ATTACHMENT 16

BRSP WATER MASTER PLAN

Technical Memorandum

HydroScience
Strategic Water Solutions

Sacramento • Berkeley • San Jose

To: John Tallman, LV Bickford Ranch LLC

From: Angela Singer
Curtis Lam

Subject: Bickford Ranch Water Master Plan

Date: July 16, 2014

LV Bickford Ranch LLC has retained HydroScience Engineers, Inc. (HydroScience) to prepare a Technical Memorandum (TM) summarizing the proposed water infrastructure required for buildout of the Bickford Ranch Specific Plan (Bickford Ranch).

Introduction

Bickford Ranch is a proposed 1,928 acre development located in Placer County, California east of Sierra College Boulevard and south of the Lincoln Newcastle Highway. A map showing the location and vicinity of the proposed Bickford Ranch development is provided as **Figure 1**. The site is currently undeveloped hilltop grassland. The area has elevations ranging from 265 feet to 950 feet, and slopes down from east to west.

The proposed development will include a variety of land uses, including rural, low-density, and medium-density residential; public and private parks; two clubhouses; a school; a fire station; and multi-use and undeveloped open spaces. Land use data is based on the Land Use Plan dated January 22, 2014. Proposed land uses within Bickford Ranch are shown in **Figure 2**. For the purpose of developing the hydraulic model alignments, the Conceptual Lotting Plan from October 16, 2013 was used to identify proposed roadway alignments and serves as the backdrop for subsequent figures presented in this TM.

The Bickford Ranch water system was modeled to accommodate storage at the point of connection to serve project development with additional high elevation storage provided for ultimate buildout. The modeling criteria are based on the Bickford Ranch – Placer County Water Agency (PCWA) Master Facilities Agreement dated September 2004 and subsequent discussions with PCWA.

Purpose

The purpose of this TM is to present the results of the hydraulic modeling effort. The intent of this analysis is to:

- Identify the water infrastructure requirements for Bickford Ranch;
- Estimate the water demands;
- Determine the minimum pipeline sizing requirements such that the system can meet fire flow requirements; and
- Identify locations for pressure-reducing valves (PRVs) to establish system zoning and maintain system pressures within established criteria.

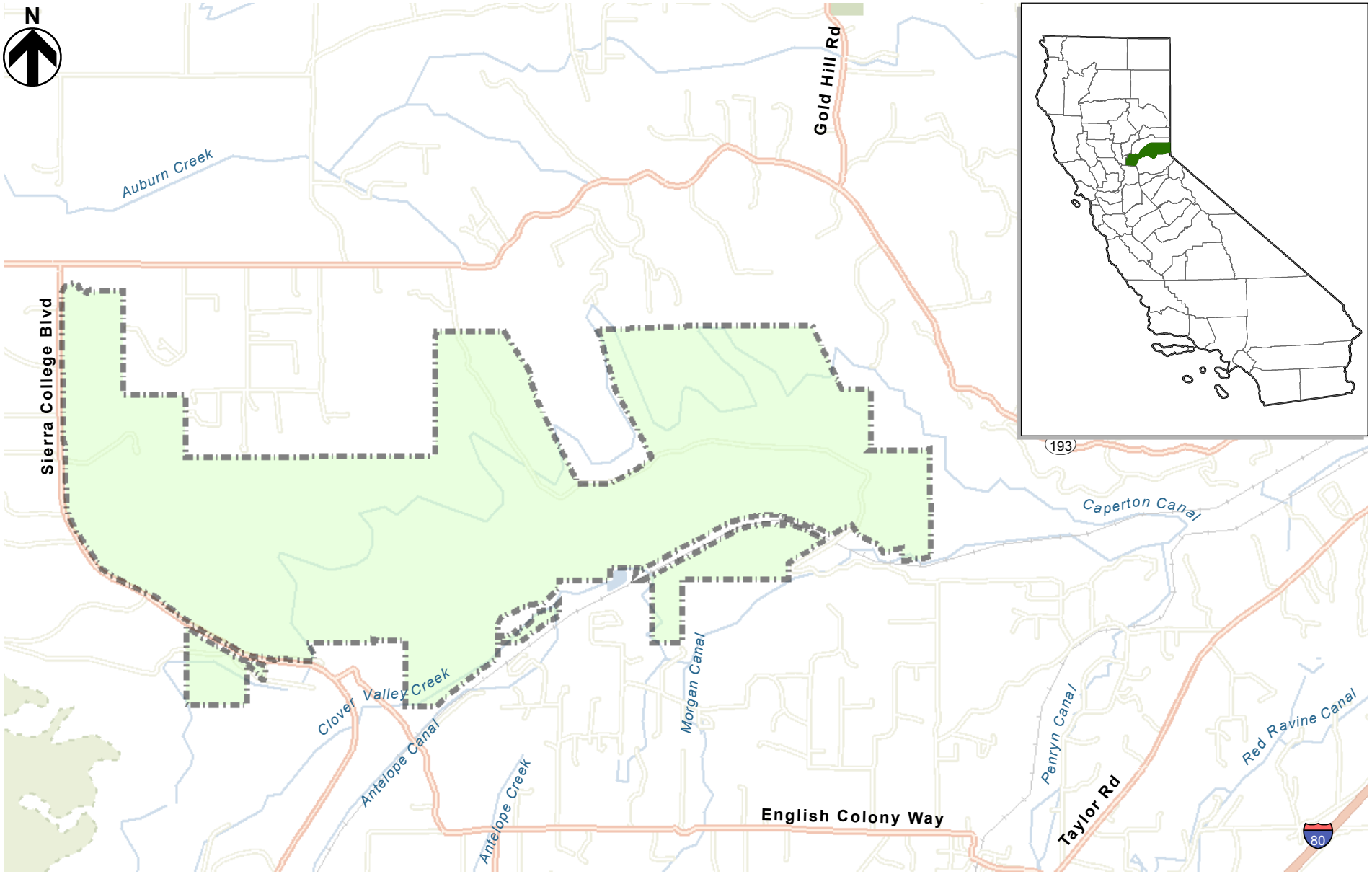


FIGURE 1
LV BICKFORD RANCH LLC
WATER MASTER PLAN
PROJECT LOCATION MAP

HydroScience

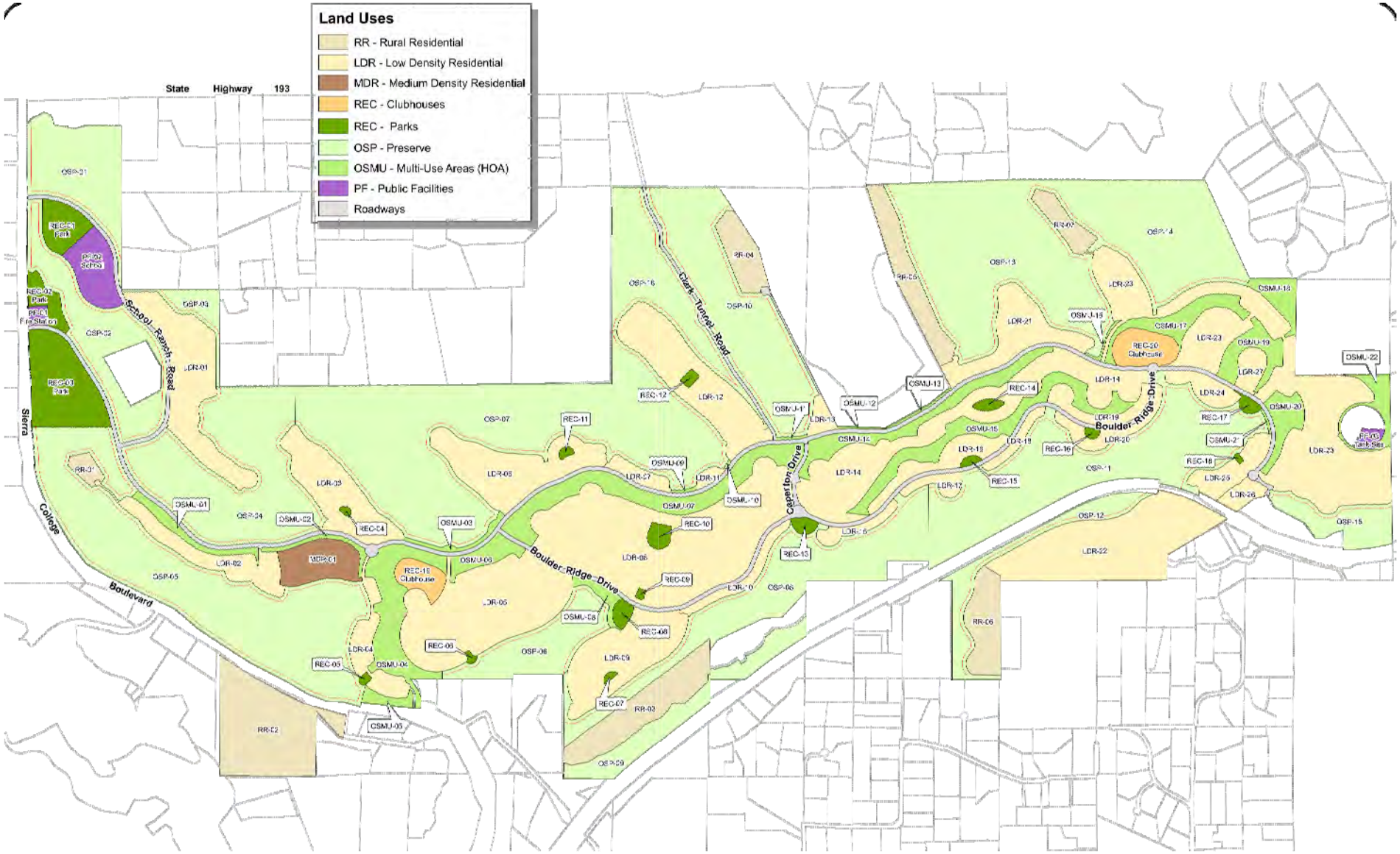


FIGURE 2
LV BICKFORD RANCH LLC
TREATED WATER INFRASTRUCTURE PHASING
LAND USE PLAN (01/22/2014)

HydroScience

S:\Common\Projects\288_Westpark\Bickford Ranch and Placer Ranch\Bickford Ranch\Figures\Figure 2.dwg DATE: 2/14/14

Water Demands

Development of water demands was based on the new construction water use factors identified in the PCWA 2010 Urban Water Management Plan. Those water use factors are summarized below in **Table 1**. These water use factors were applied to the various land use types identified by the Bickford Ranch Land Use Plan dated January 22, 2014 to determine the overall water demand for the proposed development. A summary of the system water demand is also provided in **Table 1**.

Table 1: Potable Water Use Factors and Estimated Annual Average Water Demands

Land Use Designation	Abbreviation	Quantity	Units	Water Use Factors	Average Day Demand (gpd)	Maximum Day Demand (gpd)
Rural Residential (1.1-2.3 Ac/DU)	RR	6	DU	0.96 AFY/DU (857 gpd/DU)	5,142	10,798
Rural Residential (2.31-4.6 Ac/DU)		22	DU	0.77 AFY/DU (687 gpd/DU)	15,114	31,739
Rural Residential (4.61+ Ac/DU)		4	DU	0.66 AFY/DU (589 gpd/DU)	2,356	4,948
Low Density Residential (0.1-3 DU/Ac)	LDR	192	DU	0.84 AFY/DU (750 gpd/DU)	144,000	302,400
Low Density Residential (3.1-5 DU/Ac)		1,589	DU	0.48 AFY/DU (428 gpd/DU)	680,092	1,428,193
Medium Density Residential	MDR	77	DU	0.39 AFY/DU (348 gpd/DU)	26,796	56,272
Public & Private Parks	REC	49.1	Acres	2.80 AFY/Acre (2,500 gpd/Acre)	122,750	257,775
Clubhouses		14.7	Acres	2.80 AFY/Acre (2,500 gpd/Acre)	36,750	77,175
Open Space Multi-Use Areas (LDR 0.1-3 DU/Ac)	OSMU	5.9	Acres	1.39 AFY/Acre (1,241 gpd/Acre)	7,322	15,374
Open Space Multi-Use Areas (LDR 3.1-5 DU/Ac)		129.2	Acres	0.86 AFY/Acre (768 gpd/Acre)	99,226	208,375
Open Space Preserves	OSP	1,066.6	Acres	0 AFY/Acre (0 gpd/Acre)	0	0
School	PF	11.8	Acres	2.80 AFY/Acre (2,500 gpd/Acre)	29,500	61,950
Fire Station		1.5	Acres	2.80 AFY/Acre (2,500 gpd/Acre)	3,750	7,875
Tank Site		1.8	Acres	2.80 AFY/Acre (2,500 gpd/Acre)	4,500	9,450
Total					**1,177,298**	**2,472,324**

Notes:
1. PCWA 2010 Urban Water Management Plan, Table 4-5 – Retail Treated Future Unit Water Demand Factors.

Peaking Factors

Peaking factors are detailed in the Master Facilities Agreement. Factors are applied to average day demands to determine maximum day demands (i.e. the highest demand day in a year) and peak hour demands (i.e. the highest demand hour). Demand factors and associated system demands are provided in **Table 2.**

Table 2: Peaking Factors

Demand Type	Peaking Factor	Demands (gpm)
Annual Average Day	1.0	818
Maximum Day	Annual Average Day x 2.1	1,720
Peak Hour	Maximum Day x 1.6	2,750

Modeling Criteria

The proposed Bickford Ranch hydraulic model was developed using H2ONET software from the Innovyze suite of water infrastructure modeling software. The system was modeled as a steady-state system, which evaluates a snapshot of time, namely, for this analysis, during the maximum day and peak hour. In addition, a fire flow analysis was conducted using the indicated fire flow criteria to size the infrastructure such that every node meets minimum fire flow requirements.

Modeling criteria is based on the system design parameters detailed in the Master Facilities Agreement. The parameters include minimum operational pressures, maximum operational pressures, fire demands, and storage calculations. Those parameters are detailed below.

Modeled Scenario

On May 20, 2014, PCWA transmitted an email and documentation of internal modeling results to demonstrate the estimated remaining capacity in the 42-inch pipeline at the Phase 3 pipeline point of connection. PCWA estimated that the 42-inch pipeline could provide up to 22.6 MGD, excluding demands on the 42-inch pipe from the Sunset Tank and the City of Rocklin. The City of Lincoln has purchased 17.77 MGD of regulated capacity and 0.73 MGD of unregulated capacity, or 18.5 MGD total capacity. It was thus assumed that there was 4.1 MGD of capacity remaining in the 42-inch pipeline. The average day and maximum day demand for Bickford Ranch shown in **Table 1** are less than the calculated capacity in this pipeline identified by PCWA.

PCWA historically has allowed additional connections to their system on a "first come, first served" basis, which has been their previous practice. Conditions at the point of connection may change as additional demands are connected to the PCWA system.

As part of this analysis, two of the PCWA hydraulic model scenarios were evaluated for use in determining conditions at the point of connection, Scenarios 7 and 8. Scenario 7 is titled "Expanded Foothill Capacity (63 MGD)" and Scenario 8 is titled "Ophir Alternate 1 (86 MGD)." Both scenarios represent a steady state analysis of the PCWA system.

Scenario 8 incorporates the Ophir plant into the system capacity and represents a more conservative example of system capacity, and thus was selected for use in this analysis. Assuming a max day demand of 1,720 gpm at the point of connection provides a residual pressure at the node of approximately 56 psi, which translates to an elevation of 739.17 feet.

It was noted that Scenario 8 assumes that the City of Lincoln receives 33.2 MGD of water from PCWA. As noted above, the City of Lincoln has currently purchased 18.5 MGD of capacity (including regulated and unregulated supplies) from PCWA, so Scenario 8 was updated to reflect these Lincoln demands. As Scenario 8 is currently set up, all of the City of Lincoln water demand is withdrawn from the PCWA system at Lincoln Metering Station #1. With the buildout of a new 30-inch Phase 3 pipeline north towards Lincoln and Bickford Ranch, the City of Lincoln would also be able to take water from a new proposed Lincoln Metering Station #2, which is located near Funete Way.

It was assumed that the City of Lincoln would maintain their ability to take their entire purchased 18.5 MGD capacity from either Lincoln Metering Station #1 or #2. For the purposes of this evaluation, a number of assumptions were made, including:

- Lincoln takes an equal amount of water from Metering Stations #1 and #2 (9.25 MGD each) that is equivalent to their existing purchased PCWA capacity.
- No Bickford Ranch storage tanks are turned on in the model, so Bickford Ranch would peak off of the PCWA system.
- The transmission pipeline from Ophir to Storage Tank #2 and the 42-inch transmission line through Bickford Ranch is not operational.

Based on these assumptions, the static pressure in Scenario 8 using these assumptions presented in **Table 3**.

Table 3: Modeled Pressures at Lincoln Metering Stations

Demand Type	Without Bickford Ranch Flows	Bickford Ranch Average Day (818 gpm)	Bickford Ranch Max Day (1,720 gpm)
Velocity in 30-inch Phase 3 pipeline	2.92 ft/s	3.29 ft/s	3.7 ft/s
Lincoln Metering Station #1	93.51 psi	92.4 psi	91.13 psi
Lincoln Metering Station #2	76.32 psi	74.67 psi	72.75 psi

Notes:
1. This assumes that a 30-inch Phase 3 pipeline is constructed as is currently being designed by the City of Lincoln.

If the Bickford Ranch infrastructure (transmission pipeline and storage tanks) were constructed and connected to Ophir, the pressures at Lincoln Metering Stations #1 and #2 would be greater than what are shown in **Table 3**. Additionally, the City of Lincoln has and is planning to construct storage tank(s) near Metering Station #2, which will help mitigate their peaking off of the PCWA transmission system.

The additional demands from Bickford Ranch, during either max day or average day conditions, do not impact the ability of Lincoln to receive additional water supplies from PCWA. Additionally, the construction of the new PCWA transmission line within Bickford Ranch is expected to significantly increase the ability of Lincoln to receive additional water supplies from PCWA. This modeled scenario shows that there is ample capacity for Lincoln to take their existing purchased PCWA capacity of water in a variety of methods through their current and proposed metering stations.

However, there has been concern that a 30-inch pipeline may be undersized to meet PCWA standards during buildout flow conditions if the Bickford Ranch transmission main is not connected to Ophir. Thus, PCWA has recommended that Bickford Ranch work with PCWA and the Phase 3 pipeline designers to upsize the Phase 3 pipeline from 30-inches to 36-inches between the existing Phase 3 pipeline point of connection and the Bickford Ranch turnout. The details of how Bickford Ranch will participate in funding this upsizing will be coordinated between Bickford Ranch and PCWA.

System Pressures

The hydraulic model of the water system was designed to meet the minimum and maximum pressure criteria prescribed in the Master Facilities Agreement and PCWA standards. The standard pressure and velocity criteria used in the hydraulic model are listed in **Table 4**.

Table 4: Minimum and Maximum Pressure and Velocity Constraints

Pressure	Criteria
Minimum Operational Pressures	
Max Day Demand	40 psi
Peak Hour Demand	30 psi
Max Day plus Fire Flow Demand	20 psi
Maximum Operational Pressures	
Static Pressure	130 psi
Individual PRVs required where static pressure is greater than 80 psi	
Maximum Velocities	
Domestic flows	5 ft/s
Fire flows	7 ft/s

It was assumed that these parameters were applicable to all distribution system pipelines within Bickford Ranch. The future transmission pipeline will have higher operational pressures than the requirements listed in **Table 4**. PCWA noted that consideration for higher than the maximum operational pressures may be granted on a case-by-case basis.

Due to the relatively large pressures within the distribution system, this system was modeled assuming that pressure regulators would be installed at every service where the distribution system pressure exceeded 80 psi. Thus, system pressures were modeled to allow maximum operational pressures to increase up to 130 psi.

Fire Flow Demand

Fire flow requirements are set by the Placer County Fire Department. Placer County has adopted the minimum allowable standard for fire flow to be as specified in the latest edition (2013) of the California Fire Code. The California Fire Code has published requirements for one and two family dwellings in Appendix B of the 2013 California Fire Code. For the purposes of this report, it was assumed that all dwellings and commercial buildings within Bickford Ranch would have fire sprinkler systems. Having an approved automatic fire sprinkler system installed in a one or two story dwelling allows for a reduction in the fire flow requirements of 50 percent, if approved by the fire marshal.

Based on the California Fire Code and a conservative application of the fire flow criteria, it was assumed that all single family residential dwellings would require at least 1,500 gpm of fire flow for up to two hours. All other dwellings were assumed to require 2,500 gpm of flow for up to two hours.

Modeling Results

The intent of the hydraulic modeling is to determine and plan the water supply and distribution system infrastructure while maintaining minimum criteria as determined by PCWA and detailed in the Master Facilities Agreement for Bickford Ranch.

Water System Infrastructure Summary

This section describes where Bickford Ranch will receive water, how the system would operate, the planned future transmission main, service to higher elevations, and a potential connection to the Butler Road pipeline.

Point of connection: The point of connection to the PCWA system is located just east of the terminus of Funete Way (in the Catta Verdera Country Club area), and just south of Sierra College Boulevard and west of Caperton Court. It was assumed that this point-of-connection was the 30-inch Phase 3 pipeline that will extend north from the Lincoln turnout to serve Bickford Ranch, among others. Data provided for the point-of-connection are based on the results of the “PCWA Zone 1 2005” hydraulic model. The elevation at the point of connection is 610 feet.

Bickford Ranch operations: At the Bickford Ranch point of connection to the Phase 3 pipeline, water from PCWA would flow either into a storage tank (Storage Tank #1) located on Bickford Ranch near the point of connection to the Phase 3 PCWA pipeline or be boosted by a pump station (Pump Station #1) to serve Bickford Ranch. The proposed Storage Tank #1 would be sized to mitigate the impact of peak hour withdrawals from the PCWA transmission system by Bickford Ranch demands.

Pump Station #1, which would be located on Bickford Ranch near the Phase 3 PCWA pipeline point of connection and Storage Tank #1, would pump water either out of Storage Tank #1 or directly from the Phase 3 PCWA pipeline, and would serve as the primary source of water to all of Bickford Ranch. Pump Station #1 would be sized to be able to pump water to all water demands within Bickford Ranch until Storage Tank #2 is constructed.

HydroScience also looked into locating Storage Tank #1 and Pump Station #1 within Bickford Ranch at an elevation suitable to provide gravity flow to lower elevation zones. Based on the land uses proposed within Bickford Ranch, the topography within Bickford Ranch, and the expected phasing of construction, a site could not be identified within Bickford Ranch that would be both available and at the correct elevation and topography for elevated storage. Thus, Storage Tank #1 and Pump Station #1 were both located near the point of connection to the Phase 3 pipeline for land use and operational reasons.

Between Pump Station #1 and the intersection of Bickford Ranch Road and Caperton Drive, an 18-inch distribution pipeline will be the primary water supply pipeline serving the western half of Bickford Ranch. As Bickford Ranch expands to the east of Caperton Drive, the primary water distribution pipeline serving Bickford Ranch will transition from Bickford Ranch Road to run through the unnamed village roads to the South. Within the villages, these distribution pipelines are expected to be 12-inches in diameter. Pipelines connecting to these main distribution pipelines are expected to be 8- and 12-inches in diameter. No 6-inch distribution pipelines are included in this Bickford Ranch hydraulic model for fire flow considerations.

42-inch Transmission Pipeline: In addition to the infrastructure required to serve Bickford Ranch demands, a 42-inch transmission pipeline will also be constructed within Bickford Ranch Road and between Bickford Ranch Road and Storage Tank #1. This 42-inch transmission pipeline would be constructed as the road is constructed, but not operated until the Ophir pipeline is constructed and connected to Storage Tank #2. The Ophir transmission pipeline diameter ranges from 60- to 42-inches, and will extend from the Ophir plant to Storage Tank #2 to provide another transmission pipeline serving this portion of PCWA's service area. Operating a large transmission main in an area with minimal demands without a steady flow of water going through it could result in undesirable water age concerns. Thus, the distribution system was modeled assuming the 42-inch transmission pipeline was not operational, in order to be conservative. In the future, the additional connections between the 42-inch transmission pipeline and the Bickford Ranch distribution pipelines will further increase system reliability and pressures above what is currently modeled. The 42-inch transmission pipeline will be planned to be a high pressure transmission main with no direct service connections with only PRV interties to Bickford Ranch distribution system pipelines.

When the Ophir pipeline is constructed, this new transmission pipeline and Storage Tank #2 would replace Pump Station #1 as the primary source of water to Bickford Ranch. Pump Station #1 would then serve as a secondary source of water to Bickford Ranch, should the gravity pipeline from Ophir be unavailable for any reason. Storage Tank #2 would then be able to provide elevated water storage to Bickford Ranch and other portions of the PCWA transmission system.

Pump Station #2: Once Storage Tank #2 is constructed, Pump Station #1 will typically not operate. However, Storage Tank #2 cannot provide water at pressure to all of Bickford Ranch, and will require a pump station to pump water out of Storage Tank #2 to Pressure Zone 5. This will require reoperation of the highest Bickford Ranch pressure zone to allow for Pump Station #2 to pump out of Storage Tank #2 to serve Pressure Zone 5, as well as the construction of the PRV connecting Pressure Zones 4 and 5. Pump Station #2 is expected to be constructed in tandem with Storage Tank #2. Pump Station #1 will remain available as a standby water supply source to be able to provide water at Pressure to all of Bickford Ranch should Pump Station #2 or other supplies be unavailable for any reason.

Butler Road Connection: PCWA has also requested that Bickford Ranch construct a pipeline connecting the Bickford Ranch distribution system to the existing Butler Road pipeline terminus. This pipeline would be a 6-inch connection that would function to help flush the existing Butler Road pipeline, eliminate the current dead-end main, and minimize existing water quality concerns in that pipeline. The exact routing of this pipeline is to be determined, and is thus not shown on figures in this report. It is expected that Bickford Ranch would install the distribution pipeline connecting Bickford Ranch to Butler Road, and PCWA would provide assistance in getting permits and easements for this connection. It is also expected that various other fixes to the Butler Road pipeline facilities (easements, backflows, pump station decommission) may also be required. This connection to Butler Road is required to resolve existing water quality issues resulting from an oversized pipeline originally intended to service Bickford Ranch.

Flushing station: In the western portion of Zone 1, there are dead end lines that may not be connected to other portions of a distribution system. In these areas where there are dead end lines and potentially low demand off of those lines, a flushing station for water quality purposes will be installed by Bickford Ranch and operated until such time the demand on the system does not warrant continued use of the flushing station. It is currently expected that up to two flushing stations may be required in Zone 1.

Storage Tank Sizing

Together, the volume of Storage Tank #1 and Storage Tank #2 would be sized to meet the Bickford Ranch storage needs plus the excess storage volume requested by PCWA. The overall storage tank sizing requirements have also been dictated by PCWA in the Master Facilities Agreement. Storage Tank #1 was sized to provide the difference between the Max Day flows and Average Day flows for buildout of the development, and help mitigate operational impacts of Bickford Ranch demands peaking off of the PCWA system, and provide PCWA with operational benefits during the interim time period until the gravity pipeline from Ophir is constructed to Bickford Ranch Storage Tank #2. The volume of Storage Tank #1 was also sized to minimize the storage volume needed during the interim phase of construction. It was not desired to have an oversized storage tank to minimize potential water quality concerns.

The max day and average day demands from **Table 1** were used in **Table 4** to calculate the desired Storage Tank #1 storage volume. Storage Tank #1 would help mitigate the impacts of peak hour and maximum day demands from Bickford Ranch on the PCWA transmission system. However, it was the intent of both PCWA and Bickford Ranch to minimize the volume at Storage Tank #1 to minimize potential water quality concerns associated with stagnant water during interim phases and increase the storage volume at higher elevations in Storage Tank #2. Thus, the Storage Tank #1 volume was calculated to be the difference between the Maximum Day Demand and the Average Day Demand. **Table 5** shows the desired volume for Storage Tank #1. **Table 6** then calculated the required size for Storage Tank #2.

The exact location of Storage Tank #1 would be installed on the Bickford Ranch parcel south of Sierra College Boulevard between elevations 610 and 650 in order for it to fill adequately during max day demand periods. Bickford Ranch would work with PCWA to confirm the exact site and elevation for Storage Tank #1.

Table 5: Storage Tank #1 Sizing Criteria

Land Use Designation	Average Day Demand (gpd)	Maximum Day Demand (gpd)
Rural Residential (1.1-2.3 Ac/DU)	5,142	10,798
Rural Residential (2.31-4.6 Ac/DU)	15,114	31,739
Rural Residential (4.61+ Ac/DU)	2,356	4,948
Low Density Residential (0.1-3 DU/Ac)	144,000	302,400
Low Density Residential (3.1-5 DU/Ac)	680,092	1,428,193
Medium Density Residential	26,796	56,272
Public & Private Parks	122,750	257,775
Clubhouses	36,750	77,175
Open Space Multi-Use Areas (LDR 0.1-3 DU/Ac)	7,322	15,374
Open Space Multi-Use Areas (LDR 3.1-5 DU/Ac)	99,226	208,375
Open Space Preserves	0	0
School	29,500	61,950
Fire Station	3,750	7,875
Tank Site	4,500	9,450
Total	**1,177,298**	**2,472,324**
Delta between Max Day and Average Day		**1,295,026**
Storage Tank #1 Volume		**1,300,000**

Table 6: Storage Tank #2 Sizing Criteria

Storage Designation	Criteria	Volume (gallons)
Operational storage	25% of Max Day	618,100
Emergency storage	70% of Max Day	1,730,600
Fire storage	4 hours at 2,500 gpm	600,000
Bottom storage	10% of Max Day	247,300
Total System Storage Required For Bickford Ranch Demands		**3,196,000**
Storage Tank #1 volume	Max Day - Average Day	1,300,000
Storage Tank #2 required volume	Net storage Required	1,896,000
Oversizing Request from PCWA		3,200,000
Storage Tank #2 Volume including oversizing request from PCWA		**5,096,000**

It is understood that the land on which Storage Tank #2 is to be located is owned by multiple parties, including Placer County, Bickford Ranch, and PCWA. Prior to constructing Storage Tank #2, the land on which Storage Tank #2 and Pump Station #2 sit will need to have land entitlements listing PCWA as the landowner. For the purpose of this report, it is expected that these landowners will work out the land ownership issues to allow for water infrastructure to be located on that property.

Pump Stations

Two pump stations would provide water to Bickford Ranch. Pump Station #1 would pump out of Storage Tank #1, and would serve as the primary source of water to Bickford Ranch. Prior to the construction of Storage Tank #2, Pump Station #1 would deliver water at pressure to all of Bickford Ranch. Pump Station #1 will be sized to provide the peak hour and fire flow needs to all of the pressure zones within Bickford Ranch. Following the construction of Storage Tank #2, Pump Station #1 would be a backup facility that would primarily pump to either all of Bickford Ranch or to Storage Tank #2 when the gravity line from Ophir is unavailable.

Pump Station #2 will pump out of either Storage Tank #2 or the distribution system to provide water to the highest pressure zone. Pump Station #2 would be sized to deliver water to the higher elevation areas around Storage Tank #2. These areas are generally at elevations above 800 ft, and are located on the eastern side of Bickford Ranch at the top of hill where Boulder Ridge Drive meets Bickford Ranch Road.

Table 7 presents a summary of the proposed Bickford Ranch pump station sizing criteria. This sizing criteria is one example of how the Bickford Ranch distribution system can be operated to supply the maximum day and fireflow flows. Pump Station #1 was sized assuming it is the sole source of water to Bickford Ranch. Pump Station #2 was sized to have the ability to deliver water to Zones 3-5. The final sizing of each pump station will be based on PCWA operational preferences to supply each zone.

Table 7: Pump Station Minimum Sizing Criteria

Pump Station	Max Day Pump Capacity (gpm)	Fireflow (gpm)	Total Pumping Capacity (gpm)	Minimum Head (feet)
Pump Station #1 (w/o PS #2)	1,720	3,500	5,220	330
Pump Station #2 (Zones 3-5)	1,315	2,185	3,500	95

Distribution system

The distribution system will consist of 8-, 12-, and 18-inch pipelines along the roadways paralleling Bickford Ranch Road, with branches crossing over the transmission pipeline to feed developments to either side of Bickford Ranch Road. A summary of pipeline lengths both with and without upsizing of the transmission pipeline to 42-inches is provided in **Table 8**. The length of pipeline between Bickford Ranch and the Butler Road pipeline terminus was not included in the totals listed in **Table 8** since that alignment is currently unknown.

Table 8: Summary of Pipeline Lengths

Size	Pipeline Lengths
8-inch	82,455
12-inch	38,060
18-inch	6,600
Total	127,115

Note: Values were rounded to the nearest foot.

Figure 3 provides the proposed system and sizing and **Figure 4** presents the system PRVs. PRVs are located at the boundary between zones and in some cases, within a pressure zone to create subzones.

Pressure regulating valves

Pressure regulating valves are required at all of the connections from the 42-inch transmission pipeline to Bickford Ranch, as well as to keep pressures within the distribution pipelines between 40 psi and 130 psi, as outlined in **Table 4**. For the purposes of this analysis, it was assumed that there would be one PRV connection between the 42-inch transmission line and each pressure zone within Bickford Ranch. However, these PRV connections would not be constructed until the 42-inch pipeline is put into operation. With the PRV valves, five pressure zones in Bickford Ranch were created as shown in **Table 9**.

Table 9: Pressure Zone Information

Pressure Zone	Hydraulic Grade Line (ft)	Number of Dwelling Units	Other Parcels (Acres)	Minimum Elevation Served (ft)	Static Pressure at Min Elevation (psi)	Maximum Elevation Served (ft)	Static Pressure at Max Elevation (psi)
1	468.8	34	49.9	287	78.7	359	47.6
2	752.2	227	30	529	96.7	654	42.6
3	896.0	829	48.4	622	118.6	803	40.5
4	987.3	349	37.6	749	101.7	897	40.8
5	1,054.9	451	48.1	803	109.6	950	46.8

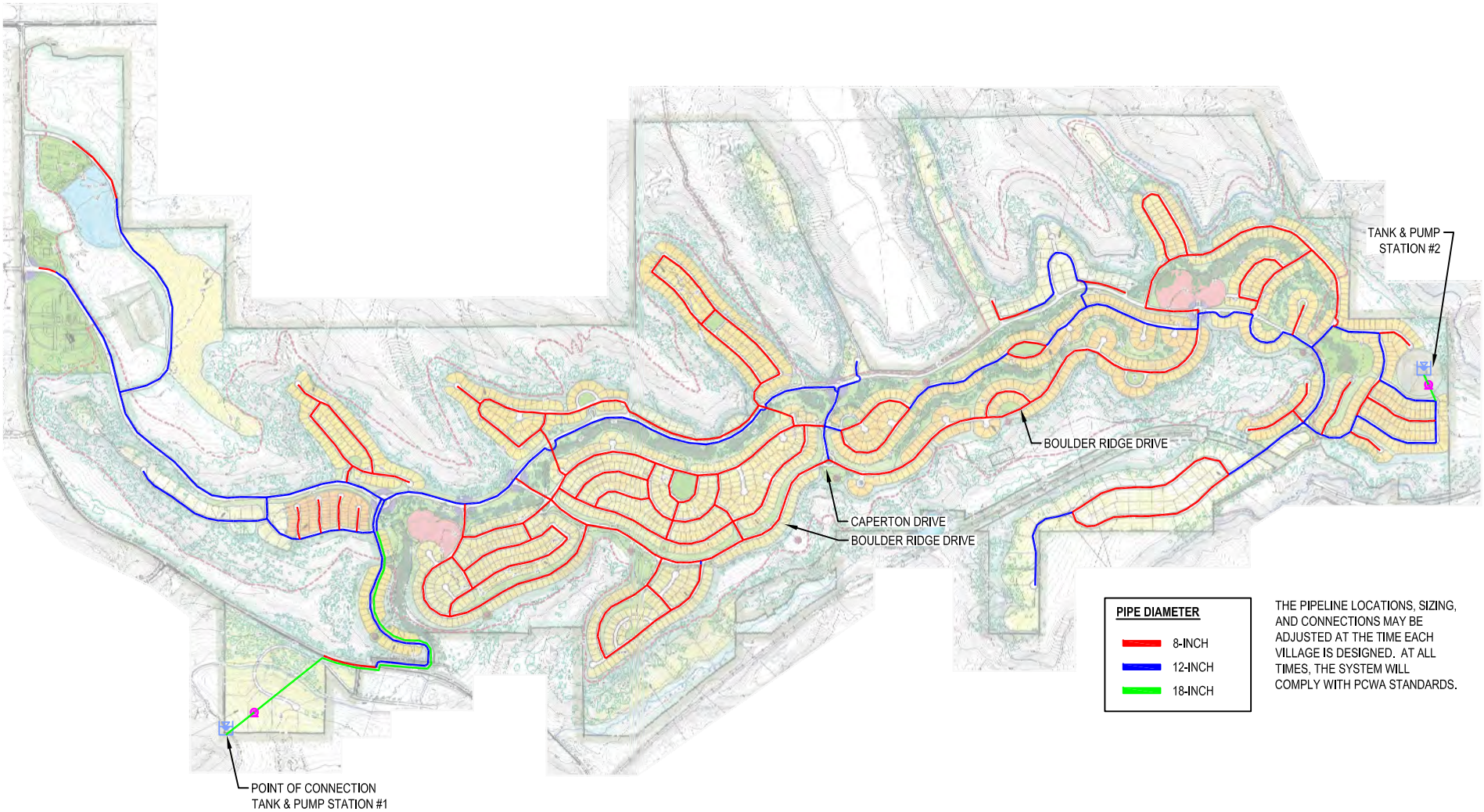
Note:
The high pressure transmission line is not included in the **Table 9** data for Pressure Zone 4..

There are currently 7 PRVs planned for Bickford Ranch that are located on proposed distribution pipelines. These PRVs are located as shown in **Figure 4**. From west to east, there are PRVs connecting Zone 1 to Zone 2, and Zone 4 to Zone 2, and Zone 5 to Zone 4. The PRV connecting Zones 5 and 4 is required when Pump Station #2 is operational. Prior to Pump Station #2 coming on-line, this PRV is not required and should be installed with a spool piece.

There are four PRVs connecting Zone 4 to Zone 3, primarily to accommodate the buildout of Zone 3 from west to east. Zones 3, 4, and 5 were modeled to have two sources of supply. Zone 2 can receive water either from Pump Station #1 or Zone 4. Zone 1 will only be able to receive water at one location due to the land use configuration.

With the operation of these PRVs, there are no nodes in the Bickford Ranch distribution system with static pressures above 130 psi. Large portions of this distribution system will have pressures ranging between 80 and 130 psi. In these areas, pressure regulators will be required at individual services. Additionally, there are no locations where pressures fall below 40 psi.

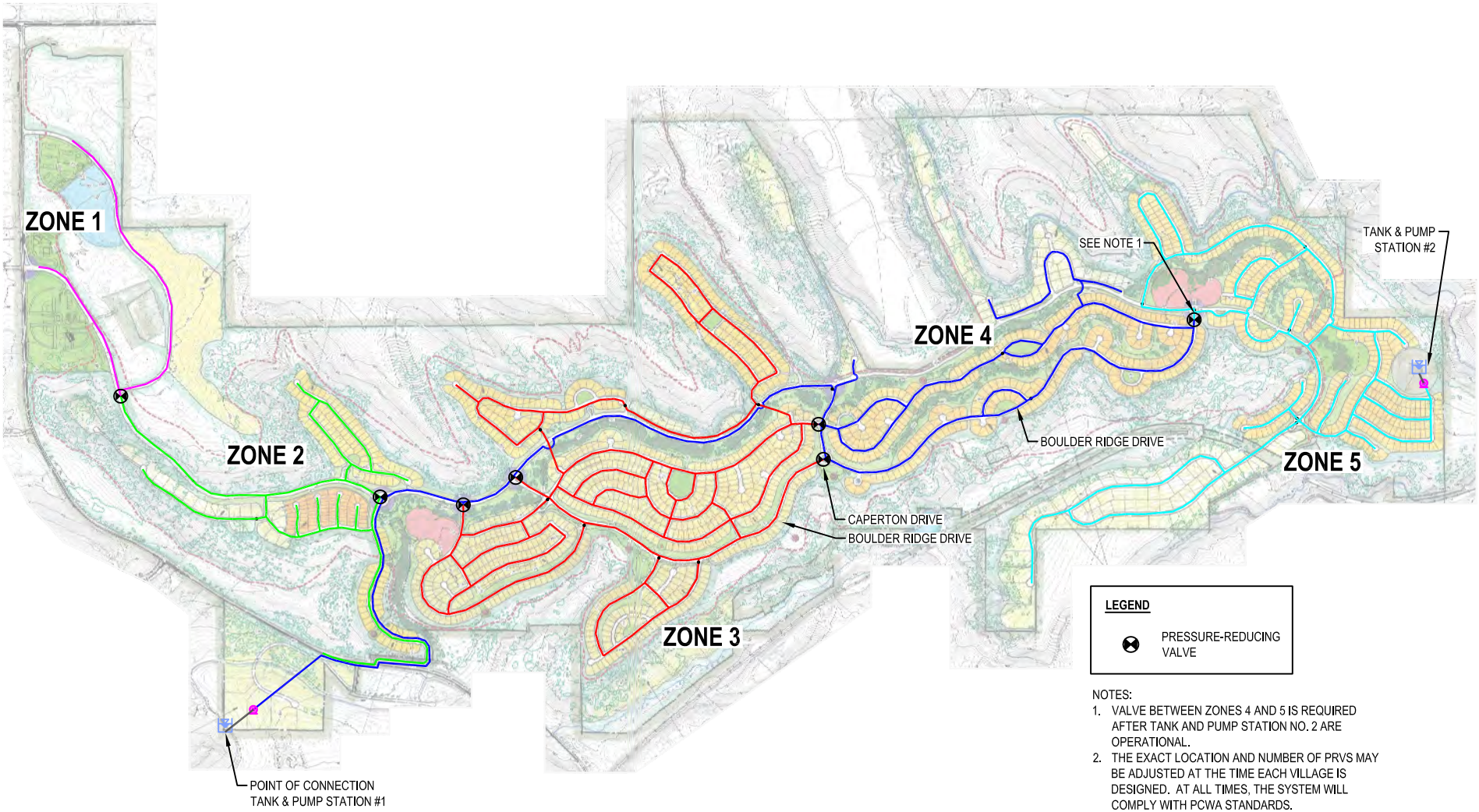
PCWA has requested that one water quality sampling station be included in each pressure zone. The specific locations will be determined as these facilities are designed.



HydroScience

FIGURE 3
LV BICKFORD RANCH LLC
WATER MASTER PLAN
SYSTEM SIZING AND FACILITIES

S:\Common\Projects\288_Westpark\Bickford Ranch and Placer Ranch\Bickford Ranch\H2ONet Model\Bickford Ranch Model 042414\Bickford Ranch Model V4.dwg DATE: 5/27/14



NOTES:

1. VALVE BETWEEN ZONES 4 AND 5 IS REQUIRED AFTER TANK AND PUMP STATION NO. 2 ARE OPERATIONAL.
2. THE EXACT LOCATION AND NUMBER OF PRVS MAY BE ADJUSTED AT THE TIME EACH VILLAGE IS DESIGNED. AT ALL TIMES, THE SYSTEM WILL COMPLY WITH PCWA STANDARDS.

HydroScience

FIGURE 4
LV BICKFORD RANCH LLC
WATER MASTER PLAN
SYSTEM ZONES AND PRV MAP

S:\Common\Projects\288_Westpark\Bickford Ranch and Placer Ranch\Bickford Ranch\H2ONet Model\Bickford Ranch Model 042414\Bickford Ranch Model V4.dwg DATE: 5/27/14

Maximum Day and Peak Hour Demands

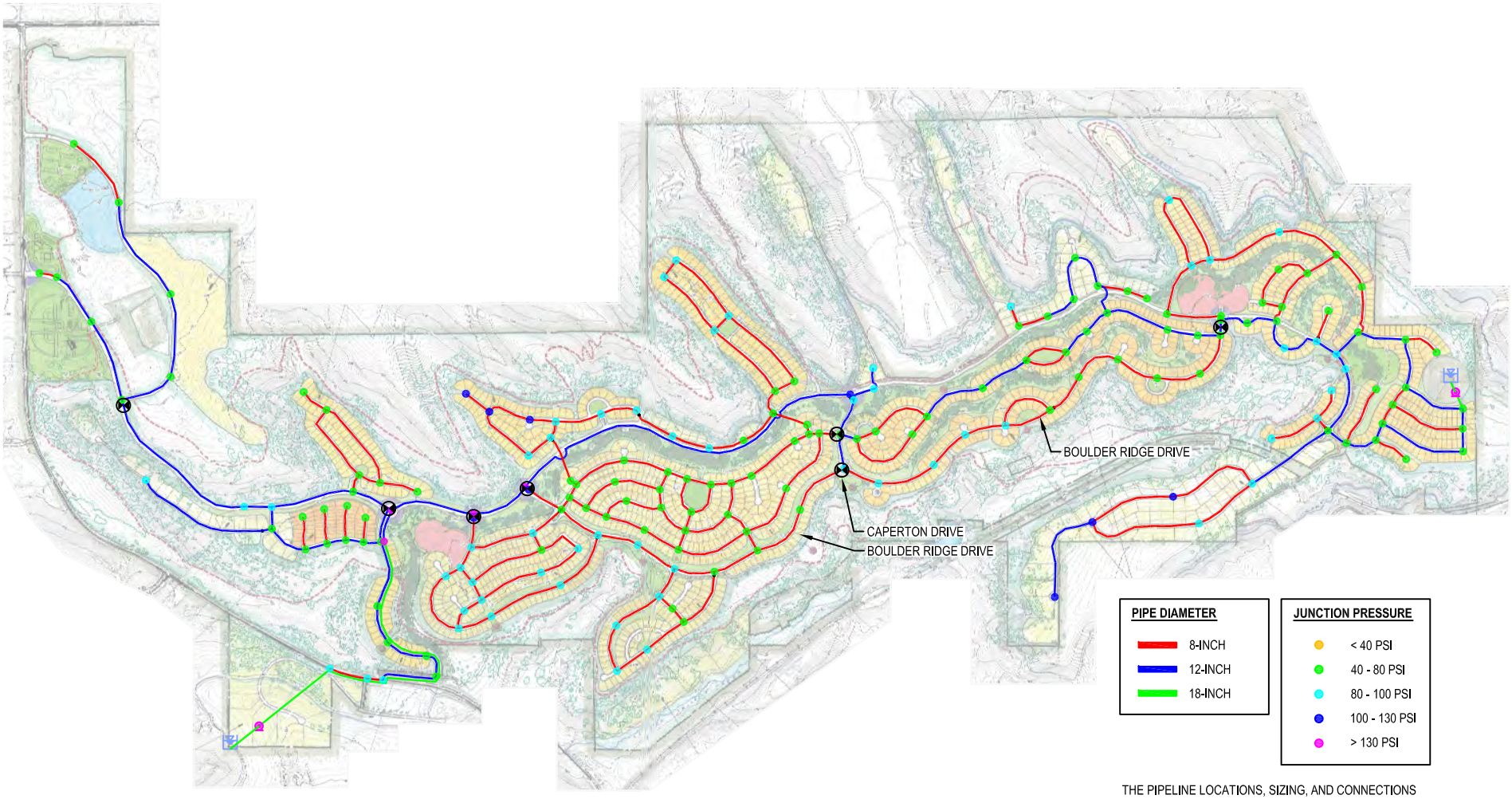
A modeling scenario was developed to analyze maximum day demands. Child scenarios for the maximum day demand scenario were applied to analyze peak hour demands as well as fire flow. Fire flow analyses were conducted using the maximum day scenarios.

Maximum day pressures for system buildout are provided in **Figure 5** and peak hour pressures are provided in **Figure 6**. Figures and modeling results for peak hour on max day and average hour pressures are provided in **Attachment A**. The difference between the peak hour on max day and average day pressures was also presented in Attachment A to show PCWA the approximate range of pressures each node will experience.

PRVs were located within the system to minimize the number of connections requiring individual PRVs. PRVs were used to maintain pressures within the prescribed operating range of 40 psi to 80 psi for maximum day demands to the extent possible.

Maximum Day plus Fire flow

Results of the fire flow analysis for system buildout are presented in **Figure 7**. This figure provides the residual pressure at each node. The residual pressure is the pressure at the respective junction at the time the hydrant is flowing. Flows include the fire flow demand as well as the static demand (i.e. max day demand). Figures and modeling results for the fire flow analyses for all phases are provided in **Attachment B**.

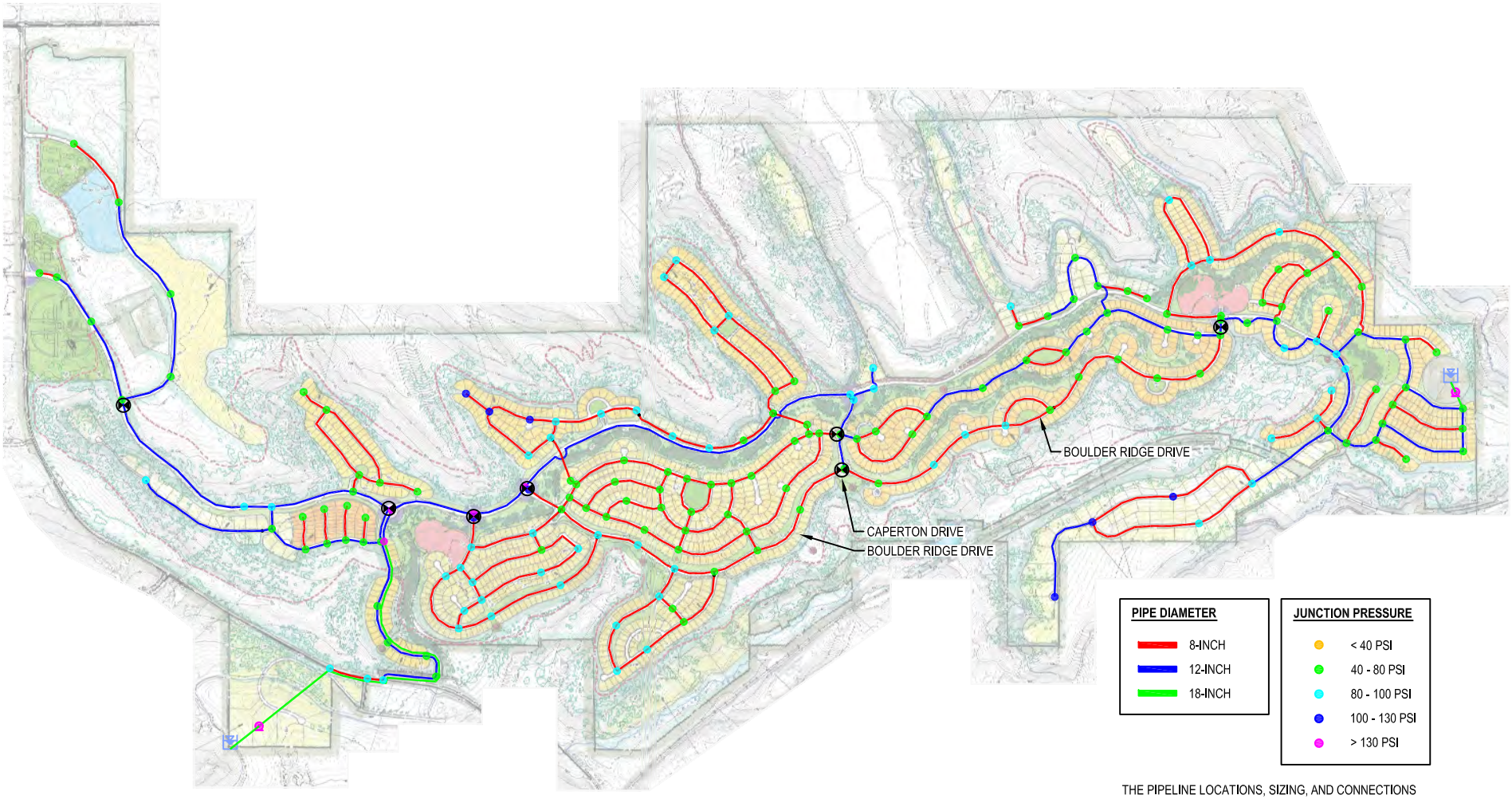


THE PIPELINE LOCATIONS, SIZING, AND CONNECTIONS MAY BE ADJUSTED AT THE TIME EACH VILLAGE IS DESIGNED. AT ALL TIMES, THE SYSTEM WILL COMPLY WITH PCWA STANDARDS.

HydroScience

FIGURE 5
LV BICKFORD RANCH LLC
WATER MASTER PLAN
MAXIMUM DAY DEMAND (BUILDOUT)

S:\Common\Projects\288_Westpark\Bickford Ranch and Placer Ranch\Bickford Ranch\H2ONet Model\Bickford Ranch Model 042414\Bickford Ranch Model V4.dwg DATE: 5/27/14



THE PIPELINE LOCATIONS, SIZING, AND CONNECTIONS MAY BE ADJUSTED AT THE TIME EACH VILLAGE IS DESIGNED. AT ALL TIMES, THE SYSTEM WILL COMPLY WITH PCWA STANDARDS.

HydroScience

FIGURE 6
LV BICKFORD RANCH LLC
WATER MASTER PLAN
PEAK HOUR DEMAND (BUILDOUT)

S:\Common\Projects\288_Westpark\Bickford Ranch and Placer Ranch\Bickford Ranch\H2ONet Model\Bickford Ranch Model 042414\Bickford Ranch Model V4.dwg DATE: 5/27/14

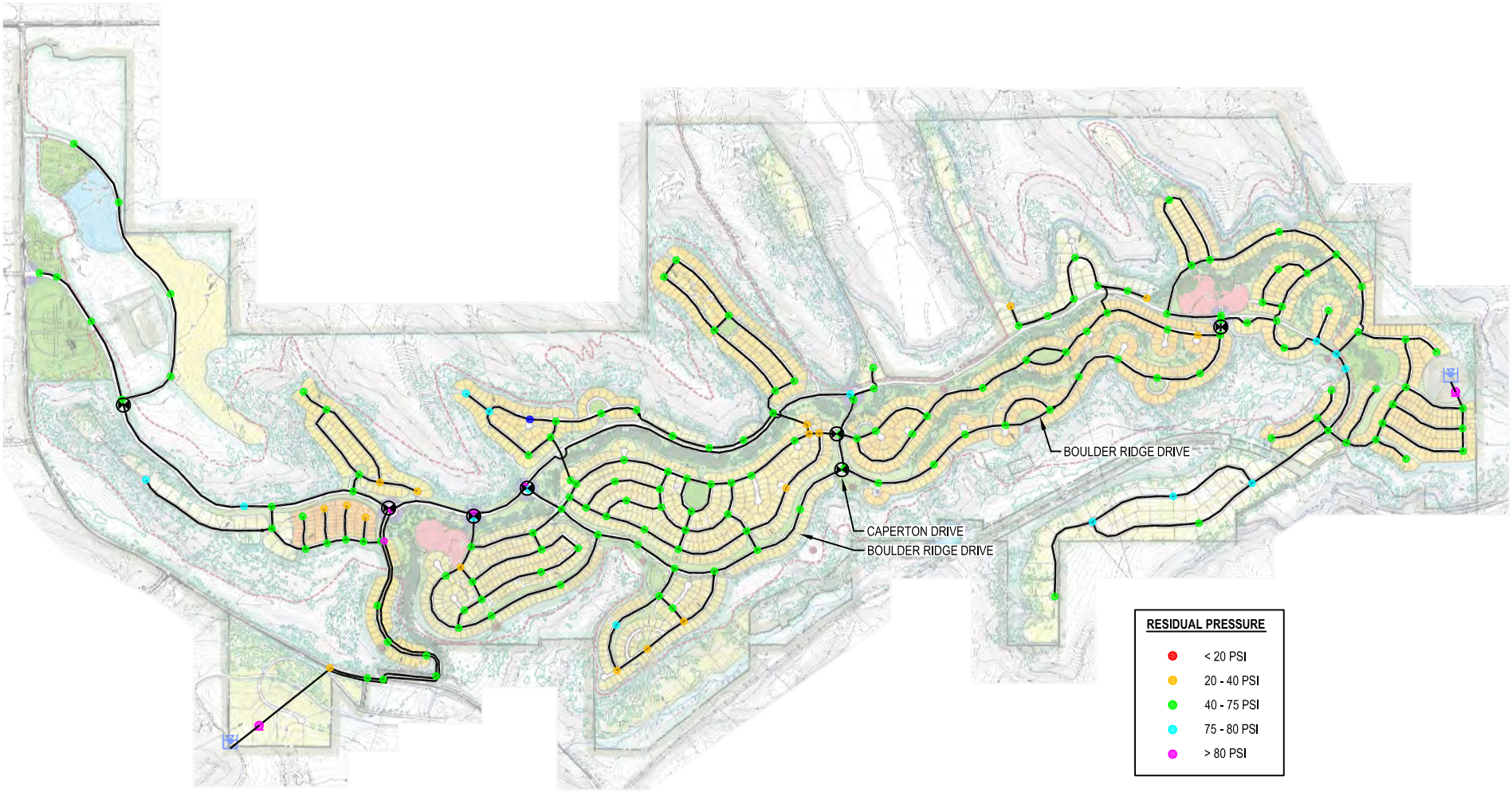


FIGURE 7
LV BICKFORD RANCH LLC
WATER MASTER PLAN
MAXIMUM DAY PLUS FIREFLOW (RESIDUAL PRESSURES)

HydroScience

S:\Common\Projects\288_Westpark\Bickford Ranch and Placer Ranch\Bickford Ranch\H2ONet Model\Bickford Ranch Model 042414\Bickford Ranch Model V4.dwg DATE: 5/27/14

ATTACHMENT A

LV Bickford Ranch LLC

Water Master Plan

Max Day and Peak Hour Modeling Results

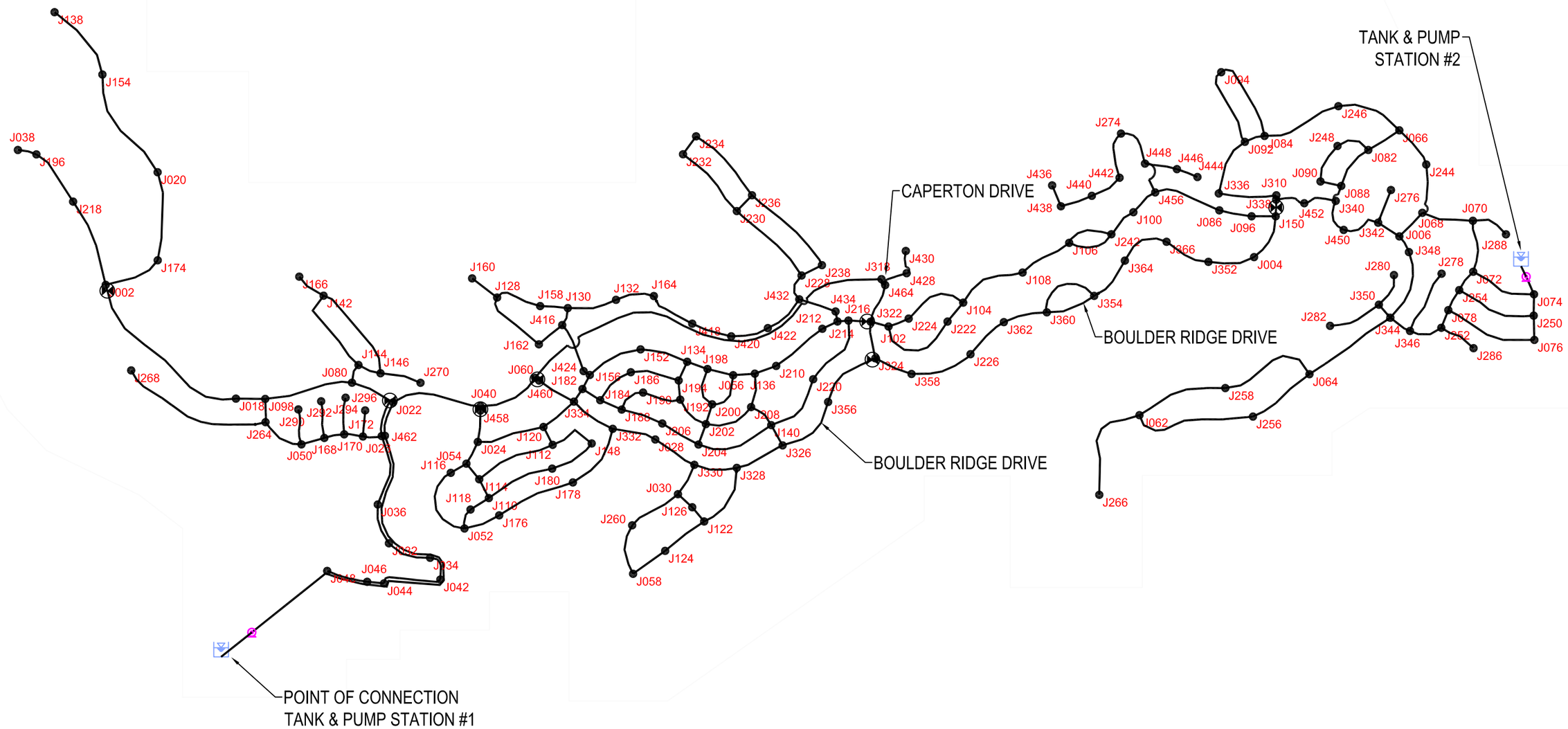
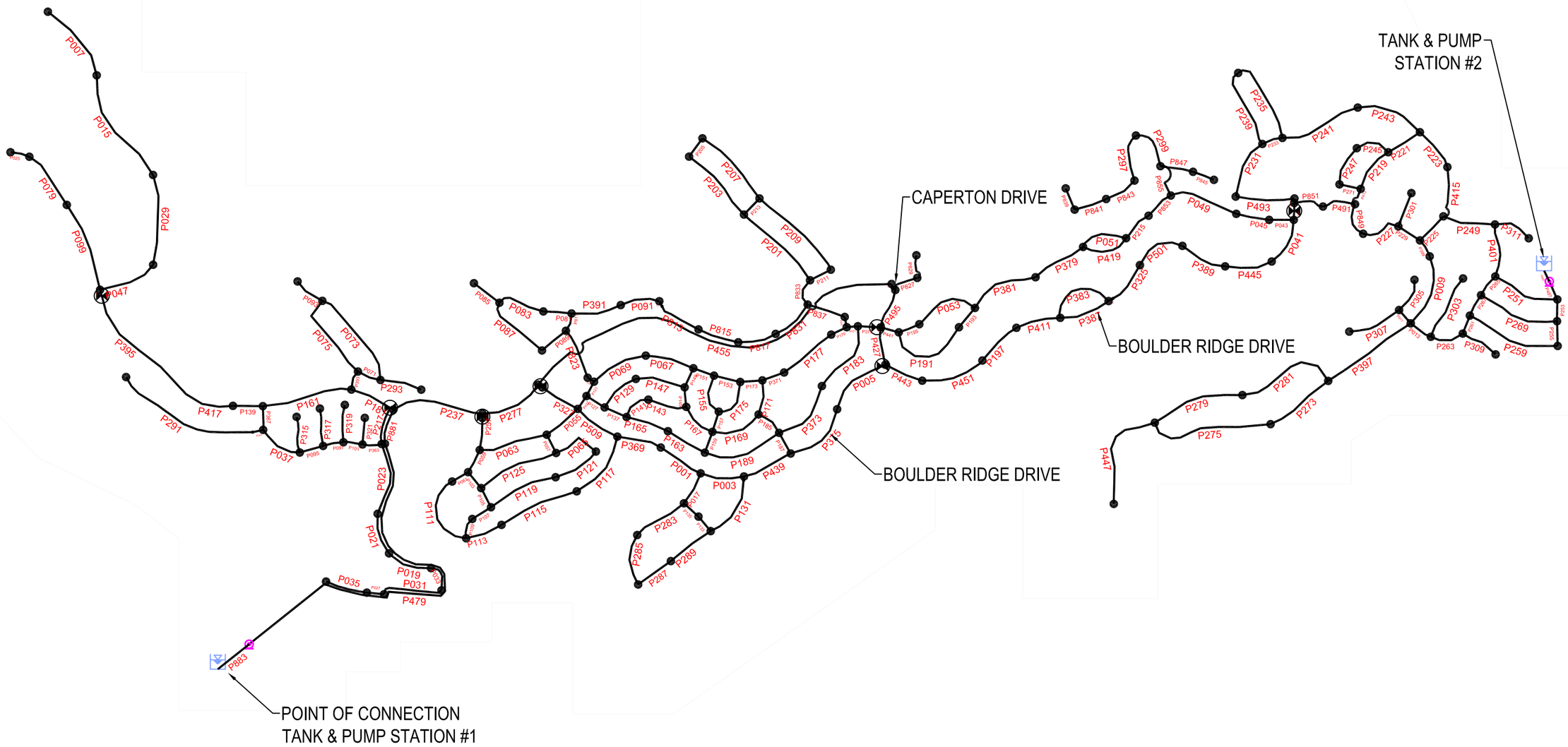


FIGURE A1
LV BICKFORD RANCH LLC
WATER MASTER PLAN
WATER SYSTEM JUNCTION ID'S

HydroScience

S:\Common\Projects\288_Westpark\Bickford Ranch and Placer Ranch\Bickford Ranch\H20Net Model\Bickford Ranch Model 042414\Bickford Ranch Model V4.dwg DATE:5/27/14



HydroScience

FIGURE A2
LV BICKFORD RANCH LLC
WATER MASTER PLAN
WATER SYSTEM PIPE ID'S

S:\Common\Projects\288_Westpark\Bickford Ranch and Placer Ranch\Bickford Ranch\H2ONet Model\Bickford Ranch Model V4.dwg DATE:5/27/14 042414

TABLE A.1
LV Bickford Ranch LLC
Water Master Plan
Junction Results

ID	Elevation (ft)	ADD (gpm)	ADD Pressure (psi)	MDD (gpm)	MDD Pressure (psi)	PHD (gpm)	PHD Pressure (psi)	(PHD - ADD) Pressure (psi)
J002	359	0	47.6	0	47.59	0	47.59	0.01
J004	864	4.17	55.38	8.76	54.88	14.02	54.16	1.22
J006	856	2.85	93.97	5.99	80.62	9.59	79.39	14.58
J018	547	3.97	88.94	8.33	88.88	13.32	88.75	0.19
J020	331	8.86	59.72	18.6	59.7	29.76	59.66	0.06
J022	660	0	143.77	0	140.88	0	137.12	6.65
J024	702	3.28	84.43	6.88	83.82	11.01	82.68	1.75
J026	625.5	1.49	54.94	3.13	54.92	5.01	54.89	0.05
J028	698	1.49	86.18	3.13	85.62	5.01	84.6	1.58
J030	699	1.49	85.75	3.13	85.21	5.01	84.21	1.54
J032	585.5	14.33	72.27	30.1	72.25	48.16	72.2	0.07
J034	608.5	2.09	62.31	4.38	62.28	7.01	62.24	0.07
J036	585	4.47	72.49	9.39	72.47	15.02	72.43	0.06
J038	313	2.6	67.53	5.47	67.51	8.75	67.47	0.06
J040	645.5	0	150.01	0	147.16	0	143.4	6.61
J042	616.5	1.23	58.84	2.57	58.82	4.12	58.77	0.07
J044	564	0	81.59	0	81.56	0	81.52	0.07
J046	556.5	0.48	84.84	1	84.81	1.6	84.77	0.07
J048	549	4.77	88.09	10.02	88.06	16.03	88.02	0.07
J050	604	2.94	64.25	6.18	64.21	9.88	64.14	0.11
J052	687.5	4.77	90.71	10.01	90.1	16.02	88.97	1.74
J054	704	11.43	83.56	24.01	82.95	38.42	81.81	1.75
J056	761.5	2.68	58.68	5.63	58.19	9.01	57.27	1.41
J058	688.5	3.99	90.3	8.37	89.76	13.39	88.76	1.54
J060	656	0	145.42	0	142.61	0	138.85	6.57
J062	803	7.29	116.96	15.32	103.85	24.51	102.97	13.99
J064	833.5	7.82	103.75	16.41	90.65	26.26	89.79	13.96
J066	914	8.16	68.75	17.13	54.65	27.41	52.35	16.4
J068	894.5	3.87	77.3	8.14	64	13.02	62.85	14.45
J070	924	5.66	64.55	11.89	51.52	19.02	50.79	13.76
J072	920	7.7	66.32	16.17	53.58	25.87	53.27	13.05
J074	950	5.81	53.37	12.19	41	19.51	41.24	12.37
J076	941	5.66	57.25	11.89	44.7	19.02	44.68	12.57
J078	923	5.66	65.01	11.89	52.23	19.02	51.84	13.17
J080	643.5	1.28	47.14	2.69	47.12	4.3	47.08	0.06
J082	907.5	4.47	71.56	9.39	57.44	15.02	55.09	16.47
J084	855	11.67	94.25	24.51	79.63	39.22	76.54	17.71
J086	887	7.15	45.42	15.02	44.93	24.03	44.23	1.19
J088	898.5	3.28	75.46	6.88	61.33	11.01	58.96	16.5
J090	901	3.28	74.38	6.88	60.24	11.01	57.88	16.5
J092	856.5	3.87	93.6	8.14	78.94	13.02	75.82	17.78
J094	835	7.21	102.92	15.15	88.27	24.23	85.16	17.76
J096	897	2.98	41.1	6.26	40.78	10.01	40.32	0.78

TABLE A.1
LV Bickford Ranch LLC
Water Master Plan
Junction Results

ID	Elevation (ft)	ADD (gpm)	ADD Pressure (psi)	MDD (gpm)	MDD Pressure (psi)	PHD (gpm)	PHD Pressure (psi)	(PHD - ADD) Pressure (psi)
J098	564	0	81.58	0	81.53	0	81.45	0.13
J100	860.5	7.75	56.85	16.27	55.74	26.03	54.19	2.66
J102	808.5	5.07	79.29	10.64	76.59	17.02	72.9	6.39
J104	821.5	5.66	73.69	11.89	71.62	19.02	68.76	4.93
J106	854	3.87	59.63	8.14	58.02	13.02	55.78	3.85
J108	832	14.17	69.15	29.76	67.33	47.61	64.8	4.35
J110	698.5	5.07	85.94	10.64	85.33	17.02	84.2	1.74
J112	711	7.45	80.53	15.65	79.92	25.03	78.79	1.74
J114	706.5	5.66	82.48	11.89	81.86	19.02	80.73	1.75
J116	697	5.66	86.59	11.89	85.98	19.02	84.85	1.74
J118	691	3.28	89.19	6.88	88.58	11.01	87.45	1.74
J120	708	4.77	81.83	10.01	81.23	16.02	80.11	1.72
J122	716.5	4.58	78.17	9.62	77.63	15.39	76.63	1.54
J124	708	9.56	81.85	20.07	81.31	32.11	80.31	1.54
J126	717	4.17	77.95	8.76	77.41	14.02	76.41	1.54
J128	643	5.66	110.01	11.89	109.45	19.02	108.42	1.59
J130	677	4.17	95.28	8.76	94.73	14.02	93.7	1.58
J132	679.5	4.74	94.2	9.96	93.66	15.93	92.66	1.54
J134	748.5	3.28	64.31	6.88	63.79	11.01	62.82	1.49
J136	766	2.09	56.74	4.38	56.27	7.01	55.39	1.35
J138	287	13.54	78.78	28.44	78.74	45.5	78.67	0.11
J140	767.5	6.26	56.1	13.14	55.65	21.03	54.81	1.29
J142	617.5	9.24	58.4	19.4	58.37	31.04	58.32	0.08
J144	644	4.4	46.92	9.23	46.9	14.77	46.84	0.08
J146	654	5.96	42.59	12.52	42.56	20.03	42.5	0.09
J148	698	3.58	86.16	7.51	85.55	12.02	84.42	1.74
J150	890	2.68	44.15	5.63	43.95	9.01	43.66	0.49
J152	744.5	5.96	66.03	12.52	65.5	20.03	64.5	1.53
J154	300	20.48	73.15	43.02	73.12	68.83	73.06	0.09
J156	734	2.68	70.58	5.63	70.03	9.01	69.01	1.57
J158	622	3.58	119.11	7.51	118.55	12.02	117.53	1.58
J160	622	2.09	119.11	4.38	118.55	7.01	117.52	1.59
J162	670	5.07	98.31	10.64	97.76	17.02	96.72	1.59
J164	688	1.49	90.52	3.13	90	5.01	89.03	1.49
J166	607.5	2.38	62.74	5.01	62.71	8.01	62.65	0.09
J168	615	2.18	59.49	4.57	59.45	7.32	59.39	0.1
J170	616.5	2.18	58.84	4.57	58.81	7.32	58.76	0.08
J172	616.5	2.18	58.84	4.57	58.82	7.32	58.77	0.07
J174	347	8.86	52.79	18.6	52.78	29.76	52.76	0.03
J176	685	3.67	91.79	7.72	91.19	12.34	90.07	1.72
J178	679	3.58	94.4	7.51	93.81	12.02	92.72	1.68
J180	702	5.66	84.43	11.89	83.81	19.02	82.68	1.75
J182	730	0.89	72.31	1.88	71.76	3	70.74	1.57

TABLE A.1
LV Bickford Ranch LLC
Water Master Plan
Junction Results

ID	Elevation (ft)	ADD (gpm)	ADD Pressure (psi)	MDD (gpm)	MDD Pressure (psi)	PHD (gpm)	PHD Pressure (psi)	(PHD - ADD) Pressure (psi)
J184	726.5	3.58	73.84	7.51	73.3	12.02	72.31	1.53
J186	737	4.77	69.29	10.01	68.76	16.02	67.77	1.52
J188	713	3.58	79.69	7.51	79.16	12.02	78.19	1.5
J190	731.5	4.17	71.67	8.76	71.15	14.02	70.18	1.49
J192	741	3.87	67.56	8.14	67.04	13.02	66.07	1.49
J194	750	3.28	63.66	6.88	63.14	11.01	62.17	1.49
J196	310	8.68	68.83	18.23	68.81	29.16	68.77	0.06
J198	754.5	5.73	61.71	12.04	61.21	19.26	60.27	1.44
J200	748	2.38	64.53	5.01	64.03	8.01	63.1	1.43
J202	734.5	4.17	70.38	8.76	69.88	14.02	68.95	1.43
J204	717	5.89	77.96	12.36	77.46	19.77	76.53	1.43
J206	714	4.17	79.26	8.76	78.74	14.02	77.79	1.47
J208	764.5	4.17	57.39	8.76	56.92	14.02	56.04	1.35
J210	772	7.15	54.15	15.02	53.7	24.03	52.88	1.27
J212	788	3.87	47.25	8.14	46.89	13.02	46.22	1.03
J214	798.5	0.89	42.71	1.88	42.37	3	41.76	0.95
J216	803	4.17	40.78	8.76	40.52	14.02	40.04	0.74
J218	320.5	41.32	64.28	86.77	64.26	138.83	64.22	0.06
J220	789	7.15	46.81	15.02	46.44	24.03	45.75	1.06
J222	819	5.66	74.76	11.89	72.54	19.02	69.48	5.28
J224	813	4.77	77.35	10.01	74.79	16.02	71.3	6.05
J226	776	3.87	93.38	8.14	91.06	13.02	87.87	5.51
J228	735.5	4.47	69.97	9.39	69.53	15.02	68.71	1.26
J230	704.5	7.65	83.4	16.06	82.95	25.69	82.11	1.29
J232	693	4.17	88.38	8.76	87.93	14.02	87.09	1.29
J234	696.5	4.47	86.86	9.39	86.41	15.02	85.58	1.28
J236	704	6.56	83.61	13.77	83.16	22.03	82.33	1.28
J238	741	4.47	67.58	9.39	67.14	15.02	66.31	1.27
J242	865	5.66	54.89	11.88	53.65	19.01	51.92	2.97
J244	919	4.17	66.63	8.76	52.9	14.02	51.12	15.51
J246	860	6.26	92.12	13.14	77.76	21.03	75.07	17.05
J248	905	3.58	72.65	7.51	58.51	12.02	56.16	16.49
J250	948.5	5.66	54.01	11.89	41.53	19.02	41.61	12.48
J252	915	1.49	68.47	3.13	55.6	5.01	55.1	13.37
J254	923	5.36	65.02	11.26	52.28	18.02	51.98	13.04
J256	849.5	8.86	96.81	18.6	83.7	29.76	82.83	13.98
J258	813	6.77	112.63	14.22	99.52	22.76	98.65	13.98
J260	666	2.38	100.05	5.01	99.51	8.01	98.51	1.54
J264	593	6.77	69.02	14.22	68.97	22.76	68.89	0.13
J266	815	3.57	111.76	7.5	98.65	12	97.77	13.99
J268	529	4.12	96.75	8.66	96.7	13.86	96.62	0.13
J270	640	2.38	48.66	5.01	48.63	8.01	48.57	0.09
J274	815	6.25	76.58	13.13	75.59	21.01	74.21	2.37

TABLE A.1
LV Bickford Ranch LLC
Water Master Plan
Junction Results

ID	Elevation (ft)	ADD (gpm)	ADD Pressure (psi)	MDD (gpm)	MDD Pressure (psi)	PHD (gpm)	PHD Pressure (psi)	(PHD - ADD) Pressure (psi)
J276	876	8.49	85.28	17.82	71.73	28.51	70.21	15.07
J278	901.5	2.09	74.3	4.38	61.3	7.01	60.6	13.7
J280	854.5	2.09	94.65	4.38	81.56	7.01	80.71	13.94
J282	855.5	3.58	94.22	7.51	81.12	12.02	80.28	13.94
J286	918	1.49	67.17	3.13	54.3	5.01	53.8	13.37
J288	939.5	2.38	57.83	5.01	44.81	8.01	44.07	13.76
J290	606	2.42	63.39	5.08	63.35	8.13	63.28	0.11
J292	616	2.42	59.05	5.08	59.02	8.13	58.96	0.09
J294	636	2.42	50.39	5.08	50.36	8.13	50.31	0.08
J296	633	2.42	51.69	5.08	51.67	8.13	51.62	0.07
J310	899.5	0	74.95	0	60.07	0	56.64	18.31
J318	749	0	105.1	0	102.31	0	98.55	6.55
J322	802	7.14	82.1	15	79.35	24	75.59	6.51
J324	792	3.5	86.43	7.35	83.68	11.75	79.92	6.51
J326	752	2.68	62.82	5.63	62.37	9.01	61.55	1.27
J328	740.5	3.28	67.77	6.88	67.26	11.01	66.29	1.48
J330	707	3.13	82.28	6.56	81.75	10.5	80.75	1.53
J332	703	1.19	84.01	2.5	83.44	4.01	82.39	1.62
J334	717	0	77.94	0	77.37	0	76.32	1.62
J336	889.5	0	79.29	0	64.52	0	61.24	18.05
J338	899.5	16.17	74.95	33.97	60.06	54.34	56.62	18.33
J340	889.5	2.68	79.36	5.63	65.22	9.01	62.85	16.51
J342	859	4.77	92.65	10.01	79.1	16.01	77.59	15.06
J344	885.5	0.52	81.22	1.09	68.12	1.75	67.28	13.94
J346	891.5	1.64	78.63	3.44	65.63	5.5	64.93	13.7
J348	844	3.73	99.18	7.84	85.87	12.54	84.73	14.45
J350	871	3.63	87.5	7.61	74.41	12.18	73.56	13.94
J352	854	5.51	59.69	11.58	58.84	18.52	57.65	2.04
J354	811	5.07	78.25	10.64	76.46	17.02	73.97	4.28
J356	772	2.98	54.23	6.26	54.01	10.01	53.59	0.64
J358	793	2.68	86.01	5.63	83.41	9.01	79.86	6.15
J360	794	6.8	85.61	14.28	83.73	22.85	81.11	4.5
J362	785.5	5.81	89.28	12.2	87.17	19.51	84.26	5.02
J364	833.5	2.09	68.52	4.38	67.03	7.01	64.94	3.58
J366	829.5	3.58	70.28	7.51	69.12	12.02	67.48	2.8
J416	691.6	13.33	88.95	27.98	88.4	44.77	87.37	1.58
J418	705	4.17	83.16	8.75	82.66	14	81.73	1.43
J420	707.5	0.26	82.09	0.54	81.61	0.87	80.72	1.37
J422	711.5	1.56	80.36	3.28	79.91	5.25	79.06	1.3
J424	726.5	1.49	73.83	3.13	73.28	5.01	72.25	1.58
J428	769	0.26	96.43	0.54	93.65	0.87	89.89	6.54
J430	763	3.52	99.03	7.38	96.25	11.81	92.48	6.55
J432	728	0.05	73.22	0.11	72.79	0.18	72	1.22

TABLE A.1
LV Bickford Ranch LLC
Water Master Plan
Junction Results

ID	Elevation (ft)	ADD (gpm)	ADD Pressure (psi)	MDD (gpm)	MDD Pressure (psi)	PHD (gpm)	PHD Pressure (psi)	(PHD - ADD) Pressure (psi)
J434	794	1.19	44.65	2.5	44.3	4.01	43.64	1.01
J436	800	2.91	83.07	6.1	82.09	9.76	80.71	2.36
J438	817	2.69	75.71	5.64	74.72	9.03	73.34	2.37
J440	823	2.08	73.11	4.38	72.13	7	70.74	2.37
J442	827.5	2.61	71.16	5.47	70.18	8.75	68.79	2.37
J444	869	1.36	53.18	2.86	52.2	4.58	50.81	2.37
J446	844	1.56	64.01	3.28	63.03	5.25	61.65	2.36
J448	832	3.13	69.21	6.56	68.23	10.5	66.85	2.36
J450	866	0	89.57	0	75.68	0	73.68	15.89
J452	891	0	78.66	0	64.02	0	60.93	17.73
J456	857.5	0	58.16	0	57.18	0	55.8	2.36
J458	651	1.17	106.52	2.46	105.91	3.94	104.78	1.74
J460	661	3.09	102.21	6.49	101.64	10.39	100.58	1.63
J462	625.5	0	158.8	0	155.91	0	152.29	6.51
J464	758	0.21	101.2	0.45	98.41	0.72	94.65	6.55

TABLE A.2
LV Bickford Ranch LLC
Water Master Plan
PHD Pipe Results

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P001	J028	J330	557.56	8	130	-88.46	0.56	0.11
P003	J330	J328	517.21	8	130	-104.79	0.67	0.14
P005	V8032	J356	774.66	8	130	313.52	2	1.65
P007	J154	J138	965.83	8	130	45.5	0.29	0.06
P009	J348	J344	872.21	12	130	-732.67	2.08	1.24
P011	V8024	J350	164.5	8	130	31.2	0.2	0
P013	J344	J346	284.5	12	130	-880.91	2.5	0.57
P015	J020	J154	1,394.24	12	130	114.33	0.32	0.06
P017	V8040	J030	373.98	8	130	5.83	0.04	0
P019	J034	J032	540.03	12	130	-28.76	0.08	0
P021	J032	J036	495.33	12	130	-76.92	0.22	0.01
P023	J036	J026	862.32	12	130	-91.94	0.26	0.03
P025	J196	J038	228.51	8	130	8.75	0.06	0
P027	J046	J044	202.02	8	130	-17.63	0.11	0
P029	J174	J020	1,063.92	12	130	144.09	0.41	0.07
P031	J044	J042	731.84	12	130	-17.63	0.05	0
P033	J042	J034	342.51	12	130	-21.75	0.06	0
P035	J048	J046	496.41	8	130	-16.03	0.1	0
P037	J050	J264	530.11	12	130	169.32	0.48	0.05
P039	V8154	J150	236.62	12	130	1,427.87	4.05	1.16
P041	J150	J004	484.2	8	130	421.39	2.69	1.78
P043	J150	J096	287.9	12	130	997.47	2.83	0.73
P045	J096	J086	391.71	12	130	987.46	2.8	0.97
P047	J002	J174	707.28	12	130	173.85	0.49	0.07
P049	J086	J456	1,179.84	12	130	963.43	2.73	2.79
P051	J242	J106	568.67	8	130	421.62	2.69	2.1
P053	J104	J224	791.96	8	130	399.3	2.55	2.64
P055	V8036	J120	441.34	8	130	149.88	0.96	0.24
P057	J112	J120	240.15	8	130	-83.84	0.54	0.04
P059	J024	J054	293.3	8	130	35.06	0.22	0.01
P061	J054	J116	216.83	8	130	3.38	0.02	0
P063	J024	J120	811.88	8	130	-50.02	0.32	0.06
P065	J148	J112	580.59	8	130	-30.97	0.2	0.02
P067	J152	J134	580.79	8	130	-92.16	0.59	0.13
P069	J156	J152	693.59	8	130	-72.13	0.46	0.1
P071	J144	J146	283.42	8	130	41.59	0.27	0.01
P073	J146	J142	1,193.25	8	130	13.55	0.09	0.01
P075	J144	J142	1,071.56	8	130	25.5	0.16	0.02
P079	J218	J196	723.42	12	130	37.91	0.11	0
P081	J130	J158	331.22	8	130	32.74	0.21	0.01
P083	J158	J128	568.22	8	130	20.73	0.13	0.01
P085	J128	J160	375.89	8	130	7.01	0.04	0
P087	J162	J128	801.56	8	130	5.3	0.03	0

TABLE A.2
LV Bickford Ranch LLC
Water Master Plan
PHD Pipe Results

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P089	J416	J162	579.9	8	130	22.33	0.14	0.01
P091	J132	J164	466.79	8	130	-98.87	0.63	0.12
P093	J142	J166	374.25	8	130	8.01	0.05	0
P095	J168	J050	283.73	12	130	187.33	0.53	0.03
P097	J170	J168	242.04	12	130	202.78	0.58	0.03
P099	J002	J218	1,077.33	12	130	176.74	0.5	0.11
P101	J172	J170	226.4	12	130	218.23	0.62	0.03
P103	J054	J114	240.59	8	130	-6.73	0.04	0
P105	J114	J110	252.4	8	130	2.09	0.01	0
P107	J110	J118	258.54	8	130	-15.01	0.1	0
P109	J118	J052	250.52	8	130	-26.02	0.17	0.01
P111	J116	J052	939.3	8	130	-15.65	0.1	0.01
P113	J052	J176	446.13	8	130	-57.69	0.37	0.04
P115	J176	J178	970.57	8	130	-70.03	0.45	0.13
P117	V8038	J178	796.98	8	130	82.05	0.52	0.14
P119	J110	J180	846.41	8	130	0.07	0	0
P121	J180	J148	570.75	8	130	-18.95	0.12	0.01
P123	J182	J156	189.14	8	130	-27.19	0.17	0
P125	J114	J112	984.66	8	130	-27.85	0.18	0.02
P127	J182	J184	250.73	8	130	-138.68	0.89	0.12
P129	J184	J186	507.51	8	130	-49.8	0.32	0.04
P131	V8042	J122	754.77	8	130	82.1	0.52	0.13
P133	J126	J122	221.72	8	130	-32.51	0.21	0.01
P135	J030	J126	231.06	8	130	-18.49	0.12	0
P137	J184	J188	280.01	8	130	-100.9	0.64	0.07
P139	J098	J018	349.85	12	130	363.91	1.03	0.14
P141	J188	J190	357.71	8	130	-36.5	0.23	0.01
P143	J190	J192	461.08	8	130	-50.52	0.32	0.03
P145	J194	J192	229.89	8	130	-48.04	0.31	0.02
P147	J186	J194	589.04	8	130	-65.82	0.42	0.07
P149	J194	J134	245.25	8	130	-28.8	0.18	0.01
P151	J134	J198	257.06	8	130	-131.97	0.84	0.11
P153	J198	J056	315.56	8	130	-99.68	0.64	0.08
P155	J198	J200	483.56	8	130	-51.55	0.33	0.04
P157	J202	J200	247.72	8	130	3.13	0.02	0
P159	J202	J204	259.45	8	130	-11.5	0.07	0
P161	J098	J080	1,062.71	12	130	-231.21	0.66	0.18
P163	J206	J204	500.46	8	130	-90.43	0.58	0.11
P165	J188	J206	513.51	8	130	-76.41	0.49	0.08
P167	J192	J202	438.58	8	130	-111.57	0.71	0.14
P169	J202	J208	617.11	8	130	-117.22	0.75	0.21
P171	J208	J136	407.83	8	130	0.23	0	0
P173	J056	J136	259.4	8	130	-165.12	1.05	0.17

TABLE A.2
LV Bickford Ranch LLC
Water Master Plan
PHD Pipe Results

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P175	J200	J056	496.24	8	130	-56.43	0.36	0.04
P177	J210	J212	708.03	8	130	-195.93	1.25	0.63
P179	J212	J214	201.28	8	130	-208.94	1.33	0.2
P181	V8148	J080	546.97	12	130	317.36	0.9	0.17
P183	J220	J216	877.89	8	130	-201.65	1.29	0.83
P185	J208	J140	332.67	8	130	-131.47	0.84	0.14
P187	J140	J326	277.67	8	130	-96.59	0.62	0.07
P189	J204	J140	956.12	8	130	-121.71	0.78	0.35
P191	J222	J102	1,031.44	8	130	344.52	2.2	2.62
P193	J104	J222	293.49	8	130	363.54	2.32	0.82
P195	J224	J102	258.4	8	130	383.28	2.45	0.8
P197	J362	J226	555.71	8	130	310.44	1.98	1.16
P201	J228	J230	1,096.70	8	130	43.06	0.27	0.06
P203	J230	J232	942.22	8	130	14.71	0.09	0.01
P205	J232	J234	264.89	8	130	0.7	0	0
P207	J236	J234	979.6	8	130	14.32	0.09	0.01
P209	J238	J236	1,189.51	8	130	33.7	0.22	0.04
P211	J228	J238	272.67	8	130	48.72	0.31	0.02
P213	J230	J236	261.76	8	130	2.65	0.02	0
P215	J100	J242	379.39	12	130	861.51	2.44	0.73
P217	V8148	J026	429.06	12	130	330.62	0.94	0.14
P219	J088	J082	553.9	8	130	-62.08	0.4	0.06
P221	J082	J066	438.72	8	130	-127.92	0.82	0.18
P223	J066	J244	526.12	8	130	-448.95	2.87	2.18
P225	J006	J068	393.05	12	130	-550.23	1.56	0.33
P227	J342	J450	555.6	12	130	1,216.25	3.45	2.02
P229	J342	J006	301.46	12	130	-1,260.78	3.58	1.17
P231	V8016	J092	677.06	8	130	-196.12	1.25	0.61
P233	J092	J084	247.1	8	130	-167.98	1.07	0.17
P235	J094	J084	1,016.95	8	130	-65.39	0.42	0.12
P237	J040	J022	973.88	12	130	-26.07	0.07	0
P239	J092	J094	945.57	8	130	-41.16	0.26	0.05
P241	J084	J246	971.57	8	130	-272.59	1.74	1.6
P243	V8026	J246	786.53	8	130	293.62	1.87	1.48
P245	J248	J082	424.7	8	130	-50.82	0.32	0.03
P247	J090	J248	485.75	8	130	-38.81	0.25	0.02
P249	J068	J070	618.73	12	130	-1,026.21	2.91	1.65
P251	J072	J074	803.39	12	130	-1,049.77	2.98	2.23
P253	J074	J250	254.8	12	130	1,007.88	2.86	0.66
P255	J250	J076	289.85	12	130	719.72	2.04	0.4
P257	J458	J024	378.75	8	130	-3.94	0.03	0
P259	J078	J076	1,122.95	12	130	-700.69	1.99	1.47
P261	J078	J252	226.36	12	130	903.43	2.56	0.48

TABLE A.2
LV Bickford Ranch LLC
Water Master Plan
PHD Pipe Results

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P263	J346	J252	401.26	12	130	-893.42	2.53	0.83
P265	J072	J254	277.07	8	130	-29.35	0.19	0.01
P267	J254	J078	273.61	8	130	221.77	1.42	0.31
P269	J254	J250	974.15	8	130	-269.14	1.72	1.57
P271	J088	J090	253.39	8	130	-27.79	0.18	0.01
P273	J064	J256	849.03	8	130	48.01	0.31	0.06
P275	J256	J062	1,474.57	8	130	18.25	0.12	0.02
P277	J060	J040	769.36	12	130	-26.07	0.07	0
P279	J258	J062	1,108.99	8	130	18.26	0.12	0.01
P281	J064	J258	1,217.97	8	130	41.01	0.26	0.06
P283	J030	J260	666.03	8	130	19.32	0.12	0.01
P285	J260	J058	615.37	8	130	11.31	0.07	0
P287	J058	J124	470.91	8	130	-2.08	0.01	0
P289	J124	J122	583.81	8	130	-34.2	0.22	0.02
P291	V8012	J268	1,703.23	12	130	13.86	0.04	0
P293	J146	J270	495.21	8	130	8.01	0.05	0
P297	J442	J274	617.18	12	130	-34.55	0.1	0
P299	J274	J448	586.21	12	130	-55.55	0.16	0.01
P301	V8018	J276	367.27	8	130	28.51	0.18	0.01
P303	J346	J278	788.44	8	130	7.01	0.04	0
P305	J350	J280	419.56	8	130	7.01	0.04	0
P307	J350	J282	650.34	8	130	12.02	0.08	0
P309	J252	J286	461.84	8	130	5.01	0.03	0
P311	J070	J288	460.86	8	130	8.01	0.05	0
P315	J050	J290	424.23	8	130	8.13	0.05	0
P317	J168	J292	440.95	8	130	8.13	0.05	0
P319	J170	J294	440.35	8	130	8.13	0.05	0
P321	J172	J296	312.42	8	130	8.13	0.05	0
P325	J364	V8028	512.77	8	130	369.83	2.36	1.48
P327	J460	J334	511.9	8	130	-10.39	0.07	0
P329	V8002	J002	73.18	12	130	350.59	0.99	0.03
P337	J040	V8008	49.4	8	130	0	0	0
P339	J060	V8010	32.82	8	130	0	0	0
P343	J264	V8012	126.68	12	130	13.86	0.04	0
P351	J336	V8016	41.18	8	130	-196.12	1.25	0.04
P353	J342	V8018	51.53	8	130	28.51	0.18	0
P359	J344	V8024	43.06	8	130	31.21	0.2	0
P361	J066	V8026	39.35	8	130	293.62	1.87	0.07
P363	J026	J172	226.85	12	130	233.68	0.66	0.04
P367	J264	J098	277.95	12	130	132.7	0.38	0.02
P369	J028	J332	529.16	8	130	83.45	0.53	0.1
P371	J210	J136	271.25	8	130	171.9	1.1	0.19
P373	J220	J140	799.53	8	130	177.62	1.13	0.59

TABLE A.2
LV Bickford Ranch LLC
Water Master Plan
PHD Pipe Results

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P375	J356	J326	811.31	8	130	303.51	1.94	1.63
P377	V8034	J216	223.97	8	130	662.59	4.23	1.91
P379	V8054	J108	637.06	12	130	829.48	2.35	1.14
P381	J108	J104	846.37	12	130	781.86	2.22	1.36
P383	J354	J360	839.5	8	130	161.3	1.03	0.52
P385	V8028	J354	58.24	8	130	369.83	2.36	0.17
P387	J354	J360	610.85	8	130	191.51	1.22	0.52
P389	J352	J366	566.88	8	130	388.85	2.48	1.8
P391	J132	J130	593.83	8	130	82.94	0.53	0.11
P393	J080	J144	231.8	8	130	81.85	0.52	0.04
P395	V8030	V8002	1,486.31	12	130	350.59	0.99	0.54
P397	V8144	J064	1,144.81	12	130	115.28	0.33	0.05
P399	J006	J348	220.8	12	130	-720.14	2.04	0.3
P401	J070	J072	624.86	12	130	-1,053.24	2.99	1.74
P411	J360	J362	531.01	8	130	329.96	2.11	1.24
P413	J088	J340	189.49	8	130	78.86	0.5	0.03
P415	J068	J244	585.95	8	130	462.96	2.95	2.57
P417	J018	V8030	649.56	12	130	350.59	0.99	0.24
P419	J242	J106	570.54	8	130	420.87	2.69	2.1
P421	J324	V8032	37.42	8	130	313.52	2	0.08
P423	J322	V8034	41.8	8	130	662.59	4.23	0.36
P425	J334	V8036	32.52	8	130	149.88	0.96	0.02
P427	J322	J324	444.15	12	130	36.86	0.1	0
P429	J332	V8038	34.55	8	130	82.05	0.52	0.01
P431	J216	J214	131.12	8	130	446.93	2.85	0.54
P433	J330	V8040	29.47	8	130	5.83	0.04	0
P435	J328	V8042	47.05	12	130	82.1	0.23	0
P437	J182	J334	181.49	8	130	162.87	1.04	0.12
P439	J326	J328	612.75	8	130	197.91	1.26	0.56
P441	J322	J102	221.01	12	130	-710.77	2.02	0.3
P443	J358	J324	471.99	8	130	288.42	1.84	0.86
P445	J004	J352	559.96	8	130	407.37	2.6	1.94
P447	J062	J266	1,293.21	12	130	12	0.03	0
P451	J226	J358	768.14	8	130	297.43	1.9	1.49
P455	J060	J318	414.73	12	130	26.07	0.07	0
P475	J310	V8050	26.05	8	130	196.12	1.25	0.02
P479	U7020	J462	5,755.29	18	130	674.05	0.85	0.97
P487	U7014	J074	234.59	18.00	130	2,077.16	2.62	0.32
P489	V8050	J338	32.21	8	130	196.12	1.25	0.03
P491	J340	J452	725.09	12	130	1,286.10	3.65	2.93
P493	J310	J336	694.54	8	130	-196.12	1.25	0.62
P495	J464	J322	550.42	12	130	12.67	0.04	0
P497	J106	V8054	27.18	12	130	829.48	2.35	0.05

TABLE A.2
LV Bickford Ranch LLC
Water Master Plan
PHD Pipe Results

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P501	J366	J364	625.87	8	130	376.84	2.41	1.88
P509	J334	J332	569.81	8	130	2.61	0.02	0
P793	J344	V8144	40.68	12	130	115.28	0.33	0
P799	J022	V8148	44.24	12	130	647.98	1.84	0.05
P807	J318	V8150	47.35	12	130	26.07	0.07	0
P811	J130	J416	217.91	8	130	36.17	0.23	0.01
P813	J418	V8160	515.81	8	130	103.88	0.66	0.14
P815	J418	J420	491.08	8	130	-117.88	0.75	0.17
P817	J422	J420	456.03	8	130	118.75	0.76	0.16
P821	J156	J424	87.29	8	130	35.93	0.23	0
P823	J424	V8158	573.5	8	130	30.92	0.2	0.02
P827	J464	J428	318.89	12	130	12.68	0.04	0
P829	J428	J430	267.45	12	130	11.81	0.03	0
P831	J432	J422	518.86	8	130	124	0.79	0.2
P833	J432	J228	333.04	8	130	106.8	0.68	0.1
P835	J214	J434	121.94	8	130	234.98	1.5	0.15
P837	J434	V8156	425.78	8	130	230.98	1.47	0.52
P839	J436	J438	270.41	8	130	-9.76	0.06	0
P841	J438	J440	390.31	8	130	-18.79	0.12	0
P843	J440	J442	402.26	12	130	-25.79	0.07	0
P845	J444	J446	262.65	8	130	-4.58	0.03	0
P847	J446	J448	387.57	8	130	-9.83	0.06	0
P849	J450	J340	409.88	12	130	1,216.25	3.45	1.49
P851	J452	J338	357.03	12	130	1,286.10	3.65	1.44
P853	J456	J100	355.66	12	130	887.54	2.52	0.72
P855	J456	J448	366.77	12	130	75.89	0.22	0.01
P857	V8008	J458	16.68	8	130	0	0	0
P859	V8010	J460	24.92	8	130	0	0	0
P861	J338	V8154	93.29	12	130	1,427.88	4.05	0.46
P867	V8150	J464	43.41	12	130	26.07	0.07	0
P869	V8156	J432	31.19	8	130	230.98	1.47	0.04
P871	V8158	J416	37.26	8	130	30.92	0.2	0
P873	V8160	J164	67.28	8	130	103.88	0.66	0.02
P881	J462	J022	417.58	12	130	674.05	1.91	0.51
P883	RES9002	U7020	469.33	18	130	674.05	0.85	0.08
P885	RES9008	U7014	138.61	18.00	130	2,077.16	2.62	0.19

ATTACHMENT B

LV Bickford Ranch LLC

Water Master Plan

Max Day plus Fire Flow Modeling Results

TABLE B.1
LV Bickford Ranch LLC
Water Master Plan
MDD plus FF Results

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)	Critical Pipe ID	Critical Pipe Velocity (ft/s)
J002	0	47.59	468.84	1,500.00	47.38	2,260.23	47.17	P329	7.03
J004	8.76	81.47	1,052.03	1,500.00	49.91	1,399.93	50.66	P041	7
J006	5.99	95.33	1,076.01	1,500.00	88.96	5,069.86	42.67	P225	7
J018	8.33	88.88	752.11	1,500.00	86.22	2,260.31	83.67	P139	7.03
J020	18.6	59.7	468.78	1,500.00	54.88	2,397.15	48.83	P029	7
J024	6.88	83.82	895.44	1,500.00	65.58	2,002.87	54.55	P059	6.98
J026	3.13	54.92	752.26	1,500.00	54.17	3,053.26	52.43	P217	7.02
J028	3.13	85.62	895.61	1,500.00	72.67	2,148.81	62.28	P369	7
J030	3.13	85.21	895.66	1,500.00	70.74	1,801.19	65.68	P017	7
J032	30.1	72.25	752.24	1,500.00	68.13	2,449.68	62.6	P021	7
J034	4.38	62.28	752.24	1,500.00	56.88	2,454.02	49.26	P019	7
J036	9.39	72.47	752.25	1,500.00	69.57	2,420.07	65.76	P023	7
J038	5.47	67.51	468.79	2,500.00	45.7	1,096.70	62.62	P025	7
J042	2.57	58.82	752.24	1,500.00	52.6	2,456.58	43.75	P033	7
J044	0	81.56	752.24	1,500.00	73.62	2,456.58	62.18	P031	7
J046	1	84.81	752.24	2,500.00	56.01	1,086.75	78.46	P027	7
J048	10.02	88.06	752.24	2,500.00	37.66	1,096.70	77.04	P035	7
J050	6.18	64.21	752.2	2,500.00	60.72	4,150.15	55.79	P095	7
J052	10.01	90.1	895.44	1,500.00	72.57	2,820.72	40.02	P113	7
J054	24.01	82.95	895.43	2,500.00	42.27	2,497.83	42.99	P103	7
J056	5.63	58.19	895.79	1,500.00	50.13	2,270.92	42.74	P173	7.01
J058	8.37	89.76	895.65	2,500.00	42.39	2,099.71	55.02	P287	7
J062	15.32	118.28	1,075.97	1,500.00	97.82	2,184.42	79	P275	7
J064	16.41	105.08	1,076.00	1,500.00	95.91	2,412.61	84.59	P397	7
J066	17.13	70.17	1,075.94	1,500.00	59.86	2,559.61	44.66	P223	7
J068	8.14	78.65	1,076.02	1,500.00	72.4	3,997.75	44.98	P249	7.01
J070	11.89	65.89	1,076.06	1,500.00	60.06	3,419.63	42.13	P401	7.01
J072	16.17	67.65	1,076.12	1,500.00	62.59	3,813.12	42.58	P251	7.01
J074	12.19	54.69	1,076.22	2,500.00	45.02	5,080.09	20		
J076	11.89	58.57	1,076.16	1,500.00	53.66	3,334.47	39.27	P255	7
J078	11.89	66.34	1,076.10	1,500.00	60.96	3,654.53	41.55	P267	7
J080	2.69	47.12	752.25	1,500.00	46.21	3,167.26	43.93	P181	7.02
J082	9.39	72.99	1,075.94	1,500.00	62.52	2,566.32	46.78	P221	7
J084	24.51	95.72	1,075.90	1,500.00	78.52	2,229.27	62.07	P241	7
J086	15.02	71.51	1,052.03	1,500.00	44.28	3,068.08	40.02	P045	7
J088	6.88	76.89	1,075.95	1,500.00	67.15	1,595.02	66.17	P413	7
J090	6.88	75.8	1,075.94	1,500.00	64.19	1,643.27	62.34	P271	7
J092	8.14	95.07	1,075.90	1,500.00	77.98	2,017.96	66.65	P231	7
J094	15.15	104.38	1,075.90	2,500.00	51.48	2,150.83	64.43	P239	7
J096	6.26	67.17	1,052.03	1,500.00	40.45	2,902.04	38.13	P043	7
J098	0.00	81.53	752.17	1,500.00	79.91	4,286.46	72.03	P161	7.01

TABLE B.1
LV Bickford Ranch LLC
Water Master Plan
MDD plus FF Results

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)	Critical Pipe ID	Critical Pipe Velocity (ft/s)
J100	16.27	83	1,052.04	1,500.00	54.33	3,545.86	41.67	P853	6.99
J102	10.64	105.69	1,052.42	1,500.00	76.15	4,902.74	20		
J104	11.89	99.96	1,052.19	1,500.00	70.37	4,766.86	20		
J106	8.14	85.84	1,052.10	1,500.00	56.55	3,491.92	39.81	P051	7
J108	29.76	95.38	1,052.13	1,500.00	65.92	4,696.45	20		
J110	10.64	85.33	895.43	1,500.00	67.77	2,468.78	45.43	P105	7
J112	15.65	79.92	895.44	1,500.00	63.07	1,775.00	58.06	P057	7
J114	11.89	81.86	895.43	1,500.00	64.64	2,883.60	30.95	P103	7
J116	11.89	85.98	895.43	1,500.00	67.31	1,693.45	63.44	P061	7
J118	6.88	88.58	895.43	1,500.00	70.56	2,157.56	55.83	P109	7
J120	10.01	81.23	895.46	1,500.00	65.84	1,413.16	67.39	P055	7.02
J122	9.62	77.63	895.66	2,500.00	42.59	2,208.69	49.48	P131	7
J124	20.07	81.31	895.65	2,500.00	36.47	1,719.56	58.22	P289	7
J126	8.76	77.41	895.66	1,500.00	62.2	2,138.01	50.04	P135	7
J128	11.89	109.45	895.61	1,500.00	90.09	1,978.48	78.8	P083	7
J130	8.76	94.73	895.61	1,500.00	79.98	2,175.97	67.54	P811	7
J132	9.96	93.66	895.66	1,500.00	77.27	1,946.63	68.46	P391	7
J134	6.88	63.79	895.71	1,500.00	55.18	2,504.89	44.47	P151	7.01
J136	4.38	56.27	895.86	1,500.00	48.76	2,993.32	33.7	P371	7.01
J138	28.44	78.74	468.73	1,500.00	53.64	1,096.70	65.06	P007	7
J140	13.14	55.65	895.92	1,500.00	48.94	3,241.25	33.1	P187	7
J142	19.4	58.37	752.22	1,500.00	47.33	2,010.66	39.99	P075	7
J144	9.23	46.9	752.23	1,500.00	41.86	1,055.89	44.21	P393	7.01
J146	12.52	42.56	752.22	1,500.00	34.6	1,437.10	35.3	P071	7
J148	7.51	85.55	895.44	1,500.00	65.18	1,771.23	58.87	P065	7
J150	5.63	70.21	1,052.03	1,500.00	43.89	2,952.23	42.78	P039	7
J152	12.52	65.5	895.66	1,500.00	54.4	2,035.21	47.48	P067	7
J154	43.02	73.12	468.76	2,500.00	52.45	2,439.28	53.96	P015	7
J156	5.63	70.03	895.62	1,500.00	60.56	2,092.03	54.11	P123	7
J158	7.51	118.55	895.61	1,500.00	101.16	1,542.64	100.48	P081	7
J160	4.38	118.55	895.61	1,500.00	92.85	1,096.70	103.58	P085	7
J162	10.64	97.76	895.61	1,500.00	79.32	1,699.78	75.25	P089	7
J164	3.13	90	895.71	1,500.00	73.1	2,138.22	59.19	P091	7
J166	5.01	62.71	752.22	1,500.00	45.35	1,096.70	52.93	P093	7
J168	4.57	59.45	752.21	2,500.00	56.27	3,847.68	52.73	P097	7
J170	4.57	58.81	752.23	2,500.00	56	3,599.00	53.54	P101	7.01
J172	4.57	58.82	752.24	2,500.00	56.46	3,365.17	54.89	P363	7.01
J174	18.6	52.78	468.81	1,500.00	50.71	2,379.51	48.19	P047	7.01
J176	7.72	91.19	895.45	1,500.00	72.84	2,073.40	59.9	P113	7
J178	7.51	93.81	895.51	1,500.00	76.68	1,732.49	72.21	P117	7
J180	11.89	83.81	895.43	1,500.00	62.79	2,066.65	48.12	P119	7

TABLE B.1
LV Bickford Ranch LLC
Water Master Plan
MDD plus FF Results

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)	Critical Pipe ID	Critical Pipe Velocity (ft/s)
J182	1.88	71.76	895.62	1,500.00	62.67	2,470.18	51.85	P127	7.01
J184	7.51	73.3	895.67	1,500.00	64.34	2,741.24	49.98	P127	7.01
J186	10.01	68.76	895.68	1,500.00	57.97	2,141.71	49.68	P129	7
J188	7.51	79.16	895.7	1,500.00	70.02	2,604.79	57.14	P137	7
J190	8.76	71.15	895.7	1,500.00	60.97	2,150.40	53.06	P141	7
J192	8.14	67.04	895.72	1,500.00	58.36	2,787.58	43.79	P167	7
J194	6.88	63.14	895.71	1,500.00	54.41	2,686.47	41.15	P149	7
J196	18.23	68.81	468.8	1,500.00	64.02	2,462.12	57.39	P079	7
J198	12.04	61.21	895.76	1,500.00	52.85	3,049.79	35.29	P151	7
J200	5.01	64.03	895.77	1,500.00	55.74	2,461.12	45.89	P157	7
J202	8.76	69.88	895.77	1,500.00	62.13	3,893.56	34.2	P169	7
J204	12.36	77.46	895.78	1,500.00	69.12	2,382.90	60.22	P159	7
J206	8.76	78.74	895.73	1,500.00	68.47	2,075.55	61.47	P163	7
J208	8.76	56.92	895.86	1,500.00	49.41	2,519.62	39.97	P185	7.01
J210	15.02	53.7	895.94	1,500.00	45.58	2,069.23	40.23	P371	7.02
J212	8.14	46.89	896.21	1,500.00	40.13	1,514.29	40.08	P179	7.01
J214	1.88	42.37	896.29	1,500.00	37.17	1,203.14	38.62	P431	7.06
J216	8.76	40.52	896.52	1,500.00	36.72	877.46	38.75	P377	7.03
J218	86.77	64.26	468.8	1,500.00	61.2	2,444.02	57.51	P099	7
J220	15.02	46.44	896.17	1,500.00	38.19	2,013.18	33.19	P183	7.01
J222	11.89	101.06	1,052.23	1,500.00	69.78	1,765.56	67.49	P193	7.03
J224	10.01	103.71	1,052.36	1,500.00	72.78	1,712.95	71.05	P195	7.02
J226	8.14	119.66	1,052.16	1,500.00	82.16	1,700.54	79.1	P451	7.02
J228	9.39	69.53	895.96	1,500.00	52.3	1,041.13	60.25	P833	7.01
J230	16.06	82.95	895.93	1,500.00	59.24	1,954.12	46.07	P201	7
J232	8.76	87.93	895.93	1,500.00	59.4	2,033.02	39.79	P203	7
J234	9.39	86.41	895.93	1,500.00	57.85	2,072.58	36.57	P207	7
J236	13.77	83.16	895.93	1,500.00	59.31	2,259.26	35.16	P209	7
J238	9.39	67.14	895.95	1,500.00	47.02	1,408.82	49.25	P211	7
J242	11.88	81.05	1,052.05	1,500.00	52.18	3,641.84	37.26	P215	7
J244	8.76	68.02	1,075.97	1,500.00	57.9	1,820.01	54.06	P415	7
J246	13.14	93.56	1,075.91	1,500.00	78.06	1,706.26	74.46	P243	7
J248	7.51	74.07	1,075.94	1,500.00	61.81	1,977.30	54.46	P245	7
J250	11.89	55.33	1,076.18	1,500.00	50.79	2,997.22	40.61	P253	7.01
J252	3.13	69.8	1,076.08	1,500.00	64.16	3,294.93	48.15	P261	7.01
J254	11.26	66.35	1,076.12	1,500.00	60.77	2,800.83	50.17	P265	7
J256	18.60	98.13	1,075.98	1,500.00	81.44	1,566.24	80.51	P273	7
J258	14.22	113.95	1,075.98	1,500.00	95.57	1,703.40	91.32	P281	7
J260	5.01	99.51	895.65	1,500.00	80.64	1,754.27	75.02	P283	7
J264	14.22	68.97	752.18	1,500.00	67.35	4,788.45	57.38	P037	7
J266	7.50	113.08	1,075.97	2,500.00	54.64	2,467.58	56.31	P447	7

TABLE B.1
LV Bickford Ranch LLC
Water Master Plan
MDD plus FF Results

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)	Critical Pipe ID	Critical Pipe Velocity (ft/s)
J268	8.66	96.7	752.18	2,500.00	81.88	2,467.58	82.32	P291	7
J270	5.01	48.63	752.22	1,500.00	32.31	1,096.70	39.44	P293	7
J274	13.13	102.7	1,052.03	1,500.00	71.96	2,446.07	64.62	P299	7
J276	17.82	86.65	1,075.99	1,500.00	72.51	1,096.70	78.61	P301	7
J278	4.38	75.63	1,076.04	1,500.00	56.35	1,096.70	64.63	P303	7
J280	4.38	95.98	1,076.02	1,500.00	79.18	1,096.70	86.34	P305	7
J282	7.51	95.55	1,076.02	1,500.00	74.81	1,096.70	83.76	P307	7
J286	3.13	68.5	1,076.08	1,500.00	55.08	1,096.70	60.76	P309	7
J288	5.01	59.17	1,076.06	1,500.00	45.57	1,096.70	51.34	P311	7
J290	5.08	63.35	752.2	2,500.00	41.46	1,096.70	58.48	P315	7
J292	5.08	59.02	752.21	2,500.00	36.72	1,096.70	54.08	P317	7
J294	5.08	50.36	752.23	2,500.00	28.46	1,096.70	45.52	P319	7
J296	5.08	51.67	752.24	2,500.00	35.77	1,096.70	48.14	P321	7
J322	15	108.52	1,052.45	1,500.00	79.02	5,000.95	20		
J324	7.35	112.8	1,052.34	1,500.00	82.6	2,855.96	68.07	P427	7.01
J326	5.63	62.37	895.95	1,500.00	55.39	2,518.04	46.61	P187	7
J328	6.88	67.26	895.72	1,500.00	55.7	1,595.51	54.58	P439	7.02
J330	6.56	81.75	895.66	1,500.00	69.4	2,721.05	48.71	P001	7
J332	2.5	83.44	895.57	1,500.00	71.41	2,409.66	57.47	P509	7
J334	0	77.37	895.57	1,500.00	66.79	1,395.64	67.9	P437	7.04
J338	33.97	76.45	1,075.94	2,500.00	52	2,916.84	45.04	P851	7
J340	5.63	80.79	1,075.95	1,500.00	72.45	3,134.73	51.45	P849	7
J342	10.01	94.02	1,075.99	1,500.00	87.06	2,722.10	75.07	P229	7.01
J344	1.09	82.55	1,076.02	1,500.00	76.39	3,887.69	50.79	P013	7.01
J346	3.44	79.96	1,076.05	1,500.00	73.98	3,637.44	52.58	P263	7.01
J348	7.84	100.53	1,076.01	1,500.00	94.16	4,910.24	50.73	P399	7
J350	7.61	88.84	1,076.02	1,500.00	79.1	1,084.91	83.26	P011	7
J352	11.58	85.8	1,052.03	1,500.00	50.37	1,576.79	49.6	P445	7
J354	10.64	104.45	1,052.05	1,500.00	64.63	2,186.11	50.74	P385	7
J356	6.26	54.01	896.64	1,500.00	47.85	1,627.83	47.01	P005	7.01
J358	5.63	112.34	1,052.26	1,500.00	78.6	1,457.44	79.12	P443	7.04
J360	14.28	111.82	1,052.06	1,500.00	72.06	2,100.24	60.25	P411	7.01
J362	12.20	115.52	1,052.10	1,500.00	76.46	1,890.19	69.47	P197	7.01
J364	4.38	94.69	1,052.04	1,500.00	55.31	1,969.16	46.66	P501	7
J366	7.51	96.42	1,052.03	1,500.00	58.52	1,760.11	54.6	P389	7
J416	27.98	88.4	895.61	1,500.00	74.24	1,613.52	72.9	P871	7
J418	8.75	82.66	895.77	1,500.00	65.99	1,989.06	55.92	P815	7
J420	0.54	81.61	895.85	1,500.00	65.93	1,799.05	60.29	P817	7
J422	3.28	79.91	895.91	1,500.00	65.84	1,640.83	63.62	P831	7
J424	3.13	73.28	895.62	1,500.00	63.07	1,390.18	64.24	P821	7
J428	0.54	123.31	1,053.59	1,500.00	92.69	2,460.21	82.65	P827	7

TABLE B.1
LV Bickford Ranch LLC
Water Master Plan
MDD plus FF Results

ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire-Flow Demand (gpm)	Residual Pressure (psi)	Available Flow at Hydrant (gpm)	Available Flow Pressure (psi)	Critical Pipe ID	Critical Pipe Velocity (ft/s)
J430	7.38	125.91	1,053.59	2,500.00	83.11	2,467.58	83.68	P829	7
J432	0.11	72.79	896	1,500.00	61.61	1,371.81	63.11	P869	7.03
J434	2.5	44.3	896.23	1,500.00	37.48	1,162.95	39.68	P835	7.05
J436	6.1	109.2	1,052.02	2,500.00	35.53	1,096.70	73.15	P839	7
J438	5.64	101.84	1,052.02	1,500.00	62.02	1,090.62	68.4	P841	7
J440	4.38	99.24	1,052.03	1,500.00	66.06	2,455.85	55	P843	7
J442	5.47	97.29	1,052.03	1,500.00	65.07	2,451.50	55.47	P297	7
J444	2.86	79.31	1,052.03	1,500.00	39.01	1,096.70	45.52	P845	7
J446	3.28	90.14	1,052.03	1,500.00	54.27	1,093.85	58.85	P847	7
J448	6.56	95.34	1,052.03	1,500.00	66.02	2,427.04	60.78	P855	7
J450	0	90.98	1,075.97	1,500.00	83.16	2,983.68	65.74	P227	7.01
J452	0	80.14	1,075.94	1,500.00	70.49	2,804.95	51.92	P491	7
J456	0	84.29	1,052.03	1,500.00	55.87	3,392.03	45.57	P049	6.99
J458	2.46	105.91	895.44	1,500.00	81.31	6,493.50	20		
J460	6.49	101.64	895.57	1,500.00	82.4	6,445.62	20		
J464	0.45	128.08	1,053.59	1,500.00	98.2	4,594.60	50.02	P495	7.04