City of Paso Robles

Recycled Water Master Plan

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City of El Paso de Robles
Recycled Water Master Plan

Master Plan Author – AECOM March 31, 2014

Executive Summary

The City of El Paso de Robles operates a potable water system that supplies approximately 6,700 acre-feet of water each year to residents and businesses, and also operates a wastewater collection system that returns flow to the City's wastewater treatment plant (located northeast of Highway 101 / 46 intersection). Approximately 3,300 AFY of treated effluent from that plant is currently discharged via a series of ponds back into the Salinas River system.

The wastewater treatment plant is undergoing an upgrade now both for compliance with current discharge requirements and for potential future reuse of treated effluent. This update of the Recycled Water Master Plan was commissioned to:

- Identify potential recycled water customers;
- Forecast the quality of recycled water;
- Evaluate recycled water distribution system options to meet in-City demands as well as potential uses in surrounding areas (i.e. the groundwater basin and/or neighboring irrigators);
- Look for opportunities to phase the construction of a recycled water delivery system, and;
- Develop planning-level cost opinions for the phased system.

Potential Customers

Recycled water is suited for irrigation and other non-potable water supply such that larger irrigators are primary potential customers. Irrigators within the City are located such that extending a recycled water delivery system eastward more than 3 miles from the treatment plant along the Highway 46 corridor would serve the most customers. Key potential in-City customers include:

Black Ranch
Hunter Ranch
Agricultural Acreage in Airport Area
Barney Schwartz Park
The Links Golf Course
Paso Robles Golf Club
River Oaks

In all, in-City irrigation customers in planned recycled water service areas may use approximately 1,520 AFY of available recycled water (2.9 million gallons per day during the maximum month). The larger of these potential users currently operate private wells to meet their irrigation needs. Customers that may be eligible to switch from the potable water system to the proposed recycled water system represent approximately 428 acre-feet per year.

Serving this set of in-City customers would leave approximately 1,780 AFY of recycled water available for other uses, more as the City grows. Potential users north and east of the City limits include:

Vina Robles Vineyard
(approx. 535 irrigated acres)
Other vineyards – "Northeast Irrigation Area"
(approx. 2,170 irrigated acres)

Other vineyards – "Eastern Irrigation Area"
(approx. 1,030 irrigated acres)

In all, potential irrigators north and east of the City limits could use the balance of available recycled water *during the irrigation season* and would require extension of the distribution system to do so.

Even with a full set of recycled water customers using all available water during the summer irrigation months, the City would have to maintain a means of winter season water disposal. This is addressed in the Basin Recharge section below.

Water Quality

An issue of concern in reusing treated effluent is salt content. Customers add to the salinity levels as we use water in our homes and businesses such that by the time flow reaches the wastewater treatment plant, the resulting flow stream is comparably high in salinity. Recycled water that is high in chlorides and "total dissolved solids", for example, is less desirable as irrigation supply because some plants do not thrive in such waters. Waters that are higher in boron content pose similar concerns. Conventional wastewater treatment processes treat the biologic / nutrient content of the water but are not designed to reduce salinity or boron content.

Paso Robles' setting with regard to salinity and boron can be summarized as:

	City well water[1]	**Estrella area wells[2]**	**WWTP Effluent**	**Goal for Irrigation[3]**
Total dissolved solids, mg/L	510-530 average	400 to 700	832-1,000[4]	<450
Chlorides, mg/L	63	50 to 80	260-380[5]	<106
Nitrates, mg/L	5.96	Below 40	5.4-8.1[6]	n/a
Boron, mg/L	0.22		0.61[7]	<0.5

[1] "Paso Robles 2012 Water Quality Report" and "Paso Robles Water Treatment Plant Project Preliminary Design Report, Technical Memo No. 3", Black & Veatch, 2008 and "Water and Wastewater Quality Concerns – Water Quality Strategy", Malcolm Pirnie, Inc., 2003
[2] "Paso Robles Groundwater Subbasin Water Banking Feasibility Study" by Fugro and Cleath, 2008
[3] Quality guidelines classified as "no problem" for irrigation as stated in "Recycled Water Study Update", Table 3.1, Boyle Engineering Corp., 2006
[4] "Water and Wastewater Quality Concerns – Water Quality Strategy", Table 2-11, Malcolm Pirnie, Inc., 2003 and input from M. Thompson, Wastewater Resource Manager.
[5] "Recycled Water Study Update", Boyle Engineering Corp., 2006
[6] "Recycled Water Study Update", Boyle Engineering Corp., 2006
[7] Plant effluent grab sample taken Aug 24, 2006

The potential recycled water customers listed in the previous section are irrigating with well water that has a TDS level of approximately 400-700 mg/L. Recycled water from the City's treatment plant would approach twice that salt concentration unless:

- the City's potable water treatment plant comes on line and introduces increasing volumes of softer Nacimiento waters into its delivery system;
- customers add less salt by making industrial pretreatment improvements and using fewer residential water softeners, and/or;
- recycled water were blended with lower salinity waters prior to irrigation.

In February 2014, the City awarded the construction contract for a 2 million gallon per day potable water treatment plant, a step that is expected to somewhat lower salt levels at the wastewater treatment plant. Also, the City undertakes an industrial pretreatment program and may in the future consider steps to control use of residential water softeners. This, too, would lower salt levels at the wastewater plant.

Still, future customers will notice that recycled water is notably more saline than groundwater, to the degree that irrigators will likely blend recycled supplies with well water. An assumed level of blending is reflected in the usage projections throughout this report.

Basin Recharge

Irrigation is seasonal while flow through the City's wastewater treatment plant is near-constant. This means that the City must continue to dispose of treated effluent during the Winter months and could do so:

- at the current location into the Salinas River (which is down-gradient of the City's supply wells);
- upstream of the City's potable water supply wells with the intent of benefitting the yield from those wells, or;
- at a location east of the City with the intent of recharging the portion of the Paso Robles Groundwater Basin that is in serious water level decline (i.e. the "Estrella Area").

The benefits of continued discharge into the Salinas River at the current location are that discharge permits are in-hand and no additional infrastructure would be needed. However, sustaining that practice does not directly benefit City wells.

The benefit of discharging recycled water upstream of the City's existing wells would be additional well yield but only 10 to 46 AFY is projected. The disadvantages of this practice include the need for more than 3 miles of transmission pipe plus recovery wells in addition to the need for a significant quantity of blending water to meet public health requirements.

Potential for Conveying Nacimiento Water

Constructing a recycled delivery system eastward out the Hwy 46 corridor presents an additional opportunity – use of the delivery system to wheel available Nacimiento water out into the Estrella Area.

This concept would encourage use of available Nacimiento supplies in the more stressed area of the groundwater basin and introduce more water into the Huer Huero Creek channel, also for the regional benefit of the basin.

Blending with Nacimiento water has a water quality advantage, too. Nacimiento TDS levels are approximately 180 mg/L compared to City recycled water quality at 832 to 1,000 mg/L TDS.

The benefits of discharging recycled water seasonally to a location east of the City (presumably into the Huer Huero Creek channel) could include direct benefit to the area in most need of recharge, continuing recharge into a Salinas River tributary, and sustaining year-round flows in the proposed recycled water delivery system. The disadvantage of this practice is little direct benefit to the City, rather this practice may pose a regional water supply benefit.

Forecasted Costs

Major components of proposed delivery systems (refer to **Figure ES-1**) are identified in this study along with engineer's opinion of probable project costs. Budget level capital cost estimates are:

Phase 1 (Service Area A)	$6.3 million
Phase 2 (Service Areas A and B)	+$35.4 million
Phase 3 (Service Areas A, B, and C)	+$4.3 million
TOTAL =	$46 million

A financial analysis is now underway, but initial observations are that this is too costly a system to be financed solely by users within the City limits. The system would make economic and water resource sense if it served broader regional needs and were financed by both City users and outside irrigation partners.

Next Steps

1. Translate the forecasted recycled water project costs into a financial plan, illustrating cash flow needs and likely revenue from new customers and user rates. Evaluate that forecast in conjunction with potable water and wastewater financial plans to hone in on likely project timing.

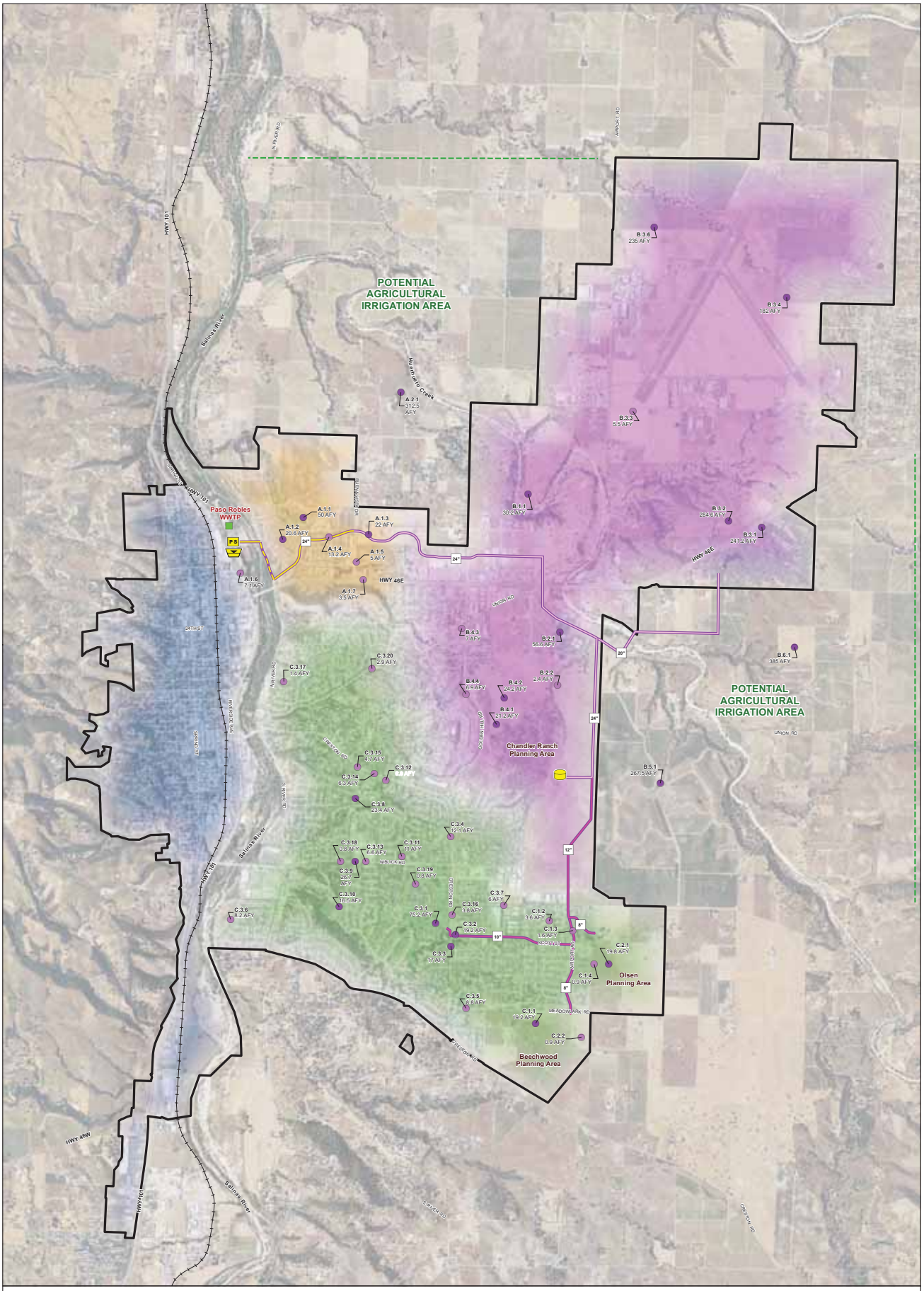
2. Host meetings with potential larger customers to discuss the contemplated water source, especially water quality.

3. Provide an overview of the recycled water plan to regional water management groups in terms of location, quality, yield, and timing of this supplemental water project.

4. Follow through on salt loading recommendations (i.e. build the Nacimiento water treatment plant, seek voluntary reduction in water softening, then pursue limiting ordinances as-needed).

5. Based on the above steps and on dialogue with potential users, work with City Council to determine financing approach and construction timing for recycled water.

Executive Summary Author
Christine M. Halley, TJCross Engineers



Legend

- CityLimits
- Railroad
- Waste Water Treatment Plant
- Extent of Potential Agricultural Irrigation Uses Considered

Recycled Water System

- Existing Pipeline - Reach A
- Proposed Pipeline - Reach A
- Proposed Pipeline - Reach B
- Proposed Pipeline - Reach C
- Pump Station
- Water Tank
- Reservoir

<SITE ID> <AFY> Service Area Demands

<ID> Demand Node

- Service Area A
- Service Area B
- Service Area C
- West Side Service Area (Future Planning Phase)

0 750 1,500 3,000 Feet

Paso Robles Recycled Water Master Plan

ES-1 : System Layout

City of Paso Robles
Project No: 60194173

AECOM

Path: Paso Robles Recycled Water MP\GIS\Paso_Robles_Capital_Improvements_with_Service_Areas.mxd

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1. Introduction

1.1 Overview

The City of El Paso de Robles (City, also referred to as Paso Robles) provides potable water and wastewater collection and treatment services for residents, businesses, and other customers within the City limits. The City also currently receives and treats wastewater from a portion of the Templeton Community Services District's users. The City's wastewater treatment plant (WWTP) is operated by the Wastewater Division and is currently undergoing an extensive upgrade, including improvements to the biological treatment process. In the future, the City plans to provide disinfected tertiary recycled water as defined by Title 22.

The City's water supply is currently provided from wells, which extract water from a deep groundwater basin and from shallow underflow of the Salinas River. Raw surface water from Lake Nacimiento is also being released to the river corridor. The City is currently designing a water treatment plant to treat surface water received from the Nacimiento Water Project, which will increase potable water supply reliability and alleviate water shortages, particularly during the dry season.

The future use of recycled water is a component of the City's long-term water management plan. Through previous studies, the City has evaluated recycled water opportunities and delivery scenarios. The City has identified a plan to deliver recycled water and has performed an initial evaluation of indirect reuse and treated effluent disposal alternatives.

In addition to supplying recycled water to future uses within the City, the recycled water system could offset some groundwater pumping east of the City. That area of the Paso Robles Groundwater Basin has experienced notable declines in groundwater level and could benefit from supplemental water.

The goals and objectives of the City's "Water Resources Plan Integration and Capital Improvement Program" dated February 2007 include:

- improving water quality;
- increasing and diversifying water resources;
- reducing salt loading into the City's groundwater basins and thereby complying with regulatory mandates;
- maintaining strong water rights position;
- increasing reliability of water supplies;
- reducing groundwater basin dependence; and,
- prioritizing public works expenditures to meet these goals.

The use of recycled water will advance many of the stated goals and help the City comply with the State of California "20 by 2020" Water Conservation Requirements. A further City goal is to identify how the recycled water delivery system could play a role in regional water needs.

The City has previously evaluated several recycled water projects in terms of cost and consistency with the City's goals and objectives, and concluded the following:

- Irrigation was the most viable direct reuse option
- Surface discharge of highly treated wastewater to the Salinas River, though representing the lowest cost project, would have limited success to no success relative to supporting the City's water resources goals and would not satisfy most pressing regional basin recharge needs
- Groundwater recharge (considered to be indirect reuse) could represent an economical means of beneficially reusing the treated effluent while simultaneously working toward achieving many of the City's water resources goals

1.2 Purpose

The objectives of this master planning effort are as follow:

- Develop a strategy for beneficial use of recycled water
- Evaluate the technical feasibility and potential benefits of percolating recycled water at locations close to the City's Thunderbird Well Field. Examine this strategy in terms of current permitting and regulatory climate, and to alternative recycled water uses
- Identify recycled water demand within and around the City that corresponds to or exceeds the City's projected wastewater generated at build-out (4.9 MGD)
- Identify a phased approach to system construction and expansion
- Develop a hydraulic model to optimize the proposed recycled water distribution system
- Develop planning-level opinions of cost for system components and facilities and a phased Capital Improvement Plan.

The project Scope of Work is included as Appendix A.

2. Background

2.1 Study Area

Paso Robles is located in San Luis Obispo County, approximately 200 miles from both San Francisco and Los Angeles along Highway 101. The study area for the City's recycled water system consists of the City's current service area, delineated by the City's boundaries, and includes consideration of providing recycled water to irrigation areas to the north and east of the City limits (see Section 3). The region experiences mild winters and hot, dry summers, characteristic of a Mediterranean climate.

Topography within the City varies between approximately 660 feet above sea level near the Salinas River in the northern part of the City, to approximately 990 feet in the Golden Hills area on the City's east side, and approximately 1,018 feet in the Highland Park area on the west side. The Salinas River and U.S. Highway 101 transect the City from roughly north to south. The majority of the City's west side has relatively flat topography, while areas east of Highway 101 include relatively low hills and flat regions.

Land uses within the City's boundary include agricultural, residential, commercial, industrial, public and undeveloped land. The majority of agricultural uses within the City are north of Highway 46. Agricultural uses and scattered rural development are predominant beyond the City limit to the north and east. Land use in the City is governed by the City's General Plan and includes several areas of proposed new development. To the north and east of the City's boundaries land uses consist of rural development, agricultural operations and undeveloped areas.

2.2 Past Recycled Water Planning

Past recycled water planning studies include the 2000 Comprehensive Recycled Water Study and the 2006 Recycled Water Study Update. Findings and recommendations from the 2006 Recycled Water Study have defined a general approach to providing recycled water service for City uses and identified the need for additional evaluation of the feasibility of a proposed indirect reuse project involving groundwater replenishment.

As part of preliminary engineering for the design of WWTP improvements, the City evaluated alternative treatment and disinfection approaches that would be further developed during further planning and design of tertiary treatment upgrades. Projections of some water quality parameters were provided in the Wastewater Treatment Plant Upgrade Facility Plan (2009).

The City's 2010 Urban Water Management Plan (finalized in 2011) forecasts future use of recycled water of approximate 650 AF per year for direct uses within the City and potential uses outside of the City currently pumping groundwater.

2.3 Existing Recycled Water Infrastructure and Considerations for Reuse

2.3.1 Wastewater Treatment Plant

The City's WWTP is currently undergoing a comprehensive upgrade to allow compliance with current discharge requirements. The current upgrade project will replace the trickling filter biological treatment process with activated sludge process configured for biological nutrient removal, and includes improvements to ancillary processes. The current upgrade will provide disinfected secondary effluent. Disinfected secondary effluent is suitable for limited irrigation uses provided that disinfection requirements outlined in Title 22 Water Recycling Criteria are met (refer to Section 3.6).

The WWTP upgrade will position the City for addition of tertiary treatment as part of its future recycled water system thereby maximizing potential use of recycled water for irrigation. The planned upgrade to tertiary treatment would include addition of filter pumps, chemical feed systems, tertiary filters, disinfection, and associated facilities.

Planned WWTP upgrades aim to reduce wastewater constituents to allow safe use of recycled water for specific uses, however, salt content is commonly a concern when considering reclamation of municipal

wastewater, and is not appreciably reduced through tertiary filtration. Salt levels in the City's current wastewater range from approximately 832 - 1,000 mg/L TDS. While the current salt content may not be ideal for all recycled water uses without some reduction of salinity, the City could consider the following measures to reduce salt levels in the recycled water supply:

- Introduction of treated water from the Nacimiento Water Project into the potable water system;
- Reduction of self regenerating water softener use by City customers; and,
- Operation of the proposed recycled water system to blend recycled water with surplus supply from the Nacimiento Water Project and/ or with groundwater, as described further in Section 4.2.

2.3.2 Conveyance Infrastructure

As part of a past sewer upgrade project, a segment of recycled water transmission main was installed along North River Road for future use. Utilization of this existing portion of transmission pipeline is described further in Sections 4 and 5.

2.3.3 Existing Water Conservation Ordinances

The City has in place a Water Conservation and Water Shortage Contingency Plan and a Water Efficient Landscaping Ordinance. The plan established water waste prohibitions that apply to existing customers and restrictions implemented in stages to increase water supply availability during shortages. The Water Efficient Landscaping Ordinance requires efficient landscape irrigation systems and restricts turf areas in new developments.

The City's pretreatment program aims to improve the water quality of discharges from commercial and industrial sewer customers and will benefit water recycling by reducing biological and chemical constituents in the City's wastewater.

3. Evaluation of Potential Recycled Water Uses

3.1 Previously Identified Uses

The 2006 Recycled Water Study Update identified 67 potential recycled water users. User categories included industrial uses, golf courses, parks, cemeteries, school yards, future developments, vineyards, other public lands and roadway medians and right-of-ways.

Additionally, the 2006 study evaluated potential percolation sites for groundwater recharge that would benefit City wells. Two sites (located near the southern City limit and along the Salinas River) were identified as prospective sites and a screening-level soils investigation was performed.

Recommendations from the 2006 Recycled Water Study Update included implementation of a hybrid recycled water system comprised of irrigation uses, groundwater recharge, and continued seasonal discharge of treated effluent to balance recycled water supply and demand.

As part of this Master Plan, the list of potential recycled water uses was updated (refer to Section 3.3). Two potential percolation sites located at the south end of the City were further evaluated in terms of current state regulatory requirements, hydrogeological characteristics, potential recharge capacity, anticipated environmental constraints, and potential benefits and constraints. Refer to Section 3.4, Appendix D, and Appendix E .

3.2 Groundwater Replenishment to Benefit City Wells

Potential groundwater recharge sites were investigated for benefit of City wells in the Recycled Water Study Update (2006). An initial screening was performed to identify potential recharge sites in and around the City and considered sites along the Salinas River and tributary drainages, including areas both north and south of the City, and along the Huer Huero Creek near the crossing of Highway 46 and north. Based on an analysis of the percolation sites provided by Fugro, two located to the south of the City along the Salinas River corridor (Sites F and G), were identified as potential candidate sites. Other sites investigated had relatively limited percolation capacity, were of less direct benefit to City water supplies, or had significant challenges for implementation of a recharge project.

Both recharge via surface spreading and recharge using subsurface injection were considered along the Salinas River on the south end of town (refer to Figure 3-1). However, prescribed treatment methods for subsurface injection include reverse osmosis following advanced treatment[1], which represent a significant capital investment by the City and high operational and maintenance costs. Due to high costs associated with both treatment requirements and operation of injection wells, it has been determined that recharge via surface spreading would be the more feasible alternative for the conceptual project.

The feasibility, potential benefits, and constraints associated with percolation of recycled water for groundwater recharge were evaluated and includes:

- Review of regulatory requirements and investigation of hydrogeological conditions that would affect project feasibility, design, implementation, and application of recycled water for groundwater replenishment.
- Preliminary analysis of environmental constraints to identify and evaluate environmental issues that could affect project development and implementation.

[1] *Groundwater Replenishment Reuse Draft Regulation, March, 2013 and further review with CDPH.*

Figure 3-1. Site F and G Locations

Both Site F and Site G appear to be free from significant environmental constraints and percolation was determined to be technically feasible at both sites. However, these potential recharge sites are more than three miles from the WWTP. Additionally, underflow during the wet seasons of each year would reduce travel time required by recharge regulations, and would limit percolation to the dry season, when no surface flow is present and underflow is low. This constraint would limit percolation activities to the dry season, when direct reuse opportunities such as landscaping and agricultural irrigation are the greatest.

Recharge regulations requiring dilution of recycled water with high-quality dilution water further reduce the amount of recycled water that could be percolated and would increase use of water that could be used for more direct beneficial uses. New recovery wells would also need to be constructed to allow recharged water to be recovered by the City.

Although the feasibility of percolating recycle water at either Site F or G was confirmed through hydrogeologic investigation, and no fatal flaws were identified through the analysis of environmental constraints, the requirement for blending of recycled water with a higher quality supply, and constraints limiting total recharge capacity result in a relatively low potential for beneficial use of recycled water. Since recharge activities would also be limited to the dry season months, recharging would reduce the availability of supply for irrigation uses (see Section 3.8).

Based on these findings and considerations, the following general recommendations have been adopted for planned recycled water delivery:

- Seek use opportunities within the City to offset potable water use
- Maximize opportunities for delivery of recycled water to high demand uses (e.g. existing golf courses now served by private wells)
- Plan for possible extension of recycled water service to large centralized demand areas such as the agricultural irrigation areas and uses immediately beyond the City's boundary
- Do not pursue development of a groundwater replenishment reuse project at Site F or G.

3.3 Groundwater Replenishment for Regional Benefit

In addition to the conceptual groundwater replenishment reuse project described in Section 3.2, the City recognizes further potential for use of the recycled water conveyance infrastructure to convey recharge or "in-lieu" deliveries to the Huer Huero Creek area.

Recycled water demand estimates documented in this Master Plan indicate that the projected wastewater flow at build-out will exceed the projected demand from identified uses within the City. One concept for beneficial reuse of surplus water is to extend the recycled water distribution system eastward, beyond City limits, to supply irrigators and possibly to discharge to Huer Huero Creek as excess recycled water is available.

"In lieu" delivery of recycled water to irrigators that would otherwise pump deep basin groundwater wells would be a direct means of reducing basin pumping. Discharging recycled water into Huer Huero Creek when irrigation demands are low may also benefit this area of the overall Paso Robles Groundwater Basin.

Recharge into this general area was evaluated by GEI along with Fugro West, Inc. and Cleath & Associates in the April 2008 report to the San Luis Obispo County Flood Control and Water Conservation District entitled "Paso Robles Groundwater Subbasin Water Banking Feasibility Study". While that report examined opportunities for banking excess State Water, its hydrogeologic observations are pertinent. The author established that the Salinas River / Hwy 46 Recharge Area "…appears to have adequate groundwater storage capacity and recharge and recovery capacity to support a recharge…project." "Recharge opportunities that warrant further investigation may exist along the Hwy 46 corridor to take advantage of in-lieu recharge opportunities and the available storage capacity resulting from the groundwater depression located northeast of the City of Paso Robles."

The 2008 report recommends supplemental water deliveries to the area east of the City primarily to meet irrigation demands and expressed concerns about an approach that hinges on recharge: "The direct recharge potential appears to be limited in this area because of the prevalence of clay interbeds, relatively low conductivity of the near-surface soils, and the thin to nil alluvial cover." If a recycled water delivery system were in place to supply irrigation demands, water could also be discharged into the Huer Huero Creek area with little additional cost for infrastructure. In this manner, waters could be introduced into the area of the Paso Robles Groundwater Basin in which pumping water levels are declining most notably, allowing regional water managers the opportunity to directly observe the outcome of that practice to determine its ongoing viability.

This concept would require further investigation to assess the potential benefit and feasibility of groundwater recharge in the Huer Huero Creek corridor, including determining the connectivity between the Huer Huero Creek alluvium and the deeper Paso Robles Groundwater Basin. Although this concept of supplying recycled water eastward, beyond City limits would not directly benefit the City's water supply system or the City's customers, it could be sponsored by agricultural irrigators outside of the City. The recycled water delivery corridor developed and recommended in this Master Plan (Sections 4.3) could support deliveries in this area. Delivery schedules and quantities, infrastructure sizing and costs would need to be assessed for further evaluation of this concept.

3.4 Assessment of Potential Recycled Water Users (Direct Use)

For this Master Plan the City and AECOM revisited potential recycled water users that had previously been identified in the 2006 Recycled Water Study Update. The City identified potential users that remained viable. Additionally, several new potential users were added based on recent potable water billing records and planning information provided by the City. Customer surveys were not conducted as part of the current study, but are recommended for private users at a later stage of implementation planning to confirm interest in recycled water use and demand amounts.

The City's inventory of potential recycled water users was updated to reflect current data and findings. Updates within three categories of recycled water use are described below.

Landscape Irrigation Uses – Recent potable water consumption records for the City's 50 irrigation accounts with the greatest estimated annual demand in 2011 were reviewed to identify existing high-demand irrigation users. For large existing irrigation sites currently irrigated with City-supplied potable water or with private wells, demands were evaluated based on available acreage data, or review of existing turf areas using aerial imagery. For identification of future irrigation uses, the City provided information on known development projects that include significant landscape irrigation components.

Non-irrigation Uses – Recent potable water consumption records for the 50 non-irrigation accounts with the greatest annual water usage were provided by the City, reviewed, and considered for inclusion in the list of potential recycled water users. Many high-demand commercial and industrial users are not considered potential users because current water uses are not suitable for recycled water service. The majority of existing high-demand commercial users identified require potable water for sanitary uses or uses involving direct human contact (swimming pools, water park, etc.). Existing high-demand industrial customers include producers of food products (wineries and a brewery) or products requiring high quality water and intended for human consumption. Based on review of each account and input from the City, only high-demand accounts with lower water quality requirements and not intended for direct human consumption, sanitary use, or with low potential for human consumption were included in the updated user list. Further investigation of water quality requirements for individual facilities could be conducted in the future if a significant benefit to serving one or more facilities is identified, however, due to the low total demand relative to existing and future irrigation demands in the Study Area, further investigation is not recommended as part of this study. Similarly, other non-irrigation uses such as construction project dust control and soils compaction, dual plumbing systems, or use by the City or other agencies may be considered if significant demand or benefit in servicing these uses is identified in the future.

Agricultural Irrigation Uses - The 2006 Recycled Water Study Update identified two potential agricultural irrigation use sites outside of the City limits. The City anticipates that additional agricultural irrigation operations currently utilizing irrigation wells may utilize recycled water to satisfy irrigation demands in the future. Irrigated acreages for the Northern and Eastern Agricultural Irrigation Areas (see Plate 1) were estimated through collaboration with the City. Using aerial imagery, parcels that appeared to be actively cultivated with vineyards or other crops at the time of review were identified in areas immediately north and east of City limits on the City's east side, and irrigated acreage was estimated. Irrigated acreage cultivated with vineyards located between these boundaries and City limits were estimated to be approximately 2,170 acres in the north (i.e. the Northern Agricultural Irrigation Area), and 1,565 acres to the east (i.e. the Eastern Agricultural Irrigation Area), including Vina Robles.

The updated list of potential recycled water use sites and customers is provided in the Appendix. The updated inventory of potential users is shown in Plate 1.

3.5 User Criteria

Each potential recycled water customer was evaluated in terms of the following criteria.

Use Category and Type - Regulatory and implementation requirements for recycled water uses are determined primarily by the intended recycled water use. General use categories were defined for each potential recycled water use to allow requirements for specific categories of recycled water uses to be applied to groups of uses.

Location - Locations have been identified for each potential user to allow planning of recycled water system distribution components and recycled water projects during this conceptual design phase. Elevation data were also estimated for prioritized recycled water uses to allow preliminary identification of recycled water distribution system pressure zones.

Average annual demand - Average annual demand has been estimated for specific potential recycled water users based on available information for each use (see Section 3.7). Data considered include billing records, estimated irrigation requirements for new and existing landscaping and turf areas that could potentially utilize recycled water based on climate data and crop information, planning data, and demand available data for existing uses. Quantified demands allow prioritization of potential users, optimization of recycled water delivery, conceptual design of the system, and sizing of infrastructure. Demand projections are described in Section 3.7

Demand variation and peaking factors - Demand variation has been assumed for each potential use based on use categories and available data. Demand variation parameters allow planning for recycled water delivery and sizing of facilities. Two general classifications of demand variation were identified and are defined below. Infrequent and irregular demands such as fire protection, dust control, street cleaning, etc. were excluded from the list of potential users.

- Continuous - continuous year-round demand with minimal seasonal fluctuation
- Seasonal – demands varying seasonally or only occurring during specific months of the year

Total annual demand for users with continuous demands are distributed equally on a monthly basis while monthly demand estimates for uses with seasonal demands were estimated based on crop evapotranspiration assumptions, irrigation efficiencies specific to use types and precipitation data. Irrigation schedules were applied according to use types for seasonal demands to determine appropriate peaking factors.

Water quality – Identification of water quality requirements applying to each use category allows screening of potential recycled water users based on compatibility with projected recycled water quality. Based on information provided by the City and review of the Wastewater Treatment Plant Upgrade-Facility Plan (2009), the Paso Robles WWTP will be upgraded to produce Title 22 disinfected tertiary recycled water. Since the City plans to produce disinfected tertiary recycled water, water quality

categories focus on sensitivity of uses to salts based on assumptions of crop types and available information for non-irrigation uses. Three general categories of water quality requirements are described below relative to recycled water compliant with the California Department of Public Health's requirements for disinfected tertiary recycled water.

- Minimal requirements - generally compatible with Title 22-compliant disinfected tertiary recycled water with few or no additional water quality requirements.

- Salt sensitivity - generally compatible with disinfected tertiary recycled water, but use or crop will likely exhibit sensitivity to salts present in recycled water that exceeds a specific range, or has not been blended with another water source to reduce salt concentrations. Two salt sensitive irrigation categories were identified: golf course irrigation and agricultural irrigation. Blending assumptions for these uses are described in Sections 3.7.1 and 4.2.4.

- Stringent water quality requirements - use may require a high degree of treatment beyond disinfected tertiary recycled water and/or may not accept recycled water.

As described in Section 3.3, existing non-irrigation users with stringent water quality requirements or applications involving direct human consumption and contact are not planned to be served with recycled water, and would continue to use City potable water.

Service Phase – To allow planning and phasing of recycled water projects, uses with existing potable water demands that could potentially be offset with recycled water are identified as 'existing' uses. Uses that have not yet been developed or may be uncertain are identified as 'future' uses.

3.6 Regulatory Requirements

The production, distribution and use of recycled water in California is regulated by the State Water Resources Control Board (SWRCB), Regional Water Quality Control Boards (RWQCB), and California Department of Public Health (CDPH) under the Clean Water Act, the California Code of Regulations, the Health and Safety Code, and the California Water Code.

The Regional Water Quality Control Board is tasked with permitting and enforcement responsibilities for recycled water projects while the California Department of Public Health is tasked with developing technical standards and recycled water criteria that are protective of public health and advising on drafting water reclamation permits and requirements.

Recycled water projects generally require the following prior to implementation:

- Notice of intent to reuse treated municipal wastewater meeting regulatory requirements for allowed uses

- Preparation and submission of an engineering report documenting the proposed production, distribution, and use of recycled water, monitoring components, and compliance with recycled water regulations
- Contractual agreements between the recycled water users and/or purveyors and the producer that establish conditions for recycled water service and use
- Issuance of an Individual Reclamation Permit or Master Reclamation Permit

The recently enacted Recycled Water Policy (2009) and subsequent amendment (2013) require that regional salt and nutrient management plans be developed by local agencies and stakeholders, and adopted into Basin Plans by 2015. The regional salt and nutrient management plans will dictate whether antidegradation analyses are necessary for specific recycled water projects. Until salt and nutrient management plans are developed, antidegradation analyses will continue to be required for all recycled water projects where the discharge will use more than 10 percent of the receiving basin's available assimilative capacity for a single project or 20 percent for multiple projects. Aspects of the Recycled Water Policy which affect specific types of recycled water projects are further described in Sections 3.6.2 through 3.6.4.

3.6.1 Treatment Requirements, Water Quality Standard, and Provisions for Use

Regulatory requirements and criteria for the production, distribution, and use of recycled water have been established by the California Department of Public Health in Title 22, Division 4, Chapter 3 of the California Code of Regulations. These regulations, commonly known as Title 22 or California Water Recycling Criteria prescribe treatment and recycled water quality requirements for allowed uses of recycled water, reliability features for treatment facilities producing recycled water, and use area requirements. Title 22 establishes four standards of recycled water suitable for various uses and defined by the level of treatment and product water quality. General treatment and water quality requirements for these four recycled water standards are summarized in Table 3-1, along with allowable irrigation uses for each standard. Specific requirements for landscape irrigation, non-irrigation uses, and groundwater replenishment projects are described in the following sections.

As described in Section 2.3.1, the City plans to upgrade the WWTP to provide Title 22 disinfected tertiary recycled water. In terms of regulatory water quality requirements, disinfected tertiary recycled water meeting Title 22 requirements is suitable for all potential uses inventoried in this Master Plan. Production of disinfected tertiary recycled water will maximize beneficial use opportunities for uses within the City. It is noted that a lesser quality of recycled water could be suitable for many of the identified potential uses if additional provisions were in place.

Table 3-1. Treatment level and total coliform requirements for irrigation uses

Treatment Level	Allowable Landscaping and Agriculture Irrigation Uses	Water Quality (TC) Requirements *
Disinfected Tertiary (Planned level of treatment for Paso Robles Recycled Water System)	Unrestricted access golf courses Parks, playgrounds, school yards Food crops (w/ edible portion contact) Residential landscaping Commercial and industrial landscaping Roadway landscaping All irrigation uses listed below with less stringent requirements	7-day median TC: 2.2 MPN/ 100 mL 30-day max TC: 23 MPN/ 100 mL Maximum TC: 240 MPN/ 100 mL
Disinfected Secondary-2.2	Food crops (w/o edible portion contact) All irrigation uses listed below with less stringent requirements	7-day median TC: 2.2 MPN/ 100 mL 30-day max TC: 23 MPN/ 100 mL
Disinfected Secondary-23	Cemeteries Freeway landscaping Restricted access golf courses Nursery stock and sod, unrestricted Pasture for animals producing milk for consumption Non-edible vegetation areas (non-recreation) All irrigation uses listed below with less stringent requirements	7-day median TC: 23 MPN/ 100 mL 30-day max TC: 240 MPN/ 100 mL
Undisinfected Secondary	Orchards and vineyards (w/o edible portion contact) Non-food-bearing trees ** Fodder, fiber crops, pasture for animals not producing milk for consumption Seed crops not for human consumption Food crops (with commercial pathogen-destroying process) Ornamental nursery stock, sod farms **	No TC requirements

* TC = total coliform. Additional requirements for turbidity, chlorine contact time, and/ or virus inactivation apply to disinfected tertiary recycled water.

** Irrigation with recycled water prohibited 14 days prior to harvest for some crops.

3.6.2 Requirements for Landscape Irrigation Uses

Recently, the State Water Resources Control Board has developed the California Recycled Water Policy (2009) and amendment (2013) to expedite implementation of projects using municipal recycled water for landscape irrigation and meeting regulatory requirements for treatment level and use area restrictions as prescribed by Title 22. The Recycled Water Policy is intended to streamline the permitting process for

landscape irrigation recycled water projects that meet CDPH treatment level requirements and use area restrictions through use of a general permit. The Recycled Water Policy requires salt and nutrient management to occur at a regional level. As a result, landscape irrigation projects that are eligible for the streamlined general permit would not typically be required to include a monitoring component if a regional salt and nutrient management plan has been established. Eligible uses under the general permit include the following:

- Parks, greenbelts, and playgrounds
- School yards and athletic fields
- Golf courses
- Cemeteries
- Residential common areas landscaping
- Commercial landscaping, except eating areas
- Industrial landscaping, except eating areas
- Freeway, highway, and street landscaping

For eligibility for the landscape irrigation general permit, a recycled water project must utilize recycled water produced and distributed by a public agency permitted for reclamation.

3.6.3 Requirements for Urban Non-irrigation Uses

Use of recycled water for urban non-irrigation uses including commercial and industrial applications is an approved use of recycled water. In California, recycled water for approved industrial and commercial uses is required to be at least disinfected secondary 23 recycled water; however several uses such as industrial process water, cooling towers, evaporative condensers, commercial laundries and car washes require disinfected tertiary recycled water. Independent of these regulatory requirements, the suitability of recycled water for non-irrigation uses is dependent on water quality requirements specific to each industrial and commercial application and varies greatly. Non-irrigation uses are currently evaluated by the RWQCB and CDPH on a case-by-case basis and require individual permitting.

3.6.4 Requirements for Agricultural Irrigation Uses

Irrigation of agricultural crops is an approved use of recycled water. As shown in Table 3-1, treatment and water quality requirements for agricultural irrigation are dependent on the crop type. Although regulatory requirements for treatment and water quality are much lower for some agricultural uses relative to landscape irrigation uses, recycled water quality is an important factor in sustaining a market for agricultural recycled water use.

3.6.5 Additional Provisions for Recycled Water Use

Title 22 includes requirements for recycled water use at reuse sites which include use of backflow prevention, signage, color coding of recycled water piping, and provisions for preventing cross connection with other utilities, run-off, overspray, and misting of recycled water.

In addition to these requirements, it is anticipated customer connections and retrofitting of existing facilities at use sites will be required. Depending on the proximity of the recycled water main to individual use sites, customer connections may include extension of service to the use site, tapping distribution main and installation of a service lateral, meter, and pressure augmentation. Retrofits will separate systems that will be supplied with recycled water from other on-site water systems. Customer retrofits at reuse sites are typically one-time occurrence, and costs are highly dependent on configuration and size of existing systems. At sites where irrigation systems are already independent of other water systems and will be completely converted to use recycled water, retrofit costs will be low. Additionally, some uses may desire provisions to use other water sources to supplement recycled water, which would require special provisions to prevent cross connection. Due to the variability of site-specific conditions and requirements, evaluation of retrofit requirements will be conducted site-by-site.

3.7 Potential Recycled Water Demands

3.7.1 Demand Estimates

Demand projections for recycled water were developed using potable water billing records for existing customers, estimated irrigation requirements using the Department of Water Resources (DWR) recommended methods for calculating irrigation demands (see attached calculations), specific plan information, and planning information made available by the City. Methods used to update demand projections varied depending upon availability of existing data. Development of demand projections is described in the following section.

The following general approaches and data sources and methods were used to estimate demands for potential uses.

Existing landscape Irrigation Uses	Existing consumption data reconciled with landscape area data and irrigation calculation (per DWR guidelines)
Future landscape Irrigation Uses	Planned irrigated area, assumed landscape type and irrigation calculation (per DWR guidelines)
Existing non-irrigation Uses	Existing billing data
Agriculture Uses	Approximate irrigated area, assumed crop type and irrigation calculation (per DWR guidelines)

Recycled water demands projected in this Master Plan reflect potential demand for recycled water. For uses where blending assumptions are made to address salinity, recycled water demands stated equate to estimated portion of irrigation demand that may be satisfied using recycled water.

Landscape Irrigation Demands

Recycled water demands for irrigation of existing landscape or turf areas were estimated based on available irrigation customer data and estimates provided by the City. Where meter records were not available for existing uses, irrigation demands were estimated based on estimated irrigated area data provided by City staff and irrigation calculations following DWR guidelines.

For future landscape irrigation uses, recycled water demands were projected for projects with large turf or landscape irrigation components using planned acreage of landscaped area and irrigation calculations outlined by the Department of Water Resources using regional ETo data, precipitation data, and crop-specific coefficients. Calculations are provided in Appendix F.

For landscape irrigation uses where salt sensitivity is anticipated (i.e. golf course turf irrigation), it was assumed recycled water would be blended with a supplemental source to reduce salinity. Recycled water demand for these uses was assumed to be 65% of total estimated irrigation demand, based on projected TDS concentration of WWTP effluent following the upgrade to tertiary treatment (City of Paso Robles Wastewater Treatment Plant Upgrade- Facility Plan, Black & Veatch, 2009) and crop salt sensitivity criteria (TDS = 725 mg/L, maximum). The salinity of wastewater following the upgrade is expected to range from 832 – 1,000 mg/L TDS, depending on the TDS concentration of the City's potable water.

Total annual demand from potential landscape irrigation uses throughout the City was estimated to be 1,401 AFY. A subset of those potential landscape needs could be met from the recycled water distribution system recommended herein.

Urban Non-irrigation Demands

Billing records for the 50 commercial and industrial users with the greatest demand in 2011 were reviewed to identify potential high-demand recycled water uses. Commercial and industrial users known to require potable water were excluded. Demands from existing high-demand users with less stringent water quality requirements have been included in the updated list for consideration of future recycled water service. For these uses it was assumed that only a small portion of existing potable water demand represented sanitary use at each facility and could not be serviced with recycled water.

Based on information provided by the City, individual car washing operations represented a very small fraction of overall non-irrigation potable water demand and offer limited opportunity for recycled water use to offset potable water demands since water used is typically recycled onsite. No new future commercial or industrial non-irrigation uses were identified by the City, therefore no future commercial or industrial water demands were projected for this study.

Total annual demand from potential non-irrigation uses was estimated to be 42 AFY from five existing uses.

Agricultural Irrigation Demands

In addition to some agricultural demands within the City limits, significant potential irrigation demand exists immediately north and east of the northern and eastern City limits. Demands projected for agricultural uses are based on the assumed crop type, available planning data for total project acreage or estimated of irrigable acreage, and irrigation calculations outlined by the Department of Water Resources using regional ETo data, precipitation data, and crop-specific coefficients. Based on projected TDS concentration of WWTP effluent following the upgrade to tertiary and crop salt sensitivity criteria described above (*Landscape Irrigation Demands*), it was assumed a fraction of total agricultural irrigation demand (40%) would be satisfied by recycled water and that recycled water would be blended with existing agricultural water supplies at the use site to reduce salt concentrations to meet crop and soil requirements. This assumption is generally consistent with other agricultural irrigation operations in California and a projection developed by a local vineyard with expressed interested in future use of recycled water.

Total agricultural irrigation demand from uses within the City is estimated to be 320 AFY. Potential annual demand of approximately 268 AFY was estimated for the Vina Robles vineyard located immediately east of City limits. Additional potential agricultural irrigation demands of 1,085 AFY and 515 AFY were estimated for the Northern and Eastern Agricultural Irrigation areas.

3.7.2 Summary of Potential Demand

The updated inventory of users identifies 65 potential recycled water users. Not all of these identified users would be served by the proposed recycled water distribution system due to their locations. Agricultural and landscape irrigation uses remain the use categories with the greatest number of potential users and total projected demand.

Total annual potential recycled water demand from in-City customers is projected to be 1,763 AFY. Total annual potential recycled water demand from in-City irrigation customers (including agricultural) is projected to be 1,721 AFY. Irrigation demands beyond the City limits could reach approximately 1,870 AFY. Demand estimates account for blending of recycled water with lower salinity groundwater for agricultural irrigation and golf course uses. The next step in recycled water system planning is to refine the location of potential users and advise the City on distribution corridor(s) that provide service to the largest number of potential customers.

Irrigation of golf courses, school yards and parks accounts for approximately 83% of the total projected demand from uses within the City and 37% of the total potential demand from identified uses. A summary of potential users and estimated demands for each use category and type is provided in Appendix B. Demand projections for each use category are shown in Table 3-2.

Table 3-2. Summary of potential recycled water uses and estimated demand by use type

Use Category	Use Type	Identified Users	Total Estimated Recycled Water Potential Demand	
			AFY	Percentage
Irrigation	Agriculture/ Vineyard *	6	2,187.5	60.3%
	Golf*	5	833.0	22.9%
	Park/ Open Space	22	289.3	8.0%
	School Yard	16	220.6	6.1%
	Roadway/ Trans.	7	23.1	0.6%
	Cemetery	1	22.0	0.6%
	Nursery	1	7.0	0.2%
	Business park	1	6.1	0.2%
Irrigation Total		59	3,588.5	98.8%
Urban Non-Irrigation	Laundry	2	22.1	0.6%
	Carwash	3	11.7	0.3%
	Manufacturing	1	8.0	0.2%
Urban Non-Irrigation Total		6	41.8	1.1%
Total (all categories and use types)		65	3,630	100.0%

Note: Projected recycled demands from golf course, agricultural and vineyard uses are a fraction of total estimated irrigation demand potential, reflecting blending estimates described in Sections 3.6.2 and 3.6.4. Potential demands listed are City-wide and include potential delivery beyond City limits. See

Table 3-8 and Table 3-9 for listing of potential customers to be served by the recommended distribution system.

As summarized in Table 3-2, projected demands from agricultural operations and golf courses represent approximately 83% of identified demand potential. Although the high level of treatment (disinfected tertiary recycled water for unrestricted reuse) planned to be provided may not be required by all high demand uses, disinfected tertiary recycled water will allow recycled water to be used throughout the City and will maximize potential for reuse.

The high percentage of demand from irrigation uses will result in high dry-season demand for recycled water and lower demand in the winter months. Recycled water programs with a user base consisting primarily of irrigation uses typically require an alternative use or disposal mechanism for wastewater or recycled water generated during the winter months.

In systems with high seasonal fluctuations in demand, maximum month demand conditions are important criteria for determining an appropriate base of recycled water users and establishing capacities of infrastructure components. Since a large percentage of the City's potential demand is from irrigation uses, the majority of recycled water demand will occur during the dry season of each year. Therefore, the system capacity will be established by the demand during the month with the highest maximum total demand (MMD).

During the month with the maximum irrigation demand, demand from all potential users identified (City-controlled facilities, other uses within the City, and agricultural uses outside of the City) would reach 7.18 MGD, which exceeds the maximum projected recycled water supply availability at build-out (4.9 MGD). Operational storage will be provided to balance variations between instantaneous supply and demand occurring on a daily basis. The City recognizes other supplemental sources of water may be available to augment recycled water deliveries. However, conceptual plans for augmentation with supplemental water have not been evaluated by the City in detail. Therefore planning of recycled water delivery is considered in terms of maximum month demand. The cumulative maximum month demand from users identified or contracted for recycled water service in the future will be limited to the supply availability during all stages of system development.

The maximum month demand from uses within the City is 3.36 MGD and corresponds to the average daily demand during the month of July. Therefore, under build-out conditions, if all identified potential uses within the City were served including those that currently utilize irrigation wells, approximately 1.54 MGD of recycled water would be available for additional uses.

3.7.3 Opportunities and Constraints for Reuse Categories

Agricultural irrigation uses provide opportunities to maximize recycled water use while minimizing costs associated with transmission and distribution, and reducing groundwater pumping for irrigation purposes. Use of recycled water could directly offset some demand for groundwater.

Use of recycled water for irrigation of existing landscape and turf areas currently irrigated with City-supplied water provides a significant opportunity to offset potable water currently being used for irrigation purposes and would increase availability of potable water supplies. It is expected that the majority of the City's existing landscape irrigation users would be eligible for the recently implemented RWQCB general permit for landscape irrigation uses (see Section 3.6.2) which is intended to streamline the permitting process.

City parks, schools, and other local government facilities represent a large percentage of existing irrigation uses within the City. These use types are generally good candidates for recycled water use since demands for large established irrigated areas are unlikely to suddenly diminish or stop entirely (unlike commercial or private uses). Operation and maintenance of these City recycled water irrigation projects could be provided for multiple use sites under a future water reuse program, allowing the City to reduce costs for retrofitting use sites for recycled water and operation and maintenance. City or agency-wide reuse programs and policies may serve as project drivers and facilitate project implementation. Other project drivers could include a mandatory use ordinance for future projects within the City limits, regional restrictions on groundwater pumping, and establishment of use contracts with prospective high-demand users beyond City limits to secure base demand for recycled water at incremental planning stages.

In addition to offsetting potable water demand, irrigation of community facilities with recycled water can allow irrigation of landscaped or turf-covered areas when potable water use restrictions may be in effect. Sustainable irrigation of community facilities provides multiple community benefits including recreational uses and improved aesthetics, public perception, and property value.

Although urban non-irrigation uses represent additional opportunities for beneficial use of recycled water, these uses are expected to have more stringent water quality and treatment or conditioning requirements prior to use. Since very few non-irrigation uses were identified by the City, it is recommended the City's Recycled Water Master Plan focus on serving large irrigation, including agricultural irrigation.

Benefits and probable constraints associated with the general recycled water use categories investigated in this study are summarized in Table 3-3.

Based on these findings, the following recommendations are provided for planned recycled water delivery:

- Offset potable water use to the extent feasible
- Maximize opportunities for delivery of recycled water to high demand uses (e.g. existing golf courses) that currently use deep well pumping for irrigation
- Plan for extension to large centralized demand areas immediately beyond the City's boundary
- Continue existing discharge practice to the Salinas River during the wet season of each year, or work with a regional partner to further evaluate potential benefit of wet season discharge to the Huer Huero Creek

Table 3-3. Benefits and constraints for potential uses by category

Use Category	Total Potential Demand or Use	Potential Benefits	Potential constraints
Agricultural Irrigation	2,188 AFY 1.95 MGD Average 4.47 MGD Max. Month Average	- Directly offset or reduce groundwater pumping for existing uses - Regulatory requirements for use are compatible with City's plans for future upgrade to provide disinfected tertiary recycled water	- Project development uncertain - Crop sensitivity to salinity or other constituents - Impacts on soil and crops - Public health and public acceptance - Implementation requires conversion of existing irrigation systems or independent system and may require user-provided storage
Landscape Irrigation	1,401 AFY 1.25 MGD Average 2.67 MGD Max. Month Average	- Directly offset significant potable water demand - Uses compatible with City's plans for future upgrade to provide disinfected tertiary recycled	- Runoff, overspray and pooling - Landscape sensitivity to salinity or other constituents - Implementation may require conversion of existing irrigation systems or independent system and may require user-provided storage
Urban Non-Irrigation	42 AFY 0.04 MGD Average & Max. Month	- Some potential to offset some potable water demand - Non-irrigation uses with little season fluctuation can equalize demand - Uses generally compatible with City's plans for future upgraded to provide disinfected tertiary recycled	- Need for additional treatment and conditioning - Scaling and corrosion of equipment - Implementation may require conversion of existing plumbing or installation of dual system - Runoff, overspray and pooling - Public health and public acceptance or industry acceptance and concern - Cross connection potential

Note: Demands shown are for all identified potential users both in-City and outside of the City.
Recycled water demand estimates account for blending assumptions for golf & agricultural irrigation uses.

3.8 Strategy for Recycled Water Use

The following approaches were used to accomplish the objectives summarized in Section 3.7.3 and to identify the most logical service areas, pipeline corridor, and phased extensions of the City's recycled system:

- Focus on recycled water use opportunities in the vicinity of the WWTP and north of Highway 46, in the initial phase to minimize initial distribution system costs and allow for more timely delivery of recycled water.
- Extend transmission pipeline as reuse projects are developed and funding is available.
- Extend transmission mains to areas within the City that will maximize future use opportunities and to uses outside of the City limits.

3.8.1 Logical Service Areas and Distribution Corridor

Potential users were grouped and evaluated according to location within the City and potential annual recycled water demand to determine the maximum concentration of potential recycled water uses and a cost-effective recycled water distribution corridor. Other use-specific factors such as proximity to groups of high demand uses; potential to offset City potable water use or deep well groundwater pumping by private wells; and potential to facilitate further expansion of the recycled water system were also considered in developing a strategy for reuse. All identified potential use sites grouped into four recycled water service areas are shown in Plate 1.

The maximum potential for recycled water use is located on the City's east side. Table 3-4 presents the 20 potential uses within the City with the greatest projected recycled water demand and general locations. Potential uses outside of the City are tabulated in Table 3-5.

Table 3-4. Locations of potential high-demand recycled water users within the City

	General Location			
Description [(1)]	**Side**	**Region**	**Type**	**Estimated Annual Recycled Water Demand (AFY)**
Black Ranch Project [(2)]	E	N	Golf/ Vineyard	284.6
Hunter Ranch [(2)]	E	N	Golf	241.2
Agriculture North of Airport [(2)]	E	N	Agriculture	235.0
The Links [(2)]	E	N	Golf	182.0
Gateway Project/ Furlotti	W	S	Vineyard	80.0
Paso Robles Golf Club [(2)]	E	S	Golf	75.3
Barney Schwartz Park	E	N	Park/ OS	56.7
River Oaks	E	N	Golf	50.1
Paso Robles Horse Park [(2)]	E	N	Park/ OS	30.3
Paso Robles High School	E	C	School Yard	26.7
Chandler Future School	E	C	School Yard	24.2
Centennial Park	E	C	Park/ OS	23.4
Flamson Middle School	W	N	School Yard	22.8
Paso Robles Cemetery	W	N	Cemetery	22.0
Cuesta North	E	N	School Yard	22.0

Description [1]	General Location		Type	Estimated Annual Recycled Water Demand (AFY)
	Side	Region		
Chandler Ranch Parks	E	C	Park/ OS	21.2
Goetz Manderley	E	N	Park/ OS	21
Olsen-Beechwood Parks	E	S	Park/ OS	20
Olsen Beechwood Future School	E	S	School Yard	19
Sherwood Park	E	S	Park/ OS	19
Total Uses within City Limit (top 20)				1,476
Total Uses within City on Potable Water (among top 20)				428
Total Uses within City Limit (east side)				1,530
Total Uses within City Limit (west side)				232
Total Uses within City Limit				1,763

1. Only the 20 potential users within the City with the greatest projected demand shown. Refer to Table 3-5 for high-demand uses outside of the City, and Appendix A for an inventory of all uses.
2. Potential recycled water demands noted with (2) are currently supplied by private wells.
3. Recycled water demand estimates account for blending assumptions for golf & agricultural irrigation uses.
4. East and west side locations designated by “E” and “W,” respectively. Northern, central, and southern locations are designated by “N,”C,” and “S,” respectively.

Table 3-5. Locations of potential recycled water users beyond City limits

Description [1]	General Location		Type	Estimated Annual Recycled Water Demand (AFY)
	Side	Region		
Northern Irrigation Area (2,170 acres)	E	N	Vineyard	1,085
Eastern Irrigation Area (1,030 acres)	E	N	Vineyard	515
Vina Robles Vineyard	E	C	Vineyard	268
Total Uses outside of City				1,868

1. Potential recycled water demands listed are currently supplied by private wells and represent a fraction of total estimated irrigation demand due to blending assumptions.
2. East and west side locations designated by “E” and “W,” respectively. Northern, central, and southern locations designated by “N,”C,” and “S,” respectively.

As shown in Table 3-4 and Table 3-5, several individual use sites on the east side of the City with high irrigation demands offer the greatest opportunity for recycled water use. Large and localized demands represent the most cost-effective reuse projects; therefore, facilities with large irrigation demands have been prioritized based on total projected recycled water demand and the location of each demand, relative to other high demand uses and the WWTP. Providing recycled water service to all high and

medium demand uses may not be feasible during the initial phase of the City's recycled water program due to the significant distance between some users and the WWTP or areas of significant localized demand, and costs associated with constructing new distribution pipelines.

General recycled water delivery areas on the City's east side were identified according to projected demand within each potential service area and the location of each area relative to the WWTP. These service areas are shown in Plate 1. Table 3-6 tabulates potential demand from each of the service areas with planned delivery.

Service Area B offers the greatest reuse opportunity in terms of potential demand served; however, supplying Service Area B will require construction of a long transmission main from the WWTP to the service areas. Service Area A, located between the WWTP and Service Area B, was identified as the preferred corridor for the pipeline based on demand potential in Service Area A from users within the City and potential to serve agriculture irrigation uses immediately north of the City. The transmission main and distribution corridors are described further in Section 4.3.

Table 3-6. Potential recycled water demand by Service Area

Service Area	Location		Estimated Potential Demand within City (AFY)	Total Estimated Potential Recycled Water Demand (AFY)
	Side	Region		
A	E	N	122	1,207
B	E	N & C	1,097	1,880
C	E	S	200	200
D	E	C & S	112	112
Total			**1,531**	**3,398**

1. Potential recycled water demands listed are currently supplied by private wells and represent a fraction of total estimated irrigation demand due to blending assumptions.
2. East and west side locations designated by "E" and "W," respectively. Northern, central, and southern locations are designated by "N,"C," and "S," respectively.

3.8.2 System Capacity and Planned Delivery

As described in Section 3.7.2, a total potential maximum month demand of approximately 3.36 MGD has been identified from uses within the City, short of the projected daily supply availability at build-out (4.9 MGD). To maximize beneficial use of recycled water and improve the cost effectiveness and financial viability of the recycled water program during each development stage, it was determined that recycled water delivery within the City could be supplemented with delivery to agricultural irrigation uses outside of the City. If all City uses were served, a surplus of approximately 1.54 MGD would be available.

Relatively little potential demand was identified within the City on the west side and the significant distances between west side use sites would make serving these sites cost-prohibitive. Additionally, beyond the identified potential uses within City limits, no significant demand potential was identified immediately beyond City limits on the west side. Therefore, it is recommended that delivery of recycled focus on the City's east side, where greater localized demand within the City occurs and service can be extended to potential high-demand uses outside of the City. Service may be extended to west side uses in the future if significant demand and benefit develop.

It is assumed that all operational storage will be provided on the City's east side for the current planning term, and that supply available will be fully utilized on the City's east side during the maximum month demand condition. A comparison of supply availability at build-out and projections of potential demand served in terms of maximum month demand is provided in Table 3-7, below. Under this delivery approach and assuming all east side uses within the City will be served (MMD of 2.93 MGD), approximately 1.97 MGD would be available for agricultural irrigation uses outside of City limits during maximum month demand conditions, corresponding to approximately 965 AFY of recycled water demand (assuming vineyard irrigation).

Table 3-7. Potential recycled water supply availability to uses outside of City

Description	Maximum Month	Average Annual
Supply Available at Build-out (average)	4.90 MGD	5,493 AFY
East Side City-controlled Demand within City Limits	0.91 MGD	475 AFY
Other East Side Demand within City Limits	2.02 MGD	1,048 AFY
Supply Available for uses outside of City (see note 1)	1.97 MGD	3,970 AFY (1)

1. Supply availability limited by maximum month demand (MMD) conditions. For vineyard irrigation, MMD of 1.97 MGD corresponds to an average annual demand of 965 AFY.
2. Recycled water demand estimates account for blending assumptions for golf & agricultural irrigation uses.

For the purposes of infrastructure sizing it is assumed that recycled water would be delivered to potential demands identified on the east side within City limits. Additionally, 1.97 MGD of recycled water may be delivered during the maximum month to agricultural irrigation uses beyond City limits, corresponding to agricultural irrigation uses with an average annual demand of approximately 965 AFY.

Inventories of recycled water uses identified for service are provided as

Table 3-8 and Table 3-9.

Table 3-8 tabulates potential recycled water demands within the City according to location within four general service areas, described in further detail in Section 4.

Table 3-8. Prospective recycled water delivery (within City)

Service Area	Prospective User Description	Estimated Irrigated Acreage [1]	Estimated Irrigation Demand		Estimated Recycled Water Demand [2]	
			AAD, AFY	MMD, gpd	AAD, AFY	MMD, gpd
A	River Oaks	22.0	77.0	145,579	50.1	94,627
	Cuesta North	8.0	22.0	42,293	22.0	42,293
	Goetz Manderley (Traditions)	7.5	20.6	39,649	20.6	39,649
	Kermit-King Elementary	4.8	13.2	25,376	13.2	25,376
	US 101	5.7	7.1	14,553	7.1	14,553
	Ayres Hotel and Resort	10.0	12.5	25,531	5.0	10,212
	State Route 46 East	2.8	3.5	7,149	3.5	7,149
Service Area A Total		**60.8**	**20.1**	**38,654**	**121.5**	**233,858**
B	Black Ranch Project	125.0	437.8	827,664	284.6	537,982
	Hunter Ranch	106.0	371.0	701,428	241.2	455,928
	Agriculture North of Airport	470.0	587.5	1,199,963	235.0	479,985
	The Links	80.0	280.0	529,379	182.0	344,097
	Barney Schwartz Park	20.6	56.7	108,904	56.7	108,904
	Paso Robles Horse Park	11.0	30.3	58,153	30.3	58,153
	Chandler Future School	8.8	24.2	46,522	24.2	46,522
	Chandler Ranch Parks	7.7	21.2	40,707	21.2	40,707
	Golden Hills Home and Garden Center	--	--	--	7.0	13,617
	Vista Cerro Drive Landscaping	2.5	6.9	13,216	6.9	13,216
	Dry Creek Road	4.3	5.5	11,234	5.5	11,234
	Airport Road Extension (Chandler Median)	1.9	2.4	4,851	2.4	4,851
Service Area B Total		**837.8**	**117.3**	**226,224**	**1,096.7**	**2,115,195**
C	Paso Robles Golf Club	33.0	115.8	218,878	75.3	142,271
	Olsen-Beechwood Parks	7.2	19.8	38,063	19.8	38,063
	Sherwood Park	7.0	19.3	37,006	19.3	37,006
	Olsen Beechwood Future School	7.0	19.3	37,006	19.3	37,006
	Oak Creek Park	6.2	17.1	32,777	17.1	32,777
	Winifred Pifer Elementary	4.4	12.1	23,261	12.1	23,261
	Virginia Peterson Elementary	3.2	8.8	16,917	8.8	16,917
	Lawrence Moore Park	3.0	8.3	15,860	8.3	15,860
	Commerce Way Business / Industrial Park Irrig.	2.2	6.1	11,631	6.1	11,631
	Turtle Creek Park	1.3	3.6	6,873	3.6	6,873
	Royal Oak Meadows	0.6	1.7	3,172	1.7	3,172

Table 3-8 continued.

C	Airport Road Extension (Beechwood)	0.6	0.9	1,787	0.9	1,787
	Airport Road Extension (Olsen Median)	0.6	0.9	1,787	0.9	1,787
Service Area C Total		**76.4**	**15.2**	**29,123**	**192.8**	**368,411**
D	Paso Robles High School	9.7	26.7	51,280	26.7	51,280
	Centennial Park	8.5	23.4	44,936	23.4	44,936
	Pat Butler Elementary	6.0	16.5	31,720	16.5	31,720
	Melody Park Playground	4.0	11.0	21,146	11.0	21,146
	Trinity Lutheran	2.5	6.9	13,216	6.9	13,216
	Liberty Continuation High School	2.4	6.6	12,688	6.6	12,688
	Lewis Middle School	2.3	6.3	12,159	6.3	12,159
	St. Rose	1.7	4.7	8,987	4.7	8,987
	Creston Parkway	1.4	3.9	7,401	3.9	7,401
	Union Road	2.3	2.9	5,872	2.9	5,872
	Montebello Oaks Parkway	0.5	1.4	2,643	1.4	2,643
	Mandella	0.3	0.8	1,586	0.8	1,586
	Casa Robles/ Lenco	0.3	0.8	1,586	0.8	1,586
Service Area D Total		**41.8**	**8.6**	**16,555**	**111.8**	**215,221**
Total		**1,016.7**	**37.1**	**71,442**	**1,522.8**	**2,932,684**

1. Estimated irrigated acreages are approximate and based on available data including inventories for existing uses, aerial imagery, and available planning data.
2. Estimated recycled water demand for golf course and agricultural irrigation uses accounts for blending to reduce supply water salinity. See Sections 3.6.2 and 3.6.5.
3. “ADD” is average annual demand; “MMD” is maximum month demand.

Table 3-9. Prospective recycled water delivery (outside of City)

Location	Potential Future Use	Use Type	AAD, AFY	MMD, gpd
East Side (Outside of City)	Northern Irrigation Area	Vineyard	385.0	786,359
	Eastern Irrigation Area	Vineyard	312.5	638,278
	Vina Robles	Vineyard	267.5	546,366
East Side (Outside of City) Total			**965.0**	**1,971,002**

1. All potential future uses shown are currently supplied by private wells.
2. Recycled water demand estimates account for blending assumptions for golf & agricultural irrigation uses.
3. “ADD” is average annual demand; “MMD” is maximum month demand.

4. Recycled Water Facilities Planning

4.1 Overview

The City's recycled water system will utilize disinfected tertiary recycled water produced at the City's WWTP and will include an almost entirely new recycled water distribution system. A phased distribution system is proposed to reduce infrastructure costs in the initial development phase while maximizing the potential for future delivery and beneficial use of recycled water (see Section 3.8). Therefore, the distribution system has been configured to provide service to customers with high demands located near the WWTP, in the north-eastern portion of the City in the initial phase.

The recycled water system will serve users within the City's current water service jurisdiction on the east side of the City and will allow future delivery of surplus recycled water to potential users located outside of City limits. Large anticipated uses include Barney Schwartz Park, irrigation of several existing golf course located on the east side of the City, and agricultural areas to the north and east of the City.

Planning and design criteria have been established for the City's recycled water system and are described in detail in the following subsections.

Table 4-1. Recycled Water System Design Criteria

Reuse Strategy	Irrigation-season delivery with continued effluent discharge during the wet season	
Supply – Treated Effluent		
Current Average Annual	3.0 MGD	
Future Average Annual (Build-out)	4.9 MGD	
Treatment		
	Initial Phase	Ultimate System
Treatment Standard	Disinfected Tertiary Recycled Water (Title 22)	
Projected Salinity (TDS) [c]	1,000 mg/L	832 mg/L
Recycled Water Demand (Build-out)		
Average Annual Demand	2,488 AFY	
	2.22 MGD[a]	
Maximum Month Demand (MMD)	4.9 MGD	
Distribution System		
Type	Branched network	
Capacity	4.9 MGD	
Irrigation Schedule		
Landscape Irrigation Time	8 hours (10 pm to 6 am)	
Landscape Irrigation Peaking Factor	3.0x MMD	
Ag. Irrigation Time	10 hours (5 am to 3 pm)	
Ag. Irrigation Peaking Factor	2.4x MMD	
Pressure		
Maximum Static	100 psi	
Minimum Static	45 psi	
Minimum Delivery Pressure	25 psi	
Pressure Zones	2	
Pipeline		
Design basis	Peak hour demand (PHD)	
Velocity	2 - 6 fps	
Max. Velocity	8 fps	
Maximum headloss	5 ft/ 1000 ft	
Materials	DIP, PVC	

Table 4-1. Recycled Water System Design Criteria (continued)

Operational Storage		
Design basis	Irrigation Demand - Maximum Month Supply	
Minimum storage requirements	1.78 MG	
Additional storage allowance	10%	
Recommended total storage	1.96 MG (multiple tanks)	
Type	Ground-level reservoir	
Pumping		
	Initial Phase	Ultimate System
Type	On-demand pumping, variable speed	Pumping to storage
Pumping capacity design basis	Peak Hour Demand (PHD) of initial uses	Maximum Month Daily Demand (MMD)

[a] Equivalent average annual flow.

[b] Storage calculated based on projected demands during maximum demand month (MMD), irrigation schedules, and the projected recycled water supply diurnal curve. See discussion following.

[c] Projected TDS concentration. See Section 4.2.3.

4.2 Recycled Water Supply and Water Quality

4.2.1 Recycled Water Supply

The City's WWTP is permitted to discharge up to 4.9 MGD of treated effluent to the Salinas River under Waste Discharge Requirements Order No. R3-2004-0031 and National Pollutant Discharge Elimination System (NPDES) permit No. CA0047953. Current and projected plant flow conditions are summarized in Table 4-2.

Table 4-2. Wastewater Treatment Plant Flow Conditions

Condition	Current (2012)	Projected Build-out
Average Annual Flow	3.0 MGD	4.9 MGD
Maximum Monthly Flow*	3.3 MGD	5.4 MGD
Peak Daily Flow	5.9 MGD	9.7 MGD

Note: WWTP Maximum monthly flow does not correspond with the recycled water system maximum month demand (MMD).

4.2.2 Treatment Facility Upgrades

The WWTP is currently undergoing a significant upgrade that will replace the existing trickling filter treatment process with and activated sludge biological treatment process. The upgraded plant will provide secondary treated and disinfected effluent that will be suitable for tertiary filtration and disinfection and includes provisions for future expansion to meet demand at build-out.

To maximize the potential for beneficial reuse, the City plans for addition of tertiary filtration and disinfection facilities as part of a future upgrade, and ultimately plans to produce 4.9 MGD of Title 22-compliant disinfected tertiary recycled water for unrestricted reuse (2009 WWTP Facility Plan). For the purposes of this study, it is assumed that tertiary filtration and disinfection upgrades and expansion of capacity will be phased to coincide with phasing of the recycled water distribution system and/ or addition of recycled water customers, and ultimately up to 4.9 MGD of tertiary filtered and disinfected recycled water will be produced.

4.2.3 Recycled Water Quality

Effluent quality projections will vary depending on factors such as the amount of Nacimiento Water introduced into the drinking water system, level of success in reducing the use of water softeners, etc. Limited effluent quality projections were included in the WWTP Upgrade Preliminary Design Report (2009) and the WWTP Facility Plan (2009); however, NPDES permit requirements for the upgraded plant are referenced herein and are summarized in Table 4-3.

Table 4-3. NPDES Water Quality Requirements

Constituent	Units	Effluent Limits		
		Average monthly	Average Weekly	Maximum Daily
BOD_5	mg/L	25	35	50 [3]
	lb/day[1]	1,022	1,430	2,043 [3]
	kg.day[1]	463	649	927 [3]
TSS	mg/L	30	45	90 [3]
	lb/day[1]	1,226	1,839	3,678 [3]
	kg.day[1]	556	834	1,668 [3]
Oil and Grease	mg/L	10	18	20 [3]
Settleable Solids	ml/L/hr	0.1	0.3	0.3 [3]
pH	s.u.	6.5-8.3 at all times		
Dissolved Oxygen	mg/L	2.0 minimum		---
Nitrogen, Total (as N)	mg/L	10	---	---
Salt [2]				
Total Dissolved Solids	mg/L	1,115	---	---
Sodium	mg/L	255	---	---
Chloride	mg/L	355	---	---
Sulfate	mg/L	200	---	---
Metals & Organic Compounds				
Copper	µg/L	21	---	39
Selenium	µg/L	4.0	---	8.6
Cyanide	µg/L	---	---	8.6 [3]
Bromoform	µg/L	---	---	8.6 [3]
Chlorodibromomethane	µg/L	0.40	---	0.80
Dichlorobromomethane	µg/L	0.56	---	1.6
Bis(2ethylhexyl)phthalate	µg/L	1.8	---	5.4
Acute Toxicity	TUa	Pass/Fail		---
Chronic Toxicity	TUc	1.0		---

Notes:
1 Mass emission limitations apply when flows are equal to or less than 4.9 mgd.
2 The limits may be increased if evidence presented and approved by RWQCB.
3 Historic Effluent Limitations
4 Shaded parameters are of particular significance for some irrigation uses.

In addition to these permit limits, the California Code of Regulations defines treatment and water quality requirements for recycled water according to intended use (refer to Section 3.6.1). Water quality requirements for disinfected tertiary recycled water complying with Title 22 of the California Code of Regulations are summarized in Table 4-4.

Table 4-4. Total Coliform Requirements for Disinfected Tertiary Recycled Water

Parameter	7-day Median	30-day Maximum	Maximum
Total Coliform Concentration	2.2 MPN/ 100 mL	23 MPN/ 100 mL	240 MPN/ 100 mL

In order to be suitable for sustained use, recycled water for irrigation of agriculture must not contain constituents in concentrations that are harmful to specific crops or soil characteristics. Constituents of concern include salinity, sodium, chloride, and boron.

Salinity, often measured in terms of total dissolved solids (TDS) or electrical conductivity is recognized to have detrimental effects on crops and soils at high concentrations and is widely used for projecting the suitability of recycled water for irrigation uses. The salinity of WWTP effluent was projected in the Wastewater Treatment Plant Upgrade Facility Plan (2009) assuming the Nacimiento Water Treatment Plant and a pretreatment/ source control program would be implemented. Projections from the Facility Plan used estimated TDS reduction from the source control program, and an assumed delivery schedule for Nacimiento water and groundwater use.

The planned tertiary filtration and disinfection improvements will improve effluent quality parameters other than TDS. However, the City's Nacimiento water treatment plant, currently under construction, will utilize water with lower TDS concentration than groundwater supplies, and will therefore reduce TDS in effluent discharged from the WWTP. Similarly, a pretreatment source control program is projected to reduce TDS in WWTP discharge. Projected WWTP effluent water quality is summarized in Table 4-5 below, adapted from the WWTP Upgrade Facility Plan.

Table 4-5. Projected WWTP Effluent Salinity with Nacimiento Water Project Imports

NWP Water(1)(2) (AFY)	Projected Ground-water(1)(2) (AFY)	Average NWP Water TDS(1) (mg/L)	Average Groundwater TDS(1) (mg/L)	Combined Water Average TDS (mg/L)	TDS Increased from Municipal Use(3) (mg/L)	WWTP Effluent TDS(4) (mg/L)
-	7,300	-	530	530	470	1000
2,000	7,400	180	530	456	470	926
4,000	7,350	180	530	407	470	877
6,000	6,500	180	530	362	470	832
6,000	6,500	180	530	362	470	832
AFY = Acre-feet/year; 1120 AFY = 1 mgd						

1. Paso Robles WTP Project Preliminary Design Report, TM No. 3, Black & Veatch, 2008.
2. Memo prepared by Black & Veatch and TJ Cross Engineers, "Alternative Approach to Water Treatment for Nacimiento Deliveries", September 7, 2008.
3. City of El Paso de Robles Water Quality Strategy Final Report, Appendix A, Malcolm Pirnie, 2003.
4. Assumes treatment processes at the WWTP have no effect on TDS and thus effluent TDS is same as influent TDS.

4.2.4 Blending for Salinity Reduction

Projected reductions in effluent salinity (Table 4-5) will make plant effluent more suitable for irrigation uses; however, a need for further salinity reduction is anticipated to meet specific tolerances of some landscaping and crops. Irrigation water with salinity between 500 and 1,000 mg/L TDS is recognized to adversely affect sensitive crops.

For example, current agricultural operations utilizing private wells for irrigation may choose to blend pumped well water with recycled water to reduce salinity. The City recognizes that dilution with alternative supplies such as surplus water from the Nacimiento Water Project, or other sources may be feasible and should be evaluated further.

As noted in Sections 3.6.2 and 3.6.4, for golf course and agricultural irrigation uses it was assumed that recycled water would be blended with a lower salinity water supply (i.e. groundwater from private irrigation wells) prior to use. Potential recycled water demands from these uses were calculated as a fraction of total projected irrigation demand, assuming recycled water with 832 mg/L TDS, blending water with TDS below 530 mg/L and maximum salinity criteria of 725 and 650 mg/L TDS for golf and agricultural irrigation uses, respectively. The suitability of recycled water for sensitive uses should be evaluated on a case by case basis.

4.3 Recycled Water Transmission and Distribution

Transmission pipelines will convey recycled water from a pumping station located at the WWTP to storage tanks, turnouts, and customers. A branched distribution network will be used to serve recycled water projects on the east side of the City. To maximize future use of recycled water, the transmission main extending from the WWTP toward the future operational storage site will be sized to convey the projected maximum month demand of 4.9 MGD for the current planning horizon, corresponding to the projected treated effluent supply. Distribution system components are described in the following subsections and shown in Plate 2.

The distribution network may require periodic flushing during times of extended low demand (e.g. wet seasons) to minimize solids deposition and potential pathogen re-growth. It is anticipated that system looping could be incorporated in the future if recycled water demands and the number of use areas increase significantly. One or more booster pumping stations may be desirable to provide sufficient pressure at specific use areas and storage locations. Pumping requirements are described below in further detail.

4.3.1 Pipeline Alignment

The preferred pipeline corridor was identified based on an evaluation of projected recycled water demands and locations, and through multiple coordination meetings with the City (refer to Section 3.8). The majority of the City's potential recycled water customers are located east of the Salinas River (Plate 1). Additionally, offsetting east-side groundwater pumping has been identified as a City priority. As a result, the proposed distribution system focuses on potential use areas located east of the Salinas River. The alignment of transmission and distribution mains provide service along the most practical corridor for maximizing recycled water deliveries to identified potential uses and was developed with consideration of constructability, easement requirements, property ownership, need for crossings of major roadways, and crossing of other features such as the Salinas River and Huer Huero Creek.

The recycled water pipeline alignment is shown on Plate 2. The new transmission main will originate at the City's WWTP and cross the Salinas River near the existing pipe bridge. The transmission main will connect to an existing segment of recycled water pipeline installed in North River Road, then proceed eastward along River Oaks Drive, Dallons Drive and Tractor Street until reaching the proposed Highway 46 crossing location near Huer Huero Creek. The transmission main will then extend south along the future extension of Airport Road, adjacent to Barney Schwartz Park, and southward toward the proposed Chandler Ranch development. From the Chandler Ranch reach, service would be extended west toward the Paso Robles Golf Course and to parks and schools located in that vicinity. The proposed alignment utilizes existing and proposed roadway corridors for the transmission main.

The transmission and distribution main alignments are divided into three major reaches (Reaches A through C) which are described in Table 4-6 and correlate with similarly named recycled water service areas described below. Demands for identified uses with a cumulative MMD up to the projected build-out supply availability of 4.9 MGD have been accounted for in facility sizing, however, extensions from the transmission and distribution mains are not detailed in this Master Plan. Additional segments of the distribution pipeline, offsite storage, and service mains will be added to extend service as new developments proceed and projects develop.

Table 4-6. Recycled Water System Transmission and Distribution Main Reaches

Reach	Pipeline Description	Pipeline Length	Large Use Projects within Service Area
A	WWTP to Buena Vista	4,800 ft	River Oaks School Aryes Project Cuesta North Northern Agricultural Irrigation Area[2]
B	Buena Vista to Union Road, Chandler Ranch and Airport Road to Hunter Ranch	25,300 ft	Horse Park Project Barney Schwartz Park Chandler Ranch Hunter Ranch Black Ranch Vina Robles and Eastern Agricultural Irrigation Area [2]
C	Chandler Ranch to Creston Road	7,770ft	Olsen and Beechwood Paso Robles Golf Course City Parks and School Yards
D	East Side Extensions [1]	7,670+ ft	East Side Schools and Parks (Golden Hill east to S. River Road)
Others	West Side Service [1]	22,000+ ft	West Side Service Area (not included for service)

1. Piping lengths associated with the extending services to Reach D uses, and uses within the City on the City's West Side are not detailed in this Master Plan.
2. Pipelines extending service to the Northern and Eastern Agricultural Irrigation Areas would be in addition to those listed above.
3. Reach D east side extension conceptual alignments include Creston Road and Niblick Road.

4.3.2 Recycled Water Service Areas and Deliveries

Delivery of recycled water to customers west of Highway 101 and the Salinas River is not proposed under this Master Plan due to cost and lack of concentrated potential users. Instead, the distribution system focuses on significant potential demands located on the east side of the City. For the purposes of this planning effort, three general recycled water service areas have been established for the City's east side. The service areas correspond with progressive extensions of the transmission main, and are named accordingly. Service Areas are listed in Table 4-6 along with large use projects within each area.

As described in Section 3.8, the City's reuse strategy is to deliver all available recycled water to uses on the City's east side. If all of the identified potential uses on the east side (within City limits) were served, an additional 1.97 MGD of excess recycled water would be available for agricultural irrigation uses to the north and east of the City. This excess demand equates to approximately 965 AFY of supply to agricultural irrigation uses (dependent on crop type and irrigation requirements, schedule, and other assumptions) from recycled water alone.

Through review of aerial imagery (Section 3.7.1) total potential demand of approximately 1,868 AFY has been identified from agricultural uses east of the Salinas River, to the north and east of City limits, corresponding to a MMD of 3.82 MGD, as described in Section 3.8.2. A portion of this demand (1.97 MGD during MMD conditions) may be served with recycled water. For the purposes of sizing recycled water distribution and transmission infrastructure, it has been assumed that approximately 0.64 MGD would be supplied to agricultural irrigation operations north of Reach A during MMD conditions. This demand quantity is associated with acreage located north of City limits within 1.5 miles of Reach A that was planted with vineyards at the time of writing, and corresponds to an average annual demand of 313 AFY. It is assumed the remaining supply of approximately 1.33 MGD during MMD conditions would be utilized by agricultural irrigation uses outside of the City (including Vina Robles) and east of Reach B. The corresponding average annual demand for these users is 653 AFY.

A summary of planned maximum monthly deliveries for the identified Service Areas is presented in Table 4-7 and represented graphically in Figure 4-1 .

Table 4-7. Planned Deliveries

Service Area	Max Month Demand (MMD)			Total Max Month Demand	Total Average Annual Recycled Water Demand
	City-controlled uses	Other uses within City	Agricultural Irrigation Outside of City		
A	0.23 MGD	--	0.64 MGD	0.87 MGD	434 AFY
B	0.24 MGD	1.88 MGD	1.33 MGD	3.45 MGD	1,749 AFY
C	0.23 MGD	0.14 MGD	--	0.37 MGD	193 AFY
D	0.22 MGD	--	--	0.22 MGD	112 AFY
Total	0.91 MGD	2.02 MGD	1.97 MGD	4.90 MGD	2,488 AFY

Reach D consists of pipeline extensions on the east side of the City, within City limits. Reach D extensions include Creston Road and Niblick Road.

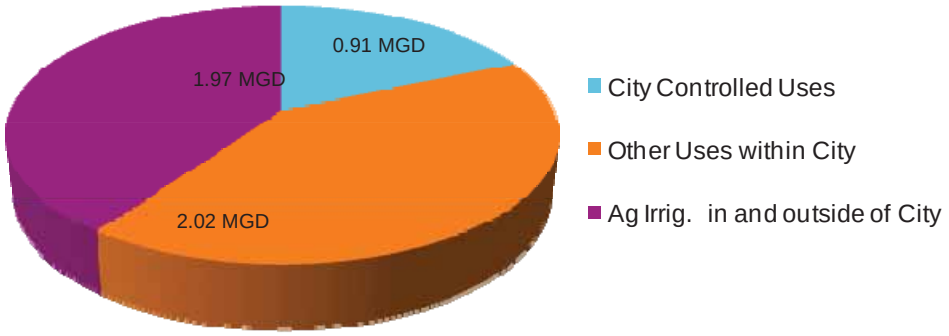

Figure 4-1. Reach A Planned Delivery Relative to Current Wastewater Supply (3.0 MGD)

Planned deliveries for each month of the year at two stages of system development (Stage A and Stage B) relative to current average wastewater supply of 3.0 mgd are shown below in Figure 4-2 and Figure 4-3. Ultimate planned delivery is shown in Figure 4-4 relative to the projected wastewater flow rate of 4.9 MGD at build-out.

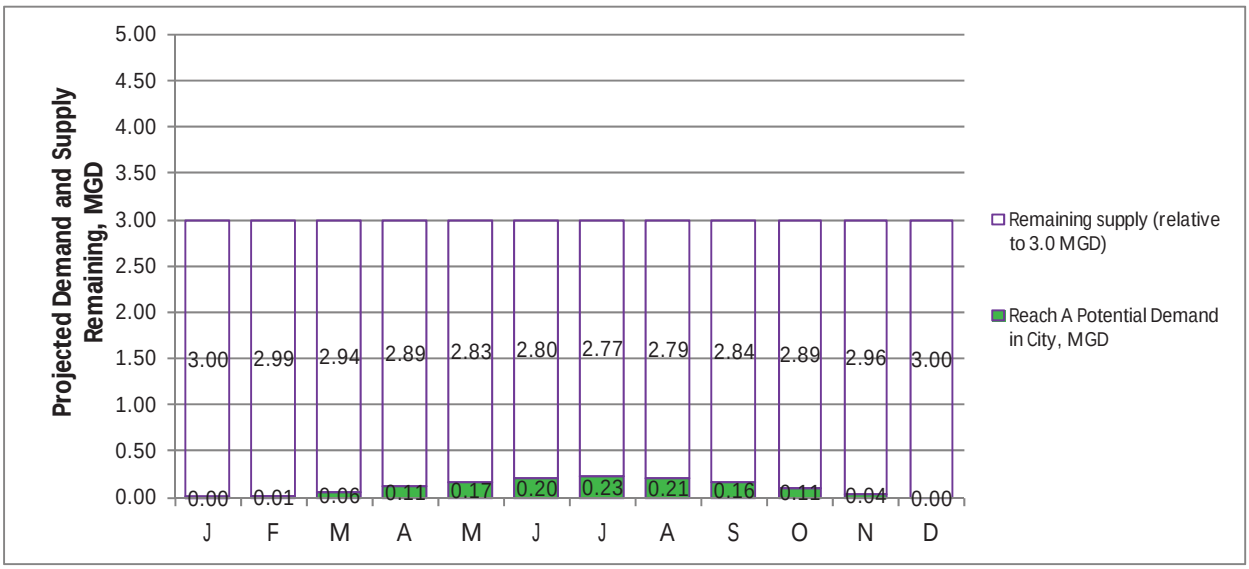

Figure 4-2. Reach A Planned Delivery Relative to Current Wastewater Supply (3.0 MGD)

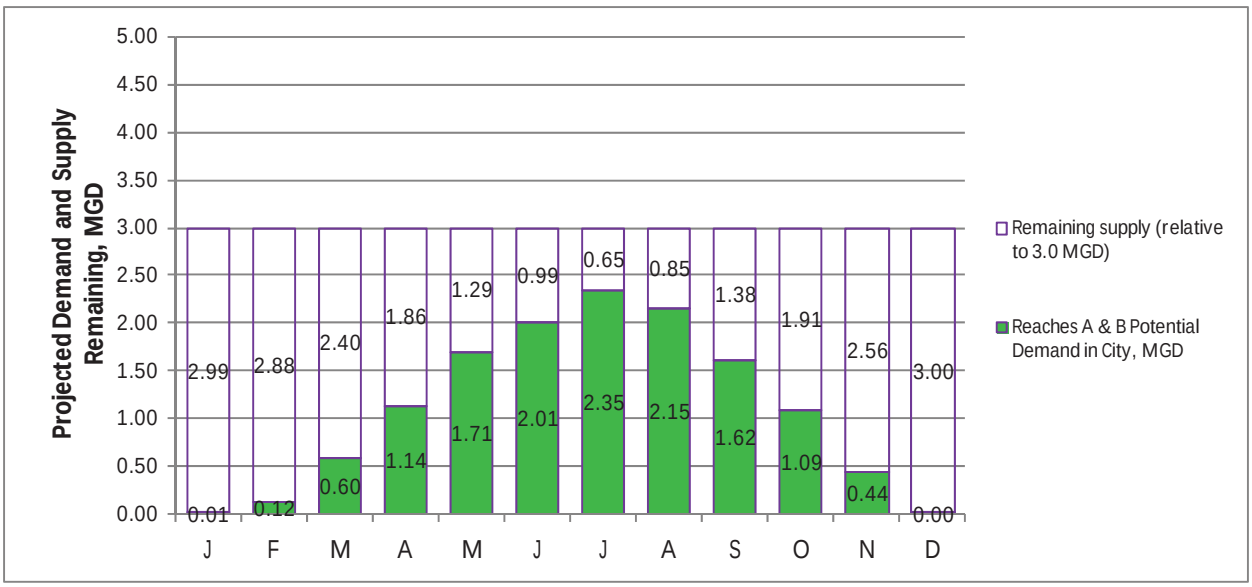

Figure 4-3. Reach A & B Planned Delivery Relative to Current Wastewater Supply (3.0 MGD)

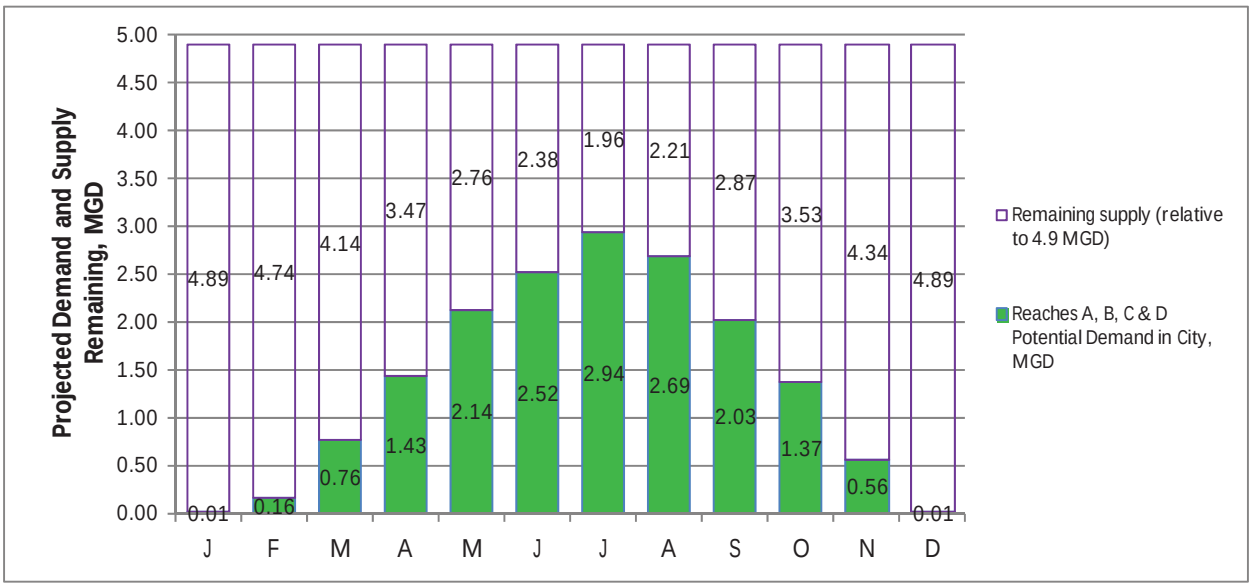

Figure 4-4. Ultimate Planned Delivery Relative to Wastewater Supply at Build-out (4.9 MGD)

In addition to the planned recycled water deliveries described above, there is potential for delivery of additional water (e.g. surplus Nacimiento supply) using the proposed distribution system. Blending recycled water with a supply with lower salts content would reduce the need for blending for some uses. It is recommended alternative delivery options be evaluated by the City or a regional partner as these concepts are further developed.

4.4 Cost Criteria

Planning level cost opinions for alternative and recommended recycled water distribution facilities have been provided to allow evaluation and comparison of infrastructure alternatives and phases. The cost opinions include tertiary filtration and disinfection treatment facilities, reservoirs, pumping, and transmission pipelines and are based on bid results, regional construction cost estimates, data prepared for previous studies, cost curve-based estimating, and other planning sources. Site-specific improvements (customer connections, service extensions and laterals, signage, cross-connection prevention, retrofit of existing systems) are not included in these cost opinions. Unit construction costs for transmission pipelines, reservoirs and pump stations are provided in Appendix C.

Construction cost opinions are relative to the current Engineering News Record Construction Cost Index (Feb. 2014, 9681.11) with total costs presented in present worth, unless otherwise noted. Estimated engineering, design, construction management, project contingencies, and other cost elements have been estimated relative to construction costs according to assumptions summarized in Table 4-8.

Table 4-8. Construction Cost Mark-ups for Project Estimates

Description	Percentage Relative to Construction Cost
Construction (Base Cost)	100%
Construction Contingency	20%
Total Construction Project Cost and Contingency	**120%**
Engineering	12%
Permitting	5%
Project Administration	5%
Construction Management and Observation	12%
Total Design Administration and CM	**134%**
Total Project Cost with Contingency	**161%**

5. Distribution Service Areas

5.1 Overview of Approach and Distribution Options

Prospective recycled water uses on the City's East Side can be supplied with recycled water through incremental expansion of the recycled water distribution system. The first stage of system development will begin at the WWTP and will extend east to the North-eastern areas of the City. Expansion of the recycled water service area and transmission main will extend through the City's east side, include remote operational storage, and will branch to maximize service within the City and high-demand uses immediately beyond the City limits. This approach will allow the City to develop and expand the system in phases so that investments in infrastructure can be paced with planned service to new users and service to potential agricultural and golf irrigation users now on private wells. It is anticipated large users

may provide onsite seasonal storage, based on review and determination by the City. Seasonal storage will not be provided by the City.

To provide for an incremental approach to system development, this plan separates the recycled water distribution system into three segments and services areas: A, B, and C. Infrastructure from each service area will be developed as a progression from Area A through Area C (See Plate 4). If sufficient demand for recycled water existed (I.e. service commitments from outside users are obtained) distribution segments A, B, and C could be constructed at the same time.

Pumping and storage requirements for service areas summarized in this section are calculated assuming remote storage facilities will be constructed as part of providing service to Service Area B. Therefore, the basis of pumping capacity requirements for Alternatives A-1 and A-2 are based on an on-demand pumping approach, while pumping capacity requirements for other alternatives are based on maximum month demands (MMD). The distribution system has been planned to serve the identified East Side uses from a single pressure zone of approximately 1,016 feet. This approach is compatible with the existing 24-inch ductile iron transmission main segment that has been constructed in North River Road and would necessitate similar transmission main construction (“pressure class” 250 ductile iron pipe) along parts of Reach A.

As previously described, the City plans to produce disinfected tertiary recycled water. Although many of the prospective uses identified may be able to utilize a lower standard of treated recycled water, the majority of this projected demand is speculative and producing a lower grade of recycled water might significantly reduce the City’s service opportunities in the future. The City’s plan to provide disinfected tertiary recycled water maximizes potential for use in the initial stage of the recycled water system and use by established irrigation uses within the City.

5.2 Reach A Service Areas

The Reach A pipeline (24-inch diameter) originates at the City’s WWTP and will cross the Salinas River to connect to an existing segment of recycled water pipeline located along North River Road. New piping will be extended from the intersection of River Oaks Drive and North River Road to Buena Vista Drive. Reach A has the ability to serve Service Area A.1 demands and potential future demands from the Northern Irrigation Area (A.2 demands). In addition to serving Service Areas A demands, Reach A will ultimately serve as a portion of the transmission main between the WWTP and the remote storage location. A summary of demand and infrastructure requirements for two Reach A delivery options is provided below.

Table 5-1. Summary of Service Area A Demand and Infrastructure Options

Service Option	Service Areas	AAD, AFY	MDD, MGD	Pipeline, ft [1]	Pumping Capacity, gpm [2]	Storage Required, MG
A - 1	A.1	114	0.22	Reach A 4,800 ft	498	0.10
A - 2	A.1 + Northern Irrigation Area	427	0.86	Reach A 4,800 ft [3]	1,220	0.34

1. Service Areas A - 1 and A - 2 will utilize the existing 24-inch recycled water segment installed in North River Road. Pipeline lengths presented above represent additional transmission main segments.
2. Service Areas A - 1 and A - 2 assume no operational storage will be available, therefore, on-demand pumping would be required to meet peak hour demands.
3. Distribution mains for delivery beyond City limits are not included in the summary of pipeline main lengths.

5.3 Reach B Service Areas

Reach B will extend from the connection to Reach A on River Oaks Drive at Buena Vista Drive and continue east beyond Golden Hill Road to a proposed crossing of Highway 46, near the Union Road intersection. The pipeline will continue southeast on Union Road toward the future Airport Road extension (running from north to south, through the future Chandler Ranch development. Reach B will terminate within the future Chandler Ranch development at the proposed remote recycled water storage location. Reach B would bring service to Service Areas B.1, B.2, and B.4 and has the ability to serve potential future demands from the Vina Robles Vineyard and the Eastern Irrigation Area (B.5 demands). This portion of Reach B will also service as an extension of the transmission main from the terminus of Reach A to the storage location at Chandler Ranch.

An optional distribution extension of Reach B from Union Road (B – 3) would proceed east along Union Road to a proposed crossing of the Huer Huero Creek, and then turn northward, returning to the vicinity of Highway 46. This east branch of Reach B would provide recycled water to Service Area B.3, near Highway 46, and Eastern Irrigation Area uses (Service Area B.6).

A summary of demand and infrastructure requirements for two Reach B service areas is provided below.

Table 5-2. Summary of Service Area B Demand and Infrastructure Options

Service Option	Service Area Extensions	Additional Demand		Additional Infrastructure Requirements		
		AAD, AFY	MDD, MGD	Pipeline [1]	Pumping Capacity, gpm [2]	Storage Capacity, MG
B - 1	B.1, B.2, B.4	149	0.29	Reach B 17,920 ft	199	0.10
B - 2	B - 1 + Vina Robles	416	0.83	Reach B 17,920 ft	578	0.30
B - 3	B - 2 + Eastern Irrig. Area	1,749	3.45	Reach B with East Branch 25,300 ft	2,394	1.25

1. Distribution mains for delivery of water to each point of use and to areas beyond City limits are not included in the summary of pipeline main lengths.
2. Service Areas B - 1, 2, and 3 assume operational storage will be available.

5.4 Reach C Service Areas

Reach C continues the recycled water distribution main southward along the future Airport Road extension to Scott Street. Reach C includes two significant branches that would extend service to the Beechwood Development Area (C.2) and City uses located in the southern and central regions of the City's East Side (D).

A summary of demand and infrastructure requirements for two Reach C service areas is provided below.

Table 5-3. Summary of Service Area C Demand and Infrastructure Options

Service Option	Service Area Extensions	Additional Demand		Additional Infrastructure Requirements		
		AAD, AFY	MDD, MGD	Pipeline [1]	Pumping Capacity, gpm	Storage Capacity, MG
C - 1	C.1	25	0.05	Reach C Chandler & Olsen Branches 7,770 ft	34	0.02
C - 2	C.1, C.2, & D	305	0.58	Reach C & Extensions 15,440 ft	405	0.21

1. Distribution mains for delivery of water to each point of use and to areas beyond City limits are not included in the summary of pipeline main lengths.

Total demand served by the future recycled water system will correspond to the extent of the back-bone alignment completed and can be increased with inclusion of the identified service are extensions.

6. Recommended Recycled Water System

The final layout and phasing of the recycled water distribution system will be driven by the locations of high-demand customers, and the timing of recycled water use commitments from these customers. Potential partnering with stakeholders beyond the City Limits will also affect/ influence layout and stages of construction.

The recommended recycled water system described in the following sections is based on information available at the time of this study and the analysis, as well as approaches and assumptions described in this master plan. The recommended system configuration focuses on maximizing delivery to direct beneficial uses, especially those with high, concentrated demand. The plan allows implementation of the recycled water system on a small scale, for delivery of recycled water for use on the City's east side, near the WWTP. Expansion of the system would occur as additional commitments for recycled water use are established. For planning purposes, the Stage 1 system, and planned system at build-out are considered.

6.1 Recommended Stage 1 System

The first stage of recycled water distribution includes completion of a small Stage 1 tertiary treatment upgrade at the WWTP, construction of new piping connecting the WWTP to the segment of existing recycled water pipeline along North River Road, and installation of new piping through Service Area A.

Although the possible future extension of service to the agricultural irrigation areas north of City Limits could provide extensive recycled water use, the high instantaneous demand of a very large irrigation operation would be more effectively served with operational storage than with on-demand pumping. Therefore, if the Northern Agricultural Irrigation Area is served as part of the Stage 1 system, it is recommended that operational storage sized for the Northern Agricultural Irrigation Area demands be provided by irrigation users, rather than the City.

The proposed Stage 1 recycled water system will serve Area A.1 users only, and will utilize on-demand pumping. Service to the Northern Irrigation Area would be provided as part of Stage 2, described below. The recommended Stage 1 system would be comprised of a storage reservoir (clear well), pump station, and hydropneumatic tank located at the wastewater treatment plant and would be sized to meet the projected Area A.1 peak demands. The initial pump station would incorporate a jockey pump for maintaining pressure and meeting lower off-peak demands from the service area. A summary of system parameters is provided in the table below. As shown in Table 6-1, the total estimated project cost identified for the recommended Stage 1 system is $6.29 MM.

Table 6-1: Stage 1 Recycled Water System Planning-level Cost Opinion

Project Component	Size/ Capacity	**Engineer's Opinion of Cost**
Stage 1 Recycled Water System		
WWTP Filtration Pump Station	--	$110,000
WWTP Tertiary Filters	0.22 MGD	$670,000
WWTP Chemical Feed System	--	$70,000
WWTP Disinfection	--	$155,000
WWTP Recycled Water Storage	0.1 MG	$200,000
WWTP Recycled Water Pump Station (2x 30 hp & 1 jockey pump)	500 gpm @ 150'	$189,000
Hydropneumatic Tank	--	$130,000
Transmission Main Reach A (24-inch CL250 DIP)	4,800 ft	$2,136,000
Salinas River Crossing (excluding transmission main)	n/a	$250,000
Estimated Construction Cost		**$3,910,000**
Construction Contingency (20%)		$782,000
Total Construction Cost		**$4,692,000**
Engineering, Permitting, Project Administration, Construction Management (34%)		$1,595,000
Total Estimated Stage 1 Project Cost		**$6,287,000**

1. WWTP storage may be provided using a dedicated partially buried storage tank, using existing WWTP pond storage or alternative means. Dedicated storage is included in the above estimate.
2. Total Estimated Project Cost includes construction contingency, engineering, project administration and construction management per Table 4-8.
3. All costs are stated in 2014 dollars at ENR Construction Cost Index of 9681.11 as of February 2014.

6.2 Recommended Stage 2 System

The recommended Stage 2 recycled water distribution system would extend recycled water service to Service Area B, and will be triggered once there are sufficient demands developed from Service Area B users or sufficient expansion of Service Area A occurs (i.e. with service to the Northern Irrigation Area). The Stage 2 expansion is planned to provide service to the Northern Irrigation Area, Barney Schwartz Park, Hunter Ranch, the future Black Ranch project, and the Eastern Irrigation Areas, and to other uses within the City's Service Area B.

Stage 2 will include construction of the Reach B transmission/ distribution main to the remote storage site proposed at the Chandler Ranch development. It is anticipated that the Stage 1 tertiary treatment system would be replaced with a treatment system of larger capacity that could be expanded to also serve Service Areas C and D during Stage 3, described below. Improvements to the recycled water pump station located at the WWTP and construction of the remote storage facility during development of Stage 2 should coincide with the development timelines of downstream undeveloped uses, connections by

irrigation and golf users in the identified demand areas to the North and East, and participation of high-demand users in the Northern and Eastern Irrigation Areas.

The total estimated project cost identified for the recommended Stage 2 recycled water system expansion is approximately $35.4 MM.

Table 6-2: Stage 2 Recycled Water System Planning-level Cost Opinion

Project Component	Size/ Capacity	**Engineer's Opinion of Cost**
Stage 2 Recycled Water System Expansion		
WWTP Filtration Pump Station	--	$605,000
WWTP Tertiary Filter	4.3 MGD	$3,724,000
WWTP Chemical Feed System	--	$372,000
WWTP Disinfection	--	$838,000
Chandler Ranch Remote Recycled Water Storage Tank	1.77 MG	$3,100,000
WWTP Pump Station (400 hp pump station)	3,410 gpm @ 290'	$1,936,000
Reach B Transmission Main – Buena Vista to Union Road (24-inch)	11,970 ft	$5,327,000
Reach B Transmission Main – Union Road to Storage Site (24-inch)	5,950 ft	$2,648,000
Reach B Transmission Main – East Branch (20-inch)	7,380 ft	$2,620,000
Highway 46 Crossing	n/a	$408,000
Huer Huero Creek Crossing	n/a	$445,000
Estimated Stage 2 Construction Cost		**$22,023,000**
Construction Contingency (20%)		$4,404,600
Total Construction Cost		**$26,428,000**
Engineering, Permitting, Project Administration, Construction Management (34%)		$8,986,000
Total Estimated Stage 2 Project Cost		**$35,414,000**

1. Total Estimated Project Cost includes construction contingency, engineering, project administration and construction management per Table 4-8.
2. All costs are stated in 2014 dollars at ENR Construction Cost Index of 9681.11 as of February 2014.

6.3 Recommended Stage 3 System (Build-out)

Build-out of the recycled water distribution system would include extension of service to Service Areas C and D. The Stage 3 expansion will likely correspond with development of the downstream Olsen and Beachwood projects. The Reach C extension will allow service to be provided for Service Area C.3 which consists primarily of established uses including the Paso Robles Golf Course, public facilities, and schools.

For planning purposes, the recommended system at build-out is planned to provide service to all identified uses within the City and the Northern and Eastern Irrigation Area uses, up to the projected

supply availability. The total estimated project cost for the recommended Stage 3 recycled water system expansion is approximately $4.28 MM.

The total estimated project cost for the recycled water system at build-out, according to the proposed staging described above is $46 MM.

Table 6-3: Stage 3 Recycled Water System Planning-level Cost Opinion

Project Component	Size/ Capacity	Engineer's Opinion of Cost
Stage 3 Recycled Water System		
WWTP Filtration Pump Station Expansion	--	$45,000
WWTP Tertiary Filter Expansion	to 4.9 MGD	$276,000
WWTP Chemical Feed System Expansion	--	$28,000
WWTP Disinfection Expansion	--	$62,000
Reach C Transmission Main – Storage Tank to Scott Street (12-inch)	6,520 ft	$1,044,000
Reach C Branch Main – Scott Street to Olsen (8-inch)	1,240 ft	$162,000
Reach C Branch Main Scott Street to Beechwood (8-inch)	2,665 ft	$347,000
Reach C Transmission Main – Scott Street to Creston (10-inch)	5,000 ft	$700,000
Estimated Stage 3 Construction Cost		**$2,664,000**
Construction Contingency (20%)		$532,800
Total Construction Cost		**$3,197,000**
Engineering, Permitting, Project Administration, Construction Management (34%)		$1,087,000
Total Estimated Stage 3 Project Cost		**$4,284,000**
Total Estimated Project Cost for System at Build-out		**$45,985,000**

1. Total Estimated Project Cost includes construction contingency, engineering, project administration and construction management per Table 4-8.
2. All costs are stated in 2014 dollars at ENR Construction Cost Index of 9681.11 as of February 2014.

7. Financial Model

AECOM has prepared an Excel-based financial model for the City's use in evaluating the economics of constructing and operating a recycled water system. The model was delivered to the City in February of 2014 and allows financial forecasting of a variety of factors such as terms of securing capital, timing of system improvements, and pace of adding new customers.

Appendix A: Scope of Work

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November 17, 2010

Paso Robles Recycled Water Master Plan and Financial Plan – Scope of Work

Project Understanding and Approach

The Recycled Water Master Plan and Financial Plan will build on the City's previous recycled water planning efforts and will involve conceptual layouts of a recycled water system, development of a phased Capital Improvement Program (CIP), and development of a financial model for the City's use in forecasting system costs (i.e. engineering, construction, staffing, O&M) and estimating necessary funding for the implementation of the recycled water system.

We have developed our proposed scope of work recognizing the unique challenges of the City's prospective recycled water use projects and to consider the available information, past studies, and local knowledge. Since the major components of a recycled water system (treatment facilities, pumping and piping systems, and storage facilities) are driven by end user criteria such as water quality, use locations, and demand quantity and variations, an updated evaluation of recycled water uses will be an important component of system development. This evaluation will precede planning of the recycled water system's back-bone infrastructure. The updated evaluation of recycled water uses will include collecting and incorporating additional information on prospective uses during the initial phase and refining use data once major customers (including City facilities) have been identified and prioritized.

Previously, with the 2006 AIWRP Recycled Water Study Update, the City evaluated several recycled water projects in terms of project cost and consistency with the City's goals and objectives, and concluded the following:

- Irrigation was the most viable direct reuse option
- Surface discharge of highly treated wastewater to the Salinas River, though representing the lowest cost project, would have limited success relative to the City's water resources goals
- Groundwater recharge (indirect reuse) could represent an economical means of reusing plant effluent while meeting many of the City's water resources goals

Using the AIWRP Recycled Water Study Update as a starting point, and recognizing specific challenges and issues associated with the City's previously developed conceptual recycled water use projects, we have identified tasks and approaches for validating recycled water and developing candidate recycled water projects. Task Group 2 of our proposed Recycled Water Master Plan tasks includes the following:

- Updating and validating the City's prospective recycled water uses
- Confirming the feasibility (from a technical, regulatory, and permitting/administrative perspective) of the City's conceptual groundwater recharge project
- Identifying environmental constraints associated with the project

Following this assessment of prospective uses of recycled water, uses will be further evaluated and prioritized for recycled water service during the early stages of the Conceptual Plan phase of our work. We anticipate collaborating with the City's team following review of the Use Assessment Technical Memorandum to incorporate input on the identified uses and their priority. Subsequent tasks closely match the City's scope of work and include a Conceptual Plan for the recycled water system, development of the Recycled Water Master Plan, and Financial Plan.

The following scope of work has been developed to address the City's needs for the Recycled Master Plan and Financial Plan.

Scope of Work

Task Group 1 – Project Meetings

1.1 Progress meetings

AECOM's Project Team will work closely with City staff throughout the project. In addition to task-related meetings included in Task Groups 2 through 5, we anticipate hosting monthly conference call meetings to discuss issues pertaining to task work, administrative draft submittals, and development of project deliverables. We have budgeted for monthly conference calls (up to nine conference calls, total).

1.2 Project Kick-off Meeting

AECOM will prepare and attend the project kick-off meeting with the City's team to review the project scope of work, schedule, responsibilities of project team members, and review any recent developments or newly identified information that could affect the project. It is assumed the Principal in Charge, Project Director, and Project Manager will attend the Project Kick-off Meeting.

1.3 Meetings with City Council

Following completion of the Recycled Water Master Plan deliverable, AECOM will participate in 3 separate meetings, held over the course of one day (also known as a 2-2-1 briefing), with City staff and City Council members to assist City staff in understanding the Recycled Water Master Plan project. It is assumed the Project Director and Project Manager will attend this workshop meeting.

Task Group 2 – Assessment of Prospective Uses

2.1 Background Information for Prospective Users and Demand Characterization

AECOM will coordinate with the City to collect and review information on prospective recycled water users and City use projects, including those recently developed, and to identify users from the existing user list that may no longer be viable. AECOM will update the existing recycled water users list and

categorize prospective recycled water users (landscape irrigation, agriculture, industrial) based on land uses, or specific information provided by the City's team. It is assumed AECOM will use the AIWRP Recycled Water Study Update as our starting-point for this evaluation.

Updated demand estimates and general demand characterizations (seasonal or other variation in demand) will be developed for each existing use and for new uses. Only large irrigation uses (parks and recreational complexes, golf courses, agricultural areas, long medians, etc.) will be included with this assessment. Irrigation demand estimates will be based upon data made available by the City for each use, or calculated using irrigated area, land use, and assumptions for general crop category and irrigation method for each use. For industrial uses, it is assumed City staff will provide water demands based on recent billing records, or other means of quantifying industrial user demands. Estimated demands, use locations, demand variability, recycled water quality required for each use, and relative sensitivity to water quality parameters will be tabulated for prospective uses. It is assumed the number of demands and uses will be the same or less than the number identified in the AIWRP.

2.2 Regulatory, Permitting and Implementation Requirements

AECOM will review and document CDPH requirements pertaining to general reuse categories for prospective recycled water users, and will investigate implementation requirements for the City's conceptual Groundwater Recharge and Reuse Project (GRRP). As part of this work, AECOM will investigate the availability of Percolation Site F, and will identify benefits and challenges in implementing prospective use projects. Findings specific to the GRRP and other uses will be documented and relative ratings for complexity of implementation will be tabulated for each prospective use project.

2.3 Technical Assessment of Percolation Sites F and G

AECOM's subconsultant, Cleath Harris Geologists, Inc. will perform a hydrologic assessment of available percolation sites to determine compatibility of site conditions with the conceptual GRRP, and estimate percolation rates and capacity of percolation facilities if located at these sites (see attached Scope of Work). Following this technical assessment, and with consideration of implementation requirements for the project, our team will develop recommendations for percolating recycled water at the identified sites.

2.4 Deliverable: Draft Recycled Water Users and GRRP Assessment Technical Memorandum

AECOM will prepare the Draft Recycled Water Users and GRRP Assessment Technical Memorandum (TM #1) which will summarize work conducted to update the list of recycled water users, characterize uses, estimate demands and demand variability, document regulatory requirements pertaining to general use categories, and summarize implementation requirement for these uses and the conceptual GRRP. The memorandum will include findings from the technical assessment of percolation sites, estimated percolation capacities of available sites, and findings pertaining to the City's ability to improve groundwater pumping rights as a result of the conceptual GRRP. Five copies of the draft technical memorandum (TM #1) will be submitted for review and comment by City staff. It is assumed a consolidated set of comments will be provided by the City following our meeting with the City to discuss recycled water uses and requirements (Task 2.5).

2.5 Meeting with City on Uses and Requirements

AECOM will prepare for and attend one meeting with the City's team to review identified uses, requirements, findings, and recommendations for the GRRP and other use projects. The purpose of this meeting will be to examine and discuss use projects and requirements with the City, determine

which reuse projects may best meet the City's goals, and receive a consolidated set of the City's comments on the Draft Recycled Water Users and GRRP Assessment Technical Memorandum.

2.6 Preliminary Environmental Analysis for Percolation Sites

If technical conditions, regulatory requirements, and the City's outlook for the GRRP are favorable, AECOM's team will perform a screening-level environmental analysis for the available percolation sites. Available percolation sites will be evaluated relative to biological and cultural resources, geological hazards, aesthetics, agriculture, and site access. The findings of this analysis and general permitting requirements for construction of percolation beds at the proposed sites would be evaluated and incorporated into the Technical Memorandum.

2.7 Deliverable: Final Recycled Water Users and GRRP Assessment Technical Memorandum

AECOM will update the Draft Recycled Water Users and GRRP Assessment Technical Memorandum (TM #1, Task 2.4) to address the City's comments and include the findings from the Preliminary Environmental Analysis for available sites, if the City's team chooses to purse implementation of the GRRP. Five copies of the finalized memorandum will be provided.

Task Group 3 – Conceptual Planning

3.1 Review WWTP Upgrade Plans and Evaluation of Prospective Uses

AECOM will review the WWTP upgrade design report (Black and Veatch) to determine projected effluent water quality and flow parameters for the recycled water source. Treatment processes and projected water quality will be compared with CDPH Title 22 requirements for specific uses, and general requirements anticipated for prospective recycled water use categories (electrical conductivity, total dissolved solids, SAR, etc.) to determine the suitability of the planned recycled water supply for prospective uses. Recycled water quantities (average and peak) documented in WWTP upgrade plans and water quality comparisons will be used to forecast the extent to which water quality and demand requirements of recycled water uses can be met, and a list of viable recycled water use projects will be compiled. Using this list, information on project implementation (Task Group 2), and design considerations, AECOM will develop a preliminary prioritization of recycled water projects.

3.2 Deliverable: Draft Evaluation and Prioritization of Recycled Water Uses Technical Memorandum

AECOM will prepare a draft Technical Memorandum (TM #2) summarizing our review of the WWTP upgrade design report, the comparison of source water flow and water quality parameters with recycled water demands from prospective uses, and our recommended prioritization of uses. Five copies of the draft TM #2 will be provided for review and comment by City staff. It is assumed a consolidated set of comments will be provided by the City following our meeting with the City's team to review and discuss the uses prioritization (Task 3.3).

3.3 Meeting with City on Use Prioritization

AECOM will prepare for and attend one meeting with the City's team to review the City's comments on the draft TM #2, discuss prioritization of recycled water use projects, and identify which priority uses will be incorporated into the Conceptual Recycled Water Plan and served by the recycled water distribution system.

3.4 Deliverable: Final Evaluation and Prioritization of Recycled Water Uses Technical Memorandum

AECOM will revise the draft TM #2 to address the City's comments and include the final prioritized recycled water users list that will be incorporated into the Conceptual Recycled Water Plan. Five copies of the final technical memorandum will be submitted to the City.

3.5 Conceptual Recycled Water Plan

Using the technical evaluation of percolation sites and demand characterizations for priority uses identified in TM #2, AECOM will prepare a conceptual plan incorporating groundwater recharge, seasonal discharge, and recycled water distribution and reuse. As part of this plan, AECOM will outline operational criteria and will perform a conceptual analysis of pressure zones, pumping, and storage facility requirements for development of a conceptual recycled water distribution system. AECOM will develop a layout of the recycled water distribution system and will identify alternative transmission main corridors, pressure zones, and pump stations that would be required to serve priority recycled water use projects. Known constraints and opportunities will be accounted for in developing alignments and siting recycled water system facilities. Our team will consider potential constraints such as environmental, legal, permitting, constructability, or other implementation challenges during development of the conceptual plan.

3.6 Deliverable: Draft Conceptual Recycled Water Plan

AECOM will prepare a draft Conceptual Recycled Water Plan for the City's review and comment. The deliverable will include a conceptual design memorandum outlining system operation, distribution system alternatives and facilities, operational parameters, and priority uses served. The draft conceptual plan will also include graphical representations (mapping) of the conceptual distribution system components. It is assumed a consolidated set of comments on the draft will be provided by the City following our meeting with the City's team (Task 3.7).

3.7 Meeting with City on Draft Conceptual Recycled Water Plan

Following development of the Draft Conceptual Plan, AECOM will conduct a workshop with the City's team to review the conceptual plan and alternative distribution system components, and to receive the City's input on the proposed system. During this workshop, AECOM will also work with the City to develop phases for the recycled water system.

3.8 Deliverable: Final Conceptual Recycled Water Plan

AECOM will incorporate the City's input, preferred alternatives, and phasing developed through review of the conceptual plan into recommendations for the final Conceptual Recycled Water System Plan. The Conceptual Recycled Water System Plan will be the basis of developing the Recycled Water Master Plan. Five copies of the finalized plan will be submitted to the City.

Task Group 4 – Recycled Water Master Plan

4.1 Distribution System Planning-level Design and Phasing

AECOM will develop a hydraulic model (WaterCAD) of the conceptual recycled water system and populate the model with demands from users identified for recycled water service. Up to ten recycled water use projects will be incorporated into the model. It is assumed components from the City's existing Potable Water Distribution System Model will be suitable for base-mapping and topography.

Using the recycled water system model, our team will evaluate recycled water delivery scenarios and conduct planning-level design for transmission mains, booster stations, and storage facilities.

AECOM will identify infrastructure and facilities needed for recycled water distribution and will document system parameters and operational criteria for the planned system. Based on this work and collaboration with the City's team, AECOM will develop a phasing plan for recycled water project components. An administrative draft of the Phasing Plan will be submitted to the City's team for review and comment before proceeding.

4.2 Capital Improvement Plan

Once recommended phasing has been vetted with the City, AECOM will develop planning-level cost opinions for the construction of recycled water system components and facilities. Estimates of operation and maintenance costs, staffing requirements, design costs, and contingencies for environmental work and other uncertainties will be developed and included with the phased Capital Improvement Plan.

4.3 Recycled Water Master Plan Deliverable

AECOM will incorporate work conducted in support of the Use Assessment and Conceptual Design (Task Groups 2 and 3) with system mapping, descriptions of recycled water facilities, recommended improvement projects, phasing, and planning-level cost opinions into the Draft Recycled Water Master Plan. Draft and final versions of the Recycled Water Master Plans will include a concise executive summary, limited to six pages. Five copies of the Draft Recycled Water Master Plan will be submitted for the City's review and comment.

AECOM will prepare for and attend one meeting to receive the City's final, consolidated comments on the draft plan. AECOM will address the City's comments on the draft report and prepare and issue the Final Recycled Water Master Plan. Up to fifteen copies of the final Recycled Water Master Plan will be submitted to the City, upon the City's request, and one electronic copy (PDF format) will be provided.

Task Group 5 – Recycled Water Financial Plan

5.1 Meeting with City

AECOM will meet with the City to review revenue needs associated with the recycled water system and gather input on the financial modeling and funding alternatives.

5.2 Financial Modeling and Scenarios

AECOM will develop an Excel-based financial model to facilitate financial analysis of the Recycled Water Master Plan Capital Improvements Program. The model will incorporate cost information such as project construction costs and operation, maintenance, and replacement costs from the Recycled Water Master Plan, projected annual recycled water deliveries based on Master Plan project phasing, and will include assumptions for parameters such as interest rates, loan terms, rate of inflation, construction cost escalation, debt reserve, potable water rates (for margin calculations relative to recycled water price ranges), and rates of operation, maintenance, and replacement cost inflation. The model will allow evaluation of the net cost of recycled water delivery, costs per unit delivered, and margin or loss relative to potable water prices. AECOM will review financial model parameters with the City before proceeding with development of model scenarios.

Using the financial model, two fee scenarios (fixed City-wide base fee plus variable usage fee, and flat customer rate without City-wide base fee) will be developed, and evaluated for average year, multiple wet-year and multiple dry-year assumptions. An administrative draft of results for these scenarios will be submitted to the City's team for review and comment, prior to proceeding with development of the Draft Financial Plan.

5.3 Recycled Water System Financial Plan Deliverable

AECOM will develop the Draft Recycled Water System Financial Plan, documenting assumptions for operational and financial parameters. Our deliverable to the City will include the Excel-based Recycled Water System Financial Model (electronic format) and documentation; the initial 10-year Recycled Water System Master Plan Budgetary Forecast; a description of assumptions; qualitative and quantitative community benefits; summary of findings; and brief recommendations for proceeding with financial planning for the recycled water program. AECOM will provide five copies of the draft for the City's review, and will address comments in the Final Recycled Water System Financial Plan. AECOM will submit five copies of the Recycled Water System Financial Plan, and two electronic copies of the financial model on CD-ROM.

Project Budget

The estimated budget for consulting services described here-in is $194,489 per the attached project budget and fee schedule. Progress payments would be requested monthly on a time-and-materials basis, with a total budget not to exceed $194,489.

Task Group 1 – Project Meetings	$8,827
Task Group 2 – Assessment of Prospective Uses	
Use Assessment (AECOM)	$27,214
Percolation Site Assessment (Subconsultant tasks)	$69,465
Task Group 3 – Conceptual Planning	$21,669
Task Group 4 – Recycled Water System Master Plan	$46,643
Task Group 5 – Recycled Water Financial Plan	$13,835
Task Group 6 – Project Management and Quality Control	$6,363
Total	**$194,489**

Project Schedule

The attached Project Schedule details projected durations of major task groups and subtasks. Our schedule has been developed to complete the Recycled Water Master Plan and Financial Plan within approximately nine months of notice-to-proceed, as requested by the City.

We hope this proposal meets your expectations and look forward to continuing our work with the City on this project. If you have any questions or comments, please contact me at 805-542-9840 x114.

Sincerely,

Kirk Gonzalez, PE
Project Manager

City of Paso Robles
Signed:
Date:
Title:

Jon Hanlon, PE
Managing Engineer

Enclosures: Project Budget, Fee Schedule, Draft Project Schedule, Subconsultant Proposals.

AECOM

AECOM
1194 Pacific, Suite 204, San Luis Obispo, CA 93401
T 805.542.9840 F 805.542.9990 www.aecom.com

Ditas Esperanza
CITY OF PASO ROBLES
Public Works Department
1000 Spring Street
Paso Robles, CA 93446

November 21, 2011

Ditas,

Subject: Scope Amendment #1 for Recycled Water Master Plan Project

We have submitted this Scope Amendment request for additional services in association with hydrogeological investigation of the Site F property, located immediately north of Sailing Avenue, between the Salinas River and Santa Ysabel Avenue. Developing percolation facilities at Site F could offer several advantages that are not available at Site G. However, after initial review of available data and our site visit, Cleath-Harris Geologists has observed that the fault crossing though Site F and less permeable soils north of the site are indicative of variable soil and percolation characteristics. Since significant future investment would be required for further planning, land acquisition, design, and construction of percolation facilities at Site F, it is recommended additional test holes and percolation testing be conducted.

Following is our proposed scope of work and budget for additional test holes and percolation testing at Site F.

Scope Amendment #1 Additional Scope Items

- Locate drill sites and obtain monitoring well permits from County Health.
- Drill a total of three test holes at Site F with continuous core auger to a depth of about 50 feet or less, log cores and abandon test holes.
- Prepare percolation test hole and run percolation tests.
- Prepare a report summarizing the findings of the exploration.

Budget

AECOM will revise our original scope of work and budget to include the scope items described above. The 2011 AECOM fee schedule will be used for additional work performed by AECOM staff, and our fee and costs will be invoiced on a Time and Materials basis. The budget for additional work will be $ 3,890.00, and will not be exceeded unless additional authorization is requested and granted in writing.

The original budget was $194,489. The revised total project budget will be $198,379.

Schedule

Tentative dates for conducting Scope Amendment #1 tasks are identified in the following table.

Authorization	by Nov. 28, 2011
Conduct field investigation	Dec. 8 – Dec. 21, 2011

We hope this Scope Amendment Request meets your expectations. Please indicate your authorization by signing in the space provided below, and return this request indicating your approval as shown.

Thank you,

Kirk Gonzalez, PE
Project Manager

City of Paso Robles

Signed: DITAS ESPERANZA
Title: CAPITAL PROJECTS ENGINEER
Date: 11-23-2011

Appendix B: Inventory of Potential Recycled Water Users

Inventory of Planned Recycled Water Deliveries

Service Area	Site ID	Description	Type	Estimated Average Annual Demand, AFY	Estimated Max Month Demand, gal/day
A	A.1.1	River Oaks	Golf	50.1	94,627
	A.1.2	Goetz Manderley	Park/ Openspace	20.6	39,649
	A.1.3	Cuesta North	School Yard	22.0	42,293
	A.1.4	Kermit-King Elementary	School Yard	13.2	25,376
	A.1.5	Ayres Hotel and Resort	Vineyard	5.0	10,212
	A.1.6	US 101	Roadway/ Trans.	7.1	14,553
	A.1.7	State Route 46 East	Roadway/ Trans.	3.5	7,149
A Total				121.5	233,858
B	B.1.1	Paso Robles Horse Park	Park/ Openspace	30.3	58,153
	B.2.1	Barney Schwartz Park	Park/ Openspace	56.7	108,904
	B.2.2	Airport Road Extension (Chandler Median)	Roadway/ Trans.	2.4	4,851
	B.3.1	Hunter Ranch	Golf	241.2	455,928
	B.3.2	Black Ranch Project	Golf	284.6	537,982
	B.3.3	Dry Creek Road	Roadway/ Trans.	5.5	11,234
	B.3.4	The Links	Golf	182.0	344,097
	B.3.6	Agriculture North of Airport	Vineyard	235.0	479,985
	B.4.1	Chandler Ranch Parks	Park/ Openspace	21.2	40,707
	B.4.2	Chandler Future School	School Yard	24.2	46,522
	B.4.3	Golden Hills Home and Garden Center	Nursery	7.0	13,617
	B.4.4	Vista Cerro Drive Landscaping	Park/ Openspace	6.9	13,216
B Total				1,096.7	2,115,195
C	C.1.1	Olsen Beechwood Future School	School Yard	19.3	37,006
	C.1.2	Turtle Creek Park	Park/ Openspace	3.6	6,873
	C.1.3	Royal Oak Meadows	Park/ Openspace	1.7	3,172
	C.1.4	Airport Road Extension (Olsen Median)	Roadway/ Trans.	0.9	1,787
	C.2.1	Olsen-Beechwood Parks	Park/ Openspace	19.8	38,063
	C.2.2	Airport Road Extension (Beechwood)	Roadway/ Trans.	0.9	1,787
	C.3.1	Paso Robles Golf Club	Golf	75.3	142,271
	C.3.2	Sherwood Park	Park/ Openspace	19.3	37,006

	C.3.3	Oak Creek Park	Park/ Openspace	17.1	32,777
	C.3.4	Winifred Pifer Elementary	School Yard	12.1	23,261
	C.3.5	Virginia Peterson Elementary	School Yard	8.8	16,917
	C.3.6	Lawrence Moore Park	Park/ Openspace	8.3	15,860
	C.3.7	Commerce Way Business / Industrial Park Irrig.	Business park	6.1	11,631
C Total				192.8	368,411
D	C.3.10	Pat Butler Elementary	School Yard	16.5	31,720
	C.3.11	Melody Park Playground	Park/ Openspace	11.0	21,146
	C.3.12	Trinity Lutheran	School Yard	6.9	13,216
	C.3.13	Liberty Continuation High School	School Yard	6.6	12,688
	C.3.14	Lewis Middle School	School Yard	6.3	12,159
	C.3.15	St. Rose	School Yard	4.7	8,987
	C.3.16	Creston Parkway	Park/ Openspace	3.9	7,401
	C.3.17	Montebello Oaks Parkway	Park/ Openspace	1.4	2,643
	C.3.18	Casa Robles/ Lenco	Park/ Openspace	0.8	1,586
	C.3.19	Mandella	Park/ Openspace	0.8	1,586
	C.3.20	Union Road	Roadway/ Trans.	2.9	5,872
	C.3.8	Centennial Park	Park/ Openspace	23.4	44,936
	C.3.9	Paso Robles High School	School Yard	26.7	51,280
D Total				111.8	215,221
Grand Total				1,522.8	2,932,684

Appendix C: Construction Cost Criteria

Transmission Pipelines and Mains	
Size, inches	Budgetary Cost (/ LF)*
8	$130
10	$140
12	$160
14	$195
16	$250
18	$310
20	$355
24	$445
*Trenchless crossings: 200% of pipeline costs.	

Storage	
Above ground prestressed concrete storage tanks	
< 1 MG	$2.00/ gal
1 - 2 MG	$1.75/ gal
3 - 4 MG	$1.50/ gal

ENR CCI 9483.7

Appendix D: Hydrogeological Evaluation of GRRP Sites

Cleath-Harris Geologists, Inc.
11545 Los Osos Valley Road, Suite C-3
San Luis Obispo, California 93405
(805) 543-1413

April 21, 2011

Kirk Gonzales
AECOM
1194 Pacific Street, Suite 204
San Luis Obispo, California 93401

SUBJECT: Percolation Pond Areas, Site Constraints, Paso Robles California

Dear Kirk:

We examined potential sites on the west side of the Salinas River in the area near the end of Ramada Drive, and on the east side of the Salinas near the end of Santa Ysabel Avenue. In both areas we defined floodways, plotted existing well locations, obtained available water level information, property boundaries, and determined where we have subsurface geologic information.

Ramada Drive Area (west of Salinas River)

To summarize our letter dated March 28, 2011 regarding the Ramada Drive area, we identified two areas: the terrace and the flood plain areas. The flood plain area adjacent to the Salinas River is underlain by permeable sands, whereas the terrace area is a sloped upper area underlain by finer grained soils that overlay gravel and sand beds that may be contiguous with the river sand deposits. The Ramada Drive area is shown on Figure 1, site topography is shown on Figure 2, and 100-year flood areas are shown on Figure 3.

The lower areas will have limited use for percolation of reclaimed effluent with respect to the time of year (higher stream flow and groundwater elevations limit the capacity to percolate effluent). The lower area is also subject to flooding. The upper areas could have percolation rate constraints (depth to permeable river deposits below the fine-grained terrace deposits) that would be reflected in design criteria.

Two test hole sites are proposed to provide stratigraphic information to the base of the river deposits. The northern site would be along the border between the terrace and flood plain (Figure 1), and the southern site would be located within the terrace area.

Santa Ysabel Avenue (east of Salinas River)

We identified an upper terrace area east of the Salinas River, southeast of the Ramada Drive area as a site warranting subsurface investigation for the proposed project (Figure

4). Encompassing approximately 20 acres, the site is located between the Salinas River and Santa Ysabel Avenue, southwest of the entrance gate to Santa Ysabel Ranch and mostly northwest of the southern end of the paved road. The terrace is a gently west and northwest sloping area above an elevation of 725 feet. It is underlain by fine-grained soils depicted as clay loam on the Soil Survey (Figure 4), overlying sand and gravel beds that may be in contact with river sand deposits.

Because of its elevated location, the site is not subject to seasonal limitations with respect to wet season stream flow and flooding (flood map shown on Figure 5), and is unlikely to have percolation limitations from high groundwater elevations. The location could be subject to percolation rate constraints depending on depth to permeable river deposits below the fine-grained terrace deposits.

Located in the northeast corner of the terrace, the buried trace of the Rinconada fault may constrain locations of permanent structures associated with the percolation ponds. The fault location, taken from the Geologic Map of the Templeton Quadrangle by Dibblee, 2004 is shown on Figure 4. The Nacimiento pipeline is located along the eastern edge of the site and on the southeastern portion of the site paralleling the alignment of overhead power lines.

Two test hole locations are shown on Figure 4, and are designed to determine the extent of the fine-grained terrace deposits and the depth to permeable sediments. The holes would extend to the base of the river deposits. The southeastern location would be at the higher elevations of the terrace and the hole in the northwestern area would be at or near the lowest ground surface elevation closer to the border between the terrace and the flood plain. The unimproved site is located on private property and has recently been disked. Site access would need to be obtained from the property owner to allow drilling at the two test hole locations.

In addition to the test holes, several backhoe test pits could be dug using an "extend-a-hoe" to better define the depth of the bottom of the fine grained soils. This would be recommended for either the Ramada Drive site or the Santa Ysabel site, and would be performed in the preferred percolation pond areas after we have information from the test holes and pond design constraints provided by AECOM.

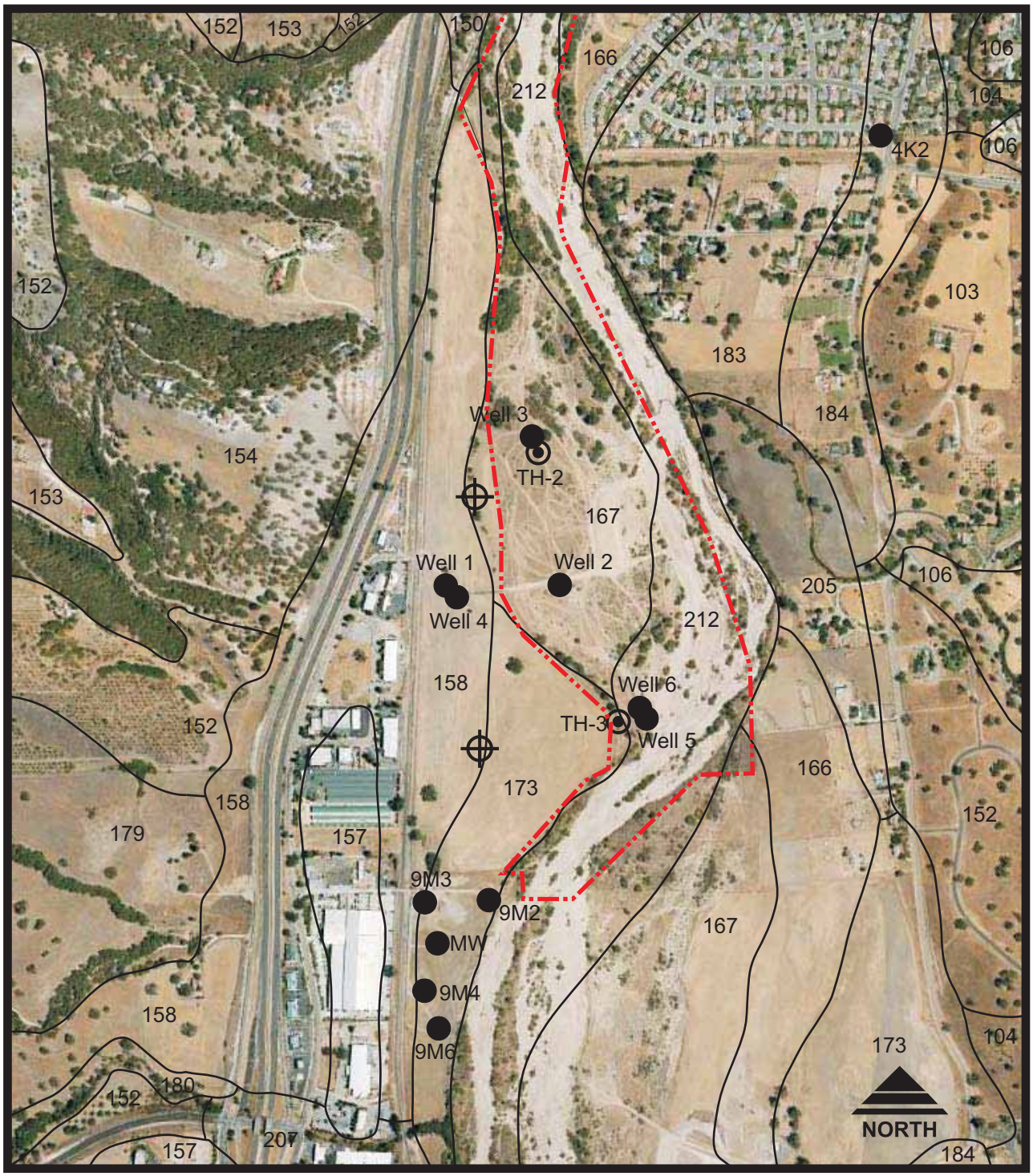
Groundwater elevations and river water levels are critical to the understanding of the available groundwater storage volume and the mounding analysis. Based on elevations of the Salinas River stream bed and regional groundwater levels, it is estimated that groundwater levels beneath the Ramada Drive and the Santa Ysabel Avenue sites are between 795 and 700 feet elevation. To better understand depths to groundwater, CHG can provide groundwater level transducers to be installed in existing wells on City property or in private wells where appropriate and where permission is granted. Water

level measuring reference points would need to be surveyed to provide groundwater elevations that could subsequently be contoured.

It is our understanding that you will be discussing the two potential sites and the subsurface exploration with City staff and we will await hearing from you prior to committing to drilling/excavation contractors and prior to performing any out-of-scope groundwater level data collection. We are available as needed in any discussions with the City.

Respectfully submitted,
CLEATH-HARRIS GEOLOGISTS, INC.

Timothy S. Cleath
Certified Hydrogeologist #81



Base map: Google Earth,
image date July 1, 2007
Soil Survey of San Luis Obispo Co,
Paso Robles Area, NRCS, 2008

Scale: 1 inch = 1,000 feet

Explanation

- Proposed test hole location
- Well location
- Test hole location
- Salinas River Parkway Preserve boundary
- 212 Soil designation for Soil Survey
- APN 020-282-010 Assessor's parcel number

Figure 1

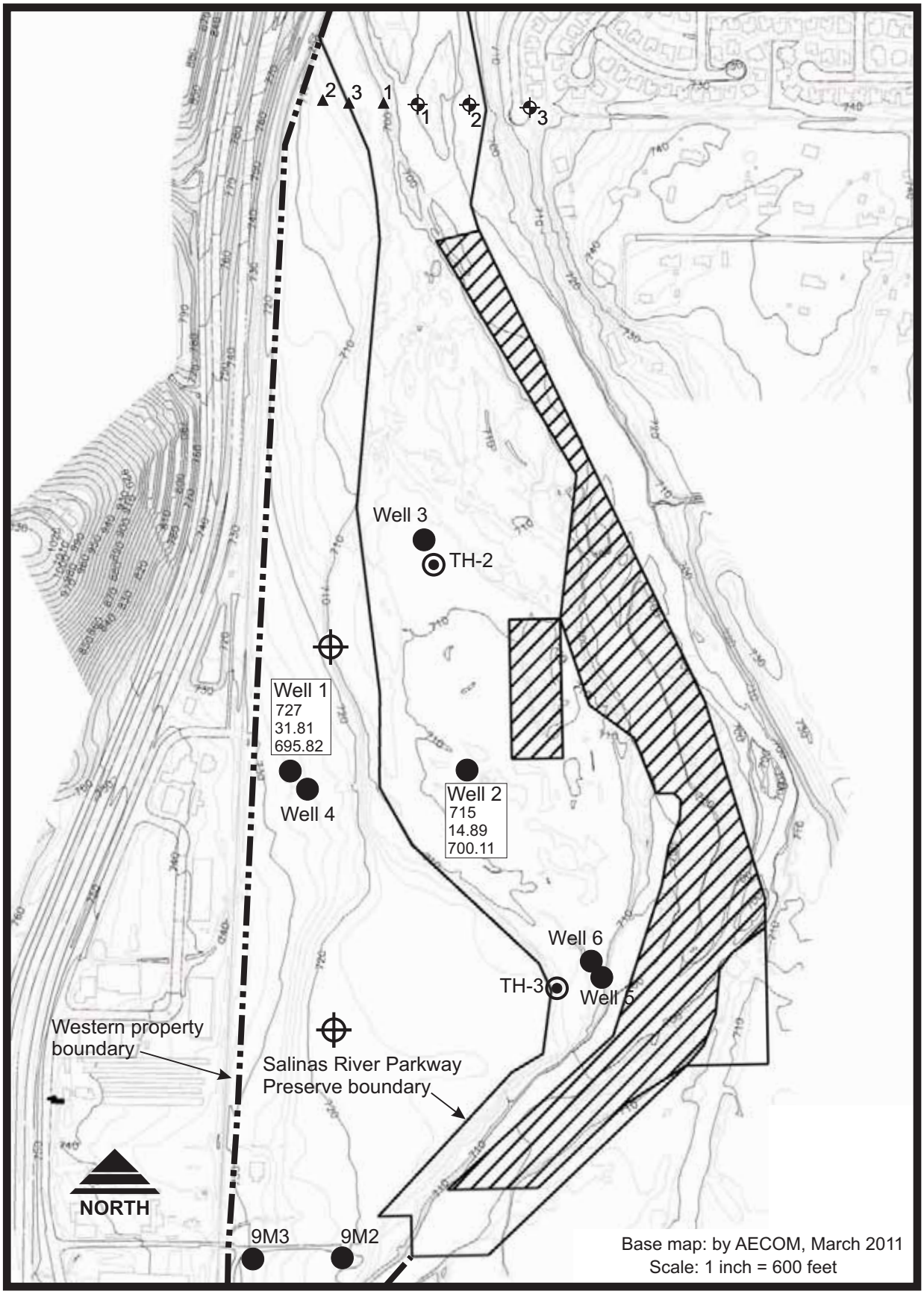
Ramada Drive Site Location and Soil Survey Map
Paso Robles Groundwater Recharge and Reuse Project

Cleath-Harris Geologists

Soil Descriptions

Map Unit Name		Map Unit	Depth (in)	Unified Soils Class	Permeability (in/hr)	Available Water Capacity (in/in)	Flooding Frequency	Septic Tank Absorption	Slope (%)	Drainage class
Metz loamy sand		166	0 to 9; 9 to 60	SM, SM	2.0 to 6.0; 2.0 to 6.0	0.06 to 0.10; 0.06 to 0.11	Rare	floods	0 to 5	Somewhat excessively drained
Metz-Tujunga complex	Metz	167	0 to 9; 9 to 60	SM, SM	2.0 to 6.0; 2.0 to 6.0	0.06 to 0.10; 0.06 to 0.11	Occasional	floods	0 to 5	Somewhat excessively drained
	Tujunga		0 to 20; 20 to 60	SM, SP-SM	6.0 to 20; 6.0 to 20	0.06 to 0.08; 0.06 to 0.08				
Mocho clay loam		173	0 to 19; 19 to 64	CL, CL-ML	0.2 to 0.6; 0.2 to 0.6	0.17 to 0.19; 0.16 to 0.21	None	percs slowly	0 to 2	Well drained
Pico fine sandy loam		184	0 to 17; 17 to 60	SM, ML, SM	2.0 to 6.0; 2.0 to 6.0	0.10 to 0.14; 0.10 to 0.14;	None	slight limitations	2 to 9	Well drained

Descriptions from the Soil Survey of San Luis Obispo County, California, Paso Robles Area (NRCS)

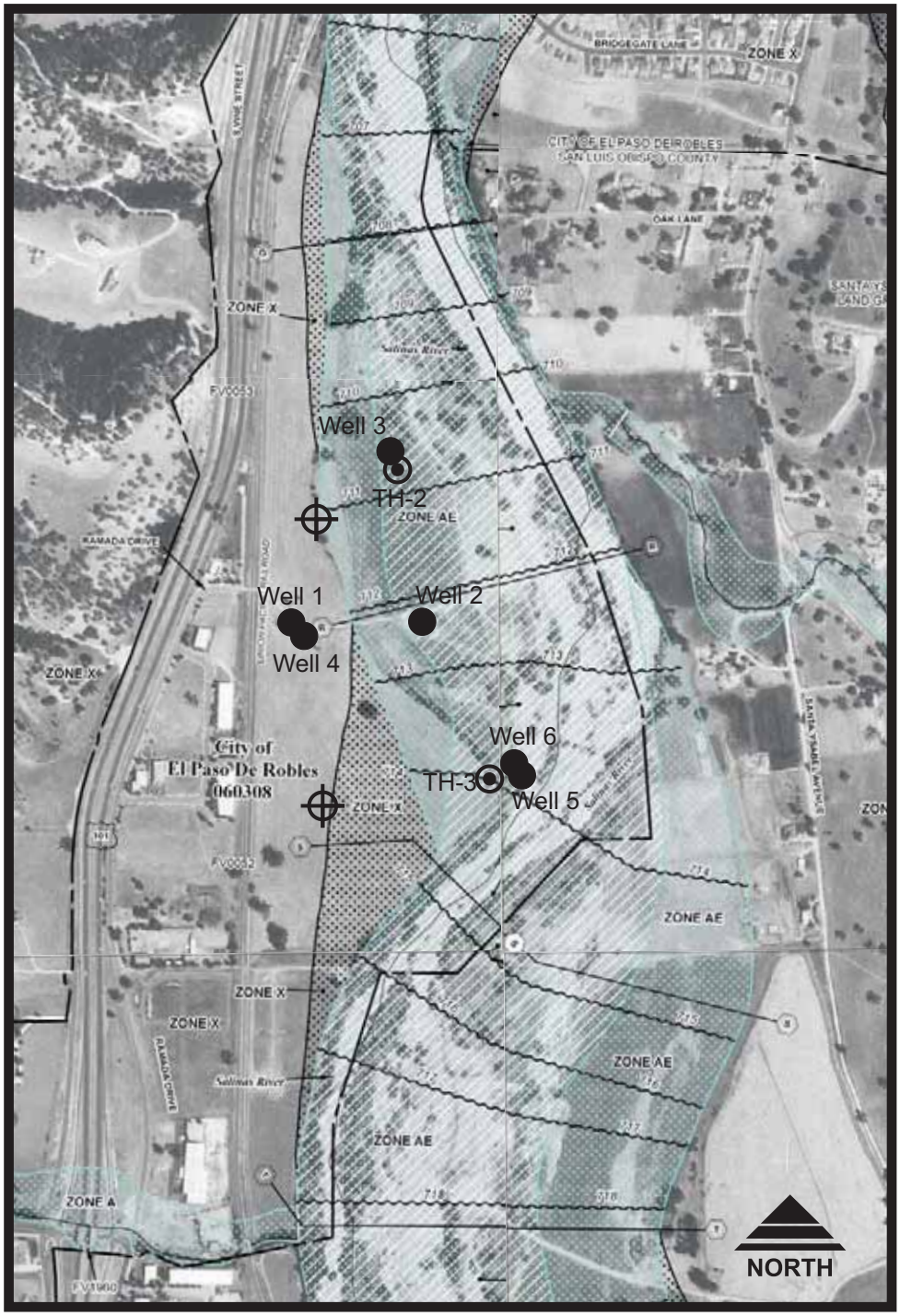


Explanation

- Well location
- Well 1 — Well name
- 727 — Ground surface elevation
- 31.81 — Depth to water
- 695.82 — Groundwater elevation
- Test hole location
- 3 — Borings by Earth Systems Pacific, 2003
- 3 — Borings by Earth Systems Consultants, 1998
- Proposed test hole

Figure 2
Ramada Dr. Site Topography
Paso Robles Groundwater Recharge and Reuse Project

Cleath-Harris Geologists



Base map: FEMA Flood Insurance Rate Maps
Effective date: August 28, 2008
Scale: 1 inch = 1,000 feet

Explanation

- Well location
- Test hole location
- Proposed test hole

Refer to next page for flood map explanation

Figure 3

Ramada Drive FEMA Flood Insurance Rate Maps
Paso Robles Groundwater Recharge and Reuse Project

Cleath-Harris Geologists

Explanation (Refers to Figure 3, FEMA Flood Insurance Rate Maps)

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

Base map: Google Earth,
image date July 1, 2007
Soil Survey of San Luis Obispo Co,
Paso Robles Area, NRCS, 2008

Scale: 1 inch = 1,000 feet

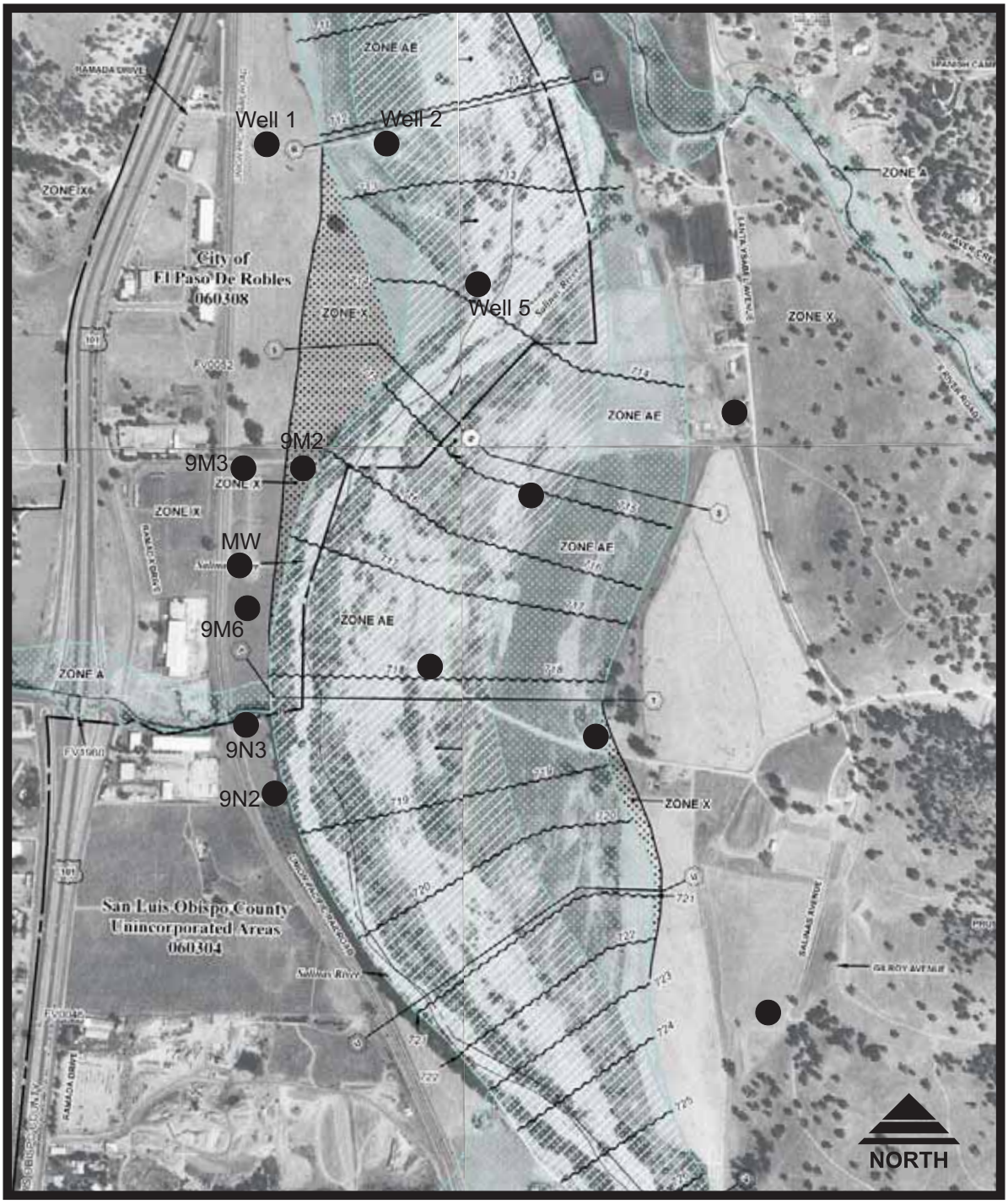
Explanation

⊕	Proposed test hole location
●	Well location
212	Soil designation for Soil Survey
APN 020-282-010	Assessor's parcel number
····· — —	Mapped trace of Rinconada fault dotted where buried, dashed where constrained (Dibblee, 2004)

Figure 4

Santa Ysabel Avenue Site
Location and Soil Survey Map
Paso Robles Groundwater
Recharge and Reuse Project

Cleath-Harris Geologists



Base map: FEMA Flood Insurance Rate Maps
Effective date: August 28, 2008
Scale: 1 inch = 1,000 feet

Explanation

● Well location

Figure 5

Santa Ysabel Avenue FEMA Flood Insurance Rate Maps
Paso Robles Groundwater Recharge and Reuse Project

Cleath-Harris Geologists

Cleath-Harris Geologists, Inc.
11545 Los Osos Valley Road, Suite C-3
San Luis Obispo, California 93405
(805) 543-1413

February 16, 2012

Kirk Gonzalez, Associate Engineer
AECOM/Boyle Engineering
1194 Pacific Street
San Luis Obispo, CA 93401

Subject: Exploratory Findings, Groundwater Recharge and Reuse Project Assessment, Paso Robles, California

Dear Mr. Gonzalez:

The Cleath-Harris Geologists (CHG) exploration phase of the City of Paso Robles Groundwater Recharge and Reuse Project Assessment follows onto the initial hydrogeologic study of the two sites: Site F on the Santa Ysabel Ranch and Site G on the City's Ramada Road Salinas River property. The findings of the exploration are presented herein.

CONDUCT OF WORK

The exploration included five continuous core borings (two on Site G and three on Site F), five percolation tests (one at each boring location), two sediment size distribution analyses (one at each site), and a pumping test of the Sand Mine well. S/G Drilling Company of Lompoc drilled the continuous borings with logging of the cuttings by CHG geologist on December 22-23, 2011. S/G Drilling installed the percolation test tubes adjacent to the borings on December 29, 2011. Five percolation tests were performed by GSI Soils, Inc. of Santa Maria on January 9, 2012; and two soil samples from depths of eight feet in boring F-2 and ten feet in boring G-2 were tested for sediment size distribution on January 11, 2012. The pumping test was performed by City staff under supervision by CHG staff on November 22, 2011. County of San Luis Obispo Health Department Environmental Health Division permits were obtained for the borings on December 14, 2011, and an inspector visited the drilling sites with a CHG geologist on January 9, 2012. The borings were all backfilled immediately following drilling. The four five-foot deep and the one seven-foot deep percolation test tubes will be removed once it is determined that no further percolation testing is needed.

The data obtained from the exploration were reduced and compiled for use in a groundwater mounding analysis. Historical groundwater levels in nearby wells were reviewed and monthly stream flow data obtained at the NOAA stream gage on the Salinas River at 13th Street in Paso Robles were plotted for use in the analysis. The numerical groundwater model for the mounding analysis is being constructed by CHG, and will be utilized to assess the potential for constructing percolation ponds.

FINDINGS

CHG's findings for Site F and for Site G address the suitability of the two sites for percolation ponds. These findings relate to the extent and vertical distribution of permeable and low permeability sediments within the alluvial deposits, groundwater elevation, percolation rates of the near surface sediments underlying the sites, and the hydraulic conductivity of the saturated alluvial deposits.

Site G

The portion of Site G where percolation ponds could be located is in the area within the lower flood plain adjacent to the Salinas River and the sand mine located within the river channel. The ground surface elevation of the flood plain varies between approximately 712 feet above sea level in the southern portion of the site to approximately 708 feet above sea level in the northern portion of the site (from topographic map provided by AECOM, 2011). The river channel elevation ranges between approximately 699 feet in the south and approximately 697 feet downstream and east of boring G-2. The flood plain is bounded on the west by the sloping upper terrace that is from 10 to 20 feet higher in elevation than the lower flood plain. Site G is shown on Figure 1 and includes an area for a conceptual 10-acre percolation pond.

The two borings drilled in Site G encountered the base of the permeable alluvial deposits sloping to the north at depths of 33 feet and 47 feet (an elevation of approximately 679 feet at boring G-1, 100 feet north of the Sand Mine well, and an elevation of approximately 661 feet at boring G-2, 750 feet north of the Sand Mine well). The alluvial deposits include silty sands in the upper several feet, below which are coarser sands with some gravel. In boring G-2, two one-foot thick sandy clay lenses were encountered at 17 feet depth and 38 feet depth, and one very thin clay lens occurred at 24 feet depth. No clay layers were observed above 33 feet depth in the southern boring G-1. The lithology logs for the two borings are included in Appendix A.

The depth to water observed during the exploration drilling at Site G was between 24 and 26 feet. These water levels were measured at a time when there was no stream flow at the NOAA Salinas River stream gage at 13th Street in Paso Robles. During the wet seasons when the stream is flowing, there is greater recharge to the alluvial aquifer and groundwater levels rise. Water levels are known to rise as high as 10 to 12 feet below ground surface during these conditions.

A one-hour constant discharge pumping test was performed at the Sand Mine well (also known as Well #2) at an average rate of 188 gallons per minute (gmp) on December 21, 2011. Static water level prior to the test was at 30 feet depth. Total drawdown at the end of pumping measured 12.21 feet for a depth below ground surface of 42.21 feet. Water levels at the Sand Mine well recovered to the original static level after 20 minutes following pump shut down. The well was measured with an apparent bottom at 90 feet below ground surface. Based on the well depth, the well is completed in permeable zones above and below the low-permeability layers observed in boring G-1 and test hole TH-2. The pumping test data is included in Appendix B.

Base map: Google Earth,
image date July 15, 2010

Scale: 1 inch = 300 feet

Test Hole	Perc Rate	Hole Depth	Soil
G-1	14 min/in	5 ft	Silty Sand (SM) 3-7'
G-2	23 min/in	5 ft	Fine Sand (SP) 3-9'

Explanation

- Percolation test boring
- Existing well
- 167 Soil Survey Map Unit

Figure 1

Ramada Drive Site Map (Site G)
Groundwater Recharge and
Reuse Project Assessment

Cleath-Harris Geologists

Site F

The portion of Site F where a percolation pond could be located is in the area within the lower flood plain adjacent to the Salinas River. The ground surface elevation of the flood plain varies between approximately 725 feet above sea level in the southern portion of the site to approximately 715 feet above sea level in the northern portion of the site (topography based on AECOM, 2011 and Santa Ysabel Ranch tract map, 1999). The river channel elevation ranges between approximately 705 feet in the south and approximately 702 feet downstream and west of boring F-3. East of borings F-2 and F-3, the flood plain is bounded by a sloping upper terrace that is from 10 to 14 feet higher in elevation than the lower flood plain. Site F is shown on Figure 2 and includes an area for a conceptual 10-acre percolation pond.

Boring F-1 was drilled on the upper terrace and encountered the base of permeable terrace deposits at approximately five feet depth. The two borings F-2 and F-3 drilled in the lower flood plain encountered the base of the permeable alluvial deposits sloping very gently to the north at depths of 37 feet and 34 feet (an elevation of approximately 686 feet at boring F-2, and an elevation of approximately 685 feet at boring F-3. The alluvial deposits include fine silty sands in the upper two to four feet, below which are coarser sands with some gravel. In boring F-2, a one-foot thick clay lens was encountered at 22 feet depth. A very thin sandy clay lens was observed at 28 feet depth in boring F-3. The lithology logs for the two borings are included in Appendix A.

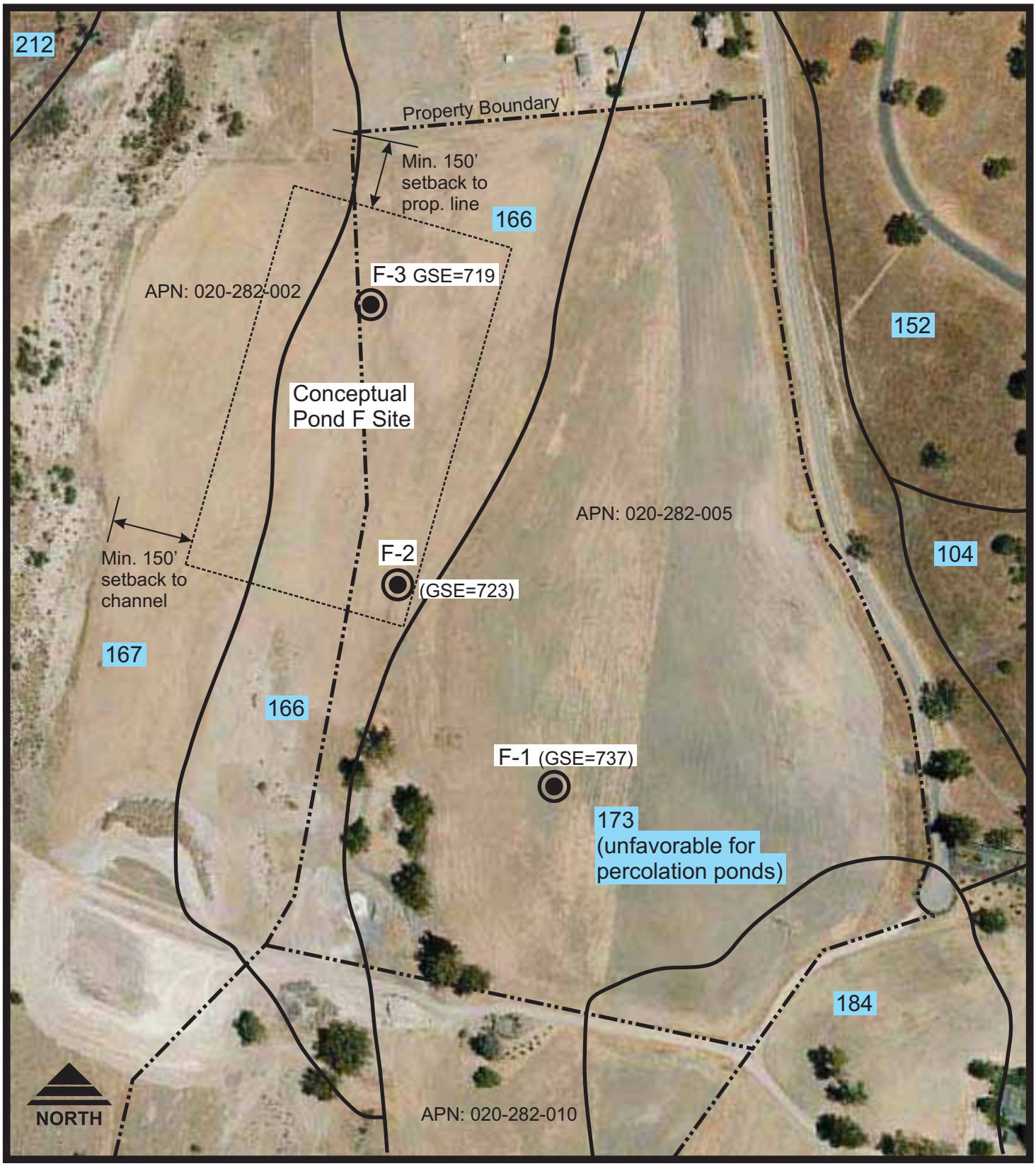
The depth to water observed during the exploration drilling at Site F was 27 feet in each of the three borings. As at Site G, these water levels were measured at a time when there was no stream flow at the NOAA Salinas River stream gage at 13th Street in Paso Robles. Like Site G, there is greater recharge to the alluvial aquifer and higher water levels during the wet season when there is flow in the Salinas River. Water levels can be expected to rise as high as 10 to 12 feet below ground surface during wet season conditions.

Groundwater Elevations and Stream Flow

Groundwater level hydrographs were reviewed for the Thunderbird Wells 10 and 13, and for the Ronconi Wells 1 and 4 to compare static groundwater levels to the elevation of the adjacent stream channel. A graph showing monthly stream flow at the Salinas River Gage located at the Creston Road Bridge is attached herein, and indicates months when there is significant flow and when there is little to no flow at the gage. An additional graph of stream gage data plots the number of months each year when there is no flow recorded at the gage. The number of months in which no flow is recorded has averaged four and one half months per year since the gage was installed in 1939. The hydrographs and the stream gage data are included in Appendix C.

Percolation Tests and Sediment Size Distribution

Following backfill of the lower depths of the borings, four-inch diameter perforated pipes were installed to five feet depth in the four flood plain borings and to seven feet in the upper terrace boring



Base map: Google Earth,
image date July 1, 2007

Scale: 1 inch = 300 feet

Test Hole	Perc Rate	Hole Depth	Soil
F-1	38 min/in	7 ft	Sandy Clay (CL) 5-9'
F-2	No perc.	5 ft	Silty Sand (SM) 2-4'; Sand (SW) 4-9'
F-3	1.5 min/in	5 ft	Sand (SW) 2-9'

Explanation

Percolation test boring

Existing well

166 Soil Survey Map Unit

Figure 2

Santa Ysabel Ave. Site Map (Site F)
Paso Robles Groundwater
Recharge and Reuse Project

Cleath-Harris Geologists

F-1. Prior to performing the tests, the borings were filled with water to allow for pre-soaking for 24 hours. The test results documented by GSI Soils, are included in Appendix D. The percolation test results and boring information are summarized below:

Table 1

Boring	Ground Surface Elevation	Depth to Water	Groundwater Elevation	Total Depth	Percolation Hole Depth	Percolation Rate	Shallow Subsurface
G-1	712	26	686	49	5 ft	14 min/in	Silty Sand (SM) 3-7'
G-2	709	24	685	49	5 ft	23 min/in	Fine Sand (SP) 3-9'
F-1	737	27	710	49	7 ft	38 min/in	Sandy Clay (CL) 5-9'
F-2	723	27	696	54	5 ft	No percolation	Silty Sand (SM) 2-4'; Sand (SW) 4-9'
F-3	719	27	692	49	5 ft	1.5 min/in	Sand (SW) 2-9'

Depths to water measured on December 22 and 23, 2011. All depths are in feet.

The fact that no percolation occurred at boring F-2 indicates that the boring or perforated pipe became plugged. The silty sand to four feet depth and sand to nine feet depth suggests that percolation rates at boring F-2 should be less than 14 minutes per inch (boring G-1) and greater than 1.5 minutes per inch (boring F-3).

The Soil Survey of San Luis Obispo County designates the soil unit at Site G, to a depth of five feet, as Tujunga soils (map unit 167) with permeabilities of 6 to 20 inches per hour (3 to 10 minutes per inch). Site F is underlain by Metz loamy sand (166) on the east portion of the site and by Tujunga (167) soils on the west portion of the site with permeabilities of 2 to 6 inches per hour (10 to 30 minutes per inch) for Metz soils and 6 to 20 inches per hour for the Tujunga soils.

A sediment size distribution analysis was conducted for boring G-2 by collecting a composited sample from five to ten feet depth. The results indicated a fine to course grained sand with less than 10 percent fine gravel and less than two percent in the silt or clay particle-size range.

A composited sample was collected from boring F-2 from four to eight feet depth. The results indicated a fine to coarse grained sand with two percent fine gravel and less than two percent in the silt or clay range. The sediment size distribution results are included in Appendix D.

Conceptual Pond Design Assumptions

The Site G pond area is located within the lower flood plain on City owned property. The pond area would overlie a favorable percolation area assumed to encompass 10 acres, with a minimum setback from the active Sand Mine well of 150 feet, and a minimum setback from the Salinas River stream channel of 150 feet. The conceptual pond dimensions would be 450 feet by 970 feet.

The Site F pond area is located within the lower flood plain on property not owned by the City. The pond area would overlie a favorable percolation area also assumed to encompass 10 acres. A

minimum setback of 150 feet is recommended from the northern property line, and a minimum 150 feet setback would be recommended from the stream channel. The upper terrace in the vicinity of boring F-1 was found to be unfavorable to pond siting because of the poor percolation test results and its soil designation as Mocho clay loam with slow percolation rates. The conceptual pond dimensions would be 500 feet by 870 feet. If you have any questions, please contact our office.

Respectfully submitted,
CLEATH-HARRIS GEOLOGISTS, INC.

Timothy S. Cleath, Certified Hydrogeologist #81
President

Appendix A

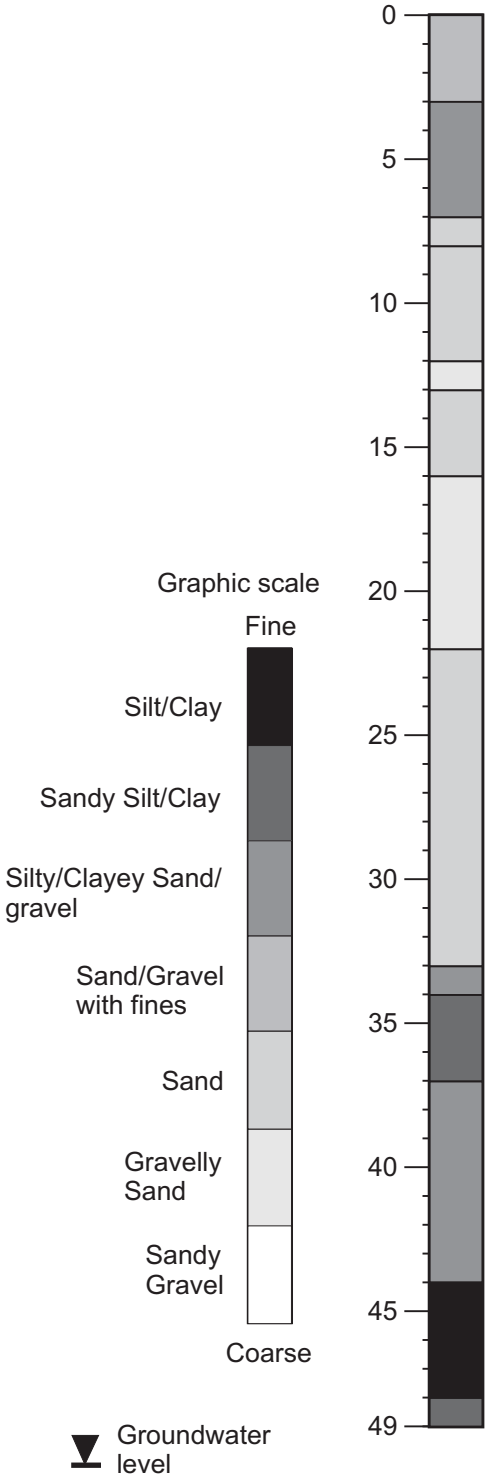
Lithologic Logs

Project: Test Borings, Paso Robles Percolation Study

Client: AECOM
Site: Ramada Drive Site, Paso Robles, California
Latitude: 35.5993° N
Longitude: 120.6893° W
Elevation: 712 feet (from AECOM Site Topography, 2011)

Log of boring: G-1

Date drilled: 12/22/11
Total Depth: 49 feet



0-3' **Sand with Silt (SP-SM);** dark yellowish brown (10YR 4/6); mostly fine to medium sand, lesser coarse; damp.

3-7' **Silty Sand (SM);** yellowish brown (10YR 5/4); fine to medium grained sand; damp.

7-8' **Sand (SW);** yellowish brown (10YR 5/4); fine to coarse, angular to subrounded, mostly quartz, lesser granitic, shale and dark mafic grains; damp.

8-12' **Sand (SP);** trace gravel; yellowish brown (10YR 5/4); fine to medium sand, subangular to subrounded; gravel to 1"; damp.

12-13' **Gravelly Sand (SW);** dark yellowish brown (10YR 3/4); fine to coarse sand; gravel to 1", subrounded.

13-16' **Sand with Gravel (SW);** yellowish brown (10YR 5/4); fine to coarse, subangular to subrounded; moist.

16-22' **Gravelly Sand (SW);** yellowish brown (10YR 5/4); fine to coarse, subangular to subrounded; gravel to 2", subrounded, mostly siliceous shale; moist.

22-33' **Sand with Gravel (SW);** yellowish brown (10YR 5/4); fine to coarse sand; gravel to 1"; increasingly moist.

Becomes wet at 26' depth.

33-34' **Clayey Sand (SC);** dark greenish gray (10Y 4/1); fine grained sand; soft interstitial clay.

34-37' **Sandy Clay (CL);** dark greenish gray (10Y 4/1); stiff, slightly plastic; fine sand. 2" thick sandy gravel lens at 37' depth.

37-44' **Clayey Sand (SC);** dark greenish gray (10Y 4/1); fine grained sand. Abundant wood fragments from 40' to 44' depth.

44-48' **Clay (CH);** dark greenish gray (10Y 4/1); stiff, plastic; black organic nodules up to 1/8" diameter from 47' to 48' depth.

48-49' **Sandy Clay (CL);** dark greenish gray (10Y 4/1); stiff; sand mostly fine grained, trace medium to coarse.

Driller: S/G Drilling Company
Rig: CME 75
Method: 8-inch diameter hollow stem auger

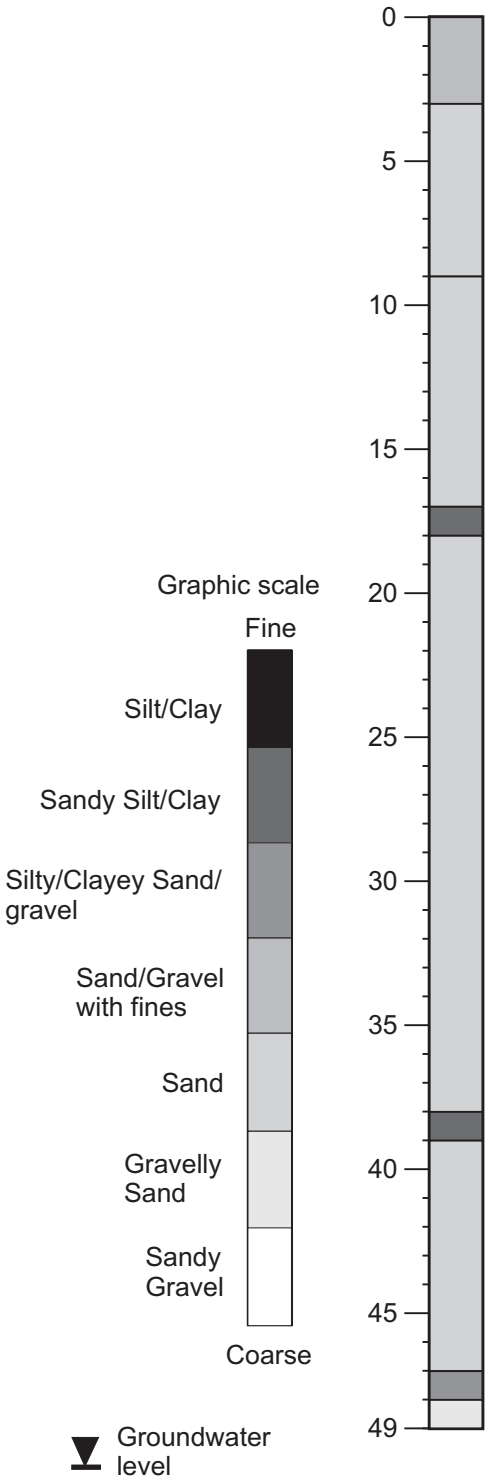
Geologist : D. Williams
Cleath-Harris Geologists, Inc.
San Luis Obispo, California

Project: Test Borings, Paso Robles Percolation Study

Client: AECOM
Site: Ramada Drive Site, Paso Robles, California
Latitude: 35.6010° N
Longitude: 120.6896° W
Elevation: 709 feet (from AECOM Site Topograpy, 2011)

Log of boring: G-2

Date drilled: 12/22/11
Total Depth: 49 feet



0-3' **Silty Sand (SM);** dark yellowish brown (10YR 4/4); fine grained sand; moist.

3-9' **Sand (SP);** yellowish brown (10YR 5/4); fine grained sand, subangular to subrounded; slightly micaceous; damp. Slight color change to 10YR 5/6 from 7' to 9' depth.

9-17' **Sand (SW);** yellowish brown (10YR 5/6); mostly fine to coarse, lesser fine, subangular to subrounded; moist.

17-18' **Sandy Clay (CL);** dark brown (10YR 3/3); soft, non-plastic; 30% fine to coarse grained sand; moist.

18-38' **Sand with Gravel (SW);** yellowish brown (10YR 5/4); fine to medium sand, subangular to subrounded; gravel to 1", subrounded; moist.

Sand becomes fine to coarse grained from 22' to 24' depth.
4" thick sandy clay lens at 23.5' depth.
Becomes wet at 24' depth.

38-39' **Sandy Clay (CL);** trace gravel; dark greenish gray (10Y 4/1); stiff, slightly plastic; fine sand.

39-47' **Sand (SP);** dark yellowish brown (10YR 4/6; mostly fine sand, lesser medium, fine to coarse grained sand lens at 44' depth.

47-48' **Silty Sand (SM);** yellowish brown (10YR 5/4); fine sand; 3" thick clay lens at 48' depth

48-49' **Gravelly Sand (SW);** yellowish brown (10YR 5/6); mostly fine to coarse sand, lesser fine, subangular to subrounded; gravel to 2", mostly subrounded shale.

Driller: S/G Drilling Company
Rig: CME 75
Method: 8-inch diameter hollow stem auger

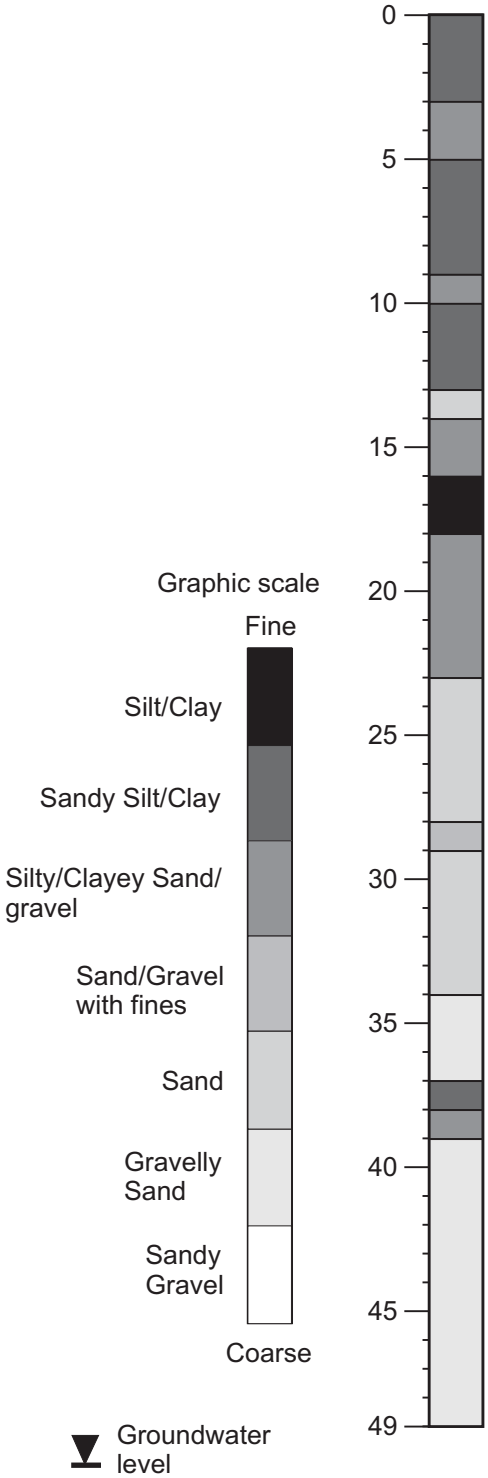
Geologist : D. Williams
Cleath-Harris Geologists, Inc.
San Luis Obispo, California

Project: Test Borings, Paso Robles Percolation Study

Client: AECOM
Site: Santa Ysabel Avenue Site, Paso Robles, California
Latitude: 35.5897° N
Longitude: 120.6829° W
Elevation: 737 feet (elevation relative to F-2 from field measurement)

Log of boring: F-1

Date drilled: 12/23/11
Total Depth: 49 feet



0-3' **Sandy Silt (ML);** dark yellowish brown (10YR 4/4); soft silt; fine sand; damp.

3-5' **Silty Sand (SM);** yellowish brown (10YR 5/4); fine grained sand, subangular to subrounded; damp.

5-9' **Sandy Clay (CL);** yellowish brown (10YR 5/4); mottled reddish brown; stiff clay; 35% fine grained sand; damp.

9-10' **Clayey Sand (SC);** yellowish brown (10YR 5/4); fine sand; damp.

10-13' **Sandy Clay (CL);** yellowish brown (10YR 5/4); weakly mottled, stiff, non-plastic; fine sand; damp.

13-14' **Sand (SP);** yellowish brown (10YR 5/4); fine sand, subangular, quartzose; damp.

14-16' **Clayey Sand (SC);** yellowish brown (10YR 5/4); fine sand; micaceous; moist.

16-18' **Clay with Sand (CL);** greenish black (10Y 2.5/1) medium consistency, slightly plastic; fine sand; moist.

18-23' **Clayey Sand (SC);** very dark greenish gray (10Y 3/1); 60% sand, mostly fine, trace medium, angular to subrounded; micaceous; 40% clay; moist.

23-28' **Sand (SW);** dark yellowish brown (10YR 4/6); fine to coarse grained, subangular to subrounded, quartzose; moist. Becomes very dark greenish gray (10Y 3/1) from 25' to 28' depth.

Becomes wet at 27' depth. 4" thick fine sandy clay lens at 28' depth.

28-29' **Gravelly Sand with Clay (SW-SC);** very dark greenish gray (10Y 3/1); fine to coarse sand; siliceous shale gravel to 2"; wet.

29-34' **Sand (SP);** dark greenish gray (10Y 4/1); fine to medium grained, subangular, mostly quartz.

34-37' **Gravelly Sand (SW);** dark greenish gray (10Y 4/1); fine to coarse, subangular to subrounded; gravel to 2", siliceous shale, trace chert.

37-38' **Sandy Clay with Gravel (CL);** dark greenish gray (10Y 4/1); stiff clay; fine to coarse sand; gravel to ½".

38-39' **Clayey, Gravelly Sand (SC);** dark greenish gray (10Y 4/1); mostly fine sand, lesser medium to coarse; subrounded gravel to 1".

39-49' **Gravelly Sand (SW);** dark greenish gray (10Y 4/1); mostly medium to coarse, lesser fine, subangular to subrounded; clasts to 4", siliceous shale and metavolcanics; subrounded. Lesser cobbles from 44' to 49' depth.

Driller: S/G Drilling Company
Rig: CME 75
Method: 8-inch diameter hollow stem auger

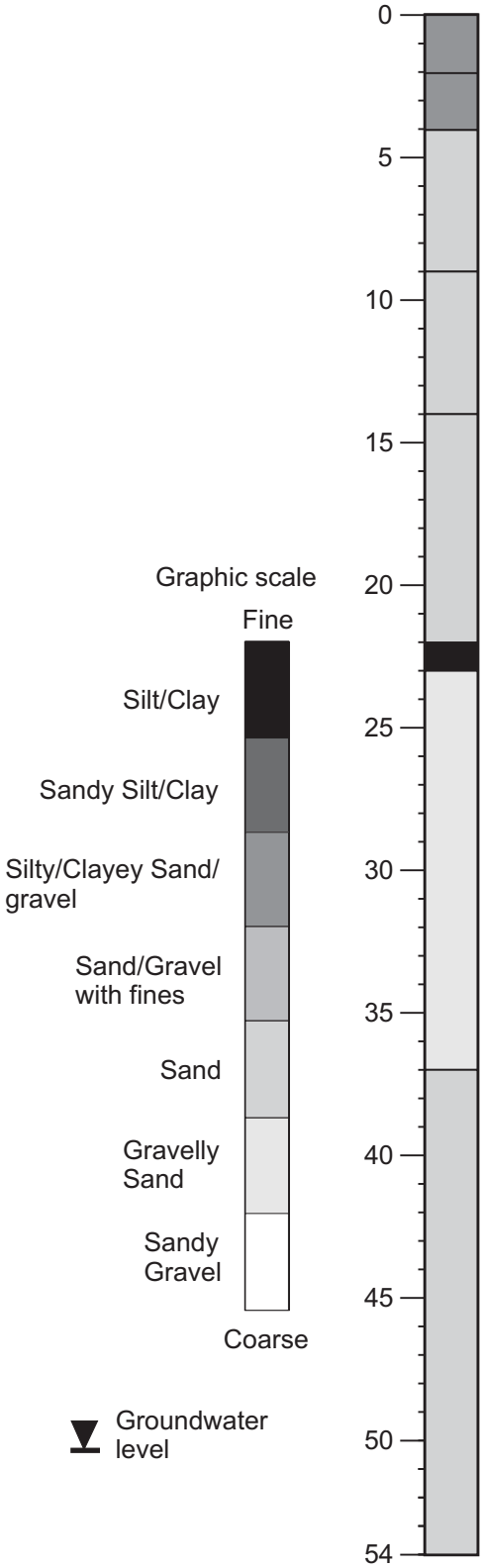
Geologist : D. Williams
Cleath-Harris Geologists, Inc.
San Luis Obispo, California

Project: Test Borings, Paso Robles Percolation Study

Client: AECOM
Site: Santa Ysabel Avenue Site, Paso Robles, California
Latitude: 35.5909° N
Longitude: 120.6840° W
Elevation: 723 feet (estimated from topographic map)

Log of boring: F-2

Date drilled: 12/23/11
Total Depth: 54 feet



0-2' **Silty Sand (SM);** dark yellowish brown (10YR 4/4); mostly fine sand, lesser medium to coarse; damp.

2-4' **Silty Sand with Gravel (SM);** yellowish brown (10YR 5/4); fine to coarse; gravel to 2"; damp.

4-9' **Sand (SW);** trace gravel; yellowish brown (10YR 5/4); fine to coarse sand; gravel to 1", subrounded; slightly micaceous; damp.

9-14' **Sand (SW);** dark yellowish brown (10YR 4/6); fine to coarse, becoming fine to medium from 11' to 12' depth and fine to coarse from 12' to 14' depth, mostly subangular, quartz and lesser black mafics; moist.

14-22' **Sand with Gravel (SW);** dark yellowish brown (10YR 4/6); fine to coarse, subangular to subrounded; gravel to 1", siliceous shale, lesser metavolcanics and granitics, subrounded; micaceous; moist.

22-23' **Clay (CL);** greenish black (10Y 2.5/1); soft, slightly plastic; micaceous; moist.

23-37' **Gravelly Sand (SW);** dark yellowish brown (10YR 4/6); fine to coarse sand; gravel to 2", subrounded; moist. Color change to grayish brown (10YR 5/2) and gravel size decreased to 1" from 29' to 37' depth.

Becomes wet at 27' depth.

37-54' **Sand with Gravel (SW);** greenish gray (5GY 5/1); fine to coarse sand; gravel to 3/4", subrounded.

Driller: S/G Drilling Company
Rig: CME 75
Method: 8-inch diameter hollow stem auger

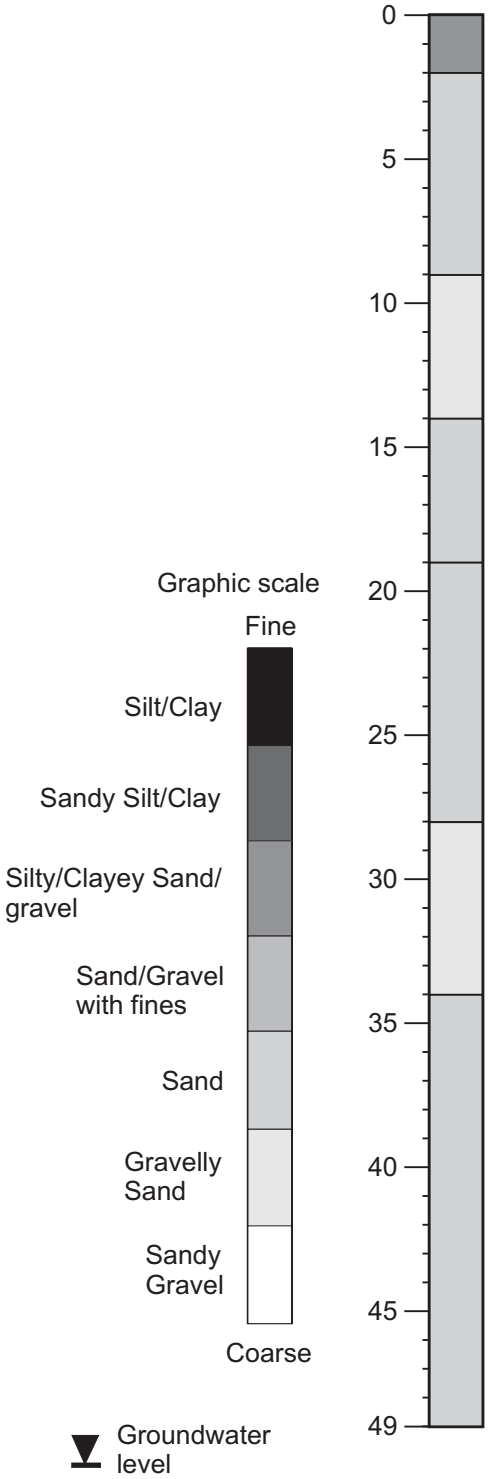
Geologist : D. Williams
Cleath-Harris Geologists, Inc.
San Luis Obispo, California

Project: Test Borings, Paso Robles Percolation Study

Client: AECOM
Site: Santa Ysabel Avenue Site, Paso Robles, California
Latitude: 35.5925° N
Longitude: 120.6842° W
Elevation: 719 feet (estimated from topographic map)

Log of boring: F-3

Date drilled: 12/23/11
Total Depth: 49 feet



0-2' **Silty Sand (SM);** dark yellowish brown (10YR 3/4); fine to medium, angular to subrounded; moist.

2-9' **Sand (SW);** dark yellowish brown (10YR 4/4); fine to coarse sand, subangular to subrounded, mostly quartz with lesser dark mafics and granitics; damp.

9-14' **Gravelly Sand (SW);** dark yellowish brown (10YR 4/6); fine to coarse sand, mostly subrounded; gravel to 2", subrounded, siliceous shale and lesser metavolcanics and granitics; moist.

14-19' **Sand (SW);** yellowish brown (10YR 5/4); fine to coarse, subangular to subrounded; moist.

19-28' **Sand (SP);** yellowish brown (10YR 5/4); fine to medium grained, mostly quartz and lesser minerals of mixed sources; slightly micaceous; moist.

Becomes wet at 27' depth.

3" thick sandy clay lens at 28' depth.

28-34' **Gravelly Sand (SW);** yellowish brown (10YR 5/4); medium to coarse sand; subrounded gravel to 2", mostly siliceous shale, trace black mafics.

Becomes dark grayish brown (10YR 4/2) from 32' to 33' depth, and dark greenish gray (5GY 4/1) from 33' to 34' depth.

34-49' **Sand (SW);** trace gravel; dark greenish gray (10Y 4/1); fine to coarse sand, mostly subrounded, lesser subangular; gravel to 1", siliceous shale.

Less gravel and less coarse sand from 39' to 49' depth.

Driller: S/G Drilling Company
Rig: CME 75
Method: 8-inch diameter hollow stem auger

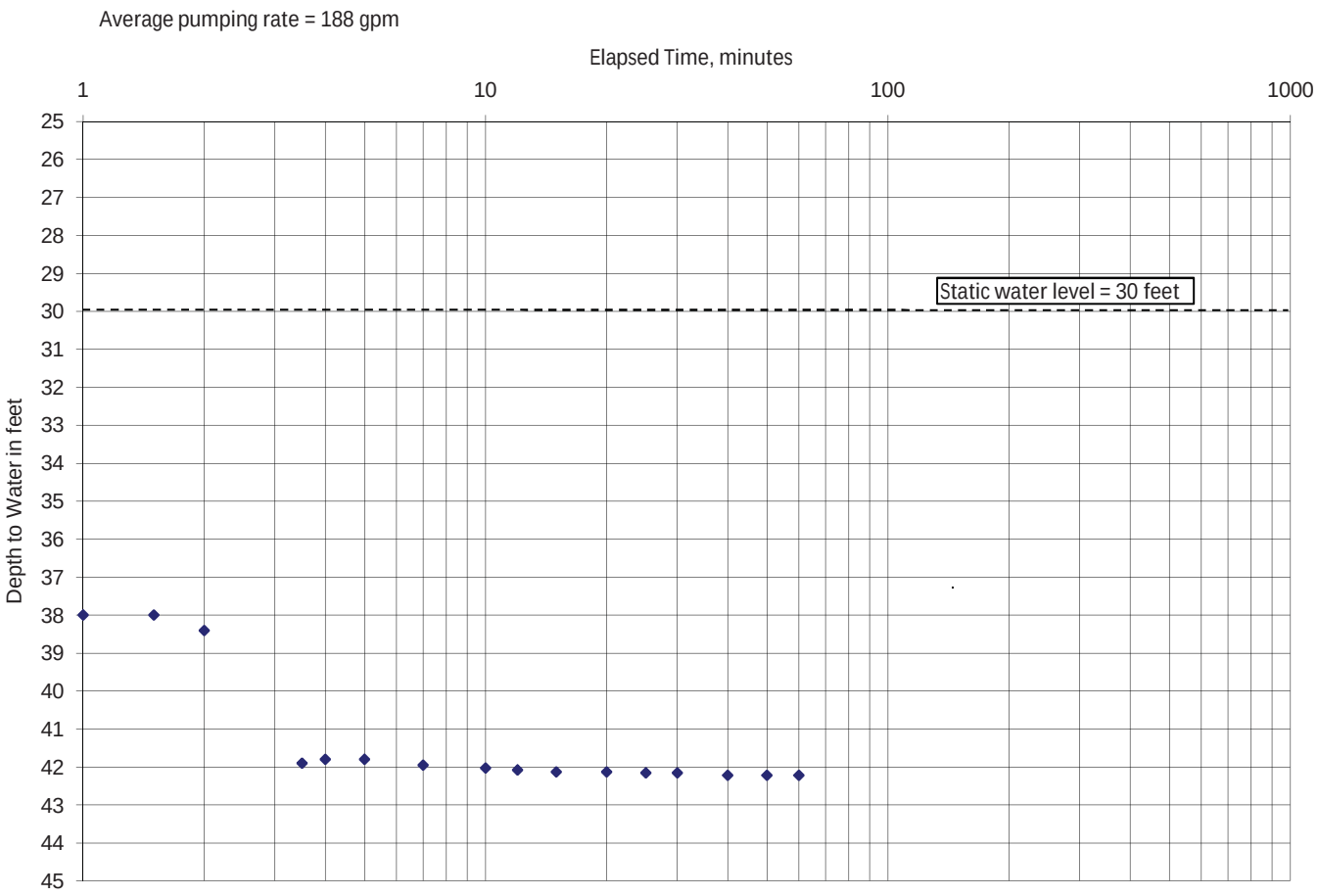
Geologist : D. Williams
Cleath-Harris Geologists, Inc.
San Luis Obispo, California

Appendix B

Pumping Test Data, Sand Mine Well

Pumping Test (60 Minute) - Sand Mine Well
December 21, 2011

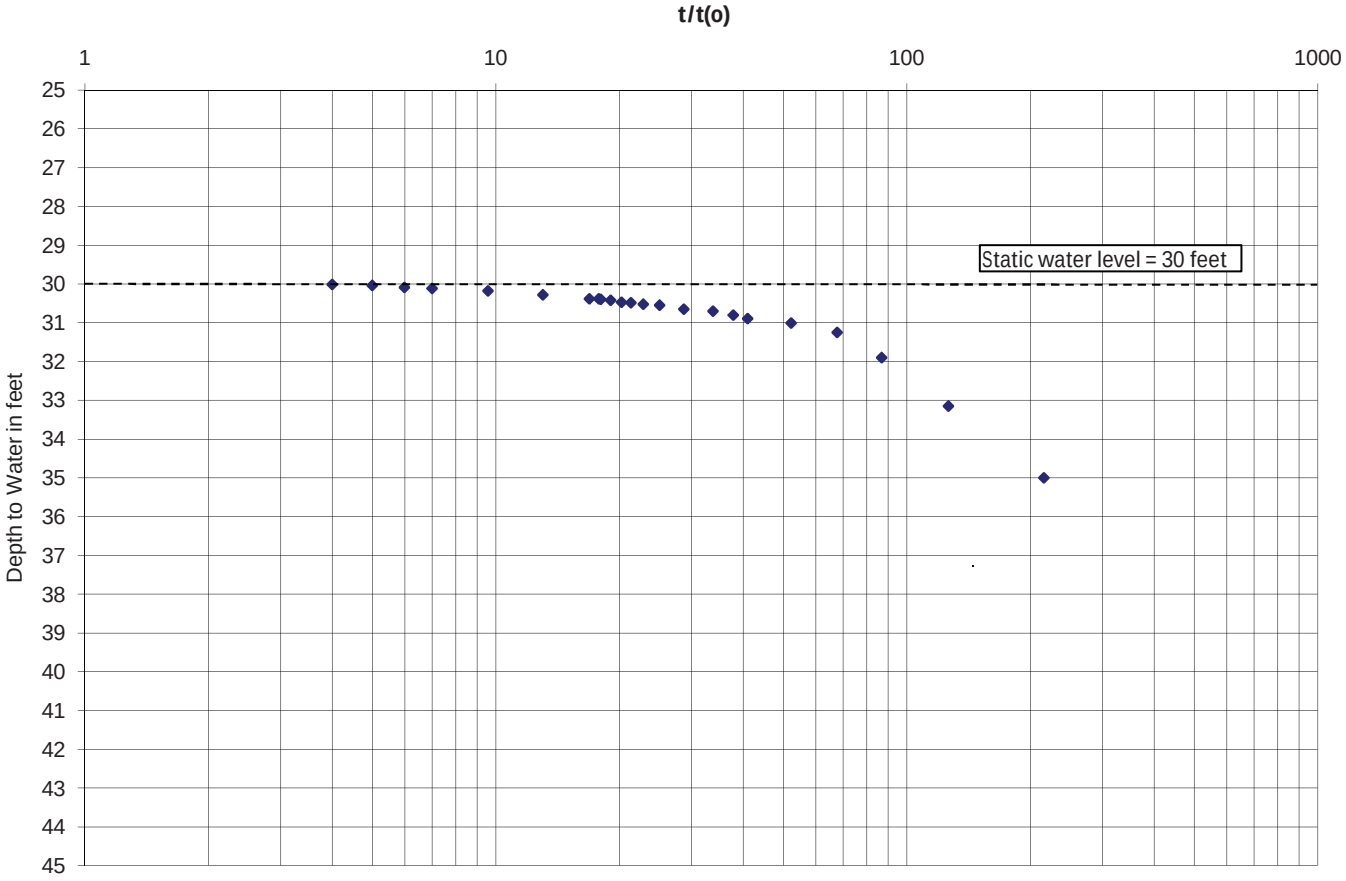
Depth to Static Water Level: 30 feet



Pumping Test (60 Minute) - Sand Mine Well
December 21, 2011

Depth to Static Water Level: 30 feet

Recovery



Pumping Test (60 minutes), Sand Mine Well

Day	Elapsed Time	Depth to Water*	Drawdown	Recorded Pumping Rate
Mo./Day/Yr	minutes	feet	feet	gallons per minute
12/21/11	0	30	0	0
	0.5	37.9	7.90	180
	1	38	8.00	180
	1.5	38	8.00	190
	2	38.4	8.40	190
	3.5	41.9	11.90	197
	4	41.8	11.80	190
	5	41.8	11.80	190
	7	41.95	11.95	173-186
	10	42.03	12.03	151-182
	12	42.08	12.08	187-190
	15	42.13	12.13	190-203
	20	42.13	12.13	186-199
	25	42.15	12.15	184-193
	30	42.15	12.15	177-185
	40	42.21	12.21	183-190
	50	42.21	12.21	179-188
	60	42.21	12.21	179-185

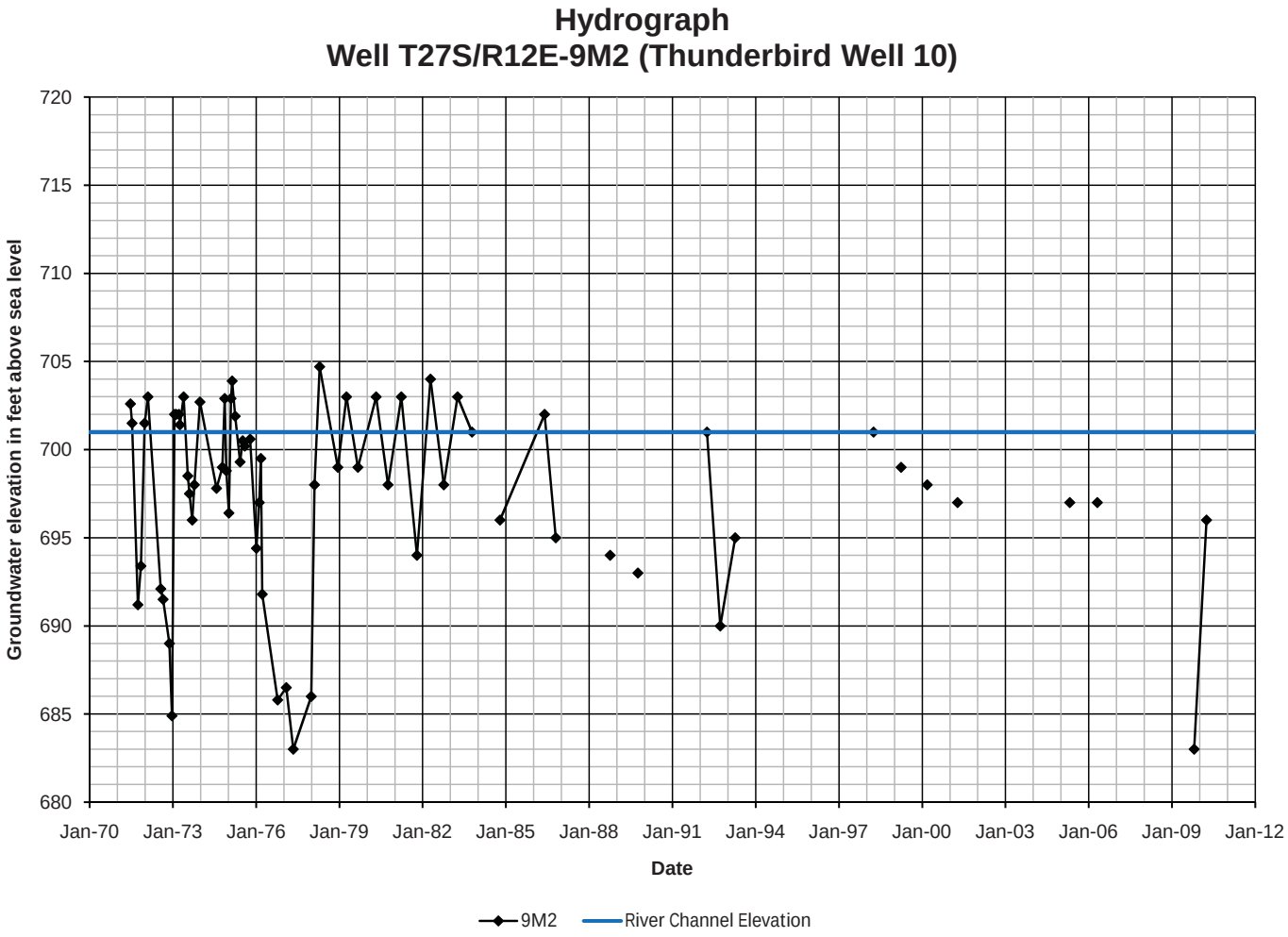
Recovery Test, Sand Mine Well

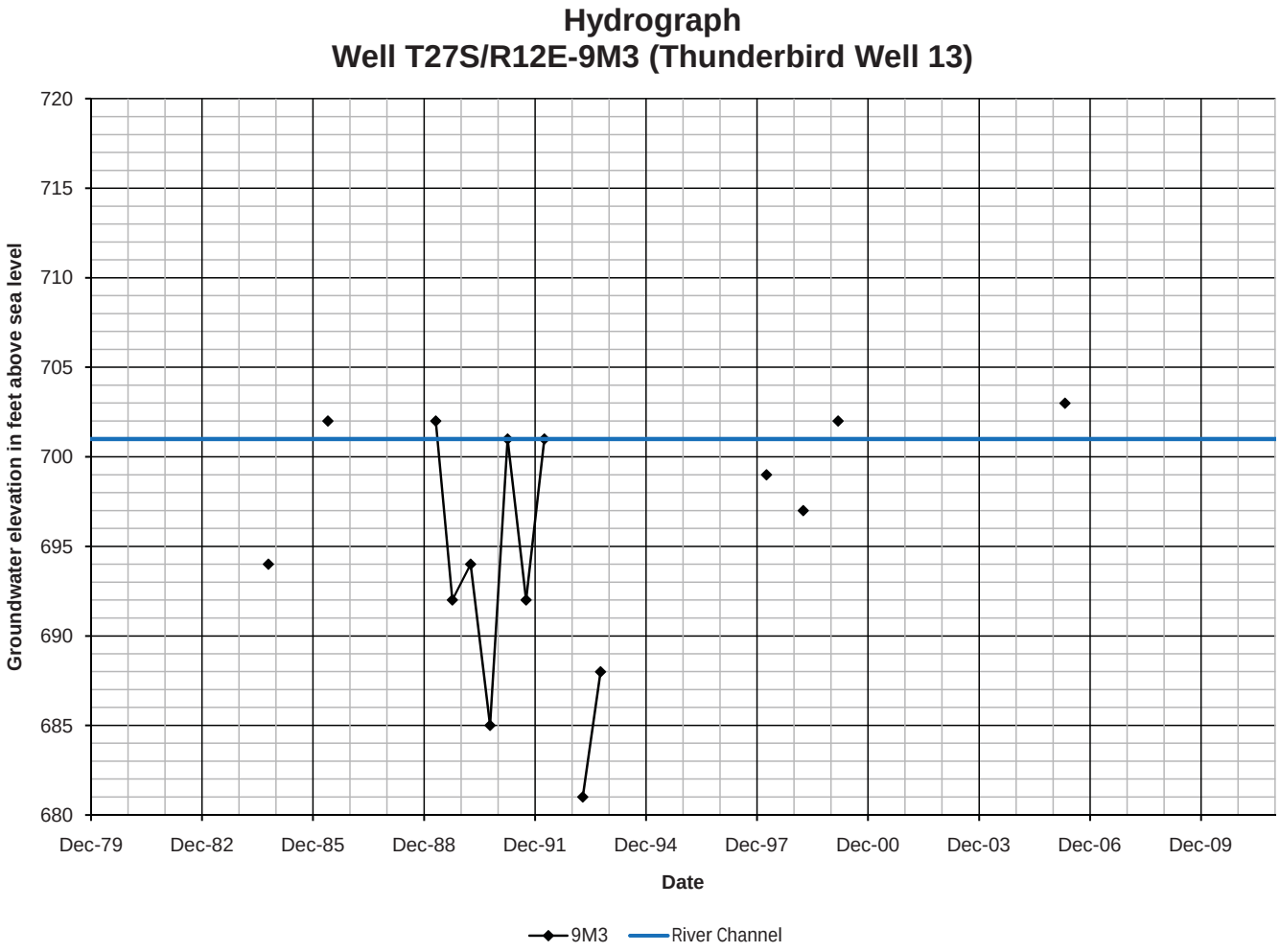
Day	Elapsed Time	Depth to Water	Elapsed Time	Recovery Time Ratio
Mo./Day/Yr	minutes	feet	minutes	
Recovery	t	s	t(0)	t/t(0)
12/21/11	60.3	35	0.3	215.3
	60.5	33.15	0.5	126.0
	60.7	31.9	0.7	86.7
	60.9	31.25	0.9	67.7
	61.2	31.01	1.2	52.3
	61.5	30.9	1.5	41.0
	61.6	30.8	1.6	37.8
	61.8	30.7	1.8	33.8
	62.2	30.65	2.2	28.6
	62.5	30.55	2.5	25.0
	62.8	30.53	2.8	22.8
	63.0	30.48	3.0	21.3
	63.1	30.47	3.1	20.2
	63.3	30.42	3.3	19.0
	63.5	30.4	3.5	18.0
	63.6	30.39	3.6	17.8
	63.8	30.39	3.8	16.9
	65.0	30.28	5.0	13.0
	67.0	30.18	7.0	9.6
	70.0	30.11	10.0	7.0
	72.0	30.09	12.0	6.0
	75.0	30.04	15.0	5.0
	80.0	30.02	20.0	4.0

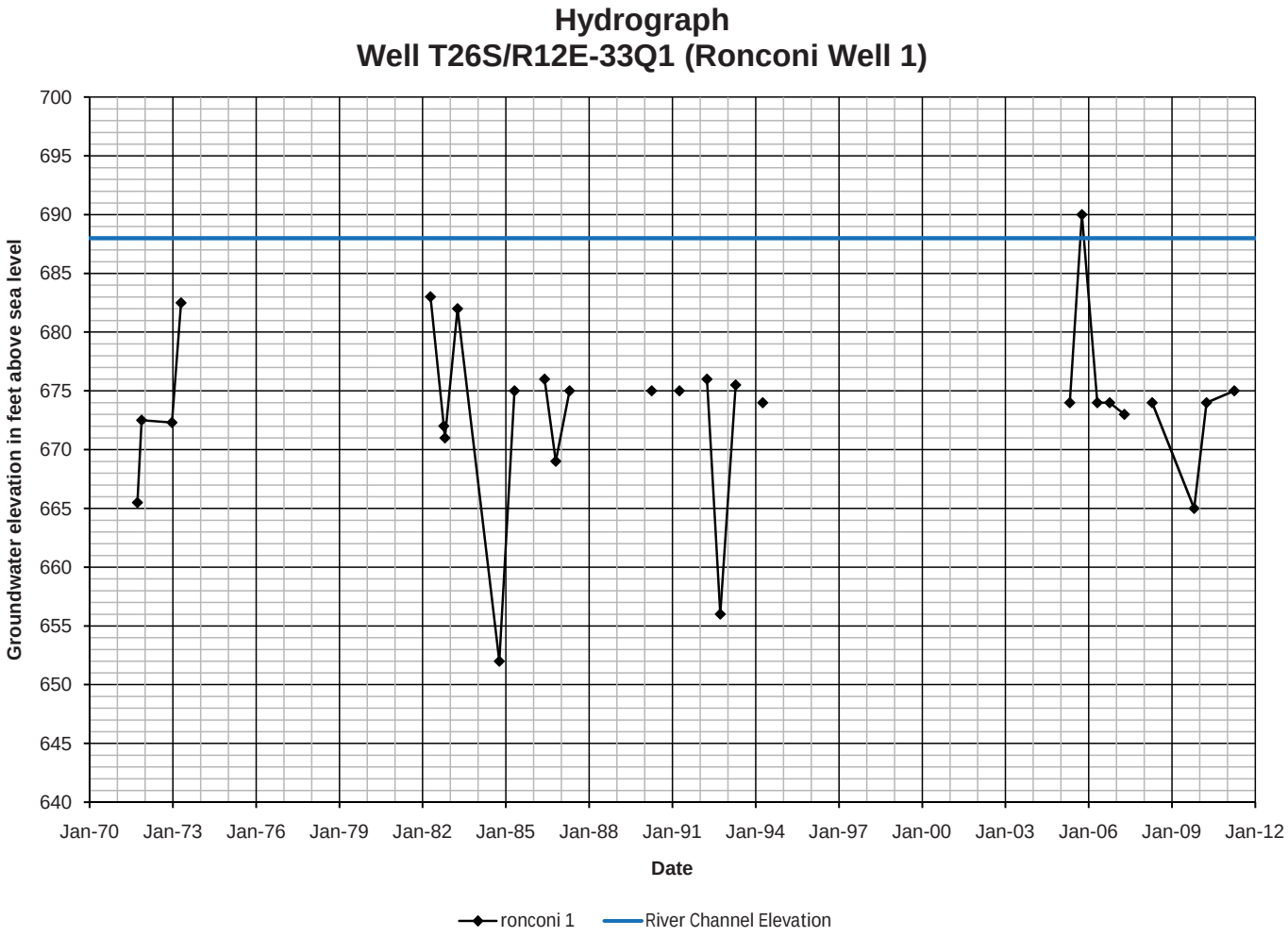
Note: Depth to water is measured below top of well casing

Appendix C

Groundwater Level Hydrographs
And
Salinas River Stream Gage Data


Hydrograph
Well T27S/R12E-9M2 (Thunderbird Well 10)
Groundwater elevation in feet above sea level
720
715
710
705
700
695
690
685
680
Jan-70
Jan-73
Jan-76
Jan-79
Jan-82
Jan-85
Jan-88
Jan-91
Jan-94
Jan-97
Jan-00
Jan-03
Jan-06
Jan-09
Jan-12
Date
9M2
River Channel Elevation


Hydrograph
Well T27S/R12E-9M3 (Thunderbird Well 13)
Groundwater elevation in feet above sea level
720
715
710
705
700
695
690
685
680
Dec-79
Dec-82
Dec-85
Dec-88
Dec-91
Dec-94
Dec-97
Dec-00
Dec-03
Dec-06
Dec-09
Date
9M3
River Channel


Hydrograph
Well T26S/R12E-33Q1 (Ronconi Well 1)
Groundwater elevation in feet above sea level
700
695
690
685
680
675
670
665
660
655
650
645
640
Jan-70
Jan-73
Jan-76
Jan-79
Jan-82
Jan-85
Jan-88
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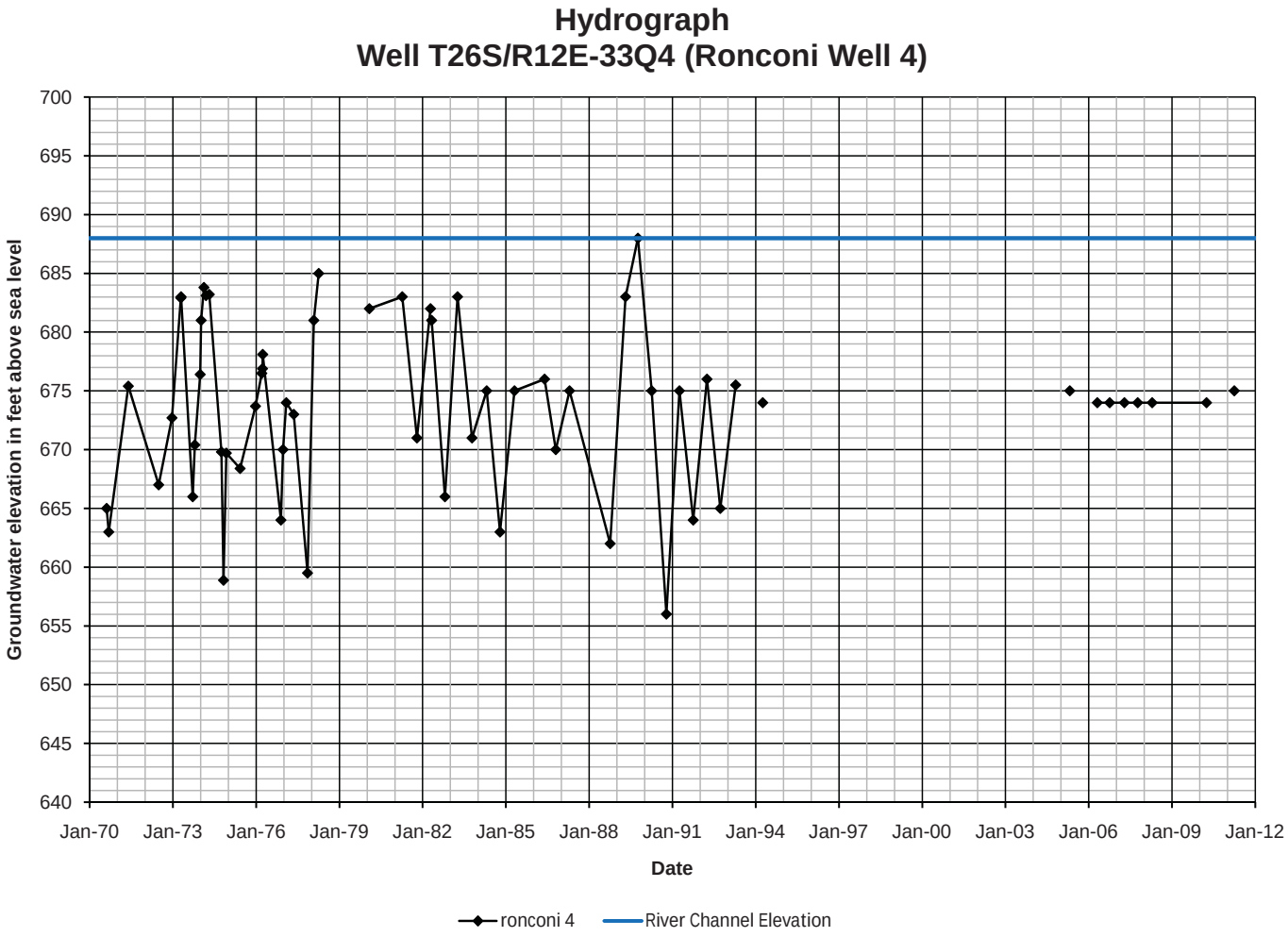
Jan-06
Jan-09
Jan-12
Date
ronconi 1
River Channel Elevation


Hydrograph
Well T26S/R12E-33Q4 (Ronconi Well 4)
Groundwater elevation in feet above sea level
700
695
690
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Jan-76
Jan-79
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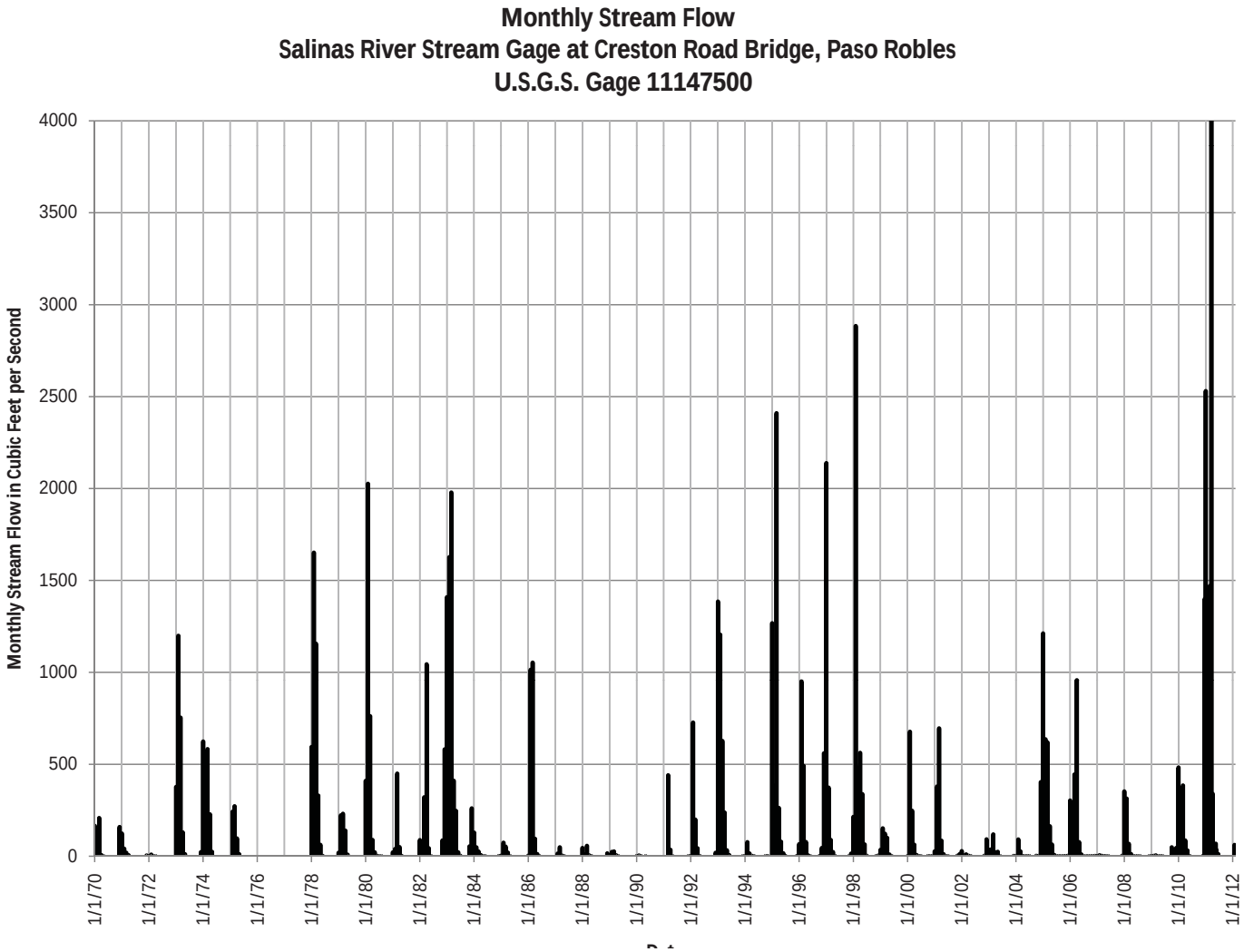
ronconi 4
River Channel Elevation


Monthly Stream Flow
Salinas River Stream Gage at Creston Road Bridge, Paso Robles
U.S.G.S. Gage 11147500
Monthly Stream Flow in Cubic Feet per Second
4000
3500
3000
2500
2000
1500
1000
500
0
1/1/70
1/1/72
1/1/74
1/1/76
1/1/78
1/1/80
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1/1/90
1/1/92
1/1/94
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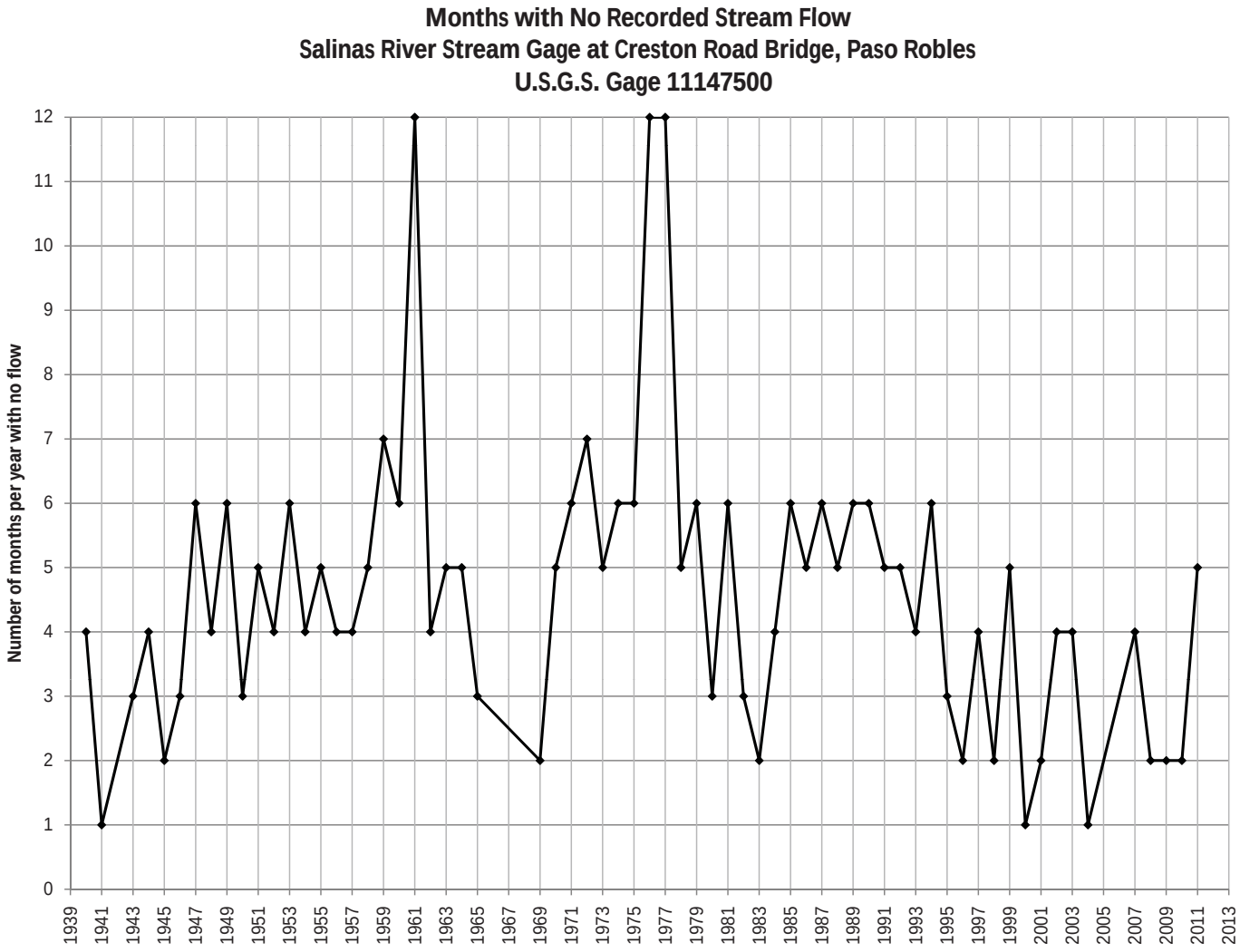
1/1/10
1/1/12


Months with No Recorded Stream Flow
Salinas River Stream Gage at Creston Road Bridge, Paso Robles
U.S.G.S. Gage 11147500
Number of months per year with no flow
0
1
2
3
4
5
6
7
8
9
10
11
12
1939
1941
1943
1945
1947
1949
1951
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2007
2009
2011
2013

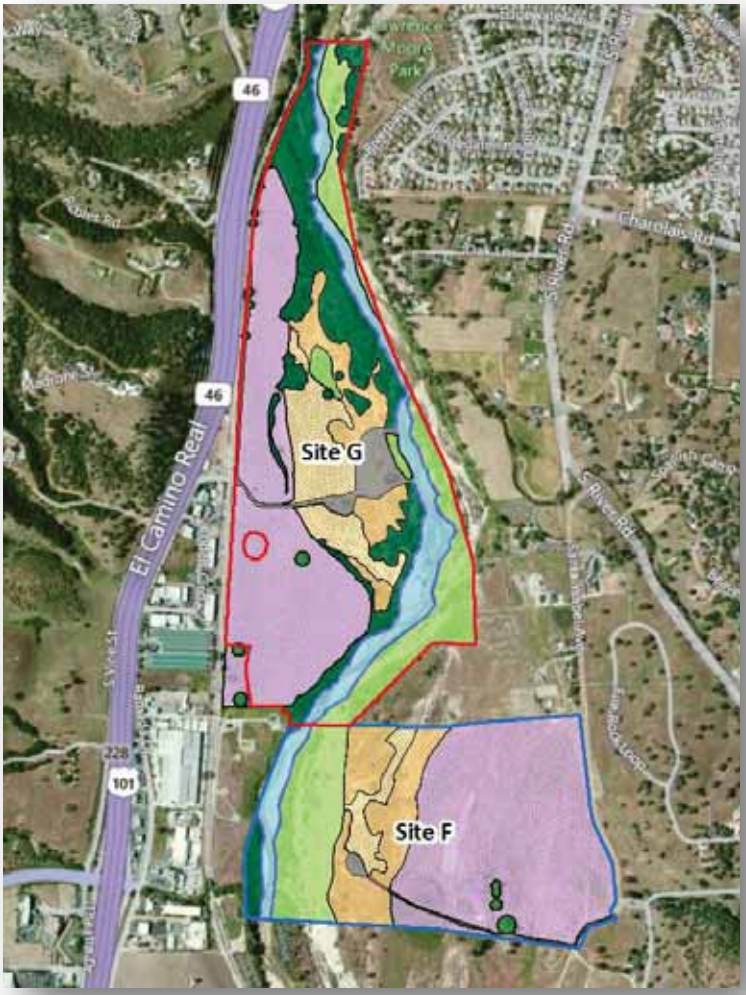
Appendix D

Percolation Tests
And
Sediment Size Distribution

Appendix E: Percolation Sites Constraints Analysis

City of Paso Robles

Percolation Sites Constraints Analysis



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City of Paso Robles Percolation Sites Constraints Study

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Table A-1. Sensitive Plant and Animal species within a five-mile search radius from CNDDB
Table A-2. Results of CNDDB Records Search, December 2011

1.0 INTRODUCTION

The purpose of this report is to provide a preliminary environmental review of two candidate sites for the construction and operation of potential groundwater recharge facilities for the City of Paso Robles. The analysis is not intended to be exhaustive, but rather identifies environmental constraints that may eliminate a site or portion of a site from further consideration. The analysis was based on a review of existing technical studies and information. The general environmental permitting requirements related to key agencies (U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Regional Water Quality Control Board, and California Department of Fish and Game) will also be described to the extent that such information can be known at this time.

The analysis of the following issues and their associated environmental constraints will comprise the body of this report:

- *Biological Resources*
- *Cultural Resources*
- *Geohazards*
- *Noise*
- *Aesthetics*
- *Traffic and Circulation Safety*
- *Agricultural Resources*
- *Land Use Regulations*
- *Land Ownership*

Description of Candidate Sites

Two sites are under consideration for the construction and operation of a groundwater recharge facility. These sites, known as Site F and Site G, are shown in Figure 1. Each site is described in more detail below.

Site F. This site is approximately 135 acres. It is located on the eastern side of the Salinas River, directly east of the Thunderbird Well Field Site. The site is just west of Santa Ysabel Avenue and can be accessed directly from Sailing Avenue. The site is privately owned by the River Road Property Entities, LLC outside of Paso Robles city limits within unincorporated San Luis Obispo County.

The site is naturally broken into an upper and lower terrace area, based on their relative proximity to the Salinas River. The upper terrace has historically been used for agricultural purposes, but is currently fallow. This portion of the site is an Agricultural Preserve (AP) under the California Land Conservation Act of 1965 (Williamson Act).

The lower terrace is within the Salinas River watershed and is subject to periodic flooding. This portion of the site is composed of riparian habitat associated with the Salinas River watershed.

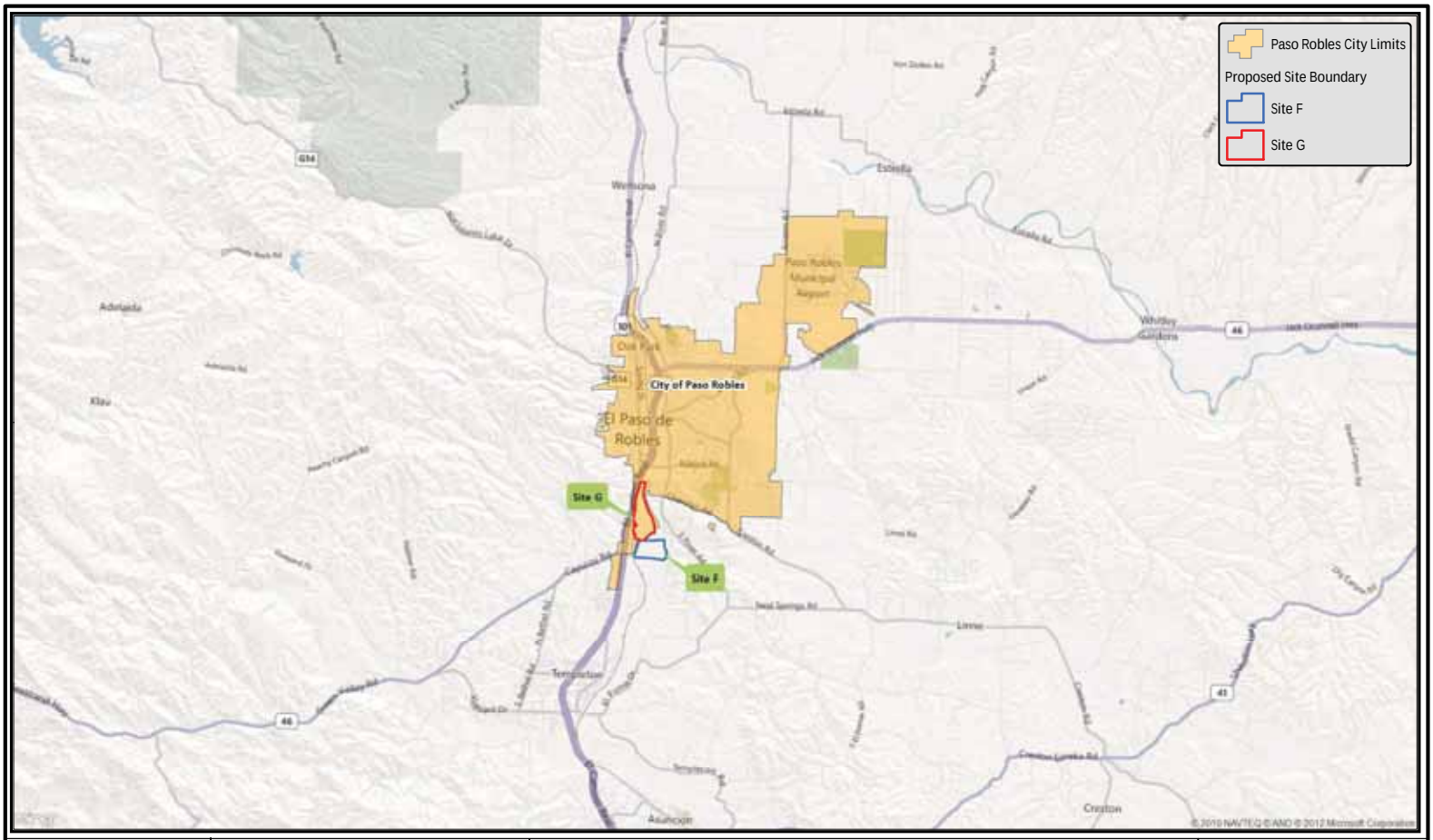
The area to the east and north of Site F is currently residential, primarily single family homes. Additional agricultural lands are to the south.

Site G. This site is approximately 197 acres. It is located approximately 0.2 miles east of U.S. Highway 101 and adjacent to the Union Pacific Railroad tracks, and is accessed via the State Route 46 West interchange to Ramada Drive (0.5 miles north of SR 46 West interchange). Site G is owned by the City of Paso Robles.

As with Site F, the site is naturally broken into an upper and lower terrace area. The upper terrace, or western portion of Site G, has historically been used for agricultural purposes.

The lower terrace and the Salinas River bed make up the Salinas River Parkway Preserve (SRPP). The lower terrace and active Salinas River channel area include a broad river floodplain with a braided river channel containing open sandy areas and hummocky "islands" anchored by sparse riparian vegetation. There is an "in-holding" area of land within the SRPP operated by Cal-Portland Cement for sand and gravel mining and material storage. This area includes a large degraded area with elaborate off road vehicle (OHV) trails. Also, the very southeastern corner of the site is designated as Agriculture Preserve under the Williamson Act (1965).

Site G is bordered to the west by Union Pacific Railroad tracks and various industrial and commercial facilities. The river borders the site to the north and east. The existing Thunderbird Well Field Site and the Site F are to the south, across the river.



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map updated 1/23/12

8,750 4,375 0 8,750 Feet

0.75 0.375 0 0.75 1.5 2.25 Miles

Paso Robles Percolation Sites

Constraints Analysis

Figure 1

Overview

2.0 POTENTIAL ENVIRONMENTAL CONSTRAINTS

The following discussion documents existing environmental conditions at Site F and Site G, and potential environmental constraints, including the possibility of permitting constraints.

2.1 BIOLOGICAL RESOURCES

Key Issues:
The analysis of biological issues includes a discussion of existing conditions established through a field survey, the potential for the candidate sites to support special-status species, the presence of riparian areas and waters of the U.S./State, and resource agency statutes and/or regulations that protect biological and wetland resources.

Introduction and Methodology

This section describes the existing conditions of biological resources and analyzes potential constraints to developing the proposed project from potentially significant biological resources. The two candidate project sites are composed of a mosaic of habitat types bordering and including the Salinas River corridor. The habitat types can support a range of botanical and wildlife resources ranging from low value habitat in agricultural fields to high habitat values in the riparian and river corridor. To establish existing conditions SII reviewed available background information including the USGS topographic map of the project vicinity, multiple years of aerial photography, the local soil survey, and a search and review of the California Natural Diversity Data Base (CNDDB) for information on special-status species with historic and recent recorded occurrences within an approximately five-mile radius of the two candidate sites.

SII biologists developed a target list of special-status plant and animal species that could potentially occur on the site based on our review of the CNDDB in the following nine USGS 7.5-minute topographic quadrangle Adelaida, York Mountain, Paso Robles, Templeton, Estrella, and Creston, Morro Bay North, Atascadero, and Santa Margarita. Table A-1 in Appendix A provides a list of special-status plant and wildlife species with recorded CNDDB occurrences in the region for evaluation against the habitat types present within the two sites evaluated for this study. Figure 2 provides a map of CNDDB recorded occurrences in the five-mile search radius.

SII biologist Michaela Koenig conducted a reconnaissance-level survey of the two sites on September 19, 2011 to characterize the existing conditions of the biological resources and to identify and map the habitat types on each site. Detailed field surveys were not conducted to confirm the presence or absence of special-status species. More exhaustive and seasonally timed site-specific surveys for the species shown in Table A-1 would be necessary to confirm their presence or absence on either project site.

Existing Conditions

The following describes the habitat types observed and mapped during field reconnaissance of the two sites and are illustrated in Figure 3. The habitat descriptions apply to both sites given the close proximity of Site F and Site G to each other, and similarity in the composition and structure of vegetation observed at the time of the field surveys. Each site is analyzed for specific constraints in the analysis and findings

section below.

Riparian

The riparian communities found within the two sites (F and G) are comprised of two distinct types of vegetation, 1) riparian scrubland, and 2) mixed riparian woodland. Riparian scrubland is found along the river bottom and along river margins in areas where live flows occur infrequently and where persistent live flow or pooling is uncommon or short-lived. Mixed riparian woodland communities are characterized as tall, open, broad-leaved, winter deciduous forests that occur along frequently inundated rivers and streams, or in areas where the water table is at or near the ground surface.

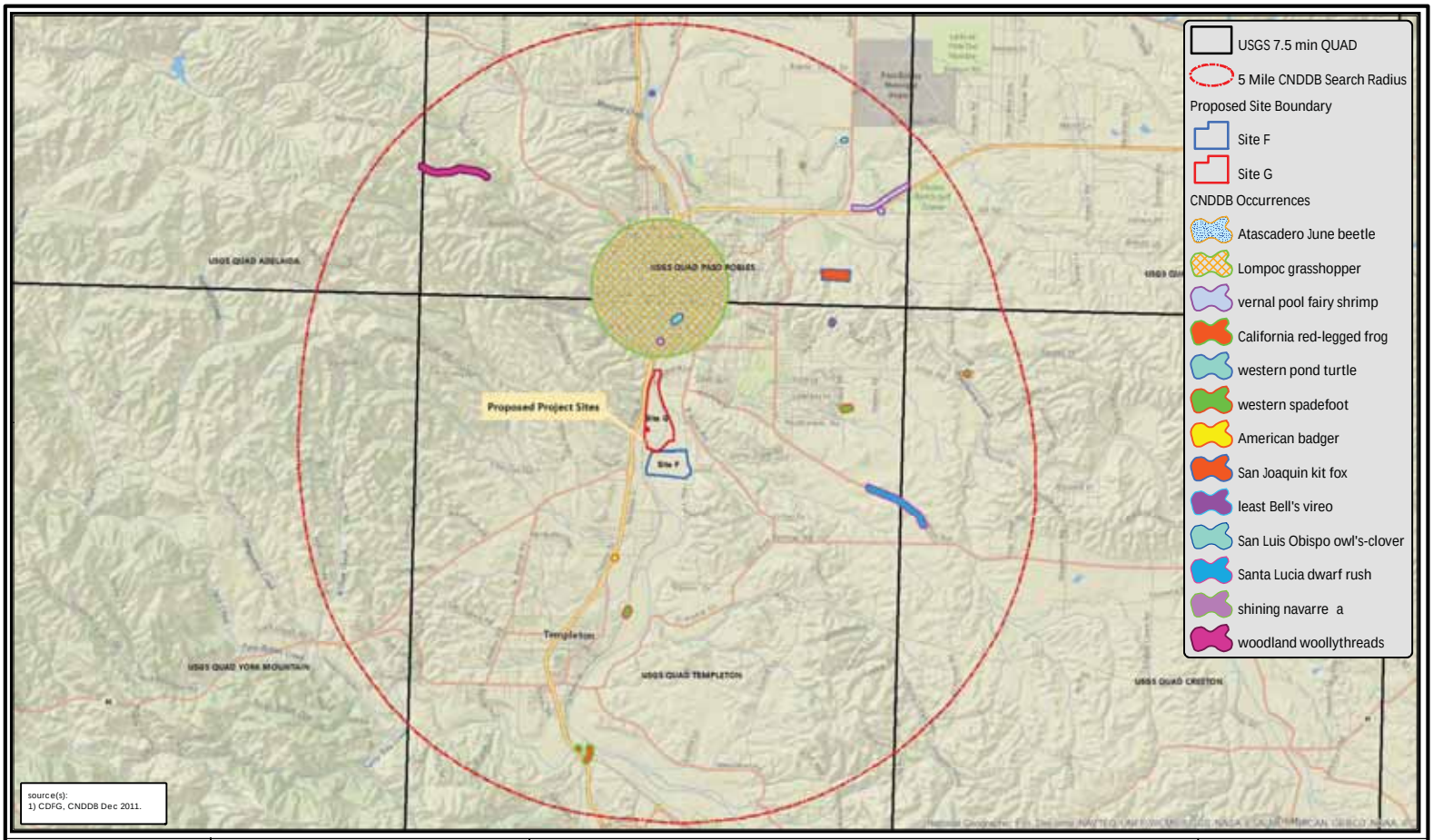
Riparian Scrubland is found on both sites along the river bottom and along river margins. The dominant riparian shrub species observed is mule fat (*Baccharis salicifolia*), scattered arroyo willow (*Salix lasiolepis*), coyote brush (*Baccharis pilularis*), poison oak (*Toxicodendron diversilobum*), California coffee-berry (*Rhamnus californica*), and blue elderberry (*Sambucus mexicana*). The scrub understory consists of. The herbaceous understory consisted of mugwort (*Artemisia douglasiana*), bur clover (*Medicago polymorpha*), telegraph weed (*Heterotheca grandiflora*), wild tarragon (*Artemisia dracunculus*), and dense patches of non-native forbs such as milk thistle (*Silybum marianum*), poison hemlock (*Conium maculatum*), and non-native annual grasses that are typical in the herbaceous understory in the region.

Mixed Riparian Woodland is found on both the eastern and western edges of the Site G and the very western edge of Site F. The overstory is dominated by Fremont's cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), box elder (*Acer negundo* var. *californicum*), and red and arroyo willows (*Salix laevigata, S. lasiolepis*). A small stand of California black walnut (*Juglans californica*) was observed as a component of the mixed riparian woodland. The scrub understory consists of coyote brush, poison oak, California coffee-berry, blue elderberry, and mule fat. The herbaceous understory consisted of mugwort, wild tarragon, and dense patches of nonnative forbs such as milk thistle, poison hemlock and non-native annual grasses that are typical in the herbaceous understory in the region.

Riparian habitats provide diverse and high value habitat for a wide array of aquatic, semi-aquatic, and terrestrial wildlife species. Riparian zones often function as essential regional corridors providing connections between habitat patches that allow for physical and genetic exchanges between isolated animal populations. A portion of the Salinas River is identified as a regional wildlife corridor that connects areas south of the city to areas to the north and to the Pacific Ocean.

Amphibians dependent upon the long-term and seasonal availability of surface water include the Pacific chorus frog (*Pseudacris regilla*), western toad (*Bufo boreas*), and American bullfrog (*Rana catesbeiana*). Additionally, the black-bellied slender salamander (*Batrachoseps nigriventris*) and ensatina (*Ensatina eschscholtzii*) are the more common amphibians known to inhabit the terrestrial areas of the riparian habitat

Reptiles expected to occur within the upper and lower terraces of the Salinas River include the western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata multicarinata*), western rattlesnake (*Crotalus veridus*), California kingsnake (*Lampropeltis getulus*), gopher snake (*Pitophis catenifer*), valley garter snake (*Thamnophis sirtalis fitchi),* striped racer (*Maticophis lateralis*), ring-neck snake (*Diadophis punctatus*), and southwestern pond turtle (*Clemmys marmorata pallida*).



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Z

map updated 2/23/12

6,400 3,200 0 6,400 Feet

0.55 0.275 0 0.55 1.1 1.65 Miles

Paso Robles Percolation Sites

Constraints Analysis

Figure 2

Regional Location / CNDDB Map

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map updated 2/23/12

470 235 0 470 Feet

0.05 0.025 0 0.05 0.1 Miles

Paso Robles Percolation Sites

Constraints Analysis

Figure 3

Habitat Map

The Salinas River riparian corridor is used by a wide variety and a high concentration of resident and migratory birds. Birds observed in the vicinity of the both sites (F and G) in association with the riparian corridor included black phoebe (*Sayornis nigricans*), white-crowned sparrow (*Zonotrichia leucophrys*), western scrub jay (*Aphelocoma californica*), lesser goldfinch (*Carduelis psaltria*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), brewer's blackbird (*Euphagus cyanocephalus*), Bewick's wren (*Thryomanes bewickii*), American crow (*Corvus brachyrhynchos*), spotted towhee (*Pipilo maculatus*), song sparrow (*Melospiza melodia*), Anna's hummingbird (*Calypte anna*), and northern flicker (*Colaptes auratus*). Two red-tailed hawks (*Buteo jamaicensis*) and a merlin (*Falco columbarius*) were observed in the cottonwoods of Site G during the SII field reconnaissance.

Common mammal species expected to occur within the riparian habitat on the two sites include deer mouse (*Peromyscus maniculatus*), Botta's pocket gopher (*Thomomys bottae*), California vole (*Microtus californicus*), striped skunk (*Mephitis mephitis*), bobcat (*Lynx rufus*), common gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), as may support seasonal use by a number of bat species.

Riverine/Riverbed

Riverine/Riverbed habitat includes the open water and unvegetated dry streambed of the Salinas River channel. Given the sandy soils of the Salinas River and modified hydrology from Santa Margarita dam the ratio of Riverine to Riverbed varies significantly on a seasonal basis. The dynamic and everchanging active channel/riverbed of the Salinas River is composed of a series of alluvial channels and associated sandbars. Vegetation established in the active floodplain consists primarily of mule fat with scattered occurrences of arroyo willow and coyote brush.

The Salinas River is designated as critical habitat for south/central California coast steelhead (*Oncorhynchus mykiss*) in San Luis Obispo County. The Salinas River through the project areas is known as a steelhead migration corridor but lacks the characteristics for suitable spawning or rearing habitat. Other fish species expected to occur within the Salinas River include prickly sculpin (*Cottus asper*), mosquitofish (*Gambusia affinis*), Sacramento pikeminnow (*Ptychocheilus grandis*), and speckled dace (*Rhinichthys osculus*).

Coyote Brush Scrub Series

Coyote Brush Series is dominated by coyote brush with occurrences of California sagebrush (*Artemisia californica*). In addition, ruderal species such as black mustard (*Brassica nigra*), and rip-gut brome (*Bromus diandrus*) were prevalent within the coyote brush habitat. This community is present along the lower terrace within the disturbed upper flood banks of the Salinas River of both Site F and Site G. Wildlife use of this habitat would be a combination of both riparian and annual grassland species using the transitional shrub habitat.

Non-Native Annual Grassland

Portions of the upper banks (eastern bank of Site F and the western bank of Site G) of both sites support patches of non-native annual grassland habitat. This annual grassland community is dominated by common weedy non-native species such as milk thistle, poison hemlock, field mustard (*Hirschfeldia incana*), red-stem filaree (*Erodium cicutarium*), wild oats (*Avena spp*.), and many brome grasses (*Bromus*

spp.) that are typical of grassland habitats in the area. Native annual forbs likely occur but were not noticeable during the September 2011 field survey.

Mammals found in upland grassland habitat may very more greatly than other vertebrate taxa. On the single site visit in 2011, California ground squirrels (*Spermophilus beecheyii*) and the middens of dusky-footed wood rat (*Neotoma fuscipes*) were observed. Tracks or sign of mule deer (*Odocoileus hemionus*), Virginia opossum (*Didelphis virginiana*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), and black-tailed jackrabbit (*Lepus californicus*) were observed along with unknown fox tracks and a matrix of canine burrows within in the sandy upper banks of the high flood zone within the SRPP.

Ruderal

Ruderal habitat is a term used to describe those areas that have been disturbed by past land-use practices and/or recent ground disturbance. These areas show evidence of previous disturbance from agriculture, grazing, OHV traffic, development, and excavation activities. Within Site F, ruderal habitat occurs along western boundary, along the access road off of Sandy Avenue and on the lower terrace OHV activities have occurred. Within Site G, ruderal habitat occurs along western boundary, along the access road off of Ramada Avenue and on the lower terrace of the SRPP where excavation, gravel mining and OHV activities have ensued. This cover type consists almost entirely of non-native, annual grasses and disturbance-adapted weedy species including rip-gut brome, red brome (*Bromus madritensis* ssp. *rubens*), wild oat (*Avena fatua*), hare barley (*Hordeum murinum* ssp*. leporinum*), redstem filaree (*Erodium cicutarium*), tumbleweed (*Amaranthus albus),* black mustard (*Brassica nigra*), poison hemlock (*Conium maculatum*), western ragweed (*Ambrosia psilostachya),* fiddleneck (*Amsinkia menziesii* var. *intermedia*), horehound (*Marrubium vulgare*), and milk thistle (*Silybum marianum*).

Wildlife species expected to occur within the ruderal habitats include free ranging raptors and many of the mammalian wildlife described in grassland communities above. Birds observed in the few coast live oaks on the perimeter of the agriculture fields and within ruderal habitats included turkey vulture (*Cathartes aura*), Eurasian collard dove (*Streptopelia decaocto*), bushtit (*Psaltriparus minimus*), oak titmouse (*Baeolophus inornatus*), mourning dove (*Zenaida macroura*), acorn woodpecker (*Melanerpes formicivorus)*, and house finch (*Carpodacus mexicanus*).

Agricultural

Agricultural areas within the Site F are present along the entire eastern upper terrace, between the ruderal habitat that occurs along the access roads and the mixed riparian scrubland habitat adjacent to the Salinas River. Agricultural areas within the Site G are present along the entire western upper terrace, between the ruderal habitat that occurs along the railroad tracks and the mixed riparian forest habitat adjacent to the Salinas River. All of the agricultural areas within the Site F and Site G were fallow during the 19 September 2011 site visit.

Special-Status Species

For the purpose of this report, special-status species are those plants and animals that are:

- Listed, proposed for listing, or candidates for listing as threatened or endangered by the Fish and Wildlife Service (USFWS) under the federal Endangered Species Act (ESA);
- Those considered “species of concern” by the USFWS;

- Those listed or proposed for listing as rare, threatened, or endangered by the California Department of Fish and Game (CDFG) under the California Endangered Species Act (CESA);
- Animals designated as "Species of Special Concern" by the CDFG; and
- California Native Plant Society (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* CNPS lists 1B, 2, and 4. List 1B are those considered by CNPS as rare, threatened, or endangered in California and elsewhere; List 2 are plants that are rare, threatened, or endangered in California but are more common elsewhere; and List 4 species are those of limited distribution or infrequent throughout a broader range of California, but whose vulnerability or susceptibility to threat appears low at this time.

Special-Status Botanical Resources

Based on the CNDDB review, six special-status plants have recorded occurrences in the vicinity of the two project sites (See also Table 1 in Appendix A). These species include:

- Lemmon's jewel-flower (CNPS List 1B.2)
- mesa horkelia (CNPS List 1B.1)
- San Luis Obispo owl's-clover (CNPS List 1B.2)
- Santa Lucia dwarf rush (CNPS List 1B.2)
- shining navarretia (CNPS List 1B.2)
- woodland woollythreads (CNPS List 1B.2);

The special-status plant species occurrences recorded by the CNDDB are typically associated with a specific soil type or habitat. The special-status plant species associated with upland soils, or ones that may occur in the grassland habitat within the region, are the Lemmon's jewel-flower and mesa horkelia. The perennial species mesa horkelia were not observed on the project site during the 2011 site visit. The suitability of the ruderal, annual grassland, and grazed habitats for the remaining rare plants listed above is low. The Santa Lucia dwarf rush, spreading and shinning navarretia, are associated with wetlands, vernal pools, and seeps. No wetlands or seeps were evident in either site (F and G). No serpentine soils or serpentine rock outcrops occur on either site (F and G) and are not expected to occur. The San Luis Obispo owl's clover and woodland woollythreads typically occur on heavy clay, granitic, and/or alkaline soils that are also lacking on both sites (F and G). A springtime rare plant survey would be needed to confirm presence or absence of any of the special-status plant species.

Special-Status Wildlife

Based on the CNDDB review, 11 special-status wildlife species have recorded occurrences in the vicinity of the two project sites (See also Table A-1 in Appendix A). These species include:

- American badger (State species of special concern)
- Atascadero June beetle (State species of special concern)
- California red-legged frog (Federal threatened; State species of special concern)
- golden eagle (State species of special concern)
- least Bell's vireo (Federally and State endangered species)
- Lompoc grasshopper (No status, historical record)
- San Joaquin kit fox, (Federally endangered State threatened species)
- steelhead-south/central CA coast DPS (Federal threatened, State species of special concern)
- vernal pool fairy shrimp (Federally threatened species)

- western spadefoot (State species of special concern)
- western pond turtle (State species of special concern)

The special-status wildlife species recorded occurrences in the region typically associated with friable soils in upland habitats include the American badger and the San Joaquin Kit Fox (SJKF). The San Joaquin kit fox (*Vulpes macrotis mutica*; SJKF) has a designated mitigation area on Site F. In addition Site F site is located within the designated SJKF corridor with the standard 2:1 Mitigation Ratio mapped by San Luis Obispo County. Site G does not within the County designated area requiring SJKF mitigation. The City does not subscribe to the County SJKF mitigation program. The American badger can occur in grassland and woodland habitats in areas of friable soils with abundant small mammal prey throughout San Luis Obispo County. Although focused surveys were not completed, no distinct or potential badger dens were observed during the September 2011 field reconnaissance.

The special-status wildlife species occurrences in the region that are associated with seasonal ponds/vernal pools include western spadefoot toad and vernal pool fairy shrimp. The project site does not support suitable seasonal aquatic habitat for western spadefoot toads or vernal pool fairy shrimp.

The Riparian habitat associated with the Salinas River is habitat for many resident and migratory birds. Of particular interest is the least Bell's vireo (state and federally endangered) that is a breeding migrant exclusive to riparian thickets and woodlands of major river systems with recent recorded occurrences in the Salinas River north of the City. As such, the riparian habitat on the project sites represents suitable habitat for the least Bell's vireo.

The California red-legged frog (federally threatened) has 2000 and 2003 recorded occurrences in Paso Robles Creek and Graves Creek near the confluence of the Salinas River. The Salinas River has highly variable winter/spring flows and can go dry during summer months or support only minimal flows in the open floodplain. Open shallow areas of creeks are not ideal habitat for the California red-legged frog. However, the project sites are located within CRLF historical range and habitat suitable to support CRLF is found in the project area, consisting of areas of slow-moving water and associated side channels in the Salinas River. The CRLF has not been recorded in the Salinas River but seasonal movements of the CRLF from occupied tributaries into the Salinas River are possible.

The southwestern pond turtle requires perennial aquatic habitat and has been recorded in the Salinas River. Stream habitat must contain large, deep pool areas with moderate-to-good plant and debris cover, and rock and cobble substrates for escape retreats. This species requires upland sites for nesting and over-wintering. Southwestern pond turtles are expected to occur within the Salinas River corridor.

The Salinas River along the project site is known habitat and designated Critical Habitat for south/central California coast steelhead (federally threatened). As discussed above, the Salinas River reach through the project area is known only as a movement corridor during times of sufficient flows and does not support spawning habitat.

The special-status invertebrate species associated with upland areas are the Atascadero June beetle and the Lompoc Grasshopper. The Atascadero June beetle is known from sand dune habitats that do not occur on the project site. The Lompoc grasshopper is a little known record from 1909 near the City of Paso Robles and has no protective status. There is a low probability of occurrence of either species on either project site.

Analysis and Findings

Both Site F and Site G support a mosaic of habitat types including fallow agricultural lands, annual grassland, riparian shrub/scrub, riparian woodland, and riverine habitats as you move from uplands to the Salinas River channel. From a biological resources perspective, the agricultural lands and annual grassland habitats provide the least constraint to project implementation. The riparian and aquatic habitat areas have the greatest potential to support listed species that could be affected by a project impacting those habitat areas. Key issues in the riparian/riverine habitat areas that would require resolution of presence or absence and potential regulatory permitting if present would be the least Bell's vireo, steelhead, California red-legged frog, and southwestern pond turtle. The riparian area also support nesting for many resident and migratory birds that would create a seasonal constraint to avoid disturbance to active nests. Activities that remove riparian habitat and/or require discharge of fill or dredged material in the river channel are subject to regulatory permitting as described below. The riparian/riverine areas should be considered the most constrained location and habitat types for project implementation.

As you move upwards away from the river itself into the grassland and agricultural lands above the banks of the Salinas River, biological resource habitat values diminish and become less constrained for project implementation. Nesting birds (both resident and migratory) remain an issue for seasonal timing of project implementation to avoid disturbance to active nests as ground nesting birds are common. Mammals such as the SJKF and American badger would become considerations for avoiding impacts to active burrow locations and possible mitigation for loss of SJKF habitat. Impacts on an active SJKF are best avoided but if infeasible, then regulatory permitting would be required. Agricultural lands if farmed annually typically do not support any nesting birds or other native wildlife species and represent the least constrained from a biological resources standpoint.

Table 1 below summaries the potential for the various special status species to occur within each habitat area on the two sites. These species are discussed in greater detail in the text that follows.

Table 1. Potential Species or Habitat Permitting Issues

Special Status Species	Site F		Site G		Habitat Type				
	Upper Terrace	Lower Terrace	Upper Terrace	Lower Terrace	Riverine	Riparian	Grassland	Ruderal	Agriculture
San Joaquin kit fox	•		•				•		
California red-legged frog		•		•	•	•			
Southwestern pond turtle		•		•	•	•			
American badger	•		•				•		
California coast steelhead		•		•	•	•			
Least bells vireo		•		•	•	•			
Nesting birds (various)	•	•	•	•	•	•	•	•	
Rare Plants (various)	•	•	•	•	•	•	•		

Actions Required to Address Potential Constraints

The following surveys or permitting actions would be required, depending on the location of project activities as noted below.

B-1. Riparian Habitat /Wetlands Permitting

Applicability:
The following action would be required in the portions of either site within areas identified as riparian or riverine habitat, most commonly found in the lower terrace portion of the two sites.

Action:
The Salinas River is considered waters of the U.S. under the jurisdiction of the United States Army Corps of Engineers (Corps), and waters of the State under California Department of Fish and Game (CDFG) jurisdiction including up to the furthest extent of riparian habitat. If the project is located within the riparian or riverine habitat areas of either Site F or G, a jurisdictional determination would need to be performed and permits obtained from the Corps, CDFG, and the Regional Water Quality Control Board for activities that impact waters of the U.S./State. Additional details about the permitting requirements of each agency are described below.

> **Jurisdictional Permitting.** Any impacts to the Salinas River, related watercourses, or the associated riparian and wetland habitat could potentially fall under the jurisdiction of the U.S. Army Corps of Engineers (Corps) as waters of the United States pursuant to Section 404 of the Clean Water Act (1972), under the jurisdiction of the Regional Water Quality Control Board (RWQCB) pursuant to Section 401 of the Clean Water Act, and under the jurisdiction of the California Department of Fish and Game (CDFG) pursuant to Section 1600 et. seq. of California Fish and Game Code. If such areas are determined to be jurisdiction, project construction would require a permit/agreement from these agencies. Pursuant to Section 401 of the Clean Water Act, any action that requires a Corps Section 404 permit also requires Water Quality Certification from the Regional Water Quality Control Board (RWQCB) to ensure the project would uphold state water quality standards.
>
> **CDFG Permitting.** In order to notify the CDFG of a proposed project that may impact a river, stream or lake as required by Fish and Game Code Section 1600 (1601 for public projects or 1603 for private projects), a Lake or Streambed Alteration Notification Form and a Project Questionnaire form along with the appropriate fees must be submitted to the CDFG.

B-2. Protocol Surveys for Special Status Species

Applicability:
The following measures would be required if the project were located in the riparian or riverine habitat zones of either site.

Action:
Locating the project in the riparian/riverine area would also prompt protocol surveys for the least Bell's vireo and California red-legged frog to determine presence or absence in the project areas. These surveys take upwards of eight survey events each and are costly and time consuming. Should either species be observed, then compliance with the Federal and State Endangered Species Acts would be required to obtain take authorization.

B-3. Rare Plant Surveys

Applicability:
The following measure would be required for any location within either site.

Action:
Regardless of the project location within either site, an appropriately timed rare plant survey is recommended to determine if any rare plants occur. The probability is low but only a spring/summer survey can produce conclusive findings.

B-4. Grassland Kit Fox and Badger Evaluation

Applicability:
The following measure would be required if the project were located in grassland habitat on either site.

Action:
Spring surveys in the grassland habitat should also include more detailed survey for active badger or SJKF dens. If an active SJKF burrow would be impacted, then compliance with the Federal and State Endangered Species Acts would be required to obtain take authorization.

B-5. Nesting Bird Surveys

Applicability:
The following measure would be required for any location within either site, if project activities would occur during the bird nesting season (February 1 to August 31).

Action:
Regardless of the project location within either site, pre-construction surveys to determine the presence or absence of migratory nesting birds should be conducted.

2.2 CULTURAL RESOURCES

Key Issue:
This section evaluates the potential for construction of the proposed facility to impact cultural resources on either site.

Resource Documents and Reports

1. *Archaeological Resource Management Reports: Recommended Contents and Format*, State of California, December 1989
2. *A Report of Archaeological Monitoring at Santa Ysabel Ranch, San Luis Obispo County, California*, February 24, 2004
3. *Guidelines For Archaeological Research Designs*, State of California, February 1991
4. Milliken, R. and J.R. Johnson. 2003. *Salinan and Northern Chumash Communities of the Early Mission Period.* Prepared for Caltrans Contract No. 06A0148 & 06A0391. Far Western Anthropological Research Group, Inc., Davis, California.
5. Jones, T.L., K. Davis, G. Farris, S.D. Grantham, B. Rivers, and T. Fung. 1994. *Toward a Prehistory of Morro Bay: Phase II Archaeological Investigations for the Morro Bay Highway 41 Widening Project, San Luis Obispo County, California.* California Department of Transportation, Sacramento. On file at Central Coast Information Center, University of California, Santa Barbara.

Introduction

At the time of Euroamerican contact, a substantial Native American population inhabited the South Coast Range and surrounding areas. Paso Robles lies within the historic territory of two Native American Indian groups known as the Obispeño Chumash and the Salinans. Two native groups, the Obispeño Chumash and the Salinan, occupied northern San Luis Obispo and southern Monterey counties, though the actual boundaries between the two groups have recently come under dispute. Although the northern portion of Obispeño Chumash territory has traditionally been assumed to encompass Morro Bay, more recent evidence suggests that this boundary may have extended farther north near the current Monterey County line (Rivers and Farris in T. Jones et al. 1994). The modern descendants of the Salinan, however, have disputed this claim, contending that southern Monterey County was Salinan territory. Regardless of the exact boundary between the two groups, it is likely that this boundary changed through time. Recently, investigations of Mission records and extrapolation from these data have led to more informed speculation about group distribution and territorial boundaries (Milliken and Johnson 2003).

The most recent and comprehensive attempt to address the boundary question (among other important ethnogeographic and ethnohistoric matters) was completed by Milliken and Johnson (2003) as part of a Caltrans funded resource management project. Milliken and Johnson employed population models to fit Mission record data to the most likely pattern of precontact habitation in the region. They conclude that it is probable that the Northern Chumash traditionally occupied the territory north to include the present day communities of Atascadero, Templeton, Paso Robles, most likely terminating in the San Marcos Creek region (just to the south of Camp Roberts). They also include that the Santa Margarita region was the location of a number of Northern Chumash villages. They therefore also conclude the southern portion of the Nacimiento drainage (on present day Camp Roberts) is within the traditional territory of the Salinan. The Chumash inhabitants of the area were removed to Mission San Luis Obispo to the south, while the Salinans were taken to Mission San Antonio or to Mission San Miguel.

The Chumash and Salinan aboriginal way of life ended with Spanish colonization. As neophytes brought into the mission system, they were transformed from hunters and gatherers into agricultural laborers and

exposed to diseases to which they had no resistance. By the end of the Mission Period in 1834, the Chumash and Salinan population had been decimated by disease and declining birthrates. Population loss as a result of disease and economic deprivation continued into the next century.

Methodology

The following information is based on record searches conducted at the Central Coast Archaeological Information Center, a Native American Heritage Commission sacred lands file check, a review of historic USGS topographic quadrangles and aerial photographs housed at the UCSB Davidson Library's Map and Imagery Laboratory, as well as a field visit. The CCIC is the official repository for all San Luis Obispo County archaeological data.

The State provides criteria for evaluating the importance of cultural resources. The State of California has formulated laws for the protection and preservation of archaeological resources. Generally, a cultural resource shall be considered to be "historically significant" if the resource meets the criteria for listing on the California Register of Historic Resources (Pub. Res. Code SS5024.1, Title 14 CCR, Section 4852) including the following:

- **a.** Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- **b.** Is associated with the lives of persons important in our past;
- **c.** Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- **d.** Has yielded, or may be likely to yield, information important in prehistory or history.

The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in an historical resources survey (meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude an agency from determining that the resource may be an historical resource as defined in Public Resources Code sections 5020.1(j) or 5024.1.

California Public Resources Code. Section 5097.9 of the California Public Resources Code stipulates that it is contrary to the free expression and exercise of Native American religion to interfere with or cause severe irreparable damage to any Native American cemetery, place of worship, religious or ceremonial site, or sacred shrine.

State Health and Safety Code § 7050.5 and Public Resources Code §§ 5097.94, 5097.98 and 5097.99. The purpose of the above codes is to provide protection to Native American human burials and skeletal remains from vandalism and destruction and to provide a regular means by which Native American descendents can make known their concerns regarding the need for sensitive treatment and disposition of Native American burials, skeletal remains and items associated with Native American burials.

Analysis and Findings

Site F

Portions of Site F were previously surveyed as part of the Nacimiento Pipeline Project (Albion Environmental, June 2011). However, the survey work was confined to the areas nearest to the proposed pipeline alignment, which now runs parallel to Santa Ysabel Avenue on the eastern boundary of the site. The very eastern portion of Site F was surveyed, hence the majority of the site was not surveyed.

The 2011 survey found two archaeological sites along the pipeline alignment, about 1,000 feet south of the potential test hole location. The full extent of these sites (CA-SLO-2087H and CA-SLO-1920/H) was not mapped, but extended beyond the boundaries of the survey, both east and west of the pipeline alignment. Both sites had been heavily disturbed by historic agricultural practices. Artifacts were mostly found within 60 cm of the surface.

Since the survey did not cover all of Site F, it is not known whether there are artifacts on unsurveyed portions of the site. It may be surmised, as with Site G, that the site is potentially sensitive because of its proximity to the Salinas River, and the fact there are known resources within 1,000 feet of the site. That said, it is also likely that whatever resources may be there are highly disturbed and fragmented. Because the test hole will not require discretionary permits, there is no specific action that is required with respect to evaluating cultural resources at the test well site.

Figure 4 indicates that all of Site F is "Potentially Sensitive", because while very little of it has been surveyed, there are known resources in the general vicinity, and it is reasonable to assume that additional resources may be uncovered closer to the river.

Recommendations

We recommend the following actions with regard to future activities on Site F:

1. Although no action is required to drill test holes on Site F, it may be useful to save the drilled core for evaluation by an archaeologist, or have an archaeologist on-site while the drilling is underway. This will provide a valuable piece of information to determine whether or not there are resources in the area that may require protection in the event a percolation basin is built at this location.
2. If as a result of the test, a percolation basin site is considered at the location of a test hole, a formal records search and Phase 1 archaeological survey should be conducted to cover the potential area of disturbance by a qualified archaeologist in conjunction with, or prior to, the CEQA process. If the Phase 1 survey indicates resources near proposed percolation basin site, then a Phase 2 survey should be conducted to more clearly define the extent of the resource. Any documented cultural resources shall be avoided and protected during development. If resource avoidance is not feasible, then a qualified archaeologist shall carry out additional archival research and data recovery excavation.
3. A percolation basin at any location will need to undergo CEQA review by the lead agency for the project, assumed to be the City of Paso Robles. This effort will likely require further cultural resource evaluation as part of the process, consistent with what is described above, unless these investigations were completed prior to the CEQA process.
4. For any potential percolation basin within Site F, ground disturbance activities should be conducted in coordination with an on-site archaeological monitor, although this will be at the discretion of the lead agency.

Site G

This section describes the potential archaeological sensitivity of Site G in the City of Paso Robles, in connection with the City's proposed recycled water and percolation basin siting program. It is based on information contained in the 1998 cultural resources survey of the area (*Cultural Resources Inventory of the Riverside Farm Properties, Paso Robles*, Pacific Archaeological Sciences Team, 1998). It is also based on a 2011 planning-level research from more recent studies identified at the Central Coast Information Center (CCIC) at the University of California, Santa Barbara, and at the San Luis Obispo County Department of Planning and Building.

The *Cultural Resources Inventory of the Riverside Farm Properties* (1998) report evaluated both the upper and lower terrace portions of Site G. The report identified the area above the Salinas River, and east of the Union Pacific Railroad tracks, as one of general sensitivity in terms of the potential to find archaeological resources. This "upper terrace" area is considered sensitive in general because of its proximity to the river and fairly level topography, which would have made it attractive as a site of past habitation and use to native peoples. Several sites have been identified in these general areas that help confirm this observation. Based on these site locations, the 1998 report identifies an area of particular "archaeological sensitivity" within this upper terrace area, meaning that there is a higher likelihood to identify resources in this location. Figure 4 of the report (attached) shows this area.

The report also identifies three specific cultural resource sites within this area of higher sensitivity, which had been discovered through previous surveys, and listed in the 1998 CCIC records search. These sites are known as CA-SLO-1894, CA-SLO-1895, and CA-SLO-1896. They vary in site, extent, and content, but all are indicators of past habitation of the area. One of these sites, CA-SLO-1895, is located very close to the location of Wells 1 and 4. This resource is described below, as reported in the 1998 study:

> *The site measures about 65 meters (N-S) by 55 meters (E-W) in size, located south of a garage structure and silo. Although recorded as one site, two distinct areas of artifact concentrations were noted on the site. The westernmost concentration included a broken sandstone pestle (about 160 mm and 70 mm in diameter at the break); cert cores and flakes; burned rock; some shell fragments (mostly clam); and possibly some other broken groundstone pieces. All of the groundstone pieces exhibited numerous plow marks. The concentration to the east included two chert scrapers, cert cores and flakes; a few pieces of clam shell; and some possible groundstone fragments. In the area between the two concentrations and to the north, a few chert flakes and a chert scraper were also noted. Like site CA-SLO-1896 (about 500 meters to the south). Most of the artifacts noted in this area were seen in the backdirt pile of burrowing animals, again indicating the site has some depth. Overall, site CA-SLO-1895 appears to be a habitation area (PAST, 1998).*

The other two sites are not in the immediate vicinity of Wells 1 and 4, but collectively create an area of high archaeological sensitivity on the upper terrace. CA-SLO-1894 is a series of artifact concentrations north of Wells 1 and 4, extending along the eastern edge of the Union Pacific Railroad tracks. The 1998 report characterized these concentrations as one large area, because limited ground visibility during the survey suggested that they might all be related. The extent of this area is about 665 meters north-south, and 25 meters east-west.

CA-SLO-1896 is south of Wells 1 and 4, in the vicinity of a deteriorating barn complex, roughly due east of C. Dunn Homes and east of the railroad tracks. The site, which consists of scattered prehistoric artifacts, measures roughly 190 meters north-south, and 80 meters east-west.

1998 Study Recommendations

The 1998 cultural resources study included specific recommendations for projects that have the potential to impact any of the identified resources within Site G. These recommendations include the following:

1. A Phase II subsurface archaeological testing program should be performed on the identified site(s) subject to being impacted to determine their extent, depth, type, contents, and "importance" as defined by CEQA Appendix K. Any Phase II investigation should include the preparation of a research design following the guidelines specified in the State Office of Historic Preservation's Planning Bulletin Number 5 (*Guidelines For Archaeological Research Designs*, State of California, February 1991). In general terms, field testing should be intensive, and include, but not be limited to:
    a. Subsurface collection;

   b. Mapping of artifacts;
   c. Subsurface testing in 10 cm levels; and
   d. Processing of excavated materials with water through a 1/16 inch mesh screen.
2. An archaeologist familiar with geologic processes should evaluate soil and landforms near the site(s) in question, which will help define the research design parameters.
3. Following the investigation, a final report should be prepared according to the guidelines specified in the State Office of Historic Preservation's Planning Bulletin Number 4(a) (*Archaeological Resource Management Reports: Recommended Contents and Format*, State of California, December 1989).
4. If the investigated site is found to be "an important archaeological resource", then appropriate protective measures should be enacted to preserve the resources for future study, or a mitigation and data recovery program should be conducted to mitigate any potential impacts that might be caused by site disturbance from proposed activities.

The 1998 study does not include specific recommendations for the lower terrace area, or any other portion of the surveyed area where artifacts were not encountered. However, the report acknowledges the general sensitivity of the entire area. The City of Paso Robles will need to make the determination, through the CEQA process, about what the appropriate steps may be to protect resources that are currently undiscovered, within any portion of Site G. It should be noted that a CEQA evaluation will be required for any potential percolation site. In all likelihood, this will be a Mitigated Negative Declaration (assuming impacts can be mitigated to a less than significant level), but that determination will need to be made by the City.

It is possible that, as a result of the CEQA process, the City will require a Native American monitor or qualified archaeologist to be present during the excavation process. If currently unidentified artifacts are discovered through ground disturbance activities, then appropriate steps would need to be taken, including an immediate halt to work, followed by an evaluation of the potential resource to determine the next steps toward the protection of that resource.

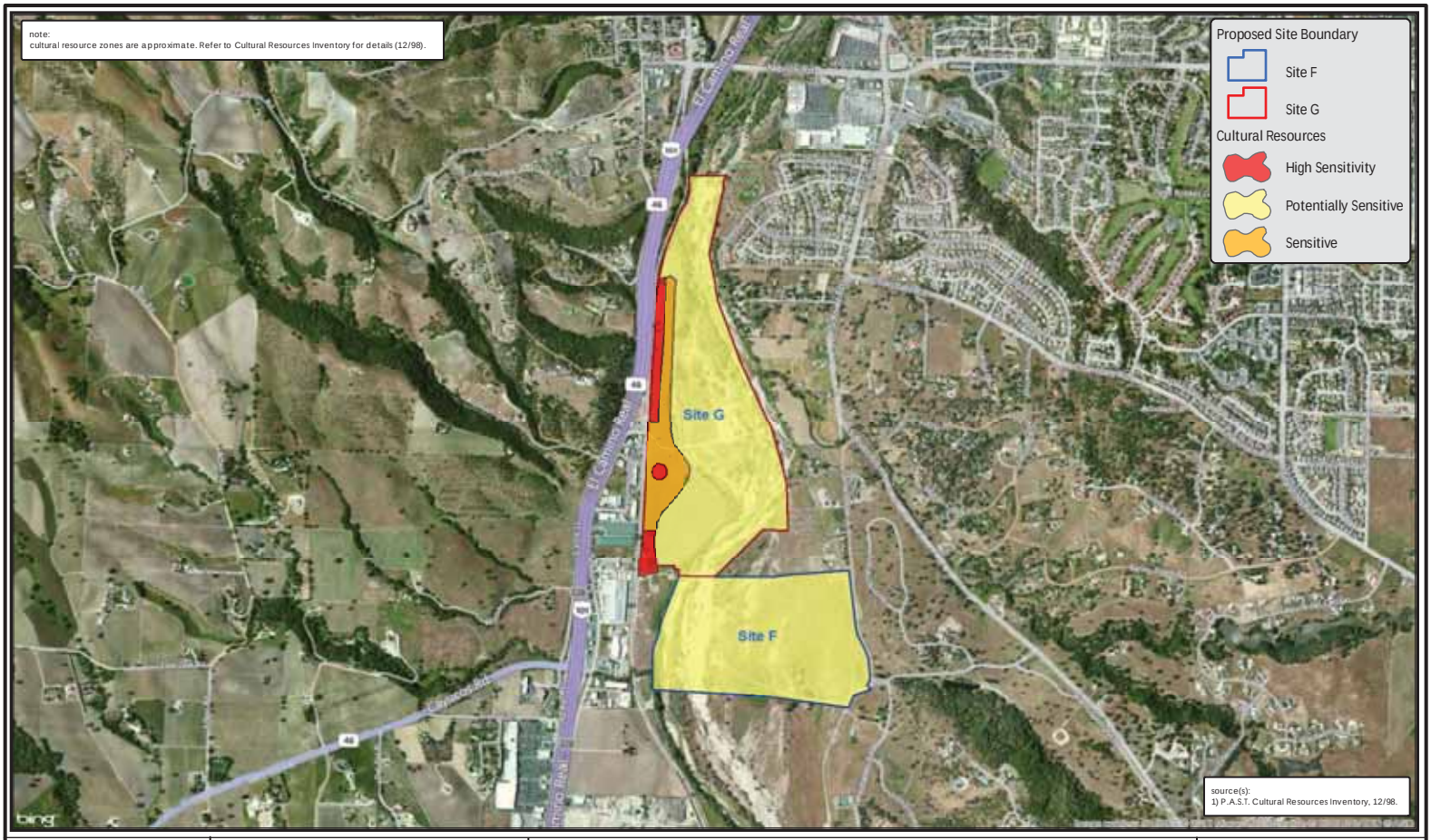
Updated 2011 Research

Because the existing cultural resource study was conducted in 1998, a follow up document investigation was conducted to determine whether any additional resources have been identified in the vicinity of the proposed disturbance. This included a database search with the County of San Luis Obispo Planning and Building Department, a review of a map of existing archaeological surveys provided by the County of San Luis Obispo Planning Department, and a review of the cultural resources monitoring report prepared for the nearby Santa Ysabel Ranch development project (*A Report of Archaeological Monitoring at Santa Ysabel Ranch, San Luis Obispo County, California*, February 24, 2004). Our investigation found that since 1998, no other surveys were conducted directly on either Site F or Site G. However, the Santa Ysabel Ranch project, which is adjacent to Site F, was conducted in 2004, and sheds additional light on the sensitivity of the area in general.

The Santa Ysabel Ranch monitoring report confirms that anywhere along the upland terraces of the Salinas River should be considered generally sensitive. That report found numerous resources along the terraces adjacent to the river, generally east of Site F. However, neither that survey, nor any others, has evaluated Site F. Nevertheless, it can be concluded that both Site F and Site G are generally sensitive archaeologically, which means there is the potential for encountering buried artifacts almost anywhere within these areas. Their archaeological sensitivity is based on the fact that the areas would have access to a steady water supply, plants for food resources (i.e., oak woodlands), and raw materials for tool making (rock outcrops). Other criteria include known travel and key vantage points, topographically flat and useable areas, good hunting opportunities, and proximity to previously identified archaeological sites. Site F and Site G exhibit most of these characteristics.

That said, the 1998 PAST report concludes the most sensitive areas within Area G are along a strip of land just east of the railroad alignment, based on the fact that is where resources were actually identified within that area.

Figure 4, which is derived from available survey information, indicates the general sensitivity of the site. Areas on the map shown in either red, orange or amber have been previously surveyed. The area shown in amber is identified as "potentially sensitive", meaning that while no resources were found during previous surveys, the area's proximity to known sites suggests that it is possible that buried artifacts could be found if the earth is disturbed. Areas shown in medium red are considered "sensitive", because previous surveys in the area have identified them as such (including Figure 2 of the 1998 survey). The darker red areas are considered to be of "high sensitivity", because these are the approximate locations of known resources identified in the 1998 survey. Note that the roughly circular area near Wells 1 and 4 is site CA-SLO-1895, which was previously discussed above. No further specific sites were identified in our research relative to the location of Wells 1 and 4 in Site G.



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map updated 12/11/11

1,300 650 0 1,300 Feet

0.1 0.05 0 0.1 0.2 0.3 Miles

Paso Robles Percolation Sites

Constraints Analysis

Figure 4

Cultural Resource Sensitivity Map

Based on the 1998 evaluation, as well as our further research, the following actions are recommended, or will likely be required by the City of Paso Robles, to construct a percolation basin within the area:

1. For previously surveyed areas within Site G, the recommendations of the PAST study, as described previously, should be implemented. This includes a Phase 2 investigation if ground disturbance has the potential to affect a known site, which is the case for the area near Wells 1 and 4. This could be conducted prior to, or in conjunction with, the CEQA process. For potential percolation sites within the lower terrace area, it may be advisable (but not required) to conduct a site-specific follow-up survey in the specific location where ground disturbance is proposed, mainly to confirm the findings of the 1998 survey that no surface artifacts were found.
2. If other percolation basin sites are considered for which a previous Phase 1 survey has not been conducted, such as those within Site F, then a formal records search and Phase 1 archaeological survey should be conducted by a qualified archaeologist in conjunction with, or prior to, the CEQA process. If the Phase 1 survey indicates resources near proposed percolation basin sites, then a Phase 2 survey, such as described previously, should be conducted to more clearly define the extent of the resource. Any documented cultural resources shall be avoided and protected during development. If resource avoidance is not feasible, then a qualified archaeologist shall carry out additional archival research and data recovery excavation.
3. A percolation basin at any location will need to undergo CEQA review by the lead agency for the project, assumed to be the City of Paso Robles. This effort will likely require further cultural resource evaluation as part of the process, consistent with what is described in either Items 1 or 2 above, unless these investigations were completed prior to the CEQA process.
4. For any potential well site within Site F or Site G, ground disturbance activities should be conducted in coordination with an on-site archaeological monitor, although this will be at the discretion of the lead agency.

Actions Required to Address Potential Constraints

This section describes the actions needed if the identified constraints are encountered on-site.

C-1. Phase I Archaeological Investigation

Applicability:

This action is required if project activities would occur on portions of either Site F or G that have not been previously surveyed for archaeological resources as shown on Figure 4.

Action:

A Phase I Archaeological Investigation shall include a review of previous archaeological surveys and/or excavations within the sites. This review will determine what portions of the site require field surveys. Previously surveyed areas may still warrant additional survey, if previous survey methodology is determined inadequate or ground surface visibility was poor. A Phase I Archaeological Investigation would include, but not necessarily be limited to, the following:

- A qualified archaeologist and Native American representative shall monitor all initial earth moving activities within native soil.
- If an archaeological site is found to be significant/important, then measures to reduce the project's impacts should be implemented as follows:

a. Avoidance of impacts to the archaeological site is the favored form of mitigation for significant sites whenever feasible.
b. The applicant may choose to cap the resource area using culturally sterile and chemically neutral fill material and shall include open space accommodations and interpretive displays for the site to ensure its protection from development. An archaeologist and a local tribal consultant shall be retained to monitor the placement of fill upon the site and to make open space and interpretive recommendations. If a significant site will not be capped, the results and recommendations of the Phase II study shall determine the need for a Phase III Data Recovery Excavation and or monitoring.
c. Where avoidance is infeasible impacts may be mitigated, when necessary, through a Phase III data recovery program.

If the site is determined to not be important, no capping and/or further archaeological investigation should be required. The results and recommendations of the Phase II study shall determine the need for construction monitoring.

Timing: It is estimated that upon project approval, a Phase I Archaeological Investigation would take approximately one month to complete, a Phase II Archaeological Investigation would take approximately two months to complete, and a Phase III Archaeological Investigation would take approximately four months to complete.

C-2. Phase II Archaeological Investigation (Subsurface Investigation)

Applicability:
This action is required if project activities would occur on portions of either Site G that have been previously surveyed, and that would be located within "highly sensitive" areas as shown on Figure 4. This may also be required on Site F or the lower terrace portion of Site G, pursuant to the results of a Phase I investigation in these areas.

Action:
A Subsurface Archaeological Resource Evaluation (SARE), or Phase II Survey, shall be completed prior to project implementation. This investigation is undertaken to meet the following goals:

a) Determine if there are intact subsurface deposits associated with this site;
b) Determine the site's boundaries;
c) Assess the site's integrity, i.e., is it intact or highly disturbed; and
d) Evaluate the site's importance or significance.

The City should consider retaining appropriate Native American representatives to monitor any subsurface testing/excavation. Results of the Phase II Evaluation will determine the need or lack thereof for additional data recovery and/or construction monitoring in the archaeological site area. When feasible, avoidance of impacts through project redesign is the preferred method for mitigating impacts to significant archaeological resources.

The archaeological excavation(s) shall be based on a written explicit research design that includes a statement or research objectives and a program for carrying out these objectives. All cultural materials collected shall be curated at a qualified institution that has proper facilities and staffing for insuring research access to the collections.

C-3. Archaeological Resource Construction Monitoring

Applicability:
For any potential location within Site F or Site G, ground disturbance activities should be conducted in coordination with an on-site archaeological monitor, although this will be at the discretion of the City of Paso Robles as lead agency.

Action:
At the commencement of project construction, an orientation meeting shall be conducted by an archaeologist for construction workers associated with earth disturbing procedures. The orientation meeting shall describe the possibility of exposing unexpected archaeological resources and directions as to what steps are to be taken if such a find is encountered.

An archaeologist shall monitor construction grading within 50 meters (164 feet) of known resources. In the event that prehistoric or historic archaeological resources are exposed during project construction, all earth disturbing work within 50 meters (164 feet) of the find must be temporarily suspended or redirected until an archaeologist has evaluated the nature and significance of the find. After the find has been appropriately mitigated (e.g., curation, preservation in place, etc.), work in the area may resume. The City should consider retaining a Chumash and/or Salinan representative to monitor any fieldwork associated with Native American cultural material.

If human remains are exposed, State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98.

Timing: Should undocumented cultural resources be identified or discovered, timing would be assessed on a case-by-case basis depending on the extent of the resource.

2.3 GEOHAZARDS

Key Issue:
This section evaluates the potential for construction and operation of the proposed facility to be impacted by soil-related geohazards.

Introduction

The two candidate sites are located in the southern portion of the Salinas River valley, a seismically active region. Seismic events can cause ground shaking and liquefaction. The largest seismically induced ground shaking events in Paso Robles may occur from earthquakes along the San Andreas Fault, located 23 miles east of the city, or the San Marcos Segment of the Rinconada Fault, located along the southwestern portion of the city. The Oceanic fault zone has also emerged as a major seismic concern for the City of Paso Robles, which was the source of the earthquake that shook the area on December 22, 2003.

The highest liquefaction risk in the city occurs along the Salinas River. Liquefaction is a loss of shear strength, usually resulting from a major earthquake. When liquefaction of the soil occurs, buildings and other objects on the ground surface may tilt or sink, and lightweight buried structures (such as pipelines) may float toward the ground surface. Liquefied soil may be unable to support its own weight or that of structures.

Hazardous soil characteristics vary throughout the region including: permeability, surface runoff, erosion hazards, and shrink-swell potential. These soil characteristics could cause expansion and settlement, landslides, and erosion. Specifically, soil erosion is the removal of soil by water and wind. The rate of erosion is estimated from four soil properties: texture, organic matter content, soil structure, and permeability. Other factors that influence erosion potential include the amount of rainfall and wind, the length and steepness of the slope, and the amount and type of vegetative cover.

The federal government defines a hazardous material as a substance that is toxic, flammable/ignitable, reactive, or corrosive. Extremely hazardous materials are substances that show high or chronic toxicity, carcinogenic, bio-accumulative properties, persistence in the environment, or that are water reactive. The analysis will consider the potential for one of the sites to be affected by the existence of leaking underground storage tanks (LUST) in the vicinity, if any.

Methodology

The individual characteristics of each soil type found on the five sites were analyzed for permeability, surface runoff, erosion hazard, and shrink-swell potential, as designated by the Natural Resources Conservation Service (NRCS) Soil Survey of San Luis Obispo County, California, Paso Robles Area (refer to Figure 5 and see Table 2 for soil descriptions). The *City of Paso Robles General Plan EIR* was also referenced for seismic/geologic characteristics, landslide risk, regional faults, and liquefaction risk.

Table 2. Soil Hazard Characteristics

COMPOSITION	SOIL NAME	SHRINK-SWELL POTENTIAL	RATE OF RUNOFF	EROSION HAZARD	PERMEABILITY	SITE F	SITE G
Greenfield	Hanford and Greenfield gravelly sandy loams, 2 to 9% slopes	Moderate	Rapid	High	Moderate		●
Linne	Linne-Calodo complex, 50 to 75% slopes	Moderate	Rapid	High	Moderately slow		●
Lockwood	Lockwood shaly loam, 2 to 9% slopes	Moderate	Medium	Moderate	Moderately slow		●
Metz	Metz loamy sand, 0 to 5% slopes	Low	Slow	Slight	Moderately rapid	●	●
Mocho	Mocho clay loam, 0 to 2% slopes	Moderate	Medium	High	Moderately slow	●	●
Pico	Pico fine sandy loam, 2 to 9 % slopes	Moderate	Medium	High	Moderately rapid	●	●
Tujunga	Metz-Tujunga complex, occasionally flooded, 0 to 5% slopes	Low	Slow	Slight	Moderately rapid	●	●
Xerofluvents	Xerofluvents-Riverwash association	Not Defined (ND)	ND	ND	ND	●	●

Source: NRCS, Soil Survey of San Luis Obispo County, California, Paso Robles Area (1983); City of Paso Robles General Plan EIR (2004)

Analysis and Findings

Site F

Site F has a high risk of liquefaction but low potential for landslides (*Paso Robles General Plan*, 2004). The upper terrace on the eastern boundary of Site F is composed of Pico fine sandy loam (2 to 9 percent slopes) and Mocho clay loam (0 to 2 percent slopes). Pico fine sandy loam consists of deep, well-drained soils that formed in alluvium from mostly sedimentary rocks. The Mocho clay loam characteristics include: moderately slow permeability, slow surface runoff, slight erosion hazard, and moderate shrink-swell potential. Both these soil types are considered prime agricultural land. The lower terrace of Site F is composed of Metz loamy sand (0 to 5 percent slopes). Metz loamy sand series consists of very deep, somewhat excessively drained soils that formed in alluvial material from mixed, but dominantly sedimentary rocks. The high water flood zone just east of the active Salinas River channel is composed Metz-Tujunga complex, occasionally flooded (0 to 5 percent slopes). The Metz-Tujunga complex soil characteristics include: moderately rapid permeability, slow surface runoff, and slight erosion hazard and occasionally floods. Finally the most western portion of Site F is composed of Xerofluvents-Riverwash association, found within the active Salinas River channel. The Xerofluvents-Riverwash association characteristics include: variable permeability, medium surface runoff, and a very high erosion hazard.

Site G

Site G has a high risk of liquefaction but low potential for landslides (*Paso Robles General Plan*, 2004). The northwestern portion of Site G is composed of Hanford and Greenfield gravelly sandy loams (2 to 9 percent) and Linne-Calodo complex (50-75 percent slopes). The Hanford and Greenfield soils characteristics include: moderately rapid permeability, slow to medium surface runoff, and a slight to moderate erosion hazard. The Linne-Calodo complex consists of steep soils on hills. This complex is about 30 percent Linne shaly clay loam and 25 percent Calodo clay loam. The Linne soil is a moderately deep, well-drained soil that formed in material weathered from calcareous sand-stone and shale. Typically, the surface layer of the Linne-Calodo complex is comprised of a deep layer of dark gray and dark grayish brown shaly clay loam. The soils that make up the upper field are Lockwood shaly loam (2 to 9 percent slopes) and Mocho clay loam (0 to 2 percent slopes). The Lockwood shaly loam soil characteristics include: moderately slow permeability, medium surface runoff, and a moderate erosion hazard. The Mocho clay loam soil characteristics include: moderately

slow permeability, slow surface runoff, slight erosion hazard, and a moderate shrink-swell potential. The lower terrace, just below the high water flood zone, is composed of Metz-Tujunga complex (0 to 5 percent slope). This complex is designated as occasionally flooded (FEMA, 2008). The Metz-Tujunga complex soil characteristics include: moderately rapid permeability, slow surface runoff, and slight erosion hazard. The Metz- Tujunga Complex soil will support riparian vegetation.

The majority of the eastern portion of Site G is composed of Xerofluvents-Riverwash association, found within the active Salinas River channel. The Xerofluvents-Riverwash association characteristics include: variable permeability, medium surface runoff, and a very high erosion hazard. Finally, the very southeastern edge of Site G is above the active Salinas River channel and includes a small fraction of Metz loamy sand (0 to 5 percent slopes) and more of the Metz-Tujunga complex, occasionally flooded (0 to 5 percent slopes). Metz loamy sand complexes are found on floodplains and alluvial fans. In general the Metz series consists of very deep, somewhat excessively drained soils that formed in alluvial material from mixed, but dominantly sedimentary rocks.

Actions Required to Address Potential Constraints

Project activities on either site will be required to comply with state and local laws with regard to construction activities. There are no locations within either site that require special attention, or should be avoided, since both sites are subject to similar soil-related geohazards. Please review the geotechnical report for more detailed analysis of this issue.

2.4 NOISE

Key Issue:
This section evaluates the potential for construction-related noise to adversely affect nearby sensitive receptors, such as homes.

Introduction and Methodology

There are two major noise sources that are typically evaluated in an analysis of this issue: linear noise sources (from vehicles on roadways and trains using rail lines), and stationary noise sources (equipment at construction sites, or industrial operations). Proposed project activities will not generate long-term trips, and will there not contribute to long-term increases in noise on roadways. In the short-term, there would be temporary increase in truck trips on nearby roadways, but the volumes will not be sufficient to increase ambient noise levels significantly.

Potential Noise Sources and General Plan Standards. The primary source of noise will be during project construction, which will be a function mostly of onsite equipment used for excavation, grading and hauling. Therefore, the analysis will focus on this issue as it evaluates potential impacts associated with either site.

The General Plan Noise Element notes that the maximum allowed noise exposure from stationary noise sources is 70 dBA during the day and evening (7AM to 10 PM), and 65 dBA at night (10 PM to 7 AM).

Construction equipment of the type associated with project activities typically generates noise levels ranging from about 80 to 85 dB at 50 feet from the source (EPA, 1971). Stationary source noise levels attenuate at 6 dBA per doubling of distance. Therefore, assuming that there is no topographic attenuation, exterior areas up to 350 feet away may be subject to construction noise levels of 70 dBA, and noise levels of 65 dBA may be experienced up to 500 feet away. It should be noted, however, that these levels are not expected to be consistently sustained and would generally be episodic. Furthermore, noise levels would be further attenuated by intervening topography and structures. Therefore, these figures may be considered a worst case scenario.

It should also be noted that there are several other more substantive noise sources within the area, which may have the effect of masking some of the temporary noise that may be experienced at either Site F or G. These include vehicle traffic on U.S. Highway 101, rail operations, and a variety of industrial operations along Ramada Drive. With respect to Highway 101, the 65 dBA noise contour reaches about 450 feet from the freeway centerline, which encompasses much of Site G, but does not include Site F. Rail operations are a less important source of noise due to the sporadic nature of rail operations, but can be experienced as a nuisance at great distance from the line. Short-term noise levels associated with passing trains can exceed 100 dB at 1,200 feet from the track, which translates to about 70 dB as far as about a half mile away. Industrial operations along Ramada Drive, including Navajo Rock and Block, and Union Asphalt, are identified in the Noise Element as substantial stationary noise sources in the vicinity. These, however, are a less noticeable source of noise at long distances. The 70 dB noise contour for these operations would be about 100 feet from the plants, with the 65 dB contour about 200 feet away.

Sensitive Receptors. A “sensitive receptor” is any land use that may be susceptible to noise, as defined in the Noise Element. Typically, these include residences, hospitals, schools, guest lodging, libraries, and parks. The nearest sensitive receptors in the vicinity that may be affected by project activities are described below:

- *Residences:* Rural-scale homes are found to the east of the Salinas River along South River Road and adjoining streets, including Oak Lane and Creeksand Lane. Suburban scale homes are also found adjacent to the river along Riverbank Lane.

- *Parks:* Lawrence Moore Park is located along the eastern edge of the Salinas River, about 1,200 feet north of Site G.

- *Other Receptors:* No other sensitive receptors are likely to be impacted by construction noise. Note that while there are numerous motels west of Highway 101, these not be affected of the masking effects of freeway noise, and because such facilities have been designed to mitigate fro such noise.

Analysis and Findings

Site F

Site F is bordered by residences to the east and to the north. The nearest home to the north is within 150 feet of the site boundary, near Santa Ysabel Avenue. The next nearest home is about 600 feet to the east, along Gilroy Avenue, and a home about 700 feet to the north of the site along Santa Ysabel Avenue. All other residences are at least 1,000 feet away to the north and east.

No other sensitive receptors are near Site F.

As noted above, construction equipment at the site could produce noise levels of 70 dBA up to 350 feet from the noise source, and up to 65 dBA 500 feet away. Depending on where proposed facilities are located on Site F, an adverse impact to the nearest home to the north along Santa Ysabel Avenue may result.

It should also be noted that Site F is in a more rural setting than Site G, and therefore has lower ambient noise levels than in Site G. Thus, construction noise has the potential to be more noticeable on Site F than G.

Site G

The site is bordered to the west by industrial park, the UPRR rail line, and U.S. Highway 101. No sensitive potentially affected receptors are located in that direction, in part because the rail and roadway operations would mask any temporary construction noise from the site.

The nearest sensitive receptors that may be affected are to the east and north. These include homes about 600 feet to the east across the Salinas River, along Riverbank Lane. Lawrence Moore Park is located about 1,200 feet to the northeast, also across the river.

As noted above, construction equipment at the site could produce noise levels of 70 dBA up to 350 feet from the noise source, and up to 65 dBA 500 feet away. Assuming that construction operations would be confined to daytime hours, when the exterior noise standard is 70 dBA, and be limited to the areas west of the riverbed itself (at least 350 feet from the nearest homes), no sensitive receptors would be impacted.

As noted above, Site G experiences greater ambient noise than does Site F. Thus, construction noise has the potential to be more noticeable on Site F than G. In addition, there are homes closer to Site F than Site G that may be impacted by construction noise. Overall, Site G would experience slightly lesser constraints with respect to noise as compared to Site F.

Actions Required to Address Potential Constraints

Project activities on either site will be required to comply with local noise ordinance requirements with regard to construction activities. With respect to Site G, no special actions would be required beyond what is called for in the Noise Element and local noise ordinance with respect to limiting construction hours, and ensuring that construction equipment is in good working order.

N-1. Restrict Areas of Disturbance

Applicability:
This measure applies to any portion of Site F within 350 feet of the nearest residential property to the north along Santa Ysabel Avenue.

Action:
Construction activities should be prohibited within 350 feet of the nearest residential properties. If this is not possible, then equipment shall be baffled, and temporary noise construction barriers be erected, to ensure that noise levels on the exterior portions of the nearest residential property do not exceed 70 dBA. In this event, noise levels should be measured on the adjacent residential property to ensure compliance with this action.

2.5 AESTHETICS

Key Issue:
This section assesses the extent to which the proposed project will affect visually sensitive areas, and be visible from public viewing locations.

Introduction

The visual character of the general vicinity is a combination of natural and built environments. Aesthetics can be altered through a change in the visual character of an area, the alteration of views from a viewing corridor, and the addition of light and glare. A modification that is visually dominant or one that substantially modifies the existing view adversely is considered a change in visual character. This can occur through the modification of existing terrain by removal of vegetation, grading activities, and the construction of new facilities. When a site is visible from a public viewing corridor, this effect is exacerbated.

The project will be located within open space along the Salinas River, and will be highly visible from many public locations. The City's General Plan Conservation Element identifies both U.S. Highway 101 and the Union Pacific rail line as important public viewing corridors near the project sites. The General Plan also identifies this stretch of the Salinas River as an important open space viewshed, and near the City's southern gateway. Both factors are given special consideration in the evaluation of projects under the General Plan relative to aesthetics.

General Plan Policy C-5A, Action Item 2, notes that projects within visually sensitive areas (such as is the case for either Site F or G) are subject to the following scrutiny with respect to coordinated site design:

> *"Establish and implement site design, landscaping, architecture, and sign design standards in order to ensure that gateways, corridors, major arterials, and natural areas are identifiable."*

This policy does not appear to address public works projects such as that currently contemplated. However, it does suggest that minimizing aesthetic impacts by shielding facilities, minimizing the profile of development, using a natural color scheme, and appropriate landscaping are all goals with respect to project design. While it is recognized that the proposed facility will not include buildings, the degree to which that the facility can be integrated into the natural environment, and shielded from public view to the extent possible, are important considerations in ensuring consistency with the intent of the General Plan.

The project will not be permanently lighted, so no impacts with respect to light and glare are expected. Therefore, this issue will not be further evaluated in this study.

Methodology

The assessment of aesthetic constraints involves qualitative analysis that is inherently subjective in nature. Different viewers react to view sheds and aesthetic conditions differently. This evaluation measures the existing visual environment against the proposed action, analyzing the nature of the anticipated change. For the purpose of this report, an aesthetic constraint is identified if the proposed development would modify the visual character of the area, or adversely affect a viewshed from a sensitive public viewing area.

Analysis and Findings

Site F
Site F is primarily visible from roadways east of the Salinas River, including Santa Ysabel Avenue. No scenic viewing corridors are identified east of the river, according to the General Plan. The site is partially visible from both U.S. Highway 101 and the rail line (both of which are identified as sensitive public viewing corridors), and in each case, the views are partially blocked by intervening industrial buildings, and riparian areas associated with the river itself. The freeway is about 1,000 feet to the west of the western boundary of the site, while the rail line is about 500 feet to the west.

It is unlikely that proposed facilities within Site F will adversely impact views from either U.S. Highway 101 or the rail line.

Activities on Site F will likely be visible from several homes east of the river, and although the General Plan does not identify this as a potential issue by itself, the fact that the site is within the Salinas River corridor and near the City's southern gateway means that special design considerations will need to be implemented to ensure that activities are screened or otherwise within the surrounding natural character of the river.

Site G
Site G contains an upper terrace that is predominately agricultural land extends to the east encompassing a portion of the Salinas River watershed. The site is located approximately 0.2 mile east of Highway 101, a city designated visual corridor and eligible for designation as a State Scenic Highway. It is also adjacent to the Union Pacific rail line, which is also identified as an important local viewing corridor.

Although views along the southern portions of Site G are screened by an intervening industrial park, and separated by about 800 feet from the freeway, the northern section is bordered directly by Highway 101 to the west and therefore directly visible. The northern portion of Site G may be visible from homes to the east across the river, roughly 600 feet away. However, because of natural buffers such as trees associated with the river, it is unlikely that the project site would be visible to these residences.

Overall, the northern portion of Site G is highly visible from designated scenic corridors, and is therefore visually sensitive. To the extent possible, any proposed facility to be located in Site G should focus on the southern portion of the site, which is much less visually sensitive.

Overall, Site G—particularly the northern portion of the site—is more visually constrained than Site F.

Actions Required to Address Potential Constraints

Project activities on either site will be required to comply with General Plan requirements with regard to minimizing aesthetic impacts through a variety of design measures, including visual screening, minimizing lighting, and use of colors to blend in with the natural environment. Consistent with that requirement, the following is intended to apply to either site in order to meet these General Plan performance criteria.

A-1. Aesthetic Design Measures

Applicability:
This measure applies to all portions of both Site F and Site G.

Action:
Because each site is within the visually sensitive Salinas River corridor, the following considerations should be

implemented into project design:

- *Project Screening.* To the extent possible, the project should not be directly visible to key public viewing corridors, particularly U. S. Highway 101 or the Union Pacific Railroad line. This is particularly a concern with the northern portion of Site G. The use of natural features such as trees and topography to hide the project is encouraged,
- *Compatible Color Palette.* Any permanent buildings or other facilities should be painted in earth tones, consistent with the surrounding natural areas.
- *Minimize Ground Disturbance.* To the extent possible, grading and other ground disturbance should be minimized to the smallest area feasible;
- *Minimize Lighting.* Lighting fixtures should be minimized, and if needed, should be hooded and shield to avoid offsite spillage, thus avoiding light and glare impacts to sensitive visual receptors offsite.

2.6 TRAFFIC AND CIRCULATION SAFETY

Key Issues:
This section assesses the extent to which the proposed project will introduce truck traffic that may have short-term impacts on nearby roadways, or otherwise result in potential safety-related conflicts with pedestrians or bicyclists.

Introduction and Methodology

The analysis will evaluate the potential to impact operations on nearby roadways. Although not expected to generate long-term traffic, construction activities have the potential to be disruptive, primarily as a result of construction trucks needing to access the sites via roadways that may traverse residential neighborhoods, or other places that may experience roadway congestion.

Traffic operations are quantified through the determination of "Level of Service" (LOS). Level of Service is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection or roadway segment representing progressively worsening traffic conditions. The main roadways of interest for the proposed project include North River Road, Dry Creek Road, State Route 46 East, Union Road, and Ramada Drive.

For the purpose of this report, the proposed facilities would have the potential to result in traffic concerns if construction truck access routes would either traverse roadways that experience substantial congestion, or if they would traverse neighborhoods that would otherwise result in potential nuisance impacts to neighbors, including noise.

Analysis and Findings

Site F
Regional access to this site is provided by U.S. Highway 101 via the Spring Street interchange to Niblick Road. Local access to the site is via South River Road to Santa Ysabel Avenue. Local access within the site is via Sailing Ave off of Santa Ysabel Avenue. Sailing Avenue is accessed through a locked gate. This section of South River Road to Santa Ysabel Avenue maintains a Level of Service (LOS) A, as it carries about 1,690 average daily trips (General Plan Circulation Element, 2011). No congestion issues are anticipated on this roadway resulting from temporary construction traffic.

Niblick Road, which is the primary access point via U.S. 101, currently experiences LOS D (31,430 ADT). Although construction truck trip volumes will be relatively small, and temporary in nature, they will contribute to existing congestion on Niblick Road as it crosses the Salinas River.

Trucks will follow South River Road to Santa Ysabel Avenue to access the site. In so doing, they will pass residential neighborhoods, including rural residential homes south of the City limits. Some of these homes include driveways that directly access these roadways. Although the truck volumes will not be large, the increased activity may pose a temporary nuisance to such residents, and an incrementally increased traffic safety hazard, particularly to pedestrians and cyclists who may be using these roads.

These issues notwithstanding, it is not anticipated that truck traffic associated with construction will significantly affect traffic flow on existing roads, or substantially degrade public safety with respect to the temporary increase in construction truck traffic.

Site G

Regional access to this site is provided by U.S. Highway 101 via the SR 46 West interchange to Ramada Drive. Local access is via Ramada Drive and across the UPRR railroad tracks. There is site entry is through a locked gate at the about the midpoint of the western side of the site.

In general, this route is appropriate for construction traffic, since Ramada Drive is designed for trucks, and has a variety of industrial and commercial uses that are already served by such traffic. In addition, there are no residential areas along this route. Ramada Drive carries about 3,700 ADT, or LOS B, so traffic congestion is not an issue along this route.

As with Site F, it is not anticipated that truck traffic associated with construction will significantly affect traffic flow on existing roads, or substantially degrade public safety with respect to the temporary increase in construction truck traffic. However, overall this route presents slightly lesser traffic-related constraints than what would occur if Site F were used.

Actions Required to Address Potential Constraints

No traffic-related constraints are anticipated at either site.

2.7 AGRICULTURAL RESOURCES

Key Issue:
This section assesses the extent to which the proposed project will affect agricultural operations, or otherwise conflict with policies that relate to the preservation of agriculture.

Introduction and Methodology

Portions of both sites have historically been used for agricultural purposes. To that end, this analysis will evaluate potential impacts to the long-term agricultural potential of the sites. It will discuss the regulatory framework governing the two sites with respect to agriculture, as well as the suitability of the soils to support agricultural uses, as appropriate.

Soil Characteristics. From a physical standpoint, both sites have been used historically for agricultural purposes. The State of California, Department of Conservation, Office of Land Conservation, Important Farmlands Inventory (IFI) system is used in San Luis Obispo County to inventory lands considered to have agricultural value. This system classifies land based upon the productive capabilities of the land, rather than the mere presence of ideal soil conditions. Land is divided into several categories of diminishing agricultural importance.

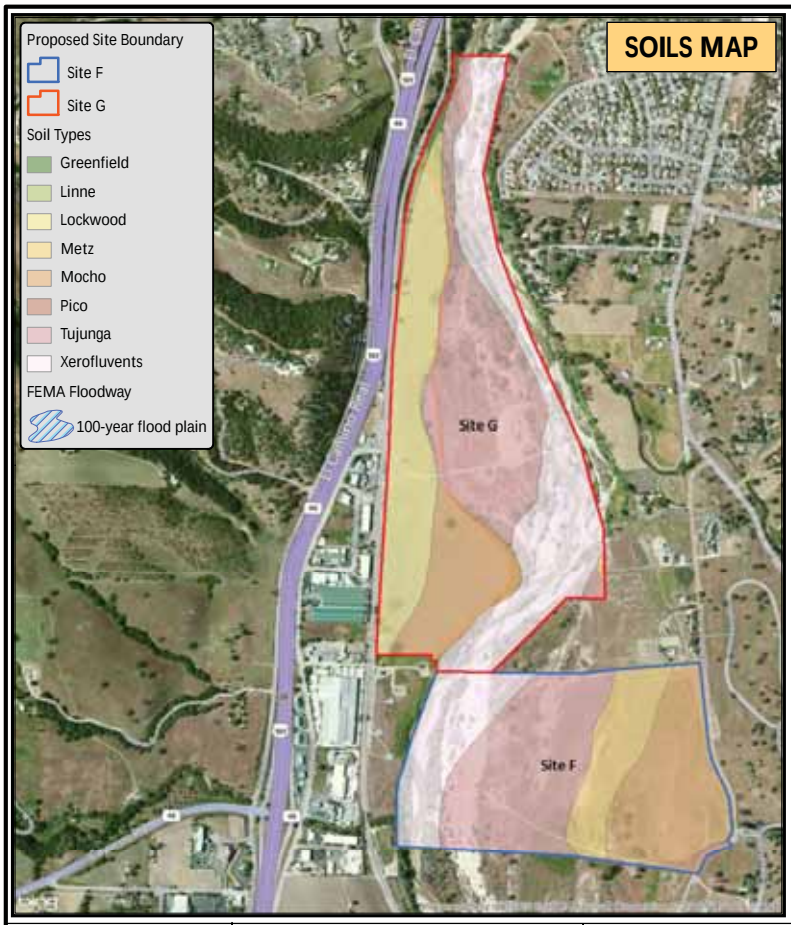
Within the IFI classification farmlands are designated as "Prime", "Statewide Importance", "Unique" and "Local Importance" as outlined in the *Paso Robles General Plan Open Space Element*. "Prime" farmlands are generally defined as irrigated soils (Class I and II) over 40 inches deep with available water holding capacity of 4 inches or more. Generally well drained, they are free from frequent flooding. Farmlands of "Statewide Importance" are irrigated lands other than prime that have a good combination of physical and chemical characters for producing feed, fiber, food, forage, and oilseed crops, "Unique" farmlands are other lands that produce high value food and fiber crops. "Local Importance" farmlands represent dry farmed lands, and un-irrigated lands of Prime and Statewide Importance. Lands that have lesser agricultural potential are classified as "Grazing," "Urban," or "Other." The latter classification includes areas that are generally unsuitable for agriculture because of geographic or regulatory constraints.

The following table shows the various soils on the two sites (see Figure 5), and their potential to support agriculture.

Table 3. Agricultural Soil Characteristics

COMPOSITION	SOIL NAME	AGRICULTURAL DESIGNATION	SITE F	SITE G
Greenfield	Hanford and Greenfield gravelly sandy loams, 2 to 9 percent	Prime Farmland		●
Lockwood	Lockwood shaly loam, 2 to 9 percent slopes	Prime Farmland		●
Pico	Pico fine sandy loam, 2 to 9 percent slopes	Prime Farmland	●	
Linne	Linne-Calodo complex, 50 to 75 percent slopes	Other Land		●
Tujunga	Metz-Tujunga complex, occasionally flooded, 0 to 5 percent	Grazing Land		●
Xerofluvents	Xerofluvents-Riverwash association	Grazing Land	●	●
Metz	Metz loamy sand, 0 to 5 percent slopes	Farmland of Statewide Importance		●
Mocho	Mocho clay loam, 0 to 2 percent slopes	Prime Farmland	●	●
Metz	Metz loamy sand, 0 to 5 percent slopes	Farmland of Local Potential	●	
Tujunga	Metz-Tujunga complex, occasionally flooded, 0 to 5 percent	Farmland of Local Importance	●	

Source: NRCS, Soil Survey of San Luis Obispo County, California, Paso Robles Area (1983); City of Paso Robles General Plan EIR (2004)



sage institute

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map updated 12/11/11

975 487.5 0 975 Feet

0.2 0.1 0 0.2 Miles

Paso Robles Percolation Sites

Constraints Analysis

Figure 5

Soils Map and Flood Plain Map

Analysis and Findings

Site F

Site F is located in unincorporated San Luis Obispo County. It is designated as Agriculture (AG) under the El Pomar-Estrella Area Plan. Although this designation does not limit prohibit the construction of the type of infrastructure envied under the project, from the County's regulatory perspective, it will be important that such a project be designed in a way to minimize impacts to agricultural use, and maintain the long-term agricultural viability of the site.

The majority of the site is also under Williamson Act contract (Figure 6). This voluntary program, also known as the Land Conservation Act, is intended to preserve agricultural by giving property tax breaks to property owners who are willing to commit to preserving their lands in agricultural use. The fact that the site is under contract does not preclude the development of percolation ponds, but instead demonstrates the County's further commitment to maintaining the agricultural potential of the site. From a regulatory perspective, this provides another reason to ensure that the design of the project does not diminish the agricultural potential of the site.

According to the *Paso Robles General Plan,* the eastern portion of Site F is Prime farmland and farmland of Local Importance; the western portion is a mixture of grazing land, Farmland of Local Potential. A small portion of the upper terrace on the eastern boundary of Site F is composed of Pico fine sandy loam (2 to 9 percent slopes, while most of it is Mocho clay loam (0 to 2 percent slopes). Both these soil types are considered Prime farmland. The lower terrace of Site F is composed of Metz loamy sand (0 to 5 percent slopes). Metz loamy sand series consists of very deep, somewhat excessively drained soils that formed in alluvial material and in considered farmland of Local Importance. The Metz-Tujunga complex soil is considered farmland of Local Importance. These four soil types are all being utilized in rotational crops and are currently designated as agricultural land. Finally the most western portion of Site F is composed of Xerofluvents-Riverwash association, found within the active Salinas River channel. The Xerofluvents-Riverwash association is not suitable for crop cultivation as it is subject seasonal inundated by the Salinas River.

Although the proposed project could be built on this site, the County will likely discourage development on prime soils. In any event, development of the project may require close coordination with the County Agricultural Commissioner's office to ensure the project's consistency with its long-term goals.

Site G

Site G is located within the Coty of Paso Robles. Under the City's General Plan, the western portion of the site (the upper terrace) is designated as Business Park (BP), while the lower terrace closer to the river is designated as Parks/Open Space (POS). Notably, none of Site G is designated for agricultural purposes, nor is it constrained by a Williamson Act contract. This, from a regulatory perspective, there are no constraints to developing the project anywhere within Site G.

From a physical perspective, the site has been historically used for agriculture, and the upper terrace in particular, which has supported row crops, is considered to be Prime farmland. The lower terrace is of lower quality, and is considered "grazing land" under the State's Important Farmlands Inventory.

Seven soil types are found on Site G including the Lockwood shaly loam (2 to 9 percent slopes), the Mocho clay loam (0 to 2 percent slopes, Hanford and Greenfield gravelly and fine sandy loam (2 to 9 percent slopes),

Linne-Calodo complex (50-75 percent slopes), Metz loamy sand (0 to 5 percent slopes), Metz-Tujunga complex, occasionally flooded (0 to 5 percent slopes), and the Xerofluvents-Riverwash association.

Although there are prime soils on the upper terrace portion of Site G, there are fewer regulatory constraints to developing the project as compared to Site F, primarily because the site is within the City of Paso Robles, and designated for urban or other non-agricultural open space uses. Thus, the General Plan anticipates that agricultural uses will cease in the long-term. Nevertheless, because there are active agricultural operations on the prime soils of the upper terrace, it may be it desirable to avoid impacting these operations (and the underlying prime soil) either by locating the facility on the lower terrace, or by locating it on the upper terrace in such a way to minimize disturbance to existing agricultural operations.

Actions Required to Address Potential Constraints

Although development would be allowed on either Site F or G, there are substantially different regulatory issues. While Site G is within the City, and is designated for non-agricultural use, Site F is in the County and designated as Agriculture, with additional protection under the Williamson Act. Thus, Site G presents fewer regulatory constraints.

The upper terrace portion of each site includes prime soils. Thus, each site includes similar physical constraints. While possible to develop on prime soils, it may be desirable to place the facility in such a manner to avoid impacting the continued viability of agricultural uses on the site.

The following action should be implemented for the respective sites.

AG-1. Minimize Impacts to Prime Soils

Applicability:
This measure applies to development on the upper terraces of both Site F and Site G.

Action:
If the project were developed on the upper terrace of either site, they should be located in such a way so as to avoid impacting the viability of continued agricultural operations. This will be particularly important on Site F, which is designated for Agricultural use by the County, and is under Williamson Act contract.

2.8 LAND USE REGULATORY CONSISTENCY

Key Issue:
This section assesses the extent to which the proposed project will be consistent with underlying land use designations governing the sites.

Introduction and Methodology

Site G is located in the City of Paso Robles, while Site F is in unincorporated San Luis Obispo County. Thus, the land use regulatory framework of each agency is presented below.

City of Paso Robles. The *Paso Robles General Plan* (2003) designates 26 land use categories and nine special study overlay categories in its *Land Use Element* in order "to provide designations to guide the general distribution, location and extent of the various types of land uses in the City."

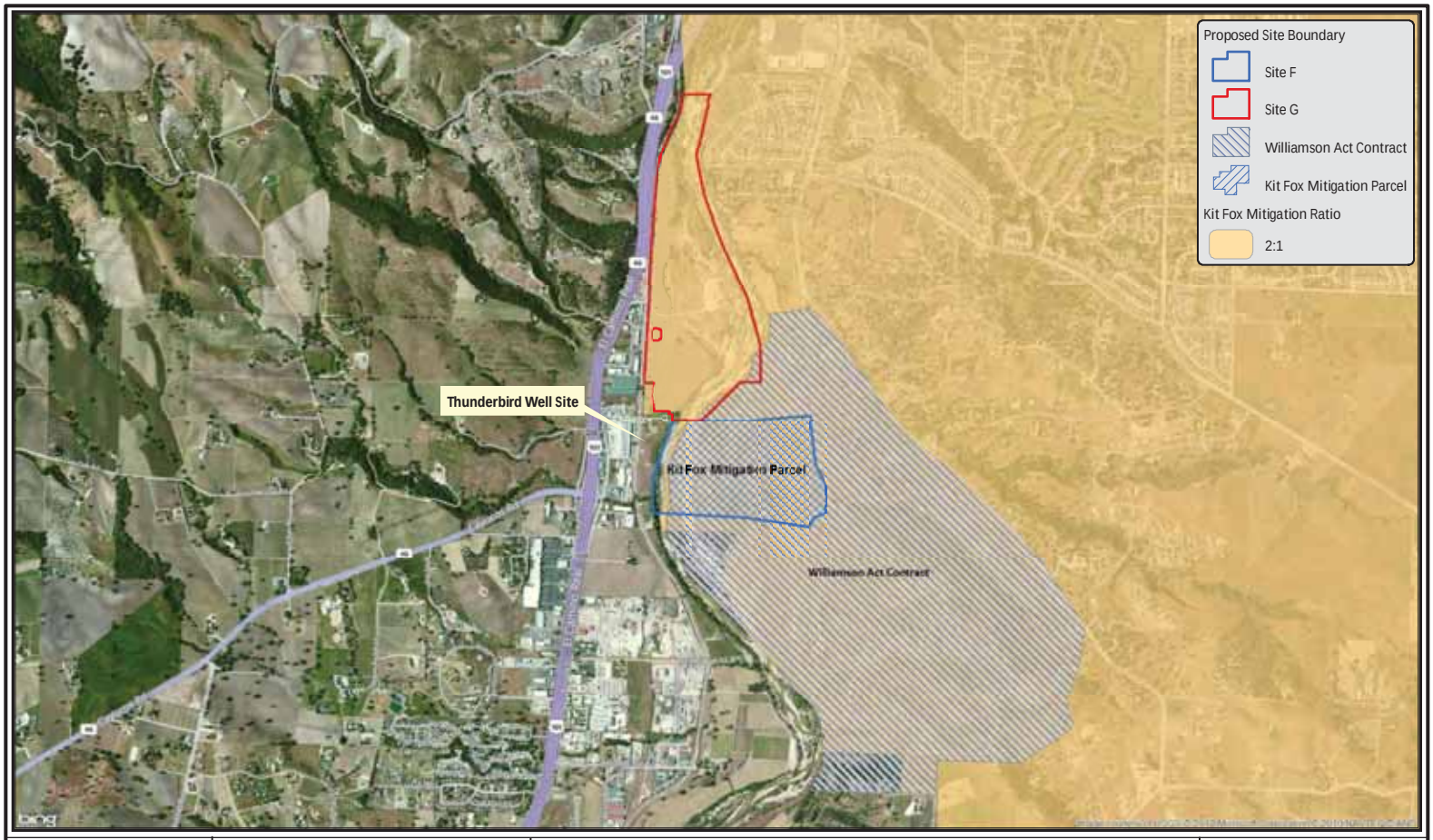
The western portion of the site (the upper terrace) is designated as Business Park (BP), while the lower terrace closer to the river is designated as Parks/Open Space (POS). The development of infrastructure is allowed under either land use designation.

The lower terrace portion of Site G is also within the Salinas River (SR) overlay category. This designation is established to ensure that development along the Salinas River corridor addresses conservation, access, and recreational opportunities. Development within this overlay is subject to special review for standards related to conservation, access and recreational opportunities along the Salinas River corridor.

The lower terrace portion of Site G is also within the Flood Hazard (FH) overlay category. This overlay designation corresponds to the 100-years flood zone as defined by FEMA, and is intended to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas. Figure 5 shows the 100-year flood plain of the Salinas River.

County of San Luis Obispo. Site F is designated as Agriculture (AG) under the El Pomar-Estrella Area Plan, which is a portion of the County's General Plan. The majority of the site is also under Williamson Act contract (Figure 6). The Williamson Act is described in more detail in Section 2.7, *Agricultural Resources*.

Site F is also within the Flood Hazard (FH) Combining Designation, which reflects the fact that the site lies within the FEMA-designated 100-year flood plain. Figure 5 shows the 100-year flood plain of the Salinas River.



sage institute

map updated 1/23/12

1,600 800 0 1,600 Feet

0.3 0.15 0 0.3 Miles

Paso Robles Percolation Sites

Constraints Analysis

Figure 6

Other Regulatory Constraints

Analysis and Findings

Site F

As noted above, Site F is designated as Agriculture (AG) under the El Pomar-Estrella Area Plan, which is a portion of the County's General Plan. Infrastructure is allowed under this designation.

Site F is also within the Flood Hazard (FH) Combining Designation, which reflects the fact that the site lies within the FEMA-designated 100-year flood plain. While there are no restrictions on the development of infrastructure, the fact that it is in the flood plain suggests that the facility will be relatively prone to flooding, and thus require a relatively high level of maintenance, particularly within the lower terrace portion of the site.

Site G

As noted above, the western portion of the site (the upper terrace) is designated as Business Park (BP), while the lower terrace closer to the river is designated as Parks/Open Space (POS). The development of infrastructure is allowed under either land use designation.

The lower terrace portion of Site G is also within the Salinas River (SR) overlay category and the Flood Hazard (FH) overlay category. While development of infrastructure is allowed within these areas, the fact that it is in the flood plain suggests that the facility will be relatively prone to flooding, and thus require a relatively high level of maintenance. The fact that is within the SR overlay zone means that it must be designed in such a way so as to protect the recreational potential of the area.

From a timing perspective, Site G may be considered slightly less constrained than Site F, because the it is located within the City, and development at this location will not require coordination with San Luis Obispo County's Department of Planning and Building. Development on Site F is within the County, and would require coordination with that agency.

Actions Required to Address Potential Constraints

No land use regulatory constraints are anticipated at either site.

2.9 LAND OWNERSHIP

Key Issue:
This section assesses whether the ownership of either site presents a potential constraint to development of the project.

Introduction
Site F is privately owned, while Site G is owned by the City of Paso Robles. The use of private property for the development of a public facility presents constraints in the form of obtaining easements, right-of-way agreements or full title ownership rights to the parcels that would be affected. Individual private property owners could present a more significant constraint with respect to obtaining these agreements when compared to public agencies. Such agencies are often mandated to cooperate with municipal projects and would be more likely to accommodate such agreements as would be required upon implementation of the proposed facilities.

Methodology
Ownership of the two sites was determined by contacting the City of Paso Robles. Specific information regarding private ownership was not examined; rather, only a city- versus private-ownership distinction is considered. A constraint is identified for sites under private ownership.

Findings

Site F
Site F (APN 020-282-002 and 020-282-005) is within the El Pomar-Estrella planning area and is just outside the City of Paso Robles. Site F is privately owned by River Road Property Entities, LLC. Both of these parcels are also designated as potential Kit Fox Mitigation Parcels by the County. Private ownership of part of the site is a potential constraint with respect to obtaining easements, right-of-way agreements or full title ownership rights.

Site G
Site G (APN 009-631-018, 009-631-019, 009-631-020, 009-811-008, 009-811-009) is within the Salinas River planning area and is owned by the City of Paso Robles. There is no constraint to development, because the City already owns the land.

Actions Required to Address Potential Constraints
No constraints are identified with respect to Site G. With respect to Site F, the following action is required.

L-1. Parcel Acquisition or Easement

Applicability:
This measure applies to Site F only.

Action:
Easements, right-of-way agreements or full title ownership rights must be obtained before construction of proposed facilities can occur.

3.0 SUMMARY AND CONCLUSIONS

Based on the evaluation of potential environmental impacts from the potential development of the proposed facility at one of the two candidate sites, additional environmental documentation would likely be required to adequately assess the impacts, regardless of the site that is ultimately selected.

Table 4 summarizes the results of the previous evaluation (Section 2.0). The table identifies the issues that will need to be addressed in the planning or environmental permitting process.

Table 4. Summary of Potential Constraints and Required Actions

Issue		**Site F**	**Site G**	***Site that is less constrained overall***
	Action Beyond Compliance with State of Local Law	*Where It Applies*	*Where It Applies*	
Biological Resources				Sites F or G, outside riparian areas
	B.1. Riparian Habitat/Wetland Permitting	Riparian or riverine areas (lower terrace)	Riparian or riverine areas (lower terrace)	
	B.2. Special Status Species Protocol Surveys	Riparian or riverine areas (lower terrace)	Riparian or riverine areas (lower terrace)	
	B.3. Rare Plant Surveys	All locations (seasonally timed)	All locations (seasonally timed)	
	B.4. Kit Fox/Badger Evaluation	Grassland habitat areas	Grassland habitat areas	
	B.5. Bird Nesting Pre-Construction Surveys	All locations (Feb 1 to Aug 31)	All locations (Feb 1 to Aug 31)	
Cultural Resources				Site G, portions of upper terrace
	C.1. Phase I Archaeological Investigation	Previously unsurveyed areas (most of site)	Previously unsurveyed areas (lower terrace)	
	C.2. Phase II Archaeological Investigation	May be required depending on outcome of Phase I.	"Highly Sensitive" as shown on Figure 4. May also be required on lower terrace, depending on outcome of Phase I.	
	C.3. Resource Construction Monitoring	All locations	All locations	
Geohazards				Neither site
	See geotechnical report			
Noise				Site G
	N.1. Restrict Areas of Disturbance	Within 350 feet of nearest residential property on Santa Ysabel Avenue	Not applicable	
Aesthetics				Site F
	A.1. Aesthetic Design Measures	All locations	All locations, but particularly northern portion of site	
Traffic and Circulation				Site G
	No special action required			

Table 4. Summary of Potential Constraints and Required Actions

Issue		Site F	Site G	*Site that is less constrained overall*
	Action Beyond Compliance with State of Local Law	*Where It Applies*	*Where It Applies*	
Agricultural Resources				Site G, especially lower terrace
	AG-1. Minimize Impacts to Prime Soils	Upper terrace	Upper terrace	
Land Use Regulation				Site G, because it is in the City
	No special action required			
Land Ownership				Site G, because it is owned by the City
	L.1. Parcel Acquisition or Easement	Entire site	Not applicable	
OVERALL				**Site G, portions of upper terrace**

As shown in Table 4, Site G is generally less constrained than Site F, particularly the upper terrace portion of Site G outside of riparian areas. Riparian areas on either site face substantially greater regulatory permitting issues, especially with regard to biological resources. With regard to cultural resources, the best location is the portion of the upper terrace that has been previously surveyed, but where no cultural resource have been found. This area is indicated in orange on Figure 4.

The primary advantage of Site G over Site F is that it is within the City limits and is owned by the City. It also does not face the regulatory constraints with respect to agricultural use that may occur on Site F, since that area is designated for agricultural use and given further protection under the Williamson Act.

4.0 REFERENCES

Holland, Robert F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. California Department of Fish and Game. Sacramento, California.

Jones, T.L., K. Davis, G. Farris, S.D. Grantham, B. Rivers, and T. Fung. 1994. Toward a Prehistory of Morro Bay: Phase II Archaeological Investigations for the Morro Bay Highway 41 Widening Project, San Luis Obispo County, California. California Department of Transportation, Sacramento. On file at Central Coast Information Center, University of California, Santa Barbara.

La Rue, D.A.(1998) Notes on PolyphyllaHarris with a description of a new species. (Coleoptera: Scarabaeidae: Melolonthinae) *Insecta Mundi*, *12*(1 & 2): 24-37

Morro Group, Inc. 2002. Biological Assessment for the Thunderbird Pipeline Project, Paso Robles, California. Prepared for the City of Paso Robles

Milliken, R. and J.R. Johnson. 2003. Salinan and Northern Chumash Communities of the Early Mission Period. Prepared for Caltrans Contract No. 06A0148 & 06A0391. Far Western Anthropological Research Group, Inc., Davis, California.

Rindlaub, K and P. Collins (1998), *Biological Resources Evaluation, Texaco Pipeline Abandonment on the Hollister Ranch,* Santa Barbara County, California.

Tibor, D.P, editor. 2001. *California Native Plant Society's inventory of rare and endangered vascular plants of California. Sixth edition.* Special Publication No. 1, California Native Plant Society, Sacramento, CA.

Titus, R. G., D. C. Erman, and W. M. Snider. 2006. History and status of steelhead in California coastal drainages south of San Francisco Bay. In draft for publication as a Department of Fish and Game, Fish Bulletin. p 293-294

Linsey, Wesley C. (1977), *Soil Survey of San Luis Obispo County, California - Paso Robles Area*, USDA-Soil Conservation Service.

CNDDB (California Natural Diversity Database). 2011. California Department of Fish and Game, 8 Natural Heritage Division, State of California. Program RareFind, December 2011.

DFG (California Department of Fish and Game). 2011. Special Vascular Plants, Bryophytes, and 10 Lichens List, Natural Diversity Database. Accessed December12, 2011 from http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPPlants.pdf.

Hickman, J. C., ed. 1993. The Jepson Manual. Berkeley: University of California Press.

CNPS (California Native Plant Society). 2006. *Inventory of Rare and Endangered Plants* (online 6 edition). California Native Plant Society, Sacramento, CA. Accessed December 10, 2011 from http://www.cnps.org/inventory.

Jennings, C.W. 1958. Geologic Map of California: San Luis Obispo Sheet. California Department of Mines and Geology, Scale 1:250,000.

Miller, R. W. and R. L. Donahue. 1990. Soils: An Introduction to Soils and Plant Growth, Sixth Edition. Prentice Hall, Englewood Cliffs, NJ.

Soil Conservation Service. 1979. Soil Survey of San Luis Obispo County, Paso Robles Area, California. USDA, SCS.

Soil Survey Division Staff. 1993. Soil Survey Manual. USDA-SCS Agric. Handbook 18. U.S. Gov. Print Office, Washington, D.C.

Soil Survey Staff. 1999. Keys to Soil Taxonomy, Eighth Edition. U.S. Department of Agriculture, NRCS.

National Marine Fisheries Service (NMFS) (2005), Endangered and Threatened Species: Listing of Several Evolutionary Significant Units (ESUs) of West Coast Steelhead, Federal Register 62(159): 43937-43953.

Archaeological Resource Management Reports: Recommended Contents and Format, State of California, December 1989

A Report of Archaeological Monitoring at Santa Ysabel Ranch, San Luis Obispo County, California, February 24, 2004

Guidelines For Archaeological Research Designs, State of California, February 1991

Milliken, R. and J.R. Johnson. 2003. *Salinan and Northern Chumash Communities of the Early Mission Period.* Prepared for Caltrans Contract No. 06A0148 & 06A0391. Far Western Anthropological Research Group, Inc., Davis, California.

Jones, T.L., K. Davis, G. Farris, S.D. Grantham, B. Rivers, and T. Fung. 1994. *Toward a Prehistory of Morro Bay: Phase II Archaeological Investigations for the Morro Bay Highway 41 Widening Project, San Luis Obispo County, California.* California Department of Transportation, Sacramento. On file at Central Coast Information Center, University of California, Santa Barbara.

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Appendix

Table A-1. Sensitive Plant and Animal species within a five-mile search radius from CNDDB
Table A-2. Results of CNDDB Records Search, December 2011

Table A-1 – Special-Status Plant and Wildlife Species within a five-mile search radius from CNDDB, December 2011

Common name *Scientific Name*	Listing Status USFWS/CDFG/ CNPS	General Habitat Description	Potential for Impacts	Period of Identification	Potential			
					Site F		Site G	
					Upper	Lower	Upper	Lower
Plants								
San Luis Obispo owl's-clover *Castilleja densiflora ssp. obispoensis*	--/--/1B.2	Meadows and seeps and valley and foothills grasslands, typically in heavy clay soil, sometimes in serpentine soils. 10 to 400 meters.	**Medium.** Onsite soils not typical for occurrence.	Flowering: March - May	X		X	
Lemmon's jewelflower *Caulanthus lemmonii*	--/--/1B.2	Pinyon and juniper woodland, and valley and foothill grasslands. 80 - 1220 meters.	**Low.** The project site does not contain pinyon-juniper woodland, but it does contain some foothill grassland habitats.	Flowering: March - May	X		X	
Mesa horkelia *Horkelia cuneataassp. puberula*	--/--/1B.1	Chaparral, cismontane woodland, and coastal scrub in sandy or gravelly soils. 70 to 810 meters.	**None.** Perennial species not observed.	Flowering: February - July				
Santa Lucia dwarf rush *Juncus luciensis*	--/--/1B.2	Chaparral, lower montane coniferous forest, meadows and seeps, and vernal pools. 300 - 2040 meters.	**Low.** The project site contains no ephemeral freshwater habitats.	Flowering: April - July				
Woodland woolythreads *Monolopia gracilens*	--/--/1B.2	In clearings of broad-leafed upland forest, chaparral, and north coast coniferous forests. Cismontane woodland, and valley and foothill grasslands, sometimes in serpentine soils. 100 - 1200 meters.	**Low.** Onsite soils not typical for occurrence.	Flowering: February - July				
Shining navarretia *Navarretia nigelliformis ssp. radians*	--/--/1B.2	Cismontane woodland, valley and foothill grasslands and vernal pools. 76 to 1,000 meters.	**None.** The project site contains no mesic sites suitable for this species.	Flowering: April - July				
Invertebrates								
Vernal pool fairy shrimp *Branchinecta lynchi*	FT/--/--	Vernal pools, swales, and ephemeral freshwater habitats.	**None.** The project site contains no ephemeral freshwater habitats.	November-April				
Atascadero June beetle *Polyphylla nubila*	--/SA/--	Occurs in sand dunes of San Luis Obispo County	**Low.** Suitable habitat of sand dunes is absent from both study sites (F and G.)	Breeding: April -July (June)	X	X	X	X

Lompoc grasshopper *Trimerotropis occulens*	--/SA/--	Known to occur in San Luis Obispo and Santa Barbara Counties.	**Low**. The two sites are within San Luis Obispo County, however this species has not been observed in the vicinity of the project since the 1909.	Breeding: April -July (June)	X	X	X	X
Fish								
Steelhead - south/central California coast DPS *Oncorhynchus mykiss irideus*	FT, CH/SSC/--	Central Coast rivers and streams from the Pajaro River, Santa Cruz County to (but not including) the Santa Maria River. Clear, cool water with abundant in-stream cover, well-vegetated stream margins, relatively stable water flow.	**High (Known).** The Salinas River is known habitat for migrating steelhead and it is considered critical habitat for steelhead. Suitable aquatic habitat is present within the river for migrating steelhead on both study sites (F and G).	Fall, winter, spring migrations.		X		X
Amphibians								
California red-legged frog *Rana aurora draytonii*	FT/SSC/--	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation.	**Moderate.** Suitable aquatic habitat may be present within the Salinas River within both study sites (F and G). Recorded in Paso Robles Creek and Graves Creek	March-August	X	X	X	X
Western spadefoot *Spea hammondii*	--/SSC/--	Largely terrestrial; enters seasonal ponds only to breed. Prefers open areas with sandy or gravelly soils, in a variety of habitats including mixed woodlands, grasslands, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, foothills, and mountains.	**Low.** Suitable upland estivation habitat present within both sites (F and G). No breeding ponds recorded nearby.	Breeding: January to May, depending on development of seasonal ponds.	X	X	X	X
Reptiles								
Western pond turtle *Emys marmorata*	--/SSC/--	Requires perennial aquatic habitat and constructs nests along edge of streams and ponds.	**High (Known).** Salinas River contains recorded occurrence for this species.	Observable year round.		X		X
Birds								
Golden eagle *Aquila chrysaetos*	MBTA, BGEPA/SSC,CFP/—	Breeds on cliffs or in large trees or electrical towers, forages in open habitats.	**Moderate.** This species may forage in the project vicinity. The trees on the project site do not appear to be suitable nesting habitat.	Nesting: January - June. Year round resident.	X	X	X	X

Least Bell's vireo *Vireo bellii pusillus*	MBTA,FE/SE/--	Summer breeding in southern California. This species occurs in low riparian areas or in dry river bottoms (below 700 meters). Nests in woody riparian areas.	**High.** Suitable riparian habitat is present within both sites (F and G).	March - July		X		X
Mammals								
American badger *Taxidea taxus*	--/SSC/--	Grasslands and other open habitats in friable soils.	**Moderate.** Friable soils in grassland habitat are present within both sites (F and G).	Year-round	X	X	X	X
San Joaquin kit fox *Vulpes macrotis mutica*	FE/ST/--	Inhabits annual grasslands or grassy open stages with scattered shrubby vegetation. Needs loose-textured sandy soils for burrowing, and a suitable prey base.	**Moderate.** The Salinas River is a known wildlife corridor for the San Joaquin kit fox. Friable soils are present within the lower terraces of the proposed well sites (F and G).	Breeding: March - June. May be present year round	X	X	X	X

Status Codes	
Federal FE = Federally Endangered FT = Federally Threatened CH = Federal Critical Habitat BGEPA= Bald and Golden Eagle Protection Act MBTA = Protected by Federal Migratory Bird Treaty Act	**State** SE = State Endangered ST = State Threatened CFP = California Fully Protected SSC = State Species of Special Concern SA = Not formally listed but included in CDFG "Special Animal" list.

Table A-2

California Department of Fish and Game
Natural Diversity Database
Full Condensed Report for Selected Elements - Multiple Records per Page

Aquila chrysaetos

golden eagle

Element Code: ABNKC22010

Status	NDDB Element Ranks	Other Lists
Federal: None	**Global:** G5	**CDFG Status:**
State: None	**State:** S3	

Habitat Associations

General: ROLLING FOOTHILLS, MOUNTAIN AREAS, SAGE-JUNIPER FLATS, & DESERT.

Micro: CLIFF-WALLED CANYONS PROVIDE NESTING HABITAT IN MOST PARTS OF RANGE; ALSO, LARGE TREES IN OPEN AREAS.

Occurrence No. 122 **Map Index:** 68049 **EO Index:** 68201

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-05-24
Site: 2006-05-24

Record Last Updated: 2007-02-07

Quad Summary: Paso Robles (3512066/269B)
County Summary: San Luis Obispo

Lat/Long: 35.65390º / -120.65248º
UTM: Zone-10 N3948101 E712515
Radius: 80 meters
Elevation: 720 ft

Mapping PrecisionSPECIFIC
Symbol Type:POINT

Township: 26S
Range: 12E
Section: 23 **Qtr:** NW
Meridian: M

Location: WEST SIDE OF HUERHUERO CREEK, BETWEEN GOLDEN HILL ROAD AND AIRPORT ROAD, PASO ROBLES.

Location Detail: A SECOND UNOCCUPIED NEST WAS IN A NEARBY OAK. LOCALS REPORT THAT GOLDEN EAGLES HAVE NESTED IN THIS AREA FOR AT LEAST 15 YEARS.

Ecological: NEST TREE WAS A BLUE OAK (QUERCUS DOUGLASII) ON AN EAST-FACING SLOPE ON THE WEST BANK OF THE CREEK; SURROUNDED BY GRAZED ANNUAL GRASSLAND/OAK WOODLAND.

Threat: THREATENED BY POSSIBLE DEVELOPMENT.

General: A SINGLE JUVENILE WAS OBSERVED IN THE NEST ON 24 MAY 2006; ADULTS WERE OBSERVED HUNTING GROUND SQUIRRELS NEARBY.

Owner/Manager: PVT

California Department of Fish and Game
Natural Diversity Database
Full Condensed Report for Selected Elements - Multiple Records per Page

Branchinecta lynchi

vernal pool fairy shrimp

Element Code: ICBRA03030

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	**Global:** G3	**CDFG Status:**
State: None	**State:** S2S3	

Habitat Associations

General: ENDEMIC TO THE GRASSLANDS OF THE CENTRAL VALLEY, CENTRAL COAST MTNS, AND SOUTH COAST MTNS, IN ASTATIC RAIN-FILLED POOLS.

Micro: INHABIT SMALL, CLEAR-WATER SANDSTONE-DEPRESSION POOLS AND GRASSED SWALE, EARTH SLUMP, OR BASALT-FLOW DEPRESSION POOLS.

Occurrence No. 287 **Map Index:** 45089 **EO Index:** 45089

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2001-02-27
Site: 2001-02-27
Record Last Updated: 2001-08-08

Quad Summary: Paso Robles (3512066/269B)
County Summary: San Luis Obispo

Lat/Long: 35.64515º / -120.63294º
UTM: Zone-10 N3947172 E714308
Radius: 80 meters
Elevation: 770 ft
Mapping Precision SPECIFIC
Symbol Type: POINT
Township: 26S
Range: 12E
Section: 24 **Qtr:** NE
Meridian: M

Location: JUST SOUTH OF HIGHWAY 46, 2 MILES EAST OF HIGHWAY 101, EAST OF PASO ROBLES

Location Detail: "AGRIGLOBE POOL"

Ecological: HABITAT CONSISTS OF VERNAL POOLS; SURROUNDED BY VINEYARDS, DIRT ROADS, SCATTERED HOUSES, AND HIGHWAY 146.

Threat: THREATENED BY AGRICULTURAL CONVERSION TO VINEYARDS.

General: 100'S OF ADULTS AND THOUSANDS OF JUVENILES OBSERVED ON 27 FEB 2001.

Owner/Manager: PVT

Occurrence No. 380 **Map Index:** 57776 **EO Index:** 57792

Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2001-03-13
Site: 2001-03-13
Record Last Updated: 2004-10-28

Quad Summary: Paso Robles (3512066/269B)
County Summary: San Luis Obispo

Lat/Long: 35.64656º / -120.63333º
UTM: Zone-10 N3947328 E714269
Area:
Elevation: 840 ft
Mapping Precision NON-SPECIFIC
Symbol Type: POLYGON
Township: 26S
Range: 12E
Section: 24 **Qtr:** XX
Meridian: M

Location: BLACKS HATCHERY AND TURKEY FARM, JUST NORTH OFF OF RTE. 46, 3.5 MILES NORTHEAST OF PASO ROBLES.

Location Detail: LAT. AND LONG. COORDINATES DO NOT AGREE WITH TRS INFO. OCCURRENCE MAPPED USING TRS INFO.

Ecological: OPEN SPACE, GRAZING LAND FOR CATTLE, RUDERAL VEGETATION WITH TWO TEMPORARY POOLS. B. LYNCHI FOUND IN POOL #2.

Threat: GRAZING.

General: 5 INDIVIDUALS OBSERVED ON 13 MAR 2001.

Owner/Manager: PVT

Occurrence No. 621 **Map Index:** 73679 **EO Index:** 74644

Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2005-01-18
Site: 2005-01-18
Record Last Updated: 2009-02-23

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.61666º / -120.68888º
UTM: Zone-10 N3943892 E709317
Radius: 80 meters
Elevation: 725 ft
Mapping Precision SPECIFIC
Symbol Type: POINT
Township: 26S
Range: 12E
Section: 33 **Qtr:** SW
Meridian: M

Location: 0.13 MI NE OF THE INTERSECTION OF NIBLICK RD & SPRING ST. WEST OF HWY 101. PASO ROBLES.

Ecological: SMALL DEPRESSIONS AND POOLS IN AND ALONG GRAVEL ACCESS ROAD ADJACENT TO UNION PACIFIC RAILROAD TRACKS. GRAVEL ROAD USED BY BICYCLES AND MOTORCYCLES.

Threat: DEVELOPMENT

General: 300+ ADULTS OBSERVED 18 JAN 2005.

Owner/Manager: UNKNOWN

California Department of Fish and Game
Natural Diversity Database
Full Condensed Report for Selected Elements - Multiple Records per Page

Castilleja densiflora ssp. obispoensis

San Luis Obispo owl's-clover

Element Code: PDSCR0D453

Status
Federal: None
State: None

NDDB Element Ranks
Global: G5T2
State: S2.2

Other Lists
CNPS List: 1B.2

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND.
Micro: 10-215M.

Occurrence No. 42 **Map Index:** 62415 **EO Index:** 62452

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2005-04-15
Site: 2005-04-15
Record Last Updated: 2005-08-29

Quad Summary: Paso Robles (3512066/269B)
County Summary: San Luis Obispo

Lat/Long: 35.65967º / -120.64289º
UTM: Zone-10 N3948762 E713368
Radius: 80 meters
Elevation: 190 ft

Mapping PrecisionSPECIFIC
Symbol Type:POINT

Township: 26S
Range: 12E
Section: 14 **Qtr:** SE
Meridian: M

Location: SOUTHWEST CORNER OF AIRPORT ROAD AND DRY CREEK ROAD, LESS THAN 1 MILE SOUTHWEST OF THE PASO ROBLES MUNICIPAL AIRPORT.

Location Detail: MAPPED WITHIN THE SE 1/4 OF THE SE 1/4 OF SECTION 14. MAPPED ACCORDING TO COORDINATES PROVIDED BY DART.

Ecological: CALIFORNIA ANNUAL GRASSLAND ON SANDY LOAM SOILS.

Threat: COMMERICAL DEVELOPMENT PROPSED ON PARCEL. IMPACTS UNKNOWN, SITE PLANS UNAVAILABLE. POSSIBLE HYBRIDIZATION.

General: 150 PLANTS OBSERVED IN 2005. THIS SPECIES IS NOT TYPICALLY AN INLAND SPECIES. CASTILLEJA DENSIFLORA SSP. GRACILIS AND C. ATTENUATA ALSO OCCUR AT THIS LOCATION, HYBRIDIZATION COULD BE INVOLVED.

Owner/Manager: PVT

California Department of Fish and Game
Natural Diversity Database
Full Condensed Report for Selected Elements - Multiple Records per Page

Caulanthus lemmonii

Lemmon's jewel-flower

Element Code: PDBRA0M0E0

Status	NDDB Element Ranks	Other Lists
Federal: None	**Global:** G2	**CNPS List:** 1B.2
State: None	**State:** S2.2	

Habitat Associations

General: PINYON-JUNIPER WOODLAND, VALLEY AND FOOTHILL GRASSLAND.

Micro: 80-1220M.

Occurrence No. 21 **Map Index:** 60014 **EO Index:** 53714

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1957-04-02
Site: 1957-04-02

Record Last Updated: 2006-04-18

Quad Summary: Paso Robles (3512066/269B), Templeton (3512056/269C)

County Summary: San Luis Obispo

Lat/Long: 35.62024º / -120.70627º
UTM: Zone-10 N3944251 E707732
Radius: 1 mile
Elevation:

Mapping Precision NON-SPECIFIC
Symbol Type: POINT

Township: 26S
Range: 12E
Section: 32 **Qtr:** XX
Meridian: M

Location: CHALK ROCK, PEACHY CANYON.

Location Detail: EXACT LOCATION UNKNOWN. MAPPED AS BEST GUESS BY CNDDB NEAR THE MOUTH OF PEACHY CANYON. UNABLE TO LOCATE CHALK

Ecological: ON DRY, ROCKY BANK.

General: NUMEROUS COLLECTIONS FROM PASO ROBLES ALSO ATTRIBUTED TO THIS LOCATION.

Owner/Manager: UNKNOWN

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Emys marmorata

western pond turtle

Element Code: ARAAD02030

Status	NDDB Element Ranks	Other Lists
Federal: None	**Global:** G3G4	**CDFG Status:** SC
State: None	**State:** S3	

Habitat Associations

General: A THOROUGHLY AQUATIC TURTLE OF PONDS, MARSHES, RIVERS, STREAMS & IRRIGATION DITCHES, USUALLY WITH AQUATIC VEGETATION, BE

Micro: NEED BASKING SITES AND SUITABLE (SANDY BANKS OR GRASSY OPEN FIELDS) UPLAND HABITAT UP TO 0.5 KM FROM WATER FOR EGG-LAYIN

Occurrence No. 1159 **Map Index:** 63708 **EO Index:** 63803

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-01-28
Site: 2006-01-28

Record Last Updated: 2006-02-21

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.62134º / -120.68465º
UTM: Zone-10 N3944419 E709687
Area: 10.7 acres
Elevation: 695 ft

Mapping PrecisionSPECIFIC
Symbol Type:POLYGON

Township: 26S
Range: 12E
Section: 33 **Qtr:** XX
Meridian: M

Location: SALINAS RIVER FLOODPLAIN, JUST EAST OF HIGHWAY 101, ON THE SE EDGE OF PASO ROBLES

Ecological: HABITAT CONSISTS POOLS CREATED BY A PERENNIAL WARM-WATER SULPHUR SPRING ABOVE AND A SERIES OF SMALL BEAVER DAMS BELOW, WITHIN A TRIBUTARY TO SALINAS RIVER ON THE WEST SIDE OF THE MAIN CHANNEL. POOLS COVERED BY A CANOPY OF SALIX LAEVIGATA.

Threat: THREATENED BY URBAN RUNOFF ADVERSELY AFFECTING WATER QUALITY. PROPERTY ADJACENT TO THE POOLS PROPOSED FOR DEVELOPMENT.

General: 5 ADULTS AND 1 JUVENILE OBSERVED ON 14 FEB 2005; MORE TURTLES ARE LIKELY TO OCCUR THAN WERE COUNTED. 26 ADULTS AND 2 JUVENILES OBSERVED ON 28 JAN 2006; TURTLES COUNTED WERE SUNNING, SO POND MAY HOLD MORE.

Owner/Manager: PVT

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Horkelia cuneata ssp. puberula

mesa horkelia

Element Code: PDROS0W045

Status
Federal: None
State: None

NDDB Element Ranks
Global: G4T2
State: S2.1

Other Lists
CNPS List: 1B.1

Habitat Associations
General: CHAPARRAL, CISMONTANE WOODLAND, COASTAL SCRUB.
Micro: SANDY OR GRAVELLY SITES. 70-810M.

Occurrence No. 57 **Map Index:** 55047 **EO Index:** 55047

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1913-07-20
Site: 1913-07-20
Record Last Updated: 2004-04-09

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.54919º / -120.70916º
UTM: Zone-10 N3936363 E707653
Radius: 1 mile
Elevation: 820 ft

Mapping Precision NON-SPECIFIC
Symbol Type: POINT

Township: 27S
Range: 12E
Section: 29 **Qtr:** XX
Meridian: M

Location: NEAR TEMPLETON.
Location Detail: EXACT LOCATION UNKNOWN. MAPPED AS BEST GUESS BY CNDDB, IN THE VICINITY OF TEMPLETON, N OF ATASCADERO.
General: UNKNOWN NUMBER OF PLANTS SEEN IN 1913. NEEDS FIELDWORK.
Owner/Manager: UNKNOWN

Occurrence No. 58 **Map Index:** 55048 **EO Index:** 55048

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1956-07-21
Site: 1956-07-21
Record Last Updated: 2004-04-09

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.51873º / -120.68630º
UTM: Zone-10 N3933033 E709805
Radius: 1 mile
Elevation: 840 ft

Mapping Precision NON-SPECIFIC
Symbol Type: POINT

Township: 28S
Range: 12E
Section: 04 **Qtr:** XX
Meridian: M

Location: NE OF ATASCADERO OFF TRAFFIC WAY.
Location Detail: EXACT LOCATION UNKNOWN. MAPPED AS BEST GUESS BY CNDDB, IN THE VICINITY OF TRAFFIC WAY, NE OF ATASCADERO.
General: 1939 COLLECTION BY FERRIS "NORTHERN EDGE OF ATASCADERO" ATTRIBUTED TO THIS SITE. UNKNOWN NUMBER OF PLANTS SEEN IN 1939 & 1956. NEEDS FIELDWORK.
Owner/Manager: UNKNOWN

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Juncus luciensis

Santa Lucia dwarf rush

Element Code: PMJUN013J0

Status	NDDB Element Ranks	Other Lists
Federal: None	**Global:** G2G3	**CNPS List:** 1B.2
State: None	**State:** S2S3	

Habitat Associations

General: VERNAL POOLS, MEADOWS, LOWER MONTANE CONIFEROUS FOREST, CHAPARRAL, GREAT BASIN SCRUB.

Micro: VERNAL POOLS, EPHEMERAL DRAINAGES, WET MEADOW HABITATS AND STREAMSIDES. 300-2040M.

Occurrence No. 8 **Map Index:** 75325 **EO Index:** 76216

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1958-04-30
Site: 1958-04-30
Record Last Updated: 2009-05-28

Quad Summary: Templeton (3512056/269C), Creston (3512055/269D)
County Summary: San Luis Obispo

Lat/Long: 35.58422º / -120.62612º
UTM: Zone-10 N3940428 E715089
Area:
Elevation:

Mapping Precision NON-SPECIFIC
Symbol Type: POLYGON

Township: 27S
Range: 12E
Section: 13 **Qtr:** N
Meridian: M

Location: 6 MI E OF PASA ROBLES ON CRESTON RD.

Location Detail: EXACT LOCATION UNKNOWN. MAPPED BY CNDDB AS BEST GUESS ALONG CRESTON RD, APPROXIMATELY 6 MI E FROM THE POST OFFICE OF PASO ROBLES.

Ecological: GRAIN FIELDS, DAMP.

General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS A 1958 HARDHAM COLLECTION. NEEDS FIELDWORK.

Owner/Manager: UNKNOWN

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Monolopia gracilens

woodland woollythreads

Element Code: PDAST6G010

Status	NDDB Element Ranks	Other Lists
Federal: None	**Global:** G2G3	**CNPS List:** 1B.2
State: None	**State:** S2S3	

Habitat Associations

General: CHAPARRAL, VALLEY AND FOOTHILL GRASSLANDS (SERPENTINE), CISMONTANE WOODLAND, BROADLEAFED UPLAND FORESTS, NORTH COAST CON

Micro: GRASSY SITES, IN OPENINGS; SANDY TO ROCKY SOILS. OFTEN SEEN ON SERPENTINE AFTER BURNS BUT MAY HAVE ONLY WEAK AFFINITY TO

Occurrence No. 2 **Map Index:** 79129 **EO Index:** 80092

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1957-04-25
Site: 1957-04-25
Record Last Updated: 2010-06-22

Quad Summary: Adelaida (3512067/270A), Paso Robles (3512066/269B)
County Summary: San Luis Obispo

Lat/Long: 35.65104º / -120.74299º
UTM: Zone-10 N3947592 E704328
Area:
Elevation:
Mapping Precision NON-SPECIFIC
Symbol Type: POLYGON
Township: 26S
Range: 11E
Section: 24 **Qtr:** XX
Meridian: M

Location: 3 MILES WEST OF PASO ROBLES (ON SOUTH ROAD TO ADELAIDA), SANTA LUCIA MOUNTAINS.

Location Detail: EXACT LOCATION UNKNOWN. MAPPED AS BEST GUESS BY CNDDB AROUND 3 ROAD MILES WEST OF PASO ROBLES ON PASO ROBLES/ADELAIDA RD.

Ecological: CHALK ROCK AND ADOBE HILLSIDE.

General: ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS A 1957 COLLECTION BY HARDHAM. NEEDS FIELDWORK.

Owner/Manager: UNKNOWN

California Department of Fish and Game
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Navarretia nigelliformis ssp. radians

shining navarretia

Element Code: PDPLM0C0J2

Status	NDDB Element Ranks	Other Lists
Federal: None	**Global:** G4T2	**CNPS List:** 1B.2
State: None	**State:** S2	

Habitat Associations

General: CISMONTANE WOODLAND, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.

Micro: APPARENTLY IN GRASSLAND, AND NOT NECESSARILY IN VERNAL POOLS. 200-1000M.

Occurrence No. 4 **Map Index:** 83651 **EO Index:** 2489

Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-06-20
Site: 2006-06-20
Record Last Updated: 2011-09-06

Quad Summary: Paso Robles (3512066/269B)
County Summary: San Luis Obispo

Lat/Long: 35.65406º / -120.65346º
UTM: Zone-10 N3948117 E712426
Radius: 80 meters
Elevation: 785 ft

Mapping Precision SPECIFIC
Symbol Type: POINT

Township: 26S
Range: 12E
Section: 23 **Qtr:** NW
Meridian: M

Location: HUERHUERO CREEK; BETWEEN GOLDEN HILL ROAD AND AIRPORT ROAD, PASO ROBLES.

Location Detail: TWO SMALL ADJACENT PATCHES 150' X 45' AND 25' X 25' ON THE WEST SIDE OF HUERHUERO CREEK IN PASO ROBLES. MAPPED BASED ON LAT/LONG COORDINATES GIVEN IN DART 2006 FIELD SURVEYS; DART NOTES POINT LOCATION WAS GIVEN DUE TO SMALL PATCH SIZES.

Ecological: IN GRAZED ANNUAL GRASSLAND HABITAT. USDA SOIL TYPE IS ARBUCKLE-POSITAS COMPLEX, 30-50 PERCENT SLOPES. ASSOCIATES INCLUDE NAVARRETIA PUBESCENS, CENTAURIUM DAVYI, CLARKIA PURPUREA, BROMUS HORDEACEUS, FILAGO GALLICA, AND HEMIZONIA

Threat: THE 160-ACRE PARCEL IS CONDUCTING A FEASIBILITY STUDY FOR DEVELOPMENT. UNKNOWN GRAZING EFFECTS.

General: 1000 PLANTS SEEN IN 2006; SURVEY NOTES "APPEARS TO BE ACRES OF SUITABLE HABITAT, BUT PLANTS VERY LOCAL IN ONE SMALL LOCATION." A VAGUE 1907 COBB COLLECTION FROM PASO ROBLES IS ALSO ATTRIBUTED TO THIS SITE.

Owner/Manager: PVT

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Polyphylla nubila

Atascadero June beetle

Element Code: IICOL68040

Status
Federal: None
State: None

NDDB Element Ranks
Global: G1
State: S1

Other Lists
CDFG Status:

Habitat Associations
General: KNOWN ONLY FROM SAND DUNES IN SAN LUIS OBISPO COUNTY.
Micro:

Occurrence No. 3 **Map Index:** 31508 **EO Index:** 58484

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1956-04-10
Site: 1956-04-10
Record Last Updated: 2004-12-09

Quad Summary: Paso Robles (3512066/269B), Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.62778º / -120.68931º
UTM: Zone-10 N3945123 E709249
Radius: 1 mile
Elevation: 800 ft
Mapping Precision NON-SPECIFIC
Symbol Type: POINT
Township: 26S
Range: 12E
Section: 33 **Qtr:** XX
Meridian: M

Location: PASO ROBLES.
General: UNKNOWN NUMBER COLLECTED 10 APRIL 1956 BY C. BLUNDELL. SPECIMENS HOUSED IN THE D. A. LA RUE COLLECTION.
Owner/Manager: UNKNOWN

Occurrence No. 4 **Map Index:** 60609 **EO Index:** 60645

Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1991-06-15
Site: 1991-06-15
Record Last Updated: 2005-03-17

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.51842º / -120.68603º
UTM: Zone-10 N3932999 E709831
Radius: 80 meters
Elevation: 830 ft
Mapping Precision SPECIFIC
Symbol Type: POINT
Township: 28S
Range: 12E
Section: 04 **Qtr:** XX
Meridian: M

Location: ATASCADERO, 2 ROAD MILES EAST OF HWY 101 AT END OF DEL RIO ROAD.
Ecological: TAKEN AT MERCURY VAPOR LIGHT.
General: 1 SPECIMEN DEPOSITED IN UC DAVIS BOHART MUSEUM OF ENTOMOLOGY.
Owner/Manager: UNKNOWN

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Rana draytonii

California red-legged frog — **Element Code:** AAABH01022

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	**Global:** G4T2T3	**CDFG Status:** SC
State: None	**State:** S2S3	

Habitat Associations

General: LOWLANDS & FOOTHILLS IN OR NEAR PERMANENT SOURCES OF DEEP WATER WITH DENSE, SHRUBBY OR EMERGENT RIPARIAN VEGETATION.

Micro: REQUIRES 11-20 WEEKS OF PERMANENT WATER FOR LARVAL DEVELOPMENT. MUST HAVE ACCESS TO ESTIVATION HABITAT.

Occurrence No. 617 **Map Index:** 50215 **EO Index:** 50215

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Decreasing

Dates Last Seen
Element: 2000-06-30
Site: 2003-06-26
Record Last Updated: 2003-07-01

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.53054º / -120.70706º
UTM: Zone-10 N3934298 E707893
Radius: 80 meters
Elevation: 775 ft
Mapping Precision SPECIFIC
Symbol Type: POINT
Township: 27S
Range: 12E
Section: 32 **Qtr:** XX
Meridian: M

Location: PASO ROBLES CREEK, TRIBUTARY TO THE SALINAS RIVER, JUST DOWNSTREAM FROM THE RAILROAD CROSSING, 1 MILE SOUTH OF TEMPLETON

Ecological: HABITAT CONSISTS OF THE FLOODPLAIN OF THE SALINAS RIVER AND PASO ROBLES CREEK; ADJACENT AGRICULTURAL LANDS RECENTLY DEVELOPED.

Threat: THREATENED BY URBAN ENCROACHMENT, WATER QUALITY/QUANTITY DEGRADATION, AND PRESENCE OF BULLFROGS.

General: 3 ADULTS OBSERVED ON 30 JUN 2000. NO CRLF OBSERVED ON 26 JUN 2003, BUT 8 ADULT BULLFROGS AND DOZENS OF BULLFROG TADPOLES WERE PRESENT.

Owner/Manager: PVT

Occurrence No. 618 **Map Index:** 50216 **EO Index:** 50216

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2003-06-26
Site: 2003-06-26
Record Last Updated: 2003-07-01

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.52937º / -120.70417º
UTM: Zone-10 N3934175 E708158
Area: 17.9 acres
Elevation: 775 ft
Mapping Precision SPECIFIC
Symbol Type: POLYGON
Township: 28S
Range: 12E
Section: 05 **Qtr:** XX
Meridian: M

Location: GRAVES CREEK, TRIBUTARY TO THE SALINAS RIVER, 100' UPSTREAM FROM THE SALINAS RIVER CONFLUENCE, 1 MILE SOUTH OF

Location Detail: GRAVES CREEK IS USED REGULARLY BY CRLF FOR BREEDING.

Ecological: HABITAT CONSISTS OF SALINAS RIVER FLOODPLAIN & GRAVES CREEK. CREEK WELL-VEGETATED WITH OVERHANGING & EMERGENT VEGETATION. CONTINUOUS SURFACE FLOW FROM HWY 101 TO NEAR SALINAS RIVER CONFLUENCE. ADJACENT AGRICULTURAL LANDS RECENTLY DEVELOPED

Threat: THREATENED BY URBAN ENCROACHMENT, ORV'S, BULLFROGS IN PASO ROBLES CREEK, AND WATER QUALITY/QUANTITY DEGRADATION.

General: 2 ADULTS OBSERVED WITHN A SMALL, DEEP POOL, AND 2 TADPLOES OBSERVED WITHIN A SHALLOW, SLOW-MOVING SECTION OF STREAM ON 30 JUN 2000. CRLF METAMORPHS OBSERVED DURING JUN 2000. 1 ADULT AND 1 TADPOLE OBSERVED ON 26 JUN 2003.

Owner/Manager: PVT

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Spea hammondii

western spadefoot

Element Code: AAABF02020

Status
Federal: None
State: None

NDDB Element Ranks
Global: G3
State: S3

Other Lists
CDFG Status: SC

Habitat Associations
General: OCCURS PRIMARILY IN GRASSLAND HABITATS, BUT CAN BE FOUND IN VALLEY-FOOTHILL HARDWOOD WOODLANDS.
Micro: VERNAL POOLS ARE ESSENTIAL FOR BREEDING AND EGG-LAYING.

Occurrence No. 223 **Map Index:** 47806 **EO Index:** 47806

Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2002-03-10
Site: 2002-03-10
Record Last Updated: 2002-04-30

Quad Summary: Creston (3512055/269D)
County Summary: San Luis Obispo

Lat/Long: 35.61157º / -120.60986º
UTM: Zone-10 N3943497 E716489
Radius: 80 meters
Elevation: 800 ft
Mapping Precision SPECIFIC
Symbol Type: POINT
Township: 27S
Range: 13E
Section: 06 **Qtr:** SW
Meridian: M

Location: VICINITY OF HUERHUERO CREEK, 4.5 MILES EAST OF PASO ROBLES

Ecological: HABITAT CONSISTS OF THE SANDY TERRACE BETWEEN TWO BRANCHES OF HUERHEURO CREEK; DOMINATED BY ANNUAL GRASSES AND FILAREE, WITH SANDY SOIL AND RELATIVELY LEVEL SLOPE.

Threat: THREATENED BY ORV TRAFFIC.

General: 2 ADULTS WERE FOUND WHERE THE ROAD CROSSING WASHED OUT ON 10 MAR 2002; NO CHORUSING WAS HEARD.

Owner/Manager: UNKNOWN

Occurrence No. 333 **Map Index:** 63634 **EO Index:** 63729

Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2005-04-08
Site: 2005-04-08
Record Last Updated: 2006-01-10

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.60341º / -120.64052º
UTM: Zone-10 N3942526 E713733
Area: 10.8 acres
Elevation: 850 ft
Mapping Precision SPECIFIC
Symbol Type: POLYGON
Township: 27S
Range: 12E
Section: 01 **Qtr:** XX
Meridian: M

Location: 0.15 MILE NNE OFTHE INTERSECTION OF WINDING BROOK ROAD AND MEADOWLARK ROAD, ON THE SE EDGE OF PASO ROBLES

Location Detail: OLSEN RANCH SPECIFIC PLAN AREA, PASO ROBLES.

Ecological: HABITAT CONSISTS OF A MAN-MADE STOCKPOND (EPHEMERAL, ~75' X 35' X 2' DEEP); SURROUNDED BY ANNUAL GRASSLAND THAT IS HEAVILY GRAZED BY SHEEP. A RESIDENTIAL NEIGHBORHOOD IS ADJACENT TO THE OUTFLOW FROM THE POND, ON THE WEST SIDE.

Threat: THREATENED BY PROPOSED DEVLEOPMENT OF UPLAND AND PROPOSED ANNEXATION OF THE RANCH INTO THE CITY OF PASO ROBLES.

General: 6 LARGE (UP TO 2" IN LENGTH) SPADEFOOT TADPOLES WERE CAUGHT AND RELEASED ON 8 APR 2005.

Owner/Manager: PVT

Occurrence No. 366 **Map Index:** 68146 **EO Index:** 68292

Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2006-05-18
Site: 2006-05-18
Record Last Updated: 2007-02-16

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.55952º / -120.69547º
UTM: Zone-10 N3937538 E708868
Area: 10.0 acres
Elevation: 765 ft
Mapping Precision SPECIFIC
Symbol Type: POLYGON
Township: 27S
Range: 12E
Section: 20 **Qtr:** XX
Meridian: M

Location: NORTH AND SOUTH OF CREEKSIDE RANCH ROAD, AT THE RAILROAD RIGHT-OF-WAY, JUST WEST OF GRANITE ROAD, TEMPLETON.

Location Detail: HABITAT CONSISTS OF FOUR EPHEMERAL POOLS LOCATED ALONG THE RAILROAD RIGHT-OF-WAY.

Ecological: POOLS WERE LESS THAN 4" DEEP, VERY TURBID, WITH NO VEGETATION. FALLOW GRASSLAND FOUND TO THE EAST OF THE POOLS AND RESIDENTIAL TO THE WEST. DRY SEASON HABITAT FOR SPADEFOOTS IS LIKELY FALLOW FARM FIELDS WITH GROUND SQUIRREL/GOPHER BURROWS.

Threat: THREATENED BY FERAL CATS, HERBICIDE APPLICATIONS BY RAILROAD, RESIDENTIAL DEVELOPMENT, AND ROAD WIDENING.

General: POOLS FIRST OBSERVED ON 24 APR 2006; BY 18 MAY 2006, TWO POOLS STILL REMAINED, WITH A FEW LARGE SPADEFOOT TADPOLES.

Owner/Manager: UNKNOWN

California Department of Fish and Game
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Taxidea taxus

American badger

Element Code: AMAJF04010

Status

Federal: None
State: None

NDDB Element Ranks

Global: G5
State: S4

Other Lists

CDFG Status: SC

Habitat Associations

General: MOST ABUNDANT IN DRIER OPEN STAGES OF MOST SHRUB, FOREST, AND HERBACEOUS HABITATS, WITH FRIABLE SOILS.

Micro: NEEDS SUFFICIENT FOOD, FRIABLE SOILS & OPEN, UNCULTIVATED GROUND. PREYS ON BURROWING RODENTS. DIGS BURROWS.

Occurrence No. 23 **Map Index:** 56521 **EO Index:** 56537

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen

Element: 2003-04-20
Site: 2003-04-20

Record Last Updated: 2004-08-30

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.57064º / -120.69898º
UTM: Zone-10 N3938765 E708521
Radius: 80 meters
Elevation: 780 ft

Mapping PrecisionSPECIFIC
Symbol Type:POINT

Township: 27S
Range: 12E
Section: 20 **Qtr:** XX
Meridian: M

Location: ALONG HIGHWAY 101, 1.5 MILES NORTH OF TEMPLETON

Ecological: HABITAT SURROUNDING HIGHWAY 101 CONSISTS OF ANNUAL GRASSLAND WITH LIVE OAK FOREST ON UPPER SLOPES.

Threat: THREATENED BY ENCROACHING DEVELOPMENT FROM URBANIZATION OF SURROUNDING SMALL TOWNS.

General: ONE ADULT FEMALE FOUND FRESHLY DEAD IN THE MEDIAN STRIP ON 20 APR 2003; CARCASS WAS COLLECTED AND GIVEN TO THE UC DAVIS NATURAL HISTORY MUSEUM.

Owner/Manager: CALTRANS

California Department of Fish and Game
Natural Diversity Database
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Trimerotropis occulens

Lompoc grasshopper

Element Code: IIORT36310

Status	NDDB Element Ranks	Other Lists
Federal: None	**Global:** GH	**CDFG Status:**
State: None	**State:** SH	

Habitat Associations

General: KNOWN ONLY FROM SANTA BARBARA AND SAN LUIS OBISPO COUNTIES.

Micro:

Occurrence No. 2 **Map Index:** 31508 **EO Index:** 60331

Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown

Dates Last Seen
Element: 1909-08-21
Site: 1909-08-21
Record Last Updated: 2008-01-14

Quad Summary: Paso Robles (3512066/269B), Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.62778º / -120.68931º
UTM: Zone-10 N3945123 E709249
Radius: 1 mile
Elevation: 800 ft

Mapping Precision NON-SPECIFIC
Symbol Type: POINT

Township: 26S
Range: 12E
Section: 33 **Qtr:** XX
Meridian: M

Location: PASO ROBLES.
Location Detail: HISTORICAL RECORD; EXACT LOCALITY NOT KNOWN, PASO ROBLES MAY JUST REFER TO NEAREST TOWN.
General: ONE FEMALE PARATYPE, DEPOSITED IN ANSP.
Owner/Manager: UNKNOWN

California Department of Fish and Game
Natural Diversity Database
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Vireo bellii pusillus

least Bell's vireo

Element Code: ABPBW01114

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	**Global:** G5T2	**CDFG Status:**
State: Endangered	**State:** S2	

Habitat Associations

General: SUMMER RESIDENT OF SOUTHERN CALIFORNIA IN LOW RIPARIAN IN VICINITY OF WATER OR IN DRY RIVER BOTTOMS; BELOW 2000 FT.

Micro: NESTS PLACED ALONG MARGINS OF BUSHES OR ON TWIGS PROJECTING INTO PATHWAYS, USUALLY WILLOW, BACCHARIS, MESQUITE.

Occurrence No. 323 **Map Index:** 82526 **EO Index:** 83542

Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 2005-07-02
Site: 2005-07-30
Record Last Updated: 2011-05-23

Quad Summary: Paso Robles (3512066/269B)
County Summary: San Luis Obispo

Lat/Long: 35.66862º / -120.69264º
UTM: Zone-10 N3949648 E708841
Radius: 80 meters
Elevation: 660 ft

Mapping Precision SPECIFIC
Symbol Type: POINT

Township: 26S
Range: 12E
Section: 16 **Qtr:** NW
Meridian: M

Location: ALONG SALINAS RIVER, 0.6 MI SSW HUERHUERO CREEK, 2.9 MI N OF PASO ROBLES PO.

Location Detail: MAPPED TO PROVIDED COORDINATES.

Ecological: HABITAT DESCRIBED AS WILLOW RIPARIAN SUPPORTING COTTONWOODS, MULE FAT AND POISON HEMLOCK. FLOWING WATER WAS ABOUT 10-20 FT WIDE. SMALL BEAVER DAMS CREATED SMALL POOLS LESS THAN 2 FT DEEP. SURROUNDING LAND USED FOR CATTLE RANCHING.

General: ONE UNBANDED MALE OBSERVED 22 MAY, 1 JUN, 11 JUN, 22 JUN; ONE BREEDING PAIR OBSERVED 2 JUL 2005; NOT OBSERVED AGAIN 12 TO 30 JUL 2005.

Owner/Manager: UNKNOWN

California Department of Fish and Game
Natural Diversity Database
Full Condensed Report for Selected Elements - Multiple Records per Page

Vulpes macrotis mutica

San Joaquin kit fox

Element Code: AMAJA03041

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	**Global:** G4T2T3	**CDFG Status:**
State: Threatened	**State:** S2S3	

Habitat Associations

General: ANNUAL GRASSLANDS OR GRASSY OPEN STAGES WITH SCATTERED SHRUBBY VEGETATION.

Micro: NEED LOOSE-TEXTURED SANDY SOILS FOR BURROWING, AND SUITABLE PREY BASE.

Occurrence No. 941 **Map Index:** 67850 **EO Index:** 68001

Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1991-06-05
Site: 1991-06-05
Record Last Updated: 2007-02-23

Quad Summary: Paso Robles (3512066/269B)
County Summary: San Luis Obispo

Lat/Long: 35.63148º / -120.64450º
UTM: Zone-10 N3945630 E713298
Area:
Elevation: 900 ft
Mapping Precision NON-SPECIFIC
Symbol Type: POLYGON
Township: 26S
Range: 12E
Section: 26 **Qtr:** SE
Meridian: M

Location: E OF PASO ROBLES, ABOUT 0.9MI SE OF INTERSECTION OF UNION RD AND GOLDEN HILL RD.

Location Detail: SOURCES GIVE DIRECTIONS AS BOTH "WESTERN 1/2 OF CHANDLER RANCH WITHIN CITY LIMITS OF PASO ROBLES" AND "NORTHERN PORTION OF CHANDLER RANCH".

Ecological: PRIMARILY GRAZED VALLEY GRASSLAND AND DRY LAND FARMING SURROUNDING OAK WOODLAND.

Threat: INCREASED ROAD KILLS WITH MORE TRAFFIC AS SURROUNDING AREAS DEVELOP, RED FOX COMPETITION.

General: FORAGING & DENNING SITE. 1 ADULT OBSERVED ON 8 JUN 1990. AREA SHOWS EXTENSIVE USE BY FOX, POTENTIAL DEN DENSITY OF OVER 0.5 PER ACRE. 1 ADULT WITH PREY IN ITS MOUTH OBSERVED 5 JUN 1991.

Owner/Manager: PVT

Occurrence No. 945 **Map Index:** 67858 **EO Index:** 68008

Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown

Dates Last Seen
Element: 1990-06-28
Site: 1990-06-28
Record Last Updated: 2007-01-19

Quad Summary: Templeton (3512056/269C)
County Summary: San Luis Obispo

Lat/Long: 35.62145º / -120.64481º
UTM: Zone-10 N3944517 E713296
Radius: 80 meters
Elevation: 900 ft
Mapping Precision SPECIFIC
Symbol Type: POINT
Township: 26S
Range: 12E
Section: 35 **Qtr:** NE
Meridian: M

Location: CHANDLER RANCH WITHIN UNDEVELOPED CITY LIMITS OF PASO ROBLES.

Ecological: VALLEY GRASSLAND SURROUNDING OAK WOODLAND (QUERCUS DOUGLASII).

Threat: RED FOX COMPETITION AND ROAD KILLS.

General: FORAGING & DENNING SITE. 1 ADULT OBSERVED ON 28 JUN 1990.

Owner/Manager: PVT

Appendix F: Summary of Irrigation Demand Calculations

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CITY OF PASO ROBLES RECYCLED WATER MASTER PLAN

DRAFT USER ASSESSMENT TECHNICAL MEMORANDUM

March 15, 2012

LANDSCAPE IRRIGATION ESTIMATES

DEPARTMENT OF WATER RESOURCES GUIDE TO ESTIMATING IRRIGATION WATER NEEDS OF LANDSCAPE PLANINGS IN CALIFORNIA, LANDSCAPE COEFFICIENT METHOD AND WUCOLS III

Lookup Table		Enter
Landscape Type	**Kc**	**Kc Cat**
Orchard	0.8	H
Other Crop	0.75	J
Very Low Demand LS	0.4	V
Turf Grass High	0.8	H
Turf Grass Low	0.6	L
Turf Grass Med	0.7	M
Vineyard		V

Lookup Table		
	Kc Category	**Kc**
High demand	H	0.75
Medium-high demand	J	0.65
Medium demand	M	0.6
Low demand	L	0.55
Very Low Demand	V	0.5

Lookup Table		
Irrig Method		**Irrig Eff**
Drip Irrigation	D	0.95
Spray Irrigation	S	0.75

Kc values based on crop coefficient values for various crops and turfgrasses per "Guide to Estimating Irrigation Water Needs of Landscape Planings in California, Landscape Coefficient Method and WUCOLS III"

Eto Data:	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
City of Paso Robles Eto, City Data >>>	*1.6*	*2*	*3.2*	*4.3*	*5.5*	*6.3*	*7.3*	*6.7*	*5.1*	*3.7*	*2.1*	*1.4*
DWR Figure >>>	*1.55*	*2.52*	*4.03*	*5.7*	*7.75*	*8.7*	*9.3*	*8.1*	*6.3*	*4.34*	*2.4*	*1.55*

Monthly Estimated Demand per Acre For Kc Categories and Irrigation Types

Calculate effective precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Eto, inches:	1.6	2	3.2	4.3	5.5	6.3	7.3	6.7	5.1	3.7	2.1	1.4
Precipitation, inches:	3.14	2.93	2.19	1.24	0.34	0.09	0.01	0.03	0.13	0.52	1.18	2.99
Effect. Precip Factor:	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Effective Precip., inches:	1.57	1.46	1.09	0.62	0.17	0.04	0.01	0.01	0.07	0.26	0.59	1.49

Calculate Total Water Applied (TWA)

Kc Category	Irrigation Type	Crop type and Irrig. Category	Kc	Irrig. Eff	Total Water Applied, inches											
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
H	D	HD	0.75	0.95	1.26	1.58	2.53	3.39	4.34	4.97	5.76	5.29	4.03	2.92	1.66	1.11
H	S	HS	0.75	0.75	1.60	2.00	3.20	4.30	5.50	6.30	7.30	6.70	5.10	3.70	2.10	1.40
L	D	LD	0.55	0.95	0.93	1.16	1.85	2.49	3.18	3.65	4.23	3.88	2.95	2.14	1.22	0.81
L	S	LS	0.55	0.75	1.17	1.47	2.35	3.15	4.03	4.62	5.35	4.91	3.74	2.71	1.54	1.03
M	D	MD	0.6	0.95	1.01	1.26	2.02	2.72	3.47	3.98	4.61	4.23	3.22	2.34	1.33	0.88
M	S	MS	0.6	0.75	1.28	1.60	2.56	3.44	4.40	5.04	5.84	5.36	4.08	2.96	1.68	1.12
J	D	JD	0.65	0.95	1.09	1.37	2.19	2.94	3.76	4.31	4.99	4.58	3.49	2.53	1.44	0.96
J	S	JS	0.65	0.75	1.39	1.73	2.77	3.73	4.77	5.46	6.33	5.81	4.42	3.21	1.82	1.21
V	D	VD	0.5	0.95	0.84	1.05	1.68	2.26	2.89	3.32	3.84	3.53	2.68	1.95	1.11	0.74
V	S	VS	0.5	0.75	1.07	1.33	2.13	2.87	3.67	4.20	4.87	4.47	3.40	2.47	1.40	0.93

Calculate Effective Water Applied

Kc Category	Irrigation Type	Crop type and Irrig. Category	Effective Water Applied, inches												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**
H	*D*	*HD*	0.00	0.11	1.43	2.77	4.17	4.93	5.76	5.27	3.96	2.66	1.07	0.00	32.14
H	*S*	*HS*	0.03	0.54	2.11	3.68	5.33	6.26	7.29	6.69	5.03	3.44	1.51	0.00	41.90
L	*D*	*LD*	0.00	0.00	0.76	1.87	3.01	3.60	4.22	3.86	2.89	1.88	0.62	0.00	22.72
L	*S*	*LS*	0.00	0.00	1.25	2.53	3.86	4.58	5.35	4.90	3.67	2.45	0.95	0.00	29.54
M	*D*	*MD*	0.00	0.00	0.93	2.09	3.30	3.93	4.60	4.22	3.15	2.08	0.73	0.00	25.05
M	*S*	*MS*	0.00	0.14	1.47	2.82	4.23	5.00	5.83	5.35	4.01	2.70	1.09	0.00	32.62
J	*D*	*JD*	0.00	0.00	1.09	2.32	3.59	4.27	4.99	4.57	3.42	2.27	0.84	0.00	27.37
J	*S*	*JS*	0.00	0.27	1.68	3.11	4.60	5.42	6.32	5.79	4.35	2.95	1.23	0.00	35.70
V	*D*	*VD*	0.00	0.00	0.59	1.64	2.72	3.27	3.83	3.51	2.62	1.69	0.51	0.00	20.39
V	*S*	*VS*	0.00	0.00	1.04	2.25	3.50	4.16	4.86	4.45	3.33	2.21	0.81	0.00	26.60

Effective precipitation was estimated as half of the total precipitation, consistent with DWR "Guide to Estimating Irrigation Water Needs of Landscape Planings in California, Landscape Coefficient Method and WUCOLS III"

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March 15, 2012

LANDSCAPE IRRIGATION ESTIMATES

DEPARTMENT OF WATER RESOURCES GUIDE TO ESTIMATING IRRIGATION WATER NEEDS OF LANDSCAPE PLANINGS IN CALIFORNIA, LANDSCAPE COEFFICIENT METHOD AND WUCOLS III

Calculation of Annual Demand For Landscape Irrigation Categories and Types									Adjusted Estimated Monthly Demand (inches/ month)											
Category	Type Description LOOKUP	Assume Landscape Type	Kc Cat lookup	Assume Irrig type	Crop and Irrigation Category (concatenate)	Lookup annual irrig. Demand (inches)	Calculated Annual Demand (afy/ acre)	Use Annual Demand (afy/ acre) LOOKUP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Landscape Irrigation	Golf	Turf Grass High	H	S	HS	41.90	3.49	3.50	0.03	0.54	2.11	3.69	5.34	6.27	7.31	6.70	5.05	3.45	1.51	0.00
Landscape Irrigation	Park/ openspace	Turf Grass Med	M	S	MS	32.62	2.72	2.75	0.00	0.27	1.70	3.14	4.65	5.48	6.39	5.86	4.40	2.98	1.24	0.00
Landscape Irrigation	School yard	Turf Grass Med	M	S	MS	32.62	2.72	2.75	0.00	0.27	1.70	3.14	4.65	5.48	6.39	5.86	4.40	2.98	1.24	0.00
Landscape Irrigation	Business park	Turf Grass Med	M	S	MS	32.62	2.72	2.75	0.00	0.27	1.70	3.14	4.65	5.48	6.39	5.86	4.40	2.98	1.24	0.00
Landscape Irrigation	Cemetery	Turf Grass Med	M	S	MS	32.62	2.72	2.75	0.00	0.27	1.70	3.14	4.65	5.48	6.39	5.86	4.40	2.98	1.24	0.00
Landscape Irrigation	Roadway/ Trans.	Very Low Demand LS	V	D	VD	20.39	1.70	1.50	0.00	0.00	0.52	1.45	2.40	2.89	3.38	3.10	2.31	1.49	0.45	0.00
Landscape Irrigation	Res. Dev. Irrig.	Turf Grass Med	M	S	MS	32.62	2.72	2.75	0.00	0.27	1.70	3.14	4.65	5.48	6.39	5.86	4.40	2.98	1.24	0.00
Agricultural	Food crops	Other crop	J	S	JS	35.70	2.98	3.00	0.03	0.54	2.12	3.71	5.37	6.31	7.35	6.74	5.08	3.47	1.52	0.00
Agricultural	Orchard	Orchard	H	S	HS	41.90	3.49	3.25	0.03	0.50	1.96	3.42	4.96	5.82	6.79	6.22	4.69	3.20	1.40	0.00
Agricultural	Vineyard	Vineyard	V	D	VD	20.39	1.70	1.50	0.00	0.00	0.52	1.45	2.40	2.89	3.38	3.10	2.31	1.49	0.45	0.00
Agricultural	Nursery	Orchard	H	D	HD	32.14	2.68	2.50	0.00	0.11	1.34	2.59	3.89	4.60	5.37	4.92	3.70	2.48	1.00	0.00
Agricultural	Pasture/ Rangeland	Other crop	J	S	JS	35.70	2.98	3.00	0.03	0.54	2.12	3.71	5.37	6.31	7.35	6.74	5.08	3.47	1.52	0.00

Calculations for landscape and agricultural irrigation follow DWR guidelines and use local ETo and Precipitation data.

Appendix G: Site F & G Groundwater Replenishment Reuse Project Technical Evaluation

Evaluation of the Conceptual Groundwater Replenishment Reuse Project – Sites F & G

In the 2006 Recycled Water Study Update, several potential groundwater recharge sites were investigated for benefit of City wells. An initial screening was performed to identify potential recharge sites and included consideration of sites along the Salinas River and tributary drainages. Candidate sites were located along the Salinas River, both north and south of the City, and along the Huer Huero Creek near the crossing of Highway 46 and north. Based on an analysis of the percolation sites provided by Fugro, only Sites F and G, located to the south of the City along the Salinas River corridor, were identified as potential candidate sites since other sites had relatively limited percolation capacity.

Per the Draft Groundwater Recharge Regulations (Groundwater Replenishment Reuse Draft Regulation, March, 2013) and further review with CDPH, groundwater recharge via surface spreading would require the WWTP to produce disinfected tertiary recycled water (oxidized, filtered and disinfected wastewater in accordance with specific Title 22 quality requirements) whereas groundwater recharge via subsurface injection would require full advanced treatment (oxidized wastewater followed by reverse osmosis in accordance with specific Title 22 quality requirements). Given the capital and ongoing operation and maintenance costs associated with reverse osmosis and brine disposal, it was determined that recharge via surface spreading was the more feasible alternative for the conceptual project.

As a continuation of previous work, the evaluation of the conceptual GRRP conducted as part of this Master Plan focuses on groundwater replenishment via surface spreading and percolation at Sites F and G. The City currently owns a large portion of Site G, which is located near the northern terminus of Ramada Drive. The availability of Site F, located on the Santa Ysabel property, east of the Salinas River near Santa Ysabel Avenue was investigated. This property was recently available for purchase and based on discussions with the current property owner, there are no immediate development plans for the property. Although the City does not currently own the Site F property, this location is considered available and may continue to be available in the future. No new potential groundwater replenishment sites were investigated as part of this current study.

Further evaluation of the feasibility, benefits, and constraints associated with the conceptual GRRP is provided in the following sections. Regulatory requirements that would affect project design, implementation, and application of recycled water for groundwater replenishment are identified and summarized in Section 1, below. To allow further evaluation of the feasibility and potential capacity of the GRRP in terms of the quantity of recycled water beneficially reused, a hydrogeological investigation has been conducted. Results of this investigation, and estimated recharge capacities are provided in Section 4. A preliminary environmental constraints analysis has also been conducted for the GRRP to identify and evaluate potential issues that could affect project development and implementation. A summary of potential benefit, challenges, and constraints associated with the conceptual GRRP is provided in Section 5.

1.0 Regulatory Requirements for Groundwater Replenishment

The production, distribution, and use of recycled water in California is regulated by the State Water Resources Control Board, and the California Department of Public Health. General requirements pertaining to all recycled water projects are summarized in Section 3.6 of the Recycled Water Master Plan. Use of recycled water for the purpose of groundwater recharge or replenishment (referred to as indirect potable reuse or a groundwater replenishment reuse project by CDPH) is an approved use of recycled water provided CDPH regulations and requirements specifically pertaining to GRRPs are met. The current Title 22 Draft Groundwater Recharge Reuse Regulations (2011) developed by CDPH define treatment, application, and monitoring requirements for groundwater recharge reuse projects (GRRP).

Treatment Requirements

Treatment standards and water quality criteria include pathogen reduction, nitrogen removal and maximum concentrations of total organic carbon and other organic and inorganic constituents. These criteria are derived from the need to protect existing and future potential groundwater sources. Specific requirements apply to each of the following three methods of recharge and treatment levels:

- Surface spreading without full advanced treatment (reverse osmosis and advanced oxidation process meeting prescribed criteria)
- Surface spreading with full advanced treatment
- Subsurface application (with full advanced treatment only)

Dilution of Recycled Water for Replenishment

In addition to compliance with treatment requirements and water quality criteria, an important requirement for GRRPs is the need to dilute recycled water prior to recharge. The diluting water (diluent) must either be a CDPH-approved drinking water source or groundwater, storm water, surface water, or another water source meeting the requirements of Section 60320.114. The use of wastewater sources for dilution water is prohibited, regardless of treatment level.

Section 60320.114 requires that the diluent water:

- Be monitored quarterly for nitrate and nitrite and not exceed MCLs;
- undergo a source water evaluation per California-Nevada Section of AWWA watershed sanitary survey handbook or other CDPH-approved evaluation;
- not exceed primary MCLs or notification levels and must use a CDPH-approved water quality monitoring plan; and
- be metered to allow calculation of monthly average recycled water contribution or (RWC).

The amount of diluent water required for a recharge project is determined using a Recycled Water Contribution (RWC) value prescribed by CDPH. The RWC is the fraction of recycled water relative to the total recharge amount (recycled water plus diluents). CDPH limits the initial RWC for surface application projects to between 0.20 and 0.50 (at CDPH discretion based on project review) for surface application projects using recycled water that is treated by reverse osmosis and advanced oxidation. For newly

implemented surface application projects using water that is not treated by reverse osmosis and advanced oxidation, RWC is limited to 0.20 during the initial project phase. For subsurface application (injection) projects, RWC is limited to 0.5. The recycled water contributions may be increased during the project design life in a phased manner if reviewed and permitted by CDPH and the RWQCB.

Subsurface Retention Time

CDPH regulations require that recharged water remain subsurface for a minimum of 6 months (depending on specific conditions) as an additional means of pathogen reduction. Subsurface residence time can be demonstrated through several methods including modeling and tracer testing. High groundwater levels could significantly affect particle residence time.

GRRP Engineering Report and Monitoring

In addition to the engineering report content typically required for all recycled water use projects, engineering reports for Groundwater Recharge Reuse Projects must also include the following:

- Comprehensive evaluation of the project and impacts on existing and potential uses of the proposed site and hydrogeological assessment of groundwater aquifer(s) receiving recharge
- Analysis demonstrating retention time for recycled water to achieve pathogen reduction criteria and response time requirements
- Antidegradation analyses for GRRPs where the project's discharge will use more than 10 percent of the Basin's available assimilative capacity for a single project or 20 percent for multiple projects. (until a salt and nutrient management plan is adopted for a region)
- Plan for alternative source of potable water or remedial treatment in case the GRRP causes an unsafe drinking water source condition
- Demonstration of managerial and technical capacity to meet requirements

GRRPs must include quarterly monitoring of recycled water and down-gradient monitoring wells for pollutants and constituents specified by CDPH based on review of the receiving groundwater basin(s) and the Engineering Report for the GRRP. The recycled water supply must also be monitored for additional chemicals specified by CDPH including pharmaceuticals, personal care products, endocrine disruptors, and other indicator chemicals.

Since GRRPs have potential to affect basin water quality, the SWRCB and RWQCB review and permit GRRPs on a case-by-case basis to confirm that regional water quality and basin objectives can be sustained for the receiving basin(s). The RWQCB may establish unique requirements to ensure water quality is protected and water supplies are sustained.

2.0 Groundwater Replenishment Reuse Project Constraints

A constraints analysis was conducted by Sage Institute for Sites F and G to examine environmental constraints at each site and identify conditions that may limit the use of either percolation site as a groundwater replenishment project. The following environmental issues were evaluated for potential constraints:

- Biological Resources
- Cultural Resources
- Geological hazards
- Noise
- Aesthetics
- Traffic and Circulation Safety
- Agricultural Resources
- Land Use Regulations
- Land Ownership

Based on the analysis of environmental constraints, neither site has fatal flaws that would preclude further planning of a groundwater replenishment project at either site. Site G was generally less constrained than Site F, especially if riparian areas can be avoided. Riparian areas on either site would provide similar regulatory permitting issues if determined to be impacted by the percolation project. Additionally, Site G is within the City limits, is owned by the City, and would not face regulatory constraints with regard to reduced agricultural use. Although Site F was recently available for purchase from the current land owner, the City's ability to acquire the property in the future is uncertain. Due to the proximity of both sites to the Salinas River, there is potential for issues with cultural and archeological resources at both sites, therefore, further archeological evaluation is recommended if the conceptual projects were pursued.

A summary of findings and site constraints is provided in the Table below.

Table 1. Summary of Constraints Analysis Findings

Issue	Action Beyond Compliance with State or Local Law	Where Action Applies		Site that is less constrained overall
		Site F	Site G	
Biological Resources				Sites F or G, outside riparian areas
	B.1. Riparian Habitat/Wetland Permitting	Riparian or riverine areas (lower terrace)	Riparian or riverine areas (lower terrace)	
	B.2. Special Status Species Protocol Surveys	Riparian or riverine areas (lower terrace)	Riparian or riverine areas (lower terrace)	
	B.3. Rare Plant Surveys	All locations (seasonally timed)	All locations (seasonally timed)	
	B.4. Kit Fox/Badger Evaluation	Grassland habitat areas	Grassland habitat areas	
	B.5. Bird Nesting Pre-Construction Surveys	All locations (Feb 1 to Aug 31)	All locations (Feb 1 to Aug 31)	
Cultural Resources				Site G, portions of upper terrace
	C.1. Phase I Archaeological Investigation	Previously unsurveyed areas (most of site)	Previously unsurveyed areas (lower terrace)	
	C.2. Phase II Archaeological Investigation	May be required depending on outcome of Phase I.	"Highly Sensitive" as shown on Figure 4. May also be required on lower terrace, depending on outcome of Phase I.	
	C.3. Resource Construction Monitoring	All locations	All locations	
Geohazards				Neither site
	See geotechnical findings			
Noise				Site G
	N.1. Restrict Areas of Disturbance	Within 350 feet of nearest residential property on Santa Ysabel	Not applicable	

Issue	Action Beyond Compliance with State or Local Law	Where Action Applies		Site that is less constrained overall
		Site F	Site G	
		Avenue		
Aesthetics				Site F
	A.1. Aesthetic Design Measures	All locations	All locations, but particularly northern portion of site	
Traffic and Circulation				Site G
	No special action required			
Agricultural Resources				Site G, especially lower terrace
	AG-1. Minimize Impacts to Prime Soils	Upper terrace	Upper terrace	
Land Use Regulation				Site G, because it is with City limit
	No special action required			
Land Ownership				Site G, because it is owned by the City
	L.1. Parcel Acquisition or Easement	Entire site	Not applicable	
OVERALL				Site G, portions of upper terrace

3.0 Hydrogeologic Investigation

Field exploration conducted at Sites F and G by Cleath Harris Geologists consisted of multiple continuous core borings at each site, sediment size analyses and percolation tests at each site, and a single pumping test from an existing well at Site G. Results of these analyses were used with historical groundwater well data and stream gage data were compiled for use in a mounding analysis model.

Groundwater flow modeling evaluated the long-term sustainability of discharges to potential recharge facilities at Sites F and G and included three transient scenarios: operation of Sites F and G individually and concurrent operation of both Sites, with discharges occurring for 6 months of every year during the wet seasons. A description of modeling results is provided as Appendix D of the Recycled Water Master Plan. Maximum sustainable loading conditions for dry-season groundwater levels were estimated for the three scenarios and are summarized in the following table.

Table 2. Summary of Hydraulic Loading Rates for Percolation Sites F and G

Scenario	Hydraulic Loading Rate*	
	conservative, ft/ day	maximum, ft/day
Site F (Santa Ysabel)	0.300	1.875
Site G (Salinas River Parkway)	0.225	1.45
Concurrent (Site F and G)	0.138	0.83

Note: Estimated hydraulic loading rates are calculated as continuous loading over entire pond area for six consecutive months with low base water levels (no flow in river). Loading rates do not account for pond rotation or inhibited surface percolation rates.

The analysis confirmed the technical feasibility of percolating recycled water at either Site F or Site G and indicated that high groundwater levels (e.g. during the wet season of each year) would significantly affect subsurface residence time of discharged water. Discharge capacity could be limited significantly during some years when high water levels are experienced. Therefore, continued discharge of treated effluent at the existing permitted location or identifying another means disposing of treated effluent and/ or excess recycled water would be necessary if the GRRP were to be implemented, and, during the typical year, discharge should be planned to occur during the dry season only.

4.0 Groundwater Replenishment

The percolation capacities of conceptual groundwater replenishment facilities located at Sites F and G have been estimated based on the technical evaluation of hydrogeological conditions and modeling performed by Cleath Harris Geologists as part of this study. A range of probable hydraulic conductivity was provided for each site. Monthly and annual capacities of each percolation site were projected using estimated hydraulic conductivity coefficients provided for each site in the hydrogeologic study, historical precipitation and evaporation data, and the following assumptions:

- Total facility footprint at either site would be approximately 9 acres
- Pond footprint would represent approximately 75% of the total available foot print at each site while 25% would be used for dikes and ancillary facilities
- Recharge amount would be based on the low-ends of the estimated ranges of potential hydraulic conductivities for each site to achieve necessary underground residence time and reduce potential for overloading percolation facilities[2]
- Recharge activities would occur during six consecutive months and would be limited to percolation during the dry season only (May through October)
- Down-time during wet months would be sufficient for restoration of percolation beds

The estimated total recharge capacities of Sites F and G during the dry-season months were estimated to be 66.2 and 50.9 AF/ month, respectively.

[2] *Residence time analyses would be necessary to confirm subsurface retention times required by CDPH would be achieved at high loading rates.*

Blending Requirements

As described in Section 1, CDPH requires that recycled water discharged for groundwater replenishment be blended with a higher-quality water source, defined by CDPH as diluent water[3], prior to percolation. The recycled water content (RWC) is the proportion of recycled water to total recharge water to percolated. Depending on CDPH requirements for RWC of the recharge water, the volume of recycled water percolated would likely be 20% of the total recharge amount initially and may increase to 50% or 70% at a later project phase.

Estimates of total recharge capacity and recycled water use rate are summarized in the following table for three recycled water contribution factors.

Table 3. Estimated recharge rates for Percolation Sites F and G

Recharge Site	Total Estimated Recharge Capacity (AF/ mo.)	Recycled water demand with blending (AF/ mo.)		
		RWC = 20%	RWC = 50%	RWC = 70%
Site F	66.2	13.2	33.1	46.3
Site G	50.9	10.2	25.5	35.6

Note: Estimated recharge capacities are based on estimated hydraulic loading and assumptions for recharge facilities described in Section 4. Recharge would be limited to 6 months of the year.

Results of the preliminary analysis of hydrogeologic conditions and percolation rates conducted as part of this study indicate a percolation facility located at either Sites F or Site G could likely percolate only approximately 51 to 66 AF/ month during six consecutive months of the year.[4] However, if groundwater replenishment is pursued, recycled water contributions would be significantly less than total percolation capacity due to CDPH dilution requirements.

Based on the hydrogeologic investigation and with consideration of CDPH requirements for groundwater replenishment reuse projects, recycled water contributions of 20% and 50% have been considered in this study to represent use during the initial and latter stages of a conceptual GRRP. This equates to an initial recycled water demand of 10.2 AF/ month which corresponds to the Site G total recharge capacity and a RWC of 20%. Total annual use of recycled water would be approximately 61.2 AF/ year (10.2 AF for six consecutive dry-season months each year).

[3] *"Diluent water" is defined by CDPH as water that has undergone a source water evaluation, is monitored and regularly tested for nitrogen compounds and primary drinking water MCL compounds, and meets other department requirements, that is used to reduce the recycled municipal wastewater contribution over time.*

[4] *Higher percolation rates may be possible; however, subsurface retention time consistent with CDPH requirements for GRRPs could not be confirmed without additional modeling.*

5.0 Technical Constraints and Recommendations

In addition to percolation facilities that would be constructed to allow recharge of recycled water, the GRRP will require conveyance of recycled water from the WWTP to the percolation facility. Along the most direct route, a minimum of 17,000 feet of piping would be required to convey recycled water to the nearer percolation facility. Few potential uses were identified near this direct alignment; therefore the direct alignment would provide limited opportunity to serve additional potential recycled water users. Although utilizing an alternative alignment to convey recycled water to the percolation site is possible, this approach would likely delay implementation of a GRRP until a late phase of the recycled water system's development, when the transmission main has been extended from the WWTP to the southern end of the City.

Additionally, recovery of recharged water would be necessary for indirect reuse of recharged water and to maximize the benefit of a GRRP. Retention time constraints would preclude the use of the Thunderbird Well Field for recovery of recharged water. This City has previously investigated other potential well sites or use of existing wells and was unable to identify suitable wells for potable water use, or locations for new potable water wells that would capture recharged water.

Although the feasibility of percolating recycle water at either Site F or G was confirmed through hydrogeologic investigation, and no fatal flaws were identified through the analysis of environmental constraints, the requirement for blending of recycled water with a higher quality supply, and constraints limiting total recharge capacity result in a relatively low potential for beneficial use of recycled water. Since recharge activities would also be limited to the dry season months, during which time the greatest potential for directly offsetting potable water use and groundwater pumping for irrigation occurs (See Section 3.8 of the Recycled Water Master Plan), the GRRP would reduce recycled water availability specific to those beneficial uses.

With consideration of the high costs of conveyance, the need to construct new recovery wells and limited total capacity of the GRRP, the project has been determined to have limited benefit relative to other direct use options, especially those that would directly offset potable water use or reduce deep basin pumping. Benefits and probable constraints associated with the GRRP and three categories of direct use opportunities investigated in this study are summarized in the Recycled Water Master Plan, Table 3-3.

Based on these findings and considerations, the following general recommendations have been adopted for planned recycled water delivery:

- Provide for and maximize use opportunities within the City to offset potable water use
- Maximize opportunities for delivery of recycled water to high demand uses (e.g. existing golf courses now served by private wells)
- Plan for possible extension of recycled water service to large centralized demand areas such as the identified Agricultural Irrigation Areas and uses immediately beyond the City's boundary
- Do not pursue development of a GRRP at Site F or G for the initial recycled water system

Appendix H: Recycled Water System Distribution Infrastructure Preliminary Design Considerations

Recycled Water System Distribution Infrastructure Preliminary Design Considerations

Descriptions of the preliminary design of the recycled water system are provided in the following Sections. A summary of planned recycled water services is included in the Master Plan.

System Capacity

Distribution system components were sized according to either maximum month demands or peak hourly demands estimated for the recycled water uses planned for service, described in Sections 3.8.2 and 4.3.2 of the Master Plan. The City's future recycled water users consist primarily of landscape irrigation, golf courses, and agricultural irrigation uses; therefore, maximum demand corresponds to the month with the highest irrigation demand. Since the total demand served will be limited to daily supply availability (4.9 MGD at build-out), system capacity is considered in terms of the maximum month demand that will be served. Average and peak flow factors are calculated relative to MMD (Table 1).

Peak hour demand has been determined according to delivery schedules for the identified users and is specific to the composition of uses. Landscaping irrigated with recycled water is typically irrigated during the night to minimize the potential for public exposure in accordance with recycled water regulations. For planning purposes, an 8-hour irrigation period between 10 pm and 6 am has been assumed. The resulting peaking factor for peak hour landscape irrigation demand is 3.0, which is equivalent of the ratio of 24 hours per day and the assumed irrigation period. This peaking factor is applied to MMD to determine the maximum hourly flow anticipated. Use areas with very high demands may be required to provide onsite operational storage and to receive delivery up to the maximum day demand over a period of 24 hours to reduce potential for very high peak demands.

Peak hour demand will be used for sizing of pumps during Stage 1 of the recycled water program, when operational storage will be unavailable and demand will be served using on-demand pumping. Therefore, peak hour demand is calculated for two possible combinations of uses during Stage 1: the first consisting of Service Area A uses within the City, and the second consisting of Service Area A uses within the City and uses agricultural irrigation uses outside of the City. The resulting range of peak hourly demand peaking factor is shown in Table 1. Estimated maximum month demand for each service area is shown in Table 2.

Table 1. Recycled Water Demand Summary

Description	Recycled Water Demands
Average Annual Demand, MGD	2.22
Average Annual Demand, AFY	2,488
Maximum Month Demand (MMD), MGD	**4.90**
MMD peaking factor	2.21
PHD peaking factor	5.1 – 5.6

(1) The average demand served is calculated relative to ultimate recycled water supply available, and MMD peaking factor.
(2) MMD peaking factor is calculated according to DWR guidelines.
(3) PHD shown for ultimate system with range corresponding to service with and without agricultural uses outside of the City. PHD peaking factors may range from 4.5 - 6.6 during Stage A development, depending on demands served.

Table 2. Distribution System Service Area Recycled Water Demands

Service Area	Transmission Main Description	Max Month Demand (MMD)			Total Max Month Demand	Total Average Annual Recycled Water Demand
		City-controlled uses	Other uses within City	Agricultural Irrigation Outside of City		
A	WWTP to Buena Vista	0.23 MGD	--	0.64 MGD	0.87 MGD	434 AFY
B	Buena Vista to Chandler Ranch and to Hunter Ranch	0.24 MGD	1.88 MGD	1.33 MGD	3.45 MGD	1,749 AFY
C	Chandler Ranch to Creston Rd	0.23 MGD	0.14 MGD	--	0.37 MGD	193 AFY
D	Central East Side Extensions	0.22 MGD	--	--	0.22 MGD	112 AFY
Total		0.91 MGD	2.02 MGD	1.97 MGD	4.90 MGD	2,488 AFY

Reach D consists of pipeline extensions on the east side of the City, within City limits. Reach D extensions include Creston Road and Niblick Road.

Velocity and Friction Losses

Fluid velocities and friction losses should be limited to avoid excessive pumping costs and prolong system life. Sizing for future phases will be determined during future expansions of the recycled water distribution system. During detailed planning and design, hydraulic modeling will be used to optimize pipe sizing according to demand, fluid velocity, and headloss. For the purposes of this master plan, maximum velocity and headloss (at peak flow) of 8 fps and 5ft/ 1,000 ft, respectively, were used.

System Pressure

The majority of potential recycled water uses consist of irrigation for either landscaping or agriculture. It is expected that landscaping and agricultural crops irrigated with recycled water will rely on pressurized surface or subsurface application methods such as furrow, low-volume sprinklers or drip irrigation systems. Recommended pressures for drip irrigation systems range from 40 – 60 psi while surface sprinkler systems may required up to 75 psi.

It is anticipated that pressure requirements for irrigation uses will vary depending on application method and crop. To minimize costs associated with retrofitting existing irrigation systems for recycled water use, pressures similar to the potable water delivery system should be provided. To enable use by most irrigation uses, a recycled water distribution static pressure range of 45 to 100 psi is planned. Delivery of recycled water to users with high pressure requirements, such as some surface sprinkler systems, may require booster pumping at the point of use or connection to meet the desired operational pressure. Preliminary evaluation of the elevations of potential uses on the east side indicates the majority of uses could be served by a single pressure zone. Table 3 summarizes the service elevations and static pressures for the primary east-side pressure zone. Expansion of the system beyond City limits and/or into higher pressure zones will require additional pumping facilities.

Table 3. Main Pressure Zone Summary

Pressure Zone (HGL)	**Topographic Elevation (ft)**		**Percentage of Irrigation Demand ***	**Percentage of Eastside Irrigation Demand ***
	Min.	Max.		
Main East RW Zone (1,017 ft)	657	914	97%	97%
Boosted East RW Zone (1,145 ft)	915	1,041	3%	3%

*Demand percentages shown exclude extended service areas.

As shown in Plate 3, the majority of identified City recycled water use areas are located within the Main East RW Zone. Identified uses within this zone correspond to approximately 97% of projected irrigation demands within the City.

Hydraulic grade lines for each zone are established at approximately 103 ft (e.g., 45 psi) above the upper range of each pressure zone service elevation to provide minimum allowable service pressure to uses in the upper elevation of the zone. The main system storage will be located at a hydraulic grade of approximately 1,017 ft to serve use sites which comprise the majority of projected demand. Pressure reducing valves will separate connections between pressure zones to provide service from higher pressure zones to uses in low pressure zones.

Storage

Stored recycled water will be required to accommodate variations between recycled water demand and supply occurring throughout the day. While municipal wastewater flow is typically lowest during the night,

irrigation of certain recycled water use areas, such as parks and landscaping, typically occurs at night, necessitating storage to equalize recycled water demands and production capability. Stored recycled water used for this purpose is designated as operational storage.

Recycled water storage capacity requirements have been estimated for the ultimate system based on WWTP effluent flow rate (supply) at build-out, maximum month demand, and irrigation peaking factors specific to the City's identified users. Irrigation peaking factors were determined by assuming irrigation schedules for irrigation use categories. It is assumed that the majority of landscape irrigation will occur during the night to limit potential for public exposure while agricultural irrigation would occur during the daylight hours when agricultural operations are actively managed. When supply exceeds daily demand (i.e. during the wet season), treated effluent will be diverted to the Salinas River for surface water discharge or will be available for other uses (e.g. discharge into Huer Huero Creek, if determined feasible).

The need for operational storage is greatest during dry months when irrigation demands are highest. If delivery is limited to uses located within the City's east side, maximum usage is projected to occur during the month of July (MMD of 2.93 MGD). With delivery of up to 4.9 MGD possible on a daily basis, approximately 1.97 MGD would be available for use at agricultural irrigation areas located north and east of the City limits, including Vina Robles. If one or more of the large volume golf course users did not elect to purchase water, considerably more water would be available for agricultural users.

The ultimate operational storage required at build-out of the recycled water system has been estimated based on projected demands during maximum month conditions, irrigation schedules listed above, and the projected recycled water supply diurnal curve. The calculated total storage volume required includes an additional allowance volume of 10%. Projected recycled water delivery, supply, and the estimated storage volume required for equalization of demand and recycled water supply are shown in Figure 1. The amount of stored water available (labeled stored supply available) is also shown on an hourly basis for a one-day period. Minimum and recommended storage requirements are summarized in Table 4 below. Storage at the WWTP in the proposed recycled water clear well, and through other means such as utilization of available ponds would contribute to the total storage requirement and reduce the need for elevated storage tank capacity.

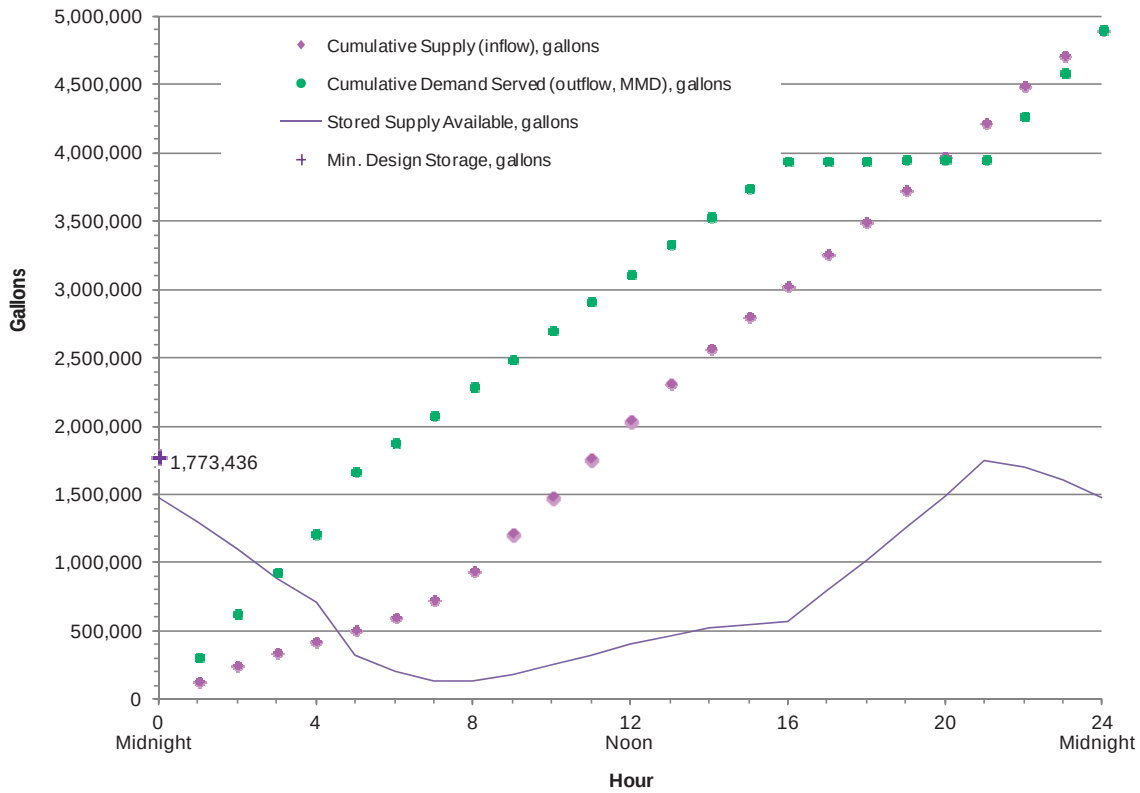


Figure 1. Storage required for ultimate delivery (4.9 MGD)

Table 4. Estimated Storage Requirements

Operational Storage	Minimum operational storage	Operational storage including 10% storage allowance	Storage Factor (as percent of MMD)
Planned Recycled Water delivery	1.61 MG	1.77 MG	36%

Storage calculated for maximum day demand conditions using projected supply diurnal curve and assumed irrigation schedules.
Storage requirements are based on delivery assumptions and peaking factors corresponding to the identified demands. Alternative delivery schedules for large use projects may impact storage requirements.

Staged implementation can be used to reduce initial construction costs and allow delivery of recycled water to nearby facilities in the early stage of system development. As uses are developed, the distribution system and storage capacity can be expanded to meet new demands.

During the first development stage (Phase A), on-demand pumping from a clear well located at the WWTP will be used to serve a limited number of uses near the WWTP. Although the on-demand system could be expanded to provide service to additional users in the future, this approach would require increased pumping capacity and energy usage to accommodate additional peak irrigation demands and

would not be cost-effective for the ultimate system. Therefore, remote storage should be implemented for accommodating peak irrigation demands during later system expansion (Reach B).

Two prospective remote elevated storage tank locations have been identified; one in the elevated areas of the Chandler Ranch planning area and another in an elevated portion of the Vina Robles Vineyard property. Both alternative storage locations would be incorporated with the Reach B extension of the distribution system. Since the Chandler Ranch storage site is located within City Limits, this site is considered the primary location for recycled water storage facilities. Maximum ground surface elevation at the Chandler Ranch site is approximately 990 – 1,010 feet. Both prospective remote storage locations are greater than 5 miles from the WWTP along the identified alignment.

Estimated storage requirements corresponding to each service area are provided in Table 5 below, based on projected service area maximum month demand (MMD), consideration of uses served within each zone, and storage facilities for the ultimate system. Maximum month demands and recommended operation storage sizing are also presented according to stages defined by extension of the transmission main from Area A to each additional service area.

Table 5. Estimated storage requirements for each Service Area

Service Area	Total Max. Month Demand (MMD)	Recommended Operational Storage
A	0.87 MGD	0.32 MG
B	3.45 MGD	1.25 MG
C	0.37 MGD	0.13 MG
D	0.22 MGD	0.08 MG
Total	4.90 MGD	1.77 MG

Operational storage calculated using storage factors in Table 4-1 of the Master Plan.
East side extensions consist of uses within Service Area C requiring small diameter pipeline extensions on the east side of the City and within City limits. Conceptual alignments include Creston Road and Niblick.

Table 6. Estimated cumulative storage requirements by stage

Stage	Service Areas	Cumulative Total Max Month Demand (MDD)	Cumulative Recommended Operational Storage
1	A	0.87 MGD	0.32 MG
2	A, B	4.32 MGD	1.56 MG
3	A, B, C	4.69 MGD	1.70 MG
4	A, B, C, D	4.90 MGD	1.77 MG

Operational storage calculated using storage factors in Table 4.
Service Area D consists of pipeline extensions in the central portion of the east side of the City, within City limits. Conceptual alignments include Creston Road and Niblick Road.

Supplying recycled water to in-City and irrigation customers will result in supply availability in months of low irrigation demand. Available water is planned to be either discharged to the Salinas River without full disinfected tertiary recycled water treatment (as is current practice with all treated effluent) and/ or to discharge to the Huer Huero Creek as a means of recharging that portion of the groundwater basin.

7.1.1 Pumping

Pumping will be required to convey recycled water from the WWTP to use areas and storage tanks. During the first phase of system development, on-demand pumping from a clear well at the WWTP will be used to serve uses near the WWTP. The system will consist of a clear well which will provide some equalization of supply, and a pump station utilizing vertical turbine pumps with variable frequency drives. Gravity storage is not planned for construction until completion of Reach B; therefore, Service Area A demands (Reach A) will be served by a pump station capable of meeting peak demand for Service Area A. Pumping capacity could be expanded to provide service to additional users. However, as additional uses are developed and demand increases, the on-demand pumping approach will become less cost-effective relative to serving peak demands from the gravity storage tank.

Once the distribution transmission main is extended to the remote elevated storage location (Reach B), the recycled water storage tank site will be constructed and will serve recycled water uses in the main pressure zone. The on-demand pumping facilities used for Service Area A would be upgraded, as needed, to allow the new storage facility to be filled at a rate no less than the daily maximum month demand (to prevent a rolling storage deficit).

Table 7. Estimated Pumping Requirements per Service Area

Service Area	Pump Design Basis	Estimated Firm Pumping Capacity per Service Area
A	PHF	498 – 1,211 *
B	MMD	2,502
C		256
D		149

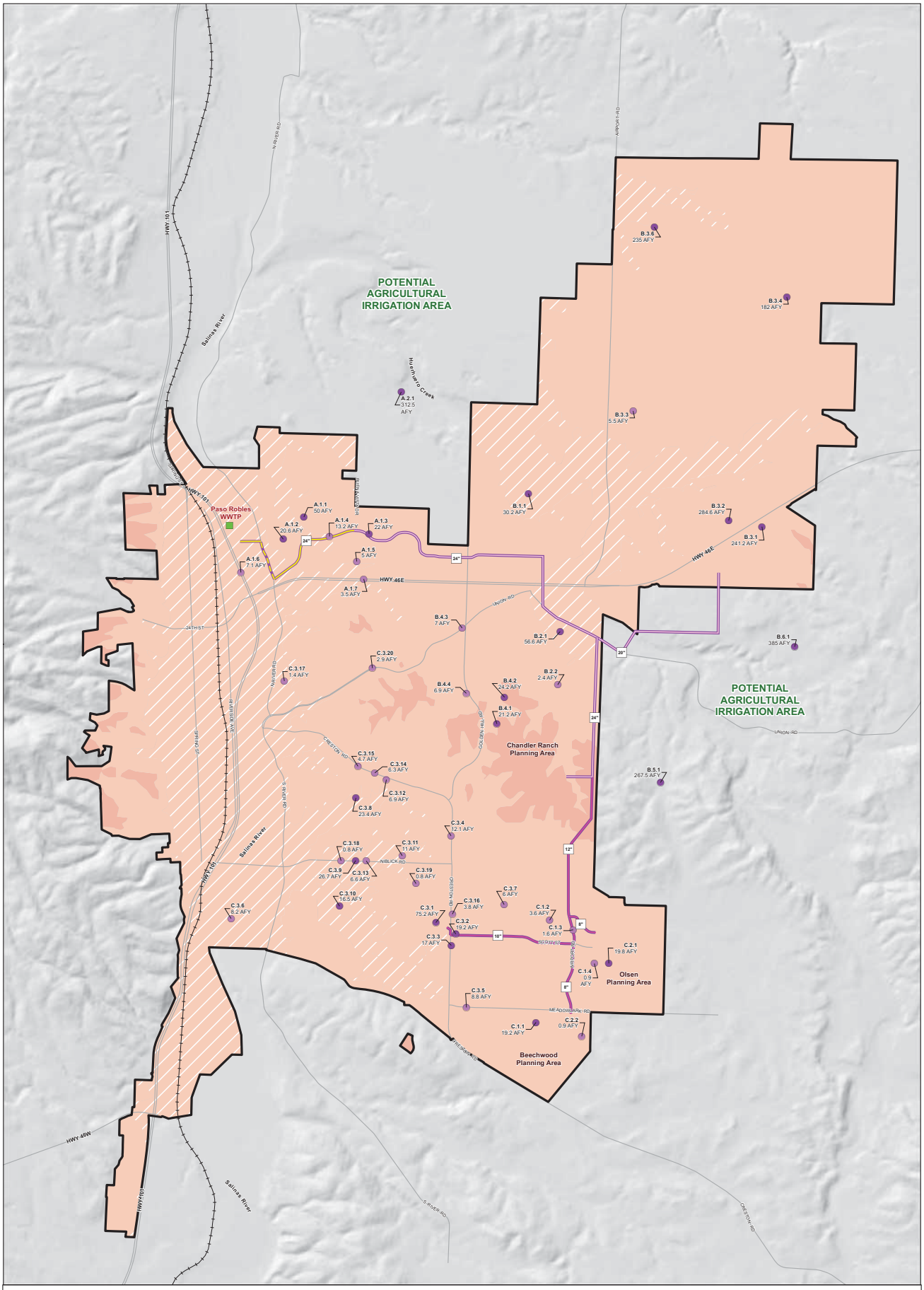
Service Area A pumping capacity is dependent on timing of service to the Northern Agricultural Irrigation Area and assumes on-demand pumping. Pumping capacity would range from 498 gpm, for serving uses within the City, to 1,211 gpm, for serving uses within the City and approx. 625 acres in the Northern Ag. Irrigation Area.

Table 8. Estimated Pumping Requirements per Recycled Water Program Stage

Stage	Areas Served	Pump Design Basis	Estimated Pumping Capacity per Stage
1	A	PHF	498 – 1,211 *
2	A, B	MMD	3,000
3	A, B, C		3,256
4	A, B, C, D		3,405

Stage 1 pumping capacity is dependent on timing of service to the Northern Agricultural Irrigation Area and assumes on-demand pumping. Pumping capacity would range from 498 gpm, for serving uses within the City, to 1,211 gpm, for serving uses within the City and approx. 625 acres in the Northern Ag. Irrigation Area.

Service to uses beyond the limits of the Main East Pressure Zone limits will be served through pressure reduction (for lower uses) or booster pumping (for higher uses). Evaluation of costs associated with serving uses outside of the main service zone is not provided in this Master Plan. These costs and potential benefit should be evaluated on a case-by-case basis.



Legend

- CityLimits
- Railroad
- Waste Water Treatment Plant

Recycled Water System

- Existing Pipeline - Reach A
- Proposed Pipeline - Reach A
- Proposed Pipeline - Reach B
- Proposed Pipeline - Reach C
- <SITE ID> <AFY> Service Area Demands

Pressure Zones

ID	Description	Topographic Elevations	HGL
A	Main Pressure Zone*	657 to 914 ft	1,014 ft
B	Boosted East Zone	>= 915 ft	1,145 ft

Note: Use sites within hatched areas of the Main Pressure Zone may require pressure reduction at service connection.

Paso Robles Recycled Water Master Plan

FIGURE 1 : Pressure Zones Layout

City of Paso Robles
Project No: 60194173

0 750 1,500 3,000 Feet

AECOM

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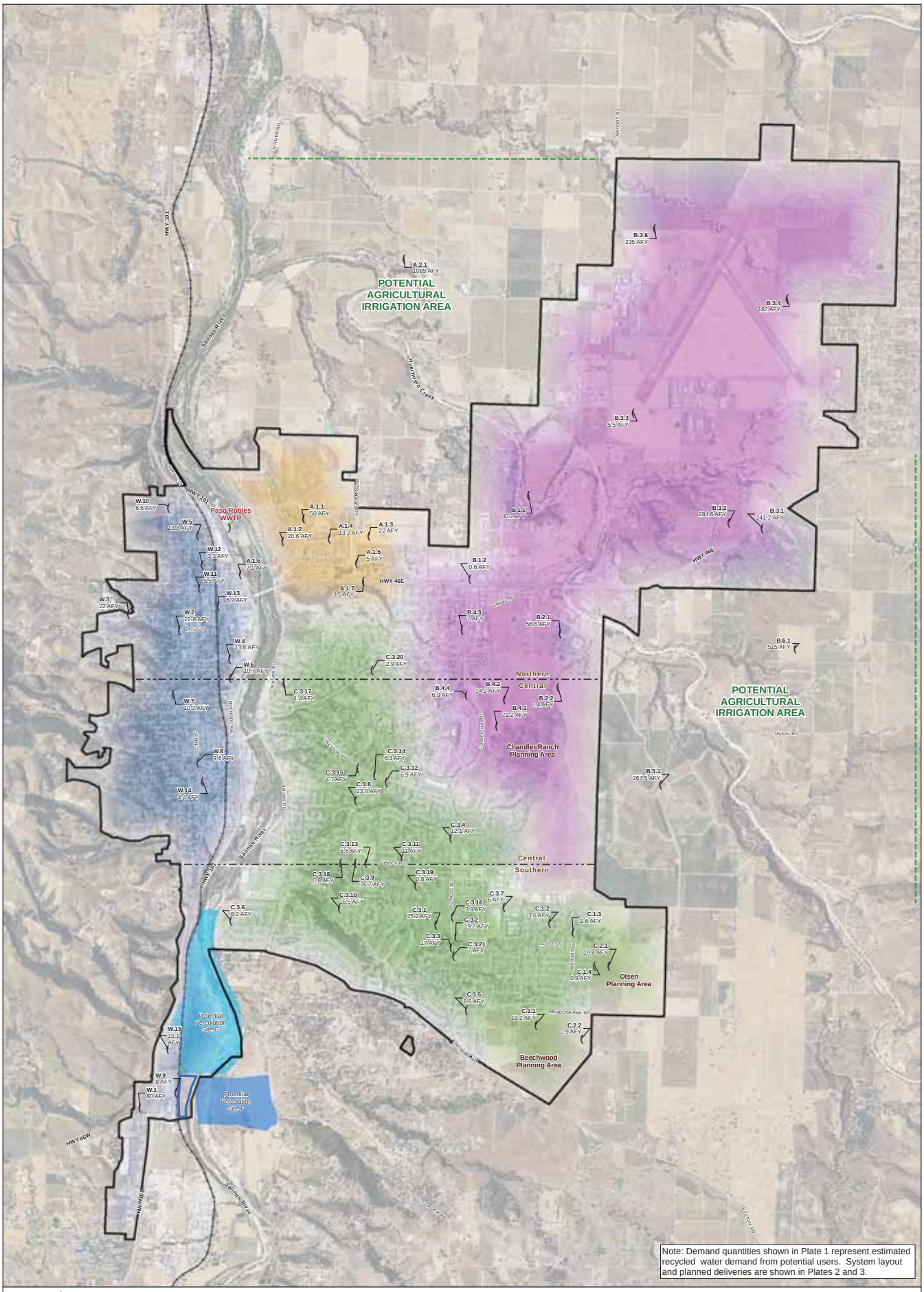
Plates



Legend

- CityLimits
- Railroad
- Waste Water Treatment Plant
- Thunderbird Well Field
- Potential Use
- Potential Percolation Site G
- Potential Percolation Site F
- Extent of Potential Agricultural Irrigation Uses Considered
- Service Area A
- Service Area B
- Service Area C
- West Side Service Area (Future Planning Phase)

Paso Robles Recycled Water Master Plan

PLATE 1 : Potential Recycled Water Use and Percolation Sites

0 750 1,500 3,000 Feet

City of Paso Robles
Project No: 60194173

AECOM

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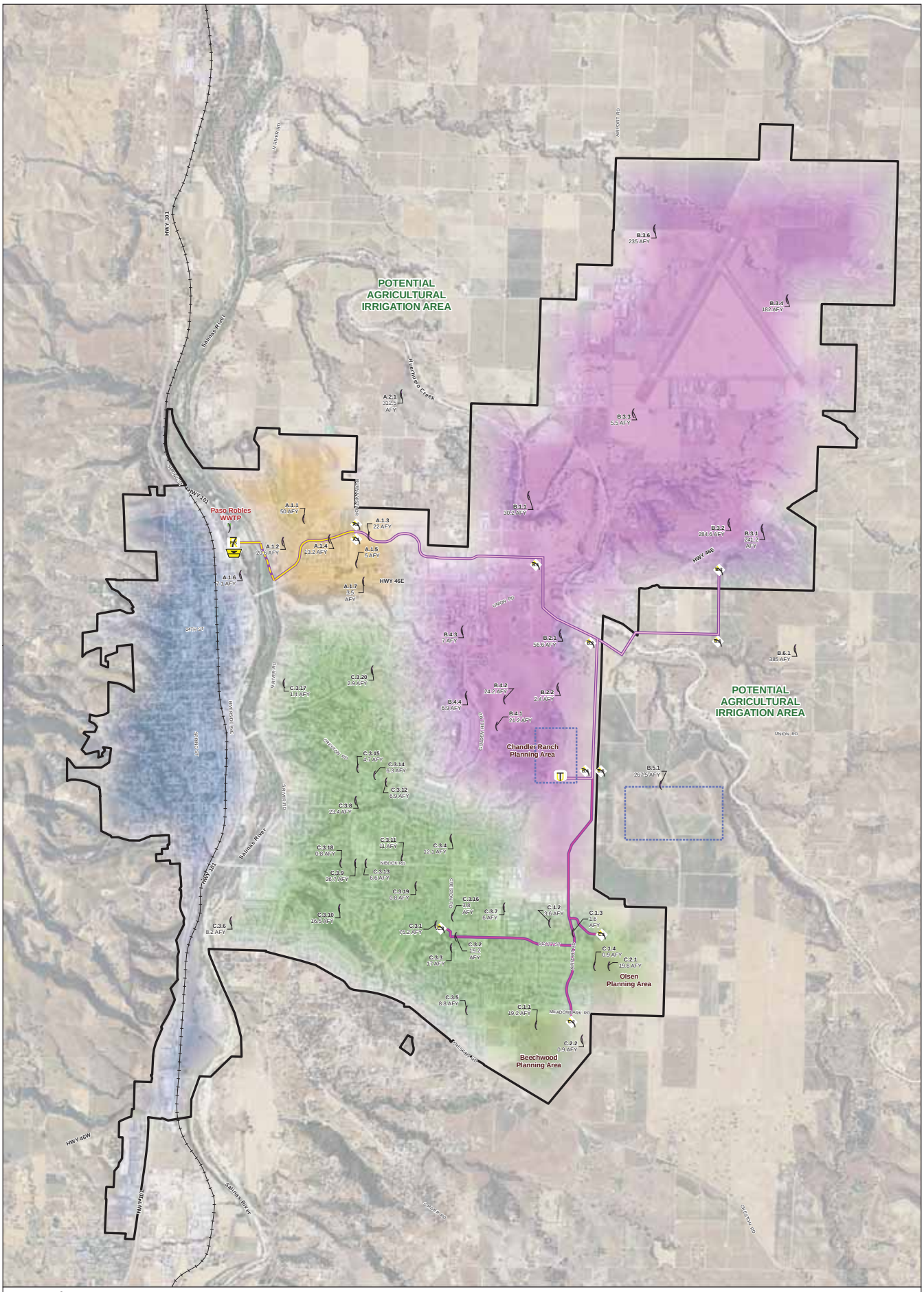

Legend

- CityLimits
- Railroad
- Waste Water Treatment Plant
- Potential Storage Locations

Recycled Water System

- Existing Pipeline - Reach A
- Proposed Pipeline - Reach A
- Proposed Pipeline - Reach B
- Proposed Pipeline - Reach C
- Pump Station
- Water Tank
- Reservoir

<SITE ID> <AFY>

- Service Area Demands
- Demand Node
- Service Area A
- Service Area B
- Service Area C
- West Side Service Area (Future Planning Phase)

Paso Robles Recycled Water Master Plan

PLATE 2 : System Layout and Prospective Service

0 750 1,500 3,000 Feet

City of Paso Robles
Project No: 60194173

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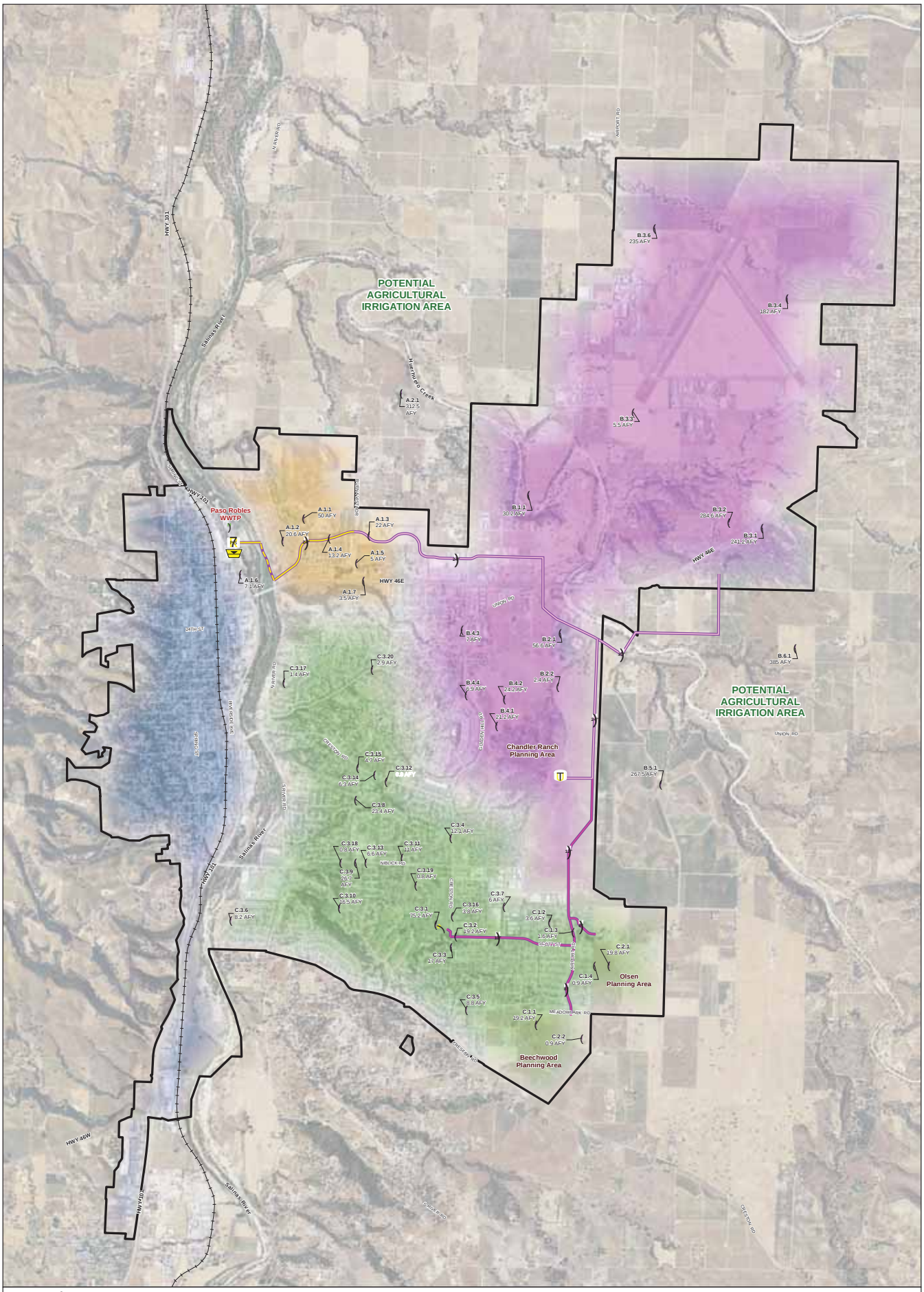
Path: Paso Robles Recycled Water MP\GIS\Paso_Robles_System_Layout.mxd



Legend

- CityLimits
- Railroad
- Waste Water Treatment Plant

Recycled Water System

- Existing Pipeline - Reach A
- Proposed Pipeline - Reach A
- Proposed Pipeline - Reach B
- Proposed Pipeline - Reach C
- Pump Station
- Water Tank
- Reservoir
- <SITE ID> <AFY> Service Area Demands
- Demand Node
- Service Area A
- Service Area B
- Service Area C
- West Side Service Area (Future Planning Phase)

Paso Robles Recycled Water Master Plan

PLATE 3 : Recommended Capital Improvements

0 750 1,500 3,000 Feet

City of Paso Robles
Project No: 60194173

AECOM

Path: Paso Robles Recycled Water MP\GIS\Paso_Robles_Capital_Improvements_with_Service_Areas.mxd