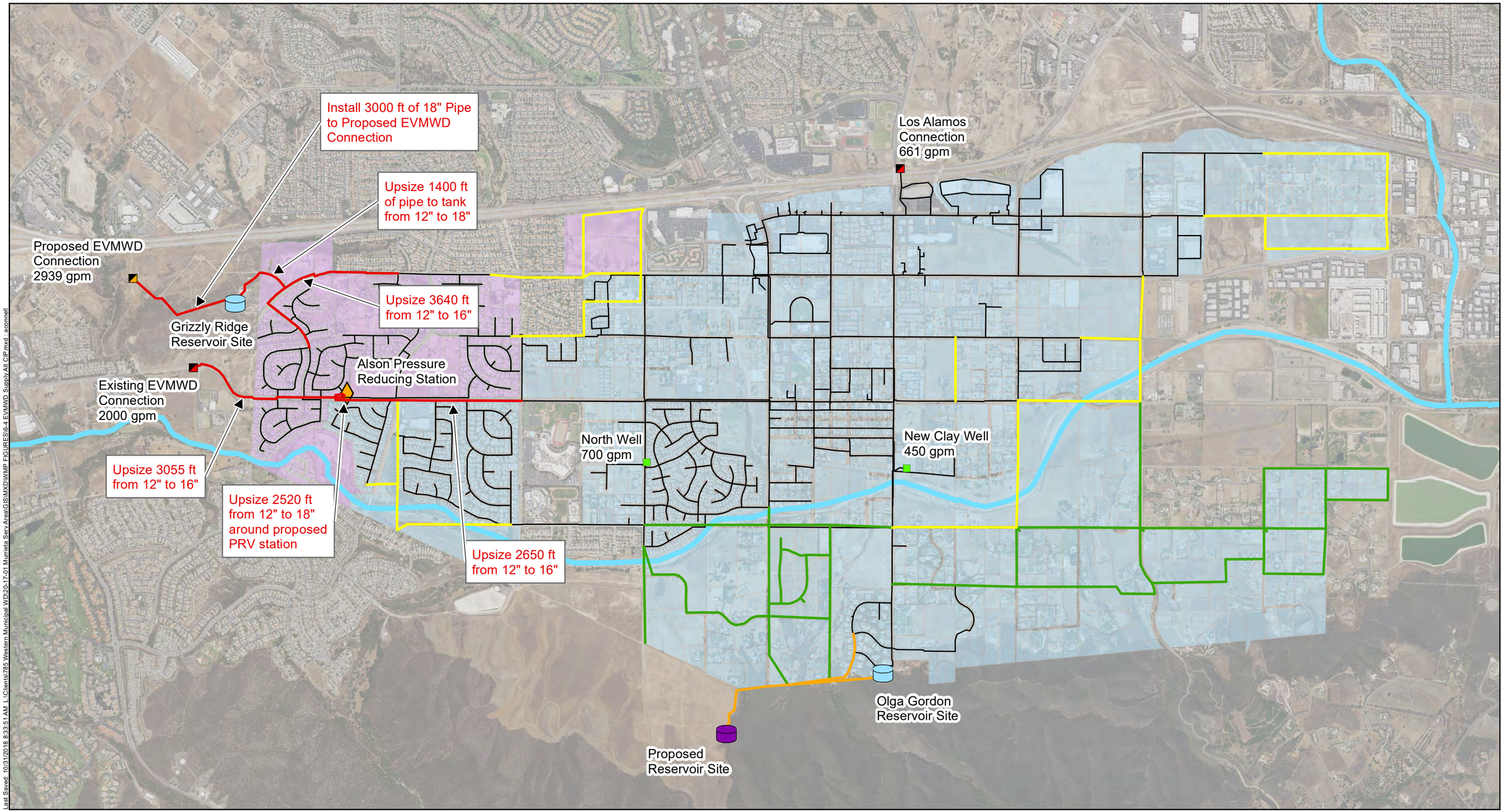
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 6-3

CIP #4a
Status Quo Supply

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Production Well
- Existing Interconnection
- Proposed Interconnection
- Existing Water Main
- Pipe to Proposed Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek
- EVMWD Supply Scenario CIP
- New PRV Station
- Murrieta Creek

Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

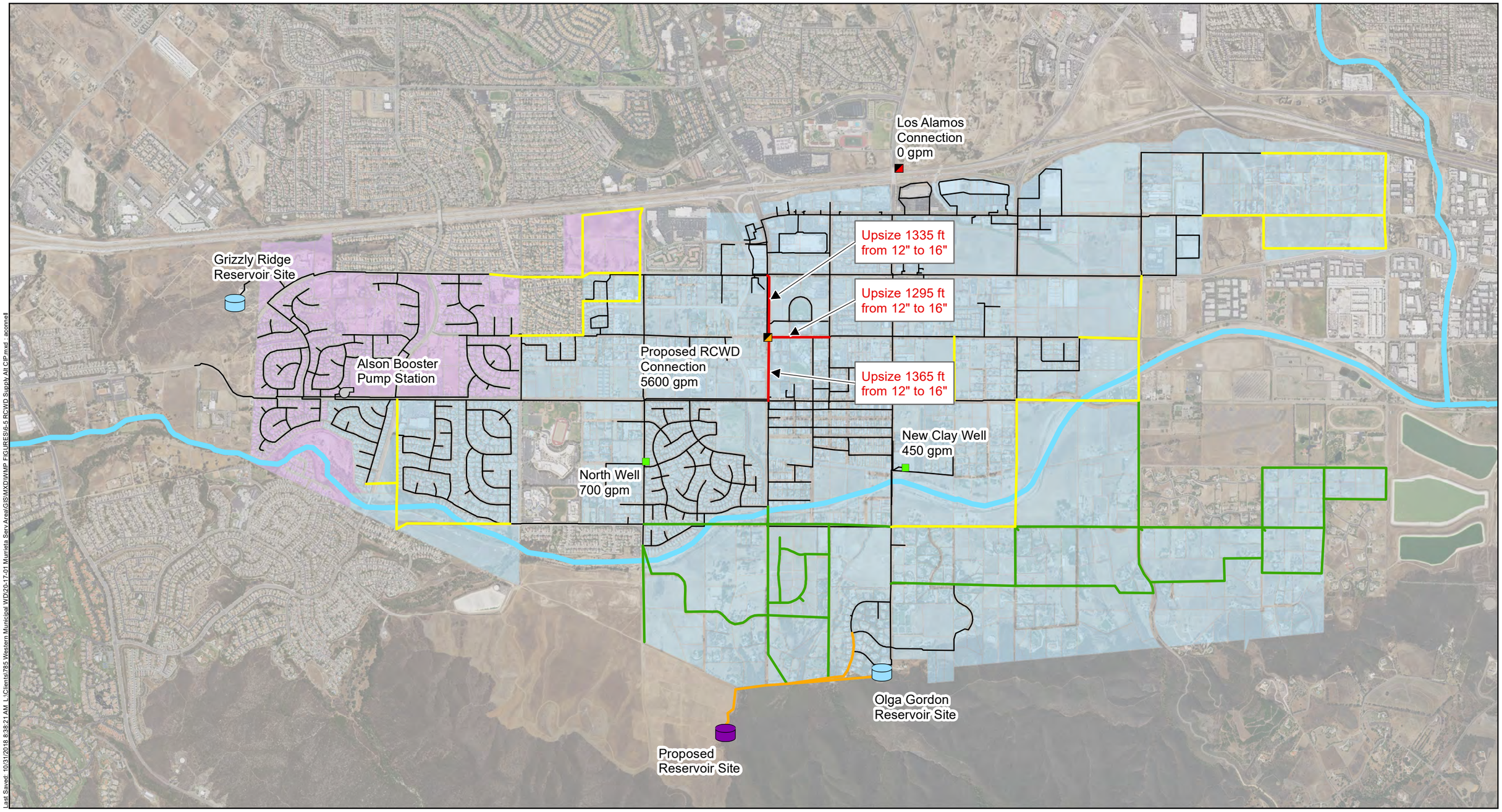
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 6-4

CIP #4b
EVMWD Supply Alternative

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Existing Interconnection
- Proposed Interconnection
- Production Well
- Booster Pump Station
- Existing Water Main
- Pipe to Proposed Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek
- RCWD Supply Scenario CIP
- Murrieta Creek

Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

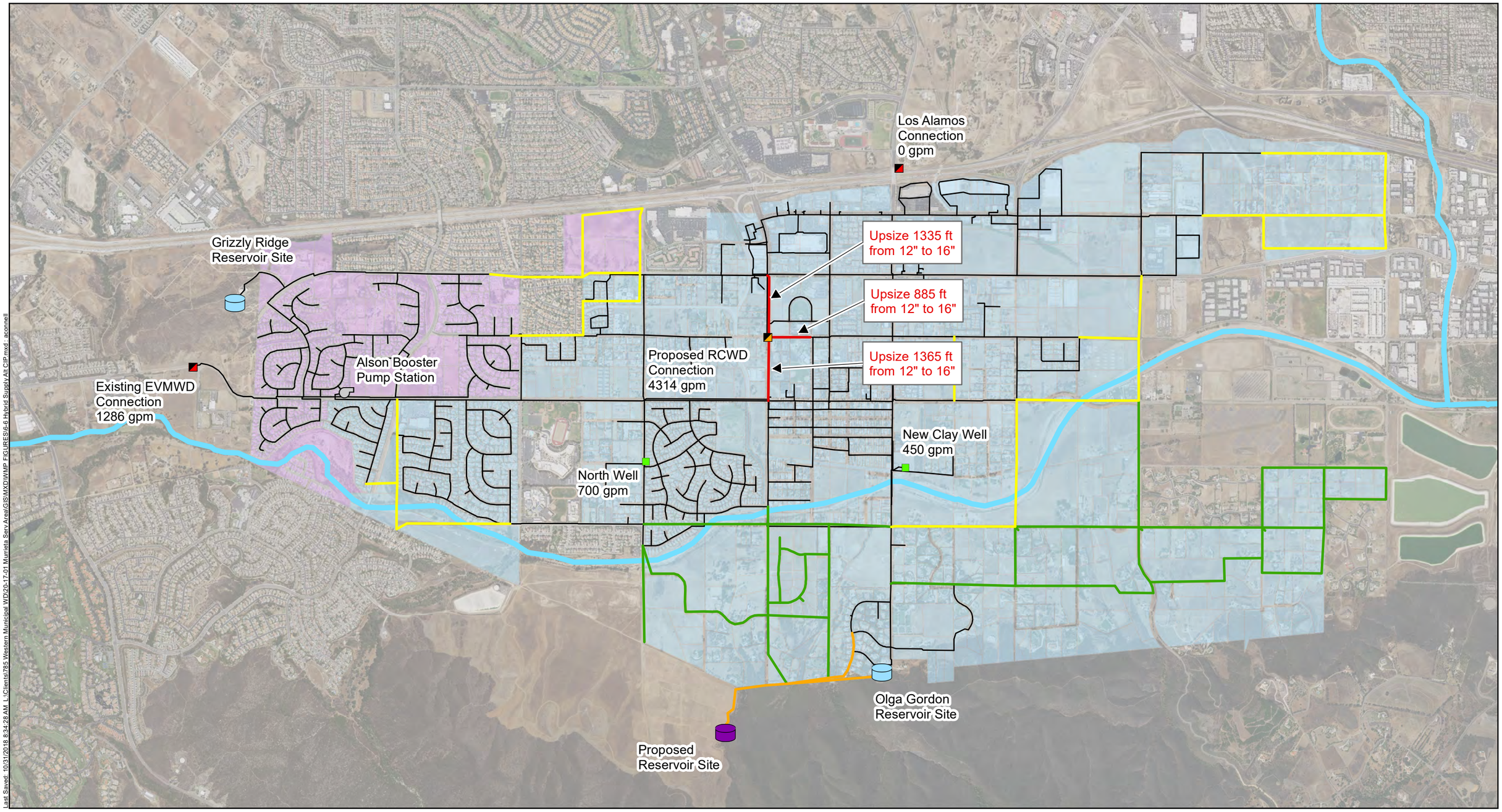
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 6-5

CIP #4c
RCWD Supply Alternative

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Existing Interconnection
- Proposed Interconnection
- Production Well
- Booster Pump Station
- Existing Water Main
- Pipe to Proposed Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek
- Hybrid Supply Scenario CIP
- Murrieta Creek

Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

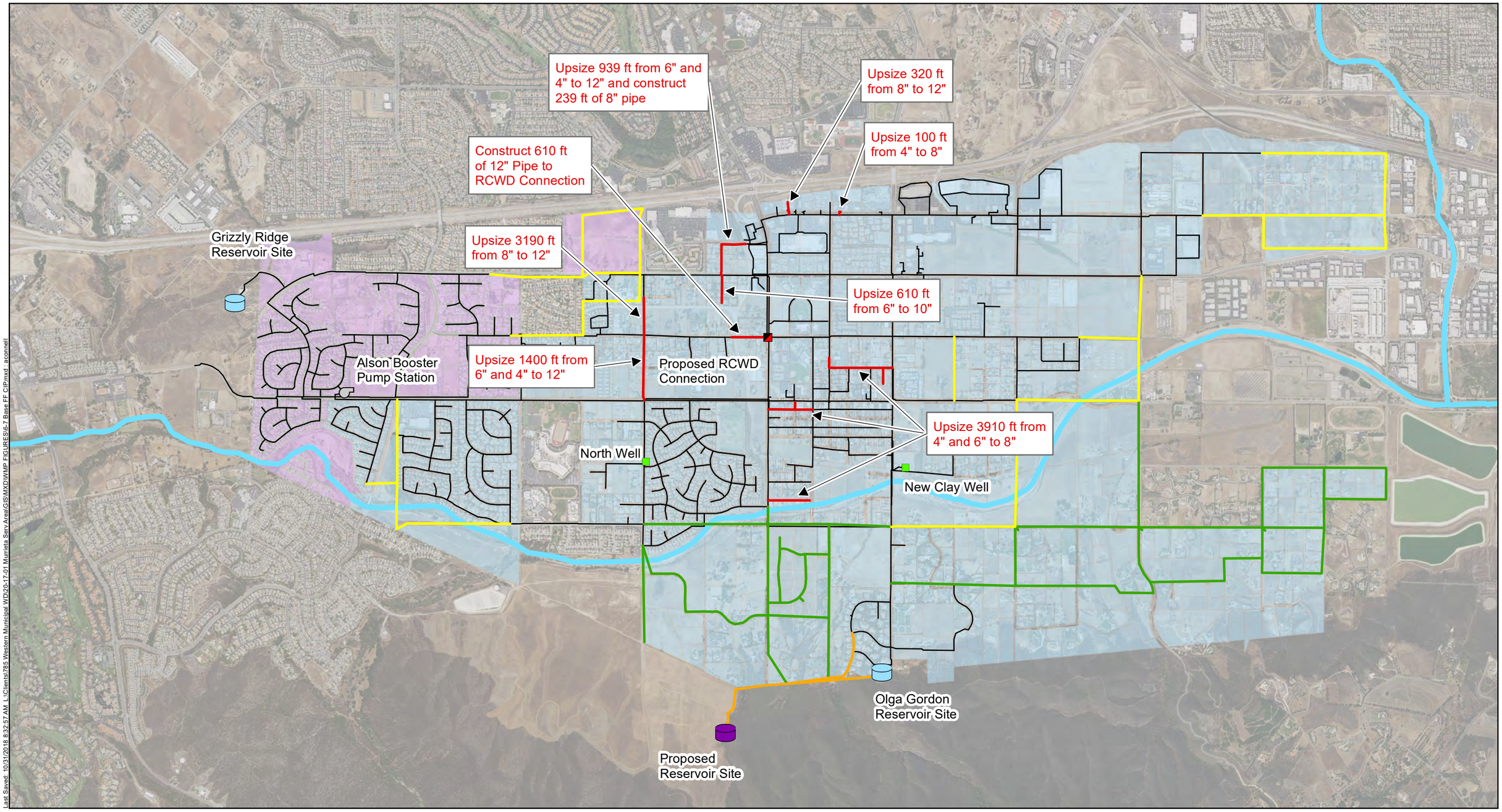
WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 6-6

CIP # 4d
Hybrid Supply Alternative

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update



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Symbology

- Proposed Reservoir Site
- Existing Reservoir Site
- Interconnection
- Production Well
- Booster Pump Station
- Existing Water Main
- Pipe to Proposed Storage
- Expansion Pipe - North of Murrieta Creek
- Expansion Pipe - South of Murrieta Creek
- Fire Flow CIP Pipe
- Murrieta Creek

Pressure Zone

- 1280
- 1430

0 1,000 2,000

Scale in Feet

WESTERN MUNICIPAL WATER DISTRICT

WEST YOST ASSOCIATES

Figure 6-7

CIP #5
Fire Flow Upgrades

Western Municipal Water District
Murrieta Service Area
2018 Master Plan Update

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