



NOTICE OF ENGINEERING/ENVIRONMENTAL COMMITTEE MEETING APRIL 16, 2024

NOTICE IS HEREBY GIVEN that the San Lorenzo Valley Water District has called a regular meeting of the Engineering/Environmental Committee to be held on **Tuesday, April 16, 2024, 2:00 p.m.**, SLVWD Conference Room, 12788 Highway 9, Boulder Creek, and via video/teleconference.

Any person in need of any reasonable modification or accommodation in order to participate in the meeting may contact the District Secretary's Office at (831) 430-4636 a minimum of 72 hours prior to the scheduled meeting.

This meeting is being conducted as an in-person meeting under the Brown Act, Government Code section 54953, and a quorum of the Committee must participate from the location(s) within the District that are identified above. Members of the public may attend the meeting at the identified location(s). Teleconferencing/videoconferencing access as set forth below is being provided as a convenience only and is not guaranteed. The meeting may continue in person even if teleconferencing/videoconferencing capability is disrupted or unavailable.

The meeting access information is as follows:

<https://us02web.zoom.us/j/87118139229?pwd=Z3Z3c3ppdGhiVGZtOFV1MisvTjM2Zz09>

Passcode: 054035

Or One tap mobile :

+16699006833,,87118139229#,,,,*054035# US (San Jose)

+16694449171,,87118139229#,,,,*054035# US

Or Telephone:

Dial(for higher quality, dial a number based on your current location):

+1 669 900 6833 US (San Jose)

+1 669 444 9171 US

AGENDA

1. Convene Meeting/Roll Call

2. Oral Communications

This portion of the agenda is reserved for Oral Communications by the public for items which are not on the Agenda. Please understand that California law (The Brown Act) limits what the Board can do regarding issues raised during Oral Communication. No action or discussion may occur on issues outside of those already listed on today's agenda. Any person may address the Committee at this time, on any subject that lies within the jurisdiction of the District. Normally, presentations must not exceed three (3) minutes in length, and individuals may only speak once during Oral Communications. Any Director may request that the matter be placed on a future agenda or staff may be directed to provide a brief response.

3. New Business:

Members of the public will be given the opportunity to address each scheduled item prior to Committee action. The Chairperson of the Committee may establish a time limit for members of the public to address the Committee on agenda items.

a. ROBSON HOMES PRESENTATION

Brief overview of the Valley Gardens Development Project presented by Robson Homes. Discussion and questions by the Committee after.

b. VALLEY GARDENS DEVELOPMENT PROJECT - WILL-SERVE LETTER

Discussion by the Committee regarding the will-serve letter for the Valley Gardens Development Project.

c. VALLEY GARDENS DEVELOPMENT PROJECT - MITIGATION CREDITS

Discussion by the Committee regarding the mitigation credits program for the Valley Gardens Development Project.

4. Unfinished Business: None

Members of the public will be given the opportunity to address each scheduled item prior to Committee action. The Chairperson of the Committee may establish a time limit for members of the public to address the Committee on agenda items.

5. Informational Material

Here is a link to previous Engineering/Environmental Committee meeting minutes:

[All Engineering/Environmental Committee Meeting Minutes | San Lorenzo Valley Water District \(slvwd.com\)](#)

6. Adjournment

Agenda documents, including materials related to an item on this agenda submitted to the Committee after distribution of the agenda packet, are available for public inspection and may be reviewed at the office of the District Secretary, 13060 Highway 9, Boulder Creek, CA 95006 during normal business hours. Such documents may also be available on the District website at www.slvwd.com subject to staff's ability to post the documents before the meeting.

Certification of Posting

I hereby certify that on April 12, 2024, I posted a copy of the foregoing agenda in the outside display case at the District Office, 13060 Highway 9, Boulder Creek, California, said time being at least 72 hours in advance of the regular meeting of the E & E Committee of the San Lorenzo Valley Water District in compliance with California Government Code Section 54956.

Executed at Boulder Creek, California, on April 12, 2024.

Holly B. Hossack, District Secretary

MEMO

DATE: April 16, 2024
TO: Engineering and Environmental Committee, SLVWD
FROM: Brian Frus, Interim General Manager
SUBJECT: Valley Gardens Development - Will Serve Letter

WRITTEN BY: Garrett Roffe, Engineering Manager
PRESENTED BY: Garrett Roffe, Engineering Manager

STAFF RECOMMENDATION

The Engineering & Environmental Committee reviews the will-serve letter and attachments for the Valley Gardens Development and recommends to the Board of Directors to direct the Interim General Manager to issue a will-serve letter by resolution to Robson Homes for the redevelopment of the former Valley Gardens golf course.

RECOMMENDED MOTION

The Committee recommends to the Board of Directors to direct the Interim General Manager to issue a will-serve letter by resolution to Robson Homes for the Valley Gardens Development project.

BACKGROUND

The former Valley Gardens golf course in Scotts Valley is the subject of a redevelopment proposal. The project proposes converting the former golf course into a residential subdivision with 142 residential lots, two apartment buildings with a total of 54 units, one commercial lot, and approximately 7.7 acres of open space. The site is located near the intersection of Lockwood Lane and Mount Herman Road and consists

of six parcels totaling just over 30 acres.

Robson has provided an analysis by Schaaf & Wheeler of fire flow and daily use requirements, which has been reviewed by Akel Engineering Group, the conclusions of which District staff concur. The Schaaf & Wheeler Valley Gardens Fire Flow Analysis, 2023 Update, Akel report review comments, and Schaaf & Wheeler response are all included as attachments to this memo.

The proposed development is situated within the Probation Zone, served by the Probation tank. This Zone is also the site of the San Lorenzo Valley Water District (SLVWD)/Scotts Valley Water District (SVWD) intertie. The proposed development includes two connections to the District's existing facilities to create a looped system within the redevelopment area. Staff have reviewed both the provided reports by Schaaf & Wheeler and Akel and existing system conditions in the Probation Zone and surrounding Zones to determine any system upgrades required to properly provide service to the proposed redevelopment.

The Probation tank provides 530,000 gallons of storage to the Probation Zone which includes two mains that will create flow restrictions located on Caseta Way and on Lockwood Lane between Arrowhead Way and Twin Pines Drive.

Staff recommends requiring an upgrade of the existing 3-inch pipe in Caseta Way to 8-inch ductile iron pipe (DIP) and provision of a new 8-inch DIP main in Lockwood Lane between Arrowhead Way and

Twin Pines Drive. In addition, staff recommends requiring replacement of the existing 6-inch main from Estrella Drive to the SLVWD/SVWD intertie with new 8-inch DIP to prevent loss of pressure and flow available to the intertie and to the Brookdale Assisted Living Facility located at the corner of Lockwood Lane and Mt Hermon Road due to the impact of the redevelopment.

PRIOR COMMITTEE ACTION

None

FISCAL IMPACT

The District will receive the upgrades to the existing system as outlined above and listed in the will-serve letter along with connection fees for each service meter and monthly charges from the additional new customers in the development.

ENVIRONMENTAL IMPACT

Robson Homes is in the process of completing an Environmental Impact Report (EIR) for the project. However, pursuant to Title 14, the California Code of Regulations, Section 15302(c) of the California Environmental Quality Act (“CEQA”) guidelines, the proposed action is an administrative activity of the District that will not result in direct or indirect physical changes to the environment.

ATTACHMENTS

- DRAFT Valley Gardens Development Will-Serve Letter
- DRAFT Resolution Approval of Will-Serve Letter for Valley Gardens
- Valley Gardens Will-Serve Exhibit
- Schaaf & Wheeler Memorandum, Valley Gardens Fire Flow Analysis, 2023 Update
- Akel Engineering Group, Report Review for Valley Gardens Fire Flow Analysis, 2023 Update
- Schaaf & Wheeler Memorandum, Response to Comments on the Valley Gardens Fire Flow Analysis, 2023 Update



April 16, 2024

Molly Robson
Robson Homes
2185 The Alameda, Suite 150
San Jose, CA 95126

Subject: Valley Gardens Development

APNs: 021-231-02
021-231-04
021-231-07
021-231-08
021-231-11
021-221-02

Dear Ms. Robson,

The District has reviewed the information provided regarding Robson Homes' property and surrounding facilities and determined that the District can provide potable water service to the referenced redevelopment of the existing Valley Gardens golf course. The District understands the proposed project to include approximately one hundred forty-two (142) single-family homes, twelve (12) accessory dwelling units (ADUs), two apartment buildings, and three commercial buildings. The project also includes approximately 7.7 acres of open space. The project is likely to result in one hundred forty-two (142) new residential meter sets, two (2) master meter sets, and three (3) commercial meter sets. The District assumes that all new construction will require sprinklers. All residential meters serving homes with sprinklers must be a minimum of 1-inch meters, residential meters serving homes without sprinklers shall be a minimum of 3/4 in, and commercial meters shall be sized according to the final configuration of the commercial buildings.

The District has relied on the following documents in the review of this project:

1. Proposed Valley Gardens Updated Site Plan, prepared by Civil Engineering Associates, dated March 18, 2024;
2. Valley Gardens Fire Flow Analysis, 2023 Update prepared by Schaaf & Wheeler Consulting Civil Engineers, dated June 9, 2023;
3. California Plumbing Code, 2022 edition;
4. California Fire Code, 2022 edition;
5. SLVWD's Water Master Plan, prepared by Akel Engineering Group, Inc. dated November 2021; and
6. District records

The District has determined that certain Conditions will apply to this service, see details below.

Conditions:

1. The District provides only potable water which is not to be used for irrigation of common areas or areas irrigated by any Home Owners Association (HOA) or similar entity.
2. The developer should be aware that reclaimed water service for irrigation purposes may be available from the Scotts Valley Water District.
3. If any reclaimed water is to be used on a private parcel, potable water service to that parcel must be equipped with a District-approved backflow prevention device (BFP).

4. The project shall include a minimum of two (2) connections, each a minimum of 8 inches in diameter, between the existing SLVWD system and the proposed water mains within the project.
5. The developer shall upgrade the existing pipeline in Caseta Way from the existing 3-inch pipe to a new 8-inch ductile iron pipe from the tie-in at Graham Hill Road to the tie-in at Lockewood Lane as shown in the attached Exhibit.
6. The developer shall provide a new 8-inch ductile iron pipe in Lockewood Lane from Estrella Drive to the existing 8-inch pipe near the intersection of Lockewood Lane and Mount Hermon Road as shown in the attached Exhibit. The short section of the existing 8-inch pipe north of Twin Pines Dr and south of Locke Wy may be retained.
7. The developer shall provide plumbing plans for all structures to be served by SLVWD. SLVWD shall determine meter sizing based on these plumbing plans.
8. The developer shall pay all connection and meter installation fees before the placement of meters or activation of service to any structure. Monies received from payment of such fees shall not be used for the construction of any facilities identified in this letter, nor any other construction required of or performed by, the developer.
9. The developer shall be responsible for the construction of all potable water facilities within the proposed development and as identified in Conditions 4, 5, and 6, above.
10. The district shall provide, and District personnel shall set all meters.
11. All construction of potable water facilities shall conform to the California Plumbing Code latest edition, California Fire Code latest edition, AWWA Standards latest edition, and District Standards latest edition.
12. District personnel shall oversee all connections to existing facilities.
13. All new facilities shall be subject to District-supervised pressure, chlorine residual, and bacteriological testing and shall pass all such tests before connection to the existing system.

Also note that:

- Approval can be withdrawn or modified at any time before payment by the applicant of all required fees.
- Water service is never guaranteed until service has been approved, sized, and all fees paid.

If you have any questions regarding this matter, please contact our office.

Sincerely,

Garrett Roffe
Engineering Manager

SAN LORENZO VALLEY WATER DISTRICT

RESOLUTION NO. __ (23-24)

SUBJECT: APPROVAL OF WILL-SERVE LETTER REGARDING WATER SERVICE FOR VALLEY GARDENS DEVELOPMENT, APN's 021-231-02, 021-231-04, 021-231-07, 021-231-07, 021-231-08, 021-231-11, and 021-221-02 IN SCOTTS VALLEY

WHEREAS, the Applicant desires to receive water service as a customer of the District; and

WHEREAS, the Applicant's properties, APN's 021-231-02, 021-231-04, 021-231-07, 021-231-07, 021-231-08, 021-231-11, and 021-221-02, generally located at the intersection of Lockwood Lane and Mount Hermon Road, Scotts Valley, California, is situated within the boundaries of the District; and

WHEREAS, the parcels are within the District's service area; and

WHEREAS, the District is interested in providing service to these parcels and the attached will-serve letter (Exhibit A) provides the covenants necessary to resolve the current situation.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the San Lorenzo Valley Water District that the Interim General Manager is authorized and directed to execute and issue a will-serve letter regarding water service to the Applicant, APN's 021-231-02, 021-231-04, 021-231-07, 021-231-07, 021-231-08, 021-231-11, and 021-221-02, on behalf of the District.

PASSED AND ADOPTED by the Board of Directors of the San Lorenzo Valley Water District, County of Santa Cruz, State of California, on the _____, 2024, by the following vote of the members thereof:

- AYES:
- NOES:
- ABSENT:
- ABSTAIN:

Holly B. Hossack, District Secretary
San Lorenzo Valley Water District



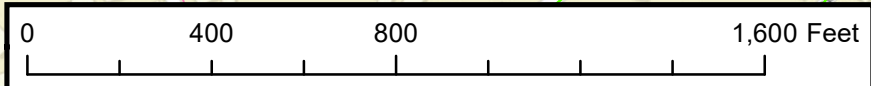
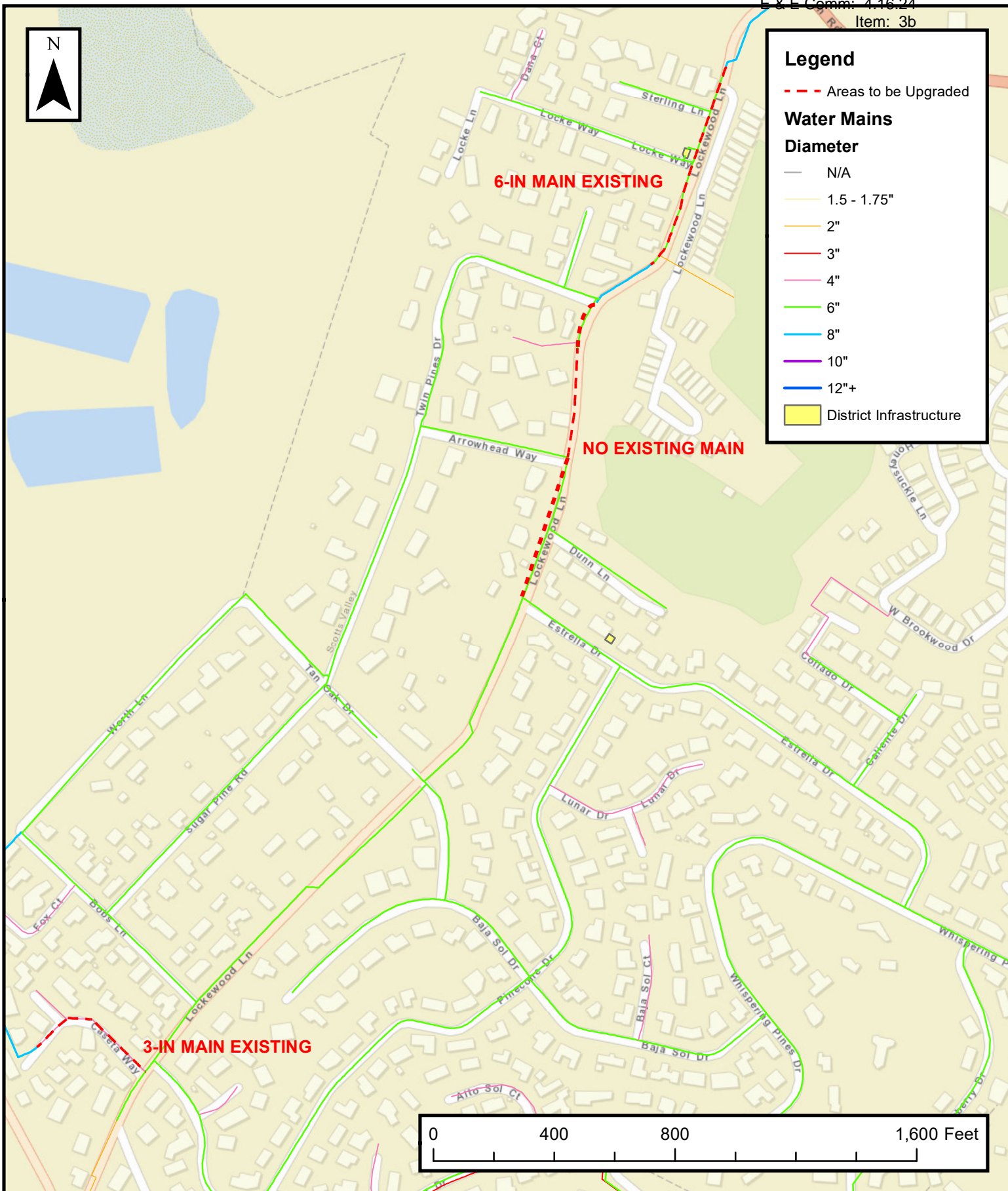
Legend


- - - Areas to be Upgraded

Water Mains

Diameter

- N/A
- 1.5 - 1.75"
- 2"
- 3"
- 4"
- 6"
- 8"
- 10"
- 12"+
- District Infrastructure



 San Lorenzo Valley WATER DISTRICT	Date: 9/19/2022	Valley Gardens Will Serve Exhibit	13060 Hwy 9 Boulder Creek, CA 95006	1 of 1
	Scale: 1:5,000			
	Drawn By: WWL			
	Approved By: JLW			

MEMORANDUM

TO: Ms. Molly Robson, Robson Homes DATE: June 9, 2023
FROM: Andrew A. Sterbenz, PE JOB#: ROBS.01.18
SUBJECT: Valley Gardens Fire Flow Analysis, 2023 Update

The purpose of this memorandum is to summarize our analysis of water supply and fire flow capacity for the Valley Gardens project in Scotts Valley, CA. The project proposes converting the existing Valley Gardens Golf Course from its previous use into a residential subdivision with up to 146 residential lots, two apartment buildings with a total of 60 units, one commercial lot and approximately 7.7 acres of open space (see attached land use figure). The site is located near the intersection of Lockwood Lane and Mount Herman Road and consists of six parcels totaling 30.74 acres¹. The majority of the site is within the San Lorenzo Valley Water District (SLVWD) service area. Our previous memorandum dated August 8, 2022 assessed the then-current plan which did not include apartments. This memorandum updates Valley Garden land use per the latest plan.

Water System Description

The SLVWD South System (see attached figure) consists of three pressure zones: Probation, Upper Pasatiempo and Manana Woods. The project is located within the Probation Zone. The Probation Zone is fed by three wells: Pasatiempo Well No. 5, Pasatiempo Well No. 6, and Pasatiempo Well No. 7, which draw water from the Santa Margarita Groundwater Basin². Service elevations range from 524-ft to 760-ft. The Probation Zone is pressurized by the Upper Pasatiempo Reservoir (through a pressure reducing valve (PRV)) and the Probation Tank. The new Probation Tank is 527,000 gallons with a base elevation of 872.5 ft and a max operating level of 897.5-ft. The Upper Pasatiempo Reservoir is 100,000 gallons with a base elevation of 905-ft. The PRV is set to the same operating level as the Probation Tank. There is a 700-gpm bi-directional pump station on Graham Hill Road connecting the SLVWD South and Felton Systems.

The Probation zone supplies the Upper Pasatiempo system and the Blue/Charlie (Manana Woods) zone. The system also has an emergency inter-tie to the Scotts Valley Water District Camp Evers pressure zone, which has a hydraulic grade line of 820-ft. The proposed Project has the potential to connect into the Scotts Valley Water District (SVWD) recycled water system for large landscape irrigation supply. The commercial area may also have fire hydrants from the SVWD system main in Mount Herman Road.

Estimate of Water Demand

The Valley Gardens project is a combination of Single Family Residential, Multi-Family Residential and Commercial land use. Table 1 shows the calculation of the estimated water demand for the Project. The project includes up to 146 residential lots with up to 7 accessory dwelling units³, and two apartment

¹ Acreage from the Santa Cruz County Assessor GIS.

² Basin Number 3-027 in DWR Bulletin 118.

³ Year-round occupancy of ADU's is conservatively assumed.

buildings with a total of 60 units for a total of 213 dwelling units. The commercial parcel includes up to 10,000 sq-ft of retail space to be served by SLVWD.

The estimated average day demand for Valley Gardens is 56.86 acre-feet/year (AFY), or 50,760 gallons per day (gpd). The former Valley Gardens Golf Course was irrigated from a private well. The Golf Course use was estimated to be 70 AFY⁴, so the proposed project would reduce the pumping from the Santa Margarita Groundwater Basin by approximately 13.1 AFY. The City of Scotts Valley produces recycled water which is available at the project site from a main in Mount Herman Road. Approximately 17% of the project water demand is estimated to be landscape irrigation, some of which may be met using recycled water⁵, further reducing the groundwater use. For this analysis we assume that all water use is from the potable distribution system.

Table 2 shows the estimation of average day demand (ADD), maximum day demand (MDD), and MDD plus fire flow demand. The assumed maximum day peaking factor is 2 times the average day demand. The assumed peak hour peaking factor is 4 times the average day demand.

Table 1: Valley Gardens Water Demand Estimate, based on May 2023 Site Plan

Land Use	Quantity	Unit	Demand Factor (afy/unit)	Potable (afy)	Potential Non-Potable (afy)	Total Demand (afy)	Notes
Single Family Residential	146	DU	0.197	28.76		28.76	1
Accessory Dwelling Units	7	DU	0.197	1.38		1.38	2
Multi-Family Apartments	60	DU	0.197	11.82		11.82	1
Commercial	10,000	SF	0.0005	5.00		5.00	3
Irrigated Landscape (Non-Turf)	4.0	AC	1.59		6.36	6.36	4, 6
Irrigated Landscape (Turf)	1.0	AC	3.54		3.54	3.54	5
Total Demand, SLVWD:				46.96	9.90	56.86	7

Notes:

1. SFR factor from SVWD/SLVVWD 2020 UWMP, equals 176 gpd/unit
2. ADU uses the SFR demand factor
3. Commercial factor per for casual dining-type restaurant.
4. Assume 4 acres of irrigated streetscape and open space areas. Allowable irrigation is 45% of ETo per MWEL0.
5. Assume 1 acre of irrigated special landscape areas (turf play areas). Allowable irrigation is 45% of ETo per MWEL0.
6. ETo is 42.42 inches/year at nearest CIMIS station (DeLaveaga Park)
7. 56.9 AFY equates to irrigating 16.1 acres of turf.

⁴ Estimate from the Scotts Valley Water District Annual Report, Water Year 2016, prepared by Hydrometrics

⁵ Recycled water may be used for commercial and common area landscape irrigation. On-site residential irrigation demand is included in the potable demand factor.

Table 2: Demand Rates

Average Day Demand (ADD)	56.86	AFY
converts to	50,760	gpd
converts to	35	gpm
Max Day Demand (MDD = ADD x 2)	71	gpm
Peak Hour (PHD = MDD x 2)	141	gpm
Minimum Fire Flow (per CA Fire Code)	1,500	gpm
MDD plus Fire	1,571	gpm

The required fire flow rates by building size are shown in Table 3. The fire code allows the local fire authority to reduce the fire demand for buildings with fire sprinklers. A 75% reduction is allowed, with a minimum flow requirement of 1,000 gpm for commercial sites. The largest apartment building is 35,706 SF. A 75% reduction is allowed for Group R-2 occupancy (apartment buildings), with a minimum flow requirement of 1,500 gpm. Fire demand was modeled at 1,500 gpm. We note here that some of the hydrants in the commercial site may be connected to the Scotts Valley Water District, which has a large diameter main in Mount Herman Road.

Table 3: Fire Flow Requirements for Type V-B Construction⁶

Type	Area (SF)	Flow (gpm)	Duration (hrs)
Single Family, un-sprinklered	<3,600	1,000	1
Single Family, sprinklered	<3,600	500	0.5
Multi-Family, un-sprinklered	<36,000	5,000	4
Multi-Family, sprinklered	<36,000	1,500	4
Commercial, un-sprinklered	<4,800	1,750	2
Commercial, sprinklered	<4,800	1,000	2

Estimate of Available Fire Flow

The water system was modeled using EPANet2, a computer-based pipe network model. Pipeline sizes and lengths were obtained from the SLVWD South System Map, provided by SLVWD. Elevations were obtained from LIDAR topography on the Santa Cruz County GISWeb.

The system was modeled under the following conditions:

1. Peak Hour Demand without fire flow
2. Maximum Day Demand with fire flow

Per the SVLWD 2010 Master Plan, the average water demand for the Probation/Pasatiempo zones is 410 acre-feet/year, or 366,000 gallons per day⁷. This equates to an average delivery rate of 254 gpm. Maximum day demand is estimated as 2 times the average daily rate, or 508 gpm. The peak hour demand is estimated as 4 times the average daily rate, or 1,016 gpm. The demand at each node was based on demand per length of pipe. The average delivery rate per length of pipe is 254 gpm per 36,200

⁶ Rates from California Fire Code (2019 Edition), Appendix B, Tables B105.1(1) and B105.1(2)

⁷ The 2021 Master Plan lists a slightly lower demand for this area. The larger value is used as a more conservative case.

LF of pipe or 0.007 gpm/ft. The demand rates applied to the model nodes are provided in Table 4 (attached). The demand for the Pasatiempo and eastern zones are modeled at node 15, as explained in attachment 4. Pipelines with street locations are listed in Table 5.

Valley Gardens was modeled with two connections to the existing system in Lockwood Lane, one at the intersection with Arrowhead Way (node 37) and the other near the existing Valley Gardens entrance (node 30)(see Figure 1). The following modeling assumptions were made:

- The bi-directional pump connection to the Felton system is not operating.
- The system connection between SLVWD and SVWD is open and supplying 350 gpm to Scotts Valley.
- The Commercial sites are fed from the SLVWD system.
- The Commercial fire flow is reduced to 1,000 gpm.
- The Multi-Family Residential fire flow is reduced to 1500 gpm.
- Pasatiempo Well 5 produces 350 gpm (nominal)
- Pasatiempo Well 6 produces 120 gpm (nominal)
- Pasatiempo Well 7 is out of service
- The Probation water tank starts at 22-ft (HGL = 945.5-ft)
- The Pasatiempo system is operated as a single tank at the same HGL as Probation Tank.

Based on the given well production capacities, the maximum day demand may be met by well pumping but the fire demand must be met using stored water. The storage required is 360,000 gallons for residential (= 1500 gpm x 4 hour x 60 minutes) and 120,000 gallons for the commercial building (= 1,000 gpm x 2 hours x 60 minutes). The Probation Tank holds 500,000 gallons, meeting the storage requirement.

Model results were checked to identify nodes falling below 20 psi (minimum pressure required under CCR Title 22) and pipelines with velocities over 5 feet per second (ft/s) during peak hour demands or over 8 ft/s during fire flows. The highest flow test scenarios were run. See our earlier memorandum for a discussion of the existing condition. Table numbering continues from our previous model for ease of comparison (i.e., the numbering in this memorandum has a deliberate gap). The results are summarized below.

Peak Hour Demand with Valley Gardens Project and 350 gpm to SVWD

This scenario includes a 350 gpm demand to Node 31 to reflect a transfer to SVWD through Intertie #2. System is modeled with two Pasatiempo Wells operating. The demand from Valley Gardens (node 45) is 143 gpm. The Probation Tank is assumed to have 894.5 ft of head. No low-pressure issues were identified. No pipelines had velocities at or above 5 ft/s (Pipe 46 to the Pasatiempo system exists only in the model to represent multiple smaller pipes, so it may be ignored). Results are given in Tables 18A and 18B, and shown on Figure 13.

Max Day Demand with 1500 gpm Fire Flow and 350 gpm to SVWD

This scenario includes a 350 gpm demand to Node 31 to reflect a transfer to SVWD through Intertie #2. System is modeled with two Pasatiempo Wells operating. The demand from Valley Gardens (node 45) is 1,571 gpm. The Probation Tank is assumed to have 894.5 ft of head. Pipes 16 and 44, 6" mains in Lockwood, had velocities at 12.6 ft/s and pipe 9, the parallel 6" main in Twin Pines was at 9.9 ft/s. Because this area is at the lowest elevation in the system, no low pressure issues were identified. Results are given in Tables 19A and 19B, and shown on Figure 14.

Max Day Demand with 1500 gpm Fire Flow, 350 gpm to SVWD and Planned Capital Improvements

Three proposed capital improvement projects were analyzed: adding a 6" pipe in Lockwood Drive from Arrowhead Way to Twin Pines Dr (connecting nodes 29 and 37), upsizing the 4" pipe in Caseta Way to 8" (Pipe 13, from node 10 to 36), and upsizing pipes 16 and 44 (6" mains in Lockwood) to 10". Adding a 6" main in Lockwood from Arrowhead Way to Twin Pines Drive did not significantly affect pressures in the model because it was parallel to the proposed 8" connection through the development. Upsizing the 4" pipe in Caseta Way increased the pressure in Lockwood Dr at node 10. Upsizing pipes 16 and 44 removed a flow restriction, reducing the velocity in those pipes from over 12 ft/s to under 6 ft/s. That improvement also reduced the high velocity in pipe 9 to less than 8 ft/s. Results are given in Tables 20A and 20B, and shown on Figure 15.

System Concerns

Pipe Velocity

SLVWD has requested that pipe velocities be kept below 5 ft/s during Peak Hour, and that we identify any above 8 ft/s during Max Day plus Fire Flow. Some water suppliers establish lower target velocities during maximum day demands, particularly those using booster pumps to maintain system pressure, but this portion of the system is fed by gravity from a large water tank. Figure 1 shows the system network map for the Peak Hour Demand without the demand from Valley Gardens. No pipelines exceed 3 ft/s during Peak Hour, unless the Scotts Valley intertie is open (Pipe 46 to the Pasatiempo system exists only in the model to represent multiple smaller pipes, so it may be ignored). With the intertie open, velocities in existing 6" mains approach, but do not exceed, 5 ft/s (see Figure 12).

Pipe velocities in several locations exceeded 8 ft/s during Max Day Demand with fire flow. Velocities higher than 8 ft/s may cause water hammer and damage to the system. The 6" pipe in Lockwood at the north end of the system exceeds 11 ft/s if a fire demand is placed at Node 31. The 6" pipe in Lockwood Ln between Estrella Dr and Arrowhead Way (nodes 9 to 8 to 37) had a modeled velocity of over 12 ft/s when the Valley Gardens fire demand was modeled in conjunction with a 350 gpm SVWD demand. Increasing those two segments from 6" to 10" is recommended.

Pressure

The maximum static water pressure at the project site is estimated to be 150 psi, due to the elevation difference between the Probation Tank (872-ft) and the site (550-ft). California Plumbing Code requires pressures to be less than 80 psi at the building connection, so the developer should either (1) install a pressure-reducing valve station at the points of connection to the existing system, or (2) provide a pressure reducing valve at each individual meter. This should be determined during detailed design. Individual PRVs are recommended, so that the new pipeline can provide through-conveyance to the Scotts Valley inter-tie.

System pressures in the updated model did not fall below 40 psi during fire flows because the project is at the lowest point in the distribution system. At the upper elevations of the system, pressures were between 20 and 30 psi during fire flow runs.

Summary

Based upon the previous system modeling, the existing SLVWD South System with the new Probation Water Tank is capable of supplying MDD plus 1,000 gpm fire flow to the Valley Gardens site without modification. Adding apartments increases the minimum fire demand to 1500 gpm, which exceeds the

conveyance capacity of the 6" water main in Lockewood Drive. Replacing this with a 10" pipe between Estrella Dr and Arrowhead Way removed this restriction. Adding a new pipe in Lockewood Dr from Arrowhead Way to Twin Pines is needed without the Valley gardens project, but is redundant if the new development installs a parallel pipeline in-tract.

Constructing the planned capital improvement replacing the 4" main in Caseta Way with an 8" main improves the performance of the looped system.

References:

1. SLVWD South System Map
2. Valley Gardens Vesting Tentative Map, prepared by RJA, dated 9/1/2021
3. SVWD/SLVWD 2020 Urban Water Management Plan
4. SLVWD 2010 Water Supply Master Plan
5. SLVWD 2021 Water Master Plan
6. California Fire Code (2019 Edition), Appendix B, Table B105.1

Attachments:

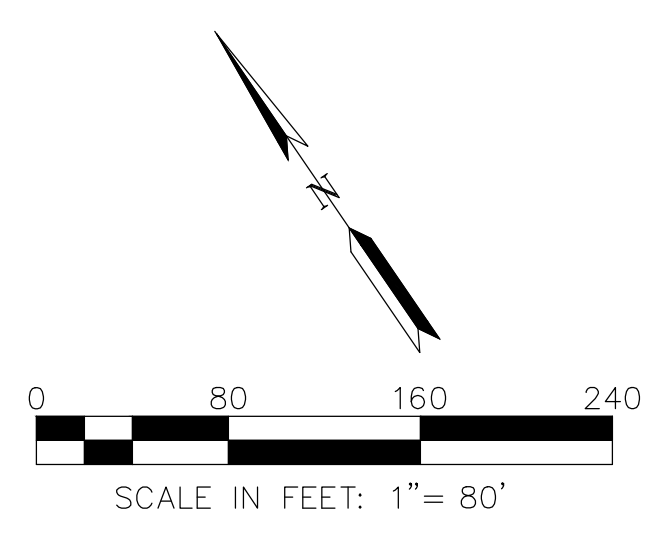
1. Valley Gardens Site Plan
2. Valley Gardens Preliminary Water Master Plan
3. SLVWD South System Map
4. SLVWD South System Model
5. Model Scenario Results Tables
6. Model Scenario Results Figures



PROJECT INFORMATION

TOTAL HOMES	110
PLAN 1 SS	8
PLAN 2	22
PLAN 3	30
PLAN 4	14
PLAN 5	16
PLAN 6 (DUET)	20

- Commercial SF: 9,650 sf
 - Outdoor Dining Areas: 1,000-2,000¹
- ¹ Estimated and subject to change based on future Tenant's actual use



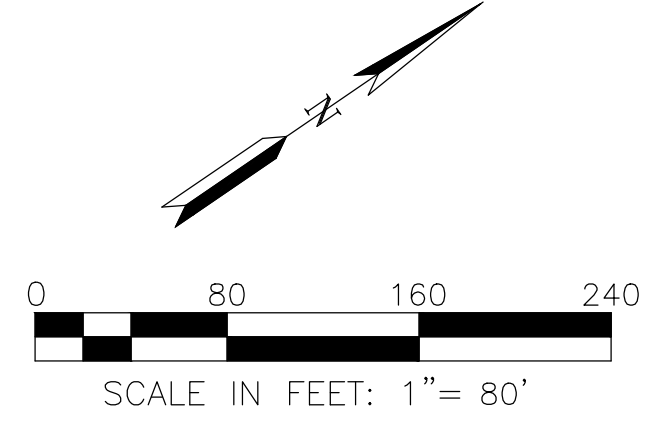
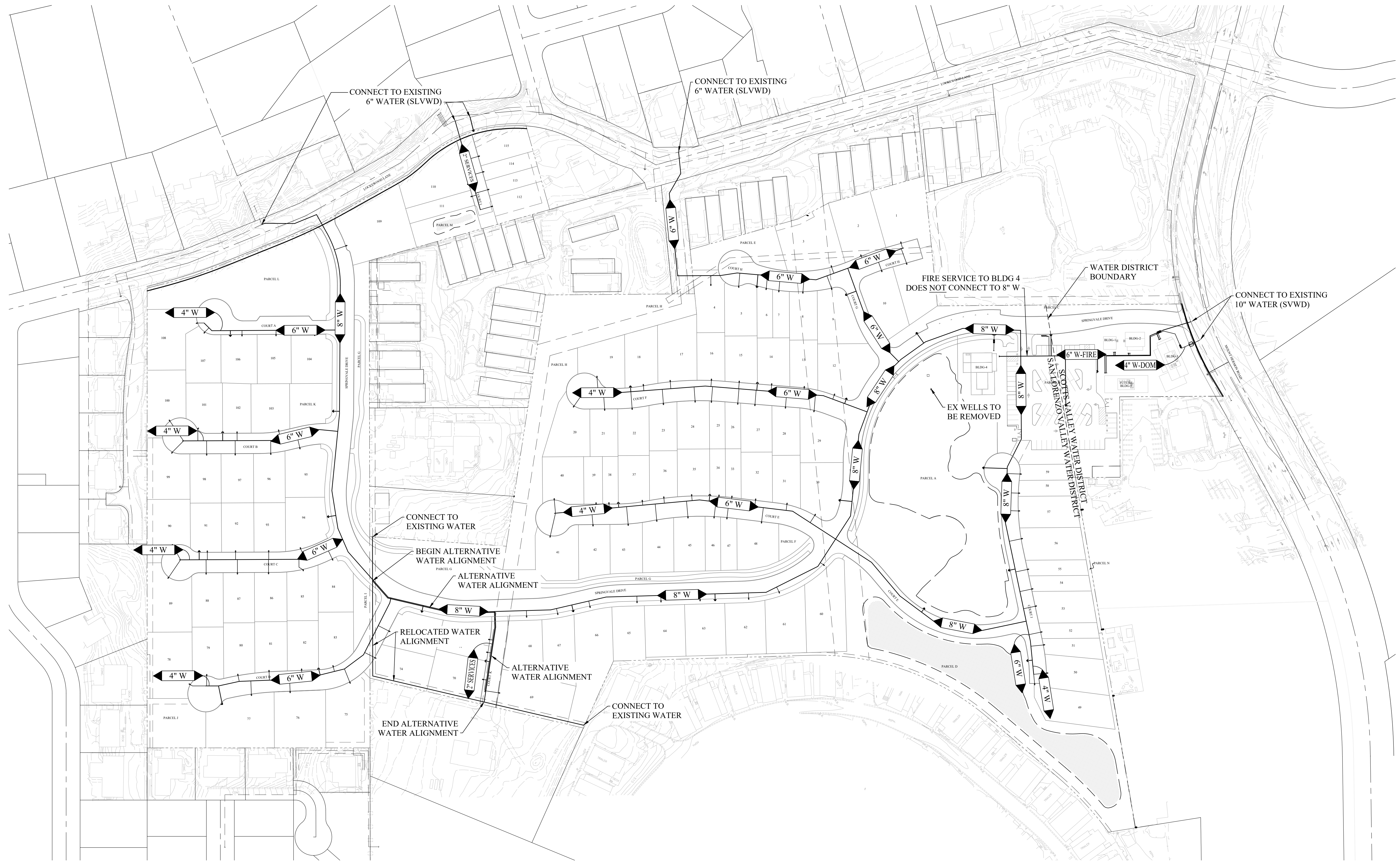
VALLEY GARDENS
SCOTTS VALLEY, CALIFORNIA
DECEMBER, 2021

RJA
RUGGERI-JENSEN-AZAR
ENGINEERS • PLANNERS • SURVEYORS
8055 CAMINO ARROYO GILROY, CA 95020
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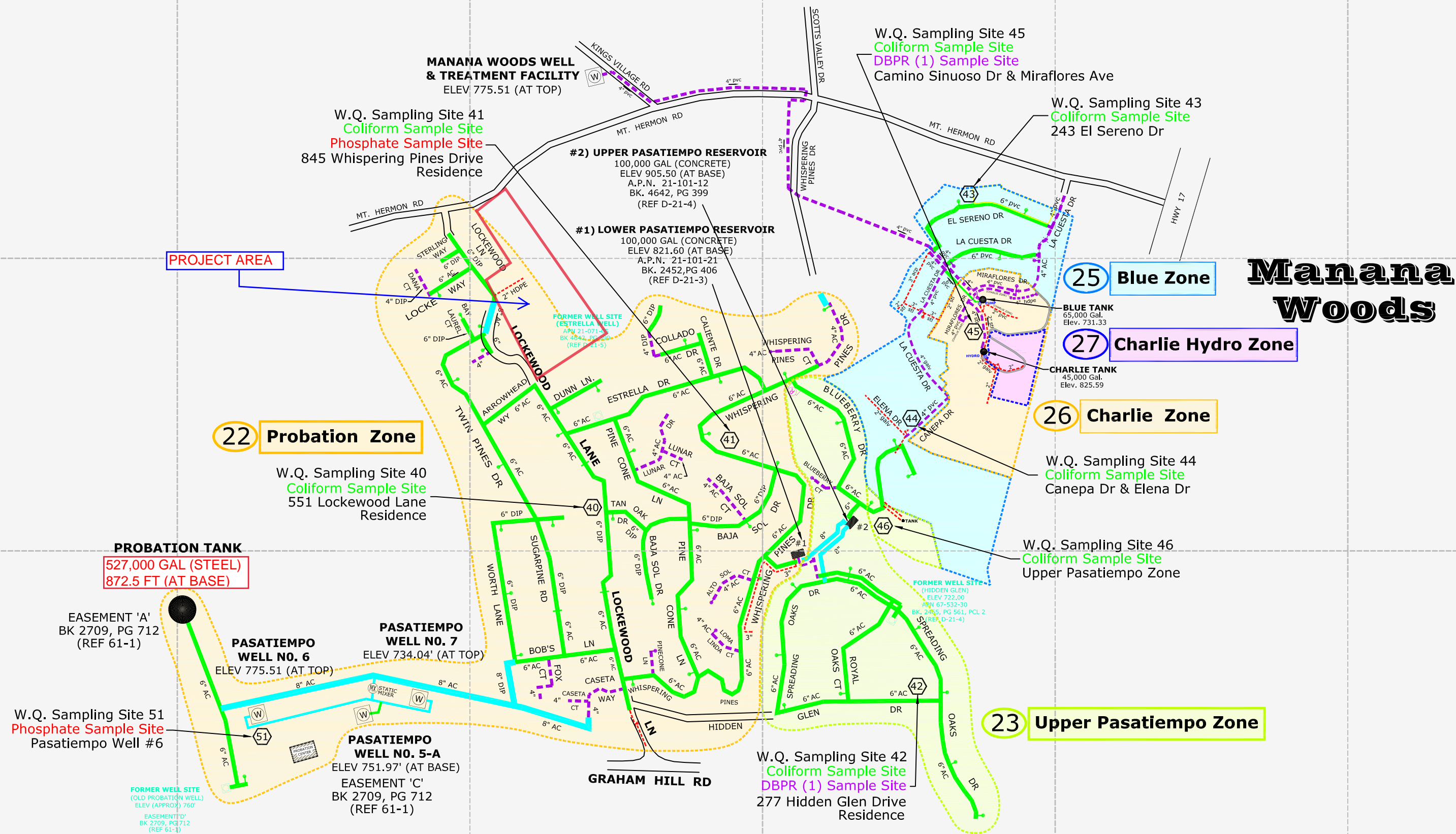
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DATE	BY	REVISIONS
9/1/2021	RJA	REVISION PER CLIENT DIRECTION

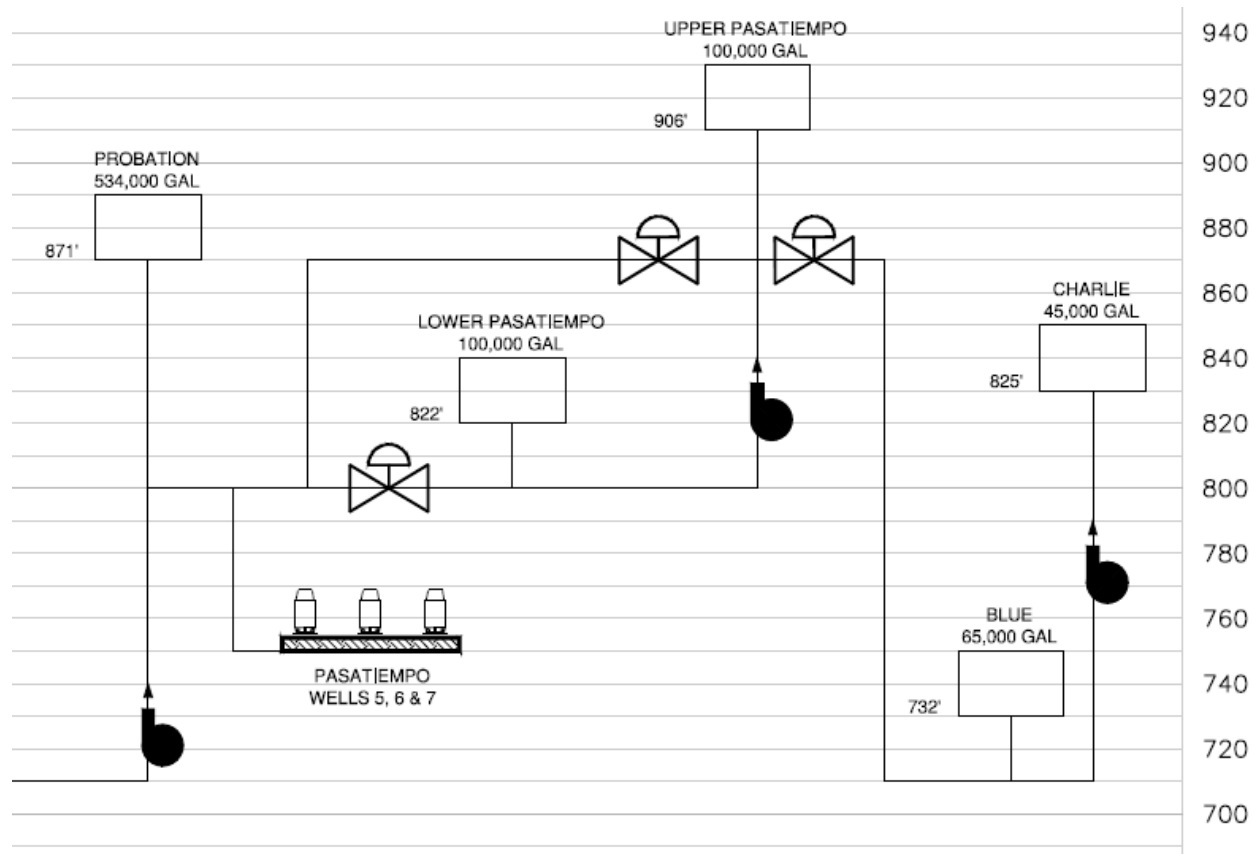
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The City of Scotts Valley



Attachment 4, SLVWD South System Model



The SLVWD South System (diagrammed above) is supplied by groundwater wells and interconnected to the Felton system (not shown). The Pasatiempo area is supplied from the Probation Zone into the lower Pasatiempo Tank through an altitude (tank fill) valve. Water is boosted from the Lower Pasatiempo Tank to the Upper Pasatiempo Tank which supplies the system by gravity. The Upper Pasatiempo Tank supplies the east end of the Probation Zone through a pressure reducing valve.

To simplify this in the fire flow model, the Pasatiempo Zone is represented as a single 100,000 gallon tank with floor at 887.5-ft and a starting water level at 894.5-ft (equal to the starting level in the Probation Tank). The water demand for the Pasatiempo and east zones are entered as a single demand at node 15, where the tank connects to the Probation system. Storage in the Lower Pasatiempo Tank is ignored, and the PRV is not modeled.

The model assumes the largest well is not operating, and the connection to the Felton system is closed.

Table 4: Node Demands

	Elevation	Avg Day Demand	Max Day Demand	Peak Hour Demand	Notes
Node ID	ft	GPM	GPM	GPM	
Junc 1	723	0	0	0	Felton System Inter-tie
Junc 2	665	6.9	13.8	27.6	
Junc 3	650	12.1	24.2	48.4	
Junc 4	638	2.5	5	10	
Junc 5	632	10.4	20.8	41.6	
Junc 6	620	6	12	24	
Junc 7	650	10.1	20.2	40.4	
Junc 8	572	5.2	10.4	20.8	
Junc 9	580	5.3	10.6	21.2	
Junc 10	622	2	4	8	
Junc 11	642	4.6	9.2	18.4	
Junc 12	690	9.7	19.4	38.8	
Junc 13	760	6.2	12.4	24.8	High Point
Junc 14	750	4.9	9.8	19.6	
Junc 15	738	44.7	89.4	178.8	Pasatiempo System
Junc 16	724	8.8	17.6	35.2	
Junc 17	680	6.3	12.6	25.2	
Junc 18	646	7.2	14.4	28.8	
Junc 19	614	7.5	15	30	
Junc 20	590	5.3	10.6	21.2	
Junc 21	610	12.7	25.4	50.8	
Junc 23	582	6.3	12.6	25.2	
Junc 24	592	13.3	26.6	53.2	
Junc 26	642	3.2	6.4	12.8	
Junc 27	606	5	10	20	
Junc 28	548	2.8	5.6	11.2	
Junc 29	540	3	6	12	
Junc 30	532	2.2	4.4	8.8	
Junc 31	524	9.5	19	38	Low Point, also Intertie to SVWD
Junc 33	618	9.2	18.4	36.8	
Junc 34	765	0	0	0	
Junc 36	640	3.5	7	14	
Junc 37	562	1.6	3.2	6.4	
Junc 39	780	16	32	64	County Juvenile Center
Junc 25	765	0	0	0	
Junc 40	770	0	0	0	
Junc 41	734	0	0	0	
Junc 42	775	0	0	0	
Junc 45	550	35	71	141	Valley Gardens

Table 5: Pipe Locations (Links)

ID	Start Node	End Note	Location
Pipe 01	2	3	From 8" AC to Bob's Ln
Pipe 02	3	4	Bob's Ln
Pipe 03	3	6	Worth Ln
Pipe 04	5	4	Bob's Ln
Pipe 05	5	33	Bob's Ln
Pipe 06	33	20	Lockewood Ln
Pipe 07	20	19	Tan Oak Dr
Pipe 08	5	6	Sugarpine Rd
Pipe 09	6	7	Twin Pines Dr
Pipe 10	25	1	Quarry Rd
Pipe 11	28	29	Lockewood Ln
Pipe 12	29	30	Lockewood Ln
Pipe 13	36	10	Caseta Wy
Pipe 14	25	35	From Probation Tank
Pipe 15	34	25	Near Probation Tank Tee
Pipe 16	8	9	Lockewood Ln
Pipe 17	9	20	Lockewood Ln
Pipe 18	9	23	Estrella Dr
Pipe 19	23	24	Estrella Dr
Pipe 20	25	39	To Probation Center
Pipe 21	24	26	Estrella Dr
Pipe 22	26	27	Whispering Pines Dr
Pipe 23	1	10	Graham Hill Rd
Pipe 24	16	17	Baja Sol Dr
Pipe 25	17	18	Baja Sol Dr
Pipe 26	18	19	Baja Sol Dr
Pipe 27	23	21	Pine Cone Ln
Pipe 29	21	18	Pine Cone Ln
Pipe 30	16	15	Whispering Pines Dr
Pipe 31	15	14	Whispering Pines Dr
Pipe 32	14	13	Whispering Pines Dr
Pipe 33	42	40	Pasatiempo Well 6
Pipe 35	12	11	Whispering Pines Dr
Pipe 36	11	10	Whispering Pines Dr
Pipe 37	33	10	Lockewood Ln
Pipe 39	42	40	Pasatiempo Well 7
Pipe 40	2	34	Wells to South System
Pipe 42	36	2	From Caseta Wy to 8" AC
Pipe 43	7	37	Arrowhead Wy
Pipe 44	37	8	Lockewood Ln
Pipe 45	26	16	Whispering Pines Dr

ID	Start Node	End Note	Location
Pipe 46	15	38	Whispering Pines Dr to Lower Pasatiempo Res
Pipe 47	13	12	Whispering Pines Dr
Pipe 48	12	18	Pine Cone Ln
Pipe 49	28	7	Twin Pines Dr
Pipe 50	30	31	Lockewood Ln
Pipe 51	40	34	To Pasatiempo Wells
Pipe 54	37	45	From Arrowhead Wy to Valley Gardens
Pipe 55	45	30	From driveway to Valley Gardens
Pump 52	Resv	41	Well Pump from Aquifer
Pump 53	Resv	42	Well Pump from Aquifer

Figure 1: Peak Hour Demands, Existing Condition

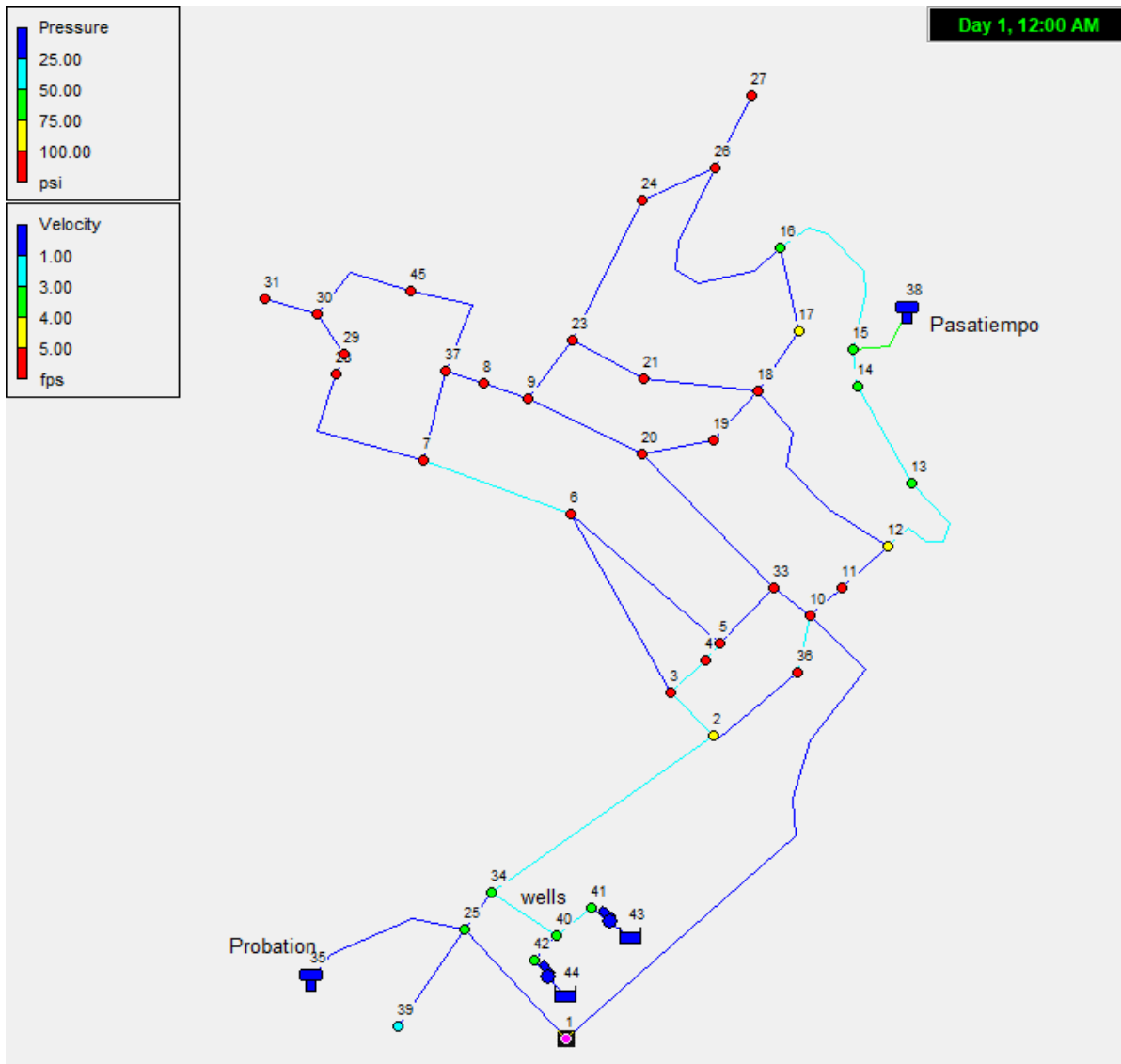


Figure 12: Peak Hour Demands, Existing Condition plus 350 gpm to SVWD

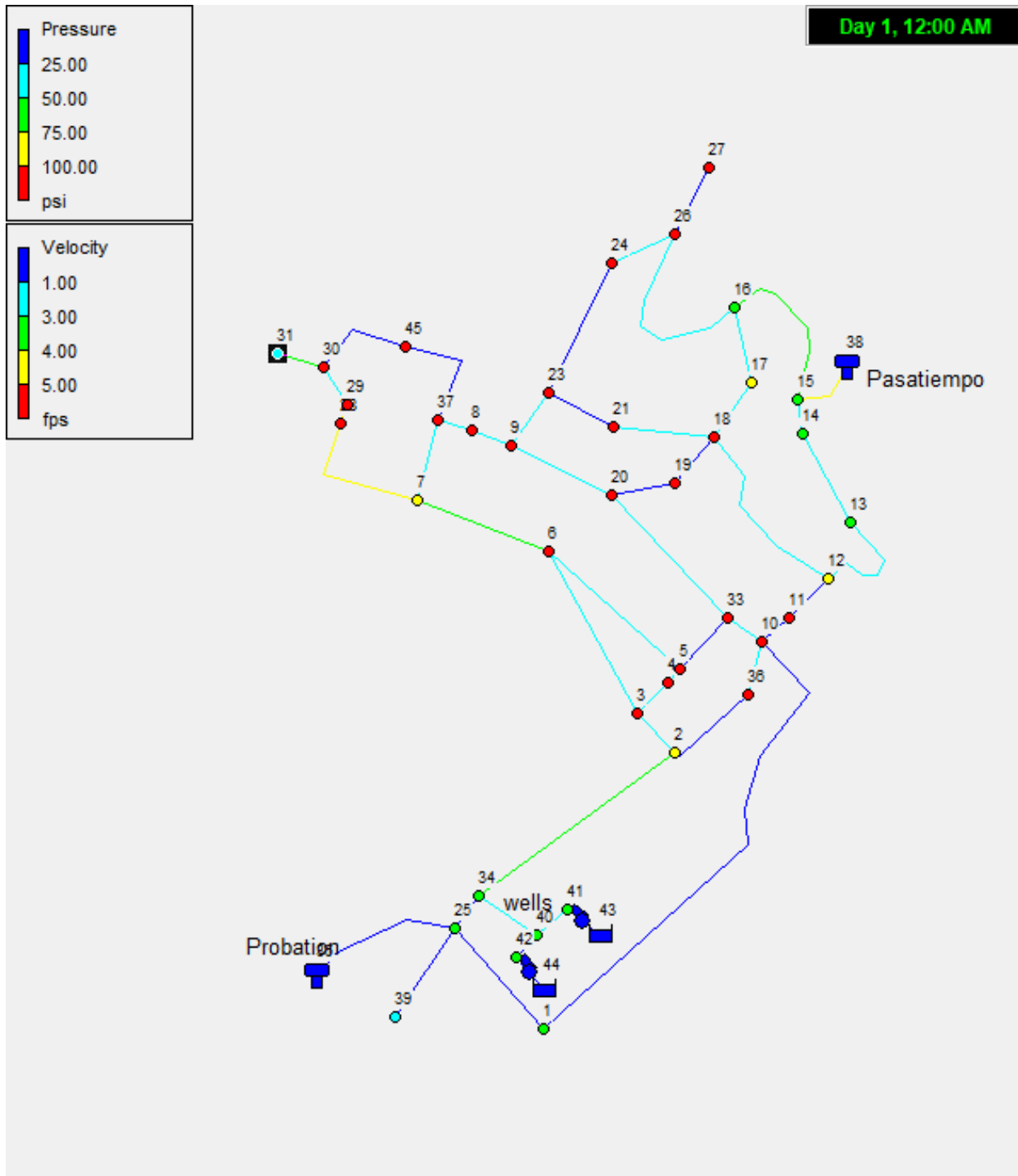


Table 18A: Peak Hour Demands with Valley Gardens and 350 gpm to Scotts Valley, Nodes

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 2	665	27.6	27.6	883.19	94.54
Junc 3	650	48.4	48.4	881.88	100.47
Junc 4	638	10	10	880.49	105.07
Junc 5	632	41.6	41.6	879.9	107.42
Junc 6	620	24	24	878	111.79
Junc 7	650	40.4	40.4	871.96	96.17
Junc 8	572	20.8	20.8	872.96	130.41
Junc 9	580	21.2	21.2	875.09	127.86
Junc 10	622	8	8	880.14	111.85
Junc 11	642	18.4	18.4	880.18	103.2
Junc 12	690	38.8	38.8	880.34	82.47
Junc 13	760	24.8	24.8	884.26	53.84
Junc 14	750	19.6	19.6	887.83	59.72
Junc 15	738	178.8	178.8	889.4	65.6
Junc 16	724	35.2	35.2	879.76	67.49
Junc 17	680	25.2	25.2	878.67	86.08
Junc 18	646	28.8	28.8	878	100.53
Junc 19	614	30	30	877.68	114.25
Junc 20	590	21.2	21.2	877.51	124.58
Junc 21	610	50.8	50.8	876.43	115.44
Junc 23	582	25.2	25.2	875.93	127.36
Junc 24	592	53.2	53.2	876.37	123.22
Junc 26	642	12.8	12.8	877.09	101.87
Junc 27	606	20	20	877.07	117.46
Junc 28	548	11.2	11.2	870.32	139.66
Junc 29	540	12	12	870.11	143.03
Junc 30	532	8.8	8.8	870.01	146.46
Junc 31	524	388	388	866.53	148.42
Junc 33	618	36.8	36.8	879.78	113.43
Junc 34	765	0	0	894.33	56.04
Junc 36	640	14	14	883.01	105.3
Junc 37	562	6.4	6.4	871.3	134.02
Junc 39	780	64	64	894.28	49.52
Junc 25	765	0	0	894.35	56.05
Junc 40	770	0	0	894.51	53.95
Junc 41	734	0	0	895.96	70.18
Junc 42	775	0	0	894.71	51.87
Junc 45	550	143	143	870.36	138.81
Junc 1	723	0	0	894.35	74.25
Resvr 43	278	#N/A	-335.79	278	0
Resvr 44	331	#N/A	-115.43	331	0
Tank 35	872.5	#N/A	-233.89	894.5	9.53
Tank 38	887.5	#N/A	-823.9	894.5	3.03

Table 18B: Peak Hour Demands with Valley Gardens and 350 gpm to Scotts Valley, Pipes

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Status
Pipe 1	330	8.55	120	482.13	2.69	Open
Pipe 2	275	6	140	252.38	2.86	Open
Pipe 3	1460	6.4	120	181.34	1.81	Open
Pipe 4	125	6	140	-242.38	2.75	Open
Pipe 5	420	6	140	54.62	0.62	Open
Pipe 6	1075	6	130	146.3	1.66	Open
Pipe 7	410	6.4	120	-66.15	0.66	Open
Pipe 8	1070	6.4	120	146.17	1.46	Open
Pipe 9	850	6	140	303.51	3.44	Open
Pipe 11	125	6	130	131.52	1.49	Open
Pipe 12	260	8	130	119.52	0.76	Open
Pipe 16	260	6	140	-327.09	3.71	Open
Pipe 17	700	6	130	-191.25	2.17	Open
Pipe 18	400	6	140	-157.04	1.78	Open
Pipe 19	900	6	140	-71.7	0.81	Open
Pipe 21	530	6	140	-124.9	1.42	Open
Pipe 22	460	6	140	20	0.23	Open
Pipe 24	520	6.4	120	159.27	1.59	Open
Pipe 25	440	6.4	120	134.07	1.34	Open
Pipe 26	390	6.4	120	96.15	0.96	Open
Pipe 27	460	6	140	-110.54	1.25	Open
Pipe 29	713	6	140	-161.34	1.83	Open
Pipe 31	235	6	140	292.93	3.32	Open
Pipe 32	610	6	140	273.33	3.1	Open
Pipe 35	480	6	140	57.51	0.65	Open
Pipe 36	240	6	140	39.11	0.44	Open
Pipe 37	250	6	140	-128.48	1.46	Open
Pipe 40	1690	8	140	-621.1	3.96	Open
Pipe 42	650	8	140	-111.38	0.71	Open
Pipe 43	510	6	140	120.39	1.37	Open
Pipe 44	230	6	140	-306.29	3.48	Open
Pipe 45	1260	6	140	-157.7	1.79	Open
Pipe 30	1030	6	140	-352.17	4	Open
Pipe 46	400	8	130	-823.9	5.26	Open
Pipe 47	800	6	140	248.53	2.82	Open
Pipe 48	1180	6	140	152.22	1.73	Open
Pipe 49	930	6	140	-142.72	1.62	Open
Pipe 50	320	6.4	120	388	3.87	Open
Pipe 14	990	12	140	-233.89	0.66	Open
Pipe 15	40	8	140	-169.89	1.08	Open
Pipe 20	690	8	140	64	0.41	Open
Pipe 33	600	8	130	115.43	0.74	Open
Pipe 39	600	8	130	335.79	2.14	Open
Pipe 51	50	8	140	451.22	2.88	Open
Pipe 54	760	10	130	420.28	1.72	Open
Pipe 55	610	10	130	277.28	1.13	Open
Pipe 13	460	4	140	97.38	2.49	Open
Pipe 10	520	12	140	0	0	Open
Pipe 23	2930	6	140	0	0	Closed
Pump 52	#N/A	#N/A	#N/A	335.79	0	Open
Pump 53	#N/A	#N/A	#N/A	115.43	0	Open

Figure 13: Peak Hour Demands with Valley Gardens and 350 gpm to Scotts Valley

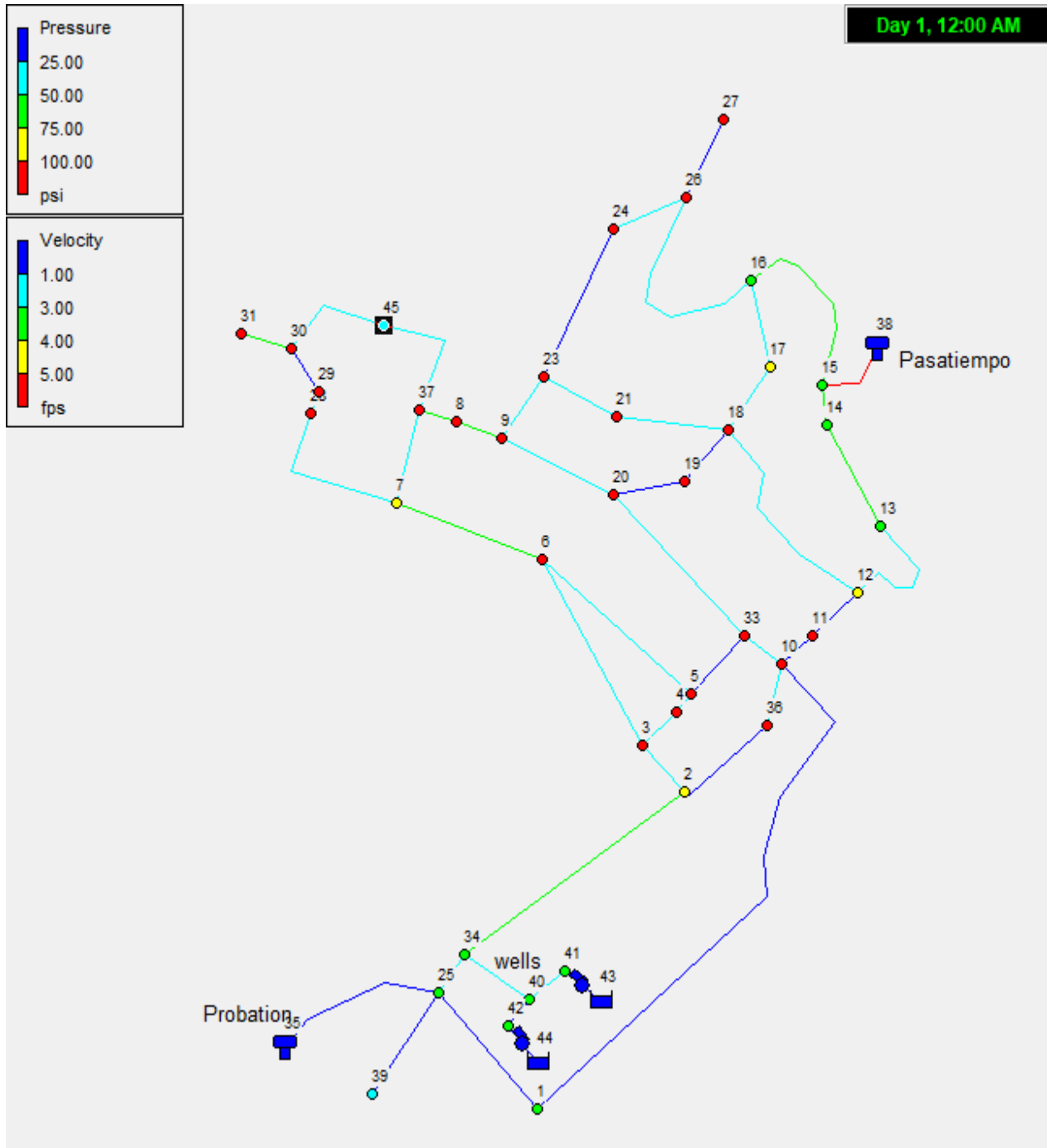


Table 19A: Maximum Day Demand plus Fire Flow and 350 gpm to Scotts Valley, Nodes

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 2	665	13.8	13.8	859.71	84.37
Junc 3	650	24.2	24.2	855.27	88.95
Junc 4	638	5	5	851.05	92.32
Junc 5	632	20.8	20.8	849.17	94.1
Junc 6	620	12	12	834.57	92.98
Junc 7	650	20.2	20.2	791.74	61.41
Junc 8	572	10.4	10.4	803.31	100.23
Junc 9	580	10.6	10.6	823.9	105.68
Junc 10	622	4	4	851.22	99.32
Junc 11	642	9.2	9.2	851.74	90.88
Junc 12	690	19.4	19.4	852.91	70.59
Junc 13	760	12.4	12.4	867.15	46.43
Junc 14	750	9.8	9.8	878.52	55.69
Junc 15	738	89.4	89.4	883.06	62.85
Junc 16	724	17.6	17.6	851.87	55.4
Junc 17	680	12.6	12.6	847.6	72.62
Junc 18	646	14.4	14.4	844.24	85.9
Junc 19	614	15	15	842.24	98.9
Junc 20	590	10.6	10.6	840.35	108.48
Junc 21	610	25.4	25.4	837.43	98.54
Junc 23	582	12.6	12.6	833.59	109.01
Junc 24	592	26.6	26.6	838.75	106.92
Junc 26	642	6.4	6.4	842.37	86.82
Junc 27	606	10	10	842.36	102.42
Junc 28	548	5.6	5.6	778.38	99.82
Junc 29	540	6	6	776.37	102.42
Junc 30	532	4.4	4.4	775.36	105.45
Junc 31	524	369	369	772.19	107.54
Junc 33	618	18.4	18.4	849.17	100.17
Junc 34	765	0	0	893.07	55.49
Junc 36	640	7	7	859.29	95.02
Junc 37	562	3.2	3.2	785.41	96.8
Junc 39	780	32	32	893.35	49.12
Junc 25	765	0	0	893.37	55.62
Junc 40	770	0	0	893.26	53.41
Junc 41	734	0	0	894.72	69.64
Junc 42	775	0	0	893.47	51.33
Junc 45	550	1571	1571	775.34	97.64
Resvr 43	278	#N/A	-336.92	278	0
Resvr 44	331	#N/A	-119.2	331	0
Tank 35	872.5	#N/A	-698.88	894.5	9.53
Tank 38	887.5	#N/A	-1274	894.5	3.03

Table 19A: Maximum Day Demand plus Fire Flow and 350 gpm to Scotts Valley, Pipes

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Status
Pipe 1	330	8.55	120	931.91	5.21	Open
Pipe 2	275	6	140	460.06	5.22	Open
Pipe 3	1460	6.4	120	447.66	4.46	Open
Pipe 4	125	6	140	-455.06	5.16	Open
Pipe 5	420	6	140	-4.2	0.05	Open
Pipe 6	1075	6	130	304.57	3.46	Open
Pipe 7	410	6.4	120	-243.73	2.43	Open
Pipe 8	1070	6.4	120	438.46	4.37	Open
Pipe 9	850	6	140	874.11	9.92	Open
Pipe 11	125	6	130	438.26	4.97	Open
Pipe 12	260	8	130	432.26	2.76	Open
Pipe 16	260	6	140	-1115.69	12.66	Open
Pipe 17	700	6	130	-537.7	6.1	Open
Pipe 18	400	6	140	-588.59	6.68	Open
Pipe 19	900	6	140	-270.33	3.07	Open
Pipe 21	530	6	140	-296.93	3.37	Open
Pipe 22	460	6	140	10	0.11	Open
Pipe 24	520	6.4	120	333.04	3.32	Open
Pipe 25	440	6.4	120	320.44	3.2	Open
Pipe 26	390	6.4	120	258.73	2.58	Open
Pipe 27	460	6	140	-330.86	3.75	Open
Pipe 29	713	6	140	-356.26	4.04	Open
Pipe 31	235	6	140	520.64	5.91	Open
Pipe 32	610	6	140	510.84	5.8	Open
Pipe 35	480	6	140	170.09	1.93	Open
Pipe 36	240	6	140	160.89	1.83	Open
Pipe 37	250	6	140	-327.17	3.71	Open
Pipe 40	1690	8	140	-1123	7.17	Open
Pipe 42	650	8	140	-177.29	1.13	Open
Pipe 43	510	6	140	410.05	4.65	Open
Pipe 44	230	6	140	-1105.29	12.54	Open
Pipe 45	1260	6	140	-313.33	3.56	Open
Pipe 30	1030	6	140	-663.96	7.53	Open
Pipe 46	400	8	130	-1274	8.13	Open
Pipe 47	800	6	140	498.44	5.66	Open
Pipe 48	1180	6	140	308.95	3.51	Open
Pipe 49	930	6	140	-443.86	5.04	Open
Pipe 50	320	6.4	120	369	3.68	Open
Pipe 14	990	12	140	-698.88	1.98	Open
Pipe 15	40	8	140	-666.88	4.26	Open
Pipe 20	690	8	140	32	0.2	Open
Pipe 33	600	8	130	119.2	0.76	Open
Pipe 39	600	8	130	336.92	2.15	Open
Pipe 51	50	8	140	456.12	2.91	Open
Pipe 54	760	10	130	1512.14	6.18	Open
Pipe 55	610	10	130	-58.86	0.24	Open
Pipe 13	460	4	140	170.29	4.35	Open
Pump 52	#N/A	#N/A	#N/A	336.92	0	Open
Pump 53	#N/A	#N/A	#N/A	119.2	0	Open

Figure 14: Maximum Day Demand plus Fire Flow and 350 gpm to Scotts Valley, Pipes

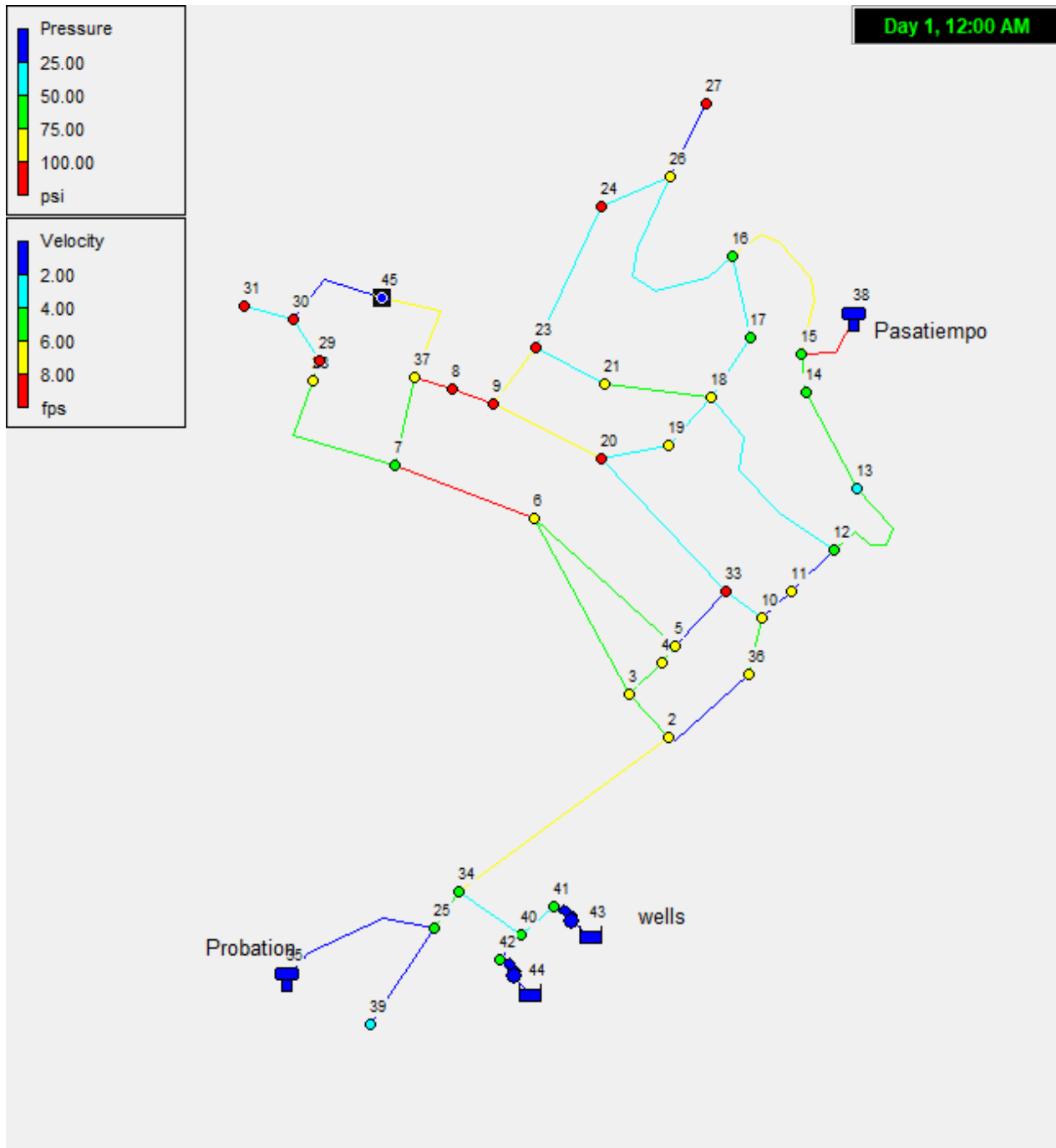


Table 20A: MDD plus Fire Flow and 350 gpm to Scotts Valley with CIPs, Nodes

Network Table - Nodes

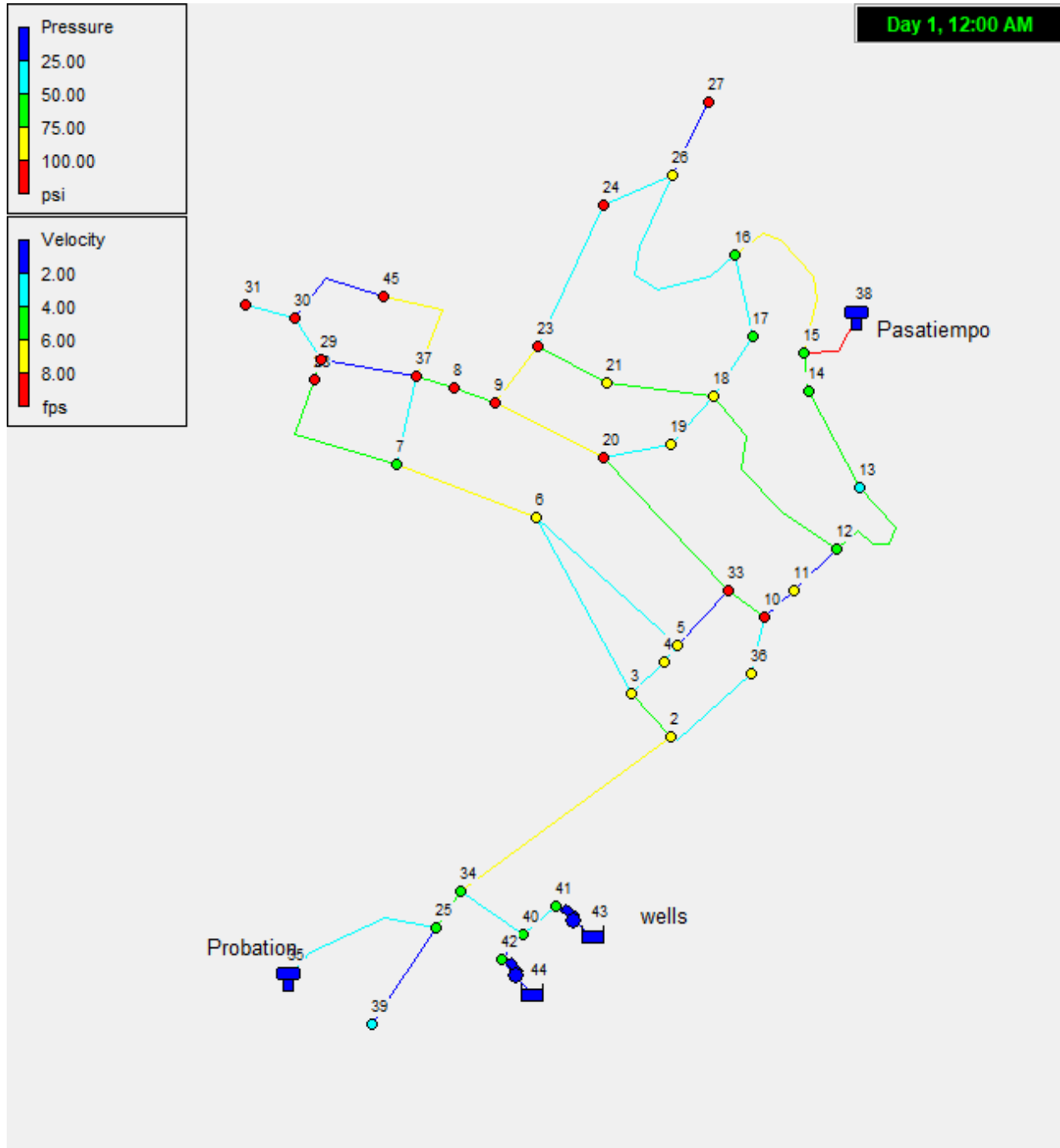
Node ID	Elevation ft	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 2	665	13.8	13.8	859.09	84.1
Junc 3	650	24.2	24.2	856.28	89.38
Junc 4	638	5	5	853.72	93.47
Junc 5	632	20.8	20.8	852.59	95.58
Junc 6	620	12	12	842.93	96.59
Junc 7	650	20.2	20.2	815.13	71.55
Junc 8	572	10.4	10.4	814.16	104.93
Junc 9	580	10.6	10.6	816.42	102.44
Junc 10	622	4	4	856.03	101.41
Junc 11	642	9.2	9.2	856.1	92.77
Junc 12	690	19.4	19.4	856.27	72.05
Junc 13	760	12.4	12.4	868.99	47.22
Junc 14	750	9.8	9.8	879.16	55.97
Junc 15	738	89.4	89.4	883.23	62.93
Junc 16	724	17.6	17.6	850.35	54.75
Junc 17	680	12.6	12.6	846.27	72.04
Junc 18	646	14.4	14.4	843.06	85.39
Junc 19	614	15	15	840.86	98.3
Junc 20	590	10.6	10.6	838.79	107.8
Junc 21	610	25.4	25.4	834.04	97.08
Junc 23	582	12.6	12.6	828.87	106.97
Junc 24	592	26.6	26.6	835.03	105.3
Junc 26	642	6.4	6.4	839.28	85.48
Junc 27	606	10	10	839.27	101.08
Junc 28	548	5.6	5.6	804.07	110.96
Junc 29	540	6	6	802.41	113.7
Junc 30	532	4.4	4.4	801.58	116.81
Junc 31	524	369	369	798.41	118.9
Junc 33	618	18.4	18.4	852.62	101.66
Junc 34	765	0	0	893.03	55.48
Junc 36	640	7	7	857.28	94.15
Junc 37	562	3.2	3.2	812.19	108.41
Junc 39	780	32	32	893.32	49.1
Junc 25	765	0	0	893.34	55.61
Junc 40	770	0	0	893.22	53.39
Junc 41	734	0	0	894.68	69.62
Junc 42	775	0	0	893.43	51.32
Junc 45	550	1571	1571	801.58	109.01
Resvr 43	278	#N/A	-336.95	278	0
Resvr 44	331	#N/A	-119.22	331	0
Tank 35	872.5	#N/A	-709.3	894.5	9.53
Tank 38	887.5	#N/A	-1263.53	894.5	3.03

Table 20A: MDD plus Fire Flow and 350 gpm to Scotts Valley with CIPs, Pipes

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM	Velocity fps	Status
Pipe 1	330	8.55	120	728.73	4.07	Open
Pipe 2	275	6	140	351.24	3.99	Open
Pipe 3	1460	6.4	120	353.29	3.52	Open
Pipe 4	125	6	140	-346.24	3.93	Open
Pipe 5	420	6	140	-25.36	0.29	Open
Pipe 6	1075	6	130	388.32	4.41	Open
Pipe 7	410	6.4	120	-256.87	2.56	Open
Pipe 8	1070	6.4	120	350.8	3.5	Open
Pipe 9	850	6	140	692.09	7.85	Open
Pipe 11	125	6	130	395.17	4.48	Open
Pipe 12	260	8	130	389.17	2.48	Open
Pipe 16	260	10	140	-1297.71	5.3	Open
Pipe 17	700	6	130	-634.59	7.2	Open
Pipe 18	400	6	140	-673.72	7.64	Open
Pipe 19	900	6	140	-297.38	3.37	Open
Pipe 21	530	6	140	-323.98	3.68	Open
Pipe 22	460	6	140	10	0.11	Open
Pipe 24	520	6.4	120	325.2	3.24	Open
Pipe 25	440	6.4	120	312.6	3.12	Open
Pipe 26	390	6.4	120	271.87	2.71	Open
Pipe 27	460	6	140	-388.94	4.41	Open
Pipe 29	713	6	140	-414.34	4.7	Open
Pipe 31	235	6	140	490.95	5.57	Open
Pipe 32	610	6	140	481.15	5.46	Open
Pipe 35	480	6	140	61.34	0.7	Open
Pipe 36	240	6	140	52.14	0.59	Open
Pipe 37	250	6	140	-432.08	4.9	Open
Pipe 40	1690	8	140	-1133.47	7.23	Open
Pipe 42	650	8	140	-390.94	2.5	Open
Pipe 43	510	6	140	271.12	3.08	Open
Pipe 44	230	10	140	-1287.31	5.26	Open
Pipe 45	1260	6	140	-340.38	3.86	Open
Pipe 30	1030	6	140	-683.17	7.75	Open
Pipe 46	400	8	130	-1263.53	8.06	Open
Pipe 47	800	6	140	468.75	5.32	Open
Pipe 48	1180	6	140	388.02	4.4	Open
Pipe 49	930	6	140	-400.77	4.55	Open
Pipe 50	320	6.4	120	369	3.68	Open
Pipe 14	990	12	140	-709.3	2.01	Open
Pipe 15	40	8	140	-677.3	4.32	Open
Pipe 20	690	8	140	32	0.2	Open
Pipe 33	600	8	130	119.22	0.76	Open
Pipe 39	600	8	130	336.95	2.15	Open
Pipe 51	50	8	140	456.17	2.91	Open
Pipe 54	760	10	130	1555.23	6.35	Open
Pipe 55	610	10	130	-15.77	0.06	Open
Pipe 13	460	8	140	383.94	2.45	Open
Pipe 10	600	6	120	0	0	Closed
Pump 52	#N/A	#N/A	#N/A	336.95	0	Open
Pump 53	#N/A	#N/A	#N/A	119.22	0.00	Open

Figure 15: MDD plus Fire Flow and 350 gpm to Scotts Valley with CIPs, Pipes



Report Reviewed	Valley Gardens Fire Flow Analysis, 2023 Update
Prepared by	Schaaf & Wheeler Consulting Civil Engineers
Date	6/9/2023
Review by	Akel Engineering Group
Review Date	9/29/2023

Description The developer for this project has submitted an updated fire flow analysis. The proposal also includes pipeline improvements for meeting the minimum fire flow requirement. This brief report includes a summary of the review completed by Akel Engineering Group, and listed on Table 1.

Table 1 Report Review for Valley Gardens Fire Flow Analysis, 2023 Update

Valley Gardens Fire Flow Analysis Report Review
San Lorenzo Valley Water District

PRELIMINARY

Section	Description	Review Comment
Water System Description - Supply	This section describes the project is located within the Probation Zone which is fed by Pasatiempo Wells No. 5, 6 and 7.	- Pasatiempo Well No.6 is inactive. - SLVWD staff have indicated Pasatiempo Well No. 8 should be active.
Water System Description - Probation Tank	The new Probation tank is 527,000 gallons with a base elevation of 872.5 ft.	The 2021 Master Plan documents the Probation Tank having a Pad elevation of 870 ft and a capacity of 528,900 gallons.
Estimate of Water Demand: Table 1	Table 1 lists Water Duty Factors and estimation of water demands for Valley Gardens	The water demand estimates are acceptable and similar to the 2021 Master Plan
Estimate of Fire Flow	Fire Flow (per CA Fire Code): 1,500 gpm for 4 hours	The fire flow requirement is acceptable and does not increase the fire storage requirements for the Probation Pressure Zone
Available Supply	The following modeling assumptions in this section mentioned "Pasatiempo Well 6 produces 120 gpm."	- Pasatiempo Well No.6 should be inactive. - Pasatiempo Well No. 8 should be added (350 gpm).
Supply Analysis	Demands: Existing MDD: 508 gpm, Valley Gardens: 71 gpm, Intertie 350 gpm Supply: Well 5 (350 gpm) and Well 6 (120 gpm)	There is a supply deficiency based on the assumptions they list: -The documented System maximum day demand (508 gpm) plus Valley Gardens (71 gpm). Total = 579 gpm. -The stated active supply: Well 5 (350 gpm) and Well 6 (120 gpm). Total = 470 gpm. -The analysis does not have enough supply to meet existing demands (this does not even include the Intertie flow of 350 gpm) - If Well 8 is not active, the MDD assumptions in the report (plus the intertie flow) will cause a supply deficiency and deplete the Probation Tank and crash the system. - We have included a quick supply vs demand analysis (assuming Well 8 is active), See Table 2.
Modeling Assumptions	The Probation water tank starts at 22 ft (HGL = 945.5 ft)	- Typo? Pad elevation (872.5 ft) plus water height (22 ft) = 894.5 ft - Additionally, SCADA indicates this tank typically operates between 8-11ft.
Storage Analysis	The storage required is 360,000 gallons for residential (1,500 gpm x 4 hours x 60 minutes)	- The storage requirements are: 1) Operational = 50% of MDD and 2) Fire Protection = Largest fire flow requirement in the Zone. - Valley Gardens requires 0.042 MG of operational storage - Valley Gardens fire flow storage requirement is equal to the pressure zones current requirement - There is enough existing capacity in the Probation tank for Valley Gardens. Please see the storage analysis on Table 3.
Pipeline Criteria	Model results were checked to identify...pipelines with velocities over 5 fps during PHDs or over 8 fps during MDD+FF.	The 2021 Water Master Plan criteria is 1) maximum velocity criteria of 10 ft/s (during Max Day Demand + Fire Flow), and 2) maximum headloss criteria of 10 ft/k-ft (during peak hour demand).
Minimum Pipeline Diameter Criteria	The provided tract map and pipeline recommendations include proposed 4-inch and 6-inch mains.	The minimum recommended pipe size should be 8-inches, unless it is a dead-end main that does not include a fire hydrant, then a 6-inch main is acceptable.
Hydraulic Analysis - Pressure Comparison	1) PHD with Valley Gardens and 350 gpm to SVWD - Pressure at Valley Gardens: 138.8 psi 2) MDD with 1,500 gpm Fire Flow and 350 gpm to SVWD - Residual Pressure at Valley Gardens: 97.6 psi 3) MDD with 1,500 gpm Fire Flow and 350 gpm to SVWD and Planned Capital Improvements - Residual Pressure at Valley Gardens: 109.0 psi	1) PHD Pressure at Valley Gardens: 131.8 psi 2) MDD+FF Residual Pressure at Valley Gardens: 46.5 psi 3) MDD+FF (plus improvements) Residual Pressure at Valley Gardens: 70.5 psi The pressure criteria is met, but the Master Plan model indicates lower pressures than documented in the Fire Flow report
Recommended Improvements	Three proposed off-site pipeline improvement projects: 1) adding a new 6" pipe in Lockwood Drive from Arrowhead Way to Twins Pines Drive (connecting nodes 29 and 37) 2) upsizing the 6" mains in Lockwood from Estrella Dr to Arrowhead Way to 10" (Pipes 16 and 44) 3) upsizing the 4" pipe in Caseta Way from end of cul-de-sac to Lockwood Ln to 8" (Pipe 13)	- The recommended 6-inch (No. 1) should be upsized to an 8-inch to adhere to the minimum pipeline standards - The recommended off-site pipeline improvements generally align with results from our quick analysis and the Master Plan recommendations.

Table 2 Supply vs Demand Analysis
Valley Gardens Fire Flow Analysis Report Review
San Lorenzo Valley Water District

PRELIMINARY

Supply and Demand Analysis			
Water Demands	ADD (gpm)	MDD (gpm)	PHD (gpm)
Valley Gardens Development^{1,2}			
San Lorenzo Valley Water District (SLVWD)	29	58	116
Scotts Valley Water District (SCWD)	6	13	26
Subtotal	35	71	142
Existing System³			
Manana Woods	228	342	513
Intertie Flow⁴			
Intertie No. 2 to Scotts Valley Water District	350	350	350
Total (Supplied by SLVWD)	607	750	979
Available Supply			
Manana Woods Wells^{5,6}			
Pasatiempo 5		350 gpm	
Pasatiempo 6 (Inactive)		-	
Pasatiempo 7		100 gpm	
Pasatiempo 8		350 gpm	
Total		800 gpm	
Supply Vs Demand Analysis			
Existing System Maximum Day Demand with Valley Gardens			
Demand		400 gpm	
Supply		800 gpm	
Surplus(+)/ Deficit (-)		400 gpm	
Existing System Maximum Day Demand with Valley Gardens + 350 gpm to Scott Valley			
Demand		750 gpm	
Supply		800 gpm	
Surplus(+)/ Deficit (-)		50 gpm	



9/29/2023

Notes:

- Source: Valley Gardens Fire Flow Analysis (2023 Update) received from Schaaf & Wheeler Consulting Civil Engineers on 8/15/2023.
- Demand peaking factors extracted from Valley Gardens Fire Flow Analysis (2023 Update), Table 2.
- Demand peaking factors extracted from 2021 San Lorenzo Valley Water District (SLVWD) Water Master Plan, Table 3.3.
- Source: Valley Gardens Fire Flow Analysis (2023 Update) received from Schaaf & Wheeler Consulting Civil Engineers on 8/15/2023.
- Pasatiempo 5 and 7 are in operation per Valley Gardens Fire Flow Analysis (2023 Update).
- Pasatiempo 8 is assumed to be operational, which flow information is extracted from 2021 SLVWD Water Master Plan, Table 4.1.

Table 3 Storage Capacity Analysis
Valley Gardens Fire Flow Analysis Report Review
San Lorenzo Valley Water District

PRELIMINARY

Land Use Type	Storage Capacity (MG)
Existing System	
Required Storage Volume	
Operational (50% * MDD)	0.20
Fire Flow (2,000 gpm for 3 hours)	0.36
Total	0.56
Existing Storage Capacity	
Probation	0.54
Lower Pasatiempo	0.10
Total	0.64
Surplus(+) / Deficit (-)	0.08
Existing System plus Valley Gardens	
Required Volume	
Operational (50% * MDD)	0.24
Fire Flow (1,500 gpm for 4 hours)	0.36
Total	0.60
Existing Storage	
Probation PZ	0.54
Lower Pasatiempo PZ	0.10
Total	0.64
Surplus(+) / Deficit (-)	0.04

Note:

1. Total Storage Requirement criteria extracted from 2021 SLVWD Water Master Plan, Table 3.3.

ft, which is below the HGL setting for the PRV¹ (902-ft). During our fire flow runs, the Pasatiempo tank supplied over 1,200 gpm to the Probation System, which is over 5 ft/s in an 8-inch pipe. With that connection closed, our model showed sufficient flow and pressure at the project site, but low pressures on the higher segment of Whispering Pines Drive.

References:

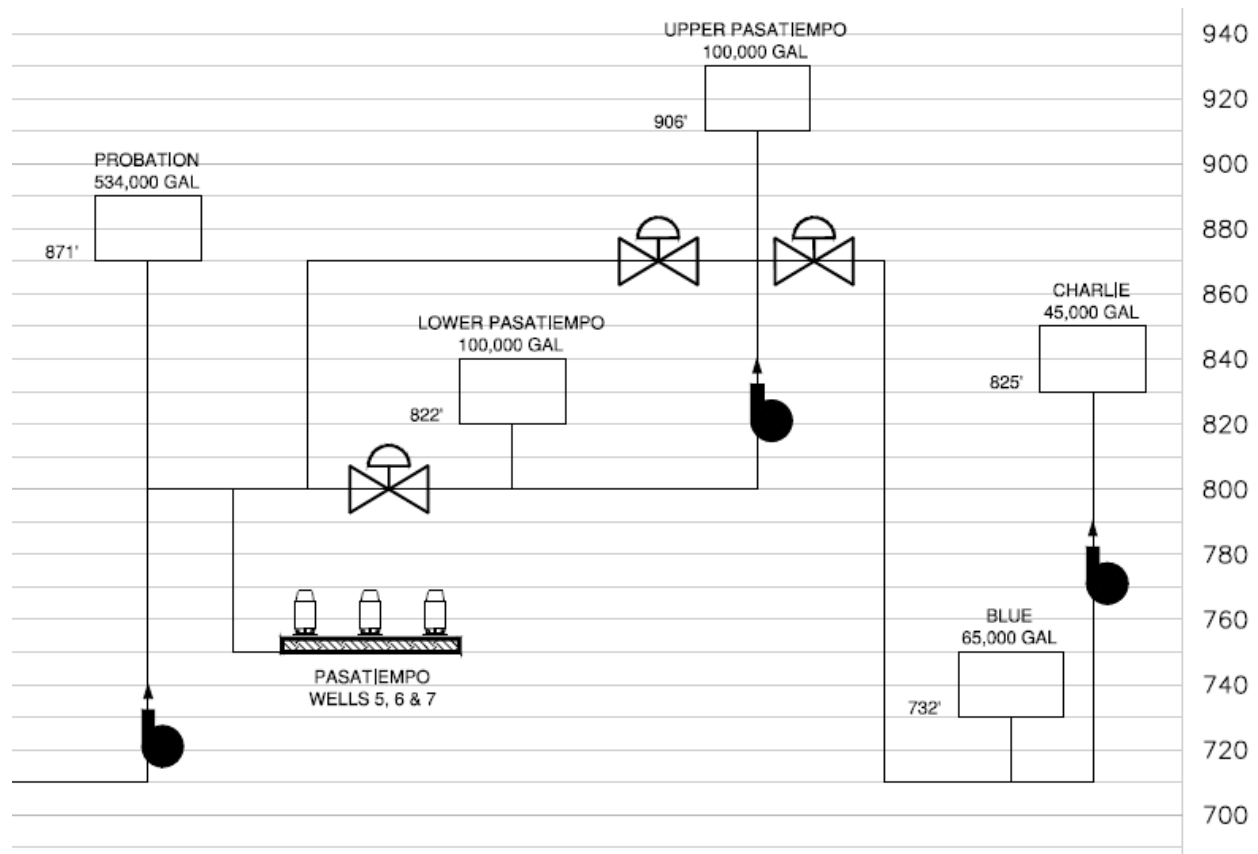
1. SLVWD 2021 Water Master Plan

Attachments:

1. Attachment 4 to our previous memorandum, SLVWD South System Model
2. Table 1, Report Review for Valley Gardens Fire Flow Analysis, 2023 Update, with responses

¹ Per Table 4.6 of the SLVWD Water Master Plan, this PRV is at elevation 637-ft and set at 115 psi.

4. Attachment 4, SLVWD South System Model



The SLVWD South System (diagrammed above) is supplied by groundwater wells and interconnected to the Felton system (not shown). The Pasatiempo area is supplied from the Probation Zone into the lower Pasatiempo Tank through an altitude (tank fill) valve. Water is boosted from the Lower Pasatiempo Tank to the Upper Pasatiempo Tank which supplies the system by gravity. The Upper Pasatiempo Tank supplies the east end of the Probation Zone through a pressure reducing valve.

To simplify this in the fire flow model, the Pasatiempo Zone is represented as a single 100,000 gallon tank with floor at 887.5-ft and a starting water level at 894.5-ft (equal to the starting level in the Probation Tank). The water demand for the Pasatiempo and east zones are entered as a single demand at node 15, where the tank connects to the Probation system. Storage in the Lower Pasatiempo Tank is ignored, and the PRV is not modeled.

The model assumes the largest well is not operating, and the connection to the Felton system is closed.

Table 1 Report Review for Valley Gardens Fire Flow Analysis, 2023 Update, with responses

Section	Description	Review Comment	S&W Response
Water System Description - Supply	This section describes the project is located within the Probation Zone which is fed by Pasatiempo Wells No. 5, 6 and 7.	- Pasatiempo Well No.6 is inactive. - SLVWD staff have indicated Pasatiempo Well No. 8 should be active.	We can correct the report text. The description is from 2019.
Water System Description - Probation Tank	The new Probation tank is 527,000 gallons with a base elevation of 872.5 ft.	The 2021 Master Plan documents the Probation Tank having a Pad elevation of 870 ft and a capacity of 528,900 gallons.	Our data is based on the Civil Plans for the tank.
Estimate of Water Demand: Table 1	Table 1 lists Water Duty Factors and estimation of water demands for Valley Gardens	The water demand estimates are acceptable and similar to the 2021 Master Plan	No response required.
Estimate of Fire Flow	Fire Flow (per CA Fire Code): 1,500 gpm for 4 hours	The fire flow requirement is acceptable and does not increase the fire storage requirements for the Probation Pressure Zone	No response required.
Available Supply	The following modeling assumptions in this section mentioned "Pasatiempo Well 6 produces 120 gpm."	- Pasatiempo Well No.6 should be inactive. - Pasatiempo Well No. 8 should be added (350 gpm).	We can correct the report text. The description is from 2019.
Supply Analysis	Demands: Existing MDD: 508 gpm, Valley Gardens: 71 gpm, Intertie 350 gpm Supply: Well 5 (350 gpm) and Well 6 (120 gpm)	There is a supply deficiency based on the assumptions they list: -The documented System maximum day demand (508 gpm) plus Valley Gardens (71 gpm). Total = 579 gpm. -The stated active supply: Well 5 (350 gpm) and Well 6 (120 gpm). Total = 470 gpm. -The analysis does not have enough supply to meet existing demands (this does not even include the Intertie flow of 350 gpm) - If Well 8 is not active, the MDD assumptions in the report (plus the intertie flow) will cause a supply deficiency and deplete the Probation Tank and crash the system. - We have included a quick supply vs demand analysis (assuming Well 8 is active), See Table 2.	The existing South System MDD is 342 gpm per Table 5.1 of the Water Master Plan. 508 is an incorrect value. The Projected MDD at buildout is 357 gpm. 357 gpm + 71 gpm = 428 gpm. The South System firm capacity is 450 gpm (largest well idle) so the combined MDD is met. The South System is connected to the North System at Intertie Pump Station 3&4. If the Scotts Valley Intertie is open and a well is off-line, the pump station from the Quail Zone should be active.
Modeling Assumptions	The Probation water tank starts at 22 ft (HGL = 945.5 ft)	- Typo? Pad elevation (872.5 ft) plus water height (22 ft) = 894.5 ft - Additionally, SCADA indicates this tank typically operates between 8-11ft.	Yes, that is a typo. The modeled HGL is 894.5-ft.
Storage Analysis	The storage required is 360,000 gallons for residential (1,500 gpm x 4 hours x 60 minutes)	- The storage requirements are: 1) Operational = 50% of MDD and 2) Fire Protection = Largest fire flow requirement in the Zone. - Valley Gardens requires 0.042 MG of operational storage - Valley Gardens fire flow storage requirement is equal to the pressure zones current requirement - There is enough existing capacity in the Probation tank for Valley Gardens. Please see the storage analysis on Table 3.	No response required.
Pipeline Criteria	Model results were checked to identify...pipelines with velocities over 5 fps during PHDs or over 8 fps during MDD+FF.	The 2021 Water Master Plan criteria is 1) maximum velocity criteria of 10 ft/s (during Max Day Demand + Fire Flow), and 2) maximum headloss criteria of 10 ft/k-ft (during peak hour demand).	No response required.
Minimum Pipeline Diameter Criteria	The provided tract map and pipeline recommendations include proposed 4-inch and 6- inch mains.	The minimum recommended pipe size should be 8-inches, unless it is a dead-end main that does not include a fire hydrant, then a 6-inch main is acceptable.	The tract map attached to the memo is from 9/1/21. SLVWD adopted design standards in January 2022. The next update by RJA will reflect the required minimum pipe sizes.

Table 1 Report Review for Valley Gardens Fire Flow Analysis, 2023 Update, with responses

Section	Description	Review Comment	S&W Response
Hydraulic Analysis - Pressure Comparison	<p>1) PHD with Valley Gardens and 350 gpm to SVWD - Pressure at Valley Gardens: 138.8 psi</p> <p>2) MDD with 1,500 gpm Fire Flow and 350 gpm to SVWD - Residual Pressure at Valley Gardens: 97.6 psi</p> <p>3) MDD with 1,500 gpm Fire Flow and 350 gpm to SVWD and Planned Capital Improvements - Residual Pressure at Valley Gardens: 109.0 psi</p>	<p>1) PHD Pressure at Valley Gardens: 131.8 psi</p> <p>2) MDD+FF Residual Pressure at Valley Gardens: 46.5 psi</p> <p>3) MDD+FF (plus improvements) Residual Pressure at Valley Gardens: 70.5 psi</p> <p>The pressure criteria is met, but the Master Plan model indicates lower pressures than documented in the Fire Flow report</p>	<p>The difference appears to stem from the way we modeled the Upper Passatiempo PRV. The master plan Table 4.6 lists it at elevation 637 and set to 115 psi, which would be HGL = 902-ft. We modeled it as a tank with an HGL of 894.5-ft. It looks like the Akel model has it opening at a lower pressure. Both models show sufficient flows and pressures.</p>
Recommended Improvements	<p>Three proposed off-site pipeline improvement projects:</p> <p>1) adding a new 6" pipe in Lockewood Drive from Arrowhead Way to Twins Pines Drive (connecting nodes 29 and 37)</p> <p>2) upsizing the 6" mains in Lockewood from Estrella Dr to Arrowhead Way to 10" (Pipes 16 and 44)</p> <p>3) upsizing the 4" pipe in Caseta Way from end of cul-de-sac to Lockewood Ln to 8" (Pipe 13)</p>	<p>- The recommended 6-inch (No. 1) should be upsized to an 8-inch to adhere to the minimum pipeline standards</p> <p>- The recommended off-site pipeline improvements generally align with results from our quick analysis and the Master Plan recommendations.</p>	<p>Per the system map, Pipe #1 would connect two existing 6-inch stubs. The Project adds a parallel 8-inch main, so we didn't see a need to make that segment an 8-inch pipe. If needed, we can pass that requirement on to RJA (the civil designer).</p>

DATE: April 16, 2023
TO: Engineering and Environmental Committee, SLVWD
FROM: Brian Frus, Interim General Manager
SUBJECT: Robson Homes Sandhills Mitigation Project Agreement
WRITTEN BY: Carly Blanchard, Environmental Programs
Manager/Administrative Analyst
PRESENTED BY: Carly Blanchard, Environmental Programs
Manager/Administrative Analyst

STAFF RECOMMENDATION

The Engineering and Environmental Committee receives this memo and recommend to the Board of Directors to enter into an agreement to provide off-site Sandhills mitigation to Robson Homes.

RECOMMENDED MOTION

The Engineering and Environmental Committee recommends the Board enter into an agreement to provide off-site Sandhills Mitigation to Robson Homes.

BACKGROUND

In January 2023 the District was approached by Robson Homes, a real estate developer, regarding the Valley Gardens Project in Scotts Valley. Robson Homes is in the process of completing a Habitat Conservation Plan (HCP) and an Environmental Impact Report (EIR) for the project. As part of their HCP, the Federal Fish and Wildlife Service (USFWS) has required that Robson Homes mitigate their project impacts on the Mount Hermon June beetle.

Entities conducting work in sandhills habitat typically purchase mitigation credits through the Zayante Conservation Bank. Unfortunately, the Conservation Bank does not have enough credits to support the Valley Gardens project. Consequently, Robson Homes has reached out to the District to inquire about conducting off-site mitigation within our lands.

The District owns the 180-acre Olympia Watershed Property, of which approximately 95 acres feature sandhill habitat. In 2017, the District

established a 6.3-acre conservation area that supports endangered species and sensitive habitats found in the Santa Cruz Sandhills. This Olympia Conservation Area was set aside by the District to mitigate the impacts of its capital improvement (CIP) and operations and maintenance (O&M) projects on rare species and sensitive habitats in the Sandhills.

The District is also in the process of developing a Habitat Conservation Plan (HCP) for its Sandhills habitat, providing mitigation on a larger scale as required by the Endangered Species Act. The HCP's Conservation Strategy has determined that the District will need to protect and restore 40 acres of habitat to mitigate the impacts of the District's CIP and O&M projects on sandhills species, based on a 3:1 ratio for permanent impacts and a 1:1 ratio for temporary impacts, as typically required by the USFWS for sandhills species mitigation. The estimated cost to manage and monitor this easement is \$80,000 annually.

The District could expand the conservation area to 50 acres to provide 10 acres of Sandhills habitat mitigation to Robson Homes to help them meet their mitigation requirements. In this scenario, the additional acres will incur additional management costs, but the consideration from Robson Homes would cover these costs and provide additional funding to offset the District's costs. Based on staff's calculations, the District would save nearly \$1.2 million on HCP implementation costs by partnering with Robson Homes to protect and restore an additional 10 acres of habitat (see Exhibit A).

FISCAL IMPACT

It is expected that approximately \$1.2 million would be received as consideration for the District providing off-site sandhills mitigation for the Valley Gardens project. This funding would offset the District's cost for restoration and management of its easement in support of its HCP.

ENVIRONMENTAL IMPACT

The actions funded by this agreement will have a positive effect on the ecosystem of the Olympia Watershed Property as the mitigation provided by Robson Homes will leverage the District's mitigation to protect and

restore a greater amount of habitat (50 acres) than if the District alone mitigates on the property (40 acres). Impacts of proposed actions on special-status species are covered by the District's HCP and Robson Homes' HCP and EIR .

ATTACHMENTS AND RELEVANT LINKS TO DISTRICT WEBSITE

- Attachment A: Habitat Conservation Plan Costs Spreadsheet

Attachment A

SLVWD & Robson Homes Sandhills Conservation Strategy

Planning-level costs to protect, restore, and manage sandhills habitat at the Olympia Watershed Property under two scenarios:

- 1) District protects, restores and manages 40 acres of habitat needed to mitigation District sandhills impacts (District Only);
- 2) District implements its mitigation and allows Robson Homes to mitigate by protecting, restoring, and managing 10 acres at the District's Olympia Watershed Property (District + Robson Homes)

Description	District + Robson		Assumptions and Comments
	District Only	Homes	
Habitat Protection	2,550,714	3,182,143	\$85k/yr. needed for 40 ac. (District Only) or \$106k/yr. needed for 50 ac. (District + Robson Homes) for mangement and monitoring and easemet defense through the Land Trust of Santa Cruz Cunty. Assumes net capitalization rate. Also accounts for one time transaction costs for easement and development of mangement plan.
Restoration	505,000	575,000	Restoration plan, implementation of restoration plan (seed collection, seeding, invasive removal, etc.)
Total Conservation Strategy Costs (Protection + Restoration)	3,055,714	3,757,143	
Proposed Fee for Robson Homes 10 acres of mitigation		1,903,572	Assumes Robson homes pays the District \$4.37 per square foot, which is the going rate for conservation credits at the conservation bank and therefore 'usual and customary'
Total Cost	3,055,714	1,853,571	
Savings to District by Collaborating with Robson Homes on Mitigation		1,152,142	

