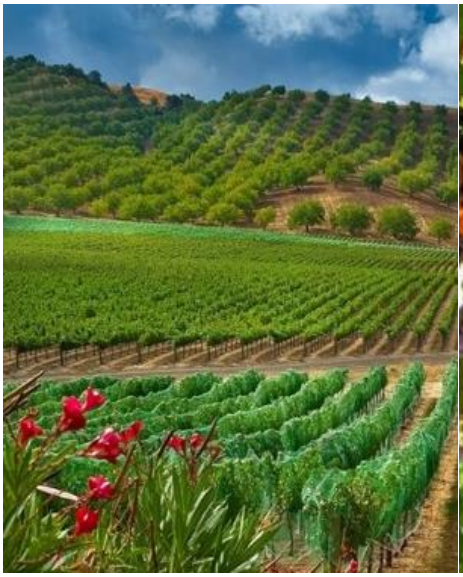

DRAFT PROJECTS SUMMARIES

Paso Robles Subbasin GSP Development

Disclaimer *These Draft Documents are provided for information only and are intended to help facilitate discussions related to Projects & Management Actions to be considered in the Paso Basin Groundwater Sustainability Plan (GSP), currently under development. The information contained herein is subject to change and does not commit, nor does it necessarily reflect the views, opinions or endorsement of, the Cooperative Committee or any Agency.*

INTRODUCTION

This document provides a brief overview of projects that could be implemented to bring additional water supplies into the Paso Robles Basin as part of the GSP. Short descriptions are included for each project along with a map showing general project locations. Rough costs are also included.

Assumptions that were made to design each project, as well as potential issues, are listed. Assumptions and issues would need to be checked and tested during the pre-design phase of each project. Project designs, and therefore costs, could change considerably as more information is gathered.

The cost estimates shown herein are class 5 (i.e. "Order of Magnitude") estimates. These were estimates made with little to no detailed engineering data. The expected accuracy range for such an estimate is within +50 percent or –30 percent. The cost estimates are based on our perception of current conditions at the project location. They reflect our professional opinion of costs at this time and are subject to change as project designs mature.

Capital costs include major infrastructure including pipelines, pump stations, customer connections, turnouts, injection wells, recharge basins, and storage tanks. Capital costs also include 30% contingency for plumbing appurtenances, 15% increase for general conditions, 15% for contractor overhead and profit, and 8% for sales tax. Engineering, legal, administrative, and project contingencies was assumed as 30% of the total construction cost and included within the capital cost. Land acquisition at $30,000/acre was also included within capital costs.

Annual operations and maintenance (O&M) fees included the costs to operate and maintain new project infrastructure. O&M costs also include any pumping costs associated with new infrastructure. O&M costs do not include O&M or pumping costs associated with existing infrastructure (e.g. State Water Project (SWP) or Nacimiento Water Project (NWP) O&M costs), as these were assumed to be part of water purchase costs.

Water purchase costs were assumed to include repayment of loans for existing infrastructure.

Capital costs were annualized over thirty years and added with annual O&M costs and water purchase costs to determine a cost in $/AF per project. This $/AF value might not

always represent the $/AF of basin benefit (i.e. "$/AF-benefit"). For instance, if the Department of Water Resources (DWR) delivered less than 100% of the allocation, the $/AF-benefit would increase. Similarly, if water that is delivered to a recharge basin recharges into the deep aquifer at a rate of 50%, then the $/AF-benefit would increase. The projects described herein are summarized in Table 1 below.

Table 1. Summary of Projects

Supply	Area	Project Type
SWP	Creston	Direct delivery for irrigation
		Recharge basin
		Direct Injection
	Shandon	Direct delivery for irrigation
		Recharge basin
NWP	Estrella	Direct delivery for irrigation
		Recharge basin

SWP Injection Wells in Creston

Description:
This project would utilize injection wells in the Creston region to directly recharge the basin with an average of 1,100 AFY of treated water from the SWP Coastal Branch pipeline. As shown in Figure 1, the project would consist of a new SWP Coastal Branch turnout, 1 mile long pipeline, and six injection wells. No pumps were assumed necessary to deliver water to the wellheads with at least 50 psi of residual pressure to this location, as the pressure in the Coastal Branch is likely sufficient. Locations further from the SWP pipeline might require a pump station.

An injection capacity of 200 gallons per minute (gpm) was conservatively assumed as 50% of production capacity in the region, 400 gpm. The actual injection capacity would need to be determined through a pilot study. The cost of the pilot study was included in the project capital cost. Other factors would also impact feasibility, including hydrogeological characteristics, land available for purchase, Coastal Branch capacity, and water quality impacts.

Summary:

- Major Infrastructure: Turnout, pipeline, 6 injection wells.
- Pipeline Length: 1 mile
- Storage required: None
- Infrastructure sized to recharge: 1,900 AFY
- Average annual water recharged: 1,100 AFY
- Estimated Basin Benefit: ~100%

Major Assumptions:

- Injection capacity (200 gpm) is 50% of production capacity for wells in the area (400 gpm).
- 50 psi residual pressure required at the well heads.
- Sufficient pressure within the Coastal Branch pipeline to reach the wellhead.

Potential design flaws:

- This project is assumed to be located very close to the SWP line. If the project had to be located at a distance much further, it could cost a lot more.
- While this project is sized for 1,900 AFY of injected water, annual SWP deliveries vary.
- Assumes treated SWP water is suitable for injection without further treatment.
- SWP Coastal Branch might not have sufficient capacity at the Creston area.

- SWP buy-in cost is unknown but negotiable.

Costs:

- Capital Cost: $16M
- Annual O&M Cost: $94k
- Project Cost annualized over 30 years: $3M
- Assumed cost to purchase SWP water: $1,200/AF
- Cost/AF: $1,800/AF

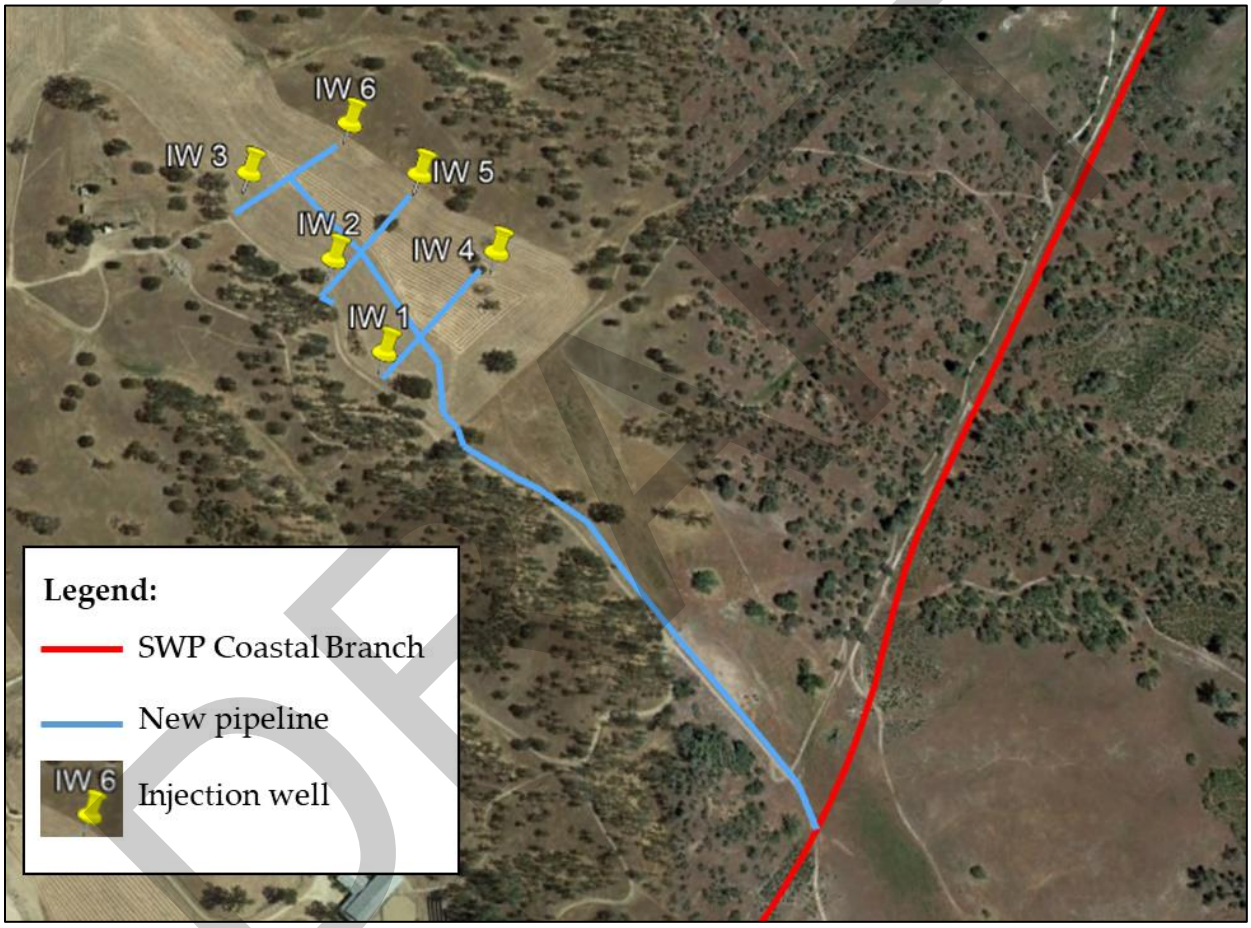

Figure 1. SWP Injection Wells in Creston

SWP Direct Delivery in Creston

Description

Delivery of treated SWP water for irrigation in the Creston area. This project consists of a turnout, pump station, tank, and pipeline sized to deliver up to 3,200 gpm. The project is sized to deliver 2,030 AFY to a group of agricultural water users in Creston near the SWP pipeline. It is assumed that 100% of demand of the users served is met by SWP water. The pipeline was sized to deliver 3,200 gpm to meet peak summer pumping demands.

Summary:

- Major Infrastructure: Turnout, pump station, tank, pipeline
- Pipeline Length: 5 miles
- Storage required: 1.7 million gallons
- Infrastructure sized to deliver: 2,030 AFY
- Average annual water delivered: 1,200 AFY
- Estimated Basin Benefit: ~100%

Assumptions

- Pipeline alignments were selected to deliver water to the largest users closest to the SWP Coastal Branch.
- Pipeline is sized to meet 100% of the demands of the modeled pumping that the pipeline delivers to.
- Assumes that farmers irrigate for 12 hours per day.
- Assumes 100% of agricultural demand is met by SWP water.
- Does not include dechlorination of SWP treated water.
- Assumes that farmers do not have daily onsite storage, and require 50 psi residual pressure at connection.
- Assumes low flow demands can be met.
- Includes agricultural customer turnouts, but not private pipelines.

Potential design flaws:

- SWP Coastal Branch might not have sufficient capacity at the Creston area to deliver the peak instantaneous flow assumed in this project based on peak monthly demand.
- SWP buy-in cost is unknown but negotiable.

Costs

- Capital Cost: $40M
- Annual O&M Cost: $203k
- Project Cost annualized over 30 years: $5M
- Cost/AF: $2600/AF

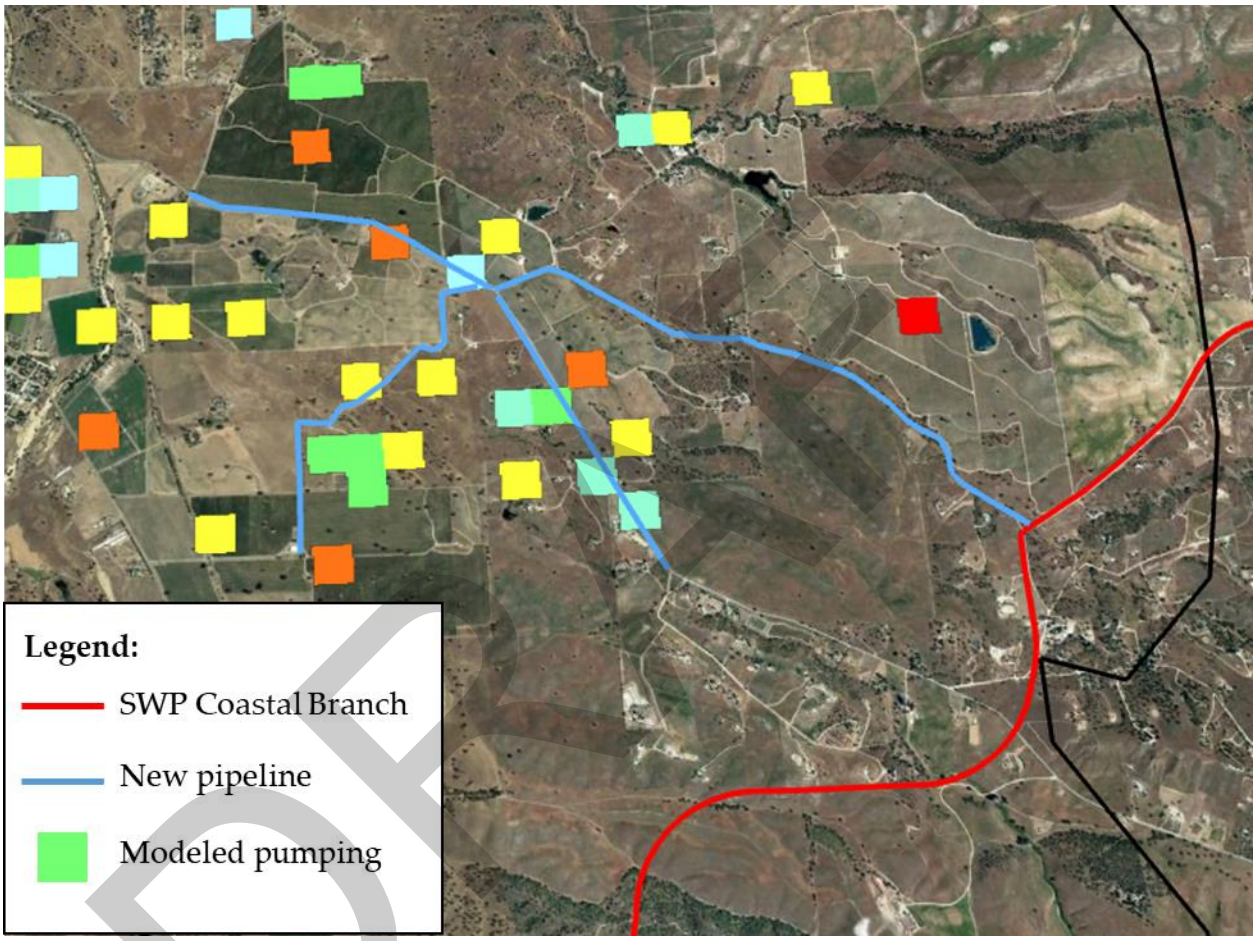

Figure 2. SWP direct delivery in Creston

SWP TO RECHARGE BASIN IN CRESTON

Description

This project consists of a short pipeline to deliver 1,900 AFY of SWP to a recharge basin close to the SWP pipeline. Locating the recharge basin close to the SWP Coastal Branch pipeline enables to the pipeline to flow by gravity without the use of a pump station. If land near the SWP is not available for purchase, this project could become more expensive.

Recharge capacity for this project is unknown. While 1,900 AFY of water might be delivered to the basin, it does not necessarily mean that 1,900 AFY of water will infiltrate into the aquifer. Therefore, the basin benefit might be much lower than the amount of water purchased and recharged.

Summary

- Major Infrastructure: Turnout, pipeline, recharge basin
- Pipeline Length: 3,900 feet
- Recharge basin size: 21 acres
- Infrastructure sized to deliver: 3,800 AFY
- Average annual water delivered: 2,200 AFY
- Estimated Basin Benefit: Unknown

Assumptions

- Neglects minor losses.
- Recharge rate of 6 inches per day, back-calculated from the Basin Supply Options Feasibility Study.

Potential design flaws

- The land very close and downhill from the SWP pipeline might not be available. If the project required a pump station, it would be more expensive.
- Infiltration rate and long-term capacity is unknown and would need to be determined through a pilot study.
- SWP Coastal Branch might not have sufficient capacity at the Creston area.
- SWP buy-in cost is unknown but negotiable.

Cost

- Capital Cost: $4M
- Annual O&M Cost: $42k
- Project Cost annualized over 30 years: $5M

- Assumed cost to purchase SWP water: $1,200/AF
- Cost/AF: $1,300/AF

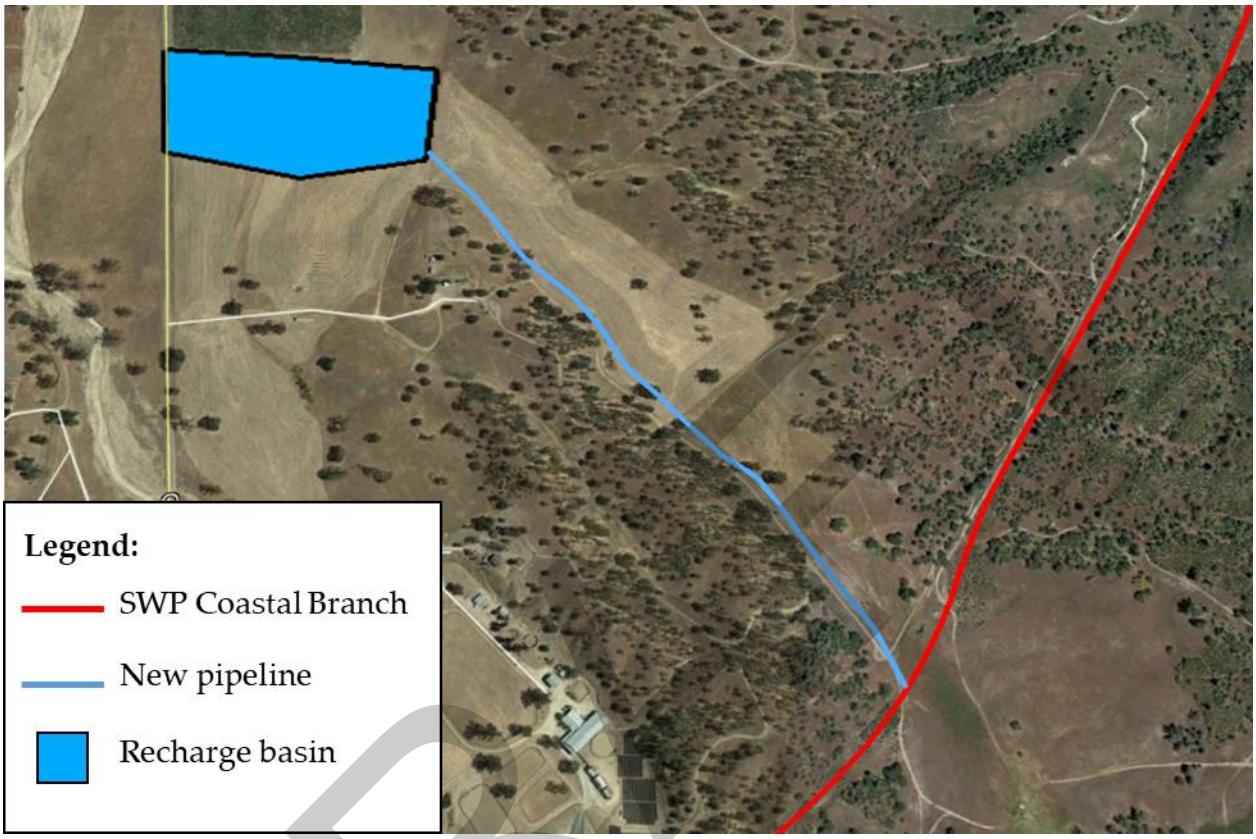

Figure 3. SWP to recharge basin in Creston

SWP Direct Delivery in Shandon

Description

This project consists of delivering treated SWP water to agricultural pumpers in Shandon near the SWP pipeline. The project is sized to meet 13% of demand in June for each user and 25% of total demand of the users reached.

Summary

- Major Infrastructure: Turnout, pipeline, pump station, storage tank
- Pipeline Length: 3.5 miles
- Storage required: none
- Infrastructure sized to deliver: 830 AFY
- Average annual water delivered: 480 AFY

Assumptions

- Pipeline alignments were selected to deliver water to the largest users closest to the SWP Coastal Branch
- Pipeline is sized to meet 25% of the demands of the modeled pumping that the pipeline delivers to
- Assumes that farmers irrigate for 12 hours per day
- Does not include dechlorination of SWP treated water
- Takes water from below the Shandon turnout
- Assumes that farmers do not have daily onsite storage, and require 50 psi residual pressure
- Assumes low flow demands can be met
- Includes agricultural customer turnouts, but not private pipelines

Potential design flaws:

- SWP Coastal Branch might not have sufficient capacity at the Creston area to deliver the peak instantaneous flow assumed in this project based on peak monthly demand.
- SWP buy-in cost is unknown but negotiable.

Cost

- Capital Cost: $14M
- Annual O&M Cost: $42k
- Project cost annualized over 30 years: $2M
- Assumed cost to purchase SWP water: $1,200/AF
- Cost/AF: $2,400/AF

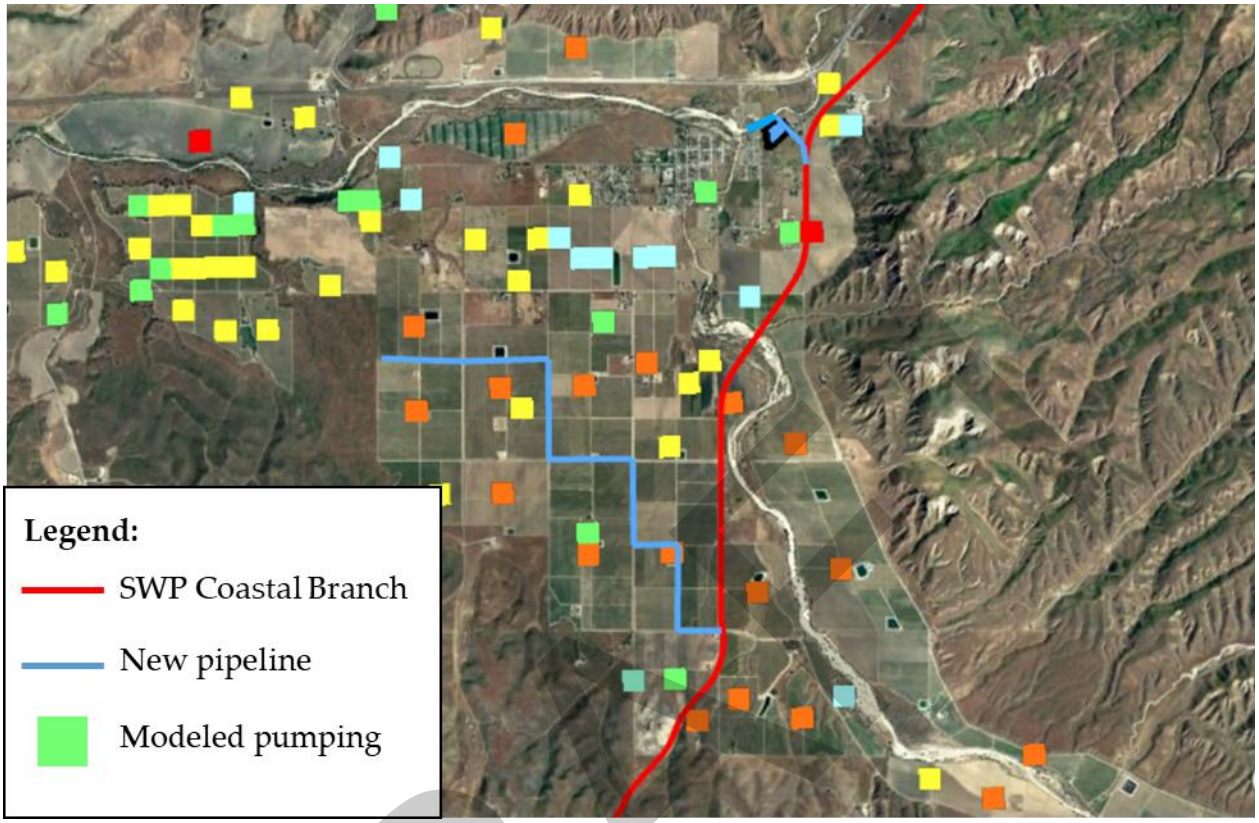

Figure 4. SWP direct delivery in Shandon

SWP TO RECHARGE BASIN IN SHANDON

Description

This project consists of a pipeline to a recharge basin in Shandon near the Estrella River. This project is sized to deliver 1,400 AFY of water. This project relies on the availability of land near the SWP pipeline such that water could be delivered from the SWP Coastal Branch to the recharge basin via gravity. If land near the SWP is not available for purchase, this project could become more expensive.

Recharge capacity for this project is unknown. While 1,600 AFY of water might be delivered to the basin, it does not necessarily mean that 1,600 AFY of water will infiltrate into the aquifer. Therefore, the basin benefit might be much lower than the amount of water purchased and recharged. Previous analyses showed that basin benefit in this region might be close to 50%.

Summary

- Major Infrastructure: Turnout, pipeline, recharge basin
- Pipeline Length: 1225 ft
- Recharge basin size: 9 acres
- Infrastructure sized to deliver: 1,600 AFY
- Annual Water Delivered to Recharge Basin: 930 AFY

Assumptions

- Recharge rate of 6 inches per day, back-calculated from the Basin Supply Options Feasibility Study. This is likely a conservative estimate, as a study on the Huerhuero shows infiltration rates of 1-4 feet per day close to the river.
- Assumes sufficient pressure exists in the Coastal Branch to flow to the recharge basin without a pump station.

Potential design flaws

- Infiltration rate and long-term capacity is unknown and would need to be determined through a pilot study.
- The land very close and downhill from the SWP pipeline might not be available. If the project required a pump station, it would be more expensive.
- SWP buy-in cost is unknown but negotiable.
- According to the 2008 Basin Study, the Estrella and North of the Estrella River have a fine-grained layer with low permeability above Paso Formation. This layer might impede aquifer recharge and lead to low infiltration capacities and basin benefit.

Cost

- Capital Cost: $2M
- Annual O&M Cost: $40,000
- Project Cost annualized over 30 years: $2M
- Assumed cost to purchase SWP water: $1,200/AF
- Cost/AF: $1,300/AF

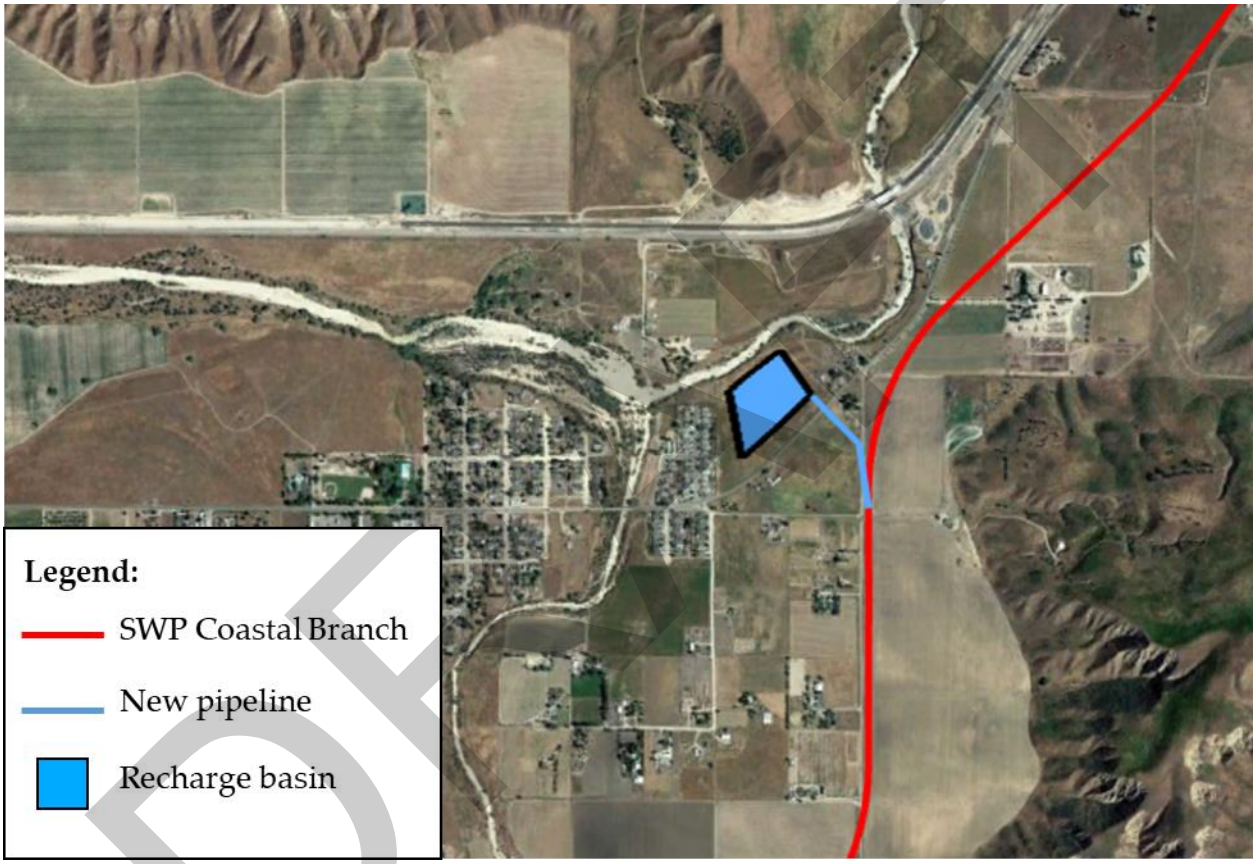

Figure 5. SWP to recharge basin in Shandon

NWP Direct Delivery in Estrella

Description

This project delivers NWP water through a new pipeline to agricultural water users near the confluence of the Salinas and Estrella Rivers. This location was selected since it does not conflict with the planned recycled water pipeline near the airport. To deliver the most water using a short pipeline, 100% of water demand to these users was assumed to be met by NWP water and the pipeline was sized to meet peak summer month demands. The pipeline diameter and pump station size could be significantly lower if growers had the ability to store water on-site.

Summary

- Major Infrastructure: Turnout, pipeline, storage tank, pump station
- Pipeline Length: 3 miles
- Storage required: 3.6MG
- Annual water delivered: 3,800 AFY
- Average annual water delivered: 3,800 AFY

Assumptions

- Pipeline alignments were selected to deliver water to the largest users closest to the NWP pipeline without interfering with the planned recycled water service area
- Pipeline is sized to meet 100% of the demands of the modeled pumping that the pipeline delivers to
- Assumes that farmers irrigate for 12 hours per day
- Assumes that farmers do not have daily onsite storage, and require 50 psi residual pressure
- Assumes low flow demands can be met
- Assumes no pretreatment
- Includes agricultural customer turnouts, but not private pipelines

Potential design flaws

- To ensure that this project provides in-lieu recharge, it would need to be confirmed that these agricultural users currently pump groundwater from the deep basin as opposed to the shallow aquifer. Since these growers are located at the confluence of two rivers, it is possible that they pump much of their groundwater from the shallow alluvium. Deep basin benefit would be higher by offsetting pumping from the deep basin.

- NWP water might require some form of treatment as it is known to be high in suspended solids and metals.
- NWP water cost is unknown and will require some form of negotiation
- NWP water would need to be secured through a long-term contract to support capital investments.

Cost

- Capital Cost: $52M
- Annual O&M Cost: $264K
- Project Cost annualized over 30 years: $8M
- Assumed cost to purchase NWP water: $1,200/AF
- Cost/AF: $2,200/AF

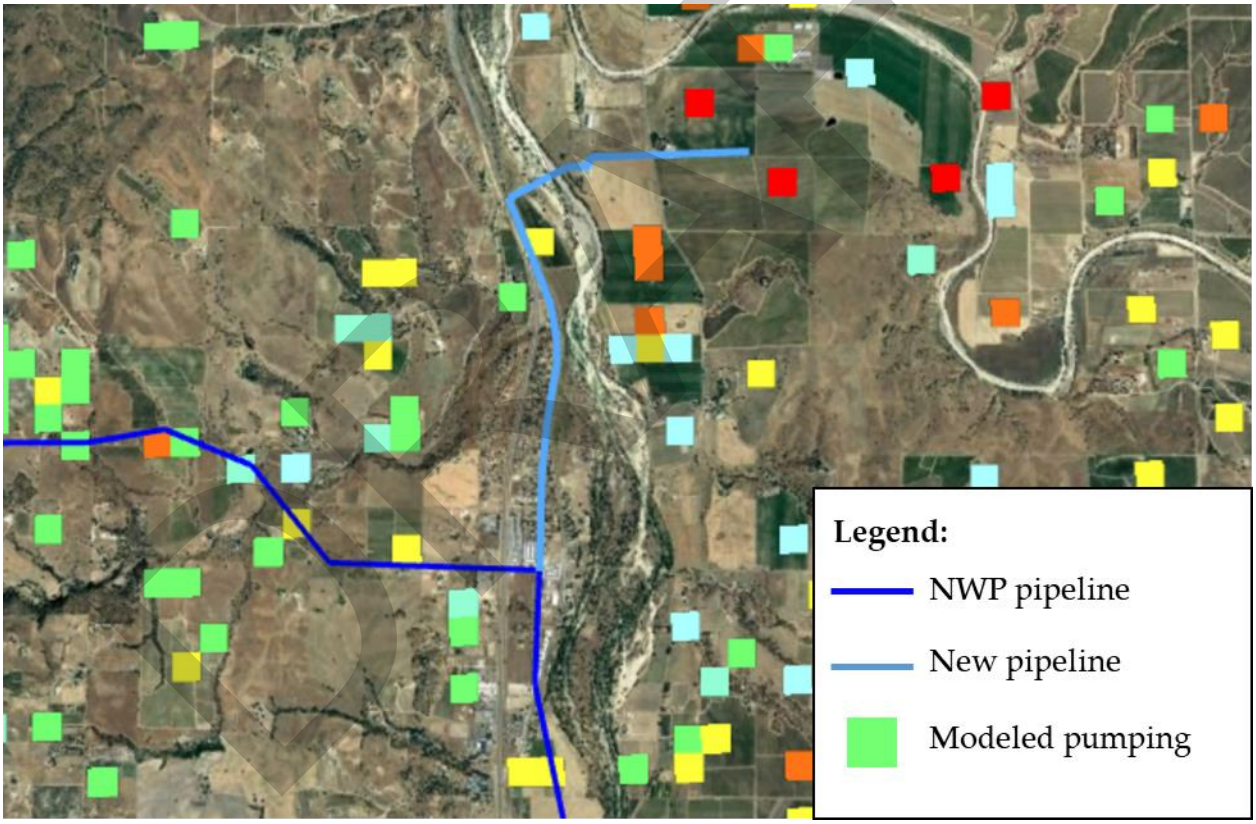

Figure 6. NWP direct delivery in Estrella

NWP TO RECHARGE BASIN IN ESTRELLA

Description

This project is sized to deliver 6,950 AFY of NWP water to a recharge basin near the airport. This location was selected as having a large area of apparently unused land. Options nearer to the pipeline also appeared limited due to housing and commercial developments. Previous studies have also shown that this region has relatively high recharge efficiency. Because the basin is far from the NWP pipeline, a pump station is required to deliver the water to the basin.

Summary

- Major Infrastructure: Turnout, pipeline, pump station, recharge basin
- Pipeline Length: 3.8 miles
- Recharge basin size: 45 acres
- Annual water recharged: 8,400 AFY
- Estimated basin benefit: Unknown

Assumptions

- Recharge rate of 6 inches per day, back-calculated from the Basin Supply Options Feasibility Study. This is likely a conservative estimate, as a study on the Huerhuero shows infiltration rates of 1-4 feet per day close to the river.

Potential design flaws

- The land might not be available, and there may be an issue locating a large body of water close to the airport due to bird nuisance.
- Infiltration rate and long-term capacity is unknown and would need to be determined through a pilot study.
- NWP water cost is unknown and will require some form of negotiation
- NWP water would need to be secured through a long-term contract to support capital investments.

Cost

- Capital Cost: $27M
- Annual O&M Cost: $742k
- Project Cost annualized over 30 years: $11M
- Assumed cost to purchase NWP water: $1,200/AF
- Cost/AF: $1,600/AF

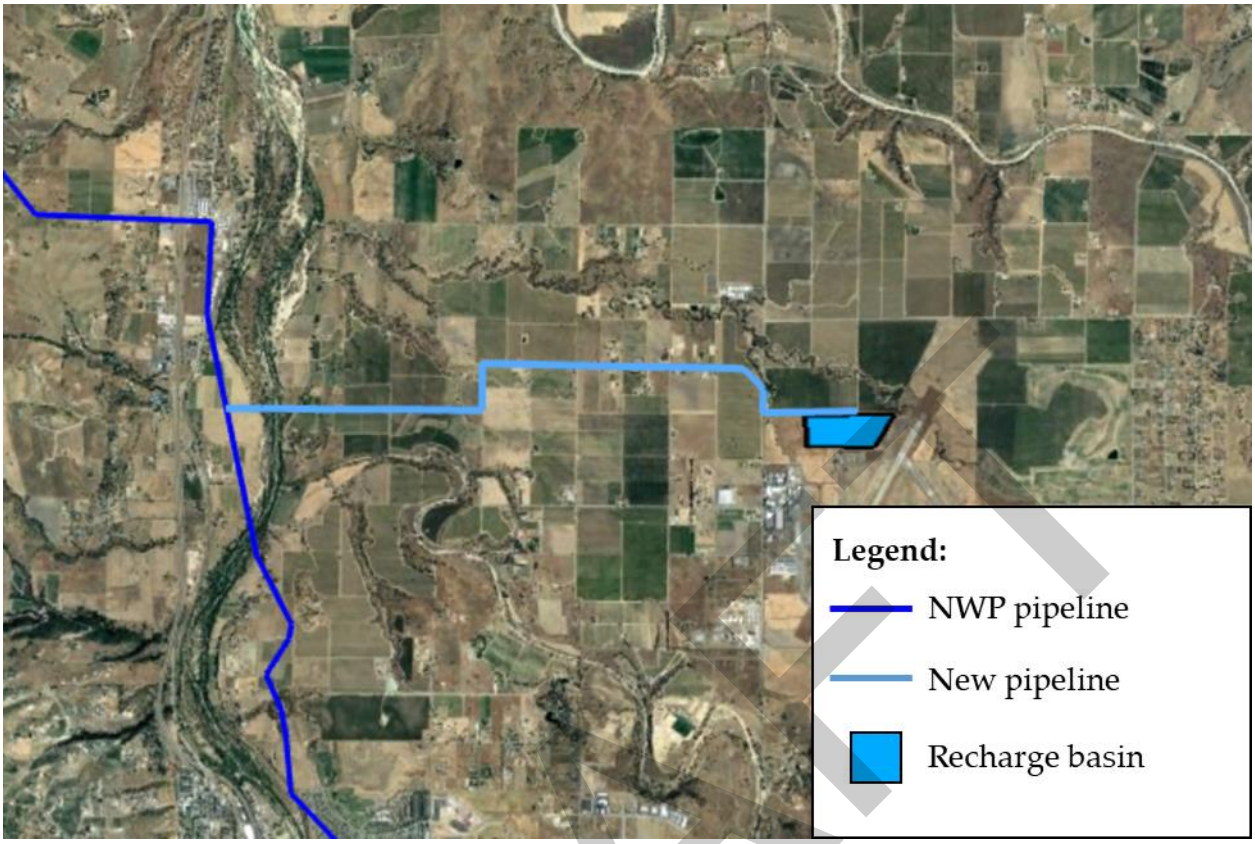

Figure 7. NWP to recharge basin in Estrella