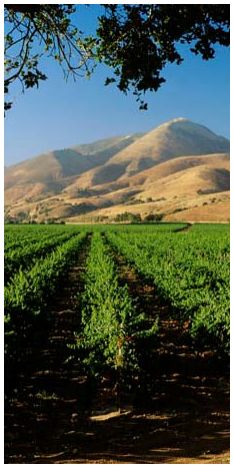
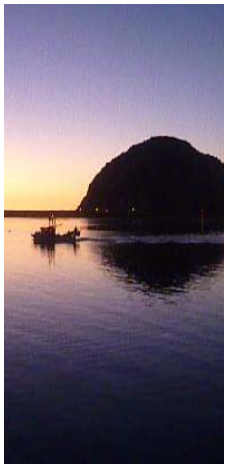
Appendix P.

Regional Recycled Water Planning

San Luis Obispo County
Regional Recycled Water Strategic Plan





Participating Agencies:

City of Arroyo Grande
City of Grover Beach
City of Morro Bay
City of Pismo Beach
County of San Luis Obispo
Nipomo Community Services District
Oceano Community Services District
South San Luis Obispo County Sanitation District
Templeton Community Services District

DRAFT
June 19, 2014

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EXECUTIVE SUMMARY

Introduction

The County of San Luis Obispo (County) is investigating opportunities for the use of treated wastewater (recycled water) across the County as part of the San Luis Obispo Region Integrated Regional Water Management (IRWM) Plan (SLO IRWMP). The Regional Recycled Water Strategic Plan (RRWSP) is one component of an update to the SLO IRWMP, and is funded by a Round 2 IRWM Regional Planning Grant from the California Department of Water Resources (DWR).

Increased interest in recycled water use has been expressed across the County through individual agency water and wastewater planning efforts, and through County-wide efforts such as SLO IRWMP and the County Master Water Plan. The interest in recycled water is driven by several factors, particularly the acknowledgement of limited existing water sources and the desire to maximize the benefit of local resources. Historically, the primary obstacles to recycled water implementation were cost competiveness with existing water supplies and some future water supplies, as well as, in some cases, public or customer acceptance of reuse. Some of these obstacles still exist and are explored in the RRWSP.

RRWSP Purpose, Objectives, and Approach

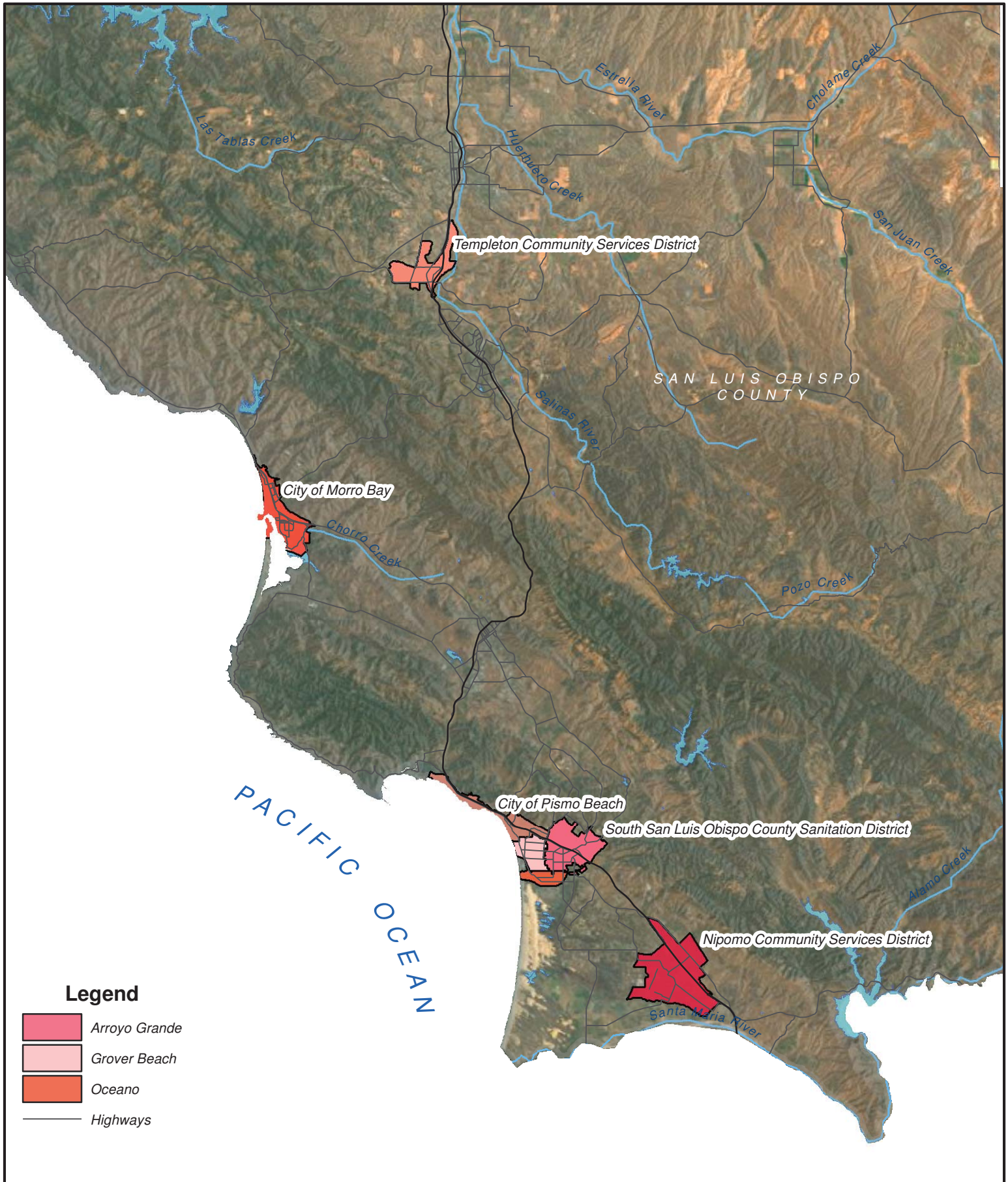
The purpose of the RRWSP is to identify and prioritize potentially viable next steps in successfully implementing water reclamation across the County in a safe and cost-effective manner. The RRWSP objectives are to:

- Update previously defined recycled water projects, identify new projects, and identify opportunities for inter-regional cooperation.
- Apply a similar cost and benefit basis to all projects to identify higher regional priorities.
- Advance existing recycled water planning efforts for each study area based on the progress and needs of each area.
- Define the critical next steps for individual agencies and regional entities to move priority projects forward.
- Identify one or more projects for the final round of Proposition 84 implementation grant funding, which is scheduled for 2015.

The RRWSP's approach builds upon the technical information developed by each agency, including treatment plant upgrades, market assessments, and project descriptions. This work also updated relevant information for previously identified projects, and identified potential modifications to those projects to lower cost while maintaining potential benefits. The RRWSP identifies high-priority projects based on costs and benefits, and defines critical next steps for each project. The RRWSP also addresses policy, regulatory, permitting, legal, and funding / financing considerations for different types of recycled water projects.

The RRWSP covers region wide recycled water opportunities, and has focused evaluations within four study areas (refer to the figure on the following page):

1. Morro Bay
2. Nipomo (Nipomo Community Services District (CSD))
3. Northern Cities (Arroyo Grande, Grover Beach, Pismo Beach, Oceano CSD, and South San Luis Obispo County Sanitation District (SSLOCSD))
4. Templeton (Templeton CSD)



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RRWSP Study Areas

San Luis Obispo County
Regional Recycled Water Strategic Plan
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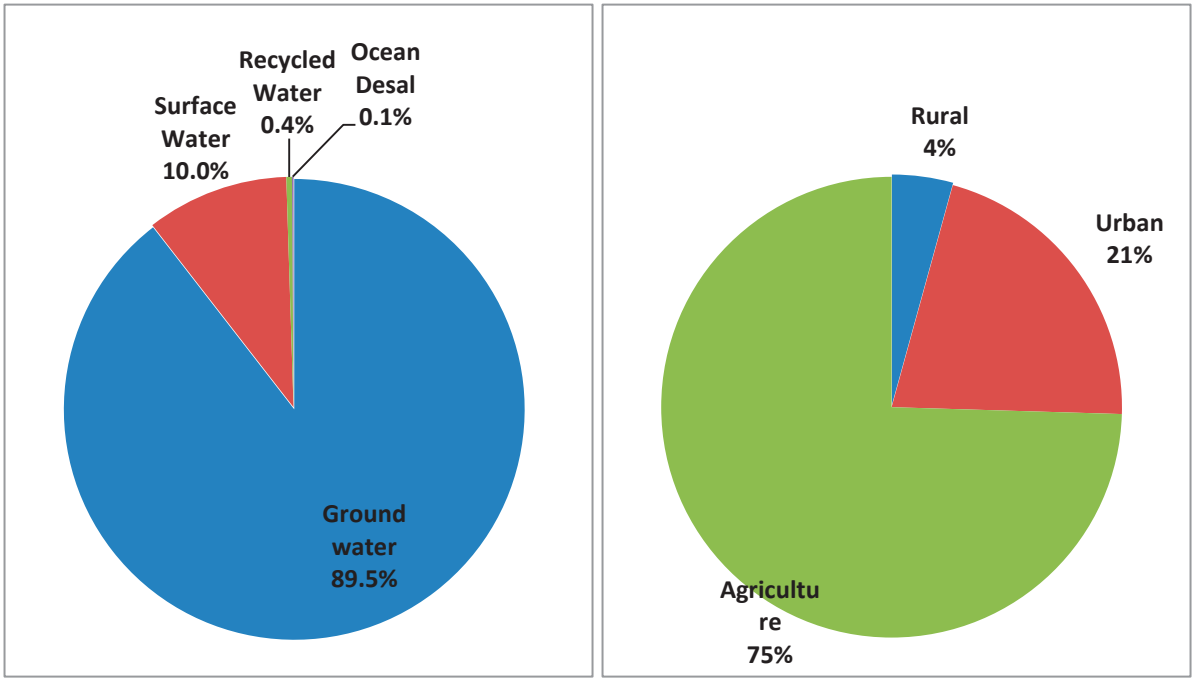
Regional Overview

The County's water supplies consist of groundwater, local and imported surface water, recycled water, and ocean desalination. The specific water supply portfolio for each water purveyor varies according to its location and previous investments in water supply infrastructure. For example, many purveyors are entirely dependent on groundwater, while a limited number use only groundwater to meet peak season demand. As reflected in the following figure, most water purveyors have a heavy reliance on groundwater.

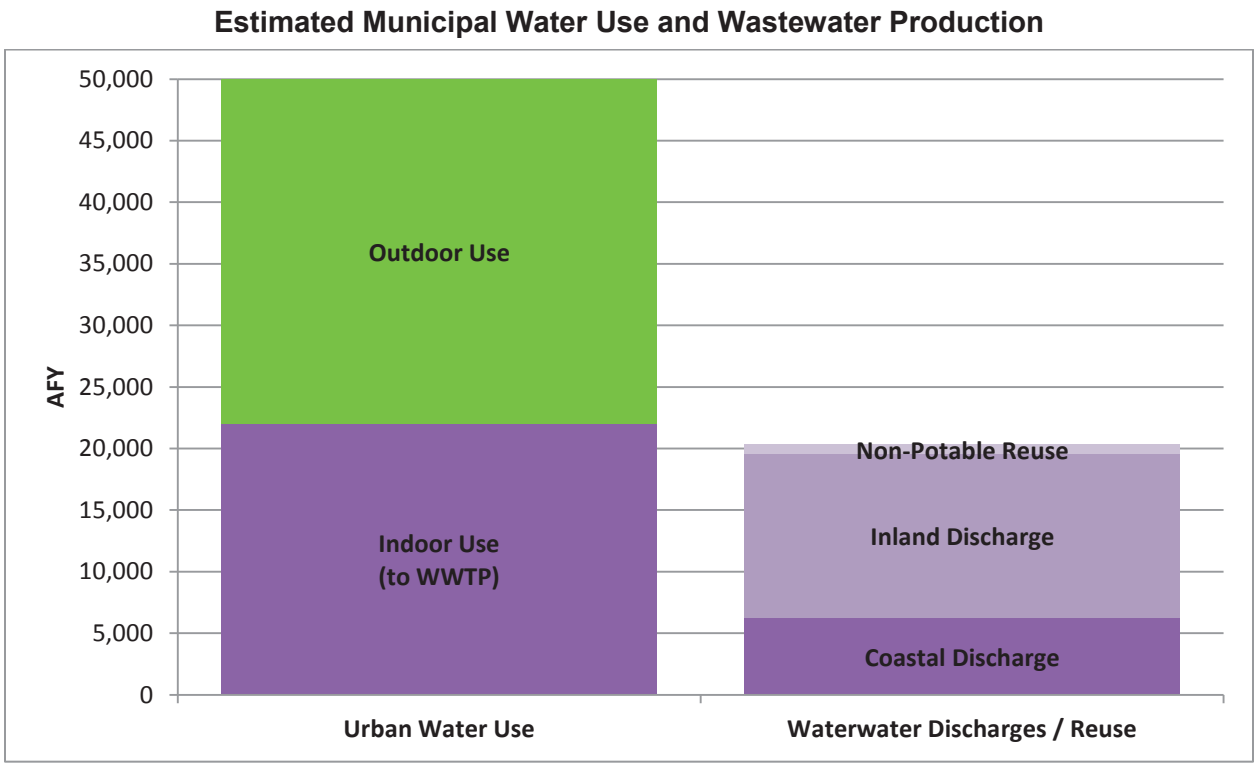
County Water Supply Portfolio & Types of Water Use



Source: San Luis Obispo County IRWM Region Public Draft (June 2014), Section D. Water Supply, Demand, and Water Budget

In general, there are limited untapped groundwater supplies for municipal drinking water use. As a result, many purveyors have invested in surface water supplies over the past decade, such as the State Water Project and Nacimiento Water Project. These new surface supplies have eased the stress on many groundwater basins. In addition, some historical supplies may be reduced in the future – whether from unsustainable pumping of groundwater, groundwater quality issues, or reductions in surface water availability. Climate change also has the potential to reduce the County's water supplies. These conditions, among others, have spurred interest in recycled water, particularly in locations where treated wastewater is discharged to the ocean and no associated water supply benefit is realized.

Urban water use accounts for approximately 21% of total water use across the County, which equates to approximately 50,000 acre-feet per year (afy). As shown in the following figure, approximately half of this volume is used outdoors and the other half is used indoors. All the indoor urban water use is conveyed to municipal wastewater treatment plants (WWTPs) and has the potential for reuse. After accounting for water losses and reuse within the WWTPs, approximately 20,000 afy (or roughly 10% of total water use across the County) has the potential for reuse. Finding the highest and best beneficial reuse for this volume of water is the focus of the RRWSP.



Source: San Luis Obispo County IRWM Region Public Draft (June 2014), Section D. Water Supply, Demand, and Water Budget

Recycled Water Background

Currently there are six operational non-potable reuse (NPR) projects across the region primarily consisting of golf course irrigation with disinfected secondary recycled water from treatment plants serving planned residential communities. The City of San Luis Obispo operates the only recycled water distribution system in the region, serving primarily City parks for landscape irrigation. Also, the County Department of Public Works is currently constructing a recycled water treatment and distribution system for the community of Los Osos, which will be operational in 2016. In total, approximately 810 afy of effluent is currently reused across the region by the following existing non-potable reuse projects:

- Atascadero (300 afy to Chalk Mountain Golf Course)
- California Men's Colony (200 afy to Dairy Creek Golf Course)
- Nipomo CSD, Blacklake WWTP (50 afy to Blacklake Golf Course)
- Rural Water Company WWTP (50 afy to Cypress Ridge Golf Course)
- City of San Luis Obispo (160 afy to nearby golf courses, schools, and commercial establishments; in addition to a minimum of 1,800 afy to San Luis Obispo Creek for streamflow augmentation)
- Woodlands MWC WWTP (50 afy to Monarch Dunes Golf Course)

In addition, approximately 790 afy of discharges are counted toward groundwater rights:

- Nipomo CSD Southland WWTP (640 afy percolated to Nipomo Mesa groundwater)
- Templeton CSD Meadowbrook WWTP (150 afy infiltrated for Salinas River underflow)

Unplanned or incidental reuse occurs in the County via discharge of disinfected secondary effluent to percolation ponds from WWTPs without an ocean outfall. The ponds discharge to the

underlying groundwater or an adjacent river and may eventually be used for potable or non-potable use, such as agriculture.

Unlike inland discharges, effluent discharge via ocean outfalls has no existing water supply benefit. Therefore, reuse of effluent from WWTPs with ocean outfalls would provide the largest water supply benefit. Approximately 6,200 afy of effluent is currently discharged to the ocean and the volume will rise as growth occurs in these areas. These discharges offer the highest opportunity for water supply benefit through reuse since the effluent does not provide any water supply benefit at this time. The following table summarizes effluent discharges and reuse across the region and the following figure shows the locations of each of these WWTPs.

Summary of Existing Effluent Discharges

Agency / WWTP	Existing Effluent		Existing Reuse	Inland Discharge	Ocean / Coastal Discharge
North County Sub-Region					
City of Atascadero	1.0 mgd	1,100 afy	300 afy	800 afy	--
Heritage Ranch CSD	0.2 mgd	230 afy	--	230 afy	--
City of Paso Robles	3.0 mgd	3,300 afy	--	3,300 afy	--
San Miguel CSD	0.1 mgd	130 afy	--	130 afy	--
TCSD Meadowbrook WWTP[1]	0.15 mgd	170 afy	--	170 afy[2]	--
North Coast Sub-Region					
California Men's Colony	1.2 mgd	1,340 afy	200 afy[3]	1,140 afy[3]	--
Cambria CSD	0.5 mgd	540 afy	--[4]	--	540 afy
Cayucos CSD	0.25 mgd	275 afy	--	--	275 afy
Los Osos WWTP[5]	1.2 mgd	1,340 afy	--	1,340 afy	--
Morro Bay	0.87 mgd	975 afy	--	--	975 afy
San Simeon CSD	0.07 mgd	80 afy	--[6]	--	80 afy
South County Sub-Region					
Avila Beach CSD	0.05 mgd	50 afy	--	--	50 afy
NCSD Blacklake WWTP	0.05 mgd	50 afy	50 afy	--	--
NCSD Southland WWTF	0.6 mgd	640 afy	--	640 afy[7]	--
Pismo Beach	1.1 mgd	1,230 afy	--	--	1,230 afy
Rural Water Company	0.05 mgd	50 afy	50 afy	--	--
City of San Luis Obispo[8]	5.1 mgd	5,700 afy	160 afy	5,540 afy[8]	--
San Miguelito MWC	0.15 mgd	170 afy	--	--	170 afy
SSLOCSD WWTP	2.6 mgd	2,910 afy	--	--	2,910 afy
Woodland MWC	0.05 mgd	50 afy	50 afy	--	--
Total	**18.3 mgd**	**20,330 afy**	**810 afy**	**13,290 afy**	**6,230 afy**

Notes:

1. Templeton CSD is considering diverting existing sewer flows that go to the Paso Robles WWTP (approximately 0.22 mgd) and conveying the flow for treatment at the TCSD Meadowbrook WWTP.
2. Templeton CSD retrieves the percolated water at downstream wells.
3. Must maintain a minimum discharge of 0.75 cfs (0.5 mgd; 540 afy) to Chorro Creek.
4. Percolated effluent serves as a barrier to slow the seaward migration of subterranean fresh water.
5. Currently under construction and start of operations planned for 2016.
6. Trucking of recycled water for irrigation started in 2014.
7. Percolated water is accounted for in the Nipomo Mesa Management Area groundwater balance.
8. Must maintain a minimum discharge of 2.5 cfs (1.6 mgd; 1,800 afy) to San Luis Obispo Creek.

Municipal Wastewater Treatment Plants within San Luis Obispo County

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Common Types of Reuse

Common types of water reuse can be divided into the following categories (based on USEPA 2012 Guidelines for Water Reuse):

- Urban Reuse
  - Unrestricted: The use of recycled water for non-potable applications in municipal settings where public access is not restricted
  - Restricted: The use of recycled water for non-potable applications in municipal settings where public access is controlled or restricted by physical or institutional barriers, such as fencing, advisory signage, or temporal access restriction
- Agricultural Reuse
  - Food Crops: The use of recycled water to irrigate food crops intended for human consumption
  - Processed Food Crops and Non-food Crops: The use of recycled water to irrigate crops that are either processed before human consumption or not consumed by humans
- Impoundments
  - Unrestricted: The use of recycled water in an impoundment in which no limitations are imposed on body-contact water recreation activities
  - Restricted: The use of recycled water in an impoundment where body contact is restricted, such as a landscape feature
- Environmental Reuse
  - The use of recycled water to create, enhance, sustain, or augment water bodies, including wetlands, aquatic habitats, or stream flow
- Industrial Reuse
  - The use of recycled water in industrial applications and facilities, power production, and extraction of fossil fuels
- Potable Reuse
  - Indirect Potable Reuse: Augmentation of a drinking water source (surface or groundwater) with recycled water followed by an environmental buffer and, for surface water only, normal drinking water treatment
  - Direct Potable Reuse: The introduction of recycled water (with or without retention in an engineered storage buffer) directly into a water treatment plant, either collocated or remote from the advanced wastewater treatment system

All of the types of reuse listed above are examined in the RRWSP with the exception of:

- Restricted Impoundments: Restricted impoundments are common recycled water storage methods for golf courses and agricultural fields but are not an end use. Use of recycled water for unrestricted impoundments is not considered in the RRWSP.
- Direct Potable Reuse: This option has recently emerged as a viable recycled water alternative across the United States, but several years of study and development of regulations await before a feasible project could be conceived in the County.

Opportunities, Constraints, and Recommendations by Study Area

This section presents the recycled water evaluation conducted for each of the study areas and summarizes opportunities across the region.

City of Morro Bay

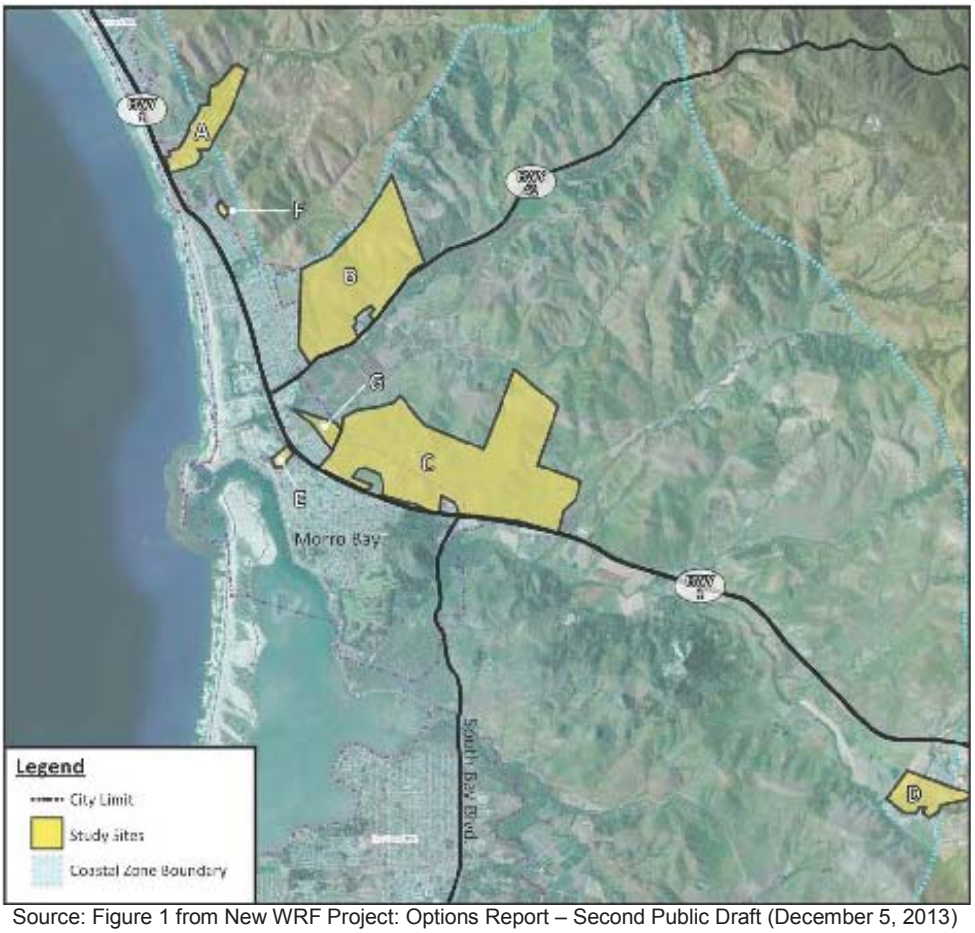
The City of Morro Bay is currently conducting a planning effort to define and site a new water reclamation facility (WRF). One key goal of the new facility is to produce tertiary effluent for reuse. As of February 2014, The City Council is scheduled to decide on a site in August 2014 and plans to have the new WRF online by February 2019.

There are a range of recycled water opportunities in and around the city, including landscape irrigation, agricultural irrigation, and groundwater recharge / streamflow augmentation. The city wants to maximize reuse from the new WRF. However, implementation of each type of potential reuse is subject to constraints, and feasible recycled water options are ultimately dependent on the site selected for the new WRF.

Next Steps

- Decide on a location for the new water reclamation facility.
- Pursue reuse opportunities specific to the WRF location.
- Incorporate recycled water planning into salt and nutrient management planning.

New WRF Sites Evaluated by Morro Bay



Source: Figure 1 from New WRF Project: Options Report – Second Public Draft (December 5, 2013)

Nipomo CSD

NCSD has two WWTPs (Southland WWTF and Blacklake WWTP) and both currently maximize reuse. Blacklake WWTP effluent is reused for irrigation at Blacklake Golf Course. Southland WWTF is percolated into the underlying groundwater basin, and these flows are included in the Nipomo Mesa Management Area (NMMA) water balance. Reuse of Southland WWTF effluent for landscape irrigation in strategic locations, such as offsetting pumping in groundwater depressions, could provide benefits to NCSD but would not necessarily provide new water. Also, Southland WWTF would need a tertiary treatment upgrade or an equivalent soil aquifer treatment and pumping system.

Potential landscape irrigation, agricultural irrigation, and groundwater recharge projects from Southland WWTF were explored in the RRWSP. However, the projects were not cost effective ($10,000+/af) primarily because NCSD would only receive a 10% water supply benefit for every unit of recycled water use since percolated Southland WWTF effluent is already part of the NMMA water balance. (The water balance assumes 10% of percolated water is lost during transport to the groundwater table and reuse of the effluent for irrigation would avoid these losses). In summary, NCSD beneficially reuses 90% of treated effluent from Southland WWTF and would only be able to receive a maximum new water supply benefit of 90 afy if all 900 afy of existing effluent is reused for irrigation.

NCSD Recycled Water Project Concepts

Alternative		Average Annual Demand	Unit Cost Based on	
ID	Description		Annual Demand	Water Supply Benefit
N1a	Nipomo Regional Park Project	51 afy	$4,790 / AF	$47,900 / AF
N1b	N1a & Blacklake Golf Course Extension	551 afy	$1,730 / AF	$17,300 / AF
N1c	N1a & Monarch Dunes Golf Course Extension	951 afy	$1,310 / AF	$13,100 / AF

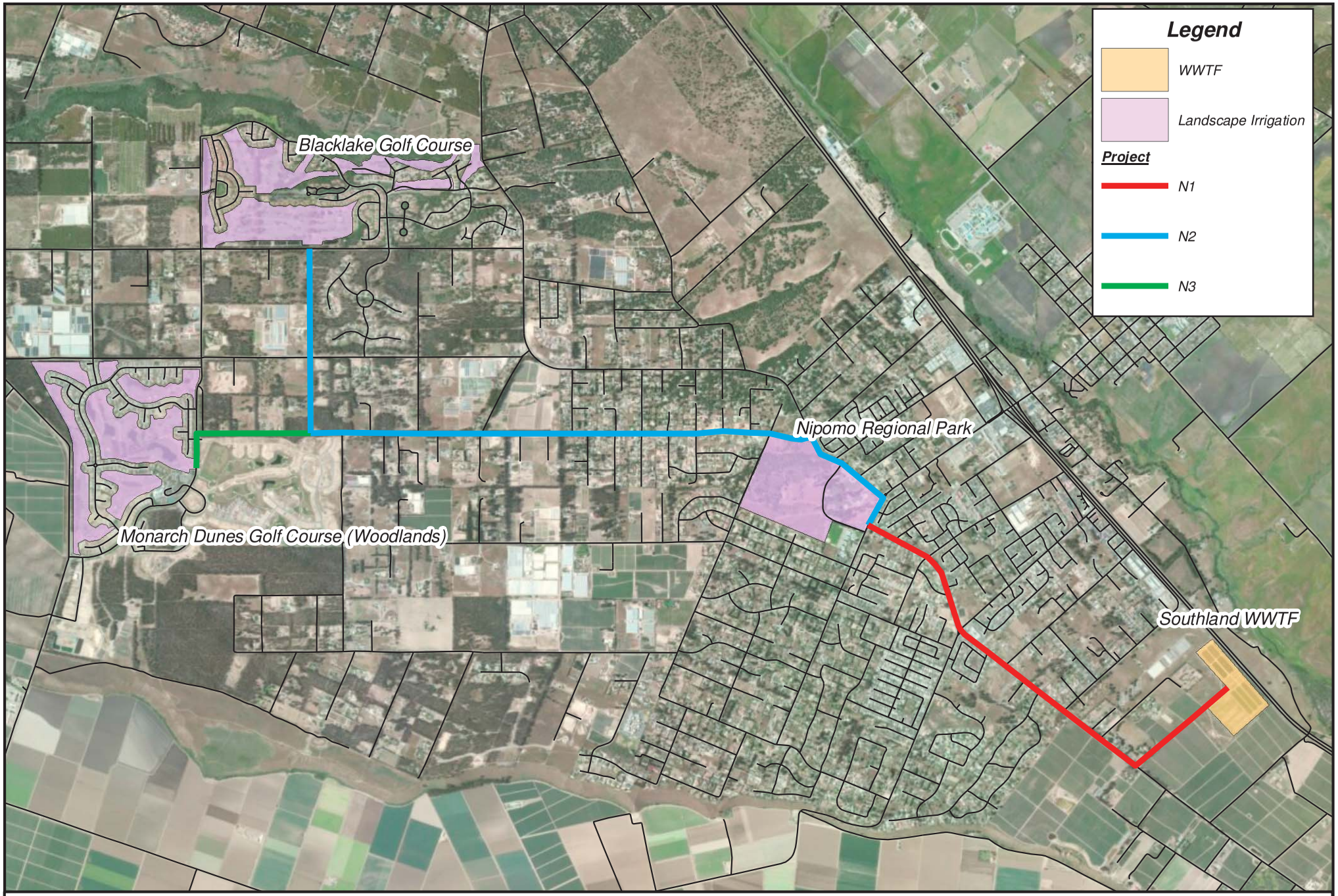
In addition, NCSD recycled water opportunities and constraints include:

- Limited opportunity for direct offset of NCSD potable water use since largest potential customers pump water from their own irrigation well
- Substantial agricultural demand exists in proximity to the Southland WWTF
- Southland WWTF will require an upgrade to tertiary filtration or pumping after percolation to implement a recycled water project
- Additional treatment may be needed to meet water quality requirements of specific customers (e.g., agriculture) resulting in additional costs for treatment and concentrate management

Based on this assessment, a water supply benefit will not drive a NCSD recycled water project. However, recycled water projects could be driven by the need for alternative disposal methods in the future based on potentially stricter waste discharge requirements from the RWQCB.

Next Steps

- Continue to monitor potential mounding of effluent recharge at the Southland WWTF and, if mounding is realized, pursue reuse opportunities
- Work with SSLOCSD representatives on potential cross-basin reuse projects
- Incorporate salt and nutrient management planning into water, wastewater, and recycled water planning.



Nipomo CSD Landscape Irrigation Project Concepts

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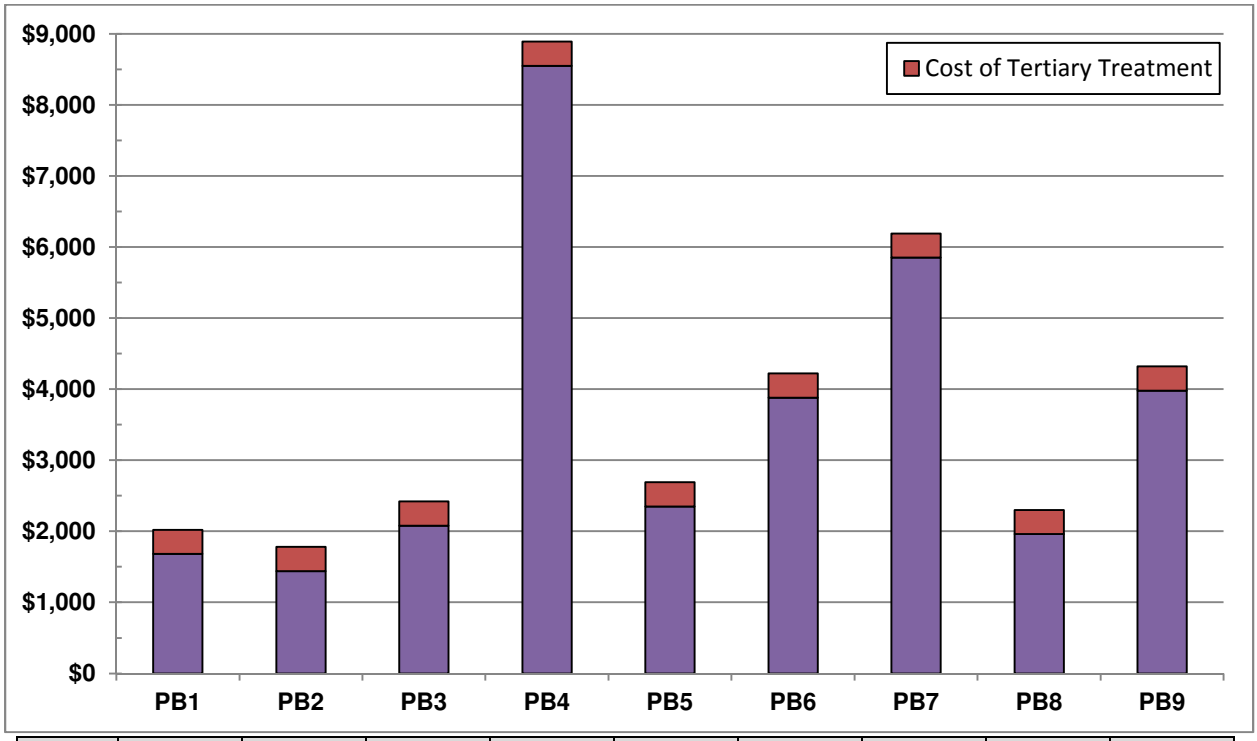
City of Pismo Beach

The Pismo Beach WWTP currently discharges approximately 1.1 mgd (1,230 afy) of disinfected secondary effluent through the joint Pismo Beach / SSLOCSD ocean outfall. Nine landscape irrigation project concepts from the Pismo Beach WWTP were defined. In addition, use of Pismo Beach WWTP effluent in combination with SSLOCSD effluent for larger, regional projects, such as agricultural reuse, groundwater recharge, seawater intrusion barrier, and surface water augmentation are discussed under SSLOCSD in the following section.

Pismo Beach Recycled Water Project Concepts	
Landscape Irrigation Project Concepts PB1: Pismo Beach Sports Complex PB2: Caltrans and Middle School PB3: Price House Historic Park PB4: South to Arroyo Grande PB5: Pismo State Beach Golf Course	PB6: Dinosaur Caves Park PB7: Palisades Park Projects using the existing effluent outfall PB8: Pismo State Beach Golf Course PB9: Western Grover Beach

Unit Costs of Pismo Beach Project Concepts ($/AF)



AFY	16	89	28	26	86	47	62	77	44

Opportunities and Constraints

Based on findings from the project concepts development process, preliminary recycled water opportunities and constraints for Pismo Beach include:

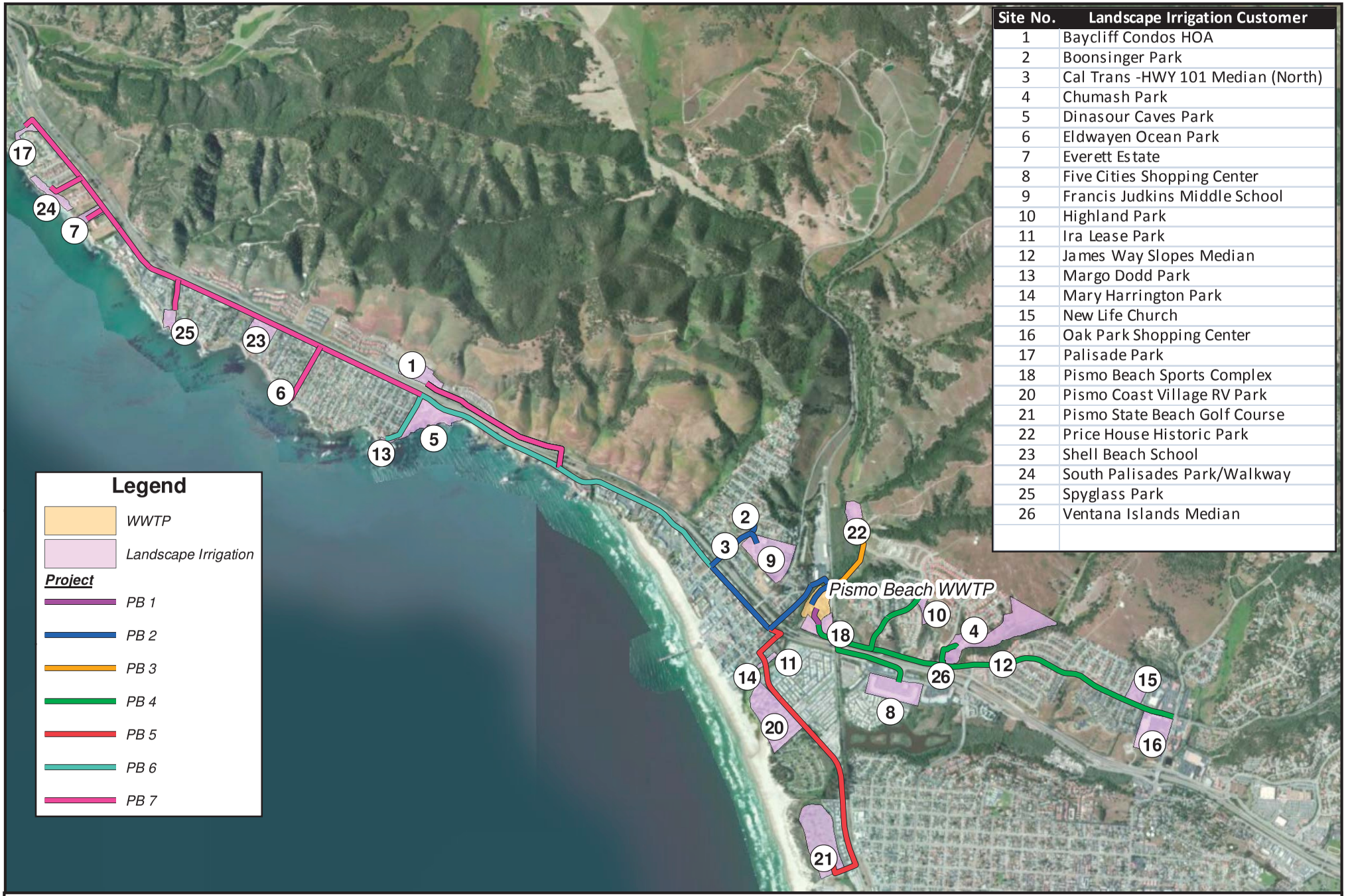
- Maximizing reuse will require more types of uses than just existing landscape irrigation.
- Approximately 130 afy of landscape irrigation demand is located within 0.5 mile of the WWTP, which offers promising reuse opportunities. However, demand estimates for several key potential customers must be confirmed before proceeding much further with planning.

- Tertiary treatment upgrades for small treatment plant commonly have high unit costs due to the lack of scale and could result in high project unit costs for service to customers close to the WWTP.
- There is potential for large recycled water use from new development if approved by the City.
- Two of the largest potential customers – Pismo Beach Sports Complex and Pismo State Beach Golf Course – are not Pismo Beach potable water customers, so their water supply benefit must be achieved through groundwater exchange.
- Most landscape irrigation customers have relatively low demands and are spread across the city, which causes service to these customers have high unit costs.
- Use of Pismo Beach effluent for agricultural irrigation is potentially the most cost-effective reuse project as long as the Pismo Beach receives a water supply benefit. Agricultural irrigation is included in the SSLOCSD section.
- Use of Pismo Beach effluent for groundwater recharge is a viable option and is included in the SSLOCSD section.

The City recently purchased abandoned oil pipelines with the intent to consider their use for conveyance of recycled water. This option could potentially reduce distribution infrastructure costs and make more landscape irrigation projects cost effective. This concept will be evaluated as part of the City's Recycled Water Facilities Plan, which is currently being prepared and is expected to be completed in early 2015.

Next Steps

- Prepare Recycled Water Facilities Plan in consultation with regional stakeholders and the SWRCB.
- Investigate ability to use abandoned oil lines for recycled water conveyance. The RRWSP did not consider this option and its application could make non-potable reuse cost effective for the City.
- Confirm demand estimates for cost effective projects
- Explore alternative tertiary treatment method geared toward relatively small flows (i.e. 0.1 to 0.3 mgd)
- Evaluate the cost to retrofit Pismo Beach State Golf Course and the ability for the city to receive groundwater benefits
- Refine potential projects to develop a phased recycled water program
- Continue discussions with new development (if approved by the City) regarding recycled water demand and funding
- Consider use of the existing outfall as a recycled water conveyance facility (but only if 100% tertiary treatment conversion is planned)
- Compare costs of viable projects with alternative water supplies
- Continue to participate in discussions with regional SSLOCSD projects that could put Pismo Beach effluent to beneficial use and confirm the ability of the City to receive a water supply benefit
- Incorporate salt and nutrient management planning into water, wastewater, and recycled water planning.



Site No.	Landscape Irrigation Customer
1	Baycliff Condos HOA
2	Boonsinger Park
3	Cal Trans -HWY 101 Median (North)
4	Chumash Park
5	Dinasour Caves Park
6	Eldwayen Ocean Park
7	Everett Estate
8	Five Cities Shopping Center
9	Francis Judkins Middle School
10	Highland Park
11	Ira Lease Park
12	James Way Slopes Median
13	Margo Dodd Park
14	Mary Harrington Park
15	New Life Church
16	Oak Park Shopping Center
17	Palisade Park
18	Pismo Beach Sports Complex
20	Pismo Coast Village RV Park
21	Pismo State Beach Golf Course
22	Price House Historic Park
23	Shell Beach School
24	South Palisades Park/Walkway
25	Spyglass Park
26	Ventana Islands Median

Pismo Beach Landscape Irrigation Project Concepts

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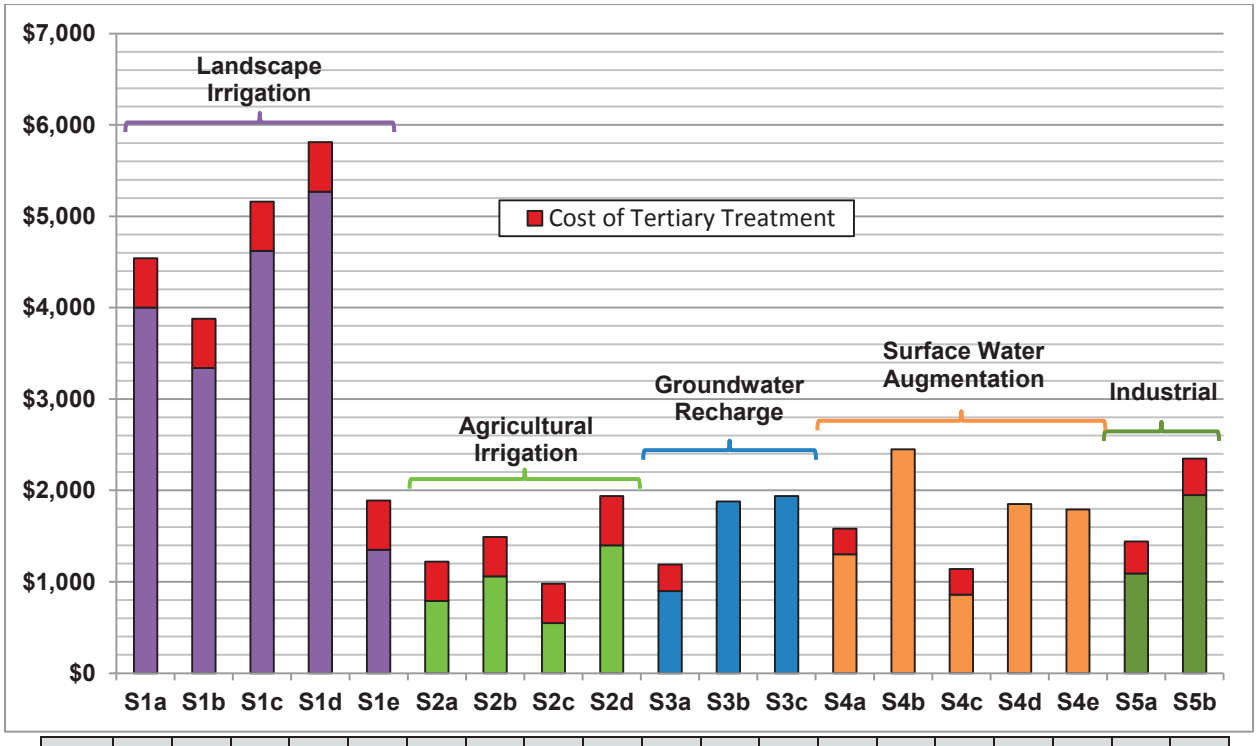
Northern Cities – SSLOCSD

The SSLOCSD WWTP currently discharges approximately 2.6 mgd of disinfected secondary effluent through a joint ocean outfall (shared with Pismo Beach). Approximately 1.1 mgd of disinfected secondary effluent from Pismo Beach WWTP is discharged through the same ocean outfall. SSLOCSD has the largest volume of effluent considered in the RRWSP and the largest opportunities for large-scale reuse; however, landscape irrigation projects are expensive ($3,000+/af) and the more cost effective reuse opportunities – agricultural irrigation, industrial reuse, groundwater recharge, seawater intrusion barrier, and surface water augmentation – will require institutional, legal, outreach, and financial planning to be feasible.

SSLOCSD Recycled Water Project Concepts	
Landscape Irrigation Project Concepts	Groundwater Recharge Project Concepts
S1a. Small Landscape Irrigation Project	S3a. GWR via surface spreading (60% RO)
S1b. Core Landscape Irrigation Project	S3b. GWR via surface spreading (Full AWT)
S1c. Extension to Grover Beach Project	S3c. GWR via injection (Full AWT)
S1d. Extension North of Highway 101 Project	Surface Water Augmentation Project Concepts
S1e. Nipomo Mesa Golf Courses	S4a. Arroyo Grande Creek Augmentation (80% RO)
Agricultural Irrigation Project Concepts	S4b. Arroyo Grande Creek Augmentation (Full AWT)
S2a. Direct delivery over 12 hours each day (Tertiary)	S4c. Los Berros Creek Augmentation (80% RO)
S2b. S2a with 40% RO	S4d. Los Berros Creek Augmentation (Full AWT)
S2c. Direct delivery over 24 hours each day (Tertiary)	S4e. Lopez Reservoir Augmentation (Full AWT)
S2d. S2a; Serving 50% of estimated demand	Industrial Reuse Project Concepts
	S5a. Tertiary Treatment
	S5b. Full RO

Unit Costs of SSLOCSD Project Concepts ($/AF)



AFY	12	162	44	52	1890	1890	1810	1890	1200	2760	2390	2390	2670	2390	2670	2390	2390	1100	1100

Overall, the amount of reuse for landscape irrigation is limited by the demand, while supply limits the amount of agricultural irrigation during the peak demand season (summer). Groundwater recharge and reservoir augmentation are limited by supply. Stream augmentation could be limited by supply or demand depending on future regulatory scenarios related to the volume of flow required at different points in the creek in the Habitat Conservation Plan.

Opportunities and Constraints

Based on the project concepts development process, SSLOCSD recycled water opportunities and constraints include the following:

- Reuse from SSLOCSD WWTP will require upgrade to tertiary treatment.
- Additional treatment may be needed to meet water quality requirements of specific customers (e.g., agriculture) or discharge regulations for specific types of reuse (e.g., stream augmentation or indirect potable reuse).
- Landscape irrigation projects have the highest unit costs due to limited demand in proximity to the SSLOCSD WWTP.
- Agricultural irrigation projects have the lowest unit costs due to substantial agricultural demand in proximity to the SSLOCSD WWTP.
- GWR and stream augmentation projects have moderate unit costs and include a range of costs primarily due to the level of treatment assumed for each project.
- GWR regulations limit the potential for cost effective projects due to the need for blend water.
- GWR and stream augmentation projects offer the highest volume of reuse.
- Industrial reuse has moderate unit costs and could potentially be combined with agricultural reuse since the industrial pipeline has the same alignment as the primary agricultural pipeline.

Next Steps

General

- Complete planned treatment plant improvements and re-evaluate facilities needed to implement tertiary treatment upgrade.
- Track regulatory drivers and their impacts on reuse opportunities from SSLOCSD WWTP, including:
    - RWQCB Waste Discharge Requirements (NPDES Permit)
    - NOAA Habitat Conservation Plan
    - California Coastal Commission Coastal Development Permit
    - Flood Protection / SWRCB Statewide General WDRs for Sanitary Sewer Systems, Water Quality Order No. 2006-0003
- Address institutional issues and potential funding mechanisms for regional projects
    - Discuss cost sharing of projects between water and wastewater agencies or water/sewer funds.
    - Discuss operations and management of the project
    - Discuss the logistics and legal basis for groundwater exchanges.
    - Coordinate with Pismo Beach reuse plans to identify the most cost effective reuse projects for the NCMA.
    - Develop project concepts sufficiently to position for grant funding opportunities

  - Initiate discussions with member agencies about project funding between the water supply entities (Arroyo Grande, Grover Beach, and Oceano CSD) and SSLOCSD.
  - Investigate funding mechanisms for regional projects that benefit NCMA pumpers in addition to SSLOCSD and its member agencies.
  - Discuss support for use of SSLOCSD recycled water in the NMMA and the related ability to receive water supply benefits in the NCMA.
- Incorporate salt and nutrient management planning into water, wastewater, and recycled water planning.

Nipomo Mesa Golf Courses

- Confirm demand estimates that account for future growth
- Address issues associated with use of NCMA effluent in the NMMA.

Agricultural Irrigation

- Initiate planning for agricultural reuse program to enable a project to be developed within 10 years.
- Conduct outreach to agricultural operations in the area determine willingness to use recycled water in the future and obstacles to implementation.
- Set up a pilot study potentially in conjunction with Cal Poly[1] similar to the Paso Robles Recycled Water Demonstration Garden. Identify funding source for a pilot project.

Industrial Reuse

- Discuss reuse options with Phillips66 refinery.
- Address issues associated with use of NCMA effluent in the NMMA.

Groundwater Recharge / Seawater Intrusion Barrier

- Track regulations associated with groundwater recharge and surface water augmentation that impact the basis of projects in the RRWSP.
- Further investigate NCMA groundwater basin, potentially with a groundwater model, to identify surface recharge locations, inland injection locations, and coastal injection locations. Define the benefits of these projects to the basin, particularly the prevention of seawater intrusion.
- Determine benefits of and need for a seawater intrusion barrier (via direct injection or in-lieu reuse) and groundwater levels that would necessitate its use. Determine the value of groundwater protected from seawater intrusion.

Streamflow Augmentation

- Continue to track developments in Arroyo Grande Creek flow requirements / restrictions.
- Track new and potential surface water discharge regulations.

[1] California Polytechnic State University San Luis Obispo, Irrigation Training & Research Center; www.itrc.org

SSLOCSD Recycled Water Project Concepts

San Luis Obispo County
Regional Recycled Water Strategic Plan
Executive Summary
DRAFT JUNE 2014

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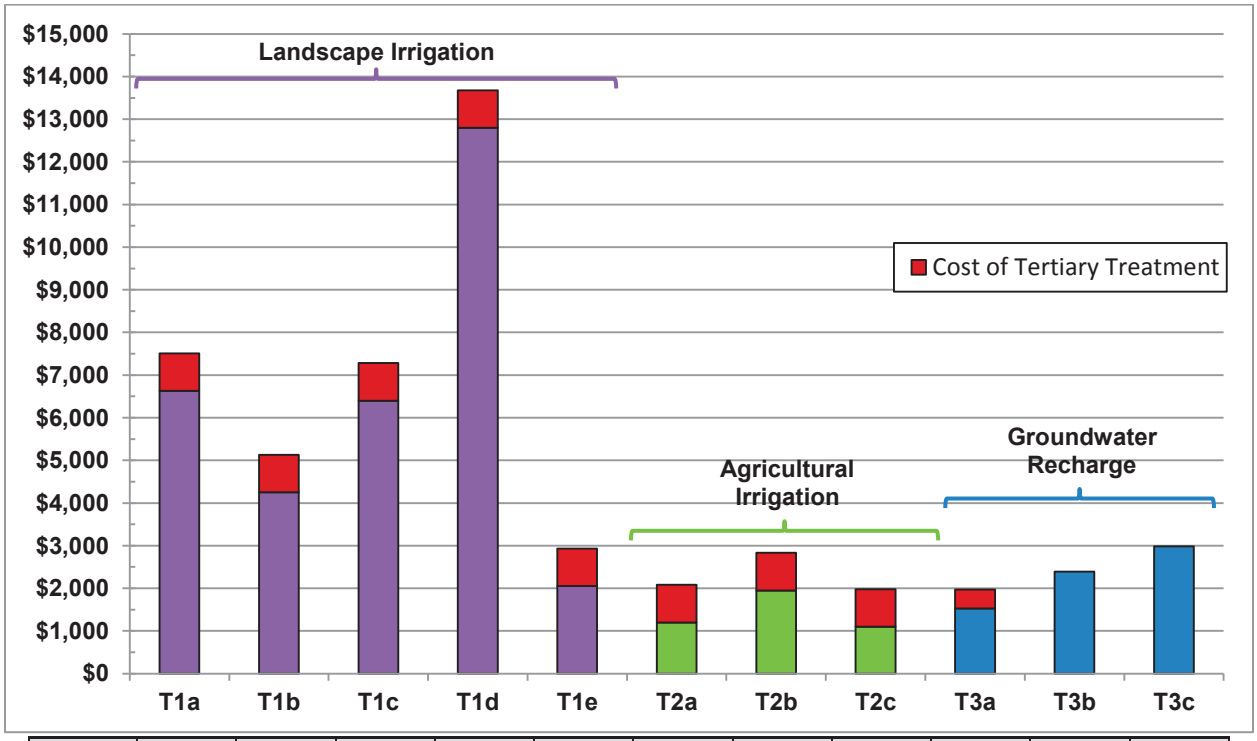
Templeton CSD

Templeton CSD is currently maximizing the water supply benefits of its Meadowbrook WWTP discharges and is planning to divert district sewer flows from Paso Robles WWTP to Meadowbrook WWTP. TCSD is evaluating the percolation capacity of the existing Selby Ponds to handle the proposed flow from the sewer diversion in addition to untreated Nacimiento water, so reuse opportunities are being explored. Most reuse options will require an upgrade to tertiary treatment. Eleven recycled water project concepts were defined for Templeton CSD.

Templeton CSD Recycled Water Project Concepts	
Landscape Irrigation Project Concepts	Agricultural Irrigation Project Concepts
T1a. Downtown Core Landscape Irrigation Project	T2a. Direct delivery over 12 hours each day (Tertiary)
T1b. Evers Sports Park Extension Project	T2b. T2b with 40% RO
T1c. Vineyard Elementary School Extension Project	T2c. Direct delivery over 24 hours each day (Tertiary)
T1d. Jermin Park Extension Project	Groundwater Recharge Project Concepts
T1e. Commercial Landscape Irrigation (Equestrian Center) Project	T3a. GWR via surface spreading (60% RO)
	T3b. GWR via surface spreading (Full AWT)
	T3c. GWR via injection (Full AWT)

Unit Costs of TCSD Project Concepts ($/AF)



AFY	27	16	20	5	160	260	260	260	530	500	500

Opportunities and Constraints

Based on the project concepts development process, TCSD recycled water opportunities and constraints include the following:

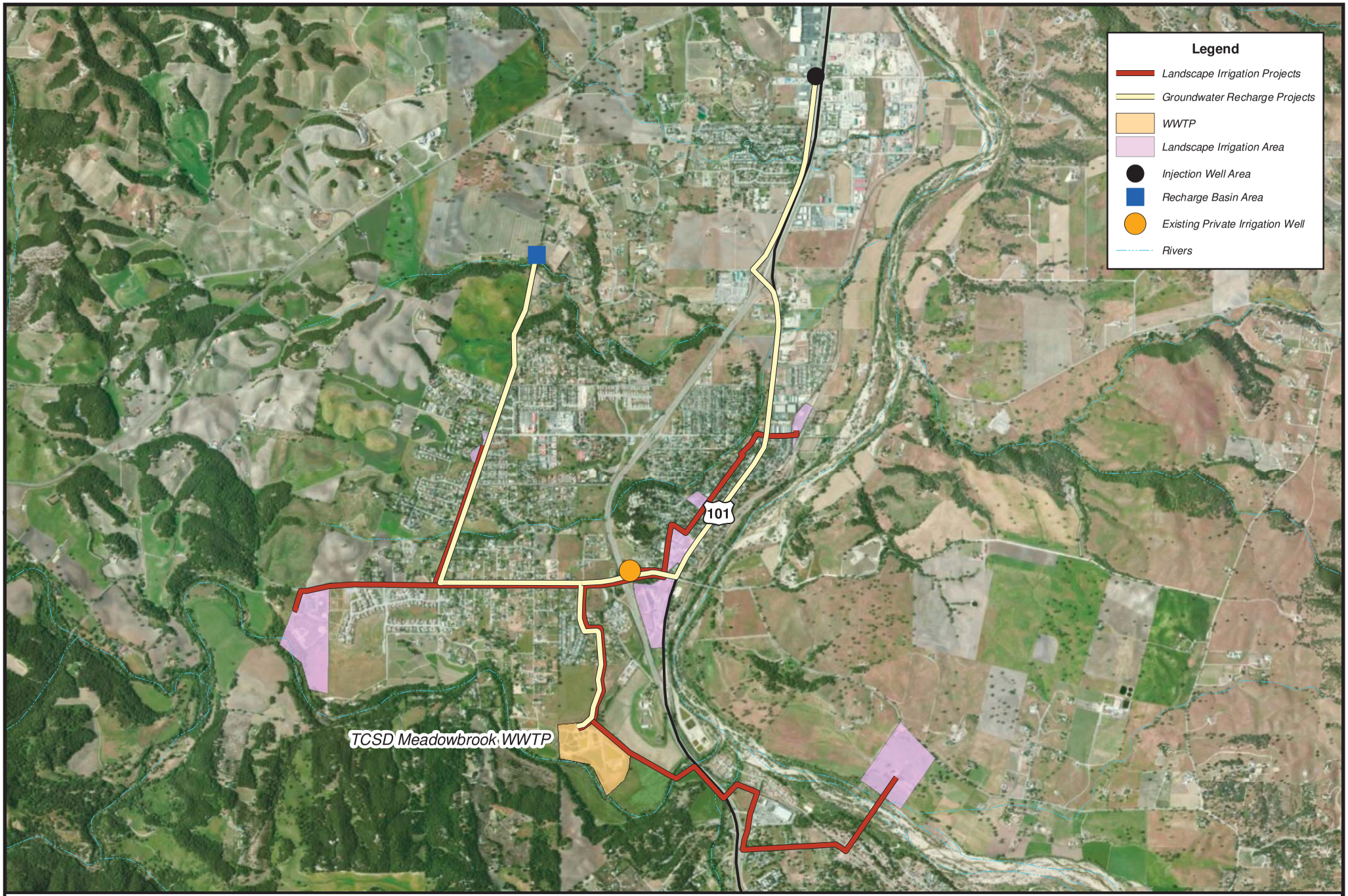
- Reuse via percolation at the Selby Ponds is the preferred use of Meadowbrook WWTP effluent.

- Significant increases to effluent flows are dependent on a combination of septic tank conversions, build-out growth, and diversions from the East Side Force Main and Lift Station Project.
- Potential for reuse of up to 0.2 mgd of effluent without treatment upgrades for feed and fodder irrigation but the reuse would not offset potable water demand.
- Reuse from Meadowbrook WWTP with a water supply benefit will require at least an upgrade to tertiary treatment.
- Additional treatment may be needed to meet water quality requirements of specific customers (e.g., agriculture) or regulations for specific types of reuse (e.g., GWR).
- Landscape irrigation projects have high unit costs due to limited demand in proximity to the WWTP.
- Commercial landscape irrigation (i.e., equestrian farm) has moderate unit costs due to moderate demand.
- Agricultural irrigation has moderate unit costs due to moderate demand in proximity to the Meadowbrook WWTP but a proper market assessment was not conducted.
- GWR has moderate unit costs due to treatment requirements and has the highest volume of reuse all effluent. There is an opportunity to include Nacimiento Water in GWR plans as well. However, costs to incorporate blend water are not included.

Next Steps

TCSD plans to incorporate feasible projects into the District's planned Integrated Water Resources Strategic Plan and must be able to adjust reuse needs based on future percolation performance of the Selby Ponds and actual increases to future flows. Therefore, TCSD should:

- Incorporate commercial irrigation, agricultural irrigation, and groundwater recharge options into the forthcoming Integrated Water Resources Strategic Plan.
- Continue investigation into improving recharge capacity at Selby Ponds through WWTP improvements as well as upgrades and improvements to the ponds.
- Considers water supply benefits and impacts to discharge capacity of continued recharge of Nacimiento water in the Selby Ponds.
- Refine feed and fodder disposal option as a temporary disposal alternative until Selby Pond recharge capacity is better known.
- If Selby Ponds cannot recharge all effluent, refine agricultural irrigation and commercial irrigation options.
- Survey private agricultural and large turfgrass operations in the vicinity of the WWTP for their interest in recycled water use combined with the ability for TCSD to use a similar amount of groundwater currently being used by the entity.
- Consider inclusion of Nacimiento water with recycled water groundwater recharge plans.
- Track GWR regulations for changes that may improve economics of GWR concepts, particularly the need for blend water.
- Incorporate salt and nutrient management planning into water, wastewater, and recycled water planning.



Templeton CSD Recycled Water Project Concepts

San Luis Obispo County
Regional Recycled Water Strategic Plan
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Other Potential Recycled Water Projects

The RRWSP focused on defining projects in five areas across the region but many more relevant opportunities exist.

North County

- **City of Atascadero:** The City currently reuses non-potable discharges at Chalk Mountain Golf Course and is currently preparing a Wastewater Collection System and Treatment Plant Master Plan update that is evaluating reuse at local parks and Atascadero Lake but no projects were defined at the time the RRWSP was prepared.
- **Heritage Ranch CSD:** HRCSD currently discharges effluent that eventually enters an unnamed tributary to the Nacimiento River. The district is considering construction of a spray irrigation discharge site to reduce discharge to surface waters.
- **City of Paso Robles:** The City is currently upgrading its WWTP to an advanced secondary (nutrient removal) process and has begun preliminary design of filtration and disinfection processes that are necessary to produce tertiary quality recycled water. The City recently adopted a Recycled Water Master Plan that identifies areas in east Paso Robles where recycled water may be used to offset pumping from the Paso Robles Groundwater Basin. Also, a major vineyard owner has expressed interest in purchasing recycled water for in-lieu recharge of the Paso Robles Groundwater Basin.

North Coast

- **California Men's Colony:** CMC currently reuses tertiary effluent at Dairy Creek Golf Course and helps to maintain a continuous flow rate of 0.75 cfs in Chorro Creek. CMC is also a regional site considered by the City of Morro Bay and Cayucos CSD for treatment of their effluent.
- **Cambria CSD:** CCSD's effluent discharges serve as a barrier to seawater intrusion. CCSD is currently pursuing an indirect reuse project involving extraction and treatment brackish groundwater near the effluent percolation ponds and is considering future non-potable reuse options.
- **Los Osos WWTP:** The new WRF plant started construction in 2014 and startup is planned for 2016. Reuse will occur via agricultural irrigation, landscape irrigation, and discharge to leach fields. The volume to each type of use is currently being defined through potential customer outreach.
- **San Simeon CSD:** The district installed a 36,000 gpd tertiary filtration system in 2013. Current reuse is via hauling by truck for irrigation of commercial properties. The district has plans to construct a distribution system in phases as funds become available.

South County

- **Rural Water Company:** All effluent is currently reused at the Cypress Ridge Golf Course and capacity remains to reuse more effluent at the course as flows to the plant increase.
- **City of San Luis Obispo:** The City is currently updating its Recycled Water Master Plan to develop plans to expand the system from existing use of 160 afy. There is also a possibility of recycled water sales to agricultural customers on the edge of the city limits, but the City ordinance limits sales of City water supplies to within city limits.
- **Woodlands Mutual Water Company:** All effluent is currently reused at the Monarch Dunes Golf Course and capacity remains to reuse more effluent at the course as flows to the plant increase.

Regional Opportunities, Constraints, and Recommendations

Ultimately, recycled water is one of many water resources options for the region. As presented in the RRWSP, there are several potential recycled water projects across the region that can provide cost effective benefits. A number of factors must be present to successfully implement a cost effective recycled water project, including water supply needs, recycled water supply and demand, acceptable economics, and protection of public health. Local conditions across the region result in a range of recycled water project opportunities and constraints. There are also opportunities and constraints that apply across the region. This section discusses these opportunities and constraints and outlines potential recommendations to move recycled water projects forward on a regional level.

Regional Opportunities and Constraints

The project concepts considered in the RRSWP revealed several recycled water opportunities across the region as well as substantial obstacles to implementation of successful projects. All the reuse projects considered in the RRWSP are technically feasible and some are cost effective but barriers remain to successful project implementation. The most common drivers for recycled water projects across the State are:

- Need for new water supply
- Occurrence of significant seawater intrusion
- Wastewater discharge restrictions

Portions of these drivers are present across the region but not to the degree to support significant recycled water investments. These drivers may increase in the future and would improve the opportunity for reuse projects. Each driver is discussed further here.

Water Supply Need

The need for a new, local, and reliable water supply is the primary driver for recycled water projects in the region. However, the region currently lacks the need for a new, *large* water supply. (Although, the 2014 drought is testing this assumption). Recycled water projects typically have strong economies of scale since the two largest components – treatment and pipelines – have economies of scale. Several potentially viable large (1,000+ afy) recycled water projects were identified but the need for this volume of new water by the individual sponsoring agency has not been demonstrated. The need may be present when considered across multiple water suppliers. A few small, cost effective (< 100 afy) recycled water projects were defined and showed some viability until the cost of small-scale treatment is included. This is the region-wide dilemma for recycled water.

On the other hand, desalination is the other primary potential large, new source of water for the county and studies of potential desalination plants in the County[2] resulted in water supply unit costs ranging from $3,000/af to $3,900/af. In addition, desalination raises non-monetary concerns, such as impact to the marine setting and energy intensity. Most recycled water project concepts in the RRWSP are more cost effective and have less environmental impacts than desalination.

Also, the maximum recycled water rate for willing agricultural customers is the cost of current water supplies, which is roughly of the avoided cost of groundwater pumping. Agricultural reuse

[2] South San Luis Obispo County Desalination Funding Study (Wallace, October 2008); Evaluation of Desalination as a Source of Supplemental Water, Administrative Draft, Technical Memorandum 2 (Boyle, September 2007)

project concepts are some of the most cost effective projects in the region but the full cost of recycled water is significantly higher than groundwater. As a result, successful agricultural reuse projects require creative funding and financing plans.

Occurrence of Significant Seawater Intrusion

The NCMA and NMMA have reduced pumping in recent years to avoid seawater intrusion and, on a smaller scale, Morro Bay, San Simeon, and Cambria have managed pumping to avoid seawater intrusion. To date, their efforts appear to be effective and there does not appear to be a need for a new seawater intrusion barrier. However, conditions may change that could necessitate the need for a new barrier. Recycled water could be recharged via percolation or injection to create a barrier or could provide in-lieu supplies to groundwater pumpers overlying the coastal area threatened by seawater intrusion.

Wastewater Discharge Restrictions

The cost to meet NPDES discharge requirements is generally attributed to wastewater rates and additional costs to produce recycled water are attributed to the recycled water system. Treatment plant upgrades can be a significant project cost, especially the initial phases, and most plants to date have not been required to upgrade to tertiary effluent. Placing the full cost of tertiary treatment plant upgrades with the benefitting recycled water project reduces the potential for a cost effective recycled water project in most cases. However, the future direction of wastewater discharge requirements is toward greater strictness and may require WWTP upgrades that would benefit reuse.

Regional Obstacles and Recommendations

The following table summarizes recycled water obstacles from a regional perspective and recommendations to address these obstacles. The table is followed by a review of regional opportunities, constraints, and recommendations for specific types of reuse projects.

Regional Recycled Water Obstacles and Recommendations

Obstacle	Recommendation
Leadership / Advocate	
Water supply projects take many years (and election cycles) from concept to operations and, as a result, many are put on hold from political and/or staff turnover. Recycled water projects can also take just as long and can cause additional political or staff concerns due to public misunderstanding or misleading information. Therefore, most successful large recycled water projects include respected scientific, public health, environmental, and political advocates to move the project forward by being able to champion the project benefits, help gain the public's trust, and assist to mitigate opposition.	- Identify recycled water champions in multiple fields - scientific, public health, environmental, and political - to support projects. - Support and facilitate regional projects with costs and benefits spread across diverse entities. - Advocate for highest and best use of existing potable water.
Cost	
Recycled water projects costs are too high to gain support.	- Identify new water supply needs based on existing water quantity, quality, or reliability. - Establish specific need for reuse (if appropriate) as part of an integrated water resources plan. - Complete advance project planning and/or preliminary design to for future funding for pilot projects, WWTP upgrades, and delivery systems. - In the future, reconsider feasible projects that may not be cost effective at this time, as the value of recycled water to municipalities grows as limits and reliability of existing sources are strained further.
Cost of treatment plant upgrades to tertiary treatment is an obstacle. Further tightening of discharge requirements will help support reuse as funds are committed to treatment plant upgrades.	- Plan for tertiary treatment upgrades in WWTP facility plans. - Identify funding sources other than recycled water projects for WWTP upgrades.
Brine disposal in the inland setting is a major hurdle for reuse (and any other salt management efforts).	- Incorporate recycled water planning into salt and nutrient management planning to identify the best management measures.
Benefits	
Reuse has clear benefits but many of the benefits are distributed across all water users. Most cost effective opportunities provide water supply benefits beyond the municipalities producing the recycled water.	- Grant funding can help address the contradiction between the lead agency / primary funding source and project beneficiaries. - Advocate for grant funding of recycled water projects in areas attempting to reduce dependence on local groundwater to improve project economic viability.
Legal	
Existing groundwater users do not have a mechanism to transfer their groundwater rights in exchange for use of alternative water supplies as is the case in most adjudicated groundwater basins.	- Start discussions with all groundwater basin pumpers to develop a mechanism to exchange groundwater rights for use of alternatives water supplies.

Obstacle	Recommendation
Financing	
Reliance on a single or low number of customers can cause payback issues if the demand is overestimated or the customer may not exist in the future.	- Confirm recycled water demand estimates and costs to convert each potential recycled water customer. - Get customer commitments prior to start of design and construction to properly design facilities and ensure revenue for loan payments.
Institutional	
Recycled water projects are often times positioned to provide regional benefits that face the challenges of bringing multiple sub-regional political entities together with diverse goals.	- Leverage existing sub-regional water planning groups, such as NCMA and NMMA, to identify key stakeholders and gain support.
Water and wastewater are handled by separate agencies in some areas, causing cost sharing / allocation issues.	- Define water and wastewater benefits of recycled water projects to support cost allocation.
Public Acceptance	
Recycled water projects, particularly involving potable reuse, require thorough, planned public outreach efforts; however, these efforts tend to be underfunded and reactionary instead of proactive, all-embracing, and well-timed.	- Make sure to include funding for initial and ongoing public outreach specific to the targeted groups.
Regulatory	
Some aspects of SWRCB and RWQCB requirements continue to treat recycled water as a waste and not a resource. The perspective is slowly shifting but still remains a hindrance.	- New General Waste Discharge Requirements for Recycled Water Use (WQO 2014-0090) (adopted 6/3/2014) provides a number of improvements to standard reuse permit requirements.
Recycled water project implementation is tied to preparation of salt and nutrient management plans for overlying groundwater basins and plan outcomes may hinder use of recycled water.	- Move forward with salt and nutrient planning in all basins where reuse is being considered and incorporate recycled water plans into the effort.
Policies	
Mandatory use and other similar policies are not in place in most jurisdictions.	- Any jurisdiction implementing a recycled water project should adopt a mandatory use ordinance to demonstrate political support and to be eligible for most grant funds or low-interest loans. - Have developers include 'purple pipe' in new developments within a reasonable distance from the WWTP or planned distribution system. Consider applying California Water Code (CWC) 13551[3] provisions if necessary.

[3] CWC Section 13551: "A person or public agency…shall not use water from any source of quality suitable for potable domestic use for non-potable uses… if suitable recycled water is available as provided in Section 13550."

Landscape Irrigation

Urban landscape irrigation represents the most common type of reuse across California followed by environmental flows and agricultural irrigation. It is the first use for recycled water for most municipal areas since opportunities for agriculture irrigation or environmental flows are limited in these settings. As a result of decades of project operations, implementation of landscape irrigation projects is generally straightforward and involves the least obstacles – with the exception of cost.

There is limited opportunity for cost effective landscape irrigation in the region for a combination of reasons:

- There is a limited amount of large landscape areas due to long-standing water conservation measures taken.
- Most of the existing large landscape areas are golf courses and most of these use at least some recycled water or non-potable groundwater. (Although significant volumes of potable water are used at these courses too to meet irrigation demand).
- Potential large landscape areas identified in the RRWSP are too far from existing WWTPs and/or demands are too small for cost effective distribution to the sites.
- The small opportunities that exist require WWTP upgrades to tertiary treatment, which generally have high unit costs on a small scale.

Several potential landscape irrigation projects are identified in the RRWSP. The cost effective projects are close to the WWTP and/or include a golf course that uses large volumes of potable water. Implementation of the smaller projects is probably more feasible due to the total cost as long as the tertiary treatment portion of the cost can be managed. In addition, successful implementation of small recycled water projects could spur support for expansion in the future.

Agricultural Irrigation

Of the types of recycled water projects evaluated in the RRWSP, agricultural reuse has the most potential across the region. Agricultural water use represents approximately 75% of total water use across the region. Agricultural reuse is advantageous because of the relatively high demand in concentrated areas combined with proximity to the existing WWTPs. Also, agricultural reuse represents matching water quality to use thus freeing potable water for potable uses. Finally, agricultural reuse in coastal locations can serve as a seawater intrusion barrier.

There are many hurdles to successful agricultural reuse projects in the region:

- Recycled water producers realizing a water supply benefit. The benefit can be realized if the agricultural customer agrees to reduce pumping from potable groundwater aquifer(s) by the amount of recycled water used.
- Providing recycled water at a competitive price to existing agricultural water supplies. Recycled water can be sold to agricultural customers at or below their current cost of water supply (primarily groundwater at up to $300/af) but the revenue from recycled water sales would most likely not cover the cost of the recycled water project on its own. To economically justify such a project, the avoided cost of new water supply acquisition must be considered as well as the potable water revenue received from the new potable supply.
- Gaining willing agricultural customers of recycled water due to real and perceived issues.

- Identifying or creating a lead agency with the capability and authority to develop, construct, and operate a regional project.

Agricultural reuse offers one of the best opportunities for recycled water use in the region while also having several obstacles to overcome. Considering this, the region can start to take efforts to address the obstacles by starting discussions on governance, water supply benefits, and recycled water pricing. In addition, steps can be taken to address grower concerns over recycled water use so that these issues can be resolved while the other non-customer issues are addressed. Recommended next steps include:

- Reach out to agricultural interests to determine steps necessary to gain willing customers.
- Conduct technical studies considering specific recycled water quality, soil conditions, and crops.
- Follow technical studies with pilot studies, potentially set in conjunction with Cal Poly[4], similar to the Paso Robles Recycled Water Demonstration Garden.
- Identify funding source(s) for a pilot project.
- Conduct educational tours of existing agricultural reuse projects in Northern, Central, and Southern California.
- Leverage the agricultural resources of the local Resource and Conservation Districts during outreach and implementation.
- Consider application of CWC Section 13551[5] to gain agricultural customers based on the availability of recycled water of adequate quality and at a reasonable cost. (Refer to Section 13.2.1 for further discussion).

Groundwater Recharge

Groundwater recharge with recycled water has some potential opportunities across the region, but geological constraints and treatment requirements cause most projects to be too expensive. The two primary areas considered for recharge – Northern Cities Management Area and Paso Robles Groundwater Basin – have limited areas where water recharged from the surface can reach the potable water aquifers. Injection is needed where surface recharge locations are lacking and injection requires the additional costs of injection wells and advanced treatment (beyond tertiary) of recycled water.

One location where injection could make sense is along the coast as a seawater intrusion barrier. Several key steps were identified for successful implementation of a potential seawater intrusion barrier projects for SSLOCSD. Other than cost, the primary obstacles to GWR with recycled water are:

- Better understanding of the groundwater basin.
- Definition of benefits other than a new water supply, such as preventing seawater intrusion and/or subsidence.
- Receipt of benefits by project sponsors or sharing of costs across all basin beneficiaries.

[4] California Polytechnic State University San Luis Obispo, Irrigation Training & Research Center; www.itrc.org
[5] CWC Section 13551: "A person or public agency…shall not use water from any source of quality suitable for potable domestic use for non-potable uses… if suitable recycled water is available as provided in Section 13550."

Also, the region should track GWR regulations that impact the basis of projects in the RRWSP. For example, currently, groundwater recharge regulations limit the potential for cost effective projects due to the need for a large volume blend water.

Streamflow Augmentation

Streamflow augmentation is an attractive reuse option since many streams now have minimum flow requirements for habitat and/or wildlife preservation. For example, offsetting Lopez Dam releases to Arroyo Grande Creek or increasing stream flow in other portions of the region to allow for pumping would create new water supplies.

However, the largest obstacles to implementation of these projects are surface water discharge regulations. Existing surface water discharge regulations add significant treatment costs and potential regulations would require even higher levels of treatment and the associated costs. This creates a situation where the ultimate cost of a project may not be known once operations start, since new regulations may require new treatment in the future to continue project operations.

To assess streamflow augmentation options in the future:

- Continue to track developments flow requirements and restrictions in in Arroyo Grande Creek and other potential sites across the region
- Track new and potential surface water discharge regulations

Concluding Remarks

The best opportunities for reuse – agriculture and groundwater recharge – align with the region's water resources profile: agriculture comprises approximately 75% of total water use and groundwater represents approximately 90% of water supplies. However, institutional and other implementation issues arise when attempting to allocate costs and realize benefits for agriculture and GWR projects because recycled water is produced by public agencies but beneficiaries extend beyond the municipalities.

Recycled water offers one of the region's best options for new water supplies, especially when compared with the cost and environmental impacts of desalination. However, many recycled water projects are more expensive than additional conservation or fully realizing the relatively recent investments in surface water projects. Additionally, water supply conditions and the associated need for recycled water vary by individual agency while recycled water projects require regional scale to achieve significant water supply benefits and acceptable costs due to economies of scale.

The full cost of recycled water appears to be too high for many areas at this time, but will become more competitive in the future as other options become more expensive, the value of local supplies increases, and successful grant funding helps to subsidize local costs. In the meantime, the region should take the initial steps outlined in the RRWSP to address hurdles to implementation of feasible recycled water projects and provide minimal initial investment in projects to position them for grant funding.

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