Fallbrook Public Utilities District Master Plan (2012) - Draft

Prepared by District Staff

Table of Contents

Chapter 2 – Recycled Water

2.1 Background

The District started serving reclaimed water in 1991. Currently the WWTP treats all influent flows to tertiary standards. The recycled sales peaked in 1997 at 860 AFY and sales have varied from 350 AFY to 675 AFY over the last few years. In 2010, two nursery customers who leased District property were required to relocate due to the construction of new District solar facilities, which resulted in reduced recycled usage. The average usage in 2011 was 600 AFY and this is used as the estimated average annual baseline usage with the current customers. The amount of recycled water available varies slightly due to minor infiltration in the wet season, but as shown in Table 2-1 is typical between 150-180 AF per month. The amount of recycled water used by customers varies significantly from summer to winter due to irrigation needs, but in the peak month of August recycled demand accounted for 77 AF or 44% of influent flows as shown in Table 2-1. The ratio of peak month (77 AF) demand to average monthly demand (50 AF) is 1.5:1.

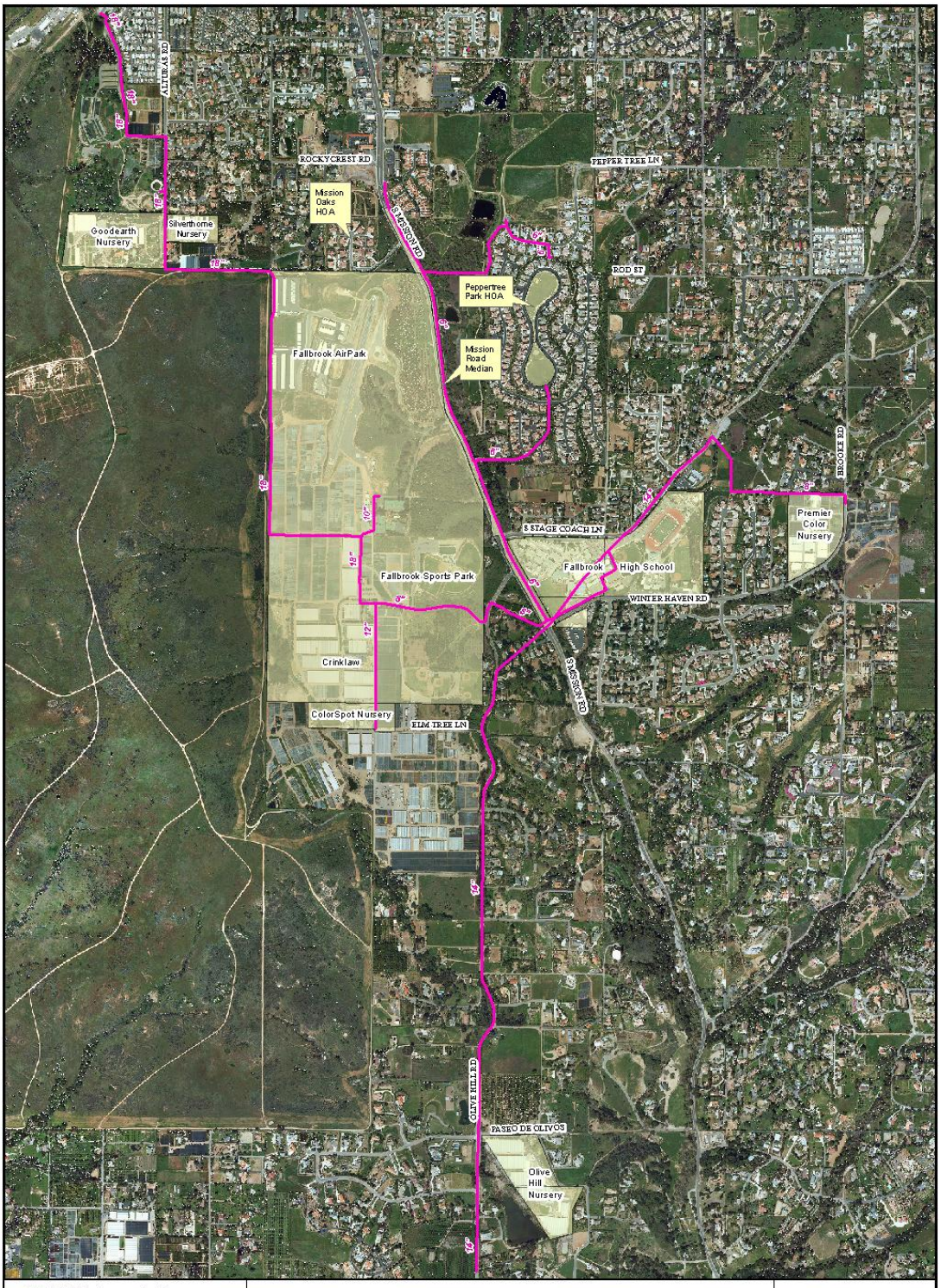
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
WWTP Influent Flow (AF)	183	162	177	163	168	164	165	165	160	162	159	170	2000
Recycled Water Sales (AF)	23	22	36	59	77	62	73	77	71	49	27	32	608
Unused Recycled Water (Ocean Disposal) (AF)	137	143	123	90	87	87	68	74	76	83	90	162	1220
% Recycled Usage	13%	13%	20%	36%	46%	38%	44%	47%	44%	30%	17%	19%	30%

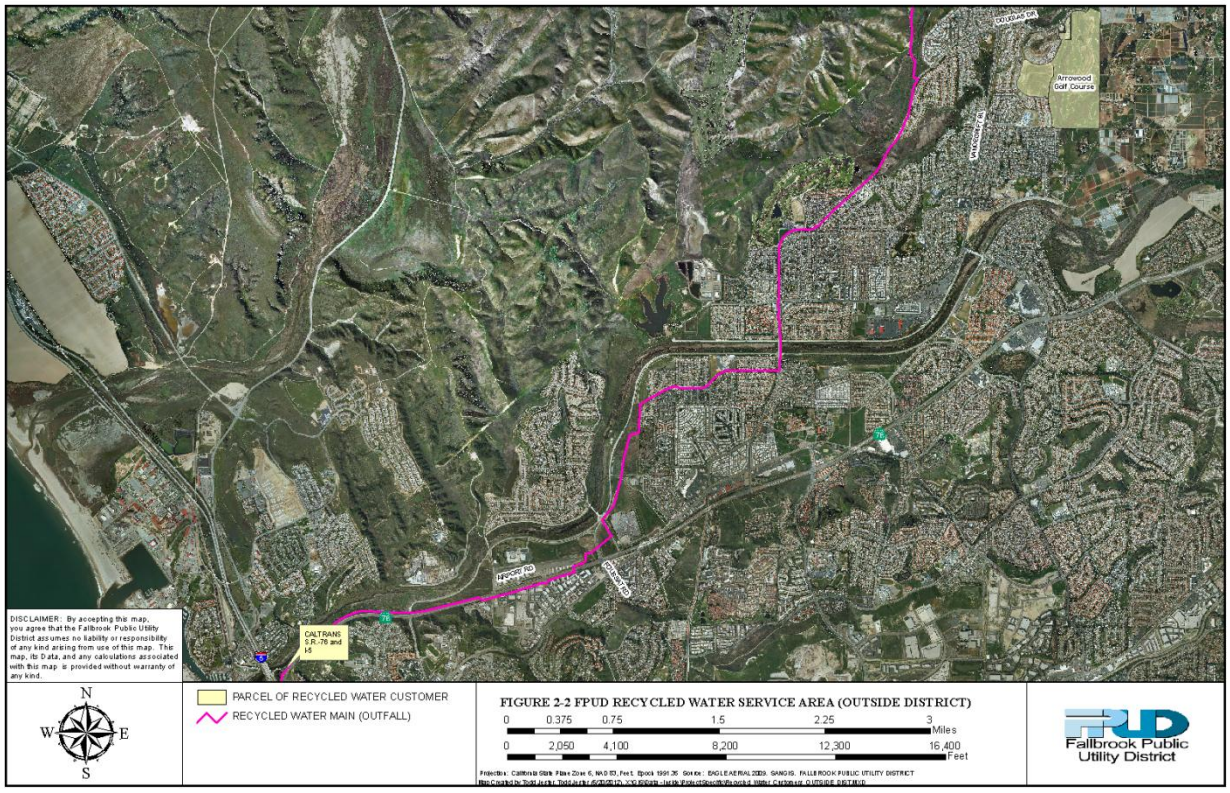
Table 2-1 - Monthly Recycled Water Usage 2011 (All figures in AF)

The District currently serves the following recycled customers:

- Goodearth Nursery
- Silverthorne Nursery
- Crinklaw
- ColorSpot Nursery
- Fallbrook Sports Park
- Olive Hill Nursery
- Fallbrook High School
- Peppertree Park HOA
- Mission Road Median
- Fallbrook Airpark
- Mission Oaks HOA
- California Department of Transportation (Caltrans)
- Arrowood Golf Course
- Premier Color Nursery
- Orange Grove Energy

The District serves users within FPUD service area and also users within the City of Oceanside's service area through the land outfall and one user in Rainbow MWD service area (Orange Grove Energy) using fill trucks and a recycled fill station. The locations of the current users are shown on Figures 2-1 and 2-2.


ROCKYCREST RD
PEPPER TREE LN
Mission Oaks HOA
Goodearth Nursery
Silverthorne Nursery
SAGEWOOD RD
ROD ST
Peppertree Park HOA
Fallbrook AirPark
Mission Road Median
BROOKE RD
Premier Color Nursery
STAGE COACH LN
Fallbrook High School
Fallbrook Sports Park
WINTER HAVEN RD
Crinklaw
DE LUZ SPRS
ColorSpot Nursery
ELM TREE LN
OLIVE HILL RD
PASEO DE OLIVOS
Olive Hill Nursery
DISCLAIMER: By accepting this map, you agree that the Fallbrook Public Utility District assumes no liability or responsibility of any kind arising from use of this map. This map, its Data, and any calculations associated with this map is provided without warranty of any kind.
PARCEL OF RECYCLED WATER CUSTOMER
RECYCLED WATER MAIN
Fallbrook Public Utility District
N
W
E
S
FIGURE 2-1 FPUD RECYCLED WATER SERVICE AREA (INSIDE DISTRICT)



2.2 Available Recycled Water Supply

The current recycled water system has reliability issues related to the age of the WWTP facilities and the lack of recycled storage. These issues have limited the ability of the District to add new customers since potable make-up water is often required when demands exceed supplies on peak demand days and when the plant is not producing tertiary effluent. In June 2011, the District evaluated alternatives to minimize use of potable make-up water for peak demand days. As shown in Figure 2-3, during certain hours on a peak day recycled demands can exceed effluent flows:

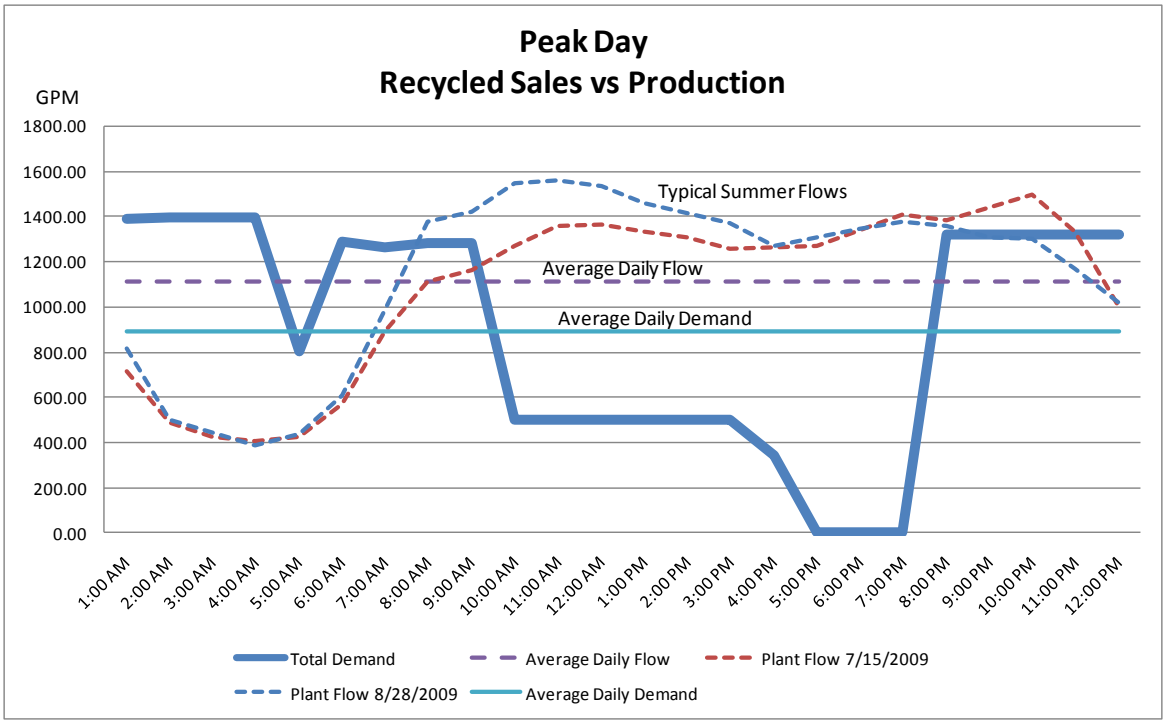


Figure 2-3 – Peak Day Recycled Demands versus Available Supply

Based on this evaluation, it was determined that recycled storage of at least 350,000 gallons is required to equalize flows during peak day demands. As part of the planned improvements at the WWTP approximately 1.5 MG of storage will be included to allow for equalization over several peak demand days. Once this storage is completed the District will be able to add additional recycled customers without increasing potable make-up water needs up to the approximate available monthly supply for the peak demand month.

Without any additional WWTP flows and with sufficient storage to deal with daily fluctuations, the recycled peak month demand could be expanded up to approximately the peak month supply. Without the construction of additional seasonal storage, the maximum recycled demand would be limited to the maximum recycled supply in the maximum demand month. This would allow an approximately 214% increase in demands, based on utilizing all recycled water in August which is the constraint on available supply versus demands as shown in Table 2-2. If it is assumed that the current demands could be increased proportionally in each month using our current demand profile, as shown in Table 2-2 then an estimated 1300 AFY would be available for additional recycled users. Since current usage is 600 AF, it would allow for up to 700 AF of new supply once the WWTP improvements are complete. Since the annual amount of influent wastewater is 2000 AF, at this utilization 700 AF would go out the outfall without additional of seasonal storage or 35% of the available supply.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
WWTP Influent Flow (AF)	183	162	177	163	168	164	165	165	160	162	159	170	2000
Current Recycled Water Sales (AF)	23	22	36	59	77	62	73	77	71	49	27	32	608
Maximum Potential Usage (Maximum Month - 100%)	49	46	77	126	165	133	157	164	152	106	58	69	1301
Unused Recycled Water (Ocean Disposal) (AF)	134	116	101	36	4	31	9	1	9	57	101	101	699
% Maximum Recycled Usage	27%	28%	43%	78%	98%	81%	95%	100%	95%	65%	36%	41%	65%

Table 2-2 – Projected Maximum Monthly Available Recycled Water for new Users (All figures in AF – Based on 2011 Influent Flow and Recycled Usage)

2.3 Recycled Expansion Options

A number of options were evaluated for the recycled water system to try and ensure the District is evaluating the economic impacts of all feasible wastewater disposal and reuse options:

1. Eliminating the Recycled Water Program
2. Developing Additional Recycled Water Demands in FPUD Service Area
3. Development of an Potable Recharge Project with Aquifer Storage and Recovery
4. Development of a Potable Recharge Project with Reservoir Augmentation

2.3.1 Option 1 - Stopping Recycled Water Production

The District is in the process of planning extensive improvements at the WWTP to improve reliability. The estimate total cost of the project is over $20 million. The improvements include extensive rehabilitation to the tertiary facilities that produce recycled water. If tertiary facilities were eliminated and all effluent was disposed of via the ocean outfall then the capital cost of the project could be reduced by about $3-$5 million. Recycled Water revenue is approximately $1480/AF including MWD and SDCWA rebates, service charges and water sales. Based on current annual sales of 515 AF per year[1] this results in $762,200 in annual revenue. If recycled sales were stopped it is estimated that O&M costs would reduce by $200,000 per year in reductions in equipment and materials. It is not expected that staffing requirements would decrease to the extent that staff reductions would be possible. There would be no savings on costs from previous capital expenditures on distribution and treatment. The net annual loss would be $562,000 per year. A summary of the capital, O&M and lifecycle cost for discontinuing recycled production is summarized below:

Capital Cost: $3-$5 million savings

O&M Cost: $-562,000

Present Worth Lifecycle Costs (30 years, 3%): -$8 to -$6 million

1. Although 600 AFY is utilized some recycled water is utilized for community areas at no cost so revenue was collected for 515 AF of the 600 AF used.

2.3.1 Option 2- Additional Recycled Users in FPUD service Area

The District has identified 42 AF of new recycled projects that will be included in existing development projects as shown in Table 2-3. The projects are already included in developer plans and it is not expected for there to be any cost to the District for these projects. Additional recycled projects were also identified as shown in Figure 2-3. These projects include a East, South and North Extension of recycled service.

Recycled Water Projects	Estimated Demand (AFY)	Estimated Cost	Cost (1,000$/AFY)
Peppertree Development Phase 7	14	0*	0
Peppertree Development Phase 8 and 9	28	0*	0
North Extension	55	$475,000	$8.6
East Extension	85	$780,000	$9.2
South Extension	40	$520,000	$13
Total	**222**	**$1,510,000**	**$8.9**
Total without North Extension**	**167**	**$1,035,000**	**$6.2**

*Costs Already included in the development
** North Extension Dependant on Construction of Army Reserve Base which is uncertain.

Table 2-3 – Additional Recycled Water Projects

The North Extension is tied to the potential construction of an Army Reserve Center on Naval Weapons Station Fallbrook. This project may not proceed and without this project there would not be sufficient demand for the extension, since the only additional demand on the North Extension would be from limited apartment complex retrofits and middle school outdoor irrigation. The East extension would feed a large nursery at the East end of the service area. The South extension would feed a nursery at the South Western end of our district. With the East and South extensions we would only be able to capture an additional 170 AFY. A summary of the estimated monthly supply and demands based on expanding the recycled system is shown in table 2-4.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
WWTP Influent Flow (AF)	183	162	177	163	168	164	165	165	160	162	159	170	2000
Current Recycled Water Sales (AF)	23	22	36	59	77	62	73	77	71	49	27	32	608
Projected Potential Usage (Additional 170 AFY)	29	28	46	76	98	79	94	98	91	63	35	41	778
Unused Recycled Water (Ocean Disposal) (AF)	153	135	131	87	70	84	72	67	70	99	125	129	1221
% Maximum Recycled Usage	16%	17%	26%	46%	58%	49%	57%	60%	57%	39%	22%	24%	39%

Table 2-4 – Projected Monthly Recycled Water Usage with New Users (All figures in AF)

Since the facility already produces tertiary water, there are no additional capital costs and the marginal O&M costs for production and supply are limited and estimate to be $166/AF additional cost so the annual revenue is estimated at $1314/AF. A summary of the capital, O&M and lifecycle cost for developing additional recycled pipelines based on details in Appendix A is summarized below:

Capital Cost: $1,035,000 million

Annual Revenue (170 AFY at $1314/AF): $223,380

Present Worth Lifecycle Costs (30 years, 3%): $3.3 million

Regulatory Issues:

The existing recycled permit should cover new users for the East and South extension which are in the San Luis Rey watershed. It will require requesting approval from the RWQCB and County, approval of recycled piping plans and having the County conduct an initial cross connection test. The North extension would result in additional users in the Santa Margarita Watershed which has stricter Total Dissolved Solids (TDS) and Nutrient limits and may require the District to complete a salt and nutrient management plan in order to obtain RWQCB approval.

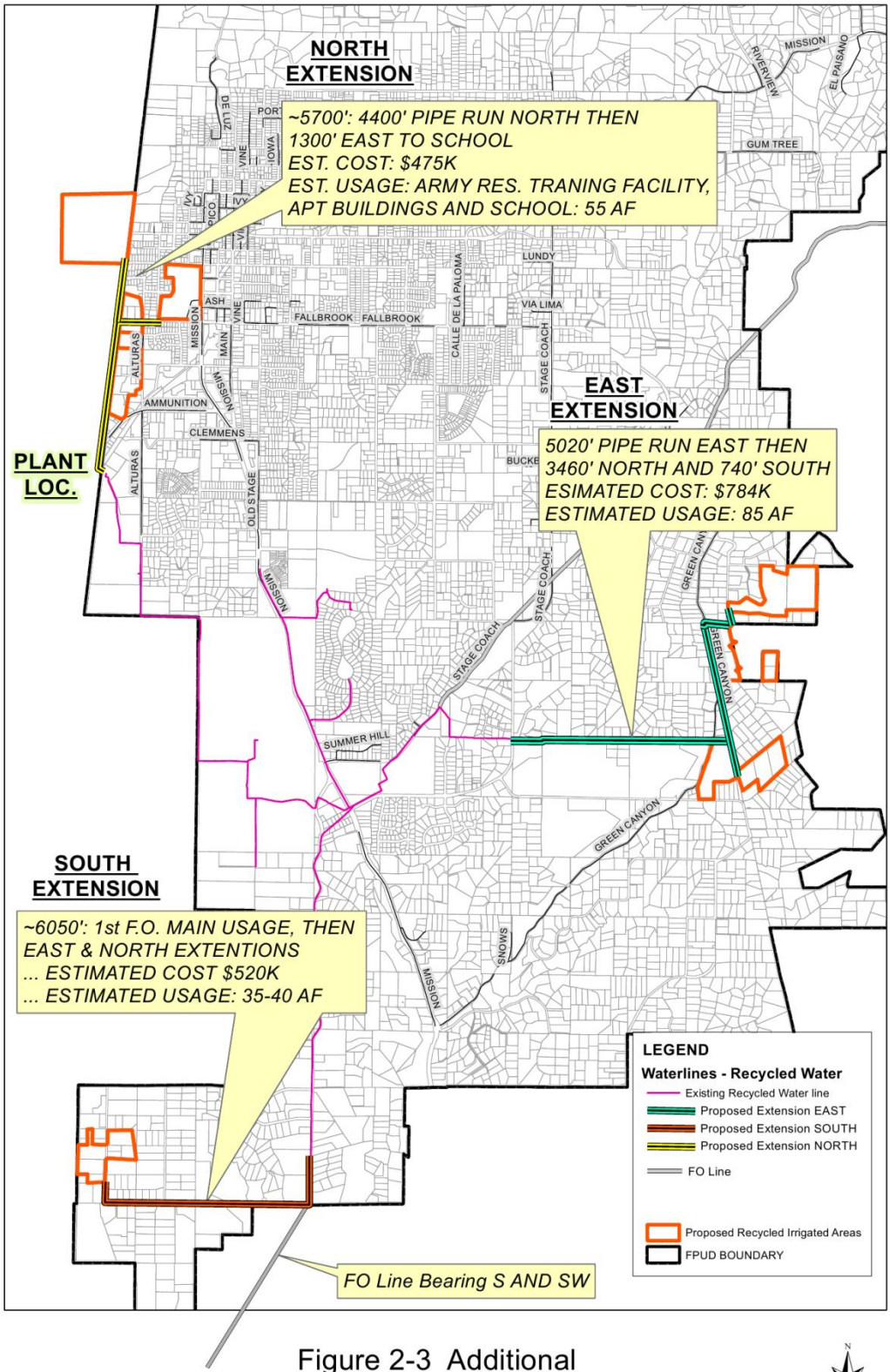


Figure 2-3 Additional
Recycled Water Users in FPUD Service Area

MAP BY SOLEIL DEVELLE 8/24/12
X:\SOLEIL\PROJECTS\Water usage_Reclaim water\RECYCLEDWATER_EXPANSION_PLAN_2012-8-11X17

2.3.2 Development of Potable Reuse Aquifer Storage and Recovery (ASR) Project

Based on the analysis in Section 2.3.1, an additional 170 AFY can be developed within the FPUD service area to create a total annual recycled water demand of 778 AFY which would still result in 1220 AFY sent to the ocean, so the District is also evaluating potential Potable Reuse (PR) alternatives such as aquifer storage and recovery to more fully utilize local water resources. Potable recharge projects that implement discharges to recharge groundwater basins have been successfully permitted and operated in California since 1962. This type of project would allow the District to more fully utilize available recycled water as a water supply source. Since the District does not overlay a viable aquifer, it would require coordination with either Camp Pendleton or Oceanside who overlay aquifer's downstream of the District. The WRP is located so that disposal could be to Fallbrook Creek in the Santa Margarita Watershed or with some additional piping to Ostrich Creek in the San Luis Rey Watershed. The water would then need to be diverted and recharged to the aquifer on the lower end of the rivers, which overlay viable aquifers.

As shown in Figure 2-4, the facilities for diversion and recharge of river flows already exist on Camp Pendleton for the Santa Margarita Watershed. In additional, as part of the Santa Margarita Conjunctive Use Project additional facilities are planned to pump groundwater and deliver to Fallbrook. The benefits and drawbacks of each option are listed in Table 2-5 below:

Option	Benefits	Drawbacks
Discharge to Fallbrook Creek	Increases Yield of Conjunctive Use Project (CUP). Facilities Planned as part of CUP to divert, store and deliver water back to FPUD. Provides potential permanent outfall capacity for Oceanside. FPUD holds water rights in Santa Margarita River.	Requires Live Stream discharge permit from RWQCB with potential limits of 1 mg/l as N for N and 0.1 mg/l as P for P. Annual limit but cannot be exceeded more than 10% of the time. TDS Target 750 mg/l.
Discharge to Ostrich Creek	Water Quality Discharge limits are higher for the San Luis Rey Watershed. Could provide additional yield for Oceanside's Desalters.	Requires Live Stream discharge permit from RWQCB with potential limits of 1 mg/l as N for N and 0.1 mg/l as P for P. Annual limit but cannot be exceeded more than 10% of the time. TDS Target 500 mg/l. Requires infrastructure for conveyance to Ostrich Creek.

		No facilities planned to improve recharge or delivery water from San Luis Rey River to Fallbrook and would require a water exchange agreement with Oceanside. FPUD holds no water rights for San Luis Rey. Water rights requirements would need to be determined.

Table 2-5 – Comparison of Potable Reuse ASR Projects

2.3.2.1 Fallbrook Creek Potable Recharge Project

Of the two options discharge to Fallbrook Creek has more potential as a viable PR project since the facilities to recharge the groundwater basin and transport water back to the District from the Groundwater basin on Camp Pendleton. As shown in Table 2-6 if an additional 170 AFY per year of recycled demands are developed, there is still the opportunity for 1000 AFY of title 22 water as a supply for an ASR PR project. In order to meet the surface water discharge objectives of 1 mg/l as N and 0.1 mg/l as P it would be necessary for the plant to operate in nitification/denitirication mode and utilize the filters as denitrification filters. Additional chemical treatment would also be required for Phosphorous Removal. The current recycled water average TDS is 880 mg/l so a reduction in TDS of 130 mg/l would be required unless the District could demonstrate that the higher TDS would not have adverse impacts. This following modifications and additional facilities would be required:

- Additional of Recirculation Pumps in the Activated Sludge Tanks
- Replacement of Filter Media for Conversion to Denitrification Filters
- Chemical addition for P removal
- Construction of 1 MGD Microfiltration Facilities for P removal and RO pre-treatment.
- Addition of Methanol Feed Facilities for Denitrification Fillters
- Reverse Osmosis Facilities to treat 15% of flow to meet 750 mg/l TDS target.

The brine could be disposed via the existing outfall. A summary of the general criteria for the ASR IPR project are below:

Criteria	**Units**
Design Capacity	Up to 1 MGD Discharge to Fallbrook Creek
Process Components	Modification for Denitrification/Nitrification at WRP. 1 MGD MF Facility. 0.15 MGD RO IPR Facility.
Estimated Footprint[(1)]	3000 sf
IPR Water Source[(2)]	Title 22 Filtered Water from Fallbrook WRF

Discharge Location	Fallbrook Creek
Recharge Location	Lake O'Neil or recharge ponds – Upper Ysidora Sub Basin
Average Retention Time in Aquifer [3]	27 years
Average Recycled Water Contribution[4]	9%
Maximum Recycled Water Contribution [4]	15%
Overall Estimate Percent Recovery[5]	83%
Net Additional Water Supply Produced	830 AFY

(1) Rough Estimate Based on footprint of City of San Diego 1 mgd demonstration Facility

(2) Includes initiation of nitrification/denitrification at WRF.

(3) Santa Margarita CUP auqifier includes Chappo at 27,000 and Upper Ysidora Sub-basins at 12,500. Based on location of Lake O'niel average retention time estimate based on Chappo volume and average annual discharge. Minimum retention time to closest withdrawal well will be substantially less.

(4) Based on modeling projected by Stetson Engineers after construction of SMR CUP facilities based on 50 years of hydrology average yield will be 10,500 AFY. Minimum yield will be 5,600 AFY.

(5) Based on 15% RO treatment and 85% Bypass with 95% recovery from MF, 85% RO and additional 10% loss for evapotranspiration

Table 2-6 Conceptual Criteria for Fallbrook Creek IPR Project.

This alternative would improve the yield of the conjunctive use project and free up permanent outfall capacity that is needed by Camp Pendleton. The FAT would be located at the existing WRP site as shown in Figure 2-5.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
WWTP Influent Flow (AF)	183	162	177	163	168	164	165	165	160	162	159	170	2000
Projected Recycled Water Sales (AF)	29	28	46	76	98	79	94	98	91	63	35	41	778
IPR Production (1 MGD Max, 92 AFM)	92	92	92	87	70	84	72	67	70	92	92	92	1002
Unused Recycled Water (Ocean Disposal) (AF)	61	43	39	0	0	0	0	0	0	7	33	37	219
%Recycled Usage	66%	74%	78%	100%	100%	100%	100%	100%	100%	96%	80%	78%	89%

Table 2-6 – Projected Monthly Recycled Water Usage with New Users and 1 mgd WPF Facility (All figures in AF)

The overall economics of the project depends on the ability to apply the existing Local Water Supply Development (LWSD) Program from the SDCWA and MWD to the water produced. The LWSD program was developed to encourage recycled water projects and provided $200/AF from SDCWA and the local resources program (LRP) provided $250/AF from MWD. The LWSD program applied to up to 900 AFY, while the LRP allowable yield adjusts based on actual usage and 900 AFY is used as an estimate. Since we expect 780 AFY of recycled sales the rebate would apply up to 120 AFY only of the additional PR project unless the rebates could be secured for the full project. In addition, the rebate applied to water designated for non-potable beneficial uses, but it was not specifically identified that potable recharge was an eligible use. It is currently not clear if the rebate will apply for these projects. As identified in Table 2-5, Camp Pendleton is looking to secure some permanent outfall capacity, and it is estimated that the value to Camp Pendleton of permanent capacity in the outfall would be at a minimum equal to their current annual cost for leased capacity which is roughly $200,000 per year.

A summary of estimated capital and O&M costs to implement a Fallbrook Creek IPR Project without the SDCWA and MWD rebate based on details in Appendix A is below:

Capital Cost: $9,750,000 million

O&M Cost for Potable Water Produced: $928 per AF

Offset for Outfall Capacity Dedicated to Camp Pendleton: $240/AF

Capitalized Unit Cost (30 years, 3%): $600/AF

Annual Avoided Water Cost (830 AFY at $672/AF, No Rebate, outfall capacity offset): $557,760

Present Worth Lifecycle Costs (30 years, 3%): $1.2 million

Total Unit Production Cost: Capital + O&M (No rebate) + Outfall Offset = $1250/AF

Regulatory Issues:

While this project would provide recharge to the groundwater basin, the proposed discharge configuration would make it a live stream discharge project, which are widely used across California. The project would require a NPDES permit from the RWQCB as well as approval from the CDPH. The project would likely be required to meet basin plan objectives by the RWQCB for nutrients and TDS for the Santa Margarita Watershed which are 1 mg/l as N for total Nitrogen, 0.1 mg/l as P for Phosphorous and 750 mg/l for TDS unless studies demonstrate that beneficial uses can be protected at higher nutrient and TDS levels. It may be subject to groundwater replenishment regulations by the CDPH, although it could be argued that it is not a groundwater recharge application and less expensive capital facilities could potentially be utilized. Currently the cost assumptions are based on meeting the basin plan objectives and not providing Full Advanced Treatment (FAT). Studies are currently underway to further evaluate nutrient limits in the Santa Margarita Watershed, which may effect discharge limits for the facility. Given the volume of the aquifer and the recharge location, it is likely that the CDPH retention requirements could be met if they were required by CDPH, but more detailed studies are necessary based on the nearest well sites.

2.3.2.2 Red Mountain Reservoir Augmentation Project

In-lieu of discharging advanced treated water into Fallbrook Creek, the water could be discharged into Red Mountain Reservoir. The dedicated piping from the WWTP to Red Mountain is planned as part of the Santa Margarita Conjunctive Use Project as shown in Figure 2-4. This project would be a direct potable reuse project and the Full Advanced Treatment (FAT) purified water would be treated again through the Red Mountain Disinfection Facility with UV disinfection and chlorine. This Project would require constructing a 1 mgd FAT Facility. Some water would be lost as brine and waste washwater through the MF and RO processes. Initial assumed overall recovery value of 80% is used for this study based on 95% recovery of MF and 85% recovery through RO, so 800 AFY of new water supply and 200 AFY of waste brine would be produced from 1000 AFY title 22 supply. It is estimated that the FAT water

purification facility at the WWTP would require additional capital costs for monitoring and fail safe controls.

Criteria	Units
Design Capacity	1 MGD
Process Components	Microfiltration/Reverses Osmosis/UV Advance Oxidation
Estimated Footprint[1]	4000-5000 sf
FAT Facility Water Source[2]	Title 22 Filtered Water from Fallbrook WRF
Discharge Location	Red Mountain Reservoir
Average Retention Time in Reservoir [3]	8 months
Average Recycled Water Contribution[4]	8.5%
Maximum Recycled Water Contribution [4]	15%
Overall Estimate Percent Recovery[5]	80%
Net Additional Water Supply Produced	800 AFY

(1) Based on footprint of City of San Diego 1 mgd demonstration Facility
(2) May require initiation of nitrification/denitrification at WRF.
(3) Red Mountain Reservoir Capacity is 1350 AF, based on 50% full at 675 AF and average flow of 1002 AFY.
(4) Based on 2010 SDCWA Water Purchases of 11,700 AFY.
(5) Based on 95% recovery from MF and 85% recovery through RO

A summary of estimated capital and O&M costs to implement a ASR PR Project without the rebate based on details in Appendix A is below:

Capital Cost: $20,000,000 million

O&M Cost for Potable Water Produced: $650 per AF

Capitalized Unit Cost (30 years, 3%): $1250 per AF

Offset for Outfall Capacity Dedicated to Camp Pendleton: $250/AF

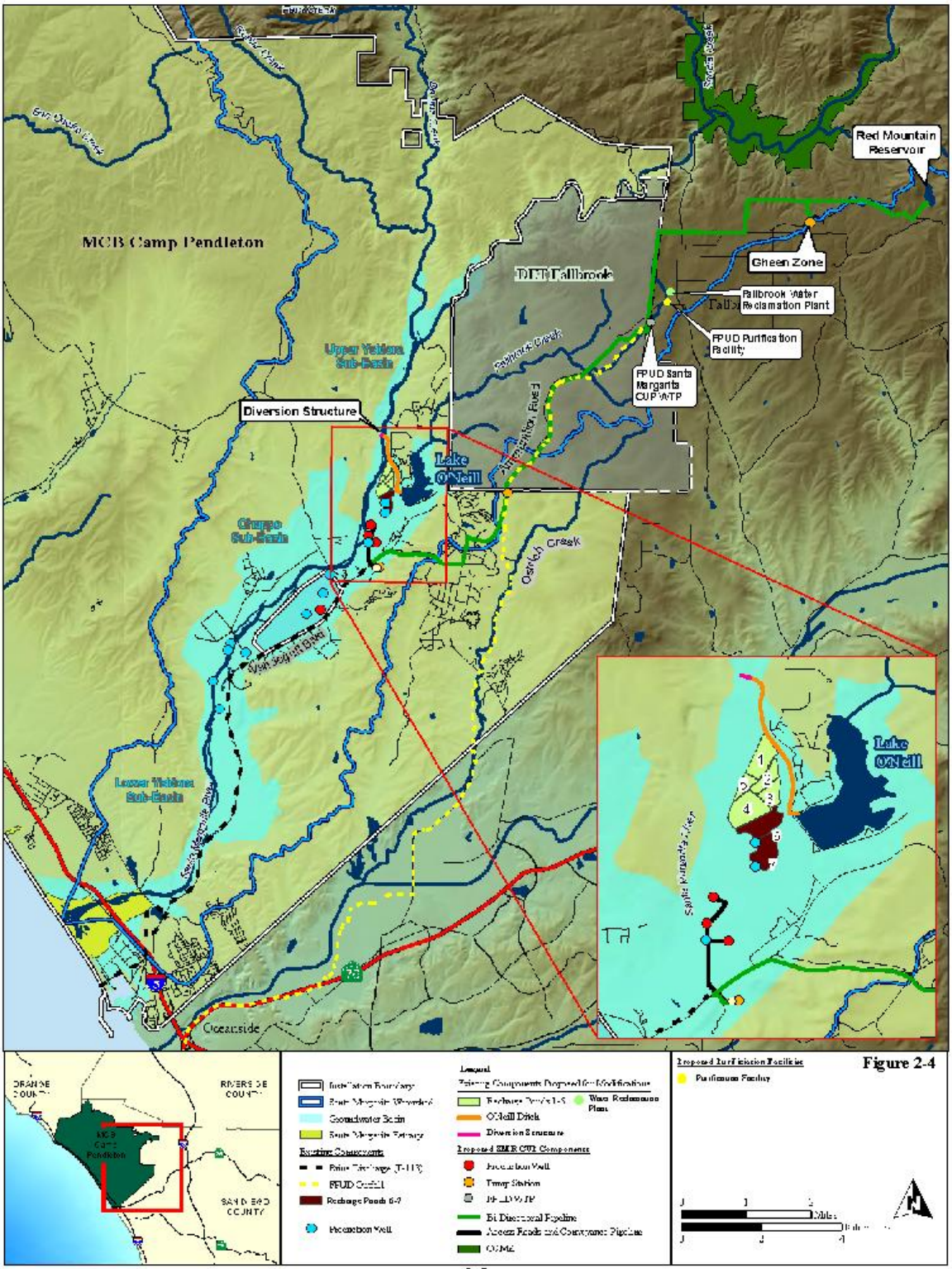
Annual Avoided Water Cost (800 AFY at $950/AF, No Rebate, outfall capacity offset): $760,000

Present Worth Lifecycle Costs (30 years, 3%): -$5 million

Total Unit Production Cost: Capital + O&M (No rebate) = $1650/AF

Regulatory Issues:

Since the discharge of this project is to a drinking water reservoir it is not subject to RWQCB approval or permitting. The project would require extensive CDPH permitting and is unlikely to be permitted at this time. Key issues would be the limited retention time in the reservoir and the lack of full conventional treatment at the reservoir. There are no similar facilities currently operating in California. There is a small 0.1 mgd facility potable recharge facility operating in New Mexico and one in Texas, but both are discharge to a WTP that includes filtration. Additional Facilities would need to be built and permitted in California before it would be feasible for the District to pursue permitting the project.


Red Mountain Reservoir
Green Zone
Fallbrook Water Reclamation Plant
FPUD Purification Facility
FPUD Santa Margarita CUP WTP
MCB Camp Pendleton
DFG Fallbrook
Upper Ysidora Sub-Basin
Diversion Structure
Lake O'Neill
Stuart Mesa Bed
Chappo Sub-Basin
Ostrich Creek
Lower Ysidora Sub-Basin
Santa Margarita River
Oceanside
Lake O'Neill
Santa Margarita River
Figure 2-4

2-5


WATER RECLAMATION PLANT
MOBILE HOME PARK
PROPOSED WATER PURIFICATION FACILITY
NAVAL WEAPONS STATION FPUD BOUNDARY
PROPOSED SANTA MARGARITA CONJUNCTIVE USE WATER TREATMENT PLANT
Emergency Backup Drying Beds
SOLAR FACILITIES
ALTURAS
MERIDA
RECYCLED WATER TRUCK FILL STATION
CLASS A BIOSOLIDS STORAGE
CANCUN
JOSTEN
Open Reservoir (Abondoned)
DISCLAIMER: By accepting this map, you agree that the Fallbrook Public Utility District assumes no liability or responsibility of any kind arising from use of this map. This map, its Data, and any calculations associated with this map is provided without warranty of any kind.
FIGURE 2-5
Legend
FACILITIES
FPUD PARCEL
PROJECT WORK AREA LOCATIONS
0 0.0175 0.035 0.07 0.105 0.14 Miles
0 95 190 380 570 760 Feet
N
W
E
S
G.I.S.

2.4 Other Potential Recycled Expansion through Coordination with other Agencies

FPUD is exploring opportunities to expand recycled water usage with the City of Oceanside, Camp Pendleton, and Rainbow MWD. Camp Pendleton currently has available recycled water with limited users. The City of Oceanside has limited recycled water production and is planning on developing more users and Rainbow does not have any recycled production or usage. The Districts agreement with Oceanside allows for the City to take available water in the outfall that does not affect existing outfall customers at no cost, so there is limited financial incentive for the District to serve additional customers in Oceanside. FPUD is exploring the following opportunities with these agencies:

City of Oceanside

- Work with Oceanside where they are planning to provide recycled water from the outfall to ensure it does not disrupt service to Caltrans.

Camp Pendleton

- Jointly purse grant funding for additional Fallbrook Creek IPR studies.
- Explore opportunities for connection of outfall with Camp Pendleton recycled system to expand distribution and storage.

Rainbow MWD

- Explore opportunities to serve additional customers in Rainbow's service area using the abandoned Fallbrook-Oceanside Line.
- Explore Additional Users on the South Line Extension in Rainbow.
- Explore option to more fully utilize existing WRP capacity and increase recycled water supplies by diverting Wastewater from RMWD to the Fallbrook WRP.

2.5 Recommendations

Based on the economic evaluation, expansion of recycled water uses represents an additional revenue source for the District. Over the long-term the value of the recycled water will make every drop of recycled water a resource for the District. As shown in Figure 2-6, based on currently projected SDCWA rate increases and an estimate 3% increase in annual O&M for the District, in the long-term a potable reuse project could be a reliable lower cost supply as SDCWA water costs continue to escalate. The District should pursue the following steps for the recycled water system:

1. Pursue proposed tertiary improvements at the WWTP to maintain recycled revenue. Ensure Facility is expanded in a way that allows for the potential future operation to support a Potable Recharge Project.
2. Pursue planning and design for proposed pipeline expansions to the South and East to serve additional recycled users identified using internal resources. Work with identified users to begin

planning for these extensions. Construct the North line if the Army Reserve Center is built. If development occurs along the proposed recycled pipeline alignments, require developers to install the pipeline sections and install connections for future recycled use.

3. Discuss with RMWD serving additional users in RMWD service area. Evaluate feasibility of service to additional users.
4. Pursue grant funding opportunities to further study the economics and regulatory limitations for the Fallbrook Creek Recharge Projects. As shown in Figure 2-6, this option could provide a long term solution to improve reliability and control water costs, but key regulatory and economic uncertainties must be further addressed. This project is also dependant on the Santa Margarita CUP.
5. Since in the long-term the Red Mountain Reservoir augmentation project may provide a local cost effective supply even without the SMRCUP project, support current efforts of the City of San Diego to advance their aquifer storage and recovery project. Support and stay informed on current efforts and testing being conducted by the City of the quality and safety of purified water supplies.

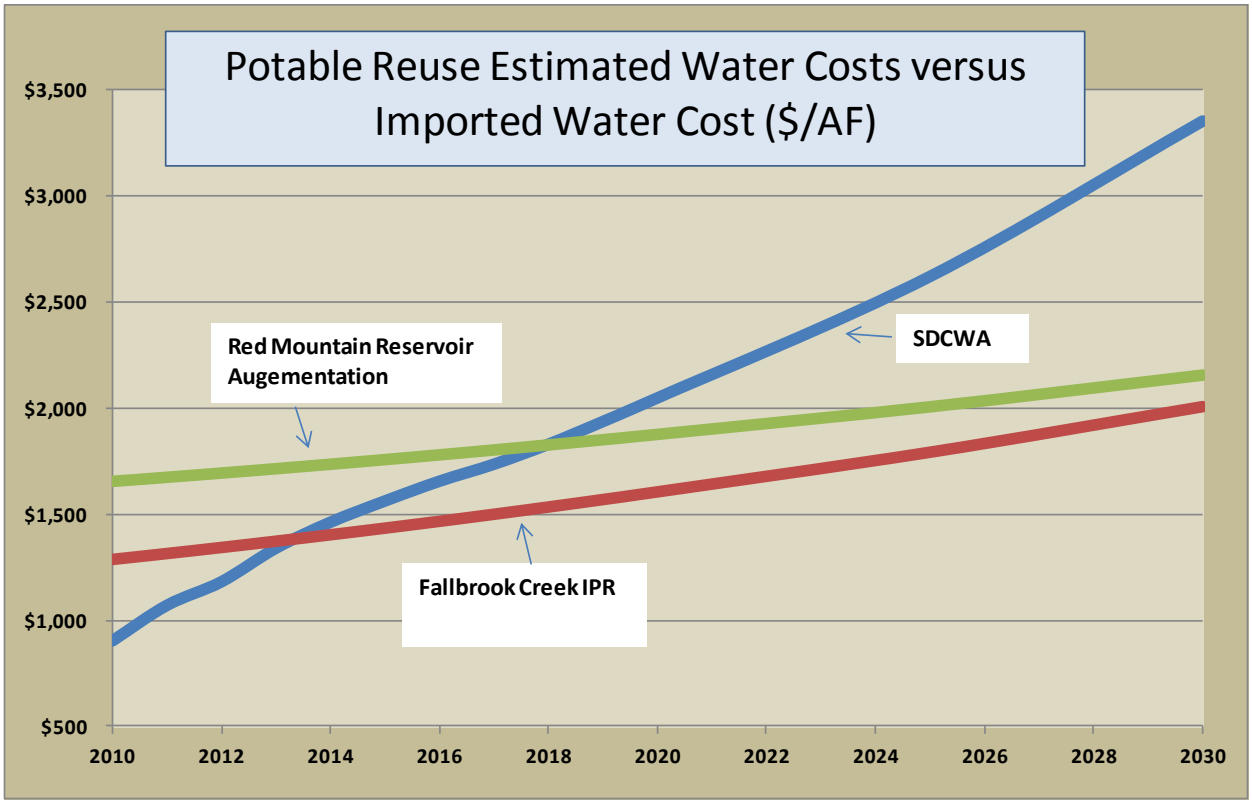


Figure 2-6 Comparison of Potable Recharge Project Costs versus SDCWA Water Costs

Chapter 2 – Appendix A – Recycled Alternatives Cost Assumptions

Option 1 – Eliminating the Recycled Water Program

Capital Savings – Based on deferring filter construction and recycled storage from planned improvements.

O&M Savings – Based on eliminating non labor costs from 2011-12 Final Budget from recycled O&M. Labor costs would be re-allocated to other WWTP functions as it would not result in a reduction in staffing.

Option 2 - Developing Additional Recycled Water Demands in FPUD Service Area

Recycled Revenue from 2011-12 Budget

Water Sales:	$494,701
Service Charges	$49,800
MWD/CWA Incentive	$240,750
Sundry (annual fees)	$5,000
Total	$790,251

Projected Sales: 535 AF

Revenue per AF = $790,251/535 = $1480/AF

Capital Costs for pipeline extensions Based on $100/lf for paved areas and $80/lf for unpaved. Values derived from FPUD costs for pipeline installation.

O&M Costs for additional supply: Since Tertiary Water is already produced marginal O&M increase is only pumping of this water. Estimated at $100/AF.

Option 3 - Development of an Indirect Potable Recharge (IPR) Project.

Capital Construction Costs:

Additional Mixed Liquor Recirculation Facilities: $0.5 Million

Methanol and Alum Storage: $0.5 Million

Conversion of Filters: $0.5 million

1 MGD MF facility (Based on $2.5 Mil/MGD): $2.5 Million

0.15 MGD RO Facility: (Based on $3 Mil/MGD): $0.5 Million (Rounded Up)

Site Work/Piping $2.0 Million

Mark-up for engineering (15%), Construction Management (10%) and Contingency (25%): $3.25 million.

Total Capital Cost: $9.75 million

Construction of Facilities to Divert, Store and Distribute Groundwater back to FPUD: $0 (already included in Santa Margarita CUP).

Construction of Facilities to treat and distribute water to Red Mountain Reservoir: $0 (already included in Santa Margarita CUP).

Dedication of Outfall Capacity to Camp Pendleton: $200,000 per year

Outfall Offset = $200,000/830 AF = $240/AF

Capitalized Unit Cost (A/P, 3%, 30 years) = 0.051 x $9.75 million = $0.5 mil per year / 830 AFY = $600 / AF

<u>O&M Costs</u>

Costs of additional Treatment: $120/AF ($120/AF Based on $3/gal for methanol, $300/ton alum, membrane replacement at $20,000/yr and $25,000 power with net production 830 AFY): $120

For Demineralization Facilities Add $100/AF

Recharge Facilities on Camp Pendleton: $90/AF (Based on Values Developed by Stetson Engineers for SMRCUP)

Groundwater Production: $280/AF (Based on Values Developed by Stetson Engineers for SMRCUP)

Conveyance to FPUD: $230/AF (Based on Values Developed by Stetson Engineers for SMRCUP)

FPUD Treatment and Conveyance to RMR: $108/AF (Based on Values Developed by Stetson Engineers for SMRCUP)

Total O&M Production: $928/AF

SDCWA Water Cost (Projected 2016): $1600/AF

SDCWA Rebate: $200/AF

MWD Rebate: $250/AF

Annual Avoided Cost (SDCWA Water Cost – Total O&M Cost) without rebates: $672/AF

Annual Avoided Cost (SDCWA Water Cost – Total O&M Cost) with rebates: 1122$/AF

Total Unit Cost = Capital + O&M no rebate – Outfall Offset = $600 + $928 -$278 = $1250/AF

Option 4 - Development of a Direct Potable Recharge (DPR) Project

Capital Costs Based on City of San Diego Demonstration 1 mgd facility: $11.8 million (Quicho et al., Sustaining San Diego, Water Environment and Technology, May 2012)

Mark-up for engineering (15%), Construction Management (10%) and Contingency (25%): $5.9 million.

Construction of Facilities to treat and distribute water to Red Mountain Reservoir: $0 (already included in Santa Margarita CUP).

Modifications to Discharge into Red Mountain Reservoir and additional monitoring and controls: $2 million

Dedication of Outfall Capacity to Camp Pendleton: $200,000 per year

Outfall Offset = $200,000/800 AF = $250/AF

Total Capital: $19.7

Capitalized Unit Cost (A/P, 3%, 30 years) = 0.051 x $19.7 = $1 mil per year / 800 AFY = $1250 / AF

<u>O&M Costs</u>

MF/RO/UV AOP Treatment: $600/AF

FPUD Conveyance to RMR: $50/AF

Total O&M Production: $650

SDCWA Water Cost (Projected 2016): $1600

SDCWA Rebate: $200/AF

MWD Rebate: $250/AF

Annual Avoided Cost (SDCWA Water Cost – Total O&M Cost) without rebates: $950/AF

Annual Avoided Cost (SDCWA Water Cost – Total O&M Cost) with rebates: $1400/AF

Total Unit Cost – Capital + O&M no rebate + Outfall Offset = $1250 + $650 -$250/AF = $1650/AF