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TECHNICAL MEMORANDUM

DATE: March 27, 2025

Project No.: 1032-80-24-02
SENT VIA: EMAIL

TO: Puente Basin Water Agency

FROM: Veva Weamer, Principal Scientist I

REVIEWED BY: Andy Malone, Principal Geologist II

SUBJECT: Technical Memorandum 3 – Part 1 & 2: *Basin Management Alternatives for the Puente Basin Groundwater Management Plan*

1.0 BACKGROUND AND OBJECTIVES

The Puente Basin Water Agency (PBWA) is in the process of developing the Puente Basin Groundwater Management Plan (GMP) to maximize the beneficial use of groundwater in the Puente Basin and thereby decrease dependence on less reliable imported water supplies. The development of the GMP is being executed by West Yost Associates (West Yost) pursuant to a multi-phase scope of work.

This Technical Memorandum *Basin Management Alternatives for the Puente Basin Groundwater Management Plan* (TM-3) describes: (i) the results of Phase 2 – Part 1, which involves the design of several "Basin Management Alternatives" for the Puente Basin; and (ii) the methods and results of Phase 2 – Part 2 to rank and select specific alternatives for further evaluation, and develop a scope of work to evaluate the selected alternatives in Phase 2 – Part 3.

This section of TM-3 describes the background that has led to the development of the GMP, the objectives of the GMP, the scope of work to prepare the GMP, and the organization of this TM-3.

1.1 Puente Basin, Narrows Agreement and Judgment

The Puente Basin is a small groundwater basin located between the San Jose and Puente Hills in eastern Los Angeles County in Southern California that is approximately 20 square miles (12,800 acres). Groundwater pumped from the Puente Basin is used as a non-potable water supply by various pumpers in the basin.

In 1971, the PBWA was formed as a joint powers authority between the Walnut Valley Water District (WVWD) and the Rowland Water District (RWD) to oversee the protection and utilization of local, imported, and recycled water within the Puente Basin. The following year in 1972, the PBWA entered into the Puente Narrows Agreement with the Upper San Gabriel Valley Municipal Water District to ensure that water management activities in the Puente Basin do not interfere with the subsurface groundwater outflow from the Puente Basin to the adjacent Main San Gabriel Basin.[1]

[1]https://puentebasin.com/wp-content/uploads/2024/10/Puente-Narrows-Agreement-with-the-Upper-San-Gabriel-Valley-Municipal-Water-District.pdf

In 1986, the pumping rights in the Puente Basin were adjudicated pursuant to the Puente Basin Judgment (Judgment) which established a physical solution for the management of the Basin.[2] The Judgment provided for the creation of the Puente Basin Watermaster to administer the Judgment and manage the Basin in accordance with the Physical Solution. Puente Basin groundwater is pumped and used primarily by five "Primary Parties" to the Judgment, including the WVWD and RWD.

1.2 Scope of Work to Prepare the GMP

In 2022, the PBWA contracted with West Yost to develop a GMP to enhance the management of the Puente Basin beyond the execution of the Judgment and the Puente Narrows Agreement. At that time, the PBWA expressed desires to maximize the beneficial use of the Puente Basin and thereby decrease dependence on less reliable imported water supplies. As described in the West Yost proposal[3] to develop the GMP, the work is being performed in three phases:

- **Phase 1 – Describe the State of the Puente Basin and Establish GMP Goals.** The objective of this phase is to develop an understanding of the physical structure and hydrology of the Puente Basin and articulate the specific goals of the Puente Basin stakeholders for improved groundwater basin management.
- **Phase 2 – Evaluate Alternatives for Basin Management**. The objective of this phase is to design and evaluate various management alternatives, and then based on the evaluations, select a preferred management alternative that will become the GMP for the Puente Basin.
- **Phase 3 – Prepare GMP and Implementation Plan**. The objective of this phase is to publish a final GMP and its implementation plan.

In December 2023, the first part of Phase 1 was completed and final *Technical Memorandum 1: Description of the Puente Basin Groundwater Management Plan Area and Basin Setting* (TM-1) was published.[4] TM-1 describes the plan area and the physical structure and hydrology of the Puente Basin. In March 2024, the second part of Phase 1 was completed and the final *Technical Memorandum 2: Goals and Concepts for Improved Management of the Puente Basin* (TM-2) was published.[5] TM-2 describes goals and objectives and general concepts for improved management of the Puente Basin. Phase 1 has been completed.

Phase 2 was initiated in June 2024 and is divided into three parts:

- **Part 1: Describe Basin Management Alternatives**. This effort requires the PBWA to first identify and describe more specific "Basin Management Alternatives" that consist of one or more project concepts.
- **Part 2: Select Alternatives for Evaluation**. This effort identifies which of the Basin Management Alternatives should be evaluated in Part 3. The scope of the evaluation in Part 3 will be dependent upon the specific Basin Management Alternatives that are selected; hence, Part 2 will include the preparation of the cost estimate to perform Part 3.
- **Part 3: Select Preferred Basin Management Alternative**. This effort consists of the evaluation of selected Basin Management Alternatives. The evaluation will include (i) a hydrologic analysis of the impacts to the Puente Basin and (ii) a cost analysis for project implementation to produce the new water supply. The evaluation will result in the selection of the preferred Basin Management Alternative that will become the basis for the GMP.

[2] https://puentebasin.com/wp-content/uploads/2024/10/Puente-Basin-Judgment.pdf
[3] Proposal to Develop a Groundwater Management Plan for the Puente Basin. West Yost. Submitted December 3, 2021.
[4] https://puentebasin.com/wp-content/uploads/2023/12/TM-PBWA_TM1_20231204-Final.pdf
[5] https://puentebasin.com/wp-content/uploads/2024/03/FINAL-TM-PuenteBasin_TM-2_240326.pdf

1.3 Goals for Basin Management, GMP Objective Statement, and Concepts for Improved Basin Management

During Phase 1 to develop a GMP, West Yost conducted multiple stakeholder meetings with the PBWA and developed goals for improved management of the Puente Basin, a GMP Objective Statement, and high-level project concepts for the GMP. These are described in TM-2 and summarized below.

Management Goals

The management goals for the Puente Basin GMP are:

- Increase use of Puente Basin groundwater to become less reliant on imported water.
- Manage the Puente Basin in a manner that avoids adverse impacts, such as chronic lowering on groundwater levels, land subsidence, degrading water quality, impacting to GDEs, etc.
- Control groundwater underflow through the Puente Narrows in a manner to comply with the Puente Narrows Agreement while utilizing existing credits and minimizing the accumulation of credits in the future.

GMP Objective Statement

Based on the Management Goals, the Objective Statement for the Puente Basin GMP is:

> *Enhance the use of Puente Basin groundwater in a sustainable manner to become less reliant on imported water while maintaining compliance with the Puente Narrows Agreement.*

Project Concepts for Improved Basin Management

Three high-level project concepts are proposed to achieve the Management Goals and GMP Objective Statement:

- ***Increase Groundwater Pumping***
  - *Purpose*: Enhance the use of the groundwater basin to create new potable or non-potable water supplies, decrease reliance on imported water, and minimize subsurface outflow of groundwater to the Main San Gabriel Basin.
  - Conceptual Project Alternatives: There can be various alternatives for increased groundwater pumping at various locations across the Puente Basin. In addition, there can be various alternatives for the ultimate use of the water which could include potable or non-potable uses (i.e., projects that require treatment of the pumped groundwater or not).
- ***Enhance Recharge***
  - *Purpose*: Utilize local reliable water sources that are not currently used in the basin (e.g., surplus recycled water, storm water runoff, dry weather flow) for artificial recharge to enhance the sustainable yield of the Puente Basin.
  - Conceptual Project Alternatives: There can be various project alternatives based on location of recharge, method of recharge (e.g., injection, spreading, or infiltration galleries), and different sources of recharge waters.
- ***Expand Monitoring Program***
  - *Purpose*: Fill data gaps to support the design and implementation of any project alternatives listed above.

- Conceptual Project Alternatives: Expansion of the monitoring program should be designed to specifically support the project alternatives that are chosen for implementation. Expansion of the monitoring program could include, but not be limited to increased groundwater monitoring at existing wells (e.g., water-levels, water-quality, pumping); construction of new monitoring wells; controlled aquifer-system testing; remote-sensing of land subsidence and potential GDEs; etc.

These are generalized descriptions of project concepts to achieve the Basin Management Goals and GMP Objective Statement. The projects can be implemented individually or in combination, with a range of potential alternatives for each concept depending on the PBWA needs and desires.

1.4 Organization of TM-3

TM-3 was prepared in two parts (1 &2) and includes the following sections:

1. **Background and Objectives.** Prepared in Part 1.
2. **Process to Develop Basin Management Alternatives.** Prepared in Part 1. This section describes the process of developing the six Basin Management Alternatives for the Puente Basin GMP.
3. **Basin Management Alternatives.** Prepared in Part 1. This section describes the seven Basin Management Alternatives including: summary description, objectives, existing/new wells, water volumes, and new facilities.
4. **Select Basin Management Alternatives for Evaluation.** Prepared in Part 2. This section describes the process and results to rank the seven Basin Management Alternatives, and outlines the proposed scope and costs estimates to evaluate the alternatives selected for further evaluation.
5. **Scope of Services to Perform Phase 2 – Part 3.** Prepared in Part 2. This is the scope of work and cost estimate for the next steps to prepare the GMP, which is to evaluate the selected Basin Management Alternatives for a cost analysis for project implementation.

2.0 PROCESS TO DEVELOP BASIN MANAGEMENT ALTERNATIVES

This section describes the process to develop up to six conceptual Basin Management Alternatives to achieve the Basin Management Goals and GMP Objective Statement. The process involved: (i) compiling data and information; (ii) working with the PBWA to identify specific projects and management actions for the management of the Puente Basin; and (iii) identify combinations of projects and management actions that can be described as six Basin Management Alternatives.

Data Collection and Planning Assumptions

To develop project concepts for the Basin Management Alternatives, it was essential to first compile foundational data and planning assumptions for Puente Basin operations and water supplies. This included gathering information on pumping, basin yield, obligation of groundwater underflow through the Puente Narrows, well pumping capacities, maximum and average pumping at each well, recycled water reuse, and non-potable supply volumes. The data and information were compiled from the work done during Phase 1 to describe the plan area, physical structure, and hydrology of Puente Basin that is documented in TM-1, and then additional data and feedback collected from the PBWA. These data and planning assumptions form the basis for assigning the pumping and recharge rates for the Basin Management Alternatives. The list of data and planning assumptions are described in Tables 1 and 2 below.

Table 1 presents the assumptions for annual pumping rates for both existing and new wells in the Puente Basin. Figure 1 shows the locations of existing wells in the Puente Basin. The pumping rates in Table 1 serve as the planning assumptions for the Basin Management Alternatives aimed at maximizing pumping efficiency to achieve the goals and objectives of the Puente Basin GMP. The annual pumping rates take into account the pumping capacities derived from well construction reports and/or pumping tests, as well as the operational feasibility of year-round pumping to meet demands considering resource availability and maintenance requirements. Most of the pumping rates are based on historical pumping that occurred since 2000. Table 1 also describes the basis for the pumping rate assumptions.

Table 1. Assumptions of the Pumping Volume by Well or Well Group to Maximize Pumping for the Various Basin Management Alternatives

Well	Maximum Annual Pumping Assumed in Basin Management Alternatives 1A, 2, 3, 4, 5, and 6		Maximum Annual Pumping Assumed in Basin Management Alternative 1B	
	Pumping, afy	Source	Pumping, afy	Source
Business Parkway	496	Max Pumping 2000-2022 + 15%	446	Max Pumping 2000-2022 + 5%
Baker	0	Dry Well	0	Dry Well
Tony Poli [(a)]	290	Max Pumping 2020-2023 -15%	250	Avg Pumping 2020-2023
Lycoming	458	Max Pumping 2000-2022 + 15%	412	Max Pumping 2000-2022 + 5%
Fairway	486	Max Pumping 2000-2022 + 15%	438	Max Pumping 2000-2022 + 5%
RV-1/RV-2	505	Max Pumping 2000-2022 + 15%	455	Max Pumping 2000-2022 + 5%
Carrier Wells Combined	190	Avg Pumping 2020-2023	190	Avg Pumping 2020-2023
New Wells	480	Avg Max Pumping at Wells +15% [(b)]	400	Avg Outflow Over Obligation [(c)]

Notes:

(a) Tony Poli is losing capacity in the later years, so uses the maximum pumping from the last 4 years, minus 15 percent; or average pumping in the last 4 years

(b) The Average of the Max Pumping takes the average of the representative wells Lycoming, Fairway, and RV-1/RV-2

(c) The assumed pumping for the new well in the west in Alternative 1B is about equal to the average volume of subsurface outflow to the Main San Gabriel Basin above the Puente Narrows underflow obligation in the last 10 years (390 afy).

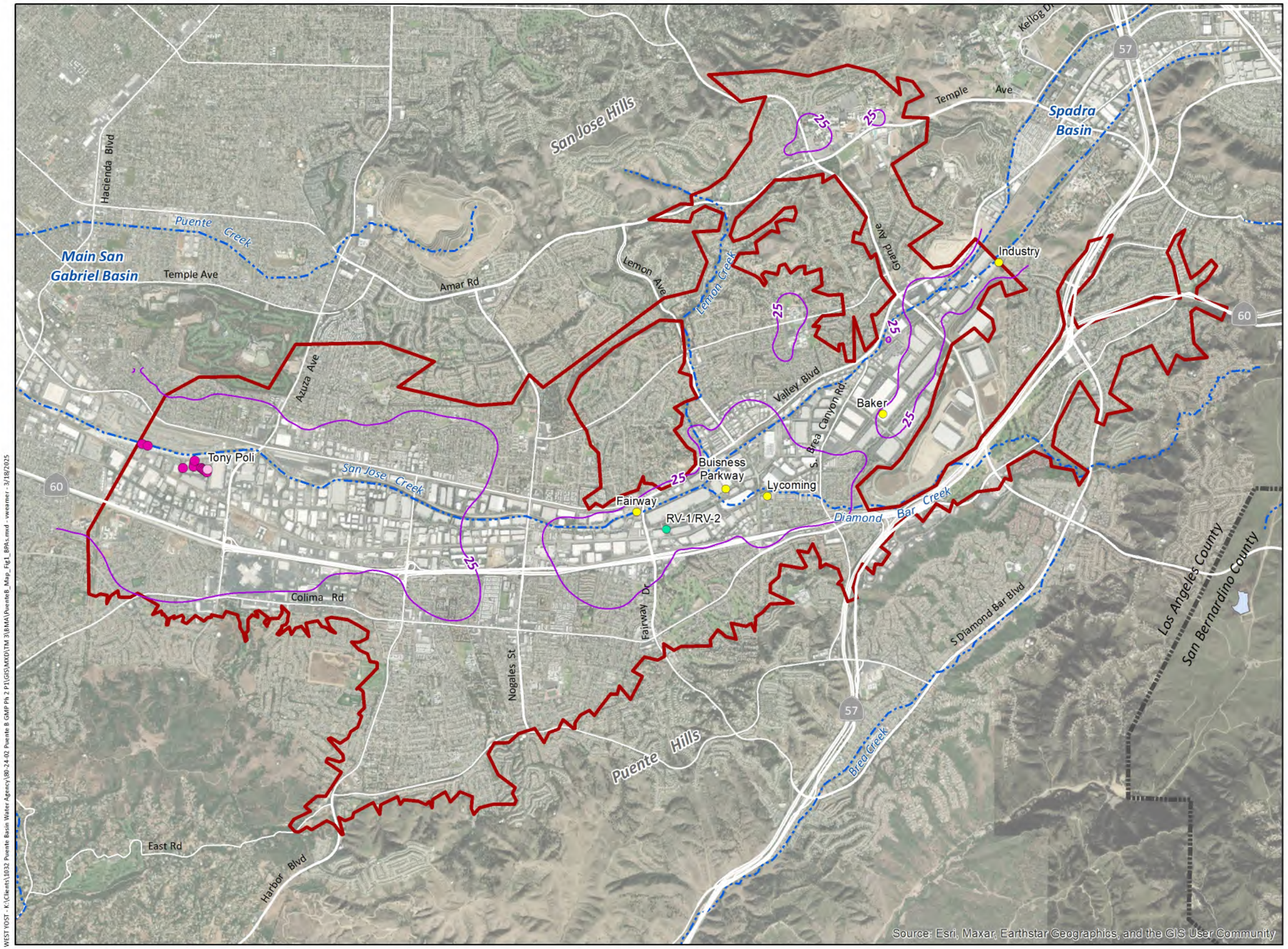
Table 2 presents the data compiled on historical operations and water use in the Puente Basin and/or assumptions for future operations and use, including: basin yield, aggregate pumping, groundwater underflow through the Puente Narrows, recycled water reuse, and non-potable supply and demands. This information forms the basis for developing six Basin Management Alternatives that are designed to meet the Management Goals and Objective Statement of the Puente Basin GMP.

Table 2. Data and Assumptions of Puente Basin Operations and Water Use to Support the Development of Basin Management Alternatives for the Puente Basin

No.	Volumetric Rate, afy	Description of Data and/or Assumption
1	1,000 to 3,400	Range in the annual Operating Safe Yield set by the Puente Basin Watermaster historically from 1987-2023.
2	1,718	Average of the annual Operating Safe Yield set by the Puente Basin Watermaster historically from 1987-2023.
3	1447	Average of historical annual pumping in Puente Basin from 2000 to 2022. Reported in TM-1.
4	1,425	The developed yield of the Puente Basin estimated in TM-1 for the 2000 to 2022 period. The developed yield is the annual average yield that was pumped from the groundwater basin over a finite period but is corrected for the change in groundwater storage and the volume of supplemental water recharge that occurred during the period of interest. The developed yield is very similar to the average historical pumping.
5	861	Average of historical annual volume of groundwater underflow from the Puente Basin to the Main Basin from 1973 to 2023.
6	298	Average of historical annual volume of groundwater underflow from the Puente Basin to the Main Basin from 1973 to 2023 that is over the PBWA's 580 afy obligation.
7	430	Maximum of historical annual volume of groundwater underflow from the Puente Basin to the Main Basin from 1973 to 2023 that is over the PBWA's 580 afy obligation.
8	20,081	The credit accumulated from 1973 to 2023 per the Puente Narrows Agreement for excess groundwater underflow over the 580 afy obligation and credit for clean-up pumping.
9	440	Assumed injection well capacity for a new injection well used for artificial recharge in a Basin Management Alternative. This is estimated as 85 percent of the average assumptions of annual pumping volumes for wells in the center portion of the Puente Basin (Lycoming, Business Parkway, RV-1/RV-2, and Fairway).
10	2,400	Maximum annual volume of recycled water from the San Jose Creek Water Reclamation Plant (WRP) used for reuse from 2021 to 2024 for the Puente Basin recycled water system for the City of Industry contractual allotments. This is recycled water used by RWD, La Puente Vally County Water District, Upper San Gabriel Valley Municipal Water District, and Industry Hills Golf Club. This is the volume of recycled water from San Jose Creek WRP assumed available to meet non-potable demands in the future.
11	1,300	Average annual volume of recycled water from the Pomona WRP used for reuse from 2010 to 2023 for the Puente Basin recycled water system from the WVWD contractual allotments. This is the volume of recycled water from Pomona WRP assumed available to meet non-potable demands or for other projects in the future.
12	1,000	Average annual volume of surplus recycled water from the Pomona WRP not used but available to WVWD from 2020 to 2023. This is the volume of recycled water from Pomona WRP assumed available to WVWD for additional projects in the Puente Basin. This volume is subject to change due to future impacts of conservation on sewer flows or other factors that can impact plant production. Moreover, the availability of recycled water varies daily and seasonally. It is assumed that the majority of this water will be available in winter months when irrigation demands are minimal.
13	140	Assumed volume of groundwater pumped from the Industry well along the border of Puente and Spadra Basins available to meet non-potable demands or for other projects in the future. This assumption is based on the maximum pumping from 2000 to 2022 plus 15 percent.
14	4,672	Average of the historical annual volume of the aggregate non-potable supplies for the RWD and WVWD's recycled water systems (Puente Basin recycled water system) from 2010 to 2023. This is 1,297 afy from Pomona WRP, 2,100 afy from San Jose Creek WRP [(a)], 1,206 afy from Puente Basin pumping [(b)], and 69 afy from the Industry Well. This is the volume of non-potable demands assumed will need to be met in the future that are currently supplied by the Puente Basin recycled water system.

(a) Based on average for the last four years (2020-2023) instead of 2010 to 2023 as done for the remaining of the non-potable supplies

(b) Puente basin pumping includes groundwater pumped by RWD, WVWD and Carrier BDP. It does not include pumping by Royal Vista Golf Course that was used for irrigation of the golf course and was not part of the Puente Basin recycled water system. Royal Vista closed February 2024 and WVWD will acquire the two wells previously operated and used by Royal Vista and can use for future supplies.



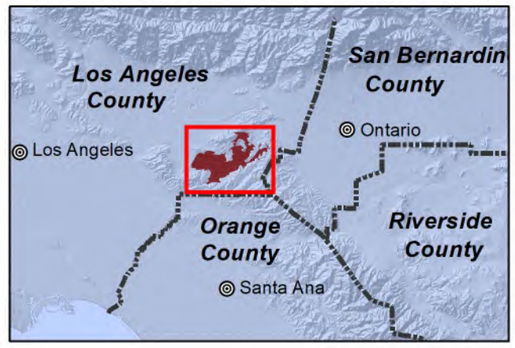
Wells Symbolized by Well Owner

- WVWD
- WVWD (Formerly Royal Vista Golf Course)
- RWD
- Carrier BDP

25 — Contour of Depth to Bedrock >25 ft-bgs

Puente Basin Adjudicated Boundary

Streams & Flood Control Channels



Prepared by: WEST YOST

0 1 2 Miles

0 1 2 Km

Prepared for:

Puente Basin Water Agency

Groundwater Management Plan

TM-3 Basin Management Alternatives

PUENTE BASIN WATER AGENCY established 1971

Current Pumping Wells in the Puente Basin

Figure 1

Process to Develop Basin Management Alternatives

In June 2024, West Yost and PBWA met in person to begin developing an initial list and conceptual descriptions for up to six potential Basin Management Alternatives. During the meeting, PBWA brainstormed various ideas for potential projects and management actions to achieve the goals and objectives of the GMP. The feedback from this meeting was used to create six draft Basin Management Alternatives with maps and tables for visual representation.

In July 2024, West Yost, PBWA, and the City of Industry reconvened in person to review and discuss the six draft Basin Management Alternatives. The feedback from PBWA and the City of Industry at this meeting was subsequently used to refine and update the draft alternatives.

On August 21, 2024, a PBWA Stakeholder meeting was held virtually to present the six draft Basin Management Alternatives and facilitate discussion and further feedback. PBWA and stakeholders will have additional time to consider and provide input on the draft alternatives as described in this technical memorandum below.

3.0 BASIN MANAGEMENT ALTERNATIVES

The six draft Basin Management Alternatives described herein are intended to achieve the Management Goals and the GMP Objective Statement. These alternatives will later be evaluated using appropriate tools to assess the hydrologic response of the Puente Basin and determine how effectively they meet the goals and objectives for basin management. The six draft Basin Management Alternatives include one option to increase pumping in the basin to create additional non-potable water supply, and five options to increase pumping to generate a new potable water supply:

- Basin Management Alternative 1A: Increase Non-Potable Water Supplies via Increased Pumping at Existing Wells
- Basin Management Alternative 1B: Increase Non-Potable Water Supplies via Increased Pumping at Existing Wells and New Well in West
- Basin Management Alternative 2: Increase Potable Water Supplies via Increased Pumping in the West and RO Treatment
- Basin Management Alternative 3: Increase Potable Water Supplies via Artificial Recharge, Increased Pumping in the West, and RO Treatment
- Basin Management Alternative 4: Increase Potable Water Supplies via Increased Pumping in the West and Center and RO Treatment
- Basin Management Alternative 5: Increase Potable Water Supplies via Artificial Recharge, Increased Pumping in the West and Center and RO Treatment
- Basin Management Alternative 6: Increase Potable and Non-Potable Water Supplies via Increased Pumping and DPR of Recycled Water

Groundwater pumped from the Puente Basin is currently used to supplement the non-potable recycled water systems of RWD and WVWD (Puente Basin recycled water system), along with other sources connected to the Puente Basin (such as recycled water). Hence, for each Basin Management Alternative, the sources and volumes required to continue meeting these non-potable demands were considered if Puente Basin groundwater is used create a new potable supply. The volume and sources to meet the non-potable demands is described for each alternative below. Table 3 summarizes assumptions of aggerate pumping from the Puente Basin, artificial recharge, and the aggregate volume and sources for the potable and non- potable supplies for each proposed Basin Management Alternatives and compares to historical operations.

Table 3. Summary of Puente Basin Pumping, Artificial Recharge, and Non-Potable and Potable Supplies used Historically and for Each Basin Management Alternative

Alternative	Pumping from Puente Basin, afy	Artificial Recharge, afy	Non-Potable Supply from Recycled Water Systems															Potable Supply from New Puente Basin Projects													
			Total, afy	Supplies			Pumping from Puente Basin											Total, afy (a)	Supplies			Pumping from Puente Basin									
				Pomona WRP	SJC WRP	Industry Well	Tony Poli	RV-1/RV-2	Fairway	Business Pky	Lycoming	Baker	Carrier BDP (Combined)	New Well 2	New Well 3	New Well 4	New Well 5		Pomona WRP	SJC WRP	Industry Well	Tony Poli	RV-1/RV-2	Fairway	Business Pky	Lycoming	Baker	Carrier BDP (Combined)	New Well 2	New Well 3	New Well 4	New Well 5
Historical Average (2010-2023)																															
n/a	1,539	0	4,672	X	X	X	X	X	X	X	X	X	X					0														
Planning for Basin Management Alternatives																															
1A	2,425	0	6,465	X	X	X	X	X	X	X	X		X					0														
1B	2,631	0	6,671	X	X	X	X	X	X	X	X		X		X			0														
2	3,865	0	5,985	X	X	X		X	X	X	X							1,536				X						X	X	X	X	
3	3,865	1,320	5,985	X	X	X		X	X	X	X							1,536				X						X	X	X	X	
4	4,344	0	5,479	X	X	X			X	X	X							2,324				X	X					X	X	X	X	X
5	4,344	1,760	5,479	X	X	X			X	X	X							2,324				X	X					X	X	X	X	X
6	3,864	0	5,310		X		X						X	X	X	X		3,488	X		X		X	X	X	X						

Notes.
(a) Supply volume assumes an 80 percent recovery rate from RO treatment

The six proposed Basin Management Alternative are described in more detail below. The description includes the following categories:

- **Description.** A description of the specific projects and management concepts in the alternative
- **Objective.** The specific objective/s of the alternative to achieve the management goals of the Puente Basin.
- **Groundwater Pumping.** The assumed aggregate groundwater pumping rate for the Puente Basin and the active pumping wells
- **Non-Potable Water Supply.** The assumed aggregate volumetric rate of non-potable supply for the Puente Basin RWD and WVWD recycled water systems, and the list of sources for this non-potable supply.
- **New Potable Water Supply.** The assumed aggregate volumetric rate of a new potable supply created from the alternative, and the list of sources for this potable supply.
- **Managed Aquifer Recharge.** A conceptual description of the recharge rate and means for artificial recharge to the Puente Basin.
- **Treatment.** A conceptual description of the proposed treatment of groundwater and/or other water supplies for the new potable supply.
- **New Facilities/Wells.** A general list of the new wells or facilities that would be needed to implement the alternative.

Figures 2 through 8 are maps that show the location of existing and new wells and facilities in each of the Basin Management Alternatives.

Basin Management Alternative 1A: Increase Non-Potable Water Supplies via Increased Pumping at Existing Wells

- **Description:** Maximize pumping at all existing wells in the Puente Basin for non-potable supply. Pumping volumes are assumed to increase by up to 15 percent of their historical maximum levels where feasible.
- **Objectives:** Increase non-potable water supply with Puente Basin groundwater, maintain sustainable groundwater levels, comply with the Puente Narrows outflow obligation.
- **Groundwater Pumping:** Total pumping in the Puente Basin of 2,425 afy at all existing wells (Tony Poli, RV-1/RV-2, Fairway, Business Parkway, Lycoming, and Carrier BDP wells). This is 886 afy more than the historical average pumping.
- **Non-Potable Water Supply:** 6,465 afy (1,500 afy = Pomona WRP; 2,400 afy = San Jose Creek WRP; 140 afy = Industry Well; and 2,425 afy = Puente Basin Wells)
- **New Potable Water Supply:** No new potable water supply**.**
- **Managed Aquifer Recharge:** No artificial recharge included.
- **Treatment:** No groundwater treatment.
- **New Facilities/Wells:** Non-potable supply storage tank (likely at Spadra Landfill). San Jose Pipeline to connect the WVWD and RWD recycled water systems.

Basin Management Alternative 1B: Increase Non-Potable Water Supplies via Increased Pumping at Existing Wells and New Well in West

- **Description:** Maximize pumping at all existing wells in the Puente Basin for non-potable supply, and one new well in the west part of the basin. Pumping volumes at the existing wells are assumed to increase by up to 5 percent of their historical maximum levels where feasible.
- **Objectives:** Increase non-potable water supply with Puente Basin groundwater, maintain sustainable groundwater levels, reduce outflow to the Main San Gabriel Basin, comply with the Puente Narrows outflow obligation, and utilize Puente Narrows credits.
- **Groundwater Pumping:** Total pumping in the Puente Basin of 2,631 afy. This includes 2,231 afy at existing wells at the rates in Table 1 for alternative 1B, and 400 afy at new well in the west. This is 1,092 afy more than the historical average pumping.
- **Non-Potable Water Supply:** 6,711 afy (1,500 afy = Pomona WRP; 2,400 afy = San Jose Creek WRP; 140 afy = Industry Well; and 2,671 afy = Puente Basin Wells)
- **New Potable Water Supply:** No new potable water supply**.**
- **Managed Aquifer Recharge:** No artificial recharge included.
- **Treatment:** No groundwater treatment.
- **New Facilities/Wells:** Non-potable supply storage tank (likely at Spadra Landfill). San Jose Pipeline to connect the WVWD and RWD recycled water systems.

Basin Management Alternative 2: Increase Potable Water Supplies via Increased Pumping in the West and RO Treatment

- **Description:** Maximize pumping at all existing wells in the Puente Basin and increase groundwater pumping in the west portion of the Puente Basin at new wells. Treat groundwater at a centralized Reverse Osmosis (RO) Treatment System in the western portion of the basin for potable supply.
- **Objectives:** Produce a new potable water supply with Puente Basin groundwater, become less reliant on imported water, maintain sustainable groundwater levels, reduce outflow to the Main San Gabriel Basin, comply with the Puente Narrows outflow obligation, and utilize Puente Narrows credits.
- **Groundwater Pumping:** Total pumping in the Puente Basin of 3,865 afy. This includes pumping at all existing wells at the rates in Table 1 for alternative 2, and three new wells in the west (480 afy each). This is 2,326 afy greater than the historical average pumping.
- **Non-Potable Water Supply:** 5,985 afy (1,500 afy = Pomona WRP; 2,400 afy = San Jose Creek WRP; 140 afy = Industry Well; and 1,945 afy = Puente Basin Wells). The Puente Basin pumping wells that will be used for the non-potable system include RV-1/RV-2, Fairway, Business Parkway, and Lycoming.
- **New Potable Water Supply:** 1,536 afy from Tony Poli, New Well 2, New Well 3, New Well 4, and Carrier BDP wells. This supply volume assumes an 80 percent recovery rate from RO treatment.
- **Managed Aquifer Recharge:** No artificial recharge.
- **Treatment:** RO treatment of pumped groundwater from Tony Poli, New Well 1, New Well 2, New Well 3, New Well 4, and Carrier BDP wells, at a centralized treatment system in the west.

- **New Facilities/Wells:** RO treatment plant, three pumping wells, pipelines to convey pumped groundwater to RO treatment plant, potable pipeline connections, and San Jose Pipeline to connect the WVWD and RWD recycled water systems.

Basin Management Alternative 3: Increase Potable Water Supplies via Artificial Recharge, Increased Pumping in the West, and RO Treatment

- **Description:** Maximize pumping at all existing wells in the Puente Basin and increase pumping in the west portion of the Puente Basin at new wells. Treat groundwater at a centralized RO Treatment System in the western portion of the basin for potable supply. New artificial recharge to the basin via injections wells.
- **Objectives:** Increase the groundwater yield of the Puente Basin, produce a new potable water supply, become less reliant on imported water, maintain sustainable groundwater levels, reduce outflow to the Main San Gabriel Basin, comply with the Puente Narrows outflow obligation, and utilize Puente Narrows credits.
- **Groundwater Pumping:** Total pumping in the Puente Basin of 3,865 afy. This includes pumping at all existing wells at the rates in Table 1 for alternative 3, and three new wells in the west (480 afy each). This is 2,326 afy greater than the historical average pumping.
- **Non-Potable Water Supply:** 5,985 afy (1,500 afy = Pomona WRP; 2,400 afy = San Jose Creek WRP; 140 afy = Industry Well; and 1,945 afy = Puente Basin Wells). The Puente Basin pumping wells that will be used for the non-potable system include RV-1/RV-2, Fairway, Business Parkway, and Lycoming.
- **New Potable Water Supply:** 1,536 afy from Tony Poli, New Well 2, New Well 3, New Well 4, and Carrier BDP wells. This supply volume assumes an 80 percent recovery rate from RO treatment.
- **Managed Aquifer Recharge:** Artificial recharge via three injection wells. The source of recharge water will be identified later but should prioritize recycled water from the Pomona WRP and/or surface water within the San Jose Creek channel. The construction and operation of the injection wells will progress initially from one well to three wells. Each injection well is estimated to recharge 440 afy. Total recharge via three injection wells is 1,320 afy.
- **Treatment:** RO treatment of pumped groundwater from Tony Poli, New Well 2, New Well 3, New Well 4, and Carrier BDP wells, at a centralized treatment system in the west.
- **New Facilities/Wells:** RO treatment plant, three pumping wells, pipelines to convey pumped groundwater to RO treatment plant from the western portion of the basin, potable pipeline connections from treatment plant, three injections wells, infrastructure for recharge water diversion, and San Jose Pipeline to connect the WVWD and RWD recycled water systems.

Basin Management Alternative 4: Increase Potable Water Supplies via Increased Pumping in the West and Center and RO Treatment

- **Description:** Maximize pumping at all existing wells in the Puente Basin and increase pumping in the western and central portions of the Puente Basin at new wells. Treat groundwater at a centralized RO Treatment System in the western portion of the basin for potable supply.
- **Objectives:** Produce a new potable water supply, become less reliant on imported water, maintain sustainable groundwater levels, reduce outflow to the Main San Gabriel Basin, comply with the Puente Narrows outflow obligation, and utilize Puente Narrows credits.

- **Groundwater Pumping:** Total of 4,344 afy of pumping at all existing wells in the Puente Basin at the rates in Table 1 for alternative 4, 3 new wells in the west (480 afy each), and one new well in the center (480 afy). This is 2,805 afy more than the historical average pumping.
- **Non-Potable Water Supply:** 5,479 afy (1,500 afy = Pomona WRP; 2,400 afy = San Jose Creek WRP; 140 afy = Industry Well; and 1,439 afy = Puente Basin Wells). The Puente Basin pumping wells that will be used for the non-potable system include Lycoming, Business Parkway, and Fairway.
- **New Potable Water Supply:** 2,324 afy from Tony Poli, Carrier BDP wells, New Well 2, New Well 3, New Well 4, RV-1/RV-2, and New Well 5. This supply volume assumes an 80 percent recovery rate from RO treatment.
- **Managed Aquifer Recharge:** No artificial recharge.
- **Treatment:** RO treatment of pumped groundwater from Tony Poli, New Well 2, New Well 3, New Well 4, Carrier BDP wells, RV-1/RV-2, and New Well 5, at a centralized treatment system in the west.
- **New Facilities/Wells:** RO treatment plant, four pumping wells, pipelines to convey pumped groundwater to RO treatment plant from western and central portions of the basin, , potable pipeline connections from treatment plant, and San Jose Pipeline to connect the WVWD and RWD recycled water systems.

Basin Management Alternative 5: Increase Potable Water Supplies via Artificial Recharge, Increased Pumping in the West and Center and RO Treatment

- **Description:** Maximize pumping at all existing wells in the Puente Basin and increase pumping in the western and central portions of the Puente Basin at new wells. Treat groundwater at a centralized RO Treatment System in the western portion of the basin for potable supply. New artificial recharge to the basin via injections wells.
- **Objectives:** Increase the groundwater yield of the Puente Basin, produce a new potable water supply, become less reliant on imported water, maintain sustainable groundwater levels, reduce outflow to the Main San Gabriel Basin, comply with the Puente Narrows outflow obligation, and utilize Puente Narrows credits.
- **Groundwater Pumping:** Total of 4,344 afy of pumping at all existing wells in the Puente Basin at the rates in Table 1 for alternative 5, 3 new wells in the west (480 afy each) and one new well in the center (480 afy). This is 2,805 afy greater than the historical average pumping.
- **Non-Potable Water Supply:** 5,479 afy (1,500 afy = Pomona WRP; 2,400 afy = San Jose Creek WRP; 140 afy = Industry Well; and 1,439 afy = Puente Basin Wells). The Puente Basin pumping wells that will be used for the non-potable system include Lycoming, Business Parkway, and Fairway.
- **New Potable Water Supply:** 2,324 afy from Tony Poli, Carrier BDP wells, New Well 2, New Well 3, New Well 4, RV-1/RV-2, and New Well 5. This supply volume assumes an 80 percent recovery rate from RO treatment.
- **Managed Aquifer Recharge:** Artificial recharge via four injection wells. The source of recharge water will be identified later but should prioritize recycled water from the Pomona WRP and/or surface water within the San Jose Creek channel. The construction and operation of the injection wells will progress initially from one well to four wells. Each injection well is estimated to recharge 440 afy. Total recharge via four injection wells is 1,760 afy.

- **Treatment:** RO treatment of pumped groundwater from Tony Poli, New Well 2, New Well 3, New Well 4, Carrier BDP wells, RV-1/RV-2, and New Well 5, at a centralized treatment system in the west.
- **New Facilities/Wells:** RO treatment plant, four pumping wells, pipelines to convey pumped groundwater to treatment plant from western and central portions of the basin, potable pipeline connections from treatment plant, and San Jose Pipeline to connect the WVWD and RWD recycled water systems.

Basin Management Alternative 6: Increase Potable and Non-Potable Water Supplies via Increased Pumping and DPR of Recycled Water

- **Description:** Maximize pumping at all existing wells in the Puente Basin and increase pumping new wells in the west. Treat a portion of the groundwater, along with recycled water effluent from Pomona WRP at a direct potable reuse (DPR) Treatment System in the eastern portion of the basin, for a new potable supply.
- **Objectives:** Produce new potable and non-potable water supplies, become less reliant on imported water, maintain sustainable groundwater levels, reduce outflow to the Main San Gabriel Basin, comply with the Puente Narrows outflow obligation, and utilize Puente Narrows credits.
- **Groundwater Pumping:** Total of 3,864 afy of pumping at all existing wells in the Puente Basin at the rates in Table 1 for alternative 6 and three new wells in the west (480 afy each). This is 2,325 afy more than the historical average pumping.
- **Non-Potable Water Supply:** 4,320 afy (2,400 afy = San Jose Creek WRP; and 1,920 afy = Puente Basin Wells). The Puente Basin pumping wells that will be used for the non-potable system include Tony Poli, New Well 2, New Well 3, New Well 4.
- **New Potable Water Supply:** 3,488 afy (2,276 afy = Pomona WRP; 140 afy = Industry Well; and 1,944 afy = Puente Basin Wells). The Puente Basin pumping wells that will provide groundwater for advanced treatment at the DRP plant include RV-1/RV-2, Fairway, Business Parkway, and Lycoming. This supply volume assumes an 80 percent recovery rate from RO treatment.
- **Managed Aquifer Recharge:** No artificial recharge.
- **Treatment:** Advance treatment at an East DPR Treatment System of all available Pomona WRP effluent along with groundwater pumped from the RV-1/RV-2, Fairway, Business Parkway, and Lycoming wells in the Puente Basin, and Industry well in the Spadra Basin.
- **New Facilities/Wells:** DPR treatment plant, pipelines to convey pumped groundwater to DPR treatment plant from central and eastern portions of the basin, potable pipeline connections from treatment plant, three pumping wells in the western portion of the basin with non-potable connections, and San Jose Pipeline to connect the WVWD and RWD recycled water systems.

Existing Facilities

- WVWD and RWD Pumping Well in Puente Basin
- WVWD Pumping Well in Spadra Basin
- Carrier BDP Pumping Well

Planned New Facilities for Alternative 1A

- San Jose Pipeline Connecting RWD/WVWD Recycled Water Systems
- Stoage Tank (location not shown)

- Contour of Depth to Bedrock >25 ft-bgs
- Puente Basin Adjudicated Boundary
- Streams & Flood Control Channels

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Prepared by: WEST YOST

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Prepared for:
Puente Basin Water Agency
Groundwater Management Plan
TM-3 Basin Management Alternatives

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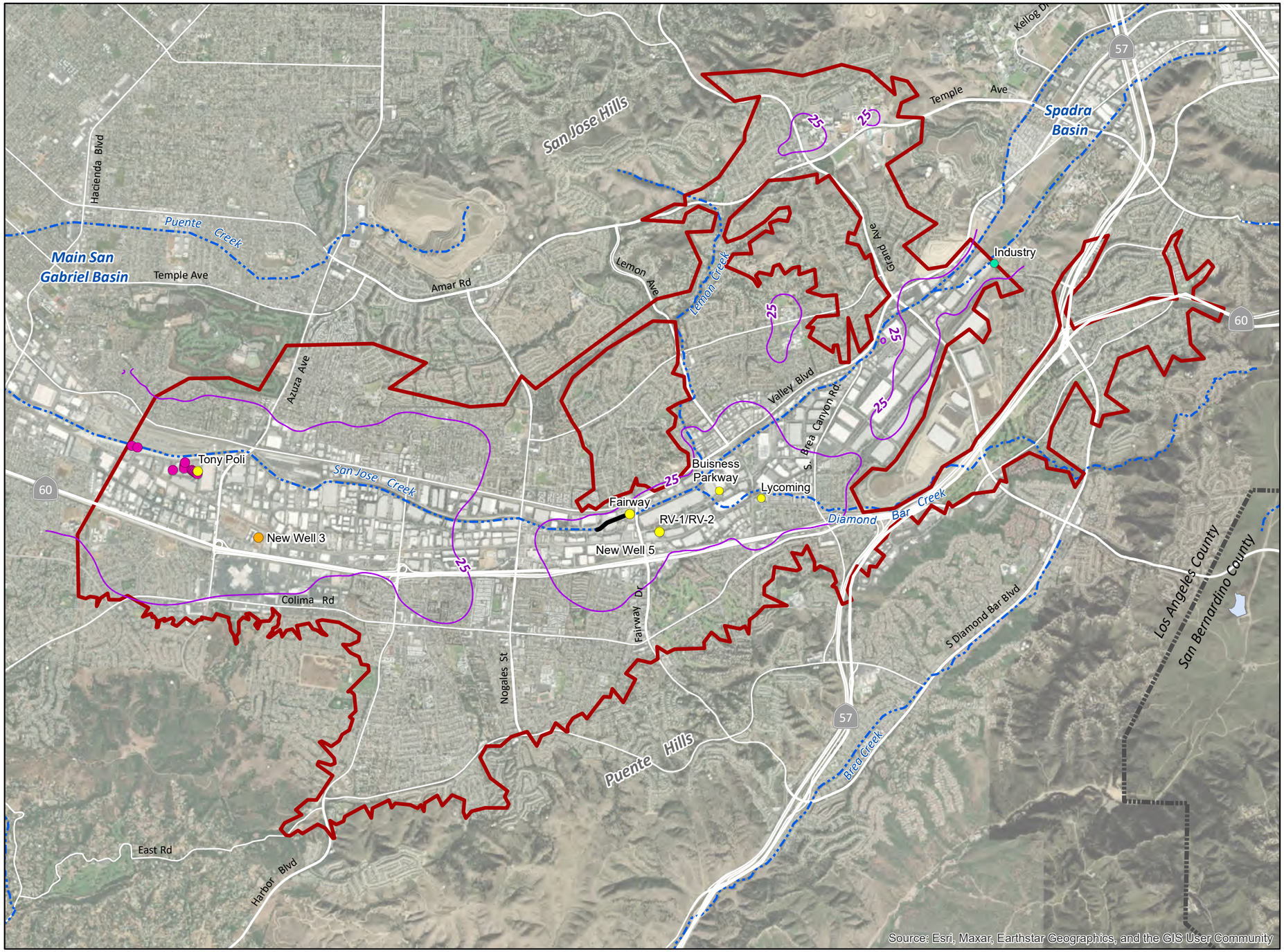
Basin Management Alternative 1A
Potential Location for Wells and Facilities
Figure 2



Existing Facilities

- WVWD and RWD Pumping Well in Puente Basin
- WVWD Pumping Well in Spadra Basin
- Carrier BDP Pumping Well

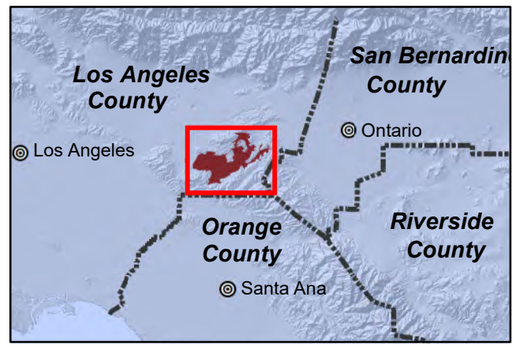
Planned New Facilities for Alternative 1B

- San Jose Pipeline Connecting RWD/WVWD Recycled Water Systems
- Pumping Well
- Stoage Tank (location not shown)

—25— Contour of Depth to Bedrock >25 ft-bgs

Puente Basin Adjudicated Boundary

Streams & Flood Control Channels



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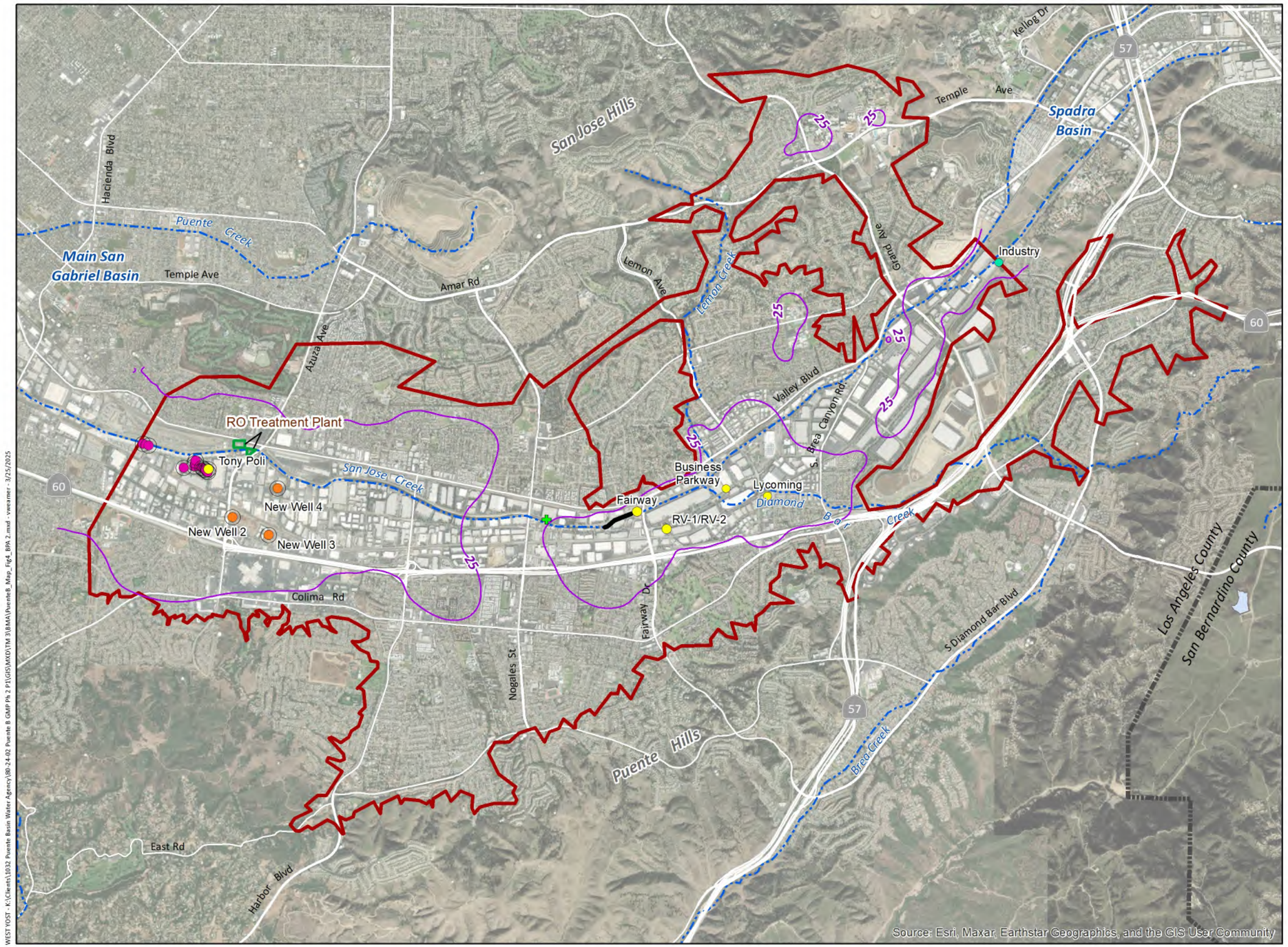
Basin Management Alternative 1B
Potential Location for Wells and Facilities
Figure 3



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Existing Facilities

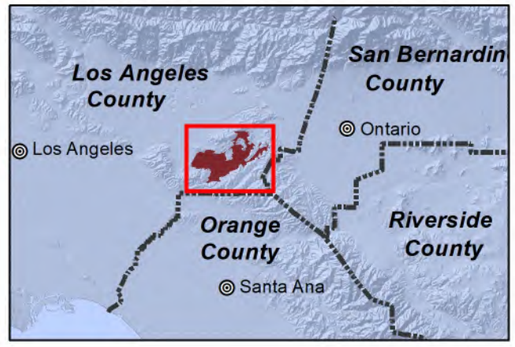
- WVWD and RWD Pumping Well in Puente Basin
- WVWD Pumping Well in Spadra Basin
- Carrier BDP Pumping Well
- Potable Water Intertie between WVWD/RWD

Planned New Facilities for Alternative 2

- Pumping Well
- Well – Groundwater is Conveyed to Plant for Treatment
- Potable Water Treatment Plant
- San Jose Pipeline Connecting RWD/WVWD Recycled Water Systems

—25— Contour of Depth to Bedrock >25 ft-bgs

- Puente Basin Adjudicated Boundary
- Streams & Flood Control Channels



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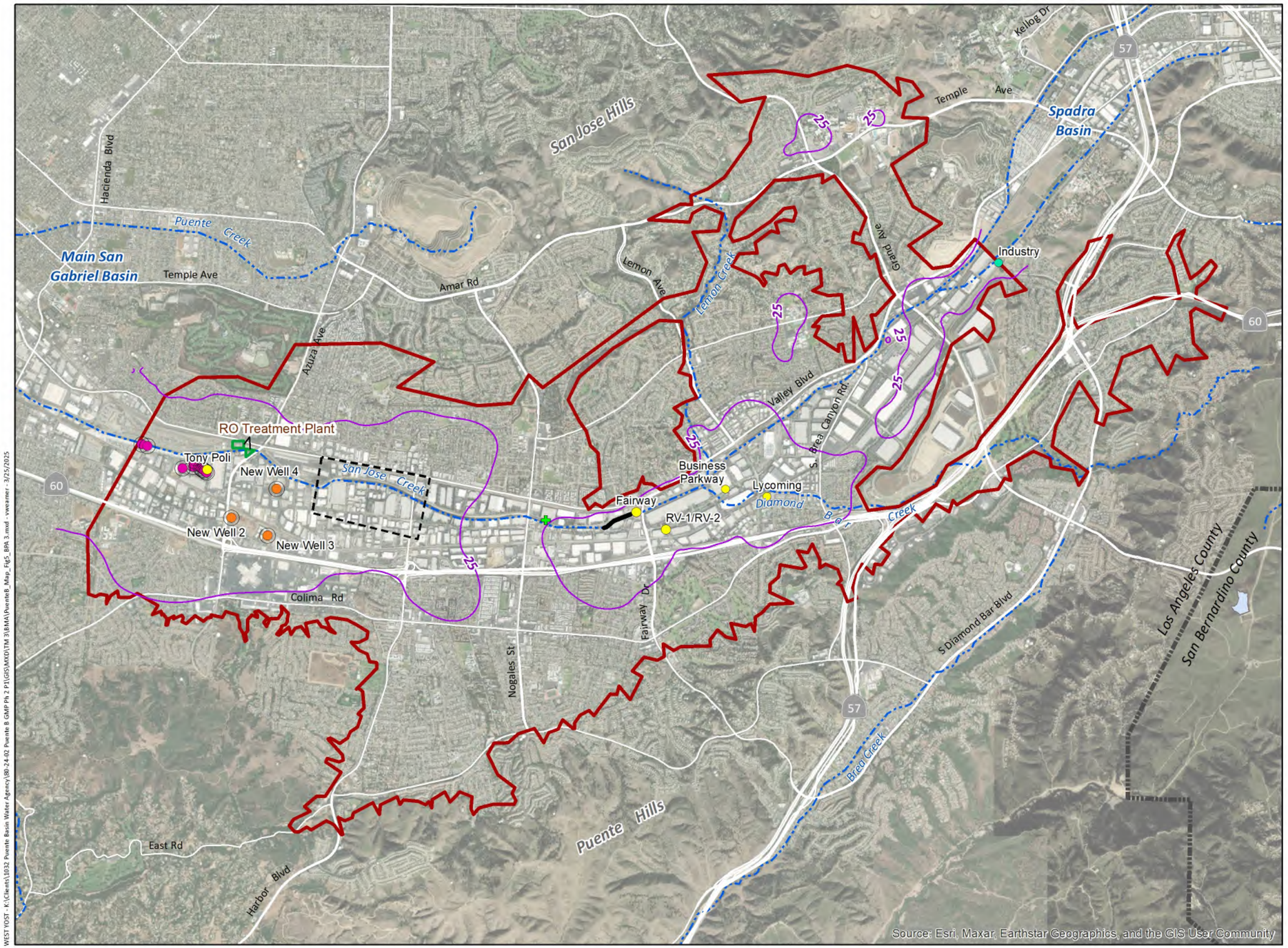
Basin Management Alternative 2
Potential Location for Wells and Facilities
Figure 4



Existing Facilities

- WVWD and RWD Pumping Well in Puente Basin
- WVWD Pumping Well in Spadra Basin
- Carrier BDP Pumping Well
- Potable Drinking Water Intertie between WVWD/RWD

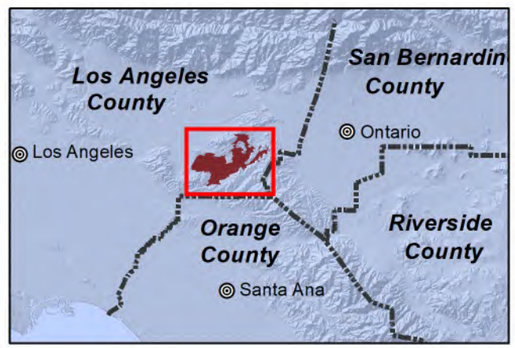
Planned New Facilities for Alternative 3

- Pumping Well
- Target Area for Injection Wells
- Well – Groundwater is Conveyed to Plant for Treatment
- Potable Water Treatment Plant
- San Jose Pipeline Connecting RWD/WVWD Recycled Water Systems

—25— Contour of Depth to Bedrock >25 ft-bgs

Puente Basin Adjudicated Boundary

Streams & Flood Control Channels



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WEST YOST

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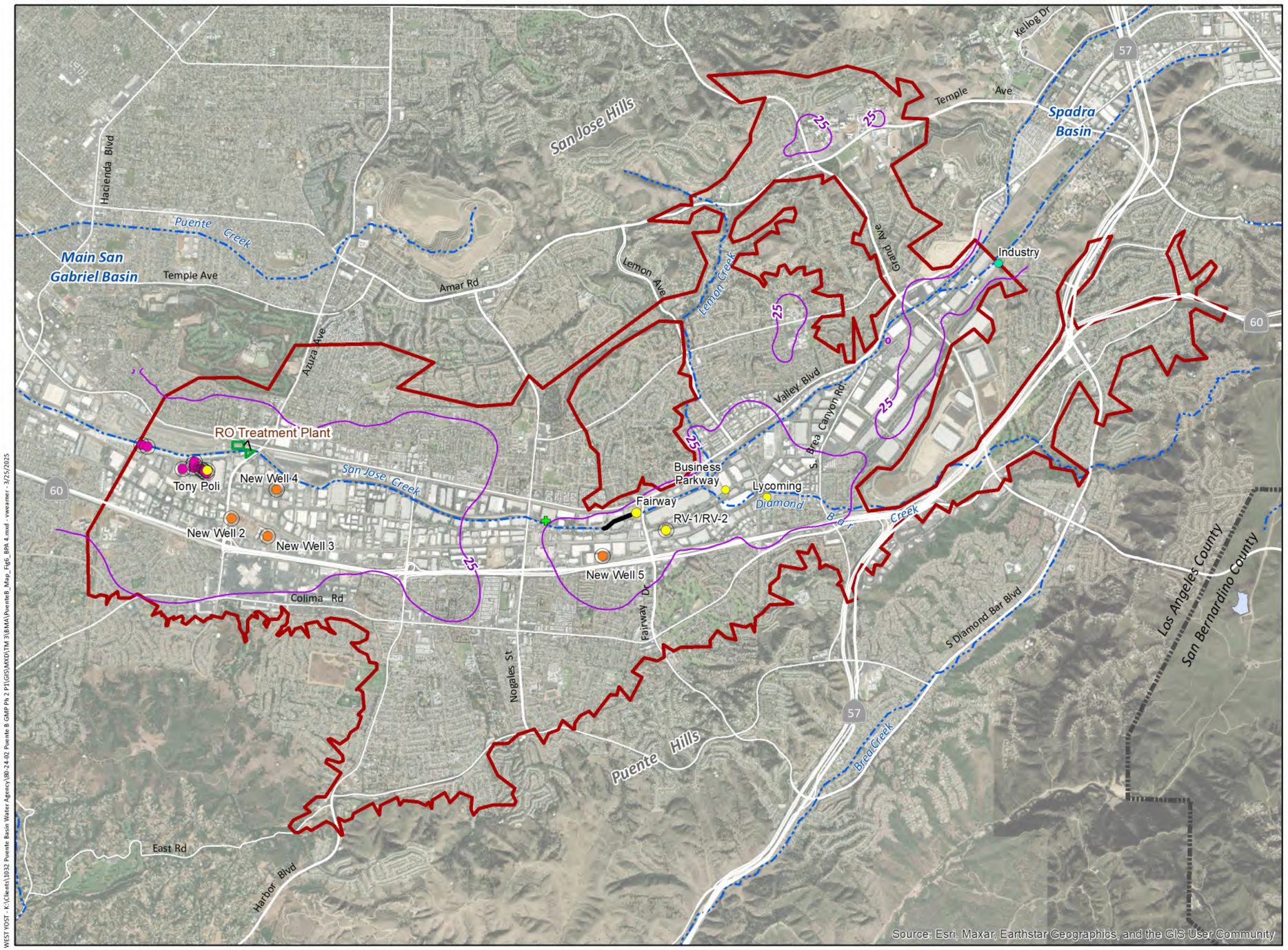
Basin Management Alternative 3
Potential Location for Wells and Facilities
Figure 5



Existing Facilities

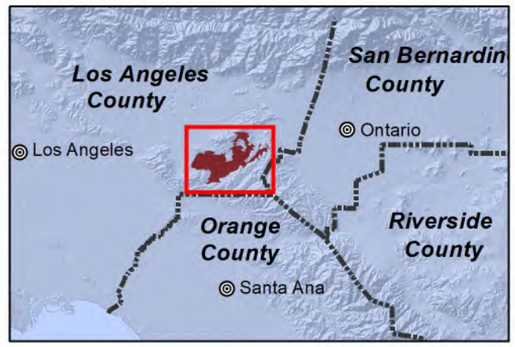
- WVWD and RWD Pumping Well in Puente Basin
- WVWD Pumping Well in Spadra Basin
- Carrier BDP Pumping Well
- Potable Water Intertie between WVWD/RWD

Planned New Facilities for Alternative 4

- Pumping Well
- Well – Groundwater is Conveyed to Plant for Treatment
- Potable Water Treatment Plant
- San Jose Pipeline Connecting RWD/WVWD Recycled Water Systems

—25— Contour of Depth to Bedrock >25 ft (ft-bgs)

- Puente Basin Adjudicated Boundary
- Streams & Flood Control Channels



Prepared by:

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Prepared for:

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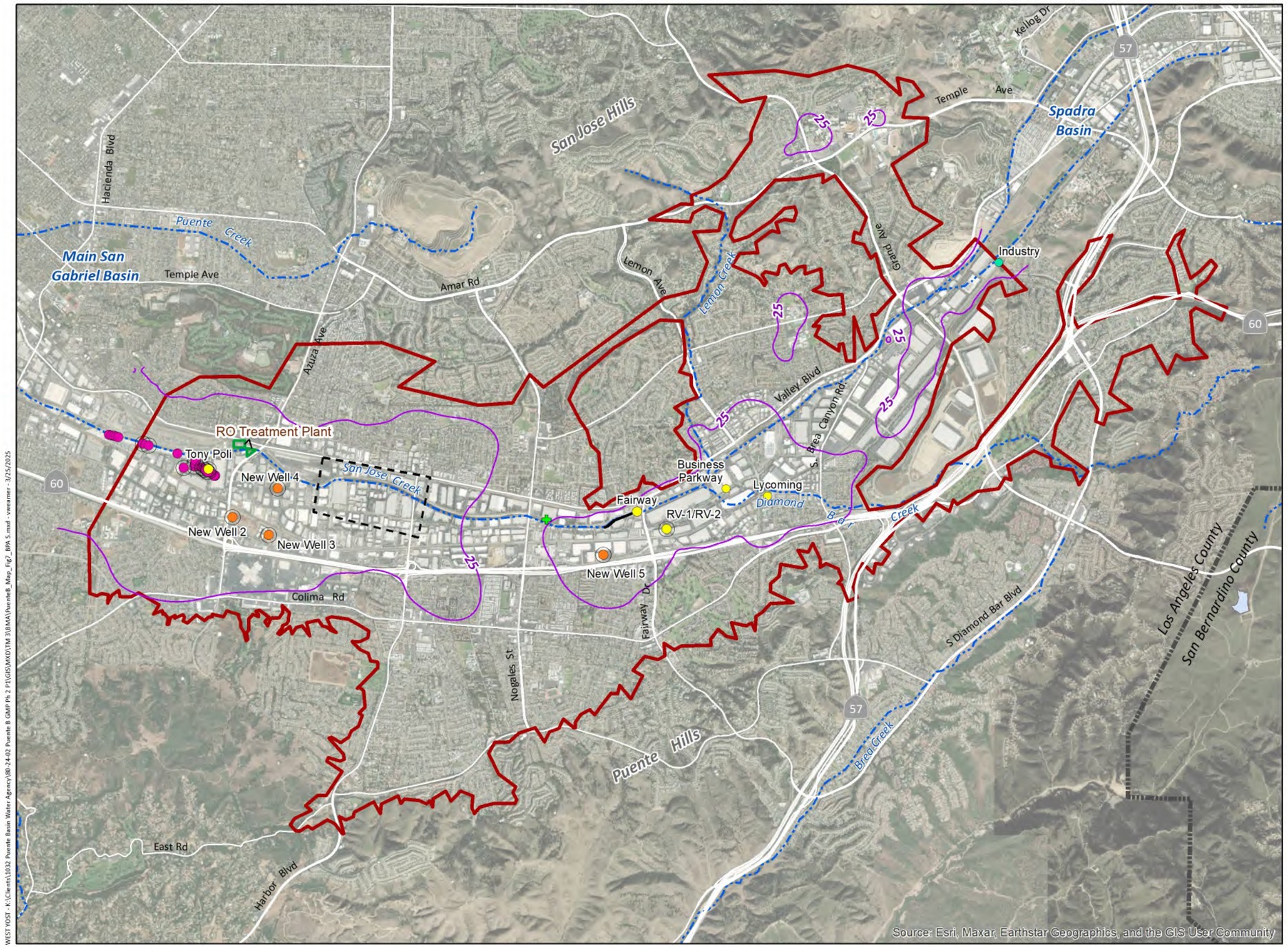
Basin Management Alternative 4
Potential Location for Wells and Facilities
Figure 5



Existing Facilities

- WVWD and RWD Pumping Well in Puente Basin
- WVWD Pumping Well in Spadra Basin
- Carrier BDP Pumping Well
- Potable Drinking Water Intertie between WVWD/RWD

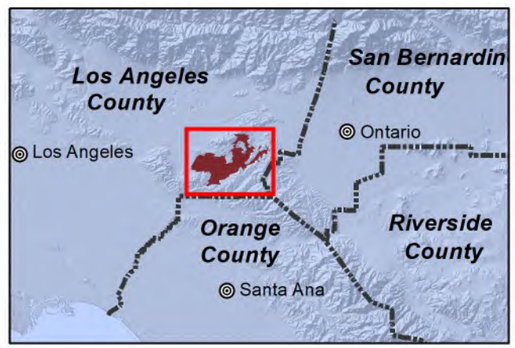
Planned New Facilities for Alternative 5

- Pumping Well
- Target Area for Injection Wells
- Well – Groundwater is Conveyed to Plant for Treatment
- Potable Water Treatment Plant
- San Jose Pipeline Connecting RWD/WVWD Recycled Water Systems

—25— Contour of Depth to Bedrock >25 ft-bgs

Puente Basin Adjudicated Boundary

Streams & Flood Control Channels



Prepared by: WEST YOST

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Prepared for:
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Groundwater Management Plan
TM-3 Basin Management Alternatives

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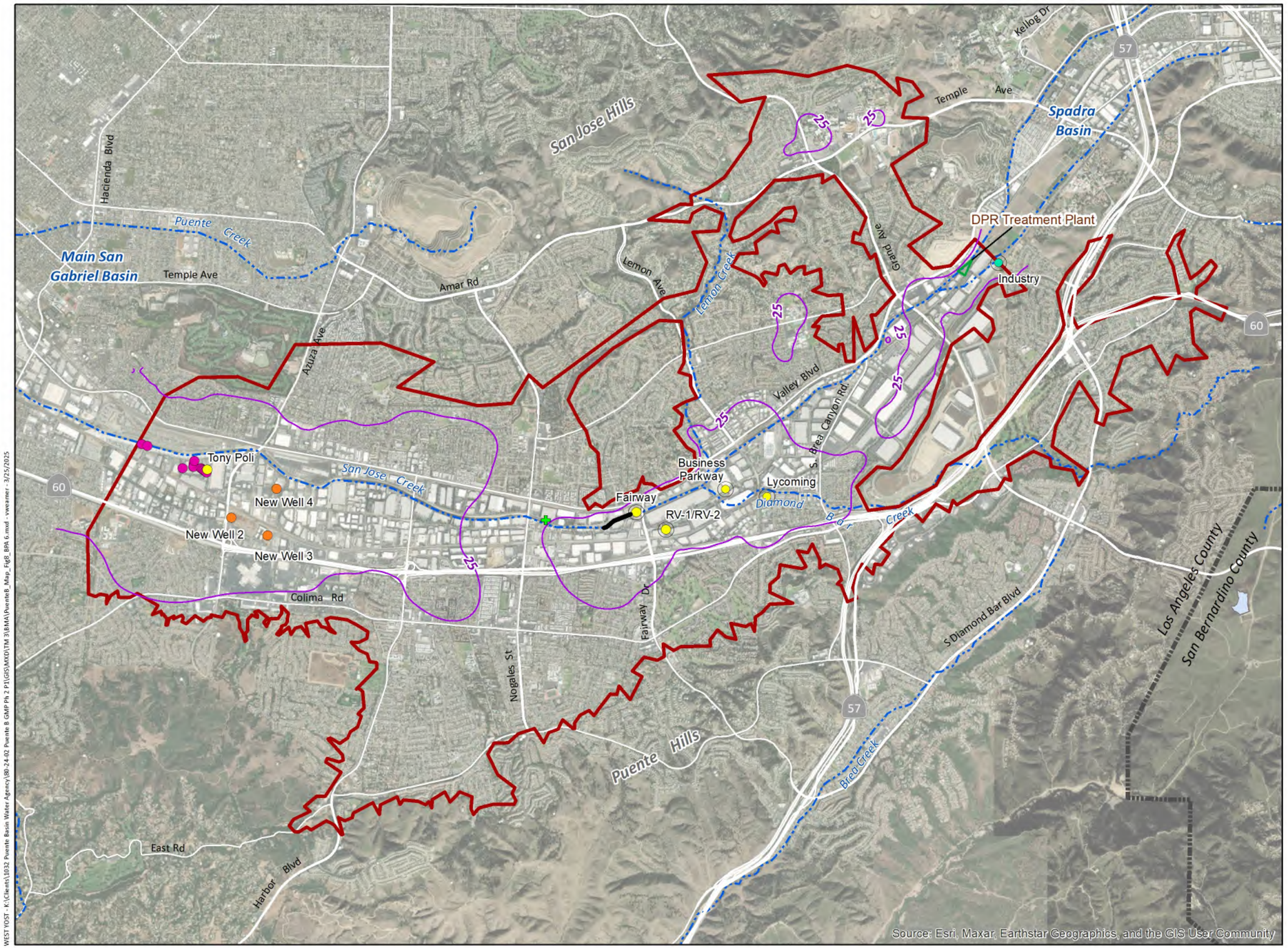
Basin Management Alternative 5
Potential Location for Wells and Facilities
Figure 7



Existing Facilities

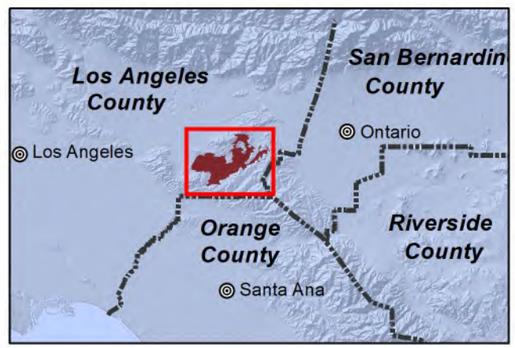
- WVWD and RWD Pumping Well in Puente Basin
- WVWD Pumping Well in Spadra Basin
- Carrier BDP Pumping Well
- Potable Drinking Water Intertie

Planned New Facilities for Alternative 6

- New Pumping Well
- Well – Groundwater is Conveyed to Plant for Treatment
- Potable Water Treatment Plant
- San Jose Pipeline Connecting RWD/WVWD Recycled Water Systems

—25— Contour of Depth to Bedrock >25 ft-bgs

- Puente Basin Adjudicated Boundary
- Streams & Flood Control Channels



Prepared by:

WEST YOST

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Basin Management Alternative 6
Potential Location for Wells and Facilities
Figure 8

4.0 SELECT BASIN MANAGEMENT ALTERNATIVES FOR EVALUATION

This section describes the process and results for a ranking the seven conceptual Basin Management Alternatives for consideration as part of the Puente Basin GMP, and outlines the proposed scope and costs estimates to evaluate the alternatives. This information will guide the PBWA in selecting the Basin Management Alternatives for further evaluation in Phase 2, Part 3.

4.1 Ranking of Basin Management Alternatives

The PBWA conducted an initial ranking of the seven Basin Management Alternatives to help the PBWA identify which Basin Management Alternatives to further consider for further evaluation in Phase 2, Part 3.

4.1.1 Ranking Criteria

Nine ranking criteria (Criteria A through I) were developed to support a preliminary ranking of the Basin Management Alternatives. This ranking is considered preliminary because the alternatives have not yet been evaluated for their hydrologic impact on the Basin and whether they can achieve the objectives of the GMP. Additionally, a cost analysis to determine their financial viability has not been conducted. Therefore, the full implications and effectiveness of these alternatives regarding hydrologic impacts and costs are not yet fully understood and will need to be considered if or when evaluations are completed.

For Criteria A through I, a numerical ranking scale was developed ranging from 1 to 5, with 1 indicating a poor ranking and 5 indicating an excellent ranking. Table 4 below, lists the criteria and ranking scale.

Table 4. Criteria and Ranking Scale to Rank the Basin Management Alternatives

Criteria	Criteria Description	Ranking Scale
A	How well does the alternative meet the objective of the GMP to become less reliant on imported water	1: Does not meet the objective at all 2: Meets the objective to a small extent 3: Moderately meets the objective 4: Largely meets the objective 5: Fully meets the objective
B	How well do you think the alternative will avoid the chronic lowering of groundwater levels	1: Will not avoid lowering at all 2: Will avoid lowering to a small extent 3: Will moderately avoid lowering 4: Will largely avoid lowering 5: Will completely avoid lowering
C	How effectively do you think the alternative will minimize outflow to the Main Basin through the Puente Basin narrows (compared to historical outflow) while still meeting the 580 acre-feet per year obligation	1: Not effective at all 2: Slightly effective 3: Moderately effective 4: Highly effective 5: Extremely effective
D	Do you think the alternative will minimize outflow to the Main Basin through the Puente Basin narrows (compared to historical outflow), to a level below the 580 acre-feet per year obligation that can utilize credits in a sustainable manner	1: Will not minimize outflow at all 2: Will minimize outflow to a small extent 3: Will moderately minimize outflow 4: Will largely minimize outflow 5: Will completely minimize outflow
E	How Feasible is the alternative considering the technical implementation and securing permits	1: Not feasible (technically impossible) 2: Low feasibility (significant challenges) 3: Moderate feasibility (some challenges) 4: High feasibility (few challenges) 5: Very high feasibility (easy to implement)
F	How feasible is the alternative when weighing the perceived implementation cost at this time against the potential benefits	1: Very Poor Feasibility: The implementation costs are likely significantly higher than the potential benefits, making the alternative impractical. 2: Poor Feasibility: The implementation costs likely outweigh the potential benefits, with limited justification for proceeding 3: Moderate Feasibility: The implementation costs and potential benefits are likely roughly balanced, making the alternative a neutral option 4: Good Feasibility: The potential benefits likely outweigh the implementation costs, providing a strong case for proceeding. 5: Excellent Feasibility: The potential benefits likely significantly outweigh the implementation costs, making the alternative highly advantageous

G	Does the alternative enhance the diversity of the water supply portfolio	1: Very Poor Enhancement: The alternative provides minimal or no additional diversity to the water supply portfolio 2: Poor Enhancement: The alternative adds some diversity, but it is limited and not significantly impactful. 3: Moderate Enhancement: The alternative moderately increases the diversity of the water supply portfolio, offering a balanced improvement 4: Good Enhancement: The alternative significantly enhances the diversity of the water supply portfolio, providing a strong improvement. 5: Excellent Enhancement: The alternative greatly enhances the diversity of the water supply portfolio, offering substantial and highly beneficial diversity
H	What is the level of complexity involved in the implementation of this alternative	1: Very high complexity. Implementation is extremely complex, with numerous significant challenges and obstacles that require extensive planning, resources, and expertise 2: High complexity. Implementation is complex, with significant challenges and obstacles that require careful planning and resources. 3: Moderate complexity. Implementation has some challenges, but they are manageable and require careful planning. 4: Low complexity. Implementation has some challenges, but they are manageable and not overly complicated 5: Very low complexity. Implementation is straightforward with minimal challenges or obstacles
I	What is the estimated timeframe for implementing the alternative (planning, design; build)	1: Very Long Timeframe: Implementation will take a significantly long period; 10+ years 2: Long Timeframe: Implementation will take a considerable amount of time; 5 to 10 years 3: Moderate Timeframe: Implementation will take a balanced amount of time; 3 to 5 years 4:Short Timeframe: Implementation will take a relatively short period; 2 to 3 years 5: Very Short Timeframe: Implementation will be completed very quickly; 1 to 2 years.

4.1.2 Ranking

Three different PBWA evaluator entities ranked the seven Basin Management Alternatives based on Criteria A through I. Each evaluator accessed each alternative against the criteria using the ranking scale scoring system. The scores for each criterion were aggregated to provide an overall ranking for each alternative, both per evaluator and in total. Table 5 summarizes the ranking scores for each Basin Management Alternative for each criterion and in total.

Table 5. Ranking Scores of Basin Management Alternatives for Criteria A through I

Alternative	Criteria	Scoring for Each Evaluator			Criteria Total	Total Ranking Score for Criteria A through I
		WVWD 1	WVWD 2	RWD		
1A - Increase Non-Potable Water Supplies via Increased Pumping at Existing Wells	**A**	3	3	4	**10**	**102**
	B	4	4	4	**12**	
	C	4	4	4	**12**	
	D	4	3	4	**11**	
	E	5	5	4	**14**	
	F	5	5	4	**14**	
	G	2	2	2	**6**	
	H	5	2	3	**10**	
	I	5	5	3	**13**	
1B - Increase Non-Potable Water Supplies via Increased Pumping at Existing Wells and New Well In the West	**A**	3	3	4	**10**	**90**
	B	4	4	3	**11**	
	C	4	3	3	**10**	
	D	4	4	3	**11**	
	E	4	4	3	**11**	
	F	4	4	3	**11**	
	G	2	2	4	**8**	
	H	3	3	3	**9**	
	I	3	3	3	**9**	
2 - Increase Potable Water Supplies via Increased Pumping in the West and RO Treatment	**A**	4	4	4	**12**	**87**
	B	2	2	1	**5**	
	C	4	4	5	**13**	
	D	4	4	5	**13**	
	E	3	3	2	**8**	
	F	3	3	2	**8**	
	G	4	4	4	**12**	
	H	3	3	2	**8**	
	I	3	3	2	**8**	
3 - Increase Potable Water Supplies via Artificial Recharge, Increased Pumping in the West, and RO Treatment	**A**	4	4	4	**12**	**78**
	B	4	4	4	**12**	
	C	4	4	4	**12**	
	D	4	4	2	**10**	
	E	2	2	1	**5**	
	F	2	2	1	**5**	
	G	4	4	4	**12**	
	H	2	2	1	**5**	
	I	2	2	1	**5**	
4 - Increase Potable Water Supplies via Increased Pumping in the West and Center RO Treatment	**A**	2	4	4	**10**	**76**
	B	4	2	3	**9**	
	C	4	4	5	**13**	
	D	2	4	5	**11**	
	E	2	2	2	**6**	
	F	2	2	1	**5**	
	G	4	4	4	**12**	
	H	2	2	1	**5**	
	I	2	2	1	**5**	
5 - Increase Potable Water Supplies via Artificial Recharge, Increased Pumping in the West and Center and RO Treatment	**A**	4	4	4	**12**	**81**
	B	4	4	4	**12**	
	C	4	4	4	**12**	
	D	4	4	4	**12**	
	E	2	2	2	**6**	
	F	2	2	1	**5**	
	G	4	4	4	**12**	
	H	2	2	1	**5**	
	I	2	2	1	**5**	
6 - Increase Potable and Non-Potable Water Supplies via Increased Pumping and DPR of Recycled Water	**A**	4	4	4	**12**	**72**
	B	2	2	1	**5**	
	C	4	4	4	**12**	
	D	4	4	4	**12**	
	E	2	2	2	**6**	
	F	1	1	1	**3**	
	G	4	4	4	**12**	
	H	2	2	1	**5**	
	I	2	2	1	**5**	

Each evaluator also selected and ranked their top three Basin Management Alternatives, using a ranking scoring system of 3, 2, and 1, with 3 indicating the top choice, 2 the second-best choice, and 3 the third-best choice. The results of the ranking for overall top three are showed in Table 6 below.

Table 6. Ranking Scores for Selection and Ranking of Top Three Basin Management Alternative

Basin Management Alternative	Scoring for Each Evaluator			Total Ranking Score for Top Three = (a) + (b) + (c)
	WVWD 1 (a)	WVWD 2 (b)	RWD (c)	
Alternative 1A	3	3	2	**8**
Alternative 1B	2	2	3	**7**
Alternative 2	1	1		**2**
Alternative 3				0
Alternative 4				0
Alternative 5				0
Alternative 6			1	**1**

Table 7 below shows the total scores for ranking the Basin Management Alternatives for Criteria A through I (Table 5), the top three ranking (Table 6), and combined as a total ranking score overall. Based on the total ranking score overall, the Basin Management Alternatives are ranked in the following order: 1A, 1B, 2, 5, 3, 4, and 6.

Table 7. Total Ranking Results Overall of Basin Management Alternatives

Basin Management Alternative	Total Ranking Score for Criteria A-I (a)	Total Ranking Score for Top Three (b)	Total Ranking Score Overall = (a) + (b)
Alternative 1A	102	8	**110**
Alternative 1B	90	7	**97**
Alternative 2	87	2	**89**
Alternative 3	78	0	78
Alternative 4	76	0	76
Alternative 5	81	0	**81**
Alternative 6	72	1	73

Red bold text - 1st place
Green bold text – 2nd place
Blue bold text – 3rd place
Orange bold text – 4th place

4.2 Scope to Evaluate Basin Management Alternatives

This section describes the proposed scope to evaluate the Basin Management Alternatives for (i) the hydrologic analysis of the impacts to the Puente Basin and (ii) a cost analysis for project implementation to produce a new water supply.

4.2.1. Hydrologic analysis of the impacts to the Puente Basin

A hydrologic analysis helps to understand the physical impacts on the Puente Basin resulting from the implementation of the Basin Management Alternatives. The primary focus of the hydrologic analysis is the impact to groundwater-level sustainability and the subsurface outflow to the Main San Gabriel Basin. Given that one of the GMP's objectives is to reduce subsurface outflow to the Main San Gabriel Basin and utilize the Puente Narrows credits accumulated over the past 40 years, understanding how an alternative will impact this outflow is crucial. It is vital to closely monitor these impacts to ensure the PBWA remains compliant with the Puente Narrows Agreement.

The recommended approaches to evaluate the physical impacts on the Puente Basin from implementing the Basin Management Alternative involves using a groundwater flow model to predict impacts prior to implementation and/or a monitoring program to continuously track impacts after implementation. The following sections provide a high-level overview of the approach, scope, and estimated rough order of magnitude (ROM) costs for using a groundwater flow model and conducting monitoring to characterize the hydrologic impacts on the Basin. These high-level descriptions are provided because we recommend to first perform the cost evaluation of each alternative that is described in Section 4.2.2, before initiating these approaches. The results of the cost evaluation will inform PBWA's decisions on which Basin Management Alternatives to further evaluate using modeling and/or monitoring methods.

4.2.1.1 Groundwater Flow Model

A groundwater-flow model is a computational tool that simulates groundwater movement through aquifers, using assumptions for aquifer properties and other hydrologic stresses (e.g., pumping and recharge) to predict changes in groundwater levels and flows. A groundwater-flow model will be constructed and calibrated for the Puente Basin and any adjacent areas relevant to the study, such as a portion of the Main San Gabriel Basin to capture the effects of changes in groundwater levels at the downgradient end of the Puente Basin. The model will incorporate all groundwater-related processes, including surface water flow in natural channels and infiltration of precipitation and applied water. The hydrogeologic conceptual model of the Puente Basin described in TM-1, along with additional required data, will be used to construct the model. Once constructed, the model will be calibrated to historical measured data (e.g., measured groundwater levels at wells) to ensure accuracy. The calibrated model will then be used to simulate future scenarios for each Basin Management Alternative, which will characterize their impacts on the Puente Basin. The primary focus of the model evaluation will be on groundwater levels and subsurface outflow to the Main San Gabriel Basin.

Table 8 below describes a general scope and ROM cost to construct, calibrate, and run a groundwater flow model and evaluate the hydrologic impacts of the Basin Management Alternatives.

Table 8. Scope and ROM Costs to Perform Groundwater-Flow Modeling

Task No	Task Name	Description	Deliverables	ROM Costs
1	Collect and Review Data	This task consists of the collection and review of data needed to construct and calibrate a groundwater-flow. These data include climate datasets (precipitation and potential evapotranspiration), aquifer properties, and other.	None	$35,500
2	Construct and Calibrate Groundwater-Flow Model	This task includes constructing a numerical groundwater-flow model, and calibrating the model to historical measured data.	The results will be incorporated into the Project Report (Task 4) and calibration results will be presented as an interim deliverable at a project meeting	$157,000
3	Model Scenarios	This task consists of the development, running, and post-processing of a baseline scenario and one or more planning scenarios. Each scenario will simulate conditions in the Puente Basin under a set of assumed future stresses.	The results will be incorporated into the Report (Task 4) and scenario results will be presented as an interim deliverable at a project meeting	$76,100
4	Modeling Report	This task includes the preparation of a Draft and Final Report to describe and document the process of model construction and calibration, and the results of the model scenarios.	One Draft and one Final Report	$63,400
			Modeling Total	**$332,000**

4.2.1.2 Conduct Monitoring Program

The development and implementation of a monitoring program is essential to understand and track the actual hydrologic impacts on the Puente Basin from the implementation of the selected Basin Management Alternative. The general scope to develop and implement the monitoring program involves preparing a monitoring plan, setting up the monitoring network, conducting the monitoring plan, and analyzing and reporting on the data collected. A monitoring plan will be prepared to describe the objectives of the monitoring plan, select the monitoring sites, identify the data types and methods for data collection, describe the methods for data analysis, and describe the reporting frequency. The set up of the monitoring network includes site visits to establish monitoring well locations, purchasing and installing equipment, and setting up a monitoring database. Conducting the monitoring program includes performing routine monitoring, collecting other data, and reviewing and managing all data in a database. The data will be analyzed and reported at a set frequency to identify trends and evaluate impacts on groundwater levels and subsurface outflow to the Main San Gabriel Basin. The monitoring program will cover the entire Puente Basin and relevant adjacent areas, with costs depending on the number of sites, equipment, data collection frequency, and data analysis/reporting frequency.

Table 9 below describes a general scope and ROM cost to develop and implement a monitoring program for the first two years to evaluate impacts from the implementation of a Basin Management Alternative.

Table 9. Scope Description and ROM Costs to Develop and Implement a Monitoring Program for the First Two Years

Task No	Task Name	Description	Deliverables	ROM Costs
1	Prepare Monitoring Plan	This task consists of designing a monitoring program and the preparing a monitoring plan.	One Draft and one Final TM	$22,500
2	Setup Monitoring Network [(a)]	This task includes purchasing of equipment, installation, and set up of the monitoring sites.	None	$41,500
3	Conduct Monitoring Program for Year 1 [(a)]	This task includes performing the first year of the monitoring and maintaining the data in a database.	All data will be uploaded and maintained in project database	$46,600
4	Conduct Monitoring Program for Year 2 [(a)]	This task includes the performing the second year of the monitoring and maintaining the data in a database	All data will be uploaded and maintained in project database	$45,400
5	Analysis and Reporting for Year 1 [(b)]	This task includes the preparation of maps, tables, and time-series plots of hydrologic data, and conducting a meeting to review.	Maps, tables, exhibits	$25,000
6	Analysis and Reporting for Year 2 [(b)]	This task includes preparation of Draft and Final Report to describe and analyze the data and conducting a meeting to review.	One Draft and one Final Report	$49,000
			Monitoring Total (Setup and 2 Years)	**$230,000**

Notes:

(a) The key component of the monitoring program will be monitoring of groundwater levels. The estimated costs assume a monitoring network of ten wells that include transducers with data loggers that record 15-minute data, and quarterly download and processing of the high-frequency data. Other hydrologic data collected by others in the basin will be collected and utilized

(b) The estimated cost assumes an annual analysis and reporting cycle. The first year will include key maps, tables, and exhibits to analysis the data. The second year will include a monitoring report to describe the analysis and results of the monitoring, and conclusions and recommendations.

4.2.1.3 Recommended Hydrologic Analysis Scope for Each Basin Management Alternative

The recommended scope for evaluating the hydrologic impacts on the Puente Basin from implementing the Basin Optimization Scenarios involves modeling and/or monitoring approaches described above. The recommended scope varies among the seven alternatives, which can be categorized into two different groups:

1. **Alternatives 1A and 1B, that involve moderate increases in pumping, ranging from 50 to 70 percent above the historical average.** Based on historical operations in the basin and the hydrogeologic conceptual model of the Puente Basin outlined in TM-1, these alternatives are unlikely to cause chronic lowering of groundwater levels or significant reductions in subsurface outflow to the Main San Gabriel Basin. Additionally, the increased pumping in the western part of the basin is approximately equal to the average volume of subsurface outflow to the Main San Gabriel Basin that has historically exceeded the obligation (about 390 acre-feet per year) over the past ten years (2014-2023). Therefore, constructing, calibrating, and using a groundwater-flow model is not necessary to evaluate these alternatives. If the alternative(s) is implemented, a monitoring program will be necessary to track the basin response to implementation and ensure there are no adverse impacts.

2. **Alternatives 2, 3, 4, 5, and 6, that involve significant increases in pumping, with a greater than 150 percent increase from historical average.** These alternatives have a chance to cause chronic lowering of groundwater levels and/or significant reductions to subsurface outflow to the Main San Gabriel Basin. Furthermore, the increased pumping in the west part of the basin is 3.5 times more than the average volume of subsurface outflow to the Main San Gabriel Basin that has historically exceeded the obligation (about 390 acre-feet per year) over the past ten years (2014-2023). Therefore, constructing, calibrating, and using a groundwater-flow model is essential to predict the impacts on the basin and determine if the alternative is feasible. If the alternative is implemented, a monitoring program will be necessary to track the basin response to implementation and ensure there are no adverse impacts.

Table 10 summaries the recommended scope and cost for the hydrologic analysis for these two groups of Basin Management Alternatives, including modeling and/or monitoring.

Table 10. Summary of Scope and ROM Cost to Perform Hydraulic Analysis for Two Groups of Basin Management Alternatives

Alternative	Hydraulic Analysis Scope	Assumed Time (for cost estimating)	Total ROM Cost
1A and 1B	Develop and Implement Monitoring Program	Two years	$230,000
2, 3, 4, 5, 6	Perform Groundwater Flow Modeling Develop and Implement Monitoring Program	Modeling: One year Monitoring: Two years	$332,000 + $230,000 Total: $562,000

4.2.2 Cost analysis for project implementation to produce the new water supply.

Evaluating the implementation costs for the Basin Management Alternatives is crucial for the PBWA to make informed decisions on which Basin Management Alternatives to further consider and/or implement. A cost analysis can estimate the implementation cost of each alternative, reveal economic advantages or disadvantages, and determine if the alternative is an economically viable approach for the water purveyors. The proposed approach for performing a cost analysis involves three general steps:

1. Develop long-term water supply plans and determine the unit cost of water supplies without implementation of any Basin Management Alternative
2. Prepare engineering cost estimates for implementation of the Basin Management Alternatives
3. Develop long-term water supply plans and determine the unit cost of water supplies with the implementation of each Basin Management Alternative.

The cost analysis will estimate the melded cost of the water supplies for Puente Basin water purveyors in aggregate for the various Basin Management Alternatives, and without the implementation of any alternative (baseline). This can be used to determine whether the melded cost of water supplies for Puente Basin water purveyors will benefit in the long term from implementing these alternatives to diversify water supplies. The results from the cost analysis will inform decisions on if it is worthwhile to continue evaluating and considering the Basin Management Alternatives, and ultimately their planning, design, construction, and operation. Given the high costs associated with performing the hydrologic analysis to evaluate the alternatives using modeling and/or monitoring, it is crucial to understand if these efforts are financially justified before proceeding.

It is recommended that the cost analysis of the Basin Management Alternatives is performed first by the PBWA, prior to the hydrologic analysis to evaluate the impacts to the Puente Basin using modeling and monitoring. Hence, the recommended scope of services for the next steps to develop a GMP in Part 3 of Phase 2 described in Section 5.0 includes performing the cost analysis for up to seven Basin Management Alternatives and using the results to make informed decisions on the prioritization and selection the Basin Management Alternatives to further evaluate.

4.3 Selection of Basin Management Alternatives for Further Evaluation

The PBWA will use the information presented in TM-3, specifically Section 4.1 on the ranking results of the Basin Management Alternatives and Section 4.2 on the scope for evaluating the alternatives, to select the alternatives for further evaluation in Part 3 of Phase 2. Once the PBWA decides which of the seven Basin Management Alternatives to further evaluate, this section will be updated in the final draft of TM- 3 to list those selected alternatives. The cost for the scope of services described in Section 5.0 will vary depending on the number of Basin Management Alternatives chosen for evaluation and will also be updated in the final draft of TM-3 to reflect the final number of alternatives.

5.0 SCOPE OF SERVICES TO PERFORM PHASE 2 - PART 3

As described in Section 4.2.2, we recommend an approach that includes first performing the cost analysis evaluation for the selected Basin Management Alternatives (to be identified by the PBWA in Section 4.3). The results of the cost analysis will be used by the PBWA to make informed decisions on the next steps to further evaluate Basin Management Alternative/s for their impact to the basin using modeling and/or monitoring methods described in Section 4.2.1. This section describes the proposed scope of services and cost estimates for Phase 2 – Part 3 to: (i) perform the cost analysis on the Basin Management alternatives; (ii) identify which Basin Management Alternatives warrant further evaluation for their hydrologic impact to the basin; and (iii) and determine the PBWA's next steps and refined scope of services and cost estimate to further evaluate Basin Management Alternatives for their hydrologic impact.

The major tasks for this scope of services include:

- Task 1 - Prepare Cost Analyses Without the Implementation of a Basin Management Alternative
- Task 2 - Prepare Cost Analyses for Basin Management Alternatives
- Task 3 - Prepare Technical Memorandum
- Task 4 - Project Management, Administration, and Meetings

Task 1 – Prepare Cost Analyses Without the Implementation of a Basin Management Alternative

In this task, West Yost will develop long-term water supply plans and determine the unit cost of each water supply for the water purveyors of the Puente Basin, assuming no implementation of a Basin Management Alternative. These water supply and cost plans will serve as a "baseline" for comparison to the Basin Management Alternatives(s).

Task 1.1 Develop Annual Water Supply Plans for Each Water Purveyor, and in Aggregate, for 2025 to 2075

This task involves working with each water purveyor to collect information and prepare projections of water supply plans for the next 50 years (2025-2075) assuming no implementation of a Basin Management Alternative. Tables will be prepared to summarize the water supply plans.

Task 1.1 Deliverables

- Tables of the annual water supply volumes for each water purveys, for 2025 to 2075
- Tables of the annual water supply volumes as a total aggregate for all water purveyors, for 2025 to 2075

Task 1.2 Develop Annual Unit Costs and Melded Unit Cost for Each Water Purveyor, and in Aggregate, for 2025 to 2075

This task involves working with each water purveyor to collect the following cost information to determine the unit cost for the various water supplies:

- Commodity costs. The cost of acquiring the water supply. For example, the commodity costs for Six Basins and Chino Basin groundwater are the Watermaster assessments.
- Production costs. The energy costs associated with producing the water supply.
- Operations and Maintenance (O&M) costs. The variable costs for field staff, contract services, tools and equipment, training and supplies, repairs and general maintenance, and the regulatory compliance associated with producing the water supply. This excludes maintenance on reservoirs or pipelines and the variable O&M costs associated with treatment.
- Treatment costs. The costs for chemicals and other variable O&M costs associated with the treatment necessary to produce potable water.

An annual percentage increase in unit cost will be assumed through the planning period to account for factors such as inflation and technological advancements. Tables will be prepared to summarize the annual unit cost and melded cost for the water supply plans.

Task 1.2 Deliverables

- Tables of the annual unit cost of each water supply and melded unit cost of all water supplies for each water purveyor, for 2025 to 2075
- Tables of the annual melded unit cost for all water supplies as a total aggregate for all water purveyors, for 2025 to 2075

Task 1.3 – As-needed Coordination and Meetings with PBWA to Confirm Water Supply Plans and Cost.

West Yost will coordinate with the PBWA via email, calls, and virtual meetings to review and approve water supply plans and cost.

Task 2 – Prepare Cost Analyses for Basin Management Alternatives

In this task, West Yost will develop engineering cost estimates for the implementation of the Basin Management Alternatives. These engineering costs will be used to prepare updated long-term water supply plans and unit costs for the water purveyors of the Puente Basin in aggregate, with the implementation of each Basin Management Alternative.

Task 2.1 Develop Planning Criteria and Assumptions.

This task includes gathering relevant data and developing a list of all planning criteria for the unit cost of equipment and materials, along with other assumptions used to estimate the cost for implementing projects under the Basin Management Alternatives.

Task 2.1 Deliverable

- Table of planning criteria of unit costs and other assumptions to estimate implementation cost of Basin Management Alternatives

Task 2.2 Develop Engineering Cost Estimates for Basin Management Alternatives.

This task involves developing high-level conceptual engineering cost estimates for the projects envisioned under the Basin Management Alternatives selected to further evaluate. The cost estimates are based on feasibility-level design and operating schemes for each new project, utilizing the unit costs and assumptions outlined in Task 2.1. The estimates encompass costs for construction (including engineering, management, and administrative expenses), O&M, and loans for capital improvements.

Task 2.2 Deliverable

- Tables of engineering cost estimates for each Basin Management Alternative

Task 2.3 Develop Cost Estimates for the Water Purveyors' Aggregate Water Supply Plans for the Basin Management Alternatives.

This task involves preparing the annual water supply plans and melded unit cost of all water supplies for the water purveyors in aggregate inclusive of the implementation of each Basin Management Alternative.

Task 2.3 Deliverables

- Tables of the total water supplies as an aggregate for all water purveyors for each Basin Management Alternative
- Tables of the melded unit cost for water supplies as an aggregate for all water purveyors for each Basin Management Alternative

Task 3 – Prepare Technical Memorandum

A Technical Memorandum 4 (TM-4) will be prepared to describe of the cost analysis of the long-term impact from the implementation of the Basin Management Alternatives, and the results and next steps. TM-4 will include the following sections:

1. Background and Objectives
2. Cost Analysis for Implementation of Basin Management Alternatives
3. Basin Management Alternatives Selected for Further Evaluation
4. Scope and Cost to Evaluate Basin Management Alternatives for Hydrologic Impact to the Basin

TM-4 will be prepared in two stages to enable the PBWA to make informed decisions on which Basin Management Alternatives to evaluate based on the cost analysis results. The initial stage (Sections 1 and 2) will describe the cost analysis for each Basin Management Alternative and assess the economic benefits and drawbacks of their implementation. The second stage (Sections 3 and 4) will include the PBWA's final selection of Basin Management Alternatives for further evaluation of their hydrologic impact on the Basin as well as the refined scope and cost of conducting these evaluations from those described at a high-level in Section 4.2 of this TM-3. As a result, this task will lead to the final selection of Basin Management Alternatives for further evaluation using modeling and/or monitoring methods, along with a refined scope and cost for these evaluations.

Task 3.1 – Draft Sections 1 and 2 of TM-4.

A draft of Sections 1 and 2 of TM-4 will be prepared. It will be distributed to PBWA and stakeholders for a one-month review period.

Task 3.2 – Conduct Workshop to Review Sections 1 and 2 of TM-4.

A virtual workshop will be held with PBWA and other interested stakeholders to review the draft Sections 1 and 2 of TM-4. The workshop will be held during the one-month review period. The PBWA and stakeholders will submit written comments and suggested edits on Section 1 and 2 during the review period.

Task 3.3 – As-needed Meeting with PBWA on TM-4.

West Yost will conduct one as-needed virtual meeting with the PBWA staff to obtain additional feedback on Sections 1 and 2 of TM-4, and feedback on the final selection of Basin Management Alternatives for further evaluation.

Task 3.4 – Draft Sections 3 and 4 of TM-4.

Feedback received from PBWA staff and stakeholders on TM-4 Sections 1 and 2 will be addressed and documented in an appendix. A draft of Sections 3 and 4 of TM-4 will be prepared and distributed to PBWA and stakeholders for a one-month review period.

Task 3.5 – Prepare Final TM-4.

Feedback received from PBWA staff and stakeholders on TM-4 Sections 3 and 4 will be addressed and documented in an appendix; and a final TM-4 will be prepared.

Task 3 Deliverables:

- PowerPoint and minutes from Workshop
- Draft Sections 1 and 2 of TM-4
- Draft Section 3 and 4 of TM-4
- Final Draft of TM-4

Task 4 – Project Management, Administration, and Meetings

This task includes all project coordination, administration, and meetings.

Task 4.1 – Project Coordination and Administration.

Includes coordinating staffing over the duration of the project and providing monthly invoices and status to PBWA staff of project progress, schedule, and budget status

Task 4.2 – As-needed Project Meetings.

Includes preparing for and conducting one as-needed virtual coordination meetings with PBWA staff to discuss as-needed topics for the development of TM-4.

Cost Estimate to Perform Phase 2 – Part 3

Table 11 is a detailed work breakdown structure and line-item cost estimate for the effort and cost for each task and subtask for the scope of services described above. West Yost will perform the scope of services on a time-and-materials basis at the billing rates set forth in West Yost's 2025 Billing Rate Schedule in Attachment B. The cost estimate in Table 11 is based on the assumption that the PBWA will select five Basin Management Alternatives for a cost analysis. This assumption may change once the PBWA finalizes which alternatives to further evaluate.

Table 11. Work Breakdown Structure and Fee Estimate to Perform Phase 2 Part 3 - Cost Analysis of Five (5) Basin Management Alternatives for the Puente Basin and Determine Next Steps to Develop a Groundwater Management Plan

	Description	Labor										Total Program Costs	
									Total Labor				
										Labor Cost			
		Principal Engineer/ Geologist II	Principal Scientist I	Senior Engineer II	Techl Specialist II	Geologist II	Tech Specialist I	Task Multi-plier	Person Hours	Sub-task	Phase/ Task	Sub-Task	Phase/ Task
Task 1 - Prepare Cost Analyses Without the Implementation of a Basin Management Alternative											$12,442		$12,442
1.1	Develop Annual Water Supply Plans for Each Water Purveyor, and in Aggregate, for 2025 to 2075		3.0		7.0		2.0	1	12.0	$2,911		$2,911	
1.2	Develop Annual Unit Costs and Melded Unit Cost Each Water Purveyor, and in Aggregate, for 2025 to		4.0	3.0	20.0		3.0	1	30.0	$7,236		$7,236	
1.3	As-needed Coordination and Meetings with PBWA to Confirm Water Supply Plans and Cost		3.0		6.0			1	9.0	$2,295		$2,295	
Task 2 – Prepare Cost Analyses for Basin Management Alternatives											$42,882		$42,882
2.1	Develop Planning Criteria and Assumptions	5.0	6.0		10.0			1	21.0	$5,832		$5,832	
2.2	Develop Engineering Cost Estimates for Basin Management Alternatives	4.0	5.0		10.0		0.5	5	97.5	$26,375		$26,375	
2.3	Develop Cost Estimates for the Water Purveyors' Aggregate Water Supply Plans for the Basin Management Alternatives		1.0	2.0	5.0		0.5	5	42.5	$10,675		$10,675	
Task 3 - Prepare Technical Memorandum											$32,438		$32,438
3.1	Draft Sections 1 and 2 of TM-4	4.0	14.0		14.0	6.0	5.0	1	43.0	$11,196		$11,196	
3.2	Conduct Workshop to Review Sections 1 and 2 of TM-4.	2.0	10.0		10.0			1	22.0	$6,086		$6,086	
3.3	As-needed Meeting with PBWA on TM-4	2.0	4.0		2.0			1	8.0	$2,392		$2,392	
3.4	Draft Sections 3 and 4 of TM-4	6.0	14.0	5.0	5.0		4.0	1	34.0	$9,870		$9,870	
3.5	Prepare Final TM-4	1.0	4.0		4.0		2.0	1	11.0	$2,894		$2,894	
Task 4 – Project Management, Administration, and Meetings											$8,600		$8,600
4.1	Project Coordination and Administration		2.5				0.3	7	19.3	$5,891		$5,891	
4.2	As-needed Project Meetings	2.0	5.0		2.0			1	9.0	$2,709		$2,709	
	Total (5 Alternatives)	**42**	**115**	**18**	**155**	**6**	**23**		**358**		**$96,362**		**$96,362**

Table 12 summaries the estimated cost for Tasks 1 through 4 and provides notes on the variability of the estimated cost depending on the number of alternatives selected for cost analysis.

Table 12. Summary of Cost to Perform Cost Analysis for Five (5) Basin Management Alternatives for the Puente Basin and Determine Next Steps to Develop a Groundwater Management Plan

Task No.	Task Name	Cost
1	Prepare Cost Analyses Without the Implementation of a Basin Management Alternative	$12,442
2	Prepare Cost Analyses for Basin Management Alternatives	$42,882
3	Prepare Technical Memorandum	$32,438
4	Project Management, Administration, and Meetings	$8,600
	Total (5 Alternatives)	**$ 96,362**

Notes: The total cost to perform the cost analysis for other numbers of Basin Management Alternatives are listed below. The cost variability is within Task 2:

- Total for 7 Alternatives - $ $105,029
- Total for 6 Alternatives - $ $98,498
- Total for 4 Alternatives - $ 88,952
- Total for 3 Alternatives - $ 81,542
- Total for 2 Alternatives - $74,132

SCHEDULE TO PERFORM PHASE 2 – PART 3

West Yost anticipates completing Tasks 1 through 4 within six months of a notice-to-proceed.

STAFFING AND CLOSING COMMENTS

Veva Weamer will serve as the lead scientist and project manager and will be responsible for implementing the project per the final approved scope and budget. Ms. Weamer will be supported by West Yost geologists, engineers, and scientists for implementation of the scope of services. Andy Malone will serve as the technical reviewer and will provide technical support to the project team and QA/QC of all project deliverables. Samantha Adams will serve as the Principal-in-Charge and will also perform technical review.

Thank you for providing West Yost the opportunity to continue to assist the PBWA in developing the GMP. We look forward to working with you on this important project. Please call if you have any questions or require additional information.

Sincerely,
WEST YOST

Veva Weamer
Project Manager

Andy Malone, PG
QA/QC
PG #86007

cc: Samantha Adams, Principal in Charge;

Attachment A: Response to Comments and Updates to Draft TM-3 Part 1
Attachment B: West Yost 2025 Billing Rate Schedule

Attachment A

Response to Comments and Updates to Draft TM-3 Part 1

ATTACHMENT A – RESPONSES TO COMMENTS AND OTHER UPDATES MADE TO THE OCTOBER 2024 DRAFT TECHNICAL MAMORADUM 3 – PART 1: BASIN MANAGEMENT ALTERNATIVES FOR THE PUENET BASIN GROUNDWATER MANAGEMENT PLAN (TM-3 – PART 1)

Comments by Suzanne Brown at Los Angeles County Sanitation Districts

Comment 1: Table 2:

The table lists 1,000 AFY as the average annual volume of surplus recycled water from the Pomona WRP. This number is consistent with current Sanitation Districts estimates of available supply, but is subject to change based on impacts of conservation on sewer flows and other factors that may impact plant production. The availability of this supply also varies significantly on a diurnal and seasonal basis, with the majority of this water being available in winter months when irrigation demands are low.

Table 2 discusses recycled water purchase contract allotments for WVWD and Industry as "rights". It may be better to refer to these amounts as contract allotments with the Sanitation Districts to avoid confusion with water rights

Response: The following updates were made:

In Table 2, Assumption No. 12 on the 1,000 afy of surplus recycled water from the Pomona WRP, text was added to indicate "This volume is subject to change due to future impacts of conservation on sewer flows or other factors that can impact plant production. Moreover, the availability of recycled water varies daily and seasonally. It is assumed that that the majority of this water will be available in winter months when irrigation demands are minimal."

In Table 2, changed "rights" to "contract allotments" in the description of the volumes and use of Pomona and San Jose Creek WRPs by WVWD and City of Industry.

Comment 2: Basin Management Alternatives 3 and 5:

These options propose to use Pomona WRP recycled water for recharge via injection. It should be noted that advanced treatment would be required (The Puente Basin is part of the San Gabriel Valley Basin and has an MUN beneficial use per the Basin Plan, thus the injection project would be considered indirect potable reuse per Title 22).

Supply projections for recharge using Pomona WRP water should factor in losses due to RO concentrate waste.

Response: As noted, recycled water recharge via injection requires the recycled water to be advanced treated, which the Pomona WRP effluent is not. The Basin Management Alternatives that include recharge via injection wells are currently described at a conceptual level. The source of recharge water will be identified later, with a priority on recycled water from the Pomona WRP and/or surface water from the San Jose Creek channel. The next steps involve evaluating the alternatives at a high level to assess the basin response and implementation costs. In Basin Optimization Alternatives 3 and 5, injection is combined with advanced treatment of the extracted groundwater downgradient at an RO Plant. If recycled water is used as the recharge source, PBWA will collaborate with regulators to obtain the necessary permits and explore the possibility of treating the groundwater after extraction, rather than before injection. During the initial cost evaluation and the subsequent planning process, a project alternative that includes advanced treatment prior to recharge can be considered and evaluated.

If the recharge water source is advanced treated recycled water from Pomona WRP, a percent loss for RO concentrate waste will be factored into the volume available for recharge.

Comment 3: Basin Management Alternative 6:

Under the New Potable Water Supply bullet, it is not clear whether the RO recovery rate was considered in determining the amount of water available from the Pomona WRP. Please clarify.

Response: In Section 3 of TM-3, the bullet points for "New Potable Water Supply" in Alternatives 2 through 6 were revised to reflect supply volumes based on an 80% recovery rate. Additionally, it is specified that an 80% recovery rate is assumed.

Updates to the Draft Basin Management Alternatives Presented in Draft TM-3 Part 1

The six Basin Management Alternatives (1 through 6) presented in the October 2024 draft TM-3 Part 1 were refined through ongoing review to determine the scope for evaluating their hydrologic impact on the basin. These updates to the alternatives are reflected in draft TM-3 Part 2 and are described below:

- **A new Basin Management Alternative 1B was added.** This alternative was added to provide an option similar to the draft Basin Management Alternative 1 (now 1A), which maximizes pumping at existing wells for non-potable supply and is simpler to implement. However, Alternative 1B includes a new well in the western part of the basin, also utilized for non-potable supply. The addition of this new well aims to moderately increase pumping in the west to reduce subsurface outflow to the Main Basin, helping achieve the GMP goal of controlling groundwater underflow through the Puente Narrows while utilizing existing credits. The draft Basin Management Alternative 1 is now referred to as Basin Management Alternative 1A.
- **Removed pumping well/s in western part of the Puente Basin for Basin Management Alternative 2 through 6.** These alternatives involve various combinations of projects to increase pumping at new wells in the basin, primarily in the western part, and treat the pumped groundwater for potable supply. Some alternatives also include artificial recharge in the western part of the basin. The reduction in pumping at new wells was implemented to decrease the excessive pumping in the western part of the basin, which was significantly higher (4.5 times or more) than the average volume of subsurface outflow to the Main San Gabriel Basin historically over the obligation through the Puente Narrows. The well in the western part of the basin, referred to as "New Well 1," was removed from Alternatives 2 through 6. Additionally, "New Well 6" was removed from Alternative 6.
- **Injection well capacity changed from 413 afy to 440 afy.** The assumed recharge capacity of each injection well was reduced to use a more conservative approach for planning purposes.
- **Assumed pumping capacity for new wells was changed from 485 afy to 480 afy.** The assumed pumping capacity at new production wells was slightly reduced to use a more conservative approach for planning purposes.
- **Potable water supply volumes were modified to account for loss during the RO treatment process.** As described in the response to LACSD comment number 3, the planned potable water supply volumes for Basin Management Alternatives 2 through 6 were reduced by 20 percent to account for an 80 percent recovery rate in RO treatment.

Attachment B

West Yost 2025 Billing Rate Schedule

2025 Billing Rate Schedule

(Effective January 1, 2025, through December 31, 2025)*

POSITIONS	LABOR CHARGES (DOLLARS PER HOUR)
ENGINEERING	
Principal/Vice President	$373
Engineer/Scientist/Geologist Manager I / II	$352 / $369
Principal Engineer/Scientist/Geologist I / II	$317 / $338
Senior Engineer/Scientist/Geologist I / II	$286 / $300
Associate Engineer/Scientist/Geologist I / II	$237 / $255
Engineer/Scientist/Geologist I / II	$185 / $215
Engineering Aide	$111
Field Monitoring Services	$138
Administrative I / II / III / IV	$102 / $127 / $152 / $168
ENGINEERING TECHNOLOGY	
Engineering Tech Manager I / II	$366 / $369
Principal Tech Specialist I / II	$336 / $348
Senior Tech Specialist I / II	$308 / $321
Senior GIS Analyst	$278
GIS Analyst	$264
Technical Specialist I / II / III / IV	$196 / $224 / $251 / $280
Technical Analyst I / II	$141 / $168
Technical Analyst Intern	$113
Cross-Connection Control Specialist I / II / III / IV	$147 / $159 / $179 / $198
CAD Manager	$222
CAD Designer I / II	$172 / $194
CONSTRUCTION MANAGEMENT	
Senior Construction Manager	$355
Construction Manager I / II / III / IV	$211 / $226 / $239 / $303
Resident Inspector (Prevailing Wage Groups 4 / 3 / 2 / 1)	$190 / $211 / $235 / $244
Apprentice Inspector	$172
CM Administrative I / II	$91 / $124
Field Services	$244

- Hourly rates include charges for technology and communication, such as general and CAD computer software, telephone calls, routine in-house copies/prints, postage, miscellaneous supplies, and other incidental project expenses.
- Outside services, such as vendor reproductions, prints, and shipping; major West Yost reproduction efforts; as well as engineering supplies, etc., will be billed at the actual cost plus 15%.
- The Federal Mileage Rate will be used for mileage charges and will be based on the Federal Mileage Rate applicable to when the mileage costs were incurred. Travel other than mileage will be billed at cost.
- Subconsultants will be billed at actual cost plus 10%.
- Expert witness services, research, technical review, analysis, preparation, and meetings will be billed at 150% of standard hourly rates. Expert witness testimony and depositions will be billed at 200% of standard hourly rates.
- A finance charge of 1.5% per month (an annual rate of 18%) on the unpaid balance will be added to invoice amounts if not paid within 45 days from the date of the invoice.

* This schedule is updated annually