



WMWD SYSTEM ANALYSIS
Greentree Ranch – TTM 38605

JN: 10308
CLIENT: WADDELL
DATE PREPARED
03/14/2024



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Section 1 - Introduction

1. Introduction

This report provides a for an analysis of proposed water infrastructure and services for Tentative Tract Map No. 38605, also known as the Greentree Ranch project. This report provides information on projected water demands, water supply, existing facilities, recommended facilities, and storage and pumping capacity associated with serving the project.

The Greentree Ranch project is located in Riverside County in the Western Municipal Water District (WMWD). The project is located on the north side of Lake Matthews, north of El Sobrante Road and East of McAllister Street. Figure 1-1 provides a location map for the project.

2. Land Use Plan

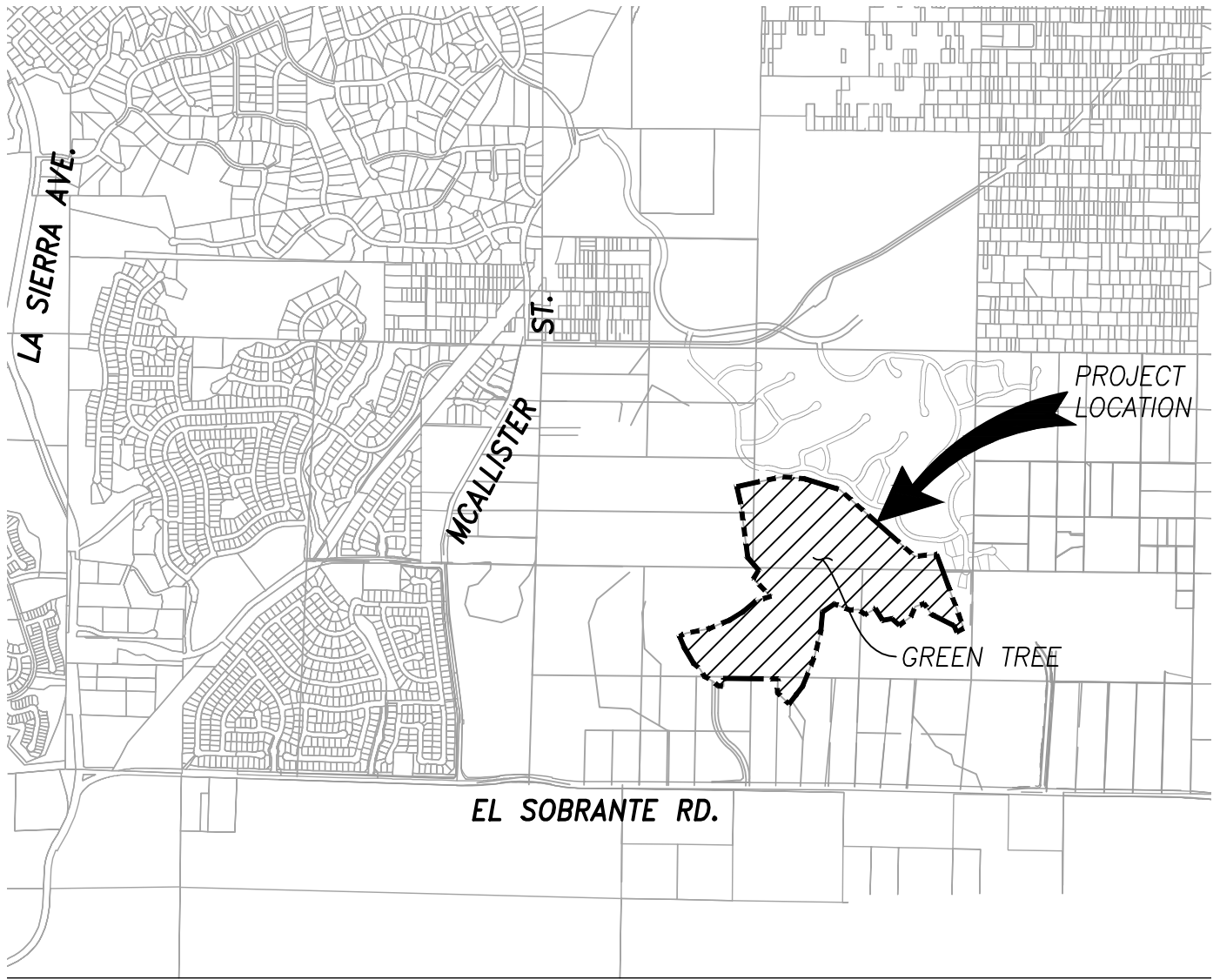
Greentree Ranch – Tract No. 38605

Tract 38605 encompasses a total of approximately 95.96 acres. Figure 1.2 provides the development plan for the project. The plan includes the development of 163 single family residential lots, one recreation and active open space area, three water quality areas, and multiple openspace and conservation lots. The developed pads on the project will range in elevation from approximately 1291 feet to approximately 1373.5 feet. The pad sizes of the residential lots will be a minimum of 10,000 square feet.

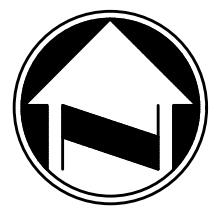
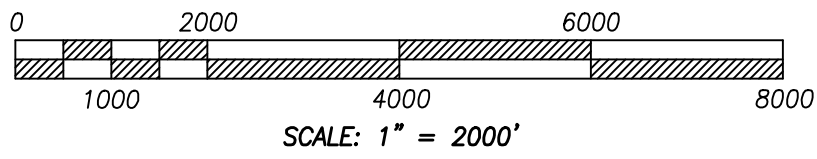
3. Purpose of Study

The purpose of this report is to establish the water facilities that will be required for the development of the Greentree Ranch Project. This water analysis and plan will be compatible with regional planning efforts of WMWD and will ensure that facilities are sized in consideration of future development in the area. A key facet of the study will be to analyze the hydraulics of the system to show how the proposed facilities will be integrated with the overall system and meet the operational requirements of the District.

4. Figure 1.1 Location Map



LAKE MATHEWS



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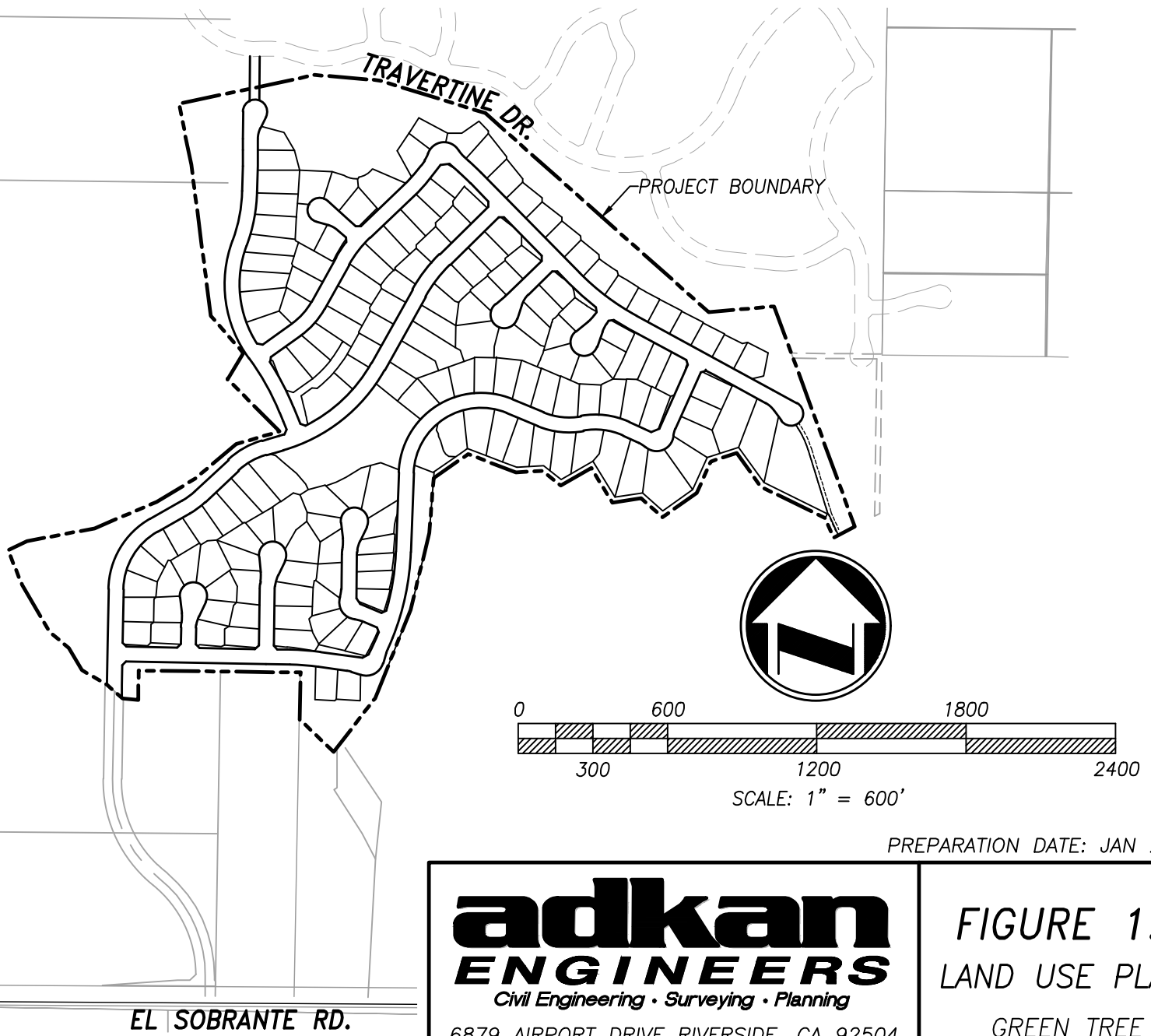
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FIGURE 1.1
VICINITY MAP

GREEN TREE
 TTM 38605

5. Figure 1.2 Land Use Map - Greentree Ranch – Tentative Tract No. 38605

U:\Projects\FOREMOST COMMUNITIES\8794\Waddell\EXHIBIT\GREEN TREE LAND USE FIGURE 1.3.dwg



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FIGURE 1.2
LAND USE PLAN

GREEN TREE
 TTM 38605

Section 2 – Planning Criteria and Projected Demands

This chapter presents the planning criteria used to evaluate water system requirements for the Greentree Ranch Project. Unless otherwise noted, the criteria utilized in this study are in accordance with the WMWD Developer Handbook, revised January 2011. This criterion is used primarily for sizing of proposed improvements to serve the project.

1. Water Duty and Peaking Factors

To convert proposed land uses to projected average water demands, water duty factors are used for the various land use types. The water duty factors utilized in this study are provided below along with the required fire flow that was used for planning purposes. Actual fire flows will be determined by the applicable standards of the Insurance Services Office (ISO) and the Riverside County Fire Department based on building type and square footage data that is not typically available at the planning level.

- Average per Capita Water Demand — 200 gpcpd
- Residents per home — 3.8
- Average day residential water demand — 1,140 gpd/unit (Note: Includes 380 gpd/unit for irrigation)
- Recreation/Park fire flow – 0 gpm (Note: There are no structures in the park requiring fire flow)
- Residential fire flow — 1,000 gpm (Note: See condition of approval below from the Riverside County Fire Department)

015 - Fire
UNKNOWN

MAP-#16-HYDRANT/SPACING

Status
Satisfied

Schedule A fire protection approved standard fire hydrants, (6"x4"x2 1/2") located one at each street intersection and spaced no more than 500 feet apart in any direction, with no portion of any lot frontage more than 250 feet from a hydrant. Minimum fire flow shall be 1000 GPM for 2 hour duration at 20 PSI. Shall include perimeter streets at each intersection and spaced 1,000 feet apart.

For the recreational area, the common areas will be served from the non-potable water system and a potable water factor of 1,000 gpd was assumed to account for anticipated recreation/park use. To convert average day demands to maximum day demands, a factor of 1.75 is used. Similarly, to convert average day demands to peak hour demands, a factor of 3.0 is used.

2. System Pressures

WMWD guidelines per the published Developer Handbook, Section 2.0 Design Criteria for Water Distribution System, Sub-Section 2.02 require residual pressures of 40 psi to 120 psi during peak hour demand conditions at each node. During a maximum day demand plus fire flow scenario, the minimum residual pressure at each node shall be 20 psi.

Sub-Section 2.03 requires a minimum of 40-psi pressure at the meter to every customer while using the pad elevation of the water tank at half full as the starting hydraulic grade line. Fire hydrants are to have 20 psi minimum residual pressure at design capacities, for this project being established by the Riverside County Fire Department as 1000 gpm.

3. Pipeline Criteria

Hydraulic analyses are to be based on a Hazen-Williams pipe roughness factor (C-value) of 120 for cement mortar lined steel pipe and a factor of 130 for PVC pipe. Under all scenarios, the maximum allowable pipeline velocity is 7.5 feet per second. Under a maximum day demand plus fire flow scenario the maximum allowable pipeline headloss is 5 feet per 1,000 feet of pipeline. For peak hour demand scenarios, the maximum allowable pipeline headloss is 3.5 feet per 1,000 feet of pipeline.

The minimum water pipeline size is 8-inch. WMWD does not accept 10-inch, 14-inch, or 20- inch pipelines for new construction. All 8-inch and 12-inch water lines shall be PVC C-900 unless special conditions exist. Pipelines 16-inch and larger shall be cement mortar lined and coated steel pipe.

4. Projected Water Demand

Table 2-1 provides the water demand projection for the Greentree Ranch project. As shown, the total projected average day demand is 0.1868 mgd (129.73 gpm). Using the peaking factors presented previously, the projected maximum daily demand is 0.3269 mgd (227.03 gpm) and the projected peak hour demand is 0.5604 mgd (389.19 gpm).

Table 2-1			
Tract 38605– Projected Water Demand			
Land Use	Quantity	Generation Factor	Total Average Flow (GPD)
Greentree Ranch	163 units	1,140 gpd/unit*	185,820
Recreation Center	1 Park	1,000 gpd/park	1,000
Total			186,820

*1,140 gpd/unit demand factor was used for development of projected flows as outlined within WMWD Section 2.0 of the Design Criteria for Water Distribution Systems, Sub-Section 2.01.

Section 3 – Existing Water Facilities

Existing regional water facilities pertinent to the Greentree Ranch project consist of supply, transmission, pumping, and storage facilities. Figure 3-1 graphically shows existing regional facilities in the vicinity of the project and a brief discussion is provided below.

1. Water Supply

The current supply of water to the Western Municipal Water District in this area is from the Mills Pipeline. The Mills Pipeline conveys northern California water that has been treated at the Mills Treatment Plant north of Lake Mathews. The Mills Pipeline supplies water to WMWD, the City of Corona, the Elsinore Valley Municipal Water District, and the Temescal Valley Water District.

The Mills Pipeline has a theoretical maximum hydraulic gradeline of 1,640 feet based on the overflow elevation of the Mills Treatment Plant. Due to the long length of piping and large quantity of water conveyed in the Mills Pipeline, the hydraulic gradeline is reduced in the pipeline as it flows away from the treatment plant. The Mills Pipeline is able to supply the WMWD 1515 Zone by gravity. The Mills Pipeline feeds water through a pressure reducing valve and into the La Sierra tank which has a high-water line of 1,515 feet. The Mills Pipeline is a 54-inch pipe that is located adjacent to the northwest corner of the Greentree Ranch project.

2. Transmission Pipelines

There is a short section of existing 30-inch 1515 Zone transmission line that is supplied from a connection to the Mills Pipeline through a pressure reducing valve. There are also sections of 12-inch and 16-inch 1515 Zone lines in McAllister Street. There are smaller diameter 1515 Zone lines to the south and west of the project and small diameter 1650 Zone facilities east and north of the project. There is an 18-inch diameter 1515 Zone pipeline from The La Sierra Tank to the intersection of El Sobrante Road and McAllister Street.

3. Pumping Facilities

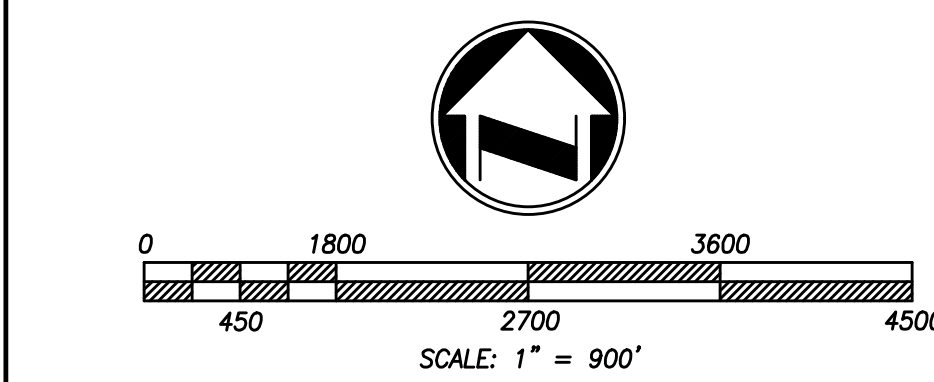
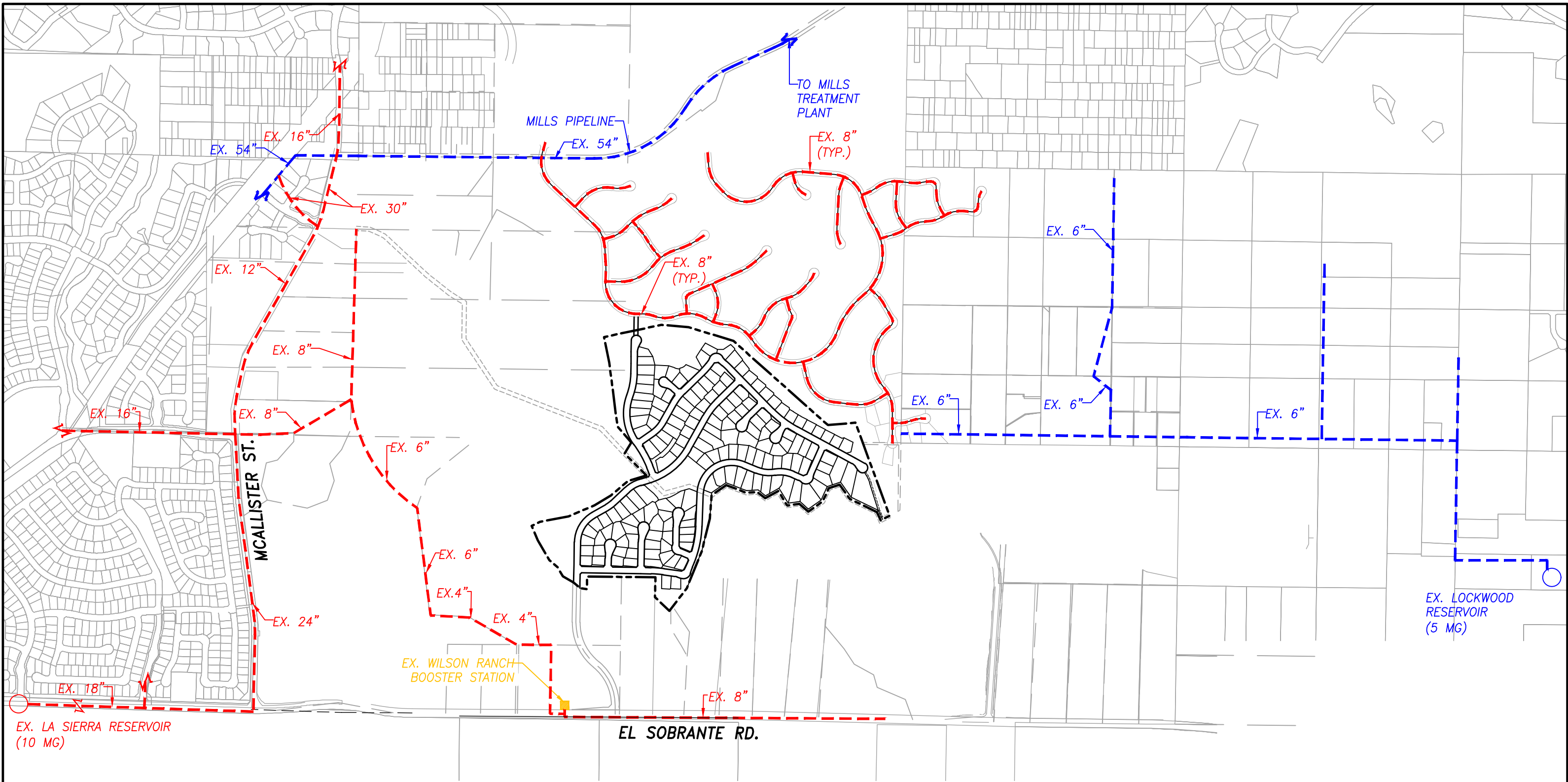
The only existing pump station pertinent to the Greentree Ranch project is the Mockingbird Pump Station which pumps water from the Mills Pipeline to the 1650 Zone reservoirs east of the project. There is also a Wilson Ranch Booster Station located to the south of the Greentree Ranch project, but this station is a small closed system pumping station that serves a small area adjacent to the project. For the purposes of the hydraulic analysis, all pumping facilities are assumed to be turned off.

4. Reservoir Storage

There are 1515 Zone and 1650 Zone Reservoirs in the vicinity of the project. The La Sierra Reservoir is a 1515 Zone Reservoir with a capacity of 10 MG, located approximately 1.5 miles west of the project. This reservoir is supplied by the Mills Pipeline via a pressure reducing station and an 18-inch line in El Sobrante Road supplies water to existing customers adjacent to the western boundary of Greentree Ranch.

There are two 1650 Zone reservoirs located to the east of the project. The Lockwood Reservoir is located approximately 0.7 miles east of the project and has a capacity of 5.0 MG. The Harley John site is located further to the southeast and has a capacity of 4.0 MG. There are no transmission lines supplied by these reservoirs in the vicinity of the project, but there are some small diameter distribution lines located adjacent to the eastern and northern project boundary.

5. Figure 3.1 Existing Water Facilities



LEGEND

	PROJECT BOUNDARY
	EXISTING 1515 ZONE
	EXISTING 1650 ZONE
	EX. BOOSTER STATION
	EX. RESERVOIR

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FIGURE 3.1
 EXISTING MAJOR POTABLE WATER FACILITIES
 TTM 38605 GREEN TREE

Section 4 – Proposed Water Facilities

This section presents the results of the water system analysis performed to establish the water system improvements required to provide service to the Greentree Ranch project. The backbone onsite and off-site recommended water system improvements have been established based on the WMWD North and South AFC Water Master Plan (Albert A. Webb, June 2014).

WMWD guidelines per the published Developer Handbook, Section 2.0 Design Criteria for Water Distribution System, Sub-Section 2.02 and 2.03 were used to determine the proposed water system meets the minimum requirements. The water system has been analyzed for the peak hour demand verifying the residual pressure at each node is a minimum of 40 PSI and a maximum of 120 PSI. A minimum of 40 psi residual pressure for peak hour demand flow is established at the proposed residential pad elevation of the servicing meter using the pad elevation of the water tank, at ten (10') full, as the starting hydraulic grade line. It should be noted the Developer Handbook specifies completing the analysis with the starting hydraulic grade line at the tank half full, however based on operational data provided by the District the La Sierra reservoir is being operated at a lower tank elevation and a starting hydraulic elevation of the tank at ten (10) feet full has been assumed.

Fire hydrants are to be verified at a minimum of 20 PSI. The fire flows for the system have been analyzed for the maximum day demand plus fire flow at the worst-case scenario (highest and furthest fire hydrant located from the distribution source) verifying the pressure at each node is a minimum of 20 PSI and maximum velocity being 7.5 feet per second.

The internal pipe sizing is based on the computer hydraulic analysis prepared as part of this study. Based on the range of elevations on the project, Greentree Ranch is proposed to be served by extending existing 1515 Zone facilities. Table 4-1 and 4-2 summarizes the expected minimum and maximum residual pressures within the project for the peak hour demand and maximum day demand plus fire flow.

Table 4-1 Tract 38605– Projected Peak Hour Demand Residual Pressures				
Pressure Zone	Lot Elevation (ft.)		Residual Pressure ¹ (PSI)	
1515	Minimum	Maximum	Minimum	Maximum
	1291	1373.5	40.3	76.0

¹ Based on reservoir being ten feet full based on operational data provided by WMWD. (Gradeline of a 1477)

Table 4-2 Tract 38605– Maximum Day Demand Plus Fire Flow System Residual Pressures		
Pressure Zone	Highest and Furthest Fire Hydrant Elevation (ft.)	Residual Pressure ¹ (PSI)
1515	1389 (Node J46)	31.86

¹ Based on reservoir being ten feet full based on operational data provided by WMWD. (Gradeline of a 1477)

1. Water System Analysis

The Water System Analysis was prepared using the Innovyze Program H2O Net Analyzer. The system was compiled using the preliminary water improvement plans for the Greentree Project as well as the existing water improvement plans provided by WMWD. The solution of the computer model is based on the Hazen-Williams equation. For pipes 12-inch in diameter and smaller, a Hazen-Williams coefficient of 130 was used. For pipe sizes larger than 12- inch, a coefficient of 120 was used.

Appendix A of this report provides the node and pipe diagram for the computer modeling that was performed.

2. 1515 Zone Model

A computer model was set up to analyze the 1515 Zone system. This zone will serve the entire Greentree Ranch development. The supply for this zone originates from the existing offsite 1515 Zone Reservoir. The project will be supplied by the connection and extension of the 18" the transmission line within El Sobrante Avenue, currently being extended easterly by the Highland Grove Project (Tract 36730).

Based on data provided by WMWD, the 1515 Zone reservoir is constructed at a Pad Elevation of 1467. For the purposes of this analysis, an available gradeline of 1,477 feet at the point of connection was assumed during average day demands and during peak hour and fire flow scenarios based on daily operational tank elevation data provided by WMWD. This represents a tank operating at a capacity of 21%, ten (10) feet full, noting the La Sierra tank has an ultimate vertical capacity of 48 feet. Additionally, and conservatively, the connection into the Tramonte Project was not considered as a source of flow, only the existing 18" transmission line within El Sobrante Avenue was modeled as a source of flow from the 1515 La Sierra tank.

The hydraulic model was simplified to analyze multiple lots as a single point of tributary demand so as to not have a complex network for this simple analysis. The site was reviewed to assess the hydrant that would provide the highest elevation coupled with the longest run from the points of connection. This hydrant is represented on the node map as J46. Tributary boundaries were identified to various nodes of the domestic system which reflected the demand of those units based on the demand divided by the number of units.

Appendix A provides the computer modeling output for the 1515 Zone and Exhibit A provides the corresponding node and pipe diagram.

3. 1515 Zone Piping

The extension of a new 18" transmission line from El Sobrante Avenue northerly within the proposed community will be constructed and will tie into new 30" transmission line bisecting the project from east to west. These improvements are per the WMWD Master Plan. The new 30" transmission line will extend through the project site from west to east with blind flange valves terminating at the easterly boundary and westerly boundary for further extension by future adjoining projects. Where the new 18" transmission intersects with the new 30"

transmission line, a 12" water line will be extended northerly and looped into Travertine Drive of the Tramonte Project – Tract 36475. All other lines within the proposed community will be a minimum of 8" and where transmission lines run along the frontage of homes, 8" lines will be run in parallel for installation of services.

The computer modeling output in Appendix A verifies that the proposed piping is adequate to meet all demand conditions considered in this report.

All on-site streets are proposed to be public and where pipelines are proposed to be located outside of street right-of-way, dedicated easements with access per WMWD requirements will be provided.

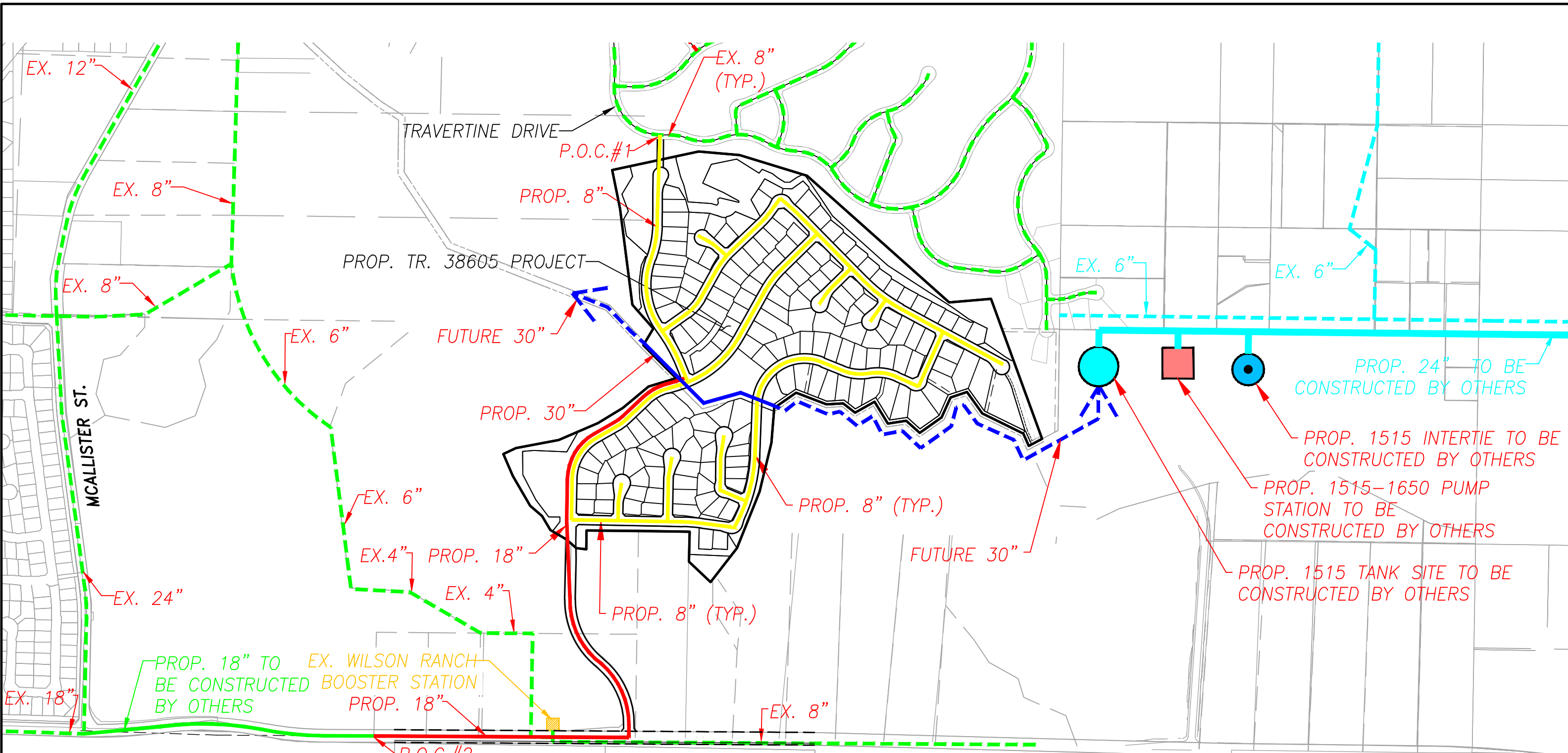
4. 1515 Zone Reservoir Capacity

The existing 1515 Zone is supplied by the La Sierra 10 MG reservoir. Based on information provided by Albert A. Webb Associates, Appendix B provides a calculation to evaluate the ability of the La Sierra tank to meet the storage needs of existing and near-term developments. As shown, there is approximately 6.42 MG of storage required, assuming existing development plus full buildout of recent Tracts 36390 and 36730, current build out of Tract 36475, the proposed build out of Tentative Tract 38605, and the future build out of Tentative Tracts 38910 and 38927. Thus, there is adequate existing storage (10 MG) to serve the proposed Greentree Ranch development by the La Sierra reservoir

Additionally, further analysis was completed to determine the project specific impacts to the La Sierra reservoir. At this time the District is currently operating the tank at approximately ten (10) feet full based on provided operational data. The addition of the proposed project would result in the utilization of 1.17' (0.2439 MG) of capacity within the 48' (10 MG) ultimate storage capacity of the La Sierra reservoir.

The WMWD Master Plan identifies the need for a 2.0 MG 1515 Zone reservoir within the property that adjoins the easterly boundary of the Greentree Ranch property, however this property is not under ownership of the Greentree Ranch developer or applicant. Although the project will not be required to construct this facility given the current capacity is available with the La Sierra reservoir, the project will dedicate all necessary easements to allow WMWD to construct the 30" and 18" transmission lines and any necessary access within the Greentree project boundary to any future reservoirs, transmission lines and/or pump station locations. All access and easement widths to the future facilities shall be per WMWD requirements.

5. Figure 4.1 Proposed Water Facilities



LEGEND

- PROJECT BOUNDARY
- EXISTING 1515 ZONE (PIPE SIZE VARIOUS)
- PROP. 1515 ZONE 8" PIPE
- PROP. 1515 ZONE 18" PIPE
- PROP. 1515 ZONE 30" PIPE
- FUTURE 1515 ZONE 30" PIPE
- PROP. 1515 ZONE TO BE CONSTRUCTED BY OTHERS
- EXISTING 1650 ZONE
- EXISTING BOOSTER STATION
- PROP. 1650 ZONE TO BE CONSTRUCTED BY OTHERS
- PROP. 1515-1650 PUMP STATION TO BE CONSTRUCTED BY OTHERS
- PROP. 1515 TANK SITE TO BE CONSTRUCTED BY OTHERS
- PROP. 1515 INTERTIE TO BE CONSTRUCTED BY OTHERS

NOTES

HGL	1515
HIGHEST PAD ELEV. (1377)	40.38 PSI
LOWEST PAD ELEV. (1292)	76.66 PSI

SCALE: 1" = 600'

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FIGURE 4.1
 PROPOSED ONSITE
 POTABLE WATER FACILITIES

TTM 38605 GREEN TREE

Appendix A – 1515 Zone Hydraulic Modeling Output

The analysis includes the following Output:

1. Maximum Day Demand plus Fire Flow at Node J46
2. Peak Hour Demands
3. Exhibit A – Node Map

Notes:

Node J46 does not represent a pad elevation. This represents a location within the community at the highest point of a crest within the street. This node was analyzed to provide a point in the system representing the highest and furthest fire hydrant that could potentially be installed at this location.

The source node identification is LA-SIERRA and was given a starting hydraulic grade line of 1477 as previously discussed representing the tank source being half full per WMWD's design criteria for water distribution systems.

Minimum Residual Pressure analyzing Peak Hour Demands is 40.3 PSI at a pad elevation of 1373.50

Maximum Day Demand plus Fire Flow at the highest possible fire hydrant location (Node J46) is 31.86 PSI at 1000GPM having an elevation of 1389.00

On-Site Water Demand Matrix					
NODE	TRIB RESIDENTIAL UNITS	TRIB OPEN SPACE ACRES	ADD (GPM)*	MDD (GPM)**	PKHR (GPM)***
J10	506		400.6	701.0	1201.8
J12	272		215.3	376.8	646.0
J14			0.0	0.0	0.0
J16			0.0	0.0	0.0
J18	12		9.5	16.6	28.5
J20	17		13.5	23.6	40.4
J22	16		12.7	22.2	38.0
J24	9		7.1	12.5	21.4
J26	12		9.5	16.6	28.5
J28	9		7.1	12.5	21.4
J30	12		9.5	16.6	28.5
J32	16		12.7	22.2	38.0
J34	13		10.3	18.0	30.9
J36	15		11.9	20.8	35.6
J38	6		4.8	8.3	14.3
J40	11		8.7	15.2	26.1
J42	7		5.5	9.7	16.6
J44	8		6.3	11.1	19.0
J46					
TOTAL	941		745	1304	2235
GPD/DU	1140	2200			
MDD PK FACTOR**	1.75				
PKHR PK FACTOR***	3.00				

NOTES:

- * AVERAGE DAY DEMAND (ADD) WAS CALCULATED TO BE CONSISTANT WITH THE DESIGN CONDITIONS COORDINATED WITH EMWD. DEMAND IS DISTRIBUTED THROUGH THE MODEL ADJACENT NODE AS SHOWN BASED ON THE UNITS TRIBUTARY TO EACH NODE.
- ** MAX DAY DEMAND (MDD) WAS PROJECTED BY APPLYING THE PEAK FACTOR TO THE ADD AS DIRECTED BY WMWD POLICY. THE REQUIRED FIRE FLOW WAS APPLIED IN THE MODEL PER FLOWRATE ASSUMED BY EMWD IN BOUNDARY CONDITIONS.
- *** PEAK HOUR DEMAND (PHD) WAS PROJECTED BY APPLYING THE PEAK FACTOR TO THE MDD AS DIRECTED BY WMWD POLICY.

TANK	LA SIERRA		PZ	1515	LWL	1467	HWL*	1491
			STATIC		MDD+FF		PHD	
LOT	TRIB NODE	PAD ELEV	HEAD	PAD	HEAD	PAD	HEAD	PAD
1	J36	1291.0	1491.0	86.6	1462.5	74.2	1466.6	76.0
2	J36	1292.0	1491.0	86.1	1462.5	73.8	1466.6	75.6
3	J36	1292.0	1491.0	86.1	1462.5	73.8	1466.6	75.6
4	J36	1293.0	1491.0	85.7	1462.5	73.4	1466.6	75.1
5	J36	1294.0	1491.0	85.3	1462.5	72.9	1466.6	74.7
6	J36	1297.0	1491.0	84.0	1462.5	71.6	1466.6	73.4
7	J36	1298.0	1491.0	83.5	1462.5	71.2	1466.6	73.0
8	J36	1302.0	1491.0	81.8	1462.5	69.5	1466.6	71.3
9	J36	1307.0	1491.0	79.7	1462.5	67.3	1466.6	69.1
10	J36	1314.0	1491.0	76.6	1462.5	64.3	1466.6	66.1
11	J36	1329.0	1491.0	70.1	1462.5	57.8	1466.6	59.6
12	J36	1327.0	1491.0	71.0	1462.5	58.7	1466.6	60.4
13	J34	1324.0	1491.0	72.3	1462.5	59.9	1466.5	61.7
14	J34	1322.0	1491.0	73.2	1462.5	60.8	1466.5	62.6
15	J34	1322.0	1491.0	73.2	1462.5	60.8	1466.5	62.6
16	J34	1322.0	1491.0	73.2	1462.5	60.8	1466.5	62.6
17	J34	1322.0	1491.0	73.2	1462.5	60.8	1466.5	62.6
18	J34	1319.0	1491.0	74.5	1462.5	62.1	1466.5	63.9
19	J34	1319.0	1491.0	74.5	1462.5	62.1	1466.5	63.9
20	J32	1317.0	1491.0	75.3	1462.5	63.0	1466.5	64.7
21	J32	1317.0	1491.0	75.3	1462.5	63.0	1466.5	64.7
22	J32	1317.0	1491.0	75.3	1462.5	63.0	1466.5	64.7
23	J32	1321.0	1491.0	73.6	1462.5	61.2	1466.5	63.0
24	J32	1324.0	1491.0	72.3	1462.5	59.9	1466.5	61.7
25	J32	1329.0	1491.0	70.1	1462.5	57.8	1466.5	59.5
26	J30	1335.0	1491.0	67.5	1462.5	55.2	1466.5	56.9
27	J30	1341.0	1491.0	64.9	1462.5	52.6	1466.5	54.3
28	J30	1347.0	1491.0	62.3	1462.5	50.0	1466.5	51.7
29	J28	1353.0	1491.0	59.7	1462.5	47.4	1466.5	49.1
30	J28	1359.0	1491.0	57.1	1462.5	44.8	1466.5	46.5
31	J28	1360.0	1491.0	56.7	1462.5	44.4	1466.5	46.1
32	J26	1361.0	1491.0	56.3	1462.5	43.9	1466.5	45.7
33	J26	1362.0	1491.0	55.8	1462.5	43.5	1466.5	45.2
34	J26	1363.0	1491.0	55.4	1462.5	43.1	1466.5	44.8
35	J26	1364.0	1491.0	55.0	1462.5	42.6	1466.5	44.4
36	J26	1370.0	1491.0	52.4	1462.5	40.0	1466.5	41.8
37	J36	1324.0	1491.0	72.3	1462.5	60.0	1466.6	61.7
38	J36	1327.0	1491.0	71.0	1462.5	58.7	1466.6	60.4
39	J36	1329.0	1491.0	70.1	1462.5	57.8	1466.6	59.6
40	J36	1329.0	1491.0	70.1	1462.5	57.8	1466.6	59.6
41	J34	1328.0	1491.0	70.6	1462.5	58.2	1466.5	60.0
42	J34	1326.0	1491.0	71.4	1462.5	59.1	1466.5	60.8
43	J34	1324.0	1491.0	72.3	1462.5	59.9	1466.5	61.7
44	J34	1320.0	1491.0	74.0	1462.5	61.7	1466.5	63.4
45	J34	1318.0	1491.0	74.9	1462.5	62.5	1466.5	64.3
46	J32	1318.0	1491.0	74.9	1462.5	62.5	1466.5	64.3
47	J32	1317.0	1491.0	75.3	1462.5	63.0	1466.5	64.7
48	J32	1316.0	1491.0	75.8	1462.5	63.4	1466.5	65.2
49	J32	1330.0	1491.0	69.7	1462.5	57.3	1466.5	59.1
50	J32	1336.0	1491.0	67.1	1462.5	54.7	1466.5	56.5
51	J32	1341.0	1491.0	64.9	1462.5	52.6	1466.5	54.3
52	J40	1346.0	1491.0	62.8	1462.5	50.4	1466.6	52.2

TANK LA SIERRA			PZ 1515		LWL 1467		HWL* 1491	
LOT	TRIB NODE	PAD ELEV	STATIC		MDD+FF		PHD	
			HEAD	PAD	HEAD	PAD	HEAD	PAD
53	J40	1349.0	1491.0	61.5	1462.5	49.1	1466.6	50.9
54	J40	1353.0	1491.0	59.7	1462.5	47.4	1466.6	49.2
55	J40	1358.0	1491.0	57.6	1462.5	45.2	1466.6	47.0
56	J40	1360.0	1491.0	56.7	1462.5	44.4	1466.6	46.1
57	J40	1361.0	1491.0	56.3	1462.5	43.9	1466.6	45.7
58	J38	1361.0	1491.0	56.3	1462.5	44.0	1466.7	45.7
59	J38	1354.0	1491.0	59.3	1462.5	47.0	1466.7	48.8
60	J40	1360.0	1491.0	56.7	1462.5	44.4	1466.6	46.1
61	J40	1356.0	1491.0	58.4	1462.5	46.1	1466.6	47.9
62	J40	1353.0	1491.0	59.7	1462.5	47.4	1466.6	49.2
63	J40	1351.0	1491.0	60.6	1462.5	48.3	1466.6	50.0
64	J40	1347.0	1491.0	62.3	1462.5	50.0	1466.6	51.8
65	J32	1341.0	1491.0	64.9	1462.5	52.6	1466.5	54.3
66	J32	1335.0	1491.0	67.5	1462.5	55.2	1466.5	56.9
67	J32	1331.0	1491.0	69.3	1462.5	56.9	1466.5	58.7
68	J32	1327.0	1491.0	71.0	1462.5	58.6	1466.5	60.4
69	J30	1345.0	1491.0	63.2	1462.5	50.8	1466.5	52.6
70	J30	1348.0	1491.0	61.9	1462.5	49.5	1466.5	51.3
71	J30	1350.0	1491.0	61.0	1462.5	48.7	1466.5	50.4
72	J30	1353.0	1491.0	59.7	1462.5	47.4	1466.5	49.1
73	J30	1353.0	1491.0	59.7	1462.5	47.4	1466.5	49.1
74	J30	1353.0	1491.0	59.7	1462.5	47.4	1466.5	49.1
75	J30	1351.0	1491.0	60.6	1462.5	48.3	1466.5	50.0
76	J30	1348.0	1491.0	61.9	1462.5	49.5	1466.5	51.3
77	J30	1345.0	1491.0	63.2	1462.5	50.8	1466.5	52.6
78	J28	1360.0	1491.0	56.7	1462.5	44.4	1466.5	46.1
79	J28	1361.0	1491.0	56.3	1462.5	43.9	1466.5	45.7
80	J28	1361.0	1491.0	56.3	1462.5	43.9	1466.5	45.7
81	J28	1361.0	1491.0	56.3	1462.5	43.9	1466.5	45.7
82	J28	1360.0	1491.0	56.7	1462.5	44.4	1466.5	46.1
83	J28	1359.0	1491.0	57.1	1462.5	44.8	1466.5	46.5
84	J26	1361.0	1491.0	56.3	1462.5	43.9	1466.5	45.7
85	J26	1362.0	1491.0	55.8	1462.5	43.5	1466.5	45.2
86	J26	1363.0	1491.0	55.4	1462.5	43.1	1466.5	44.8
87	J24	1371.0	1491.0	51.9	1462.5	39.6	1466.5	41.3
88	J24	1371.5	1491.0	51.7	1462.5	39.4	1466.5	41.1
89	J24	1372.0	1491.0	51.5	1462.5	39.2	1466.5	40.9
90	J22	1372.5	1491.0	51.3	1462.5	38.9	1466.5	40.7
91	J22	1373.0	1491.0	51.1	1462.5	38.7	1466.5	40.5
92	J22	1373.5	1491.0	50.9	1462.5	38.5	1466.5	40.3
93	J22	1374.0	1491.0	50.6	1462.5	38.3	1466.5	40.1
94	J22	1372.5	1491.0	51.3	1462.5	38.9	1466.5	40.7
95	J22	1373.0	1491.0	51.1	1462.5	38.7	1466.5	40.5
96	J22	1373.5	1491.0	50.9	1462.5	38.5	1466.5	40.3
97	J22	1373.5	1491.0	50.9	1462.5	38.5	1466.5	40.3
98	J22	1373.5	1491.0	50.9	1462.5	38.5	1466.5	40.3
99	J22	1373.5	1491.0	50.9	1462.5	38.5	1466.5	40.3
100	J22	1373.0	1491.0	51.1	1462.5	38.7	1466.5	40.5
101	J22	1372.5	1491.0	51.3	1462.5	38.9	1466.5	40.7
102	J22	1372.0	1491.0	51.5	1462.5	39.2	1466.5	40.9
103	J22	1371.5	1491.0	51.7	1462.5	39.4	1466.5	41.1
104	J22	1371.0	1491.0	51.9	1462.5	39.6	1466.5	41.4

TANK LA SIERRA			PZ 1515		LWL 1467		HWL* 1491	
LOT	TRIB NODE	PAD ELEV	STATIC		MDD+FF		PHD	
			HEAD	PAD	HEAD	PAD	HEAD	PAD
105	J22	1372.5	1491.0	51.3	1462.5	38.9	1466.5	40.7
106	J24	1372.0	1491.0	51.5	1462.5	39.2	1466.5	40.9
107	J24	1371.5	1491.0	51.7	1462.5	39.4	1466.5	41.1
108	J24	1371.0	1491.0	51.9	1462.5	39.6	1466.5	41.3
109	J24	1371.0	1491.0	51.9	1462.5	39.6	1466.5	41.3
110	J24	1370.0	1491.0	52.4	1462.5	40.0	1466.5	41.8
111	J24	1369.0	1491.0	52.8	1462.5	40.5	1466.5	42.2
112	J26	1367.0	1491.0	53.7	1462.5	41.3	1466.5	43.1
113	J26	1373.5	1491.0	50.9	1462.5	38.5	1466.5	40.3
114	J26	1373.5	1491.0	50.9	1462.5	38.5	1466.5	40.3
115	J26	1373.5	1491.0	50.9	1462.5	38.5	1466.5	40.3
116	J20	1373.5	1491.0	50.9	1462.6	38.6	1466.7	40.3
117	J20	1373.0	1491.0	51.1	1462.6	38.8	1466.7	40.5
118	J20	1373.0	1491.0	51.1	1462.6	38.8	1466.7	40.5
119	J20	1372.0	1491.0	51.5	1462.6	39.2	1466.7	41.0
120	J20	1371.0	1491.0	51.9	1462.6	39.7	1466.7	41.4
121	J20	1368.0	1491.0	53.2	1462.6	41.0	1466.7	42.7
122	J20	1366.0	1491.0	54.1	1462.6	41.8	1466.7	43.6
123	J20	1365.0	1491.0	54.5	1462.6	42.3	1466.7	44.0
124	J20	1364.0	1491.0	55.0	1462.6	42.7	1466.7	44.4
125	J20	1363.0	1491.0	55.4	1462.6	43.1	1466.7	44.9
126	J20	1366.0	1491.0	54.1	1462.6	41.8	1466.7	43.6
127	J20	1368.0	1491.0	53.2	1462.6	41.0	1466.7	42.7
128	J20	1370.0	1491.0	52.4	1462.6	40.1	1466.7	41.8
129	J20	1372.0	1491.0	51.5	1462.6	39.2	1466.7	41.0
130	J20	1374.0	1491.0	50.6	1462.6	38.4	1466.7	40.1
131	J20	1360.0	1491.0	56.7	1462.6	44.4	1466.7	46.2
132	J20	1357.0	1491.0	58.0	1462.6	45.7	1466.7	47.5
133	J18	1349.0	1491.0	61.5	1462.8	49.3	1466.7	50.9
134	J18	1352.0	1491.0	60.2	1462.8	48.0	1466.7	49.6
135	J18	1356.0	1491.0	58.4	1462.8	46.2	1466.7	47.9
136	J18	1360.0	1491.0	56.7	1462.8	44.5	1466.7	46.2
137	J18	1362.0	1491.0	55.8	1462.8	43.6	1466.7	45.3
138	J18	1362.0	1491.0	55.8	1462.8	43.6	1466.7	45.3
139	J18	1362.0	1491.0	55.8	1462.8	43.6	1466.7	45.3
140	J18	1360.0	1491.0	56.7	1462.8	44.5	1466.7	46.2
141	J18	1356.0	1491.0	58.4	1462.8	46.2	1466.7	47.9
142	J18	1352.0	1491.0	60.2	1462.8	48.0	1466.7	49.6
143	J18	1348.0	1491.0	61.9	1462.8	49.7	1466.7	51.4
144	J18	1342.0	1491.0	64.5	1462.8	52.3	1466.7	54.0
145	J44	1338.0	1491.0	66.2	1462.9	54.1	1466.7	55.7
146	J44	1343.0	1491.0	64.1	1462.9	51.9	1466.7	53.5
147	J44	1348.0	1491.0	61.9	1462.9	49.7	1466.7	51.4
148	J44	1352.0	1491.0	60.2	1462.9	48.0	1466.7	49.6
149	J44	1348.0	1491.0	61.9	1462.9	49.7	1466.7	51.4
150	J44	1344.0	1491.0	63.6	1462.9	51.5	1466.7	53.1
151	J44	1340.0	1491.0	65.4	1462.9	53.2	1466.7	54.8
152	J44	1335.0	1491.0	67.5	1462.9	55.4	1466.7	57.0
153	J42	1329.0	1491.0	70.1	1462.8	57.9	1466.7	59.6
154	J42	1330.0	1491.0	69.7	1462.8	57.5	1466.7	59.2
155	J42	1331.0	1491.0	69.3	1462.8	57.0	1466.7	58.7
156	J42	1332.0	1491.0	68.8	1462.8	56.6	1466.7	58.3

TANK LA SIERRA			PZ 1515		LWL 1467		HWL* 1491	
			STATIC		MDD+FF		PHD	
LOT	TRIB NODE	PAD ELEV	HEAD	PAD	HEAD	PAD	HEAD	PAD
157	J42	1334.0	1491.0	68.0	1462.8	55.7	1466.7	57.4
158	J42	1335.0	1491.0	67.5	1462.8	55.3	1466.7	57.0
159	J42	1336.0	1491.0	67.1	1462.8	54.9	1466.7	56.6
160	J38	1337.0	1491.0	66.7	1462.5	54.3	1466.7	56.1
161	J38	1338.0	1491.0	66.2	1462.5	53.9	1466.7	55.7
162	J38	1339.0	1491.0	65.8	1462.5	53.5	1466.7	55.3
163	J38	1342.0	1491.0	64.5	1462.5	52.2	1466.7	54.0

*HWL elevation shown used for the calculation of static pressure only, 1477 tank elevation utilized for MDD+FF and PHD, see residual pressure input values on following sheets.

RESERVOIR REPORT MDD+FF

ID	Flow (gpm)	Head (ft)
LA-SIERRA	-2,303.70	1,477.00

NODE REPORT MDD+FF

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	701.0	1,294.0	1,467.4	75.13
J12	376.8	1,315.0	1,465.3	65.13
J14	0.0	1,363.0	1,463.9	43.72
J16	0.0	1,320.0	1,463.0	61.97
J18	16.6	1,362.0	1,462.8	43.67
J20	23.6	1,375.0	1,462.6	37.97
J22	22.2	1,376.0	1,462.5	37.47
J24	12.5	1,376.0	1,462.5	37.46
J26	16.6	1,376.0	1,462.5	37.46
J28	12.5	1,361.0	1,462.5	43.96
J30	16.6	1,353.0	1,462.5	47.43
J32	22.2	1,341.0	1,462.5	52.63
J34	18.0	1,328.0	1,462.5	58.27
J36	20.8	1,329.0	1,462.5	57.85
J38	8.3	1,361.0	1,462.5	44.00
J40	15.2	1,360.0	1,462.5	44.41
J42	9.7	1,336.0	1,462.8	54.93
J44	11.1	1,353.0	1,462.9	47.62
J46	1,000.0	1,389.0	1,462.5	31.86

PIPE REPORT MDD+FF







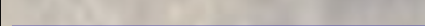



ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)
P11	LA-SIERRA	J10	5019.5	18	120	2303.7	2.9	9.6	1.9
P13	J10	J12	2123.7	18	120	1602.7	2.0	2.1	1.0
P15	J12	J14	2384.3	18	120	1225.9	1.6	1.4	0.6
P17	J14	J16	1477.2	18	120	1225.9	1.6	0.9	0.6
P19	J16	J44	294.9	8	130	129.8	0.8	0.1	0.4
P21	J44	J18	326.0	8	130	118.7	0.8	0.1	0.4
P23	J18	J20	624.5	8	130	102.1	0.7	0.2	0.3
P25	J20	J46	616.0	8	130	78.5	0.5	0.1	0.2
P27	J22	J46	702.6	8	130	-49.4	0.3	0.1	0.1
P29	J26	J24	378.1	8	130	-14.7	0.1	0.0	0.0
P31	J26	J28	420.3	8	130	-1.9	0.0	0.0	0.0
P33	J28	J30	292.1	8	130	-14.4	0.1	0.0	0.0
P35	J30	J32	311.3	8	130	-31.0	0.2	0.0	0.0
P37	J32	J34	820.6	8	130	-18.7	0.1	0.0	0.0
P39	J34	J36	629.6	8	130	-36.7	0.2	0.0	0.0
P41	J36	J38	366.5	8	130	-57.5	0.4	0.0	0.1
P43	J38	J40	665.7	8	130	49.7	0.3	0.1	0.1
P45	J40	J32	599.7	8	130	34.5	0.2	0.0	0.0
P47	J16	J42	613.8	8	130	129.2	0.8	0.3	0.4
P49	J42	J38	660.1	8	130	119.5	0.8	0.2	0.4
P51	J38	J46	520.4	30	120	970.9	0.4	0.0	0.0
P53	J24	J22	489.5	8	130	-27.2	0.2	0.0	0.0
P55	J16	J38	1276.3	18	120	966.9	1.2	0.5	0.4

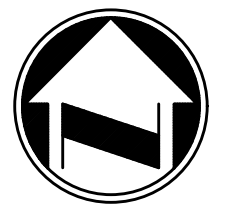
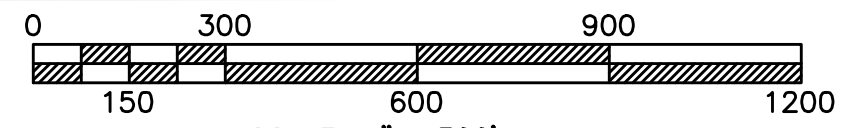
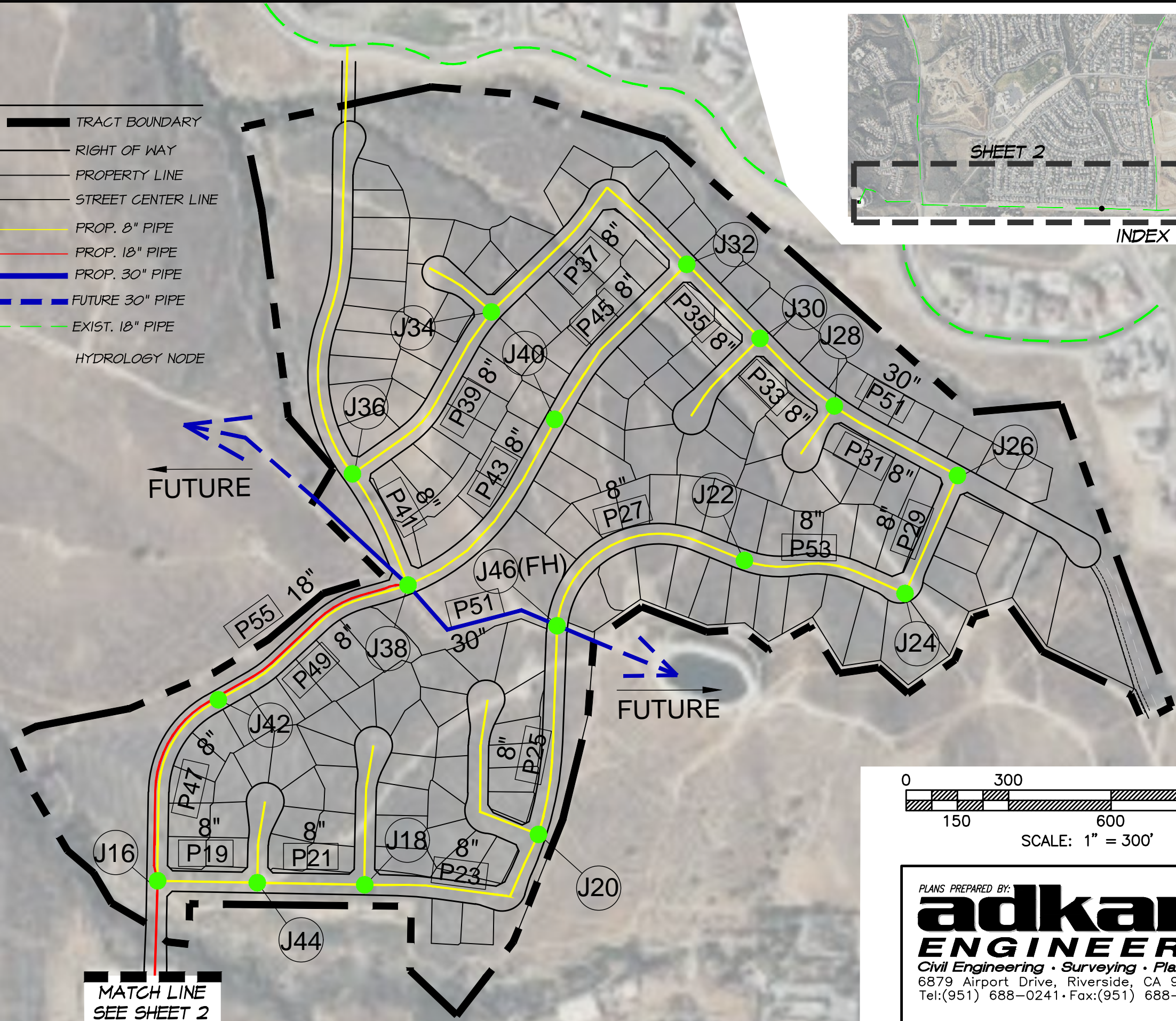
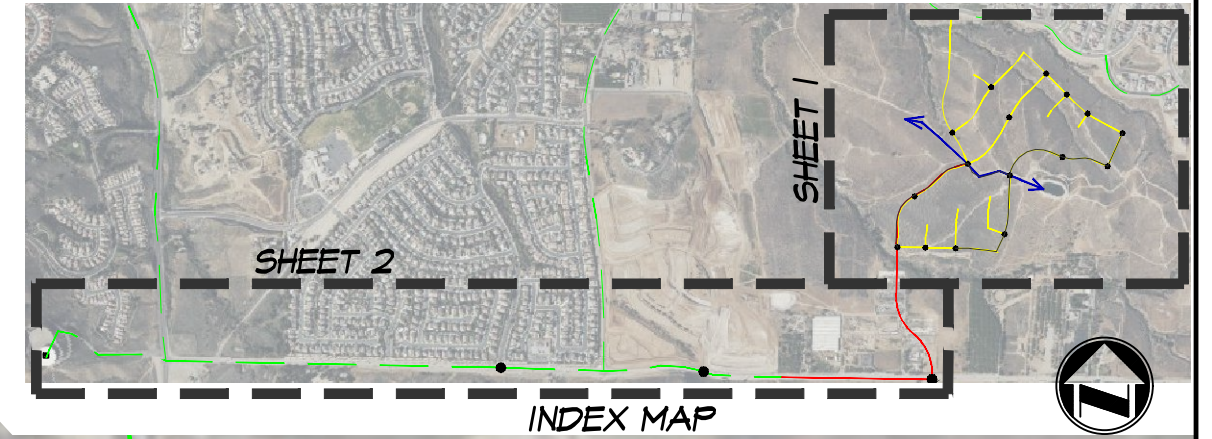
RESERVOIR REPORT PHD		
ID	Flow (gpm)	Head (ft)
LA-SIERRA	-2,235.00	1,477.00

NODE REPORT PHD				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	1,201.8	1,294.0	1,467.9	75.36
J12	646.0	1,315.0	1,467.0	65.86
J14	0.0	1,363.0	1,466.8	44.99
J16	0.0	1,320.0	1,466.7	63.58
J18	28.5	1,362.0	1,466.7	45.36
J20	40.4	1,375.0	1,466.7	39.72
J22	38.0	1,376.0	1,466.5	39.23
J24	21.4	1,376.0	1,466.5	39.21
J26	28.5	1,376.0	1,466.5	39.21
J28	21.4	1,361.0	1,466.5	45.71
J30	28.5	1,353.0	1,466.5	49.17
J32	38.0	1,341.0	1,466.5	54.38
J34	30.9	1,328.0	1,466.5	60.02
J36	35.6	1,329.0	1,466.6	59.62
J38	14.3	1,361.0	1,466.7	45.79
J40	26.1	1,360.0	1,466.6	46.17
J42	16.6	1,336.0	1,466.7	56.63
J44	19.0	1,353.0	1,466.7	49.26
J46	0.0	1,389.0	1,466.7	33.66

PIPE REPORT PHD									
ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/k-ft)
P11	LA-SIERRA	J10	5019.5	18	120	2235.0	2.8	9.1	1.8
P13	J10	J12	2123.7	18	120	1033.2	1.3	0.9	0.4
P15	J12	J14	2384.3	18	120	387.2	0.5	0.2	0.1
P17	J14	J16	1477.2	18	120	387.2	0.5	0.1	0.1
P19	J16	J44	294.9	8	130	64.8	0.4	0.0	0.1
P21	J44	J18	326.0	8	130	45.8	0.3	0.0	0.1
P23	J18	J20	624.5	8	130	17.3	0.1	0.0	0.0
P25	J20	J46	616.0	8	130	-23.2	0.2	0.0	0.0
P27	J22	J46	702.6	8	130	-89.9	0.6	0.2	0.2
P29	J26	J24	378.1	8	130	-30.5	0.2	0.0	0.0
P31	J26	J28	420.3	8	130	2.0	0.0	0.0	0.0
P33	J28	J30	292.1	8	130	-19.4	0.1	0.0	0.0
P35	J30	J32	311.3	8	130	-47.9	0.3	0.0	0.1
P37	J32	J34	820.6	8	130	-29.5	0.2	0.0	0.0
P39	J34	J36	629.6	8	130	-60.4	0.4	0.1	0.1
P41	J36	J38	366.5	8	130	-96.0	0.6	0.1	0.2
P43	J38	J40	665.7	8	130	82.5	0.5	0.1	0.2
P45	J40	J32	599.7	8	130	56.4	0.4	0.1	0.1
P47	J16	J42	613.8	8	130	43.6	0.3	0.0	0.1
P49	J42	J38	660.1	8	130	27.0	0.2	0.0	0.0
P51	J38	J46	520.4	30	120	113.1	0.1	0.0	0.0
P53	J24	J22	489.5	8	130	-51.9	0.3	0.0	0.1
P55	J16	J38	1276.3	18	120	278.8	0.4	0.1	0.0

LEGEND

-  TRACT BOUNDARY
-  RIGHT OF WAY
-  PROPERTY LINE
-  STREET CENTER LINE
-  PROP. 8" PIPE
-  PROP. 18" PIPE
-  PROP. 30" PIPE
-  FUTURE 30" PIPE
-  EXIST. 18" PIPE
-  HYDROLOGY NODE



PREPARED DATE: JAN, 2024

PLANS PREPARED BY:
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EXHIBIT A
1515 ZONE
NODE AND PIPE DIAGRAM
 TR 38605 GREEN TREE

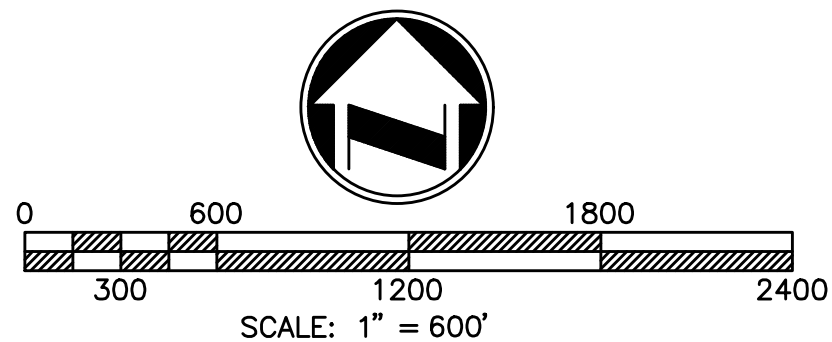
SHEET 1 OF 2 SHEETS

MATCH LINE
SEE SHEET 2



LEGEND

- — — — — EXIST. RIGHT OF WAY
- — — — — ROAD SHOULDER
- — — — — PROP. 18" PIPE
- - - - - EXIST. 18" PIPE
- HYDROLOGY NODE
- ☒ RES. LA SIERRA



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EXHIBIT A
1515 ZONE
NODE AND PIPE DIAGRAM

TR 38605 GREEN TREE

SHEET 2 OF 2 SHEETS

Appendix B – 1515 Pressure Zone Capacity Analysis (Existing and Near Term)

1515 Zone Development Summary

Description	Units
Existing Service Area as of 2016 ¹	2862
Final Tract 36390 (Citrus Heights) - Completed Community	282
Final Tract 36475 (Tramonte) - Completed Community	171
Tract 36730 (Highland Grove 1) - Partially Completed Community	272
Tract 38605 (Greentree) - Proposed Community	163
Tentative Tract No. 38910 (Highland Grove 2) – Future Community	128
Tentative Tract No. 38927 (Willow Creek)) – Future Community	206
Total 1515 PZ Units	4,084

¹ Based on information provided by Albert A. Webb Associates, 2016

Proposed Demand Projections by Unit

Average Day Demand, (gpd)	4,655,760	Based on 1,140gpd/unit
Maximum Day Demand, (gpd)	8,147,580	Based on 1.75xADD

1515 Pressure Zone Storage Summary

Required Equalizing Storage, MG	2.04	0.25 x MDD
Required Emergency Storage, MG	4.08	0.50 x MDD
Fire Flow, MG	0.30	1500 gpm at 2 hours
Total Storage, MG	6.42	

Appendix C – 1515 Pressure Zone Capacity Analysis (Project Specific)

1515 Zone Development Summary

Description	Units
Tract 38605 (Greentree) Proposed	163
Total Added 1515 PZ Units	163

Proposed Demand Projections by Unit

Average Day Demand, (gpd)	185,820	Based on 1,140gpd/unit
Maximum Day Demand, (gpd)	325,185	Based on 1.75xADD

1515 Pressure Zone Storage Summary

Required Equalizing Storage, MG	0.0813	0.25 x MDD
Required Emergency Storage, MG	0.1626	0.50 x MDD
Fire Flow, MG	N/A ²	1500 gpm at 2 hours
Total Storage, MG	0.2439³	

² Fire Flow not included in project specific tank capacity as this is necessary for all units (existing and proposed) within the 1515PZ.

³ This represents a vertical tank capacity of 1.17' of storage within the La Sierra reservoir.

The project specific demands of the proposed Greentree project required approximately 1.17' (0.2439 MG) of tank storage capacity for sufficient operation. A graphical depiction of the existing tank capacity and proposed capacity associated with the demand of the Greentree project has been included within Appendix "D".

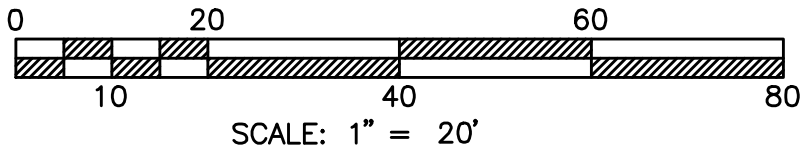
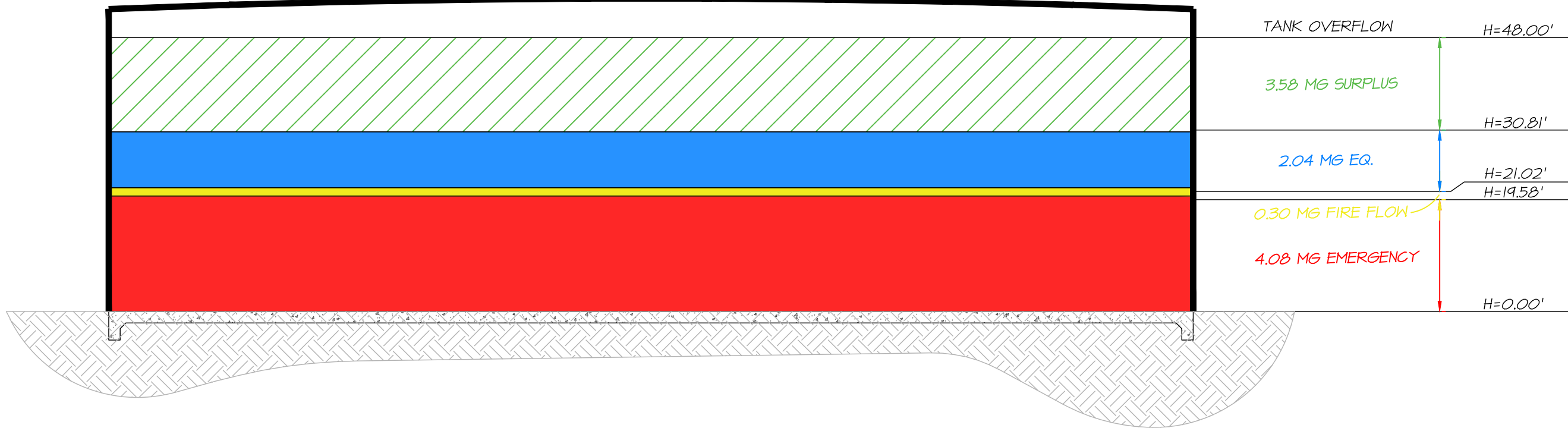
Appendix D – Graphic Depiction of La Sierra Tank

There are two graphically depictions of the La Sierra Reservoir within Appendix D.

The first depiction shows the capacity of the La Sierra tank at existing plus near-term buildout. This includes the existing development plus full buildout of recent Tracts 36390 and 36730, current build out of Tract 36475, the proposed build out of Tentative Tract 38605, and the future build out of Tentative Tracts 38910 and 38927.

The second depiction shows the impacts of Tentative Tract 38605, specifically, on the capacity of the La Sierra tank based on the current build out of the 1515 pressure zone. This includes the existing development plus full buildout of recent Tracts 36390 and 36730, current build out of Tract 36475, the proposed build out of Tentative Tract 38605. The result of the proposed project impacts equates to a volume change of 1.17' feet of reservoir storage (0.2439MG).

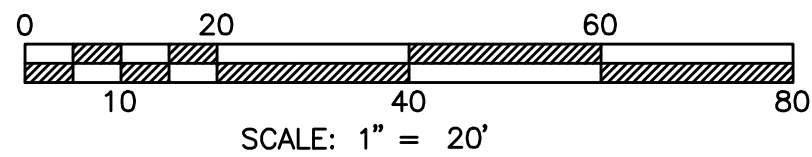
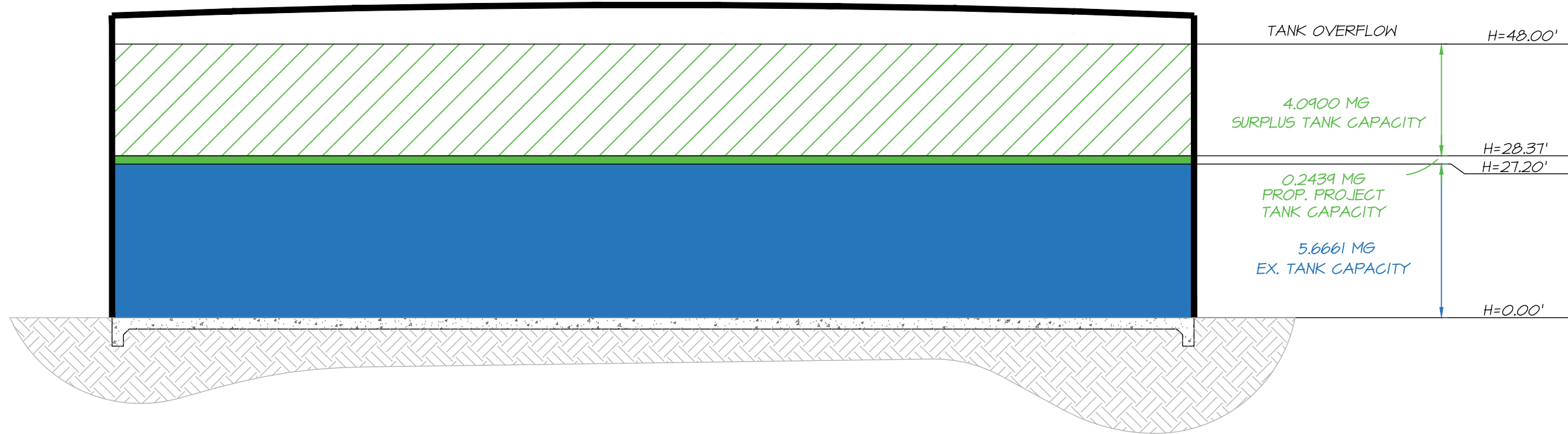
LA SIERRA TANK EXHIBIT (EXISTING AND NEAR TERM)



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LA SIERRA TANK EXHIBIT (PROJECT SPECIFIC TANK CAPACITY)

BASED ON CURRENT BUILD OUT



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