

**Nipomo Community Services District
Supplemental Water Alternatives
Evaluation Committee**



**ALTERNATIVE EVALUATION
FINAL REPORT**

Prepared by:

Committee Members

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Michael Nunley, Chair	Peter Sevcik, Vice Chair
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Date Prepared: March 15, 2013

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EXECUTIVE SUMMARY

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Executive Summary

INTRODUCTION

The Supplemental Water Alternatives Evaluation Committee (SWAEC or Committee) was formed by the Nipomo Community Services District (NCSD) Board of Directors in June, 2012. The Committee was formed to provide a thorough, accurate and objective analysis of various means to provide Supplemental Water supplies to the Nipomo Mesa region.

The SWAEC consists of the following appointments made by the Board of Directors:

Voting Members

Craig Armstrong, CPA ¹	Robert Miller, RCE
Dan Garson	Sam Saltoun, PE
Dennis Graue, PhD	Dave Watson, AICP
Kathie Matsuyama, RLA	Dan Woodson, RCE

Non-voting Members

Michael Nunley, RCE, Chair	Peter Sevcik, RCE, Vice Chair
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The SWAEC was charged with developing a process to identify a comprehensive list of possible supplemental water supply options for the Mesa, and in turn, vetting each possible alternative to arrive at a listing of viable alternatives that met a series of defined objectives as set forth by the NCSD's Bylaws for the Committee. In approaching this charge, the Committee openly recognizes that this Report and the various findings and statements contained herein are the collective opinion of the Committee members. Said another way, a Committee of eight (8) community volunteers have reviewed materials, discussed parameters and variations of each possible water supply, and conducted approximately a dozen publicly noticed meetings. Additionally, subcommittees met almost 80 times, and interviewed over two dozen subject matter experts and active members of the community. The SWAEC consistently solicited public feedback and suggestions at each and every step of this sequence, in order to arrive at a balanced and fair representation of the viable Supplemental Water Alternatives available to NCSD and its customers.

RECOMMENDATIONS

The Committee developed several general recommendations and a more extensive list of water resources management (groundwater focused) and conservation recommendations. Nipomo Community Services District and other parties to the Stipulation, with support from all water users in the Nipomo Mesa Management Area, are encouraged to:

1. Press for a complete aquifer management study and development of a unified model covering the full extent of Santa Maria groundwater basin.

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2. Pursue additional regional partnerships.
3. Provide better public education and outreach.
4. Consider solutions that may provide less supplemental water individually, but together can help meet the Nipomo Mesa region's needs.
5. Encourage individual well owners, and agricultural and industrial water users – the non-stipulated parties within the NMMA – to be part of any solution.
6. Incorporate water conservation in any project or program.
7. Pursue opportunities to minimize the impact of water rate adjustments on all users, and particularly on low-income customers.

RANKING

This Report presents eight (8) major categories of supplemental water supply sources, and then each major category is broken down into separate variations (29 in all), as appropriate. These 29 variations were then analyzed against 18 performance criteria to arrive at the ranking scores presented in the matrices of this Report. These matrices provided the framework for presenting a ranking of each alternative based on the criteria categories. A summary of the Committee's ranking results is provided on the next page.

2/25/2013 SUPPLEMENTAL WATER RANKING SUMMARY					
ALTERNATIVES		RANK	SUPPLY	COST	FEASIBILITY
I	10B-RWI Santa Maria Intertie - Full	1	GREEN	SAGE	GREEN
H	10A-RWI Santa Maria Intertie - Phase 1	2	GREEN	YELLOW	GREEN
D	04-C Conservation Programs (Current and Future)	3	RED	GREEN	GREEN
S	19C-SEA Brackish Water Desalination	4	GREEN	SAGE	SAGE
U	20B-SEA Solar Distillation - Coastal (Pilot Project Required for Proof of Concept)	5	GREEN	SAGE	YELLOW
N	13-LG Local Shallow Aquifer (Basin-wide Aquifer Study and Modeling in SLO and SB Counties Required)	6	YELLOW	GREEN	YELLOW
T	20A-SEA Solar Distillation - Inland (Pilot Project Required for Proof of Concept)	7	GREEN	YELLOW	YELLOW
Q	19A-SEA Seawater Desalination - P66 Outfall	8	GREEN	YELLOW	YELLOW
L	11-RWW Acquire Wastewater Supply from South SLO County Sanitation District	9	SAGE	SAGE	SAGE
R	19B-SEA Seawater Desalination - New Outfall	10	GREEN	YELLOW	YELLOW
F	07-AIR Phillips 66 Refinery Process Water Reuse	11	RED	SAGE	GREEN
M	12-RWW Acquire Wastewater Supply from Pismo Beach	12	YELLOW	SAGE	SAGE
G	09-AIR PXP Arroyo Grande Production Wastewater Reuse	13	YELLOW	YELLOW	SAGE
B	01B-SW Acquire Excess Table A Allocation identified by CCWA-SLOCFCWCD & Buy-into CCWA Pipeline	14	SAGE	RED	GREEN
A	01A-SW Acquire Unused Table A Amount from SLOCFCWCD	15	SAGE	RED	SAGE
C	02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline	16	YELLOW	YELLOW	SAGE
J	10C-RWI Oceano Intertie	17	RED	YELLOW	YELLOW
K	10D-RWI Nacimiento Water Project Intertie	18	YELLOW	RED	YELLOW
E	06-AIR Agricultural Water Reuse	19	RED	RED	YELLOW
O	14-LG Dana Wells	20	RED	RED	YELLOW
P	16-SFW Oso Flaco Lake	21	RED	RED	RED

	LEGEND	TOP QUARTILE	3RD QUARTILE	2ND QUARTILE	BOTTOM QUARTILE
		GREEN	SAGE	YELLOW	RED

Section I
INTRODUCTION

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INTRODUCTION

The Supplemental Water Alternatives Evaluation Committee (SWAEC or Committee) was formed by the Nipomo Community Services District (NCSD) Board of Directors in June, 2012. The Committee was formed to provide a thorough, accurate and objective analysis of various means to provide Supplemental Water supplies to the Nipomo Mesa region.

The SWAEC consists of the following appointments made by the Board of Directors. A 9-person Nomination Committee (including appointees from Nipomo Mesa Management Area purveyors and 4th District County Supervisor Teixeira) recommended these individuals to the Board.

Voting Members

Craig Armstrong, CPA ¹	Robert Miller, RCE
Dan Garson	Sam Saltoun, PE
Dennis Graue, PhD	Dave Watson, AICP
Kathie Matsuyama, RLA	Dan Woodson, RCE

Non-voting Members

Michael Nunley, RCE, Chair	Peter Sevcik, RCE, Vice Chair
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Mr. Armstrong participated with the Committee until his resignation in November, 2012 (upon his election to the NCSD Board of Directors), and Mr. Saltoun was nominated by the voting members of the committee and approved for appointment by the NCSD Board in December, 2012, as his replacement on the SWAEC. Member qualifications are included in Appendix A.

The Committee began meeting in September, 2012 to review its role in evaluating options for Supplemental Water on the Nipomo Mesa, including its purpose, objectives and process for this evaluation, as stated in the Bylaws for the Committee that were approved by the Board in July, 2012 (See Appendix B). The Committee has met continuously each month since September to review materials and reports available on a host of alternatives for Supplemental Water.

The SWAEC was charged with developing a process to identify a comprehensive list of possible supplemental water supply options for the Mesa, and in turn, vetting each possible alternative to arrive at a listing of viable alternatives that met a series of defined objectives as set forth by the NCSD's Bylaws for the Committee. In approaching this charge, the Committee openly recognizes that this Report and the various findings and statements contained herein are the collective opinion of the Committee members. Said another way, a Committee of eight (8) community volunteers have reviewed materials, consulted with numerous industry and technical experts, discussed parameters and variations of each possible water supply, and conducted approximately a dozen publicly noticed meetings. . Additionally, subcommittees met almost 80 times,

¹ CA - Inactive

and interviewed over two dozen subject matter experts and active members of the community. The SWAEC consistently solicited public feedback and suggestions at each and every step of this sequence in order to arrive at a balanced and fair representation of the viable Supplemental Water Alternatives available to NCSD and its customers.

Perhaps at this point it would be useful to briefly emphasize what the Committee has used as a working definition of “supplemental water”. The 2005 Court Stipulation, and subsequent 2008 Judgment After Trial (or Order) which incorporated the Stipulation and ordered its implementation, define three physical “Management Areas” within the greater Santa Maria Groundwater basin. The three Management Areas (MA) include the Northern Cities MA, the Nipomo Mesa MA (NMMA) and the Santa Maria Valley MA. The NMMA includes the water service area of four large purveyors; NCSD, Woodlands Mutual Water Company, Golden State (formerly Southern California) Water Company, and Rural Water Company. The NMMA area also includes other major pumpers of ground water including the Conoco-Phillips 66 refinery, agricultural and private land owners. The Court further noted that of the three Management Areas groundwater purveyors on the Nipomo Mesa had not been involved with funding or management of supplemental sources (State Water, Lopez and Twitchell reservoir water).

Section VI PHYSICAL SOLUTION, of the Stipulation makes reference to “Nipomo Supplemental Water” as a project to deliver 2,500 AFY of supplemental water to the NMMA. This project is encapsulated under an MOU between NCSD and the City of Santa Maria as one potential source of Supplemental Water. The Stipulation further defines NCSD as leading the effort to obtain the supplemental water and the required participation (purchase of supplemental water) by the three other large water purveyors in the NMMA. The volume of supplemental water imported each year may increase or decrease in the future, dependent on the health (or stress) of the NMMA as defined by the court recognized Technical Group assigned to manage the Area.

The Stipulation also defined New Urban Uses as municipal and industrial uses which occur after January 1, 2005 and required these new uses to provide a source of supplemental water.

Based on a review of the court determinations, background studies, and reports leading to the compilation of this Report, the SWAEC has defined “supplemental water” to include:

***A new source of water supply that is either imported into the NMMA from an outside source,
or
the recovery and re-use of existing sources of water from either inside or outside the NMMA,
to meet NMMA customer demands.***

This definition is an important concept to understand as it distinguishes between two (2) decidedly different sources of water.

The first, an imported source of new water supply, means that whatever the source, it cannot come from wells drilled into the groundwater basin under the Nipomo Mesa. As analyzed in this Report, the first source includes possible options such as State Water Project supplies, Waterline Intertie Projects with Santa Maria and/or the Five Cities communities, Surface Water supplies and one or more Desalination projects.

The second source involves the recovery and re-use of existing water supplies, whether they come from inside or outside the NMMA boundaries. This second source of water as analyzed in this Report includes Conservation and Demand Management options, Recycled Water opportunities and Shallow Local Groundwater options.

Each of these categories of imported or recovered water supplies include one or more detailed projects that may meet NCS D's objectives for developing new water supplies in the form of "supplemental water". In the following Report you will note these detailed projects sometimes referred to as "variations" under the major alternative categories noted above.

At this point, the Committee elected to organize its members into sub-committees, assigned one or more of the major topic areas to explore further.

These subcommittees were:

State Water Desalination	Intertie Projects	Conservation-
<u>AG and Industrial Reuse</u>	<u>Surface Water</u>	<u>Gray Water</u>
Armstrong/Saltoun	<u>Recycled Wastewater</u>	<u>Local Groundwater</u>
Graue	Miller	Matsuyama
Matsuyama	Watson	Garson
	Woodson	Graue

In order to comply with Brown Act requirements, subcommittee members were comprised of three or fewer Committee members. The subcommittees independently researched and analyzed the various alternatives.

Available background materials, reports, and interviews with interested parties, engineers and water purveyors on the Central Coast were consulted as the subcommittees went about their work. Information gleaned from this process about each of the detailed projects is summarized in this Report. Presentations of the information gathered were made to the full Committee, and following discussion and public input, direction on follow-up tasks were agreed upon by the Committee.

The results of the Committee's effort are detailed in this Report, and the Appendices attached or referenced herein. The following sections of this Report identify some eight (8) broad categories of water supply alternatives, including twenty-nine (29) variations of those alternatives, that were evaluated to meet the overall needs of the Nipomo Mesa

Management Area (as defined by the 2005 Court Stipulation and 2008 Order to import Supplemental Water Supplies) and the NSCD's unique service needs in particular.

The Committee then utilized a ranking system to attempt to identify how each water alternative met, or failed to meet, the various goals and objectives set forth in the Committee's Bylaws. In brief, these goals and objectives looked at:

- Securing an uninterrupted supply of 3,000 acre feet annually, increasing to potentially 6,200 acre feet annually, in order to supply long-term buildout demands as projected for the current and future customers of NCSD
- Providing initial deliveries of approximately 1,000 acre feet annually by 2015
- Identifying the incremental and total volume of water available from each source, and to the extent possible, whether a phased delivery of said source was possible, assuming NCSD's demands for the water increase over time
- The timing needed to deliver the water supply, including recognition of the environmental and regulatory (permitting) requirements to produce each source of water
- Costs for one-time capital and on-going operations to supply the water
- Reliability and Feasibility of each potential water supply

To address the stated goals and objectives, the Committee created a numerical ranking of each possible supplemental water alternative and proceeded to compile a matrix summarizing these rankings.

In turn, each ranking was vetted by the Committee to identify projects that were grouped into two (2) major categories:

- Supplemental Water Alternatives believed to be feasible and worth recommending to the NCSD Board to pursue, and
- those alternatives that were believed to be infeasible due to one or more "fatal flaws" that rendered the alternative unlikely or unrealistic to successfully attain.

The information relied upon and the explanations for the Committee's determinations occur in the following sections of this Report.

Section III of this Report is organized to present each of eight (8) major categories of supplemental water supply sources, and then each major category is broken down into separate variations (29 in all), as appropriate. These 29 variations were then analyzed against 18 performance criteria to arrive at the ranking scores presented in the matrices of this Report. These matrices provided the framework for presenting a ranking of each alternative based on the criteria categories. The Committee's first attempt to assign scores and to weight the evaluation criteria is included in Appendices C and D.

Section III of this Report presents each supplemental water alternative in terms of the variations and criteria noted in Table I-1.

TABLE I-1 ALTERNATIVES AND CRITERIA

MAJOR CATEGORIES	ALTERNATIVES	CRITERIA & WEIGHT
State Water Project	Acquire Unused Table A Amount Acquire Excess Table A Allocation Purchase Unused Table A Allocation	SUPPLY CRITERIA (33.3%) Supply 1,000 AFY Supply 3,000 AFY Supply 6,200 AFY
Demand Management / Conservation	Conservation Programs	
Agricultural and Industrial Reuse	Agricultural Water Reuse Phillips 66 Refinery Water Reuse PXP A.G. Production Wastewater	
Regional Waterline Intertie Projects	Santa Maria Intertie - Phase 1 Santa Maria Intertie - Full Oceano Intertie Nacimiento Water Project Intertie	Court Order - Quantity Court Order - Source Reliability
Recycled Waste Water Supplies	Acquire Supply from South SLOCSD Acquire Supply from Pismo Beach	COST CRITERIA (33.3%) Capital Cost O&M Cost
Local Groundwater	Local Shallow Aquifer Dana Wells	FEASIBILITY CRITERIA (33.3%) Court Order - Method Phasing Quality – Raw Water Quality – Finished Water Feasibility Sustainability Public Support
Surface Water	Oso Flaco Lake	
Seawater / Brackish / Other Desalination	Seawater Desalination - P66 Outfall Seawater Desalination - New Outfall Brackish Water Desalination Solar Distillation - Inland Solar Distillation - Coastal	
ALTERNATIVES ELIMINATED OR COMBINED WITH OTHER ALTERNATIVES		
State Water Project	Reactivate Desal Plant in SB - NOT FEASIBLE PER CITY OF S.B.	
Graywater	Graywater Programs – ADDRESSED IN CONSERVATION ALTERNATIVE	
Industrial Reuse	Phillips 66 Refinery Thermal Waste - NOT FEASIBLE PER P66	
Local Groundwater	Riverside Wells - NOT FEASIBLE PER LEGAL OPINION	
Surface Water	Santa Maria River - NOT FEASIBLE PER LEGAL OPINION Lopez Reservoir - ALTERNATIVE ADDRESSED IN RECYCLED WW	
Seawater / Brackish / Other Desalination	Enhanced R.O. Orcutt Oil Fields - NOT FEASIBLE – NOT FOR POTABLE USE Liquid-Liquid Extraction of Brine – NOT FEASIBLE - EVOLVING TECHNOLOGY	

Section II
RECOMMENDATIONS

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RECOMMENDATIONS

The Committee developed several general recommendations and a more extensive list of water resources management (groundwater focused) and conservation recommendations. These are summarized in this section.

A. GENERAL

Nipomo Community Services District and other parties to the Stipulation, with support from all water users in the Nipomo Mesa Management Area, are encouraged to:

1. Press for a complete aquifer management study and development of a unified model covering the full extent of Santa Maria groundwater basin.
2. Pursue additional regional partnerships.
3. Provide better public education and outreach.
4. Consider solutions that may provide less supplemental water individually, but together can help meet the Nipomo Mesa region's needs.
5. Encourage individual well owners, and agricultural and industrial water users – the non-stipulated parties within the NMMA – to be part of any solution.
6. Incorporate water conservation in any project or program.
7. Pursue opportunities to minimize the impact of water rate adjustments on all users, and particularly on low-income customers.

B. WATER RESOURCES MANAGEMENT

Fresh water is a resource that is critical to California's Central Coast, as well as our entire State and Nation. Prudent State and County water resource management is essential.

Judgments about the management of each significant deposit, such as that in the Santa Maria Valley (SMV) aquifer, should be based on the best scientific analysis. It should not depend on loosely guided and often uncoordinated decisions by a myriad of local districts and individual land owners. In the absence of complete information, well intended decisions by governing bodies and complex litigation can bind entities to actions that may, or may not be the best use of the resource or of the public's investments.

Much excellent work has been already been accomplished in collecting and analyzing data. This can be readily seen in the list of references at the end of this section. Past studies by the California Department of Water Resources, San Luis Obispo, and Santa Barbara County's planners and Flood Control and Water Conservation Districts, local

water agencies, and Management Area Technical Groups – studies that were supported in great part by respected professional water resource managers, engineers, geologists, hydrogeologists, and hydrologists - were well done and helpful. Within the resources available, there has been dedicated effort, and useful accomplishments.

However, no integrated program has been undertaken that takes into account the performance of the SMV aquifer as a unified whole. This integration is important because the past studies have shown that there is communication throughout the aquifer. At present there is no amalgamated model of the SMV aquifer to assist in managing this precious resource.

Such modeling can be extraordinarily helpful in fulfilling our trusteeship of our groundwater resource, and for helping balance supply with demand to the benefit of the entire region.

Groundwater moves slowly through pores in the soil and rock. From past analysis, it is likely that there are areas of the SMV aquifer with significant groundwater supplies, and other areas where the aquifer shows signs of distress. There are locations where withdrawals are high and others where they are relatively low.

Small districts do not have the budget or expertise to carry out the required analyses needed to build a reliable aquifer model. In the case of the SMV aquifer, this and other sources of fresh water are shared between many legal entities.

A state-of-the-art resource management study of the entire SMV aquifer is believed to be necessary to determine how to use its water supply prudently. To date no such study and modeling have been carried out for the SMV aquifer. This can only be accomplished with coordinated action by both governing Counties.

Suggested Study Objectives:

- To ensure fair and sustainable distribution of the SMV groundwater resource
- to guide the investments that need to be made to optimize the water supply
- to determine if and when to supplement the aquifer with other sources
- to establish the credibility of the resulting plans for the water users who pay for, and benefit from, the resource.

The various scenarios to be studied may include:

- More wells
- Various pumping rates
- Various distributions of well locations

- Various well completion intervals
- Various rainfall amounts
- Various recycled water percolation schemes
- Injection near the sea-fresh water interface
- Increased or decreased water pumping from the aquifer by neighboring entities

This work can be expected to benefit both counties and all of the entities in the SMV and will require their cooperation and participation. Figures 1 and 2 in the Local Groundwater evaluation show the NCSD area and the area of the SMV aquifer, respectively.

A state of the art aquifer management study would:

1. Correlate stratigraphy of all well logs in the SMV basin from surface to the bottom of the aquifer
2. Analyze all well logs to obtain aquifer rock properties, including porosity and mineralogy vs. depth
3. Construct a static, 3D structural model of the entire aquifer using modern software like GOCAD, Earthvision, Petrel, Kingdom, etc. from the correlated logs, seismic, outcrop and other relevant data
4. Collect and interpret all measurements of groundwater elevations (aquifer pressures) for pressures, permeabilities and well damage over the time period that the reservoir has been known; if the 3-dimensional distribution of well data is not sufficient, obtain new, supplementary measurements.
5. Collect aquifer water samples from non-commingled wells at any dates; interpret their compositions in the study of the hydrological effects of faults and aquitards
6. Collect or estimate the monthly water volumes produced from or injected into wells or stored in percolation ponds
7. Collect all well surface locations, trajectories and completion intervals and their changes over the historical period of aquifer use
8. Collect and correlate all core measurements and all core and cutting descriptions
9. Geostatistically analyze the above information on distribution of rock properties; populate the static model with the most likely values; and set out the ranges of possible values of those properties to guide the history matching process
10. Construct a 3D finite-difference simulation model with the proper software using all of the above information
11. Match the simulation model to the measurements of produced water volumes and aquifer pressures over all history and all of the aquifer. This process necessitates adjustments to the aquifer properties, including porosity distribution, permeability distribution, transmissibilities of faults and aquitards, and any other parameters agreed upon by the experts assigned to this study.

12. After the model is history matched satisfactorily, run the model several decades into the future to simulate the hypothetical management cases of interest
13. Report the results in a concise manner suitable for display of maps of water salinities at future dates, water volumes delivered, rainfall volumes, and items needed for calculations of operating costs.

Suggested Procedure:

The designated representatives of the participating entities meet to agree on

- Objectives
- Methods and procedures, such as mileposts and reporting
- Assisting in data gathering and a rough data inventory
- Experts to engage or to solicit for bids; disciplines to be considered are geophysics, stratigraphic geology, structural geology, paleontology, petrophysics, well engineering, reservoir/hydrologic engineering.
- If bidding is to be used, the RFP and bidding procedures
- A rough budget and how it would be shared equitably

Once the experts have been decided, their leader should be chosen, usually the person who integrates the work of the others in the final predictive model

The first tasks for all experts are:

- to make a detailed inventory of the data available and to report to the representatives the feasibility of achieving each of the stated objectives with those data.
- If shortcomings are found, they should recommend supplementary data to be obtained.
- They also must report any recommended changes in the schedule and budget.
- It may be necessary for some of the experts to have a hiatus while the supplementary data are obtained.

Finally, work and reporting are carried out as planned.

Once a comprehensive study is completed, San Luis Obispo and Santa Barbara County communities that rely largely on the SMV watershed for their fresh water supplies will have the information needed to guide wise water resource decisions.

Partial List of Sources on Aquifer Studies

State of California Department of Water Resources, **Water Resources of the Arroyo Grande – Nipomo Mesa Area Southern District Report and Appendices** (2002)

Water Systems Consulting, Inc., **Nipomo Community Services District 2010 Urban Water Management Plan** (June 29, 2011)

Douglas Wood & Associates, **Nipomo Community Services District Supplemental Water Project Addendum Environmental Impact Report** (April 25, 2012)

Wagner & Bonsignore, *Spring 2012 Groundwater Index* **Technical Memorandum** (June 18, 2012)

Wagner & Bonsignore, *Fall 2012 Groundwater Index* **Technical Memorandum** (December 3, 2012)

Boyle Engineering Corporation, **Nipomo Community Services District Water and Sewer Replacement Study** (January 2000)

Boyle Engineering Corporation, *Evaluation of Supplemental Water Alternatives*, **Technical Memorandum No. 1 Constraints Analysis** (June 2007)

Boyle Engineering Corporation, *Evaluation of Desalination as a Source of Supplemental Water*, **Technical Memorandum No. 2 Work Plan for Project Implementation** (September 2007)

Boyle Engineering Corporation, *Evaluation of Supplemental Water Alternatives*, **Technical Memorandum No. 3 Implementation of Water Supply from CCWA /State Water Pipeline** (November 2007)

Boyle Engineering Corporation, **Water and Sewer Replacement Study** (April 2008)

Bookman-Edmonston Engineering Inc., **Nipomo Community Services District Evaluation of Alternative Supplemental Water Supplies** (July 1994).

Cannon Associates **Nipomo Community Services District Water and Sewer Master Plan Update** (December 2007).

Kennedy/Jenks Consultants, **Final Report Evaluation of Water Supply Alternatives** (October 2001)

Lawrance, Fisk & McFarland, Inc., **Engineering Considerations of Groundwater Yields and Rights on the Nipomo Mesa Sub-area, San Luis Obispo County, California**, (October 1993)

S.S. Papadopoulos & Associates, Inc., **Nipomo Mesa Groundwater Resource Capacity Study, San Luis Obispo County**, California (March 2004)

Nipomo Mesa Management Area Technical Group, **Nipomo Supplementary Water Project Groundwater Impact Review** (February 2012)

SAIC Engineering, **Nipomo Community Services District Urban Water Management Plan 2005 Update**, (June 29, 2011)

C. CONSERVATION

The Supplemental Water Alternatives Evaluation Committee determined early in its process that any alternative or combination of alternatives that were reviewed, prioritized and/or ultimately recommended to the Nipomo Community Services District Board of Directors would include the recommendation that the District increase Conservation measures.

In California, water is precious, competition for water is fierce, and conservation is critical. The value that Californians place on water is reflected in a constitutional provision ensuring its reasonable and beneficial use. Article X, Section 2 of the California State Constitution prohibits the waste and unreasonable use of this precious resource.

In our semiarid, Mediterranean climate on the Nipomo Mesa, periodic droughts and the high cost of water make efficient use of valuable water supplies essential. As the major purveyor of water in Nipomo, the NCSD should be providing a leadership role in Water Conservation.

Unfortunately, the District has relied heavily on water rate increases, regulatory measures and, to a lesser degree, rebate programs as a first order of “Conservation” measures in reducing water demand. While these may be the low-hanging fruit, it leaves an abundance of Conservation measures to which the Nipomo Mesa community has not had full and complete access.

For example:

- The NCSD Water Conservation Committee currently consists of two Board members and no members of the public.
- The former full time Water Conservation and Public Outreach Position has been subdivided between multiple in-house District personnel and contracted positions diluting the former strength and scope of the position.
- The October 2012 NCSD Conservation status report indicated that only 12 out of 32 Nipomo classrooms of 4th through 6th graders received Water Conservation education in 2012.

An improved NCSD Conservation Program would:

1. Consider a Regional Partnership With All Mesa Water Purveyors to Join Together to Establish a Single, Jointly Funded, Community Conservation Program.

2. Expand Membership on the NCSD Water Conservation Committee

In 2013, a 5-year review of the 2008 NCSD Water Conservation Program will be undertaken. The District will provide a formal review of BMP compliance to the California Urban Water Conservation Council, as required, by April 2013 and use this review as a launch for comprehensive program review. Expand the NCSD Water Conservation Committee. Add community members with expertise.

3. Re-Establish NCSD Water Conservation & Public Outreach Position

From 2006 – 2010, the District maintained a full time Water Conservation and Public Outreach position. In those five years significant strides were made in conservation of water and in public outreach and education on water conservation issues. Since 2010, the work of this position has been divided between multiple in-house District personnel as well as several contracted positions. This has diluted the former strength of the position and minimizes the importance of Water Conservation, Public Outreach and Education in the Nipomo community. Consider a regional partnership of all Mesa water purveyors to join together to jointly fund a Regional Water Conservation & Public Outreach Position.

4. Provide Better Public Education Programs and Improve Media Outreach

- ***Support improved outreach messages and promote public awareness on water-related issues through advertising in multiple media.*** Connect with a broad age demographic with water quality and conservation messages. Example: improve and update website material with meaningful information on water-use efficiency and protecting water quality. Provide more current links to recent water conservation websites and up-to-date materials.
- ***Re-establish the NCSD Conservation Newsletter*** (last published in Fall 2008).
- ***Increase the number of classrooms receiving the Water Conservation message.*** The October 2012 District report indicated that only 12 out of 32 classrooms of 4th through 6th graders were served in 2012. Improve statistics. Expand the classroom education program to include other appropriate grade levels. Encourage mentors from Nipomo High School and Central Coast New Tech High

School leadership programs to participate with the District in classroom education.

- **Reach out to Cal Poly for interns and Professors** in a variety of partnerships in education, outreach and leadership opportunities.
- **Broaden use of community social media** such as Facebook, monthly emailed newsletter updates via Constant Contact and give Twitter a try.
- **Create Public Service Announcements** to be aired on local TV and radio stations.
- **Find venues for newspaper articles** with more detailed information about ongoing NCSO efforts, rather than just paid print advertisements.
- **Develop partnerships with nonprofits** and other interest groups through events and support. Work to develop relationships with groups such as The Land Conservancy, Central Coast Salmon Enhancement, Coastal San Luis Resource Conservation District, ECO-SLO, Nipomo Native Garden and the Dana Adobe Amigos which have strong community connections and demonstrated strengths in educating the public regarding water efficient landscaping and conservation techniques.
- **Provide speakers to community groups** such as the Chamber of Commerce, Rotary Clubs, Lions Clubs, and homeowners associations to promote water conservation.

5. Become More Accessible to Community Members Through Events

- **Identify and participate in community events** such as Nipomo OctoberFest, Earth Day, Coastal and Creek Clean-Ups alongside interest groups and nonprofits to implement public awareness.
- **Develop an annual free community Conservation Workshop** focused on sustainable landscaping and irrigation practices. Invite vendors to display smart irrigation controllers and drought tolerant plants. Offer a free raffle and giveaways to entice participation. Advertise well in advance to insure good attendance.
- **Conduct a Professional Gardeners Workshop.** Target a wide audience of professional gardeners that service residential and commercial locations throughout Nipomo. Topics could range from sustainable landscaping, reduction of green waste, pest management, and certification classes on weather based irrigation controllers.
- **Host an annual NCSO Open House** to familiarize customers with operations at the District administrative offices and operational venues, as appropriate.
- **Start a Nipomo Friendly Garden Contest**—partner with Nipomo Native Garden, local nurseries and hardware stores, for example, to promote “smart” and sustainable landscapes for the homeowner. The contest could judge outdoor space designs using low-water plants,

state-of-the-art irrigation controllers and precision sprinkler heads. Sponsor prizes by local nurseries and hardware stores, etc.

6. Develop Graywater Demonstration Projects

- ***Coordinate with regional partners to develop a graywater demonstration project*** in cooperation with local nurseries and hardware stores.
- ***Provide links on District website for San Luis Obispo County Graywater*** and other local, regional, statewide and national appropriate materials.

Section III
ALTERNATIVE EVALUATIONS

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ALTERNATIVE ANALYSIS – State Water Project (SW)

EXPLANATION OF TERMS USED IN THIS SECTION

Maximum Table A Amount (or Table A Amount): Formerly called “maximum annual amount”. It is the maximum amount of State Water Project (SWP) water under contract to project contractors and participants. It is represented as a volume of water – in units of acre-feet per year (AFY) – but it is not physical water. (As an analogy, it can be thought of as the size of a water tank purchased, not the amount of water that it contains.)

Table A Allocation (or Table A water): Formally called “annual allocation”. It is the amount of SWP water actually made available for purchase. This amount changes each year and is dependent upon rain fall and snow pack, reservoir levels, demand from other contractors, impacts to endangered species and several other variables. (In the analogy, it is the physical water that is available for delivery to the tank in any given year.)

SWP water is effectively rationed. Depending on annual rainfall, snowpack, and other factors, SWP contractors are allowed to draw only part of their maximum Table A amount each year. This amount varies annually, and has been as low as 11%, or as high as 100% of maximum Table A amount. The long-term average has been approximately 60%.

Fixed Cost and Variable Cost: SWP participants pay debt service on the conveyance facilities that were constructed to serve them based on their maximum Table A amount. This cost varies by participant, and depends on the how much infrastructure was constructed to deliver their water. They pay this “**fixed cost**” regardless of the actual amount of water delivered.

Under a complex formula, they also pay for the amount physical water actually delivered, commonly called the “**variable cost**”.

Unused Table A Allocation: A SWP participant may not need their entire Table A allocation in any given year. This unused allocation can be offered for sale to other project participants within the same Contractor family (SLO County could make water available to other County purveyors and Central Coast Water Authority (CCWA) could make water available to purveyors in Santa Barbara County). The sales price is negotiable, and is strictly based upon a willing seller, willing buyer principal.

Excess Table A Allocation: The Coastal Branch of the SWP serving SLO and SB Counties has some excess capacity in the conveyance facilities and the treatment plant. This excess capacity could be used to increase the amount of water that can be delivered by the system.

In other words, the pipeline can actually carry more water than is under contract to SWP participants. This is because pipe was designed conservatively and has been found to be slightly larger than needed. Additionally, pumping pressure can sometimes be increased slightly to increase the flow rate without exceeding the factors of safety mandated by design standards and code requirements.

DESCRIPTION OF VARIATIONS

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

Summary: This alternative utilizes San Luis Obispo County's full 25,000 AFY maximum Table A amount, of which approximately 15,000 AFY is not currently under contract to SLO County communities. Most of this unused Table A amount cannot be delivered to the County because SLO County elected to pay for only the pipeline capacity it needed and stranded its rights to deliver additional water past a point in Kern County. Re-acquisition of additional capacity from Kern County to CCWA's water treatment plant would be extremely expensive. Delivery of SLOCFCWCD's unused Table A amount using this method requires construction of a new 83-mile pipeline that parallels the Coastal Branch from the Central Valley to Nipomo.

Major actions required:

- Request that San Luis Obispo County amend the DWR Water Supply Agreement to increase maximum delivery amounts.
- Enter into a new turnout agreement and reconfigure the proportionate use factors for the affected facilities both retroactively and proactively.
- Negotiate a water supply agreement for 10,300 AFY of the unused Table A amount with SLOCFCWCD. (On average, delivers 6,200 AFY.)
- Negotiate buy-in agreement between DWR and SLOCFCWCD for the use of Coastal Branch rights-of-way and easements to construct parallel water conveyance facilities from Devil's Den pumping plant.
- Preliminary design and cost estimates for project construction.
- Ballot initiative to obtain voter approval from property owners.
- Obtain financing for design, and complete final design.
- Obtain financing for project construction and management.
- Bid, award, construction contracts.
- Project construction.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

Summary: Utilizes an increase in Coastal Branch excess capacity as recalculated in a 2011 SLOCFCWCD-CCWA capacity assessment study. This study determined that more water could be safely pumped through the existing pipeline, and identifies approximately 5,500 AFY of excess capacity "downstream" of Lopez Reservoir through Nipomo. In order to utilize this capacity, Nipomo would need to request that SLOC amend its Water Supply Contract with DWR and negotiate with CCWA for capacity it is entitled to, request the SLOC enter into a turnout agreement with DWR to construct a turnout and system connector, and request that SLOC acquire or utilize its own

water rights on Nipomo's behalf. Historically, SWP delivers an average of 60% of maximum Table A amount amounts, so Nipomo would need to purchase Table A amounts of 167% to receive the desired water volume on average.

Major actions required:

- Request that San Luis Obispo County amend the DWR Water Supply Agreement to increase maximum delivery amounts.
- Enter into a new turnout agreement and reconfigure the proportionate use factors for the affected facilities both retroactively and proactively.
- Negotiate purchase agreement between DWR, SLOCFCWCD and CCWA for newly identified excess capacity on the Coastal Branch.
- Offer first-right-of-refusal option to other SLO County SWP participants.
- Negotiate a Water Supply Contract amendment with DWR, CCWA and SLO County for a change in proportionate use of Coastal Branch pipeline and related facilities between the treatment plant and Nipomo.
- Negotiate turnout agreement with DWR, CCWA and SLO County, including environmental review and public participation.
- Ballot initiative to obtain voter approval from property owners
- Design and construct pipeline turnout.

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

Summary: This alternative requires NCSD to canvas SLO and SB County SWP participants with a request for purchase of any unused Table A amount. Because other SWP participants would have a first-right-of-refusal option, any allocation offered for sale would need to be passed-on by the other SWP participants in that County. To date, only Carpinteria has offered to sell a Table A amount. If purchase agreements can be negotiated, Nipomo would still need to request that SLOC acquire the Table A amount on its behalf, and enter into a turnout agreement with DWR and CCWA to construct a turnout and system connector in order to access this capacity. Since the purchase would be for Table A amount, and not for physical water, Nipomo would need to purchase the delivered water from SLOCFCWCD. Historically, SWP delivers an average of 60% of Table A allocation amounts, so Nipomo would need to purchase allocations of 167% to receive the desired water volume.

Major actions required:

- For SB County purchases, obtain legal determination, approval and direction from DWR to amend the Water Supply Contracts of the affected State Water Contractors
- Request that SLOC enter into agreements for unused Table A allocations from willing SLO and SB County SWP participants.
- Offer first-right-of-refusal option to other SLO and SB County SWP participants.

- Negotiate buy-in agreement with DWR, CCWA and SLO County for use of Coastal Branch pipeline and facilities between Lopez and Nipomo.
- Negotiate turnout agreement with DWR, CCWA and SLO County, including environmental review and public participation.
- Ballot initiative to obtain voter approval from property owners.
- Design and construct pipeline turnout.

03-SW: **REMOVED - Reactivate Desal Plant in SB / Exchange for SWP Supplies**

Summary: This alternative is similar to 02-SW, but proposes a “cap and trade” type water exchange to allow the City of Santa Barbara to create an “unused Table A allocation” amount. The concept was to have Santa Barbara restart their deactivated 3,000 AFY capacity desalination plant to supply water to their City. Santa Barbara could then release that amount of SWP water for sale to Nipomo via the CCWA owned pipeline routed through rights-of-way in Nipomo.

According to City senior staff, Santa Barbara has designated their desalination plant to be an integral part of their drought buffer, and would be very unlikely to support this alternative for Nipomo. Therefore, the alternative has been designated “not feasible”, and was removed from consideration.

SW – CRITERIA

Supply Potential:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

Potential long-term average supply of 6,200 AFY based on SWP historical water deliveries. This requires a 10,300 AFY maximum Table A amount since SWP long-term average supplies are 60% of Table A amounts (10,300 X 60% = 6,200 AFY). Year-to-year State water deliveries can vary significantly.

01A-SW necessitates construction of conveyance and water treatment facilities to parallel the Coastal Branch from Devil’s Den Pumping plant to Nipomo – a distance of approximately 83 miles. (See Note 1 below for background.)

This alternative would support the entire supply potential in the Bylaws.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

Potential long-term average supply of 3,300 AFY based on SWP historical water deliveries. This requires a 5,500 AFY maximum Table A amount since SWP long-term average supplies are 60% of Table A amounts (5,500 X 60% = 3,300 AFY).

01B-SW is introduced to utilize additional Coastal Branch excess capacity identified in a recent capacity assessment conducted by SLOCFCWCD. (See Note 2 for reference.)

This alternative could be combined with others to increase supply potential.

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

Potential long-term average supply of 600 AFY based on SWP historical water deliveries. Carpinteria has offered for sale a nominal 1,000 AFY Table A allocation. SWP long-term average supplies are 60% of maximum Table A amount (1,000 X 60% = 600 AFY). This falls short of the minimum 1,000 AFY initial supply requirement in the Bylaws, and would have to be augmented.

According to informal discussions with CCWA contacts, the cities of Montecito and Solvang may have unused Table A allocations totaling 1,500 to 1,700 AFY. However, they have not indicated interest in selling. If these cities were agreeable, and the unused water were offered for sale, it could add up to another 60% X 1,700 AFY = 1,020 AFY, making the total 1,020 + 600 = 1,620 AFY under this alternative.

The Oceano CSD General Manager has informally offered to sell Nipomo an unspecified amount of SWP water, or a municipal mix that includes SWP water to Nipomo on a non-permanent basis. That alternative is considered under J/10C-RWI for regional waterline intertie projects.

A formal purchase offer has not been made to any SLO or SB County water agency or community.

This alternative could be combined with others to increase supply potential.

Cost Considerations:

Important: The SWAEC does not have the resources needed to produce detailed engineering cost estimates. The approximations presented here are offered simply for the purpose of ranking various alternatives. They are appropriate for the purpose, but are not intended to replace more detailed estimates needed for budgeting and project development.

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

Capital Cost: Roughly approximated to be \$300 million based on similar major water resource projects that have been constructed on the Central Coast under similar conditions. (See Note 3 below for capital cost calculation.)

O&M Cost: Approximately \$1,800 per AFY. (Water cost is \$900-1,000 per AFY from SLO County per CCWA estimates, plus pipeline facilities costs of \$840 per AFY. See Note 4 for O&M cost calculation.)

B/01B-SW Acquire Excess Table A Allocation identified by SLOFCWCD and CCWA and Buy-into CCWA Pipeline

Capital Cost: Buy-in costs to access the CCWA owned Coastal Branch pipeline, and construct a Nipomo turnout are anticipated to be approximately \$120 million. (See Note 5 for capital cost calculation. See Note 6 for background on turnout.)

O&M Cost: Approximately \$2,500 per AFY. (Water cost is \$900-\$1,000 per AFY from SLO County per CCWA estimates, plus future annual cost for Coastal Branch buy-in of \$1,600 per AFY. See Note 7 for annual buy-in cost calculation.)

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

Capital Cost: \$7 million. Includes \$5 million for the initial purchase of a Table A amount of 1,000 AFY from Carpinteria (1,000 AFY X \$5,000 per AFY), plus \$2 million for construction of a Coastal Branch-CCWA turnout at Nipomo.

The cost approximation for turnout construction includes legal fees, CEQA reviews, administrative costs, public participation, and design and construction of a SWP turnout with connection to Nipomo's water distribution system. (See Note 8 below on turnout construction.)

O&M Cost: \$5,000 per AFY for delivered water based on a long-term average. This amount is assumed to be applicable to all water purchased under 02-SW for SB County communities. (See Note 9 below for background and Note 10 for O&M cost calculation.)

Court Compliance:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOFCWCD)

Would not comply with the Court Final Judgment for a pipeline to Santa Maria, and MOU with Santa Maria. Requires a return to the Superior Court for a change in the method of water delivery.

A/01A-SW would comply with the Court Final Judgment for a minimum supplemental water delivery of 2,500 AFY.

B/01B-SW Acquire Excess Table A Allocation identified by SLOFCWCD and CCWA and Buy-into CCWA Pipeline

Same as A/01A-SW.

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

Would not comply with the Court Final Judgment for a pipeline to Santa Maria, and MOU with Santa Maria. 02-SW would require a return to the Superior Court for a change in the method of water delivery.

02-SW *probably would not comply* with the Court Final Judgment for a minimum supplemental water delivery of 2,500 AFY unless it was combined with other alternatives. It is considered unlikely that volume of water could be purchased from SWP participants.

Critical Milestones for Delivery:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

1,000 AFY by 2015: Cannot meet this criterion - insufficient time for implementation.

3,000 AFY by 2020: Could probably not meet this criterion because of the difficulties of performing required CEQA and other studies, obtaining approvals and permits, acquiring rights-of-way, and obtaining funding commitments.

6,200 AFY total: Could meet this criterion if funding and sufficient time were available.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

1,000 AFY by 2015: Could meet this criterion provided SWP participants with first-right-of-refusal do not claim the excess capacity once released.

3,000 AFY by 2020: Could meet this criterion provided SWP participants with first-right-of-refusal do not claim the excess capacity once released.

6,200 AFY total: Insufficient capacity. Cannot meet this criterion unless it is combined with other alternatives.

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

1,000 AFY by 2015: Probably cannot meet the total requirement. With only Carpinteria participating, 02-SW can provide an average of 600 AFY over the long-term. Another community would have to sell Nipomo at least 670 AFY of additional Table A amounts (670 AFY X 60% = 402 AFY) to meet a long-term reliability requirement of 1,000 AFY.

3,000 AFY by 2020: Very unlikely. Can meet this criterion over the long-term only if 3,000 AFY in unused Table A amounts can be purchased from participating SLO and SB communities. A 3,000 AFY average annual allocation requires 5,000 AFY of maximum Table A amounts (3,000 AFY / 60% = 5,000 AFY.) This is almost 12% of SLO and SB County's combined SWP maximum Table A amount.

6,200: Virtually impossible for the same reason. Would require 6,200 AFY of Table A allocation, which is about 24% of SLO and SB County's combined SWP Table A amount. (6,200 AFY / 60% = about 10,300 AFY.)

Reliability:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

The historical SWP long-term average supply is 60% of maximum Table A amounts. Using the rubric criteria, 80% X 60% = 48%. In the last ten years, SWP allocations were above 48% of Table A amounts in seven of those years, giving a reliability over ten years of 70%.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

Same as A/01A-SW

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

Same as A/01A-SW

Phasing:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

Phasing not required. This alternative meets all supply requirements of the Bylaws starting at the time it is put into service.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

Phasing not required. This alternative could provide over 3,000 AFY starting at the time it is put into service provided SWP participants with first-right-of-refusal do not claim the excess capacity.

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

It is highly unlikely that this project can be upgraded to a full 3,000 AFY. That would necessitate transferring nearly 12% of SLO and SB County's combined Table A amount to service Nipomo.

Water Quality:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

The SWP delivers a raw surface water supply that would require filtration and disinfection to meet Federal and State surface water treatment requirements.

After treatment, the finished water would have TDS concentrations well below 500 mg/L.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

Only minor treatment of delivered water is needed such as chloramination system conversions. (See Attachment 2 for a typical CCWA water quality report.)

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

Same as B/01B-SW.

Feasibility:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

Construction of an 83-mile pipeline with associated facilities in California is a major endeavor, requiring the involvement of many State, County, and local agencies, financing complexities, ballot initiatives, and so forth. CEQA compliance would be a lengthy and expensive process. The cost and complexity of this alternative is beyond Nipomo's current means.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

Nipomo is not a SWP participant. SWP participants own contractual first-right-of-refusal for any unused Table A allocations offered for sale. Unused allocations go first to other SWP participants within the home County, and when inter-county transfers are contemplated, as in 02-SW, then to SWP participants outside the home County through a Table A amount transfer.

Several agencies in SLO County have reportedly expressed interest in acquiring more State water. It can be anticipated that there will be a demand among current SLO SWP participants for any additional Table A water made available by CCWA and SLOCFCWCD, which would reduce, perhaps to zero, the amount available to Nipomo.

Nipomo would need to follow a similar CEQA study, public participation, and approval process that was required had the community originally chosen to be a SWP participant during the first round of State Water hearings.

A ballot imitative would be needed as it was in the past since this alternative was previously voted down twice.

Several contracts and agreements would need to be adjusted including: CCWA agreements with various participants; the SLOCFCWCD-CCWA water treatment agreement; the SLO County Water Service Agreements, and Drought Buffer Agreements with SWP participants.

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

The same comments as 01B-SW apply regarding first-right-of-refusal. Additionally, any Table A allocations offered for sale by SB County participants must be first offered to other SB County participants, and then to participants in other California Counties. Nipomo would be last in line, and likely to see only those sales offers that are priced too high to be seriously considered by current SWP participants.

Other than Carpinteria, great difficulty is anticipated in finding local water agencies or communities willing to sell their unused Table A allocations. There is likely to be significant public and political opposition to the permanent sale of Table A allocations outside SB County.

In addition to the contracts and agreements listed in 01B-SW above, a Table A amount transfer between SBCFCWCD and SLOCFCWCD would need to be requested and approved by DWR, and the Joint Powers Agreement between SBCFCWCD and CCWA would need modification.

Sustainability:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

Once project construction is completed, no significant negative environmental impact due to energy usage, carbon footprint, greenhouse gas emissions or other similar factors is foreseen.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

Same as A/01A-SW for turnout construction.

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

Same as B/01B-SW.

Public Support:

A/01A-SW Acquire Unused Table A Amount from San Luis Obispo County Flood Control and Water Conservation District (SLOCFCWCD)

Strong opposition is anticipated due to high capital cost, and prior public reaction to high-cost projects.

B/01B-SW Acquire Excess Table A Allocation identified by SLOCFCWCD and CCWA and Buy-into CCWA Pipeline

Same as A/01A-SW.

C/02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline

Strong opposition is anticipated due to high O&M cost.

SW – NOTES

Note 1: A/01A-SW Background. SLOCFCWCD has a SWP maximum Table A amount of 25,000 AFY. However, Coastal Branch facilities constructed in the mid-1990's only built pipeline capacity for 4,830 AFY to service SLO County water agencies and communities that elected to participate in the SWP. Therefore, SLO water purveyors have contractual access to relatively little State water past the end of the Coastal Branch Phase 1 ending at Devils Den in Kern County.

Oceano CSD has informally indicated that they may have some unused Table A water available for sale out of their 750 AFY allocation. However, a permanent sale was prevented by Oceano voters (Measure B-12, November 6, 2012.) No other SWP participating agency in SLO County has indicated interest selling unused water.

Total unused and excess Coastal Branch capacity in SLO County cannot make a significant contribution in meeting the Superior Court of California 2008 Judgment requiring 2500 AFY of supplementary water. The lowest "Supply Potential" criterion specified in the Bylaws – 1,000 AFY – is more than 20% of SLO County's entire 4,830 AFY Table A amount.

Significant SWP supplemental water from for Nipomo can neither be purchased on a long-term basis from willing SLO County sellers, nor delivered because of limited Coastal Branch pipeline capacity. Therefore, a new 83-mile pipeline would need to be constructed to access SLOFCWCD's remaining unused Table A amount.

A formal purchase offer has not been made to any SLO County water agencies.

Note 2: *B/01B-SW Reference. Capacity Assessment of the Coastal Branch, Chorro Valley, and Lopez Pipelines* dated 12 December 2011 and conducted by WSC, Inc. for SLOFCWCD.

The recalculated system-wide excess capacity in the WSC study is nearly 9,000 AFY, but the identified excess “downstream” of Lopez (at the Guadalupe, Santa Maria, SCWC turnouts, and at Tank 5) is about 5,500 AFY. This new capacity determination isn't a required system factor-of-safety, but a genuine capacity increase that CCWA might be willing to offer for purchase, notwithstanding first-right-of-refusal issues (see “Feasibility” discussion above.)

Note 3: *A/01A-SW Capital Cost Calculation.*

This rough cost approximation is based on these two data points: The Coastal Branch and CCWA Extension originally cost (mid-1990's) \$575 million for 143-miles of connector – or \$4.0 million per mile. The recently completed Nacimiento project cost \$176 million for 45-miles of connector – or \$3.9 million per mile.

It should be noted that this per mile cost includes not only the pipeline construction, but all associated costs for right-of-way and easement acquisition, and construction of pumping plants, intermediate storage reservoirs, and other related support facilities. These type facilities would all be essential to accomplish this major project.

Because SWP water at Devils Den pumping station is from a raw surface source, and because the Polonio Pass water treatment plant is not sized for Nipomo's level of participation, a new treatment plant will be needed before SWP water can be added to the NCSD potable water distribution system. The WTP would be sized for a 6,200 AFY flow rate (about 6 MGD). Using the same microfiltration technology as the Lopez treatment plant, the cost can be approximated at \$20M.

Approximately 83-miles of connector and treatment facilities would be needed from Devil's Den Pumping Plant in the Central Valley to Nipomo Mesa. The average \$3.95m X 83 miles = \$328 million. Including the required WTP, this amount is \$328m + \$20m = \$348 million.

Because the required system capacity for a Nipomo project would be less, the project would be less costly. This is the result of smaller pipe, valves, fittings, pumps, tanks, and structural components. However, the cost difference is largely attributed to materials, and the effect on total project cost is not downward scalable, and marginal. Therefore, this rough approximation was rounded to \$300 million.

Note 4: A/01A-SW O&M Cost Calculation.

Using CCWA FY 2011/2012 budget data, total annual operating expenses for the Coastal Branch infrastructure was \$6,868,067 for 143 miles of connector – or approximately \$48,000 per mile. Assuming O&M costs for an 83-mile Nipomo connector would be similar, the annual O&M would be 83-miles X \$48,000 = \$4.0 million. For 6,200 AFY delivered water, this converts to approximately \$640 per AFY.

Added to this amount are WTP O&M costs estimated to be \$200 per AFY. $\$640 + \$200 = \$840$ per AFY.

The cost of the physical water charged by SLOCFCWCD must be added to the O&M cost for pipeline operating expenses.

Note 5: B/01B-SW Capital Cost Calculation.

Fixed annual assessments from current Coastal Branch participants for debt service:
\$11.5 million (CCWA FY 2011/2012 Budget)

DWR fixed costs (SWP bond debt, Delta water charges, but excluding variable cost):
\$27.9 million (CCWA FY 2011/2012 Budget)

Proportion of total Coastal Branch infrastructure needed to service Nipomo: Ideally, infrastructure costs would be calculated on the bond repayments of the \$300m in new construction costs. Additionally, SLOC will assume debt from its own infrastructure costs. These elements are difficult to predict. For purposes of cost approximation they are:

Approximately 83-miles to Nipomo / 143-miles total = 55.9%
(or 56.9% - 50% = 6.9% more than an "average" participant.)

Total Table A amounts financed by current participants:
43,908 AFY (SLOCFCWCD: 4,830 AFY + SBCFCWCD: 39,078 AFY)

Fixed annual costs per AF for "average" participants (sharing in 50% of infrastructure cost):
 $(\$11.5 + \$27.9\text{million}) / 43,908 \text{ AFY} = \897 per AFY of Table A amounts

Proportional fixed cost to Nipomo: $\$897 \times (100\% + 6.9\%) = \959 per AFY

Proportional cost to Nipomo for 5,500 AFY Table A amount:
 $5,500 \text{ AFY} \times \$959 = \$5.3$ million per year

Total proportional buy-in cost to Nipomo for years 1993 through 2015 (22 years):
 $\$5.3$ million annual buy-in X 22 years = \$116.0 million

B/01B-SW capital cost (buy-in + turnout cost): $\$116\text{m} + \$2\text{m} = \$118$ million (Say \$120 m)

Note 6: *B/01B-SW Background on Turnout.*

It has long been assumed that a turnout was installed when the SWP Coastal Branch was routed through Nipomo in the mid-1990's. (A turnout is a waterline T or Y connection to direct some water into a second, smaller capacity pipe.) Contrary to that assumption, there is no Nipomo turnout installed.

There was a 6-inch valve-connection installed in the pipeline at an existing maintenance facility in Nipomo, but no work was ever done to design and construct a turnout.

A turnout that is capable of carrying flows of up to 5,500 AFY would likely be an 18-inch pipe.

Note 7: *B/01B-SW O&M Cost Calculation – Future Annual Buy-in cost Calculation.*

Proportional cost to Nipomo for 5,500 AFY Table A amount (annual buy-in component):
 $5,500 \text{ AFY} \times \$959 = \$5.3 \text{ million per year (from Note 5 above)}$

Cost distributed to long-term average water delivered:
 $5,500 \text{ AFY} \times 60\% = 3,300 \text{ AFY}$
 $\$5.3 \text{ million} / 3,300 = \$1,598 \text{ per AFY (rounded to } \$1600)$

Added to this buy-in cost is the water cost of \$900-\$1,000 per AFY from SLO County per CCWA estimates. $\$1,600 + \$900 = \$2,500 \text{ per AFY.}$

Note 8: *C/02-SW Turnout Construction.*

Per discussion with CCWA senior personnel, a separate turnout agreement with DWR, SLO County and CCWA is needed. CCWA would design and construct a turnout on the State Water pipeline. Environmental review, public participation, a required ballot initiative, project planning, setup, design and construction costs would be charged to SLOC who would pass them on to Nipomo. CCWA experience with construction of a 100 AFY turnout at Shandon, CA shows that environmental review and public participation make this a slow and cumbersome process.

Note 9: *C/02-SW Background.*

All Coastal Branch pipeline infrastructure South from Lopez, and routed through rights-of-way in Nipomo, plus a high percentage of pipeline construction costs North through SLO County was financed by, and contractually allocated to CCWA participating communities in SB County. CCWA partners have paid debt service, and associated costs for transmitting that water since the pipeline construction was started in the early 1990's. This analysis must assume that the cost to Nipomo would be a negotiated amount that would "make whole" SB County water agencies and communities.

This analysis has made the assumption that the Carpinteria pricing – although subject to negotiation – will be supportable, and that it can be evenly applied to all SB County

participants that may offer unused Table A water for sale. They are all located at the far Southern end and therefore most costly part of the Coastal Branch connector.

Note 10: *C/ 02-SW O&M cost calculation.*

Nipomo would be responsible for paying all O&M costs through the seller's turnout – Carpinteria – in addition to the cost of physical water delivered in SLO County.

Fixed costs must be paid on the whole Table A amount. Carpinteria's annual fixed costs for their maximum Table A amount is approximately \$2 million.

Long-term average of SWP physical water delivered = 60% of Table A allocation. Average annual water delivery = 1,000 AFY X 60% = 600 AFY.

Fixed cost for delivered water at the Carpinteria turnout = \$2 m / 600 AFY = \$3,333 per AFY

Variable costs must be paid only on the water received. Average annual variable water cost at \$900-1,000 per AFY in SLO County.

Additionally, Carpinteria may want to be reimbursed for its stranded capacity rights downstream of Nipomo. A rough calculation of all these costs is \$1,750 per AFY on the entire 1,000 AFY amount. It is assumed that it could be negotiated to half, or \$875.

Total annual O&M cost = fixed cost + variable cost + stranded capacity reimbursement =
=\$3,333 + 900 + \$875 = \$5,108 (rounded to \$5,000 per AFY.)

SW - ATTACHMENT 1

Subject: State Water Project Pipeline Connection

Contact: William J. Brennan, Executive Director Central Coast Water Authority

By: Samuel Saltoun

Date: January 3, 2013

Notes:

There are two separate points of view within CCWA and CA DWR on how Nipomo could begin to use State water. It is uncertain which of two scenarios would be supported after legal review.

1. In Mr. Brennan's view, the more likely, and less difficult and costly of the two scenarios is that Table A amounts can be sold from a willing seller to a willing buyer acting through their respective willing State Water Contractor Counties.
2. In the view of some DWR personnel, another scenario that is more time consuming and costly, involves changing Table A allowances.

Both of these probably involve the many steps, environmental reviews, public participation and ballot initiative that occurred in 1993.

Our discussion was mostly directed at the first scenario.

The willing sellers could be three SB County communities with excess Table A water – Carpinteria, Solvang, and Montecito. Only Carpinteria has indicated a willingness to sell its State Water allocation. The price for purchasing the allocation would be negotiable.

- Carpinteria has offered to sell 1,000 AFY at \$5,000/AF (to help make up for costs incurred originally to purchase that capacity.) This is the cost to purchase the Table A amount, not the actual water.
- Solvang could sell 750-950 AFY if they were willing but have not indicated interest.
- Montecito could sell 750 AFY if they were willing, but also have not indicated interest.
- This totals 2,500-2,700 AFY if all three communities were willing sellers.

The sale would be processed through SB and SLO Counties though amendments to the Water Supply Contracts with DWR. SB County would bill SLO County \$5,000 for 1,000 AFY for Carpinteria reimbursement, and SLO would recover that cost from Nipomo.

SW - ATTACHMENT 1 (CONTINUED)

A separate turnout agreement with DWR, SLO County and CCWA is needed. CCWA would design and construct a turnout on the State Water pipeline (assuming a turnout is not already

there) at a cost of approximately \$200,000. Those setup costs would be charged to SLOC and passed on to Nipomo.

CCWA experience with construction of a turnout at Shandon, CA shows that environmental review and public participation make this a slow and cumbersome process.

In addition to the \$5,000,000 payable to Carpinteria for providing the Table A (one time purchase amount), Nipomo would need to pay SLO County for delivered water. Mr. Brennan estimated this to be \$900-1,000/AF. There may also be ongoing costs to Carpinteria to reimburse them for the stranded pipeline capacity downstream of Nipomo.

The total cost to Nipomo under the first scenario, using Carpinteria pricing would be an initial cost of \$5,000,000 plus ongoing fixed and variable costs to SLOC (about \$1,000 per AF, potential stranded capacity costs to Carpinteria (around \$750 per AF and around \$200,000 for a turnout if one is not already in place, and a lesser amount for a connection to Nipomo's water distribution system.

The time required is more difficult to estimate. It involves:

- A legal determination and agreement between CCWA and DWR on which scenario can be used
- A negotiated agreement on water quantities and costs with willing SB County communities
- A Water Supply Agreement with DWR, SLO and SB Counties
- A turnout agreement with DWR, SLOC and CCWA
- Design, environmental review, public participation, and construction of a SWP pipeline connection
- Design and construction of a connection from State Water to Nipomo's distribution system

Finally, all SB County communities have a contractual right-of-first-refusal on Table A transfers. Therefore, at any point in this process, any participating SB community can lay claim to any excess Table A amounts, and stop the transfer to Nipomo.

I asked Mr. Brennan if we could just bypass inter-county transfers and utilize SLO County's unused Table A allocations. He replied SB County communities paid for the entire pipeline that goes South through Nipomo, so it does not belong to SLO County to serve Nipomo. SB

SW - ATTACHMENT 1 (CONTINUED)

County also paid for a high percentage of the pipeline infrastructure all the way North through SLO County. Nipomo and SLO County can't avoid partnering with SB County to access State Water.



**Central Coast Water Authority
Process Control Benchsheet**

Date: Tuesday, January 22, 2013

Treated Water Tanks	Temp °C	pH	NTU	Chlorine (mg/L)		NH3-N (mg/L)		Alkalinity mg/L as CaCO3	Hardness mg/L as CaCO3	Nitrate mg/L as N	Nitrite	TON	TDS	Coliform	December Deliveries
				Total	Free	Total	Free								
Tank Site #2	9.8	8.04	0.07	3		0.58	0.01	62	106	1.1	0.004	1	316	Absent	
Chorro	11	8.06	0.07	2.54		0.54	0.02	60	106	1.1	0.004	1	320	Absent	
Lopez T/O	10.7	8.17	0.06	2.46		0.56	0.07	64	100	1.1	0.005	1	331	Absent	158
Guadalupe T/O	11.4	8.15	0.06	2.38		0.55	0.05	60	108	1.1	0.006	1	337	Absent	173
Santa Maria T/O	11.6	8.23	0.07	2.29		0.54	0.07	64	108	1.1	0.006	1	343	Absent	36
Golden State T/O	11.8	8.28	0.07	2.28		0.55	0.08	62	108	1.1	0.005	1	344	Absent	656
Tank Site #5	12.2	8.24	0.06	2.24		0.55	0.08	68	110	1.1	0.005	1	353	Absent	12
Vandenberg T/O	12.5	8.3	0.07	2.08		0.44	0.1	64	112	1.1	0.005	1	353	Absent	
Tank Site #7	13	8.27	0.07	2.28		0.46	0.01	66	112	1.1	0.005	1	358	Absent	0
Buellton T/O	15.2	8.59	0.06	1.85		0.4	0.01	66	110	1.1	0.01	1	369	Absent	
Solvang T/O	15.8	8.7	0.05	1.58		0.36	0.01	68	112	1.1	0.01	1	358	Absent	27
Santa Ynez ID#1 T/O	15.1	8.73	0.06	1.52		0.35	0.03	70	114	1.1	0.011	1	348	Absent	53
															0

Average Plant Flow for Sample Week = 14.0 MG

Average Cl2:NH3-N = 4.51 to 1

Samples Taken: 1/22/2013

Samples Analyzed: 1/24/2013

Sampler: Eric Keiding

Analyst: Louise Hickok, Jeff Tice

Comments: Chlorination systems on at Tank 5 and Tank 7.

Report Generated: Thursday, January 24, 2013

ALTERNATIVE ANALYSIS – Demand Management / Conservation

C –DESCRIPTION

D/04-C Conservation

The Supplemental Water Alternatives Evaluation Committee determined early in its process that any alternative or combination of alternatives that were reviewed, prioritized and/or ultimately recommended to the Nipomo Community Services District Board of Directors would include the recommendation that the District increase Conservation measures. This Alternative, unlike most other Supplemental Water Alternative Evaluations, considered alternatives to manage the demand for water within the District, rather than looking for opportunities to import water from outside of the District.

Water Conservation is defined as using water more efficiently to reduce demand, or demand management, which has the same effect as adding water to the system.

Major actions required:

- 1) Consider a Regional Partnership With All Mesa Water Purveyors to Join Together to Establish a Single, Jointly Funded, Community Conservation Program
- 2) Expand Membership on the NCSD Water Conservation Committee
The NCSD Water Conservation Committee currently consists of two Board members and no members of the public. In 2013, a 5-year review of the 2008 NCSD Water Conservation Program will be undertaken. The District will provide a formal review of BMP compliance to the California Urban Water Conservation Council, as required, by April 2013 and use this review as a launch for comprehensive program review. This would be an excellent time to expand the NCSD Water Conservation Committee to include members of the community willing to serve and provide their expertise representing Nipomo.
- 3) Re-Establish the District's Water Conservation and Public Outreach Position
From 2006 – 2010, the District maintained a full time Water Conservation and Public Outreach position. In those five years significant strides were made in conservation of water and in public outreach and education on water conservation issues. Since 2010, the position has been scattered into multiple in-house District personnel as well as several contracted positions. This

has diluted the former strength of the position and minimizes the importance of Water Conservation, Public Outreach and Education in the Nipomo community. Consider a regional partnership of all Mesa water purveyors to join together to jointly fund a Regional Water Conservation & Public Outreach Position.

4) Provide Better Public Education Programs and Improve Media Outreach

- Support improved outreach messages and promote public awareness on water-related issues through advertising in multiple media. Connect with a broad age demographic with water quality and conservation messages. Example: improve and update website material with meaningful information on water-use efficiency and protecting water quality. Provide more current links to recent water conservation websites and up-to-date materials.
- Re-establish the NCSD Conservation Newsletter (last published in Fall 2008).
- Increase the number of classrooms reached with Water Conservation message. The October 2012 District report indicated that only 12 out of 32 classrooms of 4th through 6th graders were served in 2012. Improve statistics. Expand the classroom education program to include other appropriate grade levels. Encourage mentors from Nipomo High School and Central Coast New Tech High School leadership programs to participate with the District in classroom education.
- Reach out to Cal Poly for interns and Professors in a variety of partnerships in education, outreach and leadership opportunities.
- Broaden use of community social media such as Facebook, monthly emailed newsletter updates via Constant Contact and give Twitter a try.
- Create Public Service Announcements to be aired on local TV and radio stations.
- Find venues for more detailed information about ongoing NCSD efforts through newspaper articles, rather than just paid print advertisements.
- Develop relationships with nonprofits and other interest groups through events and support.
- Work to develop partnerships with groups such as The Land Conservancy, Central Coast Salmon Enhancement, Coastal San Luis Resource Conservation District, ECO-SLO, Nipomo Native Garden and the Dana Adobe Amigos with strong community connections and demonstrated strengths in

educating the public regarding water efficient landscaping and conservation techniques.

- Provide speakers to community groups such as the Chamber of Commerce, Rotary Clubs, Lions Clubs, and homeowners associations to promote water conservation.

5) Pursue opportunities to minimize the impact of water rate adjustments on all users, in particular on low-income customers

6) Become More Accessible to Community Members Through Events

- Identify and participate in community events such as Nipomo OctoberFest, Earth Day, Coastal and Creek Clean-Ups alongside interest groups and nonprofits to implement public awareness.
- Develop an annual free community Conservation Workshop focused on sustainable landscaping and irrigation practices. Invite vendors to display smart irrigation controllers and drought tolerant plants. Offer a free raffle and giveaways to entice participation. Advertise well in advance to insure good attendance.
- Conduct a Professional Gardeners Workshop. Target a wide audience of professional gardeners that service residential and commercial locations throughout Nipomo. Topics could range from sustainable landscaping, reduction of green waste, pest management, and certification classes on weather based irrigation controllers.
- Host an annual NCSO Open House to familiarize customers with operations at the District administrative offices and operational venues, as appropriate.
- Start a Nipomo Friendly Garden Contest—partner with Nipomo Native Garden, local nurseries and hardware stores, for example, to promote “smart” and sustainable landscapes for the homeowner. The contest could judge outdoor space designs using low-water plants, state-of-the-art irrigation controllers and precision sprinkler heads. Sponsor prizes by local nurseries and hardware stores, etc.

7) Graywater

- Coordinate with regional partners to develop a graywater demonstration project in cooperation with local nurseries and hardware stores.
- Provide links on District website for San Luis Obispo County Graywater and other local, regional, statewide and national appropriate materials.

C—BACKGROUND

In California, water is precious, competition for water is fierce, and conservation is critical. The value that Californians place on water is reflected in a constitutional provision ensuring its reasonable and beneficial use. Article X, Section 2 of the California State Constitution prohibits the waste and unreasonable use of this precious resource.

The California Urban Water Management Planning Act requires all urban water suppliers serving more than 3,000 customers or providing more than 3,000 AFY of water to develop an Urban Water Management Plan (UWMP), update it every five years, and submit it to the Department of Water Resources. In addition, Governor Schwarzenegger in his 20x2020 Plan determined that for California to continue to have enough water to support its growing population, it needs to reduce the amount of water each person uses per day (Per Capita Daily Consumption) by 20% by 2020.

In our semiarid, Mediterranean climate in Nipomo, periodic droughts and the high cost of water make efficient use of valuable water supplies essential. The NCS D became a signatory member of the California Urban Water Conservation Council (CUWCC) in January 2008. The CUWCC is an association of water agencies, public advocacy and special interest groups concerned with water supply and conservation of natural resources in California.

Five years ago, in February 2008, the NCS D Board adopted a Water Conservation Program, available on the NCS D website:
http://ncsd.ca.gov/Library/water_conservation/Conservation%20Program/2008-1069.pdf
This year, in April 2013, a 5-year review of the NCS D Water Conservation Program will be undertaken.

C -- ALTERNATIVES

D/04-C Conservation

1) Best Management Practices

The California Urban Water Conservation Council has been responsible for developing 14 "Best Management Practices" (BMPs) (see Note 2) for water conservation and is responsible for monitoring their implementation by signatory agencies.

Frequently the three primary BMP strategies Water Districts use for encouraging water conservation are: *price increases, regulations, and rebates*. The NCSD is no exception and has used these three BMPs as principle methods for encouraging conservation in Nipomo. Unfortunately, a very important CUWCC BMP strategy, *Conservation Coordinator*, has not been retained its status as a core Conservation measure by the NCSD. (See Note 3 for a list, provided by NCSD staff, of current NCSD conservation efforts/policies)

Rate Increases

Tiered pricing structures, in which the price of water increases steeply after predetermined usage thresholds, target high-use water consumers who may be in the best position to reduce their water use. Tiered pricing has shown some efficacy in curbing demand, particularly with irrigation uses. Many water agencies turn to tiered pricing structures as a first order of “Conservation” measures in reducing water demand.

NCSD has shown a heavy reliance on rate increases as a primary strategy to encourage water conservation. As stated in the NCSD 2010 Urban Water Management Plan (UWMP p.60):

“The major tools that the District is using to conserve water and achieve the 20% reduction from the baseline are: using a rate structure that encourages less water use, reducing high-use customer consumption (the two largest users are the Nipomo Community Park and the Nipomo High School. The Park uses about 56 AFY and the High School uses about 80 AFY. These parcels are in need of landscape irrigation retrofits and improvements), implementing water use reduction programs.....and implementing water use reduction ordinances.....”

NCSD implemented a four-tiered rate structure in 2011. SWAEC discussions with the Nipomo community have resulted in the inclusion of a recommendation of the pursuit of opportunities to minimize the impact of water rate adjustments on all users, in particular on low-income customers.

Regulatory Measures and Rebate Programs

Regulatory measures used by Water Districts include restrictions on landscaping and hosing off hard surfaces, as well as building code requirements for low-flow toilets and showers in new homes.

Rebate programs reduce the price of low flow toilets, showers and other water-efficient appliances, in particular dishwashers and washing machines. NCSD has an ongoing high-efficiency washing

machine rebate program underway. (See Note 4: How Conservation Rebates Stack Up)

Regulatory measures and rebate programs can be very successful. Regulatory measures and rebates aimed at curbing indoor water use have helped hold water consumption at roughly the same level in the City of Los Angeles over the past 10 years, despite a growing population.

The NCS D list rebates for plumbing retrofits, high efficiency clothes washers, lawn or “turf” removal, and “smart” irrigation controller installations as non-core conservation measures. Non-core measures are considered measures that may not all be essential to the success of the conservation program.

NCS D Water Conservation and Public Outreach Position

The NCS D employed a full-time Water Conservation and Public Outreach position at the District from 2006 to 2010. During that time, the District had a regular presence at community events, an excellent Conservation newsletter, a series of water conservation related workshops (a District core conservation measure), and a broad spectrum of water related pamphlets were published. As discussed above, this public outreach and education work by the District largely stalled when the full time Water Conservation and Public Outreach position ended in 2010. Re-consolidating the scope of work of this position into a full time position would be advantageous to the District’s water conservation and public outreach and education goals.

2) Graywater

Using laundry water for irrigation is one of many ways to conserve drinking water supply and reduce flow to the wastewater system. Graywater is water from washing machines, showers, bathtubs, and bathroom sinks. It is wastewater that can contain some soap, salts, hair, suspended solids and bacteria, but that is clean enough to water plants. Water from toilets, kitchen sinks, or wash water from diapers is **not** considered graywater in California. Graywater (treated or untreated) is not the same as recycled water, which is highly treated wastewater from a centralized treatment facility.

This discussion pertaining to graywater in the NCS D is regarding the simplest type of graywater system, called a “laundry to landscape” system. A “laundry to landscape” system is a low-cost, flexible option for graywater conservation that is easy to install. A three-way valve placed on the discharge hose of a washing machine allows graywater

to be directed to the landscape or to the sewer, as needed, without altering the existing plumbing. Graywater from a washing machine is suitable for trees, bushes, shrubs, small perennials and larger annuals.

Reusing graywater is an important component of sustainable water practices. There are many benefits of using graywater instead of potable water for irrigation. Reusing graywater can:

- Decrease water and wastewater utility bills.
- Diversify the NCS D water portfolio and provide an alternate source of irrigation water, reserving treated potable water for high-quality water needs.
- Reduce the energy (approximately 2 watt-hours per gallon of water) and chemicals needed to treat wastewater.

Another benefit of using graywater is that it connects us to our water supply, helping us understand where our water comes from and where it goes. In concert with water-wise landscaping and other water conservation methods, using graywater as a resource helps reduce dependency on groundwater and supplemental water alternatives.

Graywater is not currently being actively looked at as a demand management alternative by NCS D. It is however, a good tool in the array of conservation methods for which the District should be providing education, demonstration, workshops and outreach for the community. There is a wealth of information and available leadership within the Central Coast to assist NCS D in this effort.

C – CRITERIA

Supply Potential:

D/04-C Conservation

The estimated supply potential is 500 AFY.

Conservation efforts are already underway on the Nipomo Mesa. Additional conservation efforts could yield immediate additional supply potential. Gains from demand reduction accumulate gradually, one water-efficient washing machine or reduced irrigation cycle at a time. In an emergency such as, for example, complete loss of imported State water following an earthquake, rationing (the most extreme form of conservation) could yield overnight gains from drastic measures such as severely curtailing outdoor water use.

1) Examples of Water Conservation supply potential:

- Running the dishwasher only when full (2.5 gallons per load)
- Washing only full loads of clothes (15-50 gallons per load)
- Replacing high-volume flushing toilets with low flow models (2-4 gallons per flush)
- Watering at night to reduce evaporation (20-25 gallons per day)
- Reducing each irrigation cycle by 1-3 minutes (20-25 gallons per day)
- Repairing leaks and broken sprinkler heads (20 gallons per day per leak)
- Replacing water-hungry lawns and gardens with climate-appropriate plants (10+ gallons per square foot per year)

2) Graywater Supply Potential Estimate

See Note 1 for Graywater Supply Estimating.

Cost Considerations:

D/04-C Conservation

Cost Range: For the purposes of this report, it is estimated annual O & M for Conservation to be approximately \$210 per AFY.

Capital Costs for Conservation are dependent on the level of commitment by the NCS D to this Alternative and cannot be ascertained to a level of certainty at this time. For purposes of this report, it is estimated that Capital Costs could range from \$50,000 to \$1,000,000.

The July 2010 Report: “*San Diego’s Water Sources Assessing The Options*” sponsored and published by the Equinox Center and researched and produced by the Fermanian Business & Economic Institute, estimated the cost of Water Conservation between \$336 and \$1,136 per AF in 2020 and between \$608 and \$1,508 per AF in 2030.

The August 2008 Report: “*Where Will We Get The Water? Assessing Southern California’s Future Water Strategies*” August 2008, Prepared by LA Economic Development Corporation and Sponsored by the Southern CA Leadership Council, AECOM Water and Eastern Municipal Water District, estimated the annual water savings will cost approximately \$210 per AFY over 30 years.

The marginal cost of conservation programs is projected to rise at a 3.1% real pace over the twenty-year period. Although new technologies could enhance water saving efforts, conservation programs could start to run into diminishing returns over the next two

decades as the easiest and least costly options for water users are implemented.

Court Compliance:

D/04-C Conservation

Method: Conservation does not import water via connection to the City of Santa Maria. However, it is not likely to be opposed by the other stipulated parties if proposed to the court,

Source: Conservation does not import water to the Mesa.

Quantity: Conservation does not deliver 2,500 AFY.

Critical Milestones for Delivery:

D/04-C Conservation

<i>1,000 AFY by 2015:</i>	500 AFY is Feasible by 2015
<i>3,000 AFY by 2020:</i>	Probably Not Feasible
<i>6,200 AFY total:</i>	Probably Not Feasible

Reliability:

D/04-C Conservation

Conservation is considered highly reliable on a long-term basis. It is not a volatile water supply. Businesses want access to a reliable source of water to run their operations and residential consumers assume a ready access to water at all times. No one water source can be completely guaranteed.

State water appears to face the greatest risk because of the possibility of drought conditions and natural disasters that would result in sea water intrusion in the Sacramento-San Joaquin River Delta or destroy pipelines and canals either in Northern or Southern California. Groundwater and surface water face significant swings in availability because of changes in weather, climate, and precipitation. Desalination and recycling facilities could face temporary disruptions due to power failures, earthquakes, or technical problems.

Even conservation cannot be relied on totally because of the failure of consumers to adhere to water restrictions or to change their

behavior substantially. The inability of one single water source or option to be completely reliable argues for the importance of a diversified approach to meeting NCSD supplemental water demands.

There is potential to decrease demand on the water supply in the District through greater water efficiency and conservation. The amount of water conserved will depend on how many people participate, and how aggressively they conserve. Both factors will be heavily influenced by the nature and extent of water agency conservation programs developed by the Nipomo Community Services District.

Phasing:

D/04-C Conservation

While there is definitely the opportunity to increase the amount of water conservation occurring on the Nipomo Mesa, this Alternative will not meet the definition per the criterion for Phasing; the project cannot be upgraded from 1,000 to 3,000 AFY.

Water Quality:

D/04-C Conservation

Conservation is perhaps the ultimate environmentally friendly water source. Individual strategies seldom require an environmental impact report.

Feasibility:

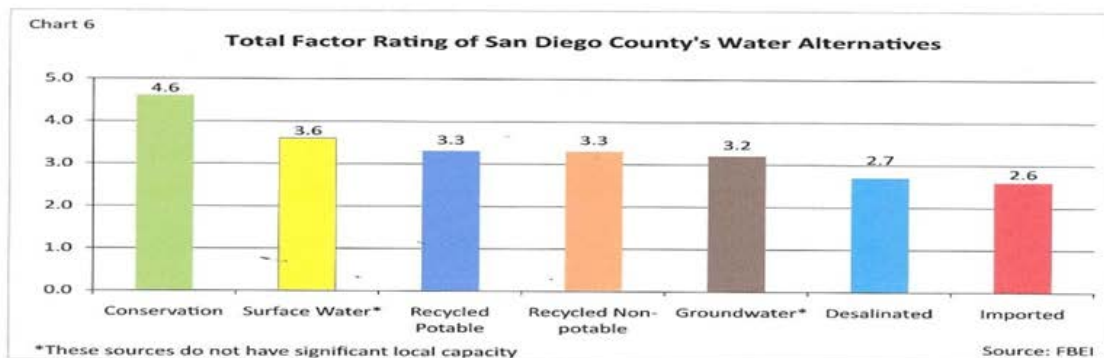
D/04-C Conservation

The feasibility of Conservation as an importance supplemental water alternative has been the subject of several in-depth studies in California recently. The San Diego report below found Conservation to be the most favorable and least costly option of seven supplemental water alternatives analyzed. In the Southern California report, the only water strategy of nine to receive all favorable ratings in the eight criteria was Water Conservation.

1) *“San Diego’s Water Sources Assessing The Options”* July 2010
Sponsored and published by the Equinox Center
Researched and Produced by the Fermanian Business & Economic
Institute

This report is based on the premise that water is likely to be the most critical resource challenge that the San Diego region will face in the next two decades as it strives to achieve sustainable growth. While imported water is likely to remain an important source for the region for some time, diversification into other sources will be necessary. Seven primary sources exist to address San Diego County's water demands: imported water, surface water, groundwater, desalinated sea water, recycled non-potable water, recycled potable water, and conservation.

Legal, regulatory, technical, health, social, and environmental factors also were important to assessing the optimal mix of water options for San Diego County. The report presents a matrix ranking the alternatives across these various dimensions. On a scale of 1 to 5, where 5 represents the most favorable/lowest-cost option, Conservation is the most favorable and least costly option of the seven water solutions analyzed for San Diego County by a wide margin over the next two decades. These findings suggest that solving San Diego County's water challenge may rest significantly on the demand side.



2) *“Where Will We Get The Water? Assessing Southern California’s Future Water Strategies”* August 2008, Prepared by LA Economic Development Corporation and Sponsored by the Southern CA Leadership Council, AECOM Water and Eastern Municipal Water District

This report was prepared after the spring of 1988, the driest in 88 years when rivers across California were so dangerously low that a statewide drought had been declared. The report evaluated nine water strategies including urban water conservation, stormwater capture, recycling, ocean desalination, and groundwater desalination as viable strategies to replace or augment imported water. Transfers

from agricultural users to urban users were examined to increase the volume of imported water. And inter-agency cooperation, groundwater storage, and surface storage were also looked at as strategies to increase overall water system reliability, particularly during dry years.

The report evaluated nine water strategies based on their potential (the total average annual volume of water the strategy could add to the region's water supply available to urban water users). For each strategy, representative projects were selected and evaluated based on eight criteria: reliability (the ability to deliver water during dry years); timeliness (the number of years from project conception to the start of operations); risk (the probability that projects undertaken as part of a strategy will ultimately be completed and deliver or store water); environmental friendliness (the likely reception projects can expect based on their environmental impacts); greenhouse gases (the impact of the project's operations and water deliveries on the state's carbon footprint); capital cost (the initial cost of the strategy); operating cost (the ongoing annual cost of the strategy); and 30-year cost (the all-in cost per acre-foot for water sourced from the project, including initial capital costs plus operating costs, interest payments, and, where applicable, the cost of transporting the water to Southern California).

The only water strategy of the nine evaluated to receive all favorable ratings in the eight criteria was Water Conservation. The strategy with the lowest 30-yr cost for water was Water Conservation with a cost of \$210 per AFY.

Assessing Southern California Water Strategies									
Strategy	2025 Regional Potential (TAF)	Typical Project Characteristics							
		Timeframe (years)	Drought-Proof (Reliability)	Risk (Project Aborted)	Enviro Opinion	GHG	Initial Cap. Cost (\$millions)	Annual Oper. Cost (\$millions)	30-yr cost Treated (\$/AF)
<i>Strategies to Replace or Augment Imported Water</i>									
Urban Water Conservation	1,100+	0-2	●	●	●	●	\$0	\$0.5	\$210
Local Stormwater Capture	150+	3-5	●	●	●	●	\$40-\$63	\$1-\$3.5	\$350+
Recycling	450+	6-10	●	●	●	●	\$480	\$30	\$1,000
Ocean Desalination	150+	6-10	●	●	●	●	\$300	\$37	\$1,000+
Groundwater Desalination	TBD	6-10	●	●	●	●	\$24	\$0.7	\$750-\$1,200
<i>Strategies to Increase Imported Water</i>									
Transfers-Ag to Urban	200+	1-5	●	●	●	●	n/a	n/a	\$700+
<i>Strategies to Increase Reliability</i>									
Inter-agency Cooperation	**	0-5	●	●	●	●	low	low	n/a
Groundwater Storage	1,500+	3-5	●	●	●	●	\$68-\$135	\$13	\$580
Surface Storage	0	10+	●	●	●	●	\$2,500+	\$7.5-\$15.5	\$760-\$1,400

*TAF- Thousand Acre-Feet
 ** Improves reliability and efficiency of existing supplies
 Source: LAEDC

● Favorable ● Neutral ● Unfavorable

Sustainability:

D/04-C Conservation

Conservation has a positive environmental impact or no increase in carbon footprint, greenhouse gas emissions, or other similar measures.

Some benefits of conserving water include reducing flow into wastewater treatment facilities, minimizing the need to develop new supplies, with associated energy costs, to meet expanding needs. Individual water consumers can also benefit by saving money on their water and energy bills when using water efficiently.

Public Support:

D/04-C Conservation

Conservation measures should have strong public support.

C – NOTES

Note 1: Graywater Regulations and Calculations

Graywater Regulations

Graywater use is legal in California. California's regulations for residential graywater systems can be found in Chapter 16A of the California Plumbing Code. In August 2009, California's graywater regulations changed, allowing for lower-cost graywater systems to be installed legally, including some without the need for a permit.

In San Luis Obispo County, a permit is not required for a laundry graywater system that meets the conditions listed below. You can install a graywater system for outdoor irrigation without a permit if you meet all of the following requirements:

- Graywater comes from the washing machine only.
- Graywater system does not alter the household plumbing (you access graywater from the hose of the machine, not by cutting into the plumbing).
- Graywater system is for a one- or two-unit residential building.
- Graywater system follows 12 guidelines set forth in the California Plumbing Code.

You need a permit for a graywater system for outdoor irrigation that includes any of the following conditions:

- Graywater system collects water from showers, sinks, or baths.
- Graywater system alters the plumbing (you cut into the drainage plumbing to access the graywater).
- Graywater system is installed in a building that is not a one- or two-unit residential building.
- Graywater system includes a pump (besides the washing machine's internal pump) or a tank.

Reference: California Residential Graywater Code: California Plumbing Code, California Code of Regulations Title 24, Part 5, Chapter 16A.

Available

at http://www.hcd.ca.gov/codes/shl/2007CPC_Graywater_Complete_2-2-10.pdf

Cohen, Yorem, 2009. Graywater—A potential source of water. UCLA Institute for the Environment. Available

at: <http://www.ioe.ucla.edu/reportcard/article.asp?parentid=4870>

California can develop a more sustainable water program by increasing graywater recycling to a level at which it becomes a measurable part of the State's water portfolio. However, an effective graywater recycling program will have to include broad public education and participation, certified and properly managed distributed graywater recycling systems, centralized recycling plants where applicable, and incentives for graywater recycling programs.

The volume of residential graywater in California appears sufficient to meet a significant portion of outdoor residential water demand. Coordinated government assistance for the selection, installation and deployment of distributed graywater systems is needed to accelerate the development of graywater recycling, and to alleviate the pressure on already dwindling potable water resources.

Graywater Calculations

To calculate the quantity of supply potential of graywater, the default method listed in The California Code of Regulations (Title 24, Part 5, Chapter 16A) is as follows:

Step 1) Calculate the number of occupants in your household: 2 occupants are automatically assumed in the First Bedroom; 1 occupant in Each Additional Bedroom

Step 2) Calculate the Graywater flow as follows: Washing Machine = 15 gpd/occupant

Step 3) Multiply the number of occupants (as calculated above, not the actual number of people who live in the home) by the estimated graywater flow in gpd per occupant to calculate the total estimated daily graywater flow.

Number of occupants x graywater flow per occupant = total estimated daily graywater flow

Using this formula, in a three-bedroom home of four people, the following volumes of graywater would be produced:

Number of occupants: Four (two in the first bedroom plus one for each additional bedroom).

Washing machine graywater: 15 gpd x 4 people = 60 gpd Total graywater

Note 2: CUWCC BMPs

- 1) Conservation Coordinator
- 2) Waste Water Prevention
- 3) Wholesale agency assistance programs

- 4) Water Loss Control
- 5) Metering with Commodity rated for all new connections and retrofit of existing connections
- 6) Retail Conservation Pricing
- 7) Public Education Programs
- 8) School Education Programs
- 9) Residential Assistance
- 10) Landscape Water Survey
- 11) High Efficiency Clothes Washing Machine Financial Assistance Incentives Programs
- 12) Commercial, Industrial, Institutional
- 13) Landscape
- 14) GPCD CBMPs Not Implemented or scheduled for implementation

Note 3: Current Nipomo Community Services District conservation efforts/policies (provided by the NCSD):

- Maintained compliance with CA Urban Water Conservation Council req'ts and Best Management Practice recommendations
 - Public outreach and education
 - Responded to 1,300 calls from customers with questions about saving water/money
 - Distributed "Water Ways" newsletter to all 3-6 grade teachers in area schools
 - Presented training to twelve classes, approximately 340 students
 - Participated with Countywide Partners for Water Conservation to implement County website to aid homeowners in plant selection and water conservation practices (www.slowaterlandscaping.com)
 - Advertising
 - Maintained active reminders in billing, lobby area, and Adobe Press. Included seasonal reminders on irrigation practices and conservation-oriented bill inserts in two of six 2012 water bills
 - Workshops
 - Technical assistance (leak detection and water audits)
 - Each month, staff reviews water meter data and contacts owners if usage is abnormally high – 270 notifications this yr
 - 103 service calls to investigate leak reports/high water use as of October 16, 2012
 - Conservation-based, four-tiered water rate structure
 - Clothes washer rebates
 - 22 rebates issued through September 2012; 209 issued over life of program (>\$15k)
- 2013 Conservation Program Direction
- Developing tracking system to capture customer-staff interactions related to water conservation
 - Improving ongoing leak detection and tracking/reporting efforts

- Will review, improve, and more aggressively promote water audit (exterior and interior) program
- Five-year formal review of District's Water Conservation Program will be undertaken by April 2013
- Hiring Assistant Engineer to provide technical support for administering conservation program
- Hiring Public Information Assistant to focus on conservation-related outreach

Options considered/evaluated

Note 4:**CONSERVATION REBATES -- HOW THEY STACK UP****SANTA CRUZ**

Toilets: \$150 for 1.28 gallon flush or dual flush, \$200 for commercial

Energy Star washing machine: \$100 for residential and \$400 for commercial

Turf replacement: 50 cents per square foot up to \$250 for single-family residential customers, \$1,000 for multifamily and commercial

Rain barrels: During the rainy season, the city offers 65-gallon rain barrels at a discount, which in the past has been about \$50 for a barrel that retails for \$149.

Pressurized water broom: \$50 for commercial

X-Ray film processor re-circulation system: \$2,000 for commercial

Cooling tower conductivity controller: \$900 or \$1,200 for commercial

SOQUEL CREEK

Toilets: \$150 for 1.28 gallon flush or dual flush

Energy Star washing machine: \$100 for residential, \$200 for commercial

Hot-water recirculation system: \$75

Graywater to landscape: \$75 per connection, up to three connections

Irrigation parts: \$5 per part, maximum of \$50 for residential and \$250 for large sites

Drip irrigation retrofit: \$20 per 100 square feet converted

Rain catchment system: \$25 for 40-200 gallons, max \$750 for 3,000 gallons

Weather-based irrigation controller: \$75-\$125

Turf replacement: \$1,000 max for single-family home, \$3,000 for nonsingle family; covers 50 percent of materials cost up to \$1 per square foot of turf removed.

SOURCE: City of Santa Cruz, Soquel Creek Water District

TOILETS AND WASHING MACHINES

The city of Santa Cruz has offered rebates for toilet retrofits since 1995 and washing machines since 2000, reporting at least 11,000 and 7,200, respectively. Soquel Creek Water District issued an estimated 3,700 toilet rebates from 1997-2011, 4,915 washing machine rebates from 1999-2011 and directly installed 3,452 toilets from 2003 until 2010 when it stopped that program.

SOURCE: City of Santa Cruz, Soquel Creek Water District

Santa Cruz Statements

Goddard, the conservation director, said the desalination plant's environmental impact report will provide details about how much conservation there might be left. As part of updating its 10-year conservation plan, the department also will hire a consultant to survey households to determine how much untapped savings remains.

But Ricker, the county's water resources director, cautioned conservation has a limit.

"There has been a lot of wishful thinking that we could solve more problems by doing more conservation," he said. "Realistically, that just isn't there."

"I don't think we are going to come up with alternatives that are going to be cheaper than desal," Jan Bentley, retired Santa Cruz superintendent of water production. "But to utilize all the alternatives takes a policy decision and a commitment to do that."

"Desal is still the most expensive source of water," said Tom Luster, the state Coastal Commission's pointman on desalination, adding that any municipality will need to demonstrate it has exhausted its options. "Why go there if you have these far less expensive sources that aren't going to cause coastal impacts?"

ALTERNATIVE ANALYSIS – Agricultural and Industrial Reuse (AIR)

AIR –DESCRIPTION OF VARIATIONS

E/06-AIR Agricultural Water Reuse

Agricultural water reuse looked at two scenarios: 1) desalination of agricultural runoff; and 2) a water recovery and recycling system that captures greenhouse runoff and blends nutrient-rich runoff with fresh water for reuse as nursery irrigation water in a closed system.

1) Farmers and greenhouse growers on the Nipomo Mesa use tailwater recovery systems to collect, store and transport irrigation tailwater for reuse in farm irrigation distribution systems. A central desalination plant could be constructed to clean-up brackish water from agricultural operations to provide a supplemental water supply. High levels of nitrates and other chemicals used in greenhouse operations would require removal. This would not be considered a new water source since the desalinated water would not be imported water. The quantity of water available cannot be determined at this time; all but 2 of the agricultural operations on the Nipomo Mesa are private. Gaining support from the agricultural community would probably be difficult. Determining a central location for a desalination plant, the need for construction of miles of brine pipelines and the overall huge cost of construction would be the overriding considerations for this alternative not to go forward as a viable supplemental water alternative.

2) There are at least 16 greenhouse growers on the Nipomo Mesa. The majority of these are private landowners with wells. A water recovery and recycling system would capture nursery runoff and blend the nutrient-rich water with fresh water for reuse as greenhouse nursery irrigation water in a closed system. Greenhouse nursery plants would be watered based on plant needs by means of a computer-operated irrigation delivery system that would precisely control irrigation scheduling and timing. By recovering and reusing water, the greenhouses could reduce their reliance on groundwater by up to 50%.

Major actions required:

- Seek assistance from Nipomo Mesa growers to identify any areas where surface runoff from crop irrigation exits the Nipomo Mesa Management Area (NMMA).
- Seek assistance from agricultural industry organizations and research groups to identify ways to reduce atmospheric losses from transpiration and evaporation.
- Where opportunities are identified, encourage growers to develop strategies for recycling tailwater, and reducing evaporative losses.

- Working with the Central Coast Greenhouse Growers Association, determine the level of water recovery and reuse systems currently in place in nurseries in the NMMA.
- Develop strategies to partner with those growers in the NMMA without water recover and recycling systems to develop these water-saving practices.

F/07-AIR Phillips 66 Refinery Process Water Reuse

Phillips 66 refinery currently pumps approximately 1,100 AFY of fresh water from the SMV aquifer for its cooling requirements and all other onsite purposes. It discharges about 320 AFY of brine to the ocean in an outfall.

This alternative uses a reverse osmosis plant to extract about 270 AFY of fresh water from that brine for reuse in cooling. That would offset an equal volume of required make-up fresh water so that the plant would require only about 630 AFY from the aquifer. The effluent to the ocean would then be a brine with Total Dissolved Solids closer to that of seawater.

Phillips 66 representatives have said the District is welcome to approach them to participate in a project if they see potential in this opportunity.

Major actions required:

- Agree with Phillips 66 on lease or use or purchase of land and outfall at their site
- Obtain permits
 - to construct a desalination plant (probably membrane) on the land.
 - to discharge a higher concentration brine to the ocean through Phillips existing outfall.
- Construct and operate the desalination plant using Phillips 66 cooling water effluent as source and using Phillips 66 outfall.

08-AIR REMOVED - Phillips 66 Refinery Thermal Waste Recapture

This alternative has been removed from consideration. Discussions with senior managers at the Santa Maria Phillips 66 refinery show that this alternative is not feasible at any reasonable cost. Heat sources at the refinery are very many, and widely dispersed. Waste heat cannot be effectively collected for reuse. Phillips 66 representatives have said the District is welcome to approach them to participate in a project if they see potential in this opportunity.

G/09-AIR **PXP Arroyo Grande Production Wastewater Reuse**

Beginning this year, and for a period of 10-12 years, the Veolia Water's Produced Water Reclamation Facility at the Plains Exploration & Production Company's (PXP) Arroyo Grande Oilfield will begin discharging a Reverse Osmosis (RO) effluent stream into Pismo Creek. This alternative proposes ways in which this highly-purified waste water, totaling 940 AFY, can be purchased and transported approximately 18 miles to Nipomo by construction of a pipeline, or by truck, rail, or barge.

Important: Because this potential supply is expected to end in years 2023 to 2025, any delays in obtaining required approvals, environmental studies, permits, acquisition of rights-of-way and easements, requirements for public participation, identification of funding, contracting delays, etc. will reduce the value of this alternative.

Major actions required:

- Explore possible use of PXP-Veolia's RO effluent stream for Phillips 66 refinery operations, for Mesa groundwater recharge, or both.
- Develop a strategy for conveying the effluent from the Arroyo Grande Oilfield to Nipomo Mesa by using trucks, railcars, building a pipeline, or other means.
- Explore possible funding strategies for project planning, design, and construction, and transportation contracts for trucking, rail, or barge delivery.
- Accomplish any required studies to investigate possible pipeline routing.
- Negotiate acquisition of the PXP-Veolia RO effluent stream.
- Seek cooperation from SLO County, Pismo Beach, Arroyo Grande, Grover Beach, and Ocean for proposed construction as needed.
- Perform CEQA investigations, and apply for required permitting, including the Coastal Commission if required.
- Public participation and outreach.
- Acquire rights-of way and easements if needed.
- Obtain funding.
- Project design and award of all contracts for construction and transportation.

AIR – CRITERIA

Supply Potential:

E/06-AIR Agricultural Water Reuse

Significant supply potential from agricultural tailwater is not anticipated. “Well-designed and well-managed sprinkler and microirrigation systems rarely produce tailwater runoff.” (U.C. Davis, Division of Agriculture and Natural Resources Publication 8225.)

The SWAEC is not aware of any surface runoff exiting the NMMA that is the result of agricultural operations. The porous dune sands capture almost all runoff, and effectively make the Mesa a closed system. With the exception of water lost to the atmosphere through transpiration and evaporation, any excess irrigation water is reabsorbed into the groundwater aquifer. (See Note 1 for more information.)

However there is the potential for new supply from greenhouse growers through water recovery and recycling systems that capture nursery run-off and blend it with fresh water, potentially reducing use of groundwater by fifty percent.

In addition, precisely controlled computer operated irrigation delivery systems in combination with new technologies such as capillary mats which wick water up into plants can deliver water more specifically and conserve significantly more water.

F/07-AIR Phillips 66 Refinery Process Water Reuse

The effluent from the Phillips 66 cooling tower is approximately 320 AFY. The typical efficiency of an RO plant treating such brackish water is 85%. Thus, the expected fresh water output from the plant would be 270 AFY.

Phillips 66 has announced an application to expand the refinery capacity, but by a small percentage. That means that there is no prospect of more than the 270 AFY from this plant unless additional feed water were brought in from elsewhere, such as a waste water treatment plant.

G/09-AIR PXP Arroyo Grande Production Wastewater Reuse

Could theoretically provide approximately 940 AFY (20,000-bpd, barrels per day) of highly-treated effluent stream.

G/09-AIR will likely have a limited lifetime that depends on productivity of the AG oilfield. The water reclamation facility is expected to operate for 10 to 12-years under the agreement between PXP and Veolia Water.

This effluent is currently permitted to be surface discharged to Pismo Creek from the Veolia Water's Produced Water Reclamation Facility at the Plains Exploration & Production Company's (PXP) Arroyo Grande Oilfield.

In 2013, the Water Reclamation Facility will begin producing 45,000-bpd of treated water, of which 25,000-bpd will be used as Once-Through-Steam-Generation (OTSG) for oil production.

The facility is located near the intersection of Price Canyon Road, and Ormonde Road in the Arroyo Grande Oilfield. It would necessitate constructing conveyance facilities, or potentially trucking, or rail delivery of water to Nipomo Mesa.

Cost Considerations:

Important: The SWAEC does not have the resources needed to produce detailed engineering cost estimates. The approximations presented here are offered simply for the purpose of ranking various alternatives. They are appropriate for the purpose, but are not intended to replace more detailed estimates needed for budgeting and project development.

E/06-AIR Agricultural Water Reuse

Agricultural Tailwater Capital Cost. Costs cannot be anticipated or estimated. Collection of tailwater, and reuse or re-injection into the aquifer would likely be accomplished *in situ*, and is location specific and situational. If any areas are found where surface runoff is occurring, it would likely be more cost effective to manage irrigation to prevent runoff than to implement a reuse strategy.

Water Recovery and Recycling System Capital Cost. Engineering consulting fees for the general design of the drain system, ground preparation fees and supplies including ground cloth (impermeable barrier) and drainage and distribution pipelines. Equipment costs for water recycling include a filtration system, a variable frequency drive pump, programmable logic controller system, and a computer/software package to operate the system.

Agricultural Tailwater O&M Cost. Likewise, cannot be anticipated or estimated.

Water Recovery and Recycling System O&M Cost: Operating costs include electricity to operate the pump.

F/07-AIR Phillips 66 Refinery Process Water Reuse

The effluent from the Phillips 66 cooling tower is brackish (TDS concentrations approximately three times that of fresh water) and therefore requires less rigorous plant specifications than would sea water as feed. The investment would therefore be less and the operating costs less as well. The land footprint would be very small, and the outfall should not require expansion.

The capital items are:

RO Plant	\$4M
Total	\$4M

The O&M costs were estimated at \$800/AF

G/09-AIR PXP Arroyo Grande Production Wastewater Reuse

Capital Cost Trucking Option: \$6-8 million for construction of necessary on-site access and transfer facilities, and possible subsurface discharge wellfield. (See Note 2 for trucking capital cost information.)

O&M Cost Trucking Option: \$8,400 per AF for hauling contract, and for negotiated water cost. (See Note 3 for trucking O&M cost information.)

Capital Cost Pipeline Options: There is insufficient information to approximate the capital cost for construction of conveyance facilities for 940 AFY of treated water from the PXP Arroyo Grande oilfield to Nipomo.

It is very likely that pipeline costs would greatly exceed trucking costs. Due to the limited lifetime of this option, and the amount of time needed to perform required environmental studies, obtain approvals, acquire rights-of-way, design and build a pipeline, the pipeline may only be in service for a short period of time before the water supply is no longer available.

O&M Cost Pipeline Options: The water cost would be negotiable with the PXP and Veolia Water. There is insufficient information to estimate the annual operation and maintenance cost of conveyance or transfer facilities. (See Note 4 for pipeline cost discussion.)

Cost for Rail Delivery Option: Has not been fully investigated. However, it would involve construction of a pipeline from the Arroyo Grande Oilfield to the coastal rail route near a location where an available rail siding exists,

or could be constructed. It may also involve the acquisition of stainless steel tanker cars that are suitable for potable water delivery.

Cost for Barging Option: This option is considered unrealistic and has not been fully investigated. It would also involve construction of a pipeline from the Arroyo Grande Oilfield to the coast. Barge transportation would also require construction of docking facilities and piping systems needed to fill barges. The offloading facilities near the Mesa shoreline would entail construction of an offshore mooring platform and underwater pipeline and a pumping plant to convey the water up to the Mesa.

Court Compliance:

E/06-AIR: Agricultural Water Reuse

Would not comply with the Court Final Judgment for a pipeline to Santa Maria, and MOU with Santa Maria.

E/06-AIR *would not comply* with the Court Final Judgment for a minimum supplemental water delivery of 2,500 AFY.

F/07-AIR: Phillips 66 Refinery Process Water Reuse

Same as E/06-AIR.

G/09-AIR: PXP Arroyo Grande Production Wastewater Reuse

Same as E/06-AIR.

Critical Milestones for Delivery:

E/06-AIR: Agricultural Water Reuse

1,000 AFY by 2015: Cannot meet this criterion.

3,000 AFY by 2020: Cannot meet this criterion.

6,200 AFY total: Cannot meet this criterion.

F/07-AIR Phillips 66 Refinery Process Water Reuse

1,000 AFY by 2015: Cannot meet this criterion.

3,000 AFY by 2020: Cannot meet this criterion.

6,200 AFY total: Cannot meet this criterion.

G/09-AIR PXP Arroyo Grande Production Wastewater Reuse

1,000 AFY by 2015: Can meet the timeframe criterion only if the trucking option is used, and very nearly meets the quantity criterion (provides 940 AFY.)

3,000 AFY by 2020: Cannot meet this criterion.

6,200 AFY total: Cannot meet this criterion.

Reliability:

E/06-AIR: Agricultural Water Reuse

Where locations of surface runoff from irrigation can be identified that exit the NMMA boundaries, reliability would be high during irrigation.

Reliability would also be high for greenhouses that use a water recovery and recycling system.

F/07-AIR: Phillips 66 Refinery Process Water Reuse

Would be highly reliable as long as the Phillips 66 plant continues to operate.

G/09-AIR: PXP Arroyo Grande Production Wastewater Reuse

Would provide a highly reliable and consistent volume of water as long as Arroyo Grande oilfield production remained stable – expected to last until 2023 to 2025.

Phasing:

E/06-AIR: Agricultural Water Reuse

Not applicable. It is very unlikely that surface runoff from agricultural irrigation, achievable reductions in evaporative losses, and water recovery and recycling systems will make a significant contribution in meeting the minimum 1,000 AFY specified in the Bylaws.

F/07-AIR: Phillips 66 Refinery Process Water Reuse

Not possible without including additional sources of brackish water. The supply potential is limited to 270 AFY.

G/09-AIR: PXP Arroyo Grande Production Wastewater Reuse

Not possible. The supply potential is limited to 940 AFY with a projected duration of 10-12 years.

Water Quality:

E/06-AIR: Agricultural Water Reuse

There is a potential benefit to collecting and treating any runoff that is identified before it is re-injected into the aquifer. Brackish water desalination of agricultural runoff could help to reduce nitrates, salts and other pollutants that leach out of fertilizers and pesticides during irrigation. However, determining a central location for a desalination plant, the need for construction of miles of brine pipelines and the overall huge cost of construction would be the overriding considerations.

The water recovery and recycling system would provide benefits to the ground water basin water quality. It provides greater control over nutrient management because it is a closed system. By recovering and reusing water, pollutants such as nitrates, salts, fertilizers and pesticides are prevented from being re-injected into the aquifer. They exist in a closed system and are recycled back through the greenhouse and reused by plants.

F/07-AIR: Phillips 66 Refinery Process Water Reuse

The water produced from this plant would use reverse osmosis membrane technology, and could be compliant with Federal and State drinking water standards. However, that specification may not be necessary since the water would not be used for personal consumption.

G/09-AIR: PXP Arroyo Grande Production Wastewater Reuse

The PXP wastewater discharged from the Produced Water Reclamation Facility will be highly treated using micro-filtration and reverse osmosis membrane technology, and is projected to be compliant with Federal and State drinking water standards.

Feasibility:

E/06-AIR: Agricultural Water Reuse

The California Water Code does not impact property owners when there is no runoff. Review by resource agencies, and permitting is only required when surface runoff leaves a property.

F/07-AIR: Phillips 66 Refinery Process Water Reuse

This project should be very feasible, since it would use an existing plant site, outfall and brackish water stream. Therefore permitting requirements should be minimal.

G/09-AIR: PXP Arroyo Grande Production Wastewater Reuse

Using the trucking, permitting may not be a major impediment as all tank trucks would be properly licensed for operation on public highways. There would still be a significant impact to the local communities caused by heavy truck traffic operating 24/365 for years on end.

Regardless of the approach taken for the pipeline options permitting would be a major hurdle involving multiple agencies.

Sustainability:

E/06-AIR: Agricultural Water Reuse

Collection, treatment and reuse of agricultural tailwater has a positive environmental impact.

The water recovery and recycling system would also have a positive environmental impact.

F/07-AIR: Phillips 66 Refinery Process Water Reuse

The treatment of Phillips 66 cooling water effluent would have a positive environmental impact. It would reduce their pumping of fresh water by 270 AFY.

The resulting volume of water discharged to the ocean outfall would be less, although the weight of dissolved solids would remain the same as it is now.

G/09-AIR: PXP Arroyo Grande Production Wastewater Reuse

It is difficult to predict the environmental impact of this alternative.

Trucking would create an emissions concern as diesel trucks would be on the road 24/7 for ten years.

Rail delivery would have only a slight emissions footprint.

If pipeline conveyance is involved, there would be little impact due to energy usage or emissions after construction completion.

Public Support:

E/06-AIR: Agricultural Water Reuse

Public support would be positive for collection, treatment and reuse of agricultural tailwater, if any, as well as water recovery and recycling systems.

F/07-AIR: Phillips 66 Refinery Process Water Reuse

Public support would probably be positive for a plant that uses existing infrastructure to reduce the volume of fresh water required from the SMV aquifer to operate the refinery.

G/09-AIR: PXP Arroyo Grande Production Wastewater Reuse

Significant opposition is expected to pipeline construction, or pipeline rehabilitation because of potential environmental impacts, temporary timeframe, and high cost.

For the trucking option, opposition can also be anticipated as a result of traffic concerns. Efforts to prevent this alternative from being adopted would be expected.

AIR – NOTES

Note 1: *E/06-AIR Tailwater background.* There are two agricultural customers of Nipomo Community Services District. All other agricultural operations in Nipomo are private landowners with private wells. An inventory of potential tailwater sources could make it possible to assign a definitive supply potential to this alternative.

If there are any agricultural operations that discharge to a stream or outfall which exits the Mesa, then that water could be reclaimed. Also, if flower growers could reclaim transpiration and evaporation through tenting, and collect the condensation, that would be equivalent to new water - but that's difficult to accomplish in practice. (See Attachment 1 for more information on agricultural water reuse.)

Note 2: *G/09-AIR Trucking Option Capital Cost Information.*

Capital Costs:

Rough approximation to construct loading facilities at PXP Arroyo Grande Oilfield (in millions):

Design, CEQA review, permitting etc.:	\$0.2 m
Transfer storage tank (estimated 0.5 m gal):	1.5 m
Piping systems and pumping facilities:	0.5 m
Three-station loading area:	0.3 m
Drive-through road improvements, truck staging and security features:	0.5 m
Total Arroyo Grande station:	\$3.0 m

Rough approximation to construct offloading facilities at Nipomo Mesa: and subsurface discharge wells at Nipomo Mesa (in millions):

Similar facilities as Arroyo Grande station:	3.0 m
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Rough approximation for subsurface discharge wells at Nipomo Mesa (in millions):

Exploratory test wells, site surveys, and design:	0.5 m
Subsurface discharge wells (Estimated 5 wells including power, pipelines, and access):	1.5 m
Total Nipomo Mesa wellfield:	\$2.0 m
Total capital cost for P66 feedwater requirements:	\$6.0 m
Total capital cost for groundwater recharge:	\$8.0 m

Note 3: *G/09-AIR Trucking Option O&M Cost Information.*

O&M Costs:

Round-trip mileage:	36 miles
Round-trip time (drive-load-unload-breaks):	2 hours

Daily water PXP/Veolia water volume:	840,000 gal/day
Tractors with S/S tankers:	7,800 gal/trip
Round-trips per day (840,000 / 7,800):	108 loads/day
Min # of rigs operating 24/7/365 (108 RT X 2 hr / 24 hrs = 9.0):	10 tractors and tankers (includes standby)
Annual lease cost (\$150,000/rig X 10):	\$1.5 m tractor/tanker lease costs per yr
Annual operating cost (fuel, taxes, insurance): (36 mi X 108 loads/day / 5 mi/gal X \$4 /gal X 365 days + \$10,000 /yr X 10 trucks):	\$1.2 m operating cost per yr
Total annual truck cost (\$1.5 m + 1.2 m):	\$2.7 m truck cost per yr
Annual driving time (2 X 108 X 365):	78,840 hrs/yr
Min # of personnel (78,840 hr / 40 hr/wk / 50 wks = 39.4):	42 drivers (includes standby & mgr)
Annual salary + benefits + tax + overhead: (\$75,000 / yr X 42 personnel):	\$3.2 m labor cost per yr
Total operating cost (\$2.7 m + \$3.2 m):	\$5.9 m / yr
Plus trucking contractor's admin, OH, bonding and profit (25% = \$1.5 m):	\$7.4 m / yr
Trucking Cost per acre-foot per year (\$7.4 m / 940 AFY = \$7,872 / AF):	\$7,900 / AF
Negotiated Purchased Water Cost (a guess):	\$500 / AF
Total O&M Cost:	\$8,400 / AF

Note 4: *G/09-AIR Pipeline Options Cost Information.*

Aside from CEQA reviews, permitting issues, State, County, and local agency approvals, many factors would need to be considered in developing basic construction estimates. Among others, these factors include pipeline routing, acquisition of rights-of-way and easements, determining pumping and intermediate storage requirements.

There are two routes for a pipeline to convey treated water from the PXP Arroyo Grande Oilfield to the Nipomo Mesa, only one of which is considered plausible.

The plausible route would construct a pipeline approximately 11.4 straight-line-miles – or 18 miles along established roadways – southeast from the PXP oilfield in the Corral de Piedra hills to Nipomo Mesa. The topography along this route is irregular, and would involve indirect routing, constructing multiple pumping stations, tunneling, or all.

A second, implausible route would be a pipeline generally following Pismo Creek to the Pismo Beach area approximately 2.7 straight-line-miles southwest. At the Pismo Beach area, it may be possible to construct a pumping station, and connect to a decommissioned oil pipeline. Such a pipeline is reported to have connected the old Unocal oil terminal at Avila Beach to the Phillips 66 oil refinery at Nipomo. The National Pipeline Mapping System (NPMS) shows what may be the old connector as owned by ConocoPhillips (Phillips 66). (See Attachment 2 for the NPMS rendering.)

There are challenges to using rehabilitated oil pipelines that are difficult to overcome, and make this second route unrealistic. Perhaps most important would be the difficulty seeking cooperation from the abandoned pipeline's owner. Allowing Nipomo to use an old oil pipeline can create a major liability issue for the previous owner if, for example, contaminated soils were found during the rehabilitation process. (See Attachments 3 and 4 for more information.)

Reusing a decommissioned oil pipeline is only discussed here for completeness because it has been investigated as a way to reduce the cost of building new pipeline to bring water to the Mesa.

E/06-AIR ATTACHMENT 1

Agricultural Water Use

a. Brief Description

There are 2 Agricultural customers of Nipomo Community Services District. All other Agricultural operations in Nipomo are private landowners with private wells.

- 1) Many farmers and greenhouse growers on the Nipomo Mesa currently use a Tailwater Recovery system designed to collect, store and transport irrigation tailwater for reuse in a farm irrigation distribution system. The purpose is to conserve irrigation water supplies and protect surface water quality by collecting and reusing water. Water that flows off the low end of a field is collected in a sump and reused for irrigation on the same or adjacent fields. The water is either directly pumped from the sump to be reused or may be pumped to an irrigation regulation reservoir for storage until needed. Filtration systems are required to prevent irrigation systems from clogging. The sump must be periodically cleared of accumulated sediment. This material can be returned to field areas. If food safety concerns limit use of recovered water on fresh crops, water may be used for dust control on roads.



Advantages

- Eliminates sediment leaving field
- Conserves irrigation water
- Potentially recycles all tailwater
- May reduce deep well pumping costs
- Captures soil for reuse

Disadvantages

- More management needed
- May accumulate salts
- Land out of production
- May cause pollutants to leach to groundwater

E/06-AIR ATTACHMENT 1 (CONTINUED)

Advantages (Cont'd)

- May eliminate the need for additional conservation practices for sediment
- Reduces transport of weed seeds and insects downstream
- May be adapted to serve as a winter sediment basin

Desalination technology could remove salts added from agricultural operations to provide a supplemental water supply. The primary difference between seawater and brackish water is the concentration of salt in the water that is being purified. Like brackish groundwater, there is less salt to remove from agricultural tail waters, so less energy is required in the reverse osmosis process. However, there are also high levels of nitrates prevalent in agricultural tail water which would require removal.

2) Water Recovery System

There are at least 16 green house growers on the Nipomo mesa. As indicated in the background information above, the majority of these are private landowners with wells. Innovative nursery owners on the Central Coast are developing systems of watery recovery and computer-operated irrigation that have **cut their water use by 50%** (“California Water Stewards: Innovative On-Farm Water Management Practices” by Lisa Kresge, California Institute for Rural Studies and Katy Mamen, California Agricultural Water Stewardship Initiative January 2009 California Institute for Rural Studies).

The water recovery and recycling systems capture nursery runoff and blend the nutrient-rich water with fresh water for reuse as nursery irrigation water in a closed system. Nursery plants are watered based on plant needs by means of a computer-operated irrigation delivery system that precisely controls irrigation scheduling and timing. This gives a grower who may be pumping, for example, 1800 gallons a minute the ability to be very precise in their delivery time and enables significant conservation of water. Capillary mats for small container grown stock are an additional tool for reducing water loss in nurseries. Plants wick water up through holes in the bottom of their pots by capillary action as needed, rather than wasted overhead watering.

E/06-AIR ATTACHMENT 1 (CONTINUED)

By recovering and reusing water, the nurseries are reducing their reliance on groundwater. The drainage and recovery systems also eliminate soil erosion and keep nutrient-saturated run-off from leaving the nursery.

b. Quality

The desalination of brackish groundwater requires less energy than ocean desalination since the incoming water is not as salty. This type of process will therefore contribute less greenhouse gas emissions than an ocean desalination facility drawing power from the same source. Even if the groundwater desalter is powered by energy from fossil fuels, it will have a smaller carbon footprint than water imported from Northern California.

c. Reliability

High

d. Required Facilities

Waste stream management methods include building a "brine line" to the ocean with an outfall, zero liquid discharge, and deep aquifer injection.

e. Constraints

- Brine disposal is the limiting factor for groundwater desalination projects.
- Without effective brine mitigation strategies, inland desalination plants cannot be built.
- Moderate risk based solely on the high cost of building and operating these facilities.

f. Schedule 3-5 years, to allow plenty of time for an environmental review.

g. Cost Range

Menifee Desalter in Riverside County Groundwater Desalination

Initial Capital Cost	\$24 million
Ongoing Operating Cost	\$700,000 (\$310,000 of annual operating costs are for disposal of brine)
Production Capacity	2,500 A/F
Estimated Cost	\$750-\$1,200 Per AF

Sources: LAEDC; Eastern Municipal Water District

E/06-AIR ATTACHMENT 1 (CONTINUED)

The EMWD desalter facts:

- EMWD has high end costs for groundwater desalination. Water being desalted is saltier than other brackish water in the region. The Menifee plant reduces dissolved salts from 2,000 parts per million to 330 parts per million. Other facilities in the region start with water that may have a concentration of salts of 800 to 900 parts per million or less. Saltier water can require different membranes and higher pressure, both add cost.
- Normal operation cost, but the Inland Empire pumps the salty brine to the ocean via Orange County by way off a 63-mile series of "brine line" pipes.
- Brine is 'treated'(diluted with treated wastewater) at the wastewater treatment plant and discharged to the ocean. The cost of brine line, when added to the initial capital costs of the desalter, adds considerably to the cost per acre-foot.
- Costs in the table above are based on actual production (which varies from roughly 1,500 AF/Y to 3,360 AF/Y) not theoretical capacity.
- Average facility production is estimated at 2,500 AF/Y
- Cost per acre-foot in the above table represents the final cost of water delivered to the distribution system. Water from the desalter is available at drinking standards; no additional treatment costs are necessary.

Cost Comparison

Richard A. Reynolds Groundwater
Desalination
Chula Vista, San Diego County

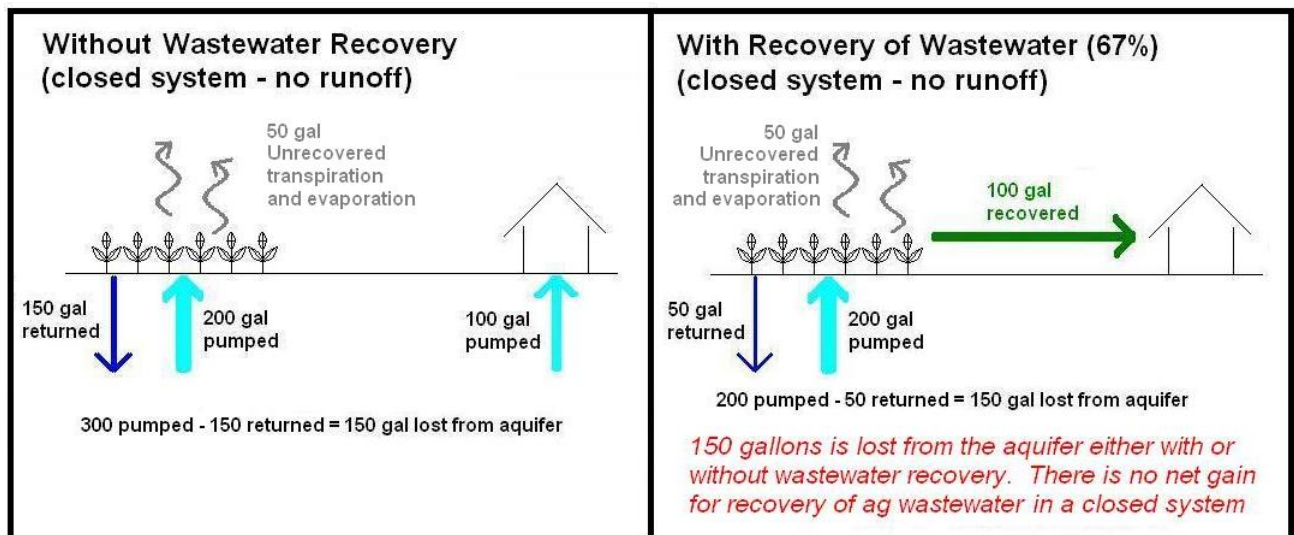
Initial Capital Cost	\$430/ AF
Ongoing Operating Cost	\$320/AF (The cost to the Sweetwater Authority is actually \$540 per acre-foot, as MWD subsidizes the water at a rate of \$210 per acre-foot.)
Production Capacity	3,500 AF
Estimated Cost	\$750 Per AF

h. Conclusion

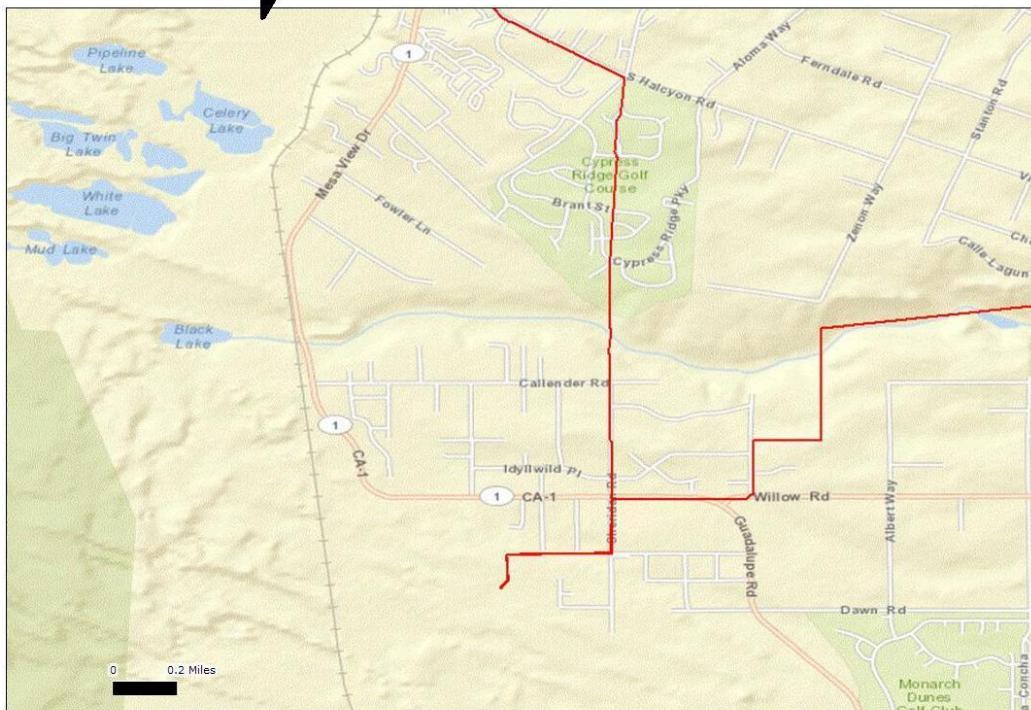
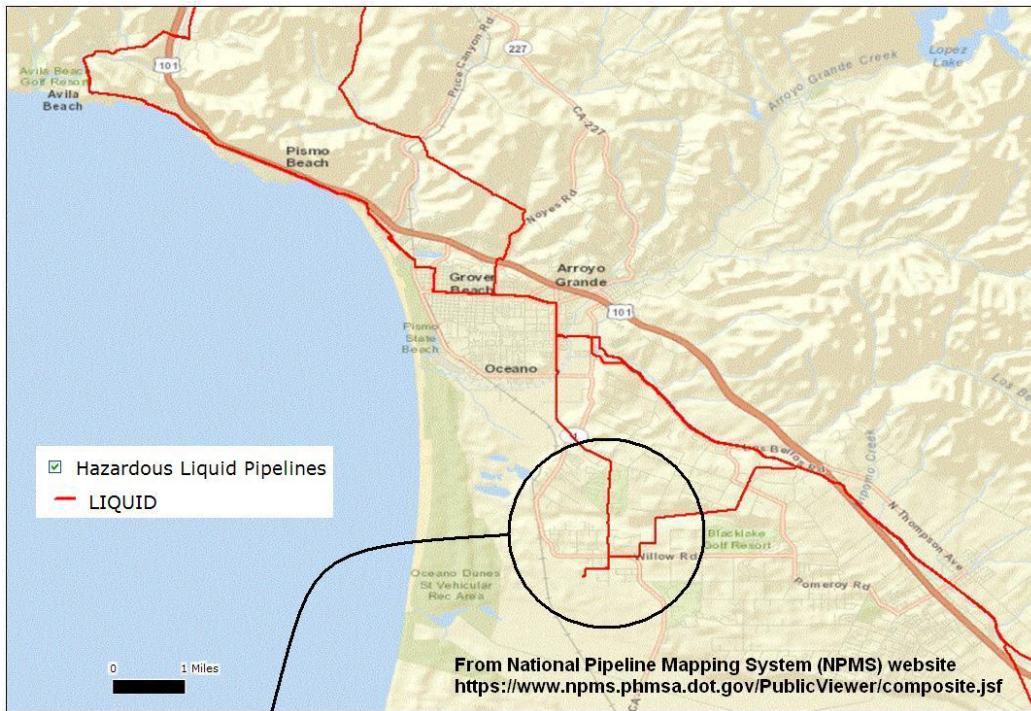
In theory, while desalination of agricultural runoff could produce a volume of usable supplementary water, it would not be new water because the porous dune sands capture almost all the runoff, making it a closed system. But, if there are any agricultural operations that discharge to a stream or outfall which exits the Nipomo Mesa, then that water could be reclaimed. In addition, if growers could reclaim transpiration through tenting, and collection of

E/06-AIR ATTACHMENT 1 (CONTINUED)

condensation that would be the equivalent of new water - but that would be tough to accomplish in practice. In addition, gaining support from the agricultural community would probably be difficult. Determining a central location for a desalination plant, the need for construction of miles of brine pipelines and the overall huge cost of construction would be the overriding considerations for this alternative not to go forward as a viable supplemental water alternative.



G/09-AIR ATTACHMENT 2



Gas Transmission Pipelines											
Hazardous Liquid Pipelines											
LNG Plants											
Breakout Tanks											
Highly Populated Areas											
Other Populated Areas											
1 record(s) found											
OPERATOR ID	OPERATOR NAME	SYSTEM NAME	COMMODITY CATEGORY	COMMODITY DESCRIPTION	INTERSTATE DESIGNATION	PIPELINE STATUS CODE	PERSON TO CONTACT	ENTITY TO CONTACT	CONTACT ADDRESS	PHONE/FAX/EMAIL	
31684	CONOCOPHILLIPS	SISQUOC/SANTA MARIA-TORCH/SUEY JCT	Crude Oil		N	In Service	Ed Hetsko (Technical Services Engineering Lead)		600 N. Dairy Ashford, Room TN-5084, Houston TX 77079	Phone: (832) 379-6246 Fax: ed.hetsko@conocophillips.com	

G/09-AIR ATTACHMENT 3

Subject: Rehabilitation of Decommissioned Oil Pipelines

Contact: Andrew Romer, AECOM Principal Engineer

By: Michael Nunley, Peter Sevcik, Rob Miller, Kathie Matsuyama, and Sam Saltoun

Date: February 1, 2013

Background: Andy Romer was the 2012 recipient of the Stephen D. Bechtel Pipeline Engineering Award by the American Society of Civil Engineers (ASCE). The award is considered the highest honor a pipeline engineer can receive in the industry.

Notes:

1. Reuse of old oil pipelines for water transmission and distribution would be “fraught with lots of problems.”
2. The structural condition of old lines is expensive to evaluate. It is necessary to put a tool inside the length of the line to determine wall thickness, and evaluate allowable fluid pressures. Old lines don’t have the capability of inserting and retrieving test apparatus. Pipeline inspection gauges (PIGs) need a way to be launched and retrieved.
3. The toxicity of hydrocarbons makes it difficult or impossible to remove all traces the product. Flushing chemicals are needed, and safe disposal of the used material is difficult and expensive, and requires permitting approval.
4. All structural linings that are available today are permeable to hydrocarbons. This means that it would not be possible to prevent contamination.
5. The soil around old oil lines is frequently contaminated and considered hazardous waste. Oil pipeline owners abandon old pipelines because they no longer have enough product to move, and/or because it becomes uneconomical to continue fixing leaks.
6. There is a legal question of liability for any contamination of soil surrounding oil pipelines. Is the original pipeline owner responsible for the cleanup of contaminated soils, or does liability transfer to a new owner? Even if the old pipeline is to be replaced with new pipe in the same right-of-way, contaminated soil is still a major concern. In every case, the “cost potential is huge, and difficult to predict.”

7. If the transported water is limited to industrial uses, there can still be air quality and effluent concerns, and it may become a regulatory item. Additionally, there is likely to be treatment involved before the water can be used or discharged to separate all traces of hydrocarbons and chemicals that were picked up in the rehabilitated pipeline.

Submitted by: Sam Saltoun

G/09-AIR ATTACHMENT 4

Subject: Rehabilitation of Decommissioned Oil Pipelines

Contact: Richard Haberman, AECOM Principal Engineer

By: Michael Nunley, Peter Sevcik, Rob Miller, Kathie Matsuyama, and Sam Saltoun

Date: February 1, 2013

Background: Rich Haberman is a former California Department of Public Health, District Director overseeing CDPH Region III, which includes 12 Counties in the Central Valley. As such, was responsible for water treatment plant operation and distribution, oversight of regulations on drinking water standards, and regional wastewater recycling programs.

Notes:

1. From the regulatory perspective, using former oil pipelines for conveyance of drinking water, or for recharging groundwater aquifers used for potable water, has never been attempted, to his knowledge. There is even great reluctance by regulatory agencies to issue a permit for reuse of an abandoned potable water pipeline, to again transport potable water.
2. There are stringent criteria in regulations and law for the type of pipe allowed, the location of water distribution system pipelines, and the separation from other utilities corridors to prevent commingling in the event of pipeline leaks or breaks.
3. Mr. Haberman's experiences with past leakages show that all sorts of problems are created when repairs are made. It is often difficult to disinfect even new pipe and pipe fittings.
4. Concerning pipelines used for conveyance of recycled water and graywater, there are regulatory requirements to insure no interconnections or cross-connections can ever be inadvertently made with potable water lines.

Submitted by: Sam Saltoun

ALTERNATIVE ANALYSIS – Regional Waterline Intertie Projects (RWI)

RWI – DESCRIPTION OF VARIATIONS

H/10A-RWI Santa Maria Intertie – Phase I Only

The City of Santa Maria and the District have signed a Wholesale Water Supply Agreement dated January 5, 2010, to allow the sale of the City's "municipal mix" of groundwater and State Water to the District in compliance with the 2005 Court Stipulation. This variation is a first phase of the original NCSW Supplemental Water Project, and allows the District to begin purchasing some water (500-1000 AFY) from the City while minimizing infrastructure compared to the full 3000 AFY delivery.

Major actions required:

- Permits are in hand, CEQA requirements have been met, and the water agreement has been executed by both parties.
- Completion of bid packages, release of bid packages, and construction of the following facilities is required:
 - New water main in the City of Santa Maria distribution system from Taylor Road along Blosser Road to and underneath the Santa Maria River levee
 - Horizontal direction drilling (HDD) of new pipeline across the Santa Maria River to a new pump station site near Joshua and Orchard Roads
 - New pump station
 - Connection to existing Joshua Road water main in the District's water distribution system
 - Conversion of four existing NCSW wells from chlorination disinfection systems to chloramination

I/10B-RWI Santa Maria Intertie – Full Project

This variation represents the full Supplemental Water Project originally proposed to transfer up to 3000 AFY of water from the City of Santa Maria to the District.

Major actions required:

- Permits are in hand, CEQA requirements have been met, and the water agreement has been executed by both parties.
- Completion of bid packages, release of bid packages, and construction of the following facilities is required:
 - New water main in the City of Santa Maria distribution system from Taylor Road along Blosser Road to and underneath the Santa Maria River levee

- Horizontal direction drilling (HDD) of new pipeline across the Santa Maria River to a new pump station site near Joshua and Orchard Roads
- New pump station
- Connection to existing Joshua Road water main in the District's water distribution system
- Conversion of four wells from chlorination disinfection systems to chloramination
- Water mains and pressure reducing valve stations around the District distribution system to reduce pressure impacts and allow the District to request higher flows from the City (up to 3000 AFY)
- New storage tank at the pump station site

J/10C-RWI Oceano CSD Waterline Intertie

Involves the delivery of up to 500 AFY of potable water supplies by contract. The Oceano Intertie would include extension of a potable water line and supporting infrastructure from the Oceano Community Services District (OCSD) to tie into the NCSD water system near the Highway 1-Willow Road intersection. This was proposed as a temporary delivery (possibly 10 years with 5 year extensions) of up to 500 AFY.

Major actions required:

- Contractual agreement between NCSD and OCSD
- Environmental and construction clearances to build pipe line and supporting infrastructure for delivery of water to NCSD system
- Preliminary design and cost estimates for project construction.
- Approval from OCSD customers
- Obtain financing for design, and complete final design
- Obtain financing for project construction and management
- Bid, award, construction contracts
- Project construction

K/10D-RWI Nacimiento Water Project Intertie

The Nacimiento Water Project (NWP) delivers raw surface water from Lake Nacimiento to North County communities and San Luis Obispo. This alternative accesses the NWP reserve capacity of 2,148 AFY at its Southern terminus – the SLO Water Treatment Plant (SLOWTP). It would involve constructing approximately 32 miles of pipeline to Nipomo, with related pumping, interim storage, water treatment, and support facilities.

Major actions required:

- Obtain approval and direction from SLO County for purchase of NWP reserve capacity.
- Negotiate connection and purchase agreements with SLO County.

- Negotiate rights-of-way agreements and easements for waterline construction through SLO County communities, and with CCWA to parallel the Coastal Branch pipeline.
- Perform required CEQA and other studies, obtain needed approvals, and ensure public participation.
- Preliminary design and cost estimates for project construction.
- Ballot initiative to obtain voter approval from property owners.
- Obtain financing for design, and complete final design.
- Obtain financing for project construction and management.
- Bid, award, construction contracts.
- Project construction.

RWI – CRITERIA

Supply Potential:

**H/10A-RWI Santa Maria Intertie – Phase I Only and
I/10B-RWI Santa Maria Intertie – Full Project**

According to the City of Santa Maria’s Urban Water Management Plan, the City can provide up to 6200 AFY of water to the District from their “municipal mix” of State Water and groundwater.

J/10C-RWI Oceano CSD Waterline Intertie

Up to 500 AFY for an initial 10 year period, with potential options to extend beyond initial 10 year period.

K/10D-RWI Nacimiento Water Project Intertie

2,148 AFY is the NWP maximum reserve capacity available to serve South County. The NWP is designed to convey 15,750 AFY, of which 9,655 AFY is under contract to North County water agencies including SLO city. The unsubscribed 6,095 AFY is constricted by pipe size in the last reach, and only the 2,148 AFY would be deliverable to Nipomo.

Cost Considerations:

H/10A-RWI Santa Maria Intertie – Phase I Only

Capital Cost: Capital cost is approximately \$13M based on the engineer’s opinion of construction cost.

O&M Cost: \$1820/AF based on Fee Schedule for FY 2014 from agreement, including \$180/AF for District O&M costs assuming 1000 AF delivery. City of Santa Maria is evaluating whether Phase I project could

deliver 1000 AFY. Escalation will occur per contract but may be similar to cost escalation for power, chemicals, O&M, etc., in other alternatives

I/10B-RWI Santa Maria Intertie – Full Project

Capital Cost: Capital cost is approximately \$30M based on the Assessment Engineer’s Report, including contingencies and approximately \$3.5M of “sunk costs”.

O&M Cost: \$1734/AF based on Fee Schedule for FY 2014, including \$94/AF District O&M costs. Escalation will occur per contract but may be similar to cost escalation for power, chemicals, O&M, etc., in other alternatives

J/10C-RWI Oceano CSD Waterline Intertie

Capital Cost: The project would connect to the District system at Willow Rd and Hwy 1 and would require the following facilities:

- 6 Miles of Pipeline: \$7.8M to \$10.2M
- Booster Pump and Storage: \$1M to \$2M
- Chloramination: \$0.5M
- Design, environmental, admin, right of way, other non-construction costs: \$3M to \$4M

O&M Cost: According to T. Geaslen (OCSD General Manager) at SWAEC Meeting on 11/25/12, OCSD pays approximately \$1500/AF for water. Assuming a 10% markup for any wheeling or system charges, SWAEC assumes O&M Cost would be approximately \$1650/AF.

K/10D-RWI Nacimiento Water Project Intertie

Capital Cost: \$95 million. (See Note 10D-1 for capital cost approximation.)

O&M Cost: Approximately \$2,500 per AFY. (See Note 10D-2 for O&M cost approximation.)

Court Compliance:

**H/10A-RWI Santa Maria Intertie – Phase I Only and
I/10B-RWI Santa Maria Intertie – Full Project**

In full compliance with Court order.

J/10C-RWI Oceano CSD Waterline Intertie

Would not comply with court order to import 2,500 AFY from the City of Santa Maria, but is not likely to be opposed by the other stipulating parties if proposed to the Court. There may be opposition to the proposed delivery volume and temporary nature of the agreement.

K/10D-RWI Nacimiento Water Project Intertie

Would not comply with the Court Final Judgment for a pipeline to Santa Maria, and MOU with Santa Maria. 10D-RWI would require a return to the Superior Court for a change in the method of water delivery. However, it is not likely to be opposed by the other stipulating parties of proposed to the Court.

10D-RWI *would not comply* with the Court Final Judgment for a minimum supplemental water delivery of 2,500 AFY unless it was combined with other alternatives. However, 2,148 AFY is very close to the Court target.

Critical Milestones for Delivery:

**H/10A-RWI Santa Maria Intertie – Phase I Only and
I/10B-RWI Santa Maria Intertie – Full Project**

The full project can meet all critical milestones for delivery.

J/10C-RWI Oceano CSD Waterline Intertie

1,000 AFY by 2015: Would provide only 50% of targeted delivery.

3,000 AFY by 2020: Cannot meet criterion target.

6,200 AFY total: Cannot meet criterion target.

K/10D-RWI Nacimiento Water Project Intertie

1,000 AFY by 2015: Cannot meet this criterion - insufficient time for implementation. It would take a decade or more to complete required negotiations, complete CEQA studies, obtain approvals and permits, acquire rights-of-way, conduct a ballot initiative, obtaining funding commitments, design and construct an NWP Nipomo extension.

3,000 AFY by 2020: Could not meet this criterion because of inadequate supply potential.

6,200 AFY total: Could not meet this criterion because of inadequate supply potential.

Reliability:

**H/10A-RWI Santa Maria Intertie – Phase I Only and
I/10B-RWI Santa Maria Intertie – Full Project**

The supply is considered over 80% reliable to the full 6200 AFY based on the City's Urban Water Management Plan. Due to their participation in the State Water Project, and their ability to use groundwater, the City has several approaches to ensure long-term and short-term reliability of their water supplies – for example, they can "bank" or carry over in one year up to 8,500 AF of unused water supplies, to improve reliability of City supplies and by extension, the Intertie water deliveries.

J/10C-RWI Oceano CSD Waterline Intertie

OCSO supply is at this point offered as an "interim" supply for at least 10 years, and long-term (permanent) reliability cannot be assured.

K/10D-RWI Nacimiento Water Project Intertie

After completion, this alternative would likely provide over 80% of annual design flow.

Phasing:

H/10A-RWI Santa Maria Intertie – Phase I Only

See 10B-RWI discussion. 10A-RWI is the "first phase" of the 10B-RWI project.

I/10B-RWI Santa Maria Intertie – Full Project

In order for the City to supply NCSO with 2,500-3,000 AFY, additional State Water Allocation must be acquired. Assuming 3,000 AFY of "blended water" (half groundwater – half State Water) is desired, and allowing for long term reliability of State Water at 60% average annual delivery, the City would pursue as much as 2,500 AFY of State Water. A similar calculation assuming 60% averaged delivery for the 6,200 AFY needs, would require about 5,200 AFY of additional State Water supplies. It is estimated that this process of securing additional State Water would take about 18 months for the City to complete.

J/10C-RWI Oceano CSD Waterline Intertie

Water would be delivered in one phase.

K/10D-RWI Nacimiento Water Project Intertie

This project cannot be upgraded to a full 3,000 AFY.

Water Quality:

**H/10A-RWI Santa Maria Intertie – Phase I Only and
I/10B-RWI Santa Maria Intertie – Full Project**

The City must maintain a blend of at least 50% State Water to meet water quality requirements at their wastewater treatment facility. Therefore, the quality of imported water is expected to be in the neighborhood of 500 mg/L at highest TDS concentrations.

J/10C-RWI Oceano CSD Waterline Intertie

Water Quality would meet State Drinking Water standards.

K/10D-RWI Nacimiento Water Project Intertie

The NWP delivers a raw surface water supply that would require filtration and disinfection to meet Federal and State surface water treatment requirements.

After treatment, the finished water would have TDS concentrations well below 500 mg/L.

Feasibility:

**H/10A-RWI Santa Maria Intertie – Phase I Only and
I/10B-RWI Santa Maria Intertie – Full Project**

All permits and approvals are in hand.

J/10C-RWI Oceano CSD Waterline Intertie

OCSO supplies are feasible, subject to contractual and construction requirements.

K/10D-RWI Nacimiento Water Project Intertie

Construction of a 32-mile pipeline with associated facilities in California is a significant endeavor, requiring the involvement of many State, County, and local agencies, financing complexities, ballot initiatives, and so forth. CEQA compliance would be a lengthy and expensive process.

Sustainability:

**H/10A-RWI Santa Maria Intertie – Phase I Only and
I/10B-RWI Santa Maria Intertie – Full Project**

Environmental impact would be similar to any pumping project.

J/10C-RWI Oceano CSD Waterline Intertie

Supplies would be sustainable for the term of any contract entered into with OCSD. Environmental impact would be similar to any pumping project, but carbon footprint would likely be higher than 10A and 10B-RWI.

K/10D-RWI Nacimiento Water Project Intertie

Once project construction is completed, no significant negative environmental impact due to energy usage, carbon footprint, greenhouse gas emissions or other similar factors is foreseen. Major impact would be disturbed areas due to pipeline and carbon footprint due to pumping.

Public Support:

**H/10A-RWI Santa Maria Intertie – Phase I Only and
I/10B-RWI Santa Maria Intertie – Full Project**

Financing approach was not approved by property owners in the assessment vote of May, 2012.

J/10C-RWI Oceano CSD Waterline Intertie

A shared water resource program and waterline intertie between NCSD and OCSD could produce the added benefit of NCSD sharing potable water supplies with OCSD in the event the OCSD system or resources were interrupted. In 2012, the Oceano community voted to require that a permanent water sale must have public approval through a vote of OCSD customers.

K/10D-RWI Nacimiento Water Project Intertie

Strong opposition is anticipated due to high capital cost, and prior public reaction to high-cost projects.

RWI – NOTES

Note 10D-1: K/10D-RWI Capital Cost Approximation

Capital cost is roughly approximated using two data points: The Coastal Branch CCWA Extension originally cost (mid-1990's) \$575 million for 143-miles of connector – or \$4.0 million per mile. The recently completed Nacimiento project cost \$176 million for 45-miles of connector – or \$3.9 million per mile.

It should be noted that this per mile cost includes not only the pipeline construction, but all associated costs for planning and design, right-of-way and easement acquisition, construction of pumping plants, intermediate storage reservoirs, and all other related support facilities.

Approximately 32-miles of connector and treatment facilities would be needed from SLOWTP to Nipomo Mesa. The average $\$3.95\text{m} \times 32 \text{ miles} = \126m .

Because rights-of way acquisition would probably cost less by utilizing the CCWA route for much of the distance, and because the required system capacity for a Nipomo project would be less, the overall project would be less costly per mile. This is the result of smaller pipe, valves, fittings, pumps, tanks, and structural components. However, the cost difference is largely attributed to material cost, and the effect on total project cost is not downward scalable, and marginal.

Therefore, this calculation was reduced by one-third to $\$126\text{m} \times 67\% = \84m (say $\$85\text{m}$.)

Because NWP water is from a raw surface source, a water treatment plant will be needed before it can be added to the NCS D potable water distribution system. The WTP would be sized for a 2148 AFY flow rate (about 2 MGD). Using the same microfiltration technology as the Lopez treatment plant, the cost can be approximated at $\$10\text{M}$.

Total Capital Cost = $\$85 \text{ m} + \$10 \text{ m} = \$95 \text{ m}$.

Note 10D-2: K/10D-RWI O&M Cost Approximation

Using NWP budget data, total annual operating expenses for the Coastal Branch infrastructure was $\$3,688,555$ for 45 miles of connector – or approximately $\$82,000$ per mile. Assuming O&M costs for an 32-mile Nipomo extension could also be reduced by one-third, like capital cost, the annual O&M would roughly be $32\text{-miles} \times \$82,000 \times 67\% = \1.7m . This converts to $\$1.7\text{m} / 2,148 \text{ AFY} = \814 (say $\$800$) per AFY.

Added to this amount would be the cost to share the pipeline capacity from Lake Nacimiento to SLOWTP.

The total NWP deliveries under contract = 9,655 AFY. Nipomo's projected share = $2,148 \text{ AFY} / 9,655 \text{ AFY} = 22.2\%$ of total annual NWP costs (see cost projection table below.)

$\$16,261,428 \times 22.2\% = \$3.6\text{m} / 2,148 \text{ AFY} = \$1,684$ (say $\$1,700$ per AF)

Total annual water cost includes $\$800$ O&M for the Nipomo extension + $\$1,700$ for NWP buy-in, or $\$2,500$ per AF.

Participant	Nacimiento Project Construction Costs	Less Prior District Costs	Net Annual Base Debt Costs, 100% CAPI	Annual O&M Costs	Ad Valorem Property Tax Allocation Credit	Total Annual Nacimiento Project Costs
City of Paso Robles	\$60,720,840	\$426,100	\$4,612,000	\$1,341,731	(\$425,117)	\$5,528,614
Templeton CSD	\$6,335,142	\$26,631	\$480,000	\$186,344	(\$26,570)	\$639,774
Atascadero MWC	\$33,562,390	\$213,050	\$3,068,000	\$772,922	(\$212,559)	\$3,628,363
City of San Luis Obispo	\$73,992,045	\$875,555	\$5,489,000	\$1,327,737	(\$359,224)	\$6,457,513
Cayucos (CSA 10A)	\$547,278	\$2,664	\$0	\$9,821	(\$2,657)	\$7,164
Total	\$175,157,695	\$1,544,000	\$13,649,000	\$3,638,555	(\$1,026,127)	\$16,261,428

ALTERNATIVE ANALYSIS – Recycled Wastewater Supplies (RWW)

RWW – DESCRIPTION OF VARIATIONS

Potential delivery/user option common to both variations:

- Groundwater recharge via percolation
- Phillips 66 direct reuse
- Agricultural use
- Golf course use
- Additional applications to parks, landscaping and Caltrans Hwy 1, 101, and 166 Rights of Way
- Groundwater recharge from Pismo or SSLOCSD along the coast would be beneficial in managing saltwater intrusion impacts.

L/11-RWW Acquire Supply from South SLO County Sanitation District

Treated wastewater that is currently discharged from SSLOCSD WWTF to the ocean would be further treated and delivered to users or recharge areas on the Mesa. It is assumed that reverse osmosis will be necessary for salt removal.

Major actions required:

- Water purchase or lease agreement with SSLOCSD
- Environmental and construction clearances to build tertiary treatment system with reverse osmosis, pipeline and supporting infrastructure for delivery of water from the SSLOCSD WWTF to users or recharge facilities. Another variation could involve an exchange of Lopez Reservoir water for recycled water.

M/12-RWW Acquire Supply from Pismo Beach

Treated wastewater that is currently discharged from Pismo Beach WWTF to the ocean would be further treated and delivered to users or recharge areas on the Mesa. It is assumed that reverse osmosis will be necessary for salt removal.

Major actions required:

- Water purchase or lease agreement with City of Pismo Beach
- Environmental and construction clearances to build treatment system, wells (possibly), pipeline and supporting infrastructure for delivery of water from the Pismo Beach WWTF to users or recharge facilities.

RWW – CRITERIA

Supply Potential:

L/11-RWW Acquire Supply from South SLO County Sanitation District

SSLOCSD has the potential for up to 2,250 AFY available

M/12-RWW Acquire Supply from Pismo Beach

Pismo has the potential for up to 1,450 AFY available. Pismo has plans to reuse as much recycled water as possible, with the balance conveyed to the joint outfall with SSLOCSD for discharge to the ocean. Recycled water from Pismo can be made available at Oceano.

Cost Considerations:

L/11-RWW Acquire Supply from South SLO County Sanitation District

Capital Cost: The capital cost at the treatment plant, including demineralization, is on the order of \$15 to \$20M. Approximately 6 miles of pipeline would cost \$7.8 to \$10.2 M; and storage, pumping, rights of way, permitting, and design would cost an additional \$4M resulting in a total capital cost range of \$27 to \$34 M.

O&M Cost: Estimated at \$1,000/AF for reverse osmosis.

M/12-RWW Acquire Supply from Pismo Beach

Capital Cost: The capital cost at the treatment plant, including demineralization, is on the order of \$8-10M. Approximately 6 miles of pipeline would cost \$7.8 to \$10.2 M; and storage, pumping, rights of way, permitting, and design would cost an additional \$4M, resulting in a total capital cost range of \$20 to \$24 M.

O&M Cost: Estimated at \$1,000/AF for reverse osmosis.

Court Compliance:

L/11-RWW Acquire Supply from South SLO County Sanitation District

Not in compliance with Court order, but not likely to be opposed by stipulated parties if presented to the Court.

M/12-RWW Acquire Supply from Pismo Beach

Not in compliance with Court order, but not likely to be opposed by stipulated parties if presented to the Court.

Critical Milestones for Delivery:

L/11-RWW Acquire Supply from South SLO County Sanitation District

Project can only deliver 2250 AFY but project could be implemented by 2020.

M/12-RWW Acquire Supply from Pismo Beach

Project can only deliver 1450 AFY but could be implemented by 2020.

Reliability:

L/11-RWW Acquire Supply from South SLO County Sanitation District

Very reliable supply

M/12-RWW Acquire Supply from Pismo Beach

Very reliable supply

Phasing:

L/11-RWW Acquire Supply from South SLO County Sanitation District

After initial pipeline is built, project could be phased.

M/12-RWW Acquire Supply from Pismo Beach

After initial pipeline is built, project could be phased.

Water Quality:

L/11-RWW Acquire Supply from South SLO County Sanitation District and

M/12-RWW Acquire Supply from Pismo Beach

Water quality is a constraint for both SSLOCSD and Pismo Beach WWTF sources, due to high chloride and sodium levels, and therefore reverse osmosis treatment is likely.

Groundwater recharge for purposes other than disposal may require advanced treatment including demineralization and advanced oxidation.

Phillips 66 Refinery - Water quality would need to be the same as they have now. P66 treats the water for use in boilers, so it has to be of good quality, or additional treatment would be necessary.

Feasibility:

**L/11-RWW Acquire Supply from South SLO County Sanitation District and
M/12-RWW Acquire Supply from Pismo Beach**

Groundwater recharge via percolation may be viable in the area on Mesa Road between Osage and Viva Way, but the community opposition to this 24 acre site is expected to continue to be substantial.

Golf course use is viable with demineralization, but the overall demand is limited (three golf course development properties).

Agricultural use is allowable, but based on local experience, may take years to develop willing users.

Sustainability:

**L/11-RWW Acquire Supply from South SLO County Sanitation District and
M/12-RWW Acquire Supply from Pismo Beach**

Project likely to be viewed positively by regulatory agencies

Public Support:

**L/11-RWW Acquire Supply from South SLO County Sanitation District and
M/12-RWW Acquire Supply from Pismo Beach**

Potential Five Cities users may not be willing to sell this resource or transfer it outside their areas. SSLOCSD, its participating agencies, and the City of Pismo Beach have been working on plans to use recycled water.

ALTERNATIVE ANALYSIS – Local Groundwater (LG)

Background Description

- The Local Groundwater (LG) alternative considers the use of certain water resources in the NMMA that are not directly being utilized by the NCSD, Woodlands, GSW and Rural Water. These resources include water found in the shallow aquifer, the Dana wells, and possible wells to be drilled along the Santa Maria River in South San Luis Obispo County.
- The court has ruled that these Local Groundwater resources are not considered new water and therefore cannot be considered solutions relative to the Stipulation.
- Nonetheless, there has been considerable debate about these water resources and the SWAEC has committed to exploring any reasonable alternative.
- It is believed that the local groundwater resources are linked to the deeper aquifer that NCSD, Woodlands, GSW, and Rural Water draw from (i.e. that the local groundwater resources feed the deeper aquifer).
- However, the groundwater monitoring reports prepared by Cleath and Associates report that the water levels in the shallow aquifer have been rising over the last few years while the water levels in the deep aquifer have been falling.
- So, while the shallow and deep aquifers may be linked, there are questions about the direct nature of the links. Limited geological studies indicate that there are barriers to the vertical flow within the aquifer that may significantly retard the flow
- Assuming that the physical connection between some shallow groundwater and the deeper portions of the aquifer are either very slow or non-existent, then withdrawals from some locations may have little effect on the rest of the aquifer. As a result production from certain shallow aquifer locations would actually contribute water that is not being used.
- This positive opportunity must be tempered by the reality that a thorough study of the hydrology of the aquifer is necessary to understand the flow connections and to guide the siting of potential new wells.

LG – DESCRIPTION OF VARIATIONS

N/13-LG: Local Shallow Aquifer

Major actions required:

- Carry out the recommended aquifer management study to map the aquifers in three dimensions and to establish the degree of communication between the various depths and areas.
- Once certain shallow sands are understood to act either independently of the deeper sands or nearly so, wells should be

planned, drilled and tied into the NCSD system to supplement the current supply from the deeper aquifers.

O/14-LG: Dana Wells

Major actions required:

- Evaluate the Dana wells for water production to alleviate the concentration of withdrawals in the area of the ground water depression. The NCSD has access to two wells called the Dana wells that are located just south of Camino Caballo approximately 5 miles from the ocean. They are less productive than other wells that NCSD currently uses to supply water to its customers, and they are connected to the distribution system, but are not being produced currently.
- Use the recommended aquifer management model recommended above to evaluate the impact of producing water from these wells on the ground water elevations in the rest of the aquifer.
- Test the wells for mechanical integrity and flow rates. If those items are not satisfactory, they should be considered for redrilling. If the wells are to be redrilled, a horizontal design should be evaluated to maximize their productivity.

15-LG: REMOVED - Riverside Wells

Major actions required:

- Legal opinion tells us that NCSD does not have the right to drill along the Santa Maria River. Page 11 of the Stipulation, Section V.A.2., as verified by District Special Water Rights Counsel James Markman, assigns all rights to pumping water in SMV to overlying owners in the SMVMA. The District would need to purchase the water rights or otherwise acquire the water from the overlying owners. As Figure 2 shows, any riverside wells are clearly outside the NMMA and would be within SMVMA. Therefore, this alternative was not considered further.

LG – CRITERIA

Supply Potential:

N/13-LG : Local Shallow Aquifer

It is very early to speculate on the potential water supply capacity of the shallow reservoirs. For comparison purposes a preliminary approximation is that it could supply 1000 AFY without inviting sea water

intrusion into either the shallow or deeper aquifers. The aquifer management study is the only way to determine this.

O/14-LG: Dana Wells

This option probably could not supply the volumes required, unless the wells were redrilled horizontally; even then it is doubtful.

Cost Considerations:

Important: The SWAEC does not have the resources needed to produce detailed engineering cost estimates. The approximations presented here are offered simply for the purpose of ranking various alternatives. They are appropriate for the purpose, but are not intended to replace more detailed estimates needed for budgeting and project development.

N/13-LG : Local Shallow Aquifer

Based on the well that the Woodlands recently drilled to a depth of 400 ft, the capital required to drill, equip and tie in a vertical, shallow well was estimated as \$100k to gain 160 AFY of capacity. Therefore, the capital costs were estimated as:

1000 AFY	3000 AFY	6200 AFY
\$0.8M	\$2.4M	\$5 M

However, these rates may not be achievable physically without damaging the aquifer. Operating costs would be approximately \$200/AF for pumping, filtering and treatment.

O/14-LG: Dana Wells

Well testing	\$15k/well
Well tie in to PL	\$50k
Well redrill	\$100k/well
Directional redrill	\$300k/well
Total, possibly	\$2M for 3000 AFY.

Court Compliance:

N/13-LG : Local Shallow Aquifer

May not comply with the court order for “new” water

O/14-LG: Dana Wells

Does not comply with the court order for “new” water

Critical Milestones for Delivery:

N/13-LG: Local Shallow Aquifer

1,000 AFY by 2015: Possibly feasible

3,000 AFY by 2020: Probably not feasible

6,200 AFY total Probably not feasible

O/14-LG: Dana Wells

1,000 AFY by 2015: Possibly feasible

3,000 AFY by 2020: Probably not feasible

6,200 AFY total: Probably not feasible

Reliability:

N/13-LG : Local Shallow Aquifer

Probably reliable, needs the aquifer management study to determine

O/14-LG: Dana Wells

Probably reliable, just as the currently used wells, if rates are sufficient

Phasing:

N/13-LG : Local Shallow Aquifer

Easily phased, if feasible

O/14-LG: Dana Wells

Not feasible for only two wells

Water Quality:

N/13-LG : Local Shallow Aquifer

Good – treating requirements may be different from the currently producing aquifer. Supply is high in nitrates, which would not impact agricultural or irrigation use.

O/14-LG: Dana Wells

Comparable to other NCSD wells in the aquifer

Feasibility:

N/13-LG : Local Shallow Aquifer

Probably feasible. Should need minimal permitting

O/14-LG: Dana Wells

Physically feasible. Permitting & redrilling could be required

15-LG: REMOVED – Riverside Wells

Not feasible legally

Sustainability:

N/13-LG : Local Shallow Aquifer

This assessment requires the aquifer management study recommended above

O/14-LG: Dana Wells

This assessment requires the aquifer management study recommended above

15-LG: REMOVED – Riverside Wells

Not feasible legally

Public Support:

N/13-LG : Local Shallow Aquifer

Very likely, since wells are the means currently accepted by the public

O/14-LG: Dana Wells

very likely, since wells are the means currently accepted by the public

LG – NOTES

Note 1:

Figures 1 and 2 show the location of the NCSD area and its relation to the total SMV aquifer. Obviously, the NCSD portion is a small part of the whole. Therefore, pumping aquifer water in the NCSD area affects all of the entities that use that water, but the NCSD by itself cannot manage the aquifer.

Figure 1 NCSA Service Area [Final UWMP NCSA 2006]

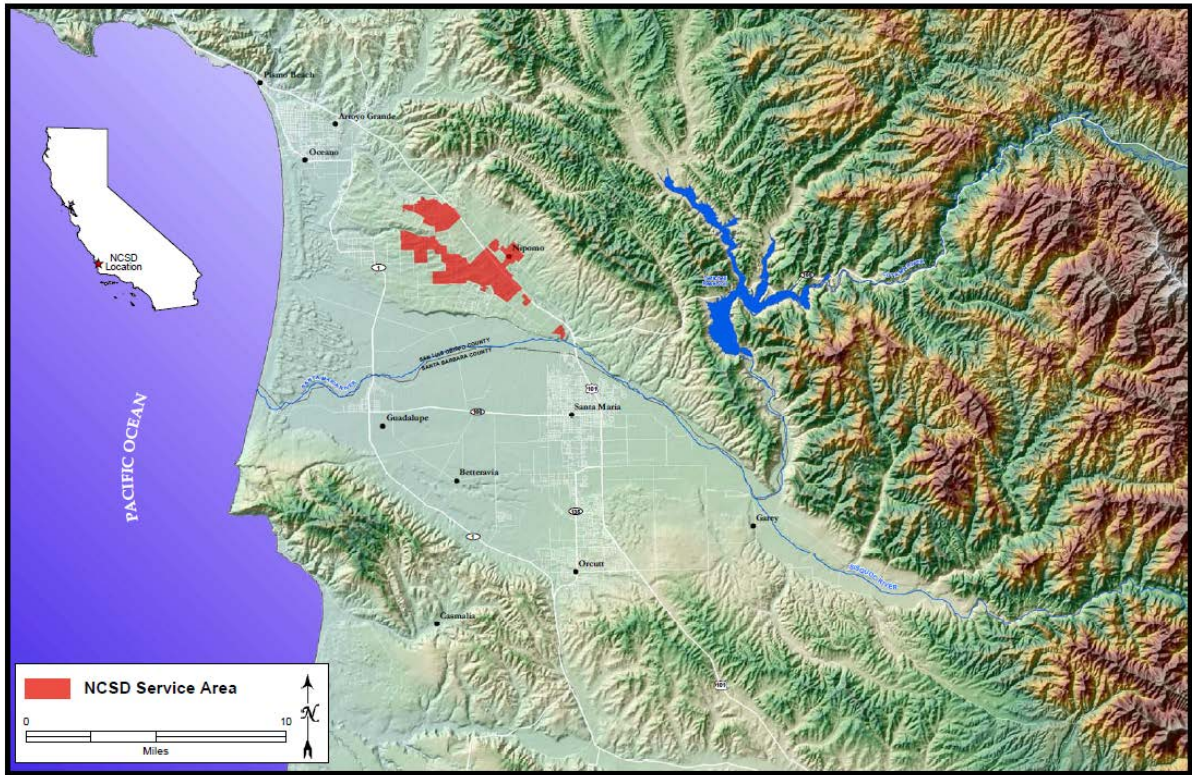


Figure 1. Nipomo Community Services District Location

Figure 2 Santa Maria Valley Aquifer Location [Final UWMP NCSD 2006]

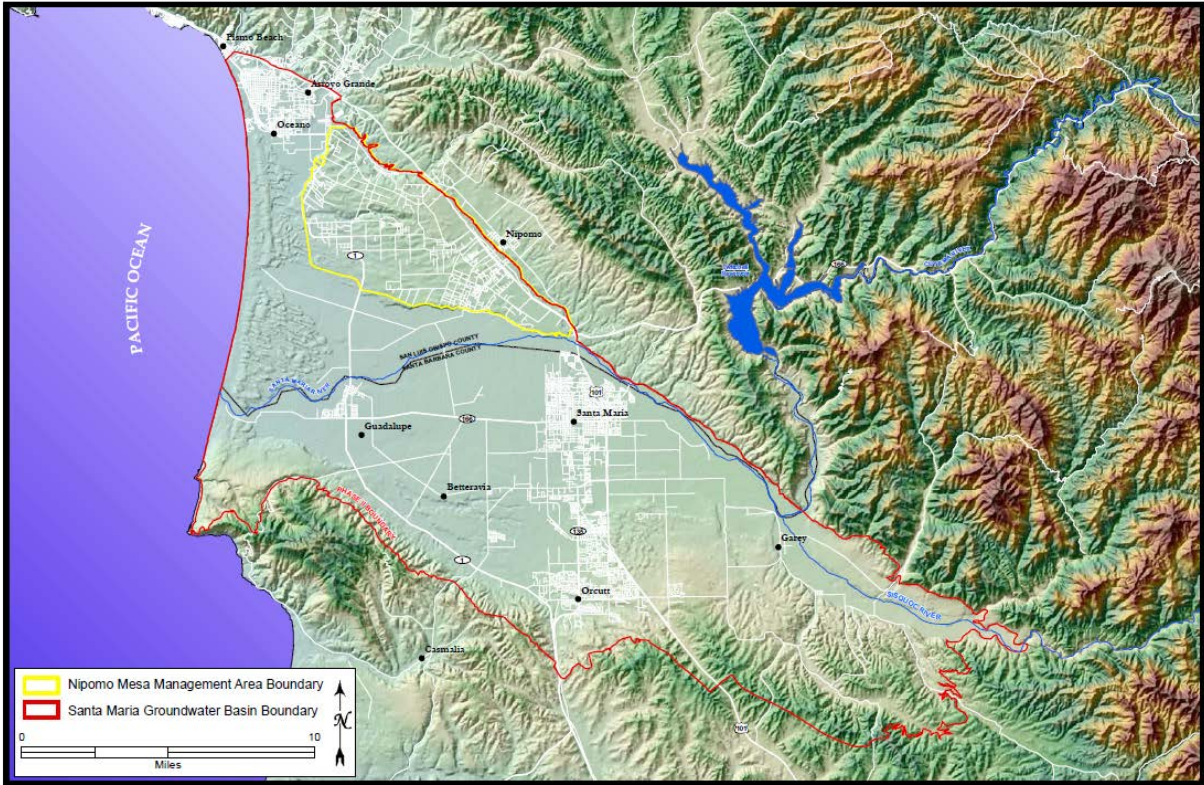


Figure 3. Santa Maria Groundwater Basin and Nipomo Mesa Management Area

Note 2:

Figures 3 and 4 show the degree of depression of the groundwater levels and the persistence of that depression over time.

Figure 3 Groundwater Elevation Contours in 1995 [DWR Study 2002]

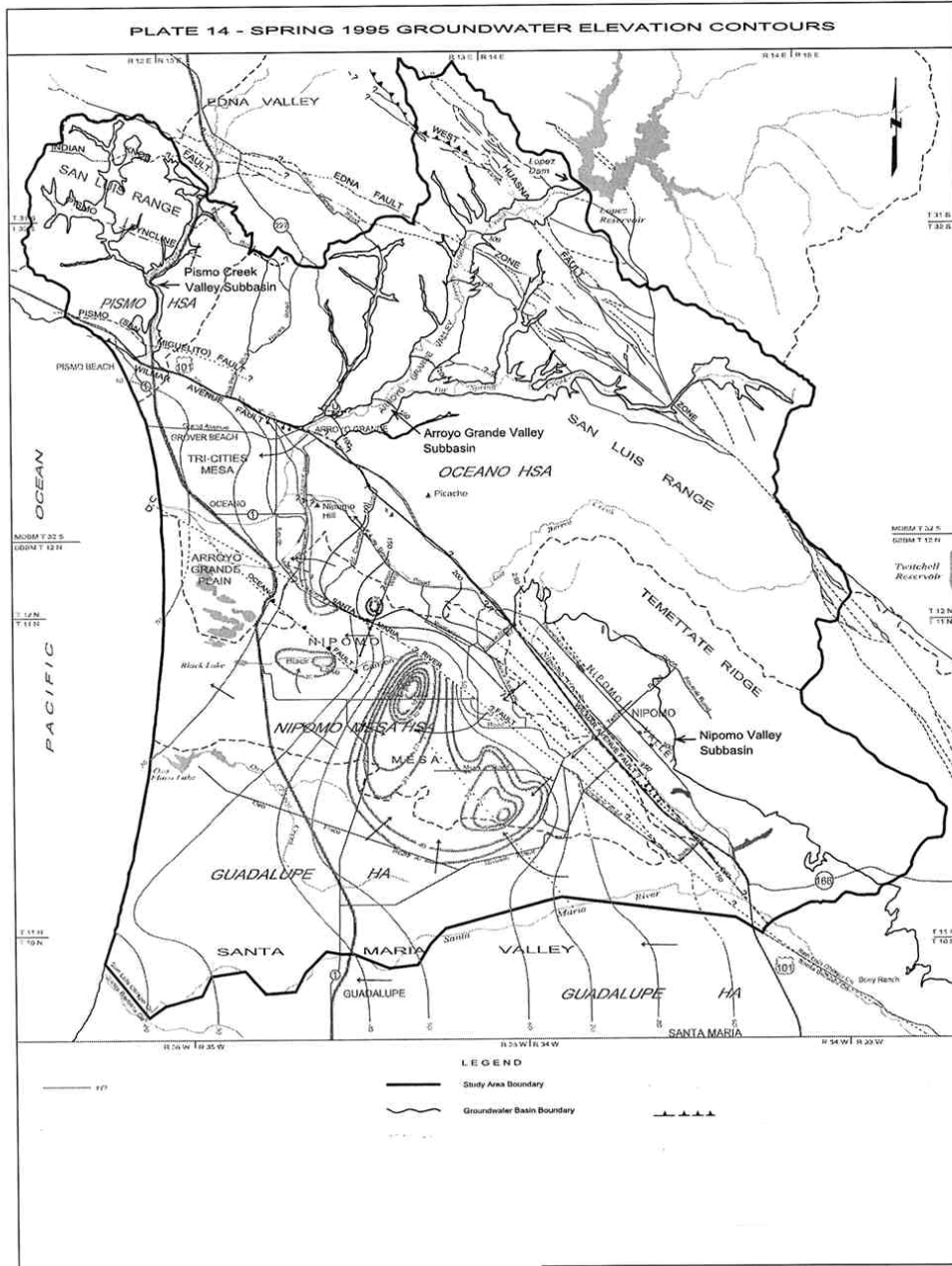


Figure 4 Groundwater Elevation Contours in 2011 [NMMA TG 2011 Annual Report, Figure 6-6]

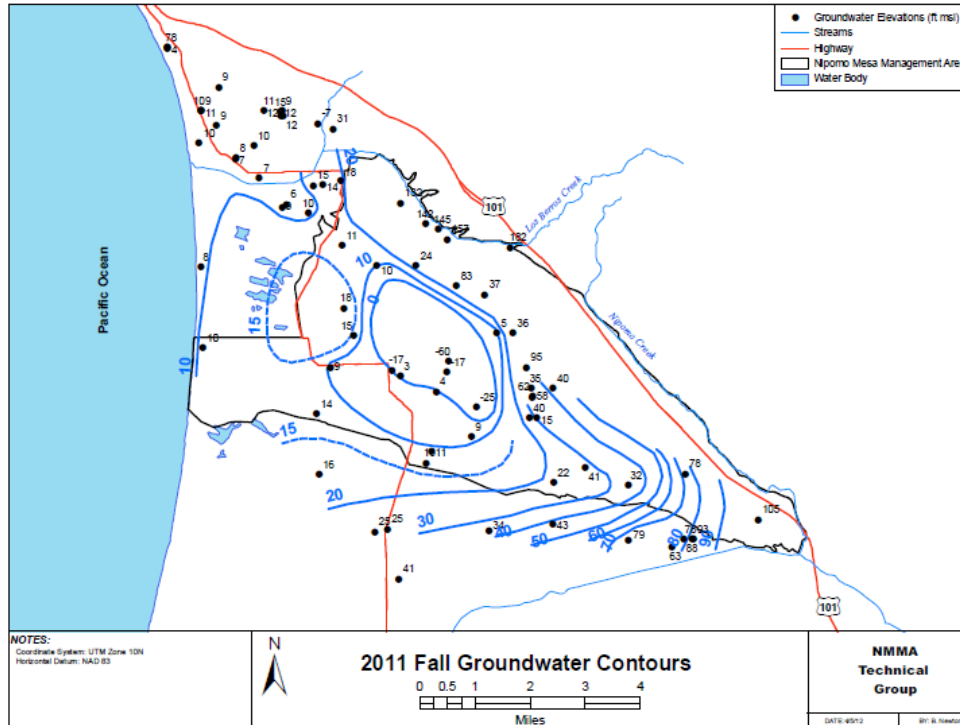


Figure 6-6. 2011 Fall Groundwater Contours

Note 3:

Figures 5, 6 and 7 show the locations of the wells used by NCSD. Several are in the area of depressed groundwater levels. Figure 7 shows the wells identified for intended pumping rate reductions when the supplemental water becomes available.

Figure 5 Map of NCSD Source Wells [Final UWMP NCSD 2006]

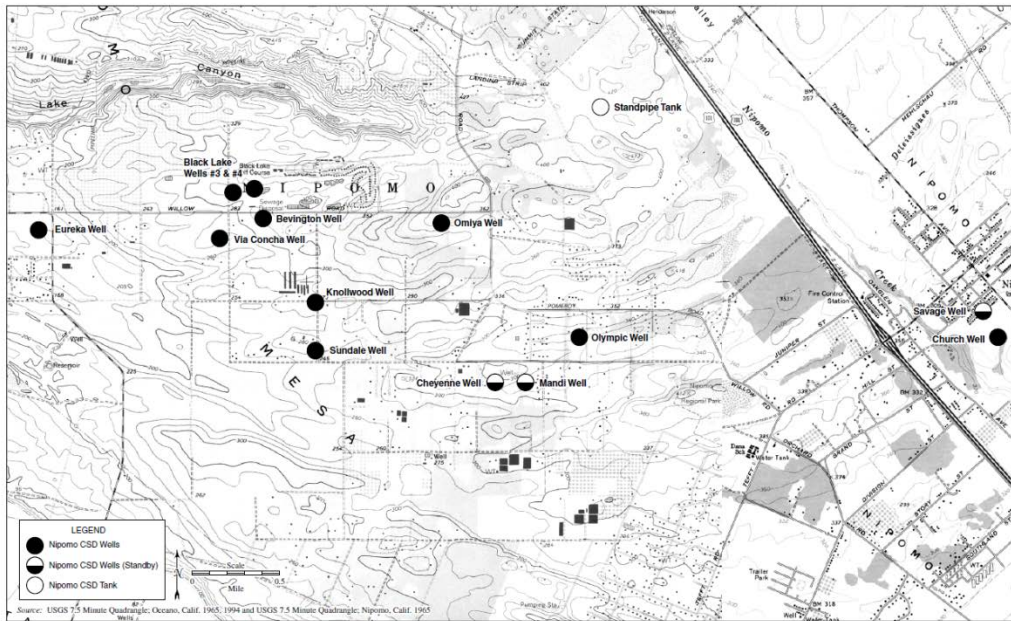


Figure 4. Location of Nipomo Community Services District Wells

Figure 6 NCSD Areas and Wells [NCSD 2010 Urban Water Management Plan Figure 13]

Nipomo Community Services District
2010 Urban Water Management Plan

2. Water Supply

Figure 13. Wells and Storage Tanks

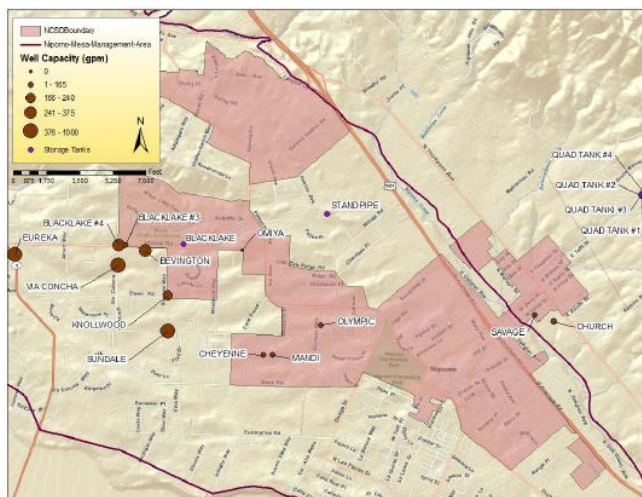
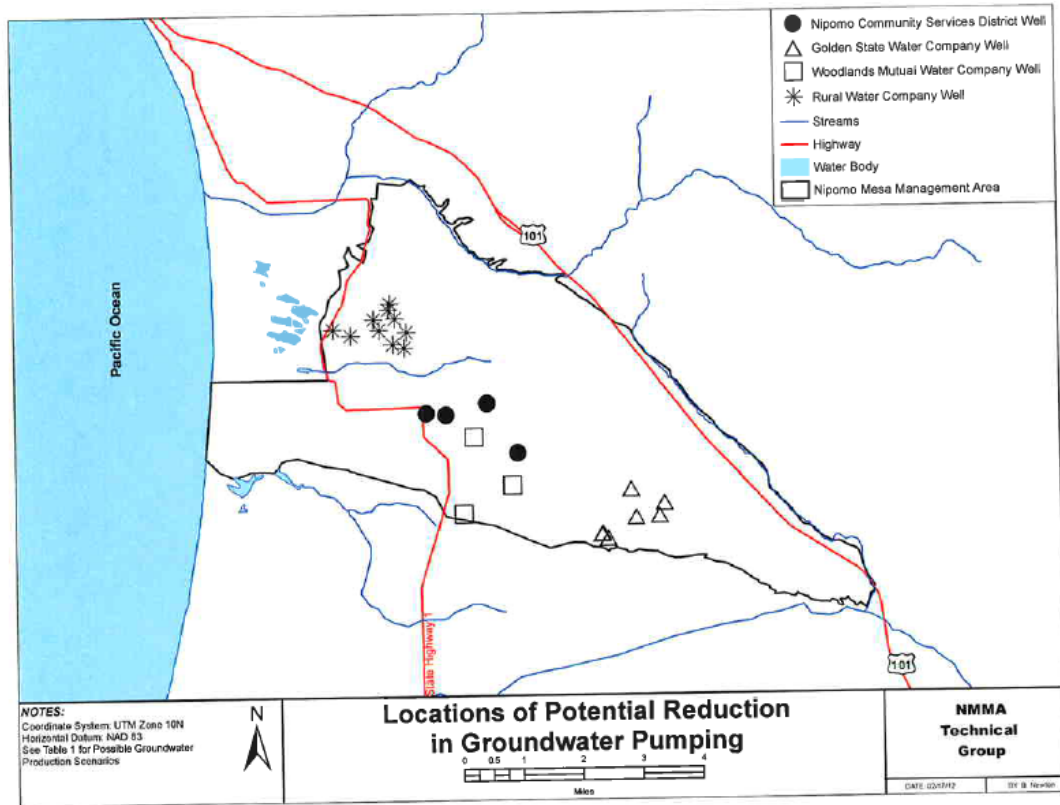


Figure 7 NMMA Location of Potential Reduction in Groundwater Pumping [NMMA Final Supplemental Water Project Review 2012]

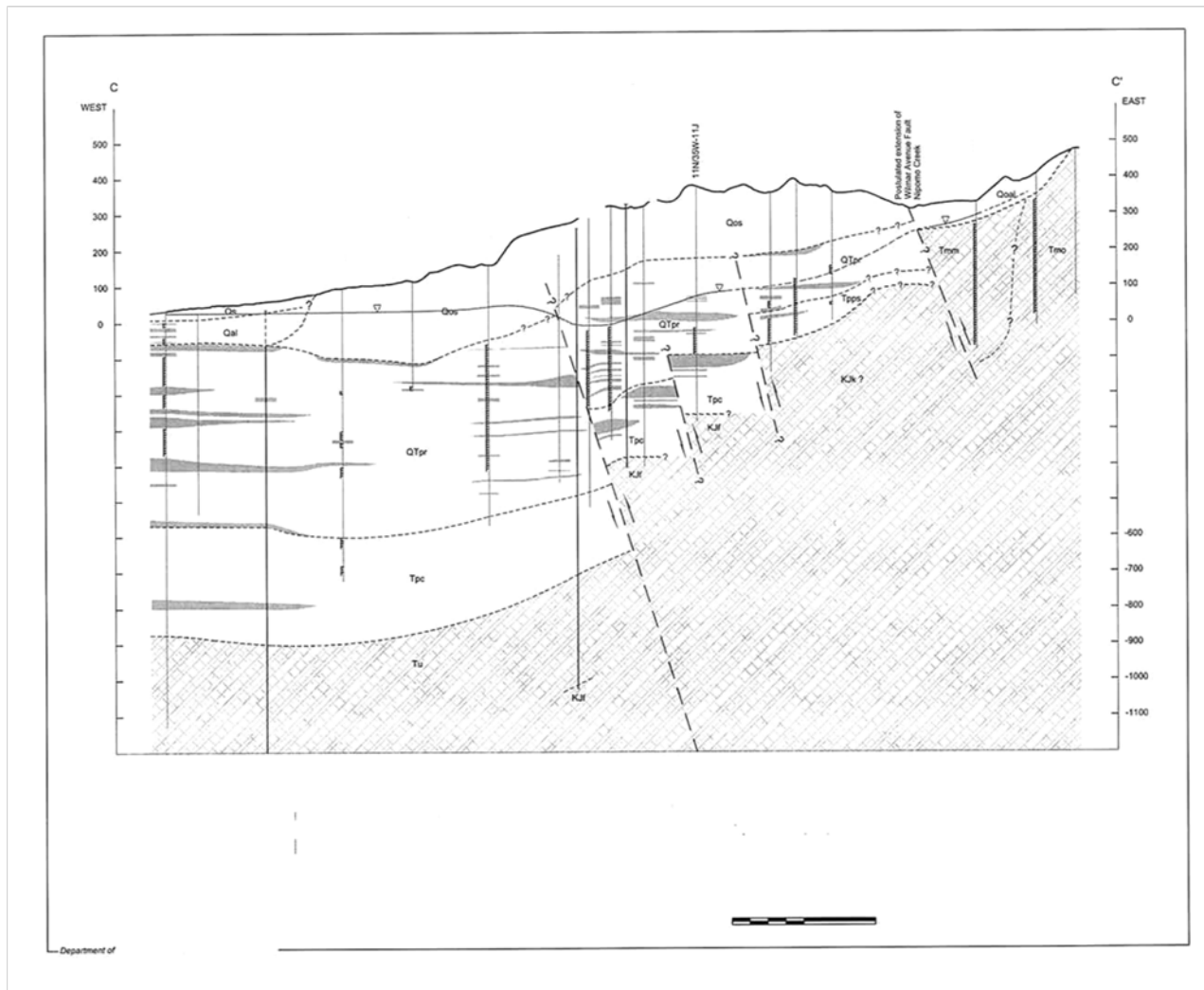


Note 4:

Figure 8 shows the thickness of the aquifer in a cross section under the Nipomo Mesa. It also shows aquitards that have been indicated in well logs.

The Dana wells are located in the middle part of this section, where the productivity may be less than other locations with thicker sand sections. To overcome that problem those wells could be redrilled horizontally to gain productivity from each well.

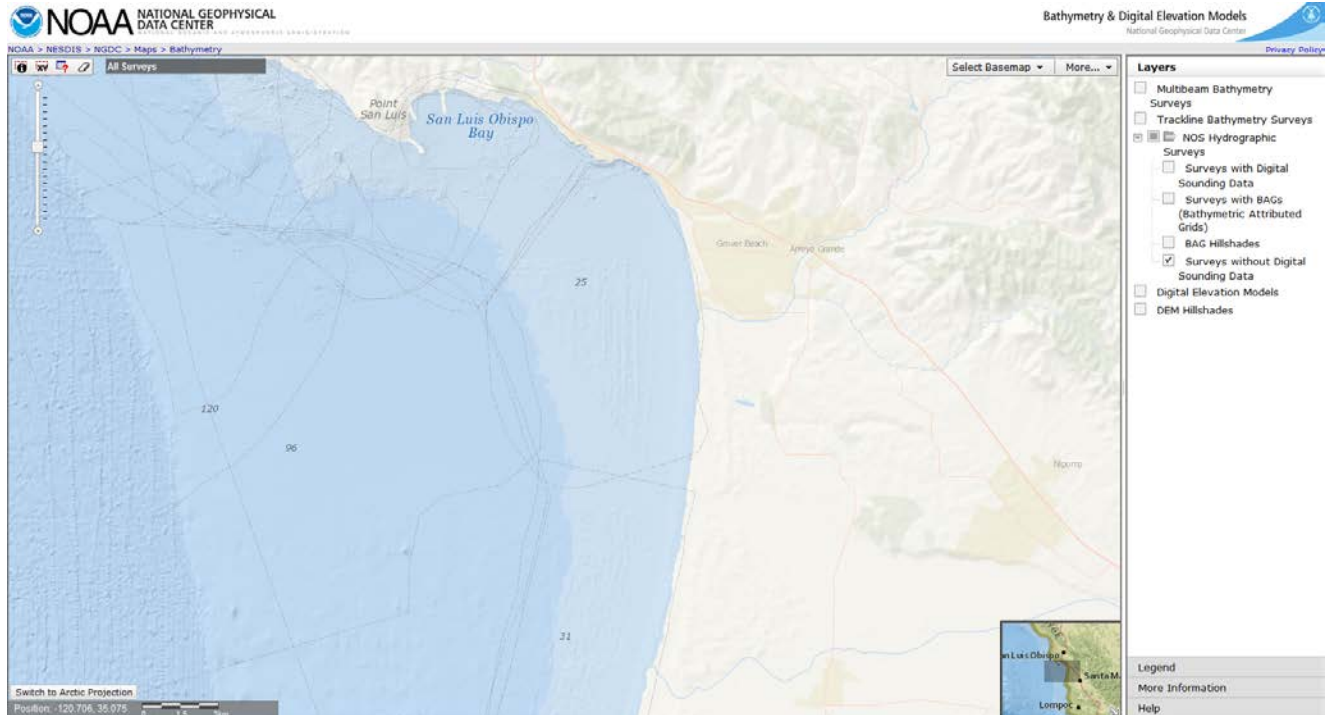
Figure 8 West to East Geologic Cross Section through Nipomo Mesa [DWR Study 2002]



Note 5:

The bathymetric map offshore Nipomo shows that the depth to the ocean bottom increases very gradually with distance offshore. That and the large thickness of the sand section immediately onshore in Figure 8 suggest that the sand outcrop probably extends a large distance offshore, in the absence of decreasing thickness or faulting. Therefore the location of the current interface between sea water and fresh water is unknown without direct measurements.

Figure 9 Bathymetry Offshore South San Luis Obispo County [NOAA National Physical Data Center].



ALTERNATIVE ANALYSIS – Surface Water (SFW)

SFW – DESCRIPTION OF VARIATIONS

P/16-SFW Oso Flaco Lake

Surface water and shallow groundwater from Oso Flaco Lake and/or its watershed would be treated and conveyed to the District's water distribution system.

Major actions required:

- Environmental and construction clearances to build treatment system, wells (possibly), pipeline and supporting infrastructure for delivery of water to NCSD system
- Preliminary design and cost estimates for project construction.
- Obtain financing for design, and complete final design
- Obtain financing for project construction and management
- Bid, award, construction contracts
- Project construction

17-SFW REMOVED - Santa Maria River

Surface water or river underflow would be treated and conveyed to the District's water distribution system.

Major actions required:

- Water purchase or lease agreement with Santa Maria Valley Water Conservation District and possibly other owners
- Environmental and construction clearances to build treatment system, wells (possibly), pipeline and supporting infrastructure for delivery of water to NCSD system
- Preliminary design and cost estimates for project construction.
- Obtain financing for design, and complete final design
- Obtain financing for project construction and management
- Bid, award, construction contracts
- Project construction

18-SFW Lopez Reservoir

Surface waters presently released from Lopez Lake into Arroyo Grande creek could be partially offset by recycled water in the South County, thereby generating new water resources. At present, 4,200 AFY are released from Lopez Lake to meet contractual obligations of the Flood Control District.

Since this variation is directly related to the recycled wastewater alternatives, it is not discussed further in this section. See Notes.

SFW – CRITERIA

Supply Potential:

P/16-SFW Oso Flaco Lake

Unknown. Flows could be highly transient in nature.

17-SFW REMOVED - Santa Maria River

Unknown. Flows could be highly transient in nature.

Cost Considerations:

P/16-SFW Oso Flaco Lake

Capital and O&M Cost: Unknown

17-SFW REMOVED - Santa Maria River

Capital and O&M Cost: Unknown

Court Compliance:

P/16-SFW Oso Flaco Lake

Not in compliance with Court order.

17-SFW REMOVED - Santa Maria River

Not in compliance with Court order. Surface water from normal Santa Maria River flows percolates into the basin and does not represent a supplemental supply.

Critical Milestones for Delivery:

P/16-SFW Oso Flaco Lake

Due to permitting issues, project unlikely to reach any of the milestones.

17-SFW REMOVED - Santa Maria River

Due to water rights and permitting issues, project unlikely to reach any of the milestones.

Reliability:

P/16-SFW Oso Flaco Lake

Unknown. Flows could be highly transient in nature.

17-SFW REMOVED - Santa Maria River

Flows that are in excess of environmental demands will be highly transient in nature (not yearly) and do not represent a viable surface water supply. In addition, the amount of storage necessary to impound the short term flows and ensure reliability would be excessive.

Phasing:

P/16-SFW Oso Flaco Lake

Unknown

17-SFW REMOVED - Santa Maria River

Unknown

Water Quality:

P/16-SFW Oso Flaco Lake

The source would likely require advanced treatment, such as reverse osmosis, which would give rise to the same brine management challenges as desalination.

17-SFW REMOVED - Santa Maria River

Coagulation, filtration, and disinfection would be required per State and Federal drinking water standards.

Feasibility:

P/16-SFW Oso Flaco Lake

Existing water rights should be considered for any surface water supplies. If reverse osmosis is required, the brine waste stream may contain contaminants besides salts that could limit discharge options. Snowy Plover habitat and Coast Commission jurisdiction would be barriers to viability. Surface water from high flow events will be subject to environmental demands, including steelhead/salmon recovery planning that is on-going.

Receiving approval from CDPH is not likely unless all other water supply options are exhausted, due to presence of pesticides and other toxic compounds.

17-SFW REMOVED - Santa Maria River

Existing water rights should be considered for any surface water supplies. Receiving approval from owners of water rights is not likely.

Sustainability:

P/16-SFW Oso Flaco Lake

Snowy Plover habitat and Coastal Commission jurisdiction would be barriers to viability.

17-SFW REMOVED - Santa Maria River

Any project to use this water could be considered in conflict with steelhead/salmon recovery planning that is on-going.

Public Support:

P/16-SFW Oso Flaco Lake

Presence of pesticides and other contaminants in the water, as well as possible environmental impact, could make public support unlikely.

17-SFW REMOVED - Santa Maria River

Owners of water rights have expressed opposition to selling or transferring rights to Santa Maria River water.

SFW – NOTES

Notes on 18-SFW: Lopez Reservoir

- 1) Surface waters presently released from Lopez Lake into Arroyo Grande creek could be partially offset by recycled water in the South County, thereby generating new water resources. At present, 4,200 AFY are released from Lopez Lake to meet contractual obligations of the Flood Control District.
- 2) Lopez supplies are not available to NCSD. Agreements for participation in any related project would need to be negotiated with the Flood Control District Zone 3 participants.

- 3) One concept is to “wheel” Lopez water to NCSD via the SWP pipeline necessitating CCWA agreement to such a concept.
- 4) A study is currently being performed for expansion of the capacity of Lopez Reservoir. An expansion would increase the yield of the reservoir.
- 5) Completion of the County's HCP for the Lopez-Arroyo Grande Creek and Oceano Flooding projects is needed before determining quality parameters and what potential yield from substituting recycled water for downstream releases is possible.

ALTERNATIVE ANALYSIS –Seawater/Brackish/Other Desalination (SEA)

SEA – DESCRIPTION OF VARIATIONS

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

Construct a desalination plant capable of expansion to produce 6200 AFY of fresh water on the site of the Phillips 66 refinery. Then pipe the fresh water to the nearest NCS D pipeline capable of transporting this volume. As source water, use sea water or brackish water from wells drilled directionally into the aquifer-bearing sands beneath the ocean, a distance of two miles or more. Dilute that sea water with the cooling water that the refinery currently discharges to the ocean through an outfall. Discharge the concentrated brine by-product through the existing refinery outfall.

This site has several advantages:

- It is close to the ocean, approximately 2 miles
- It already exists as a permitted industrial site
- It has an existing ocean outfall for the discharge of the by-product brine
- It has a stream of brackish water that could be used along with sea water as source supply for the reverse osmosis desalination process.
- The distance to the NCS D pipeline system is not large, estimated at 5.5 miles or less.

Major actions required:

- Agree with Phillips 66 on lease or use or purchase of land and outfall at their site (Site 2 shown on Boyle Tech Memo 2 Figure A-1)
- Obtain permits (May be part of a turn-key project).
 - to directionally drill wells from that site to the west to intersect sand saturated with seawater or brackish water.
 - to construct a desalination plant (probably membrane) on the land.
 - to discharge a higher concentration brine and a higher volume to the ocean through Phillips existing outfall.
 - to construct a pipeline connecting the site to the NCS D system.
- Drill the wells necessary to deliver the planned water rates (May be part of a turn-key project).
- Construct and operate the desalination plant using Phillips 66 cooling water effluent and water produced from the wells as source and using Phillips 66 outfall. (May be part of a turn-key project).

R/19B-SEA Seawater with New Outfall

Construct a desalination plant capable of expansion to produce 6200 AFY of fresh water on a site east of Oso Flaco Lake. Then pipe the fresh water to the nearest NCS D pipeline capable of transporting this volume. As source water, use sea water or brackish water from wells drilled directionally into the aquifer-bearing sands beneath the ocean, a distance

of two miles or more. Use either a new outfall or injection wells drilled into the aquifer under the ocean to discharge the resulting brine.

It may be possible to dispose of the brine in porous formations below the fresh water aquifer. Such a process may be less expensive than laying long pipelines to an ocean outfall or to subsea injection wells. However, we are not aware of studies to identify those formations or to estimate their capacities to take in the large volumes of brine effluent anticipated in this study.

This site has several advantages:

- It is close to the ocean, approximately 3.5 miles
- It is in an area of agricultural and industrial use
- The distance to the NCSD pipeline system is not large, estimated at 4 miles

Major actions required:

- Purchase sufficient land at the Site 3 shown on Boyle Tech Memo 2 Figure A-1
- Obtain permits
 - to construct a desalination plant (probably membrane) on the land.
 - to directionally drill wells from that site to the west to intersect sand saturated with seawater or brackish water.
 - to construct and operate a new brine outfall west of Oso Flaco Lake.
 - to construct a pipeline connecting the site to the NCSD system.
- Construct and operate the desalination plant using water produced from the wells as source and using the new outfall. (May be part of a turn-key project).

S/19C-SEA Brackish Water with New Outfall

This specification is the same as 19B-SEA, but assumes that the intake wells intersect brackish water. The advantage of the brackish water source is that the desalination plant specifications are less expensive and the volume of fresh water produced from a given volume of brackish water is almost twice that produced from sea water.

Major actions required: Same as above, but assumes that the wells intersect brackish water

T/20A-SEA Solar Distillation Inland

Construct an array of solar stills inland that is supplied with sea water. Obtain the sea water from wells drilled directionally under the ocean. Separate the fresh water from sea water by allowing the incident energy from the sun to vaporize the water within a container equipped with condensing capabilities, and capture the condensing water in a pipe system. The distillation containers will occupy an array similar to those

used in solar electricity plants. Pipe the produced fresh water to the NCSD system and the concentrated brine by-product to a new ocean outfall or to injection wells in the aquifer under the ocean. Obtain electric power to run the pumps, filters, etc. from solar electric panels at the plant site.

The major items needed for the project are land, estimated at 2 square miles or more for the solar cells to make 3,000 AFY of fresh water, based on a yield of 2 liters/m² found in the systems studied to date [see references below].

The advantages of this project are:

- Availability of solar energy at significant intensity most of the year at a location near a very large supply of sea water
- The availability of solar energy is somewhat greater inland because of less fog
- Possibly lower land costs inland
- Virtually no sensitivity to the price of hydrocarbon fuels because of use of solar energy for heat and electricity

The processes used in this alternative have been in use for many years on small scales, but we are not aware of any plant of the size contemplated in North America. A fairly large plant operated from 1984 to 2002 in Abu Dhabi [El-Nashar, *Multiple Effect Distillation of Seawater Using Solar Energy*, **Solar Energy Conversion and Photoenergy Systems** Vol. II, Encyclopedia of Life Support Systems]. A pilot project would be required to prove the applicability of this concept in this location [see *Mission 2012*, Massachusetts Institute of Technology (2012); Nebbia, *Early Work on Solar Distillation in Italy 1953-1970*, University of Bari, Italy, nebbia@quipo.it]. The costs of building and operating the plant are unknown. The estimates made here are very rough and require the pilot plant to narrow the uncertainty [see Bound, *Solar Distillation*, practicalaction.org (2012)].

Major actions required:

- Obtain a suitable site for a pilot project, possibly on the Phillips 66 site, which has land with industrial permits and an outfall
- Obtain permits to operate a pilot project designed to evaluate the efficacy and costs of this method
- Build and operate the pilot project using either brackish water (such as Phillips 66 heat exchanger effluent) or sea water. If sea water were used, a supply apparatus might have to be permitted and built also.
- If the pilot project's results are favorable, proceed to the next steps.
- Design a solar distillation array to satisfy the needed water supply rates
- Obtain permits

- Sea water source (offshore or through undersea wells)
- Land use for the acreage required for the still
- Pipelines from the source to the still area, from the still area to the outfall and from the still area to the NCSD system
- Outfall construction or injection wells
- Purchase the required land, probably east of the NCSD tankage, to maximize capture of solar energy and to minimize land costs
- Build and operate the still designed for the required fresh water delivery rate

Since solar stills only operate in daylight, the water production is cyclic each day and between annual seasons. Therefore, the process might lend itself to storage of the produced water in the aquifer rather than on the surface. If so, the costs of the necessary injection wells would probably be offset by savings in pipelines.

U/20B-SEA Solar Distillation Coastal

This alternative is basically the same as that above, but closer to the ocean. Since the two pipelines from and to the ocean are estimated to be the largest capital cost item in 20A-SEA, that part of the costs would be reduced. A disadvantage could be that land, potentially in or near the Guadalupe Oil Field site, might cost more than that inland. Another potential disadvantage is the lower average annual insolation that might result from the more persistent fog that occurs nearer to the coast.

Major actions required: Same as above, but potentially in or near the Guadalupe Oil Field site. The pipelines would be shorter, but the available solar energy could be less.

SEA – CRITERIA

Supply Potential:

SEA-all cases: The supply of ocean water is almost without limit. The means to acquire it is technically straight-forward, but require permitting and capital expenditure.

The source could be by sea-bed intake or through wells drilled directionally to reach offshore. The wells could encounter brackish water or sea water, depending on the location of the location of the fresh water – sea water interface and on the length of the wells.

The effluent from the heat exchangers from the Phillips 66 plant or other industrial sites could be brackish.

Cost Considerations:

Important: The SWAEC does not have the resources needed to produce detailed engineering cost estimates. The approximations presented here are offered simply for the purpose of ranking various alternatives. They are appropriate for the purpose, but are not intended to replace more detailed estimates needed for budgeting and project development.

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

Capital Cost: Using the Carlsbad and Monterey newly planned reverse osmosis (RO) plants as a guide the capital required would probably be about \$16,000 per Acre Foot per Year (AFY). In both of those locations existing ocean outfalls will be used.

Since RO plants are modular, the initial plant could be built to satisfy the early demand; the later expansions would be straight-forward. Their efficiency is approximately 0.5 gallons of fresh water for each gallon of sea water intake.

In addition, a pipeline of approximately 5 miles would be required to transport the fresh water product to the NCSD system at a cost of approximately \$1.5 million/mile [Padre Associates Inc., *Supplementary Water Alternatives Environmental and Permitting Constraints Analysis* for NCSD and Boyle Engineering Corp. (May 25, 2007) Appendix D].

The directionally drilled wells were estimated to cost \$400,000 to drill and equip; their outputs were estimated at 500 AFY (~300 gallons per minute [gpm]).

If the Phillips 66 outfall were used it would require expansion for an estimated cost of \$200,000. Expansions beyond the initial 1000 AFY target would probably require permitting the additional volume through the outfall and some physical modifications.

The initial demand of 1000 AFY would therefore require approximately 1500 AFY of intake sea water and 300 AFY of brackish water effluent from the Phillips 66 plant. The 4 wells and 5 miles of pipeline would cost of \$25 million. Total capital was estimated as \$62 million for a 3000 AFY capacity.

O&M Cost: Costs were estimated as \$1000/AF, somewhat higher than the costs in other RO plants to include a safety factor.

R/19B-SEA Seawater with New Outfall

Capital Cost: The capital cost for this case is the same as 19A-SEA plus the cost of permitting and building a new outfall offshore. That was roughly estimated to be \$5 million.

The total capital then would be \$68 million for a 3000 AFY capacity.

O&M Cost. This cost was estimated to be the same as the 19B-SEA case.

S/19C-SEA Brackish Water with New Outfall

Capital Cost The capital cost for this case is the same as 19B-SEA, except that the cost of building the plant was decreased by \$2000/AFY to recognize the milder operating conditions needed for brackish water processing. This would extend to lower operating pressures and less exotic metallurgy.

The total capital then would be \$60 million for a 3000 AFY capacity.

O&M Cost. This cost was estimated to be \$800/AF, a savings of \$200/AF compared to the sea water cases.

T/20A-SEA Solar Distillation Inland

Capital Cost The capital items for this case are land (efficiency of 2 L/m²/day requires 3,400 m²/AFY), 28 miles of pipeline regardless of plant size (example location in Suey Canyon), source wells and outfall or injection wells for effluent.

Even though it would not be essential that all of the area occupied by the distillation plant was contiguous, for estimating purposes it was assumed that the land purchase and pipelines would have to be sized for the ultimate expansion, so the cost for a small initial plant would be large on the basis of volume delivered. The total capital for 3,000 AFY could be \$90 million (\$42 million of it for pipelines), and for 6,200 AFY could be \$130 million.

It might be possible to fund costs of the pilot project with grants from county, state or federal government or private entities that are interested in evaluating the use of solar distillation.

O&M Cost. Estimated as \$400/AF. Electricity to run the pumps and other equipment would be obtained from solar cells on the site. Therefore, O&M costs would be insensitive to prices of hydrocarbons.

U/20B-SEA Solar Distillation Coastal

Capital Cost This case was assumed to require the same capital costs as case 20A-SEA for all items except the pipelines. The distance total was 9 miles for a cost of \$14 million. The land could cost more and the fresh water output could be less per unit of capital cost because of less insolation (watt-hours/sq meter/day of sunlight). The total capital for 3,000 AFY could be \$60 million, and that for 6,200 AFY could be \$100 million.

O&M Cost: Estimated as \$400/AF. Electricity to run the pumps and other equipment would be obtained from solar cells on the site.

Court Compliance:

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

Would not comply with the Court Final Judgment for the method or source. However, with permits for the discharge method it would comply with the minimum supplemental water delivery of 2,500 AFY.

R/19B-SEA Seawater with New Outfall

Same as above.

S/19C-SEA Brackish Water with New Outfall

Same as above.

T/20A-SEA Solar Distillation Inland

Same as above.

U/20B-SEA Solar Distillation Coastal

Same as above.

Critical Milestones for Delivery:

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

1,000 AFY by 2015: Cannot meet this criterion.

3,000 AFY by 2020: Probably cannot meet this criterion.

6,200 AFY total: Probably can meet this criterion.

R/19B-SEA Seawater with New Outfall

1,000 AFY by 2015: Cannot meet this criterion.

3,000 AFY by 2020: Probably cannot meet this criterion.

6,200 AFY total: Probably can meet this criterion.

S/19C-SEA Brackish Water with New Outfall

1,000 AFY by 2015: Cannot meet this criterion.

3,000 AFY by 2020: Probably cannot meet this criterion.

6,200 AFY total: Probably can meet this criterion.

T/20A-SEA Solar Distillation Inland

1,000 AFY by 2015: Cannot meet this criterion.

3,000 AFY by 2020: Might meet this criterion.

6,200 AFY total: Probably can meet this criterion.

U/20B-SEA Solar Distillation Coastal

1,000 AFY by 2015: Cannot meet this criterion.

3,000 AFY by 2020: Might meet this criterion.

6,200 AFY total: Probably can meet this criterion.

Reliability:

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

Extremely reliable. The raw water source is very large, and the technology is long established.

R/19B-SEA Seawater with New Outfall

Same as above.

S/19C-SEA Brackish Water with New Outfall

Same as above.

T/20A-SEA Solar Distillation Inland

Probably very reliable. The raw water source is very large, and the technology is long established on a small scale. But, it needs to be proven at this location because of the uncertainties of local insolation (energy rate received from the sun) and the economies of scale for this method.

U/20B-SEA Solar Distillation Coastal

Same as above.

Phasing:

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

Phasing is common in this technology; the plant scales well economically

R/19B-SEA Seawater with New Outfall

Same as above.

S/19C-SEA Brackish Water with New Outfall

Same as above.

T/20A-SEA Solar Distillation Inland

Probably does not scale well. The major investments, pipelines and land, need to be made early to be available for expansion later. The distillation panels scale to the needed through-put.

U/20B-SEA Solar Distillation Coastal

Same as above.

Water Quality:

SEA all cases: Produced water quality is excellent.

Feasibility:

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

Feasible, but permitting has required 10 years or more for the many precedents existing on the California coast.

R/19B-SEA Seawater with New Outfall

Same as above.

S/19C-SEA Brackish Water with New Outfall

Same as above.

T/20A-SEA Solar Distillation Inland

Not well known. A pilot project would be required.

U/20B-SEA Solar Distillation Coastal

Same as above.

Sustainability:

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

Power usage will be substantial and sensitive to costs of hydrocarbon fuels.

R/19B-SEA Seawater with New Outfall

Same as above.

S/19C-SEA Brackish Water with New Outfall

Same as above.

T/20A-SEA Solar Distillation Inland

Solar energy projects can have significant impacts to endangered species habitats, due to the large amount of area that is disturbed.

U/20B-SEA Solar Distillation Coastal

Same as above.

Public Support:

Q/19A-SEA Seawater with Existing Outfall & Phillips 66 Cooling Water

Probably good, based on acceptance of the same approach in other coastal communities.

R/19B-SEA Seawater with New Outfall

Same as above.

S/19C-SEA Brackish Water with New Outfall

Same as above.

T/20A-SEA Solar Distillation Inland

Solar energy projects have faced some public opposition, due to the large amount of area that is disturbed.

U/20B-SEA Solar Distillation Coastal

Same as above.

SEA – NOTES

Figure 1: Map of potential sites for Desalination Plants [Boyle Tech Memo 2 Fig. A-1]

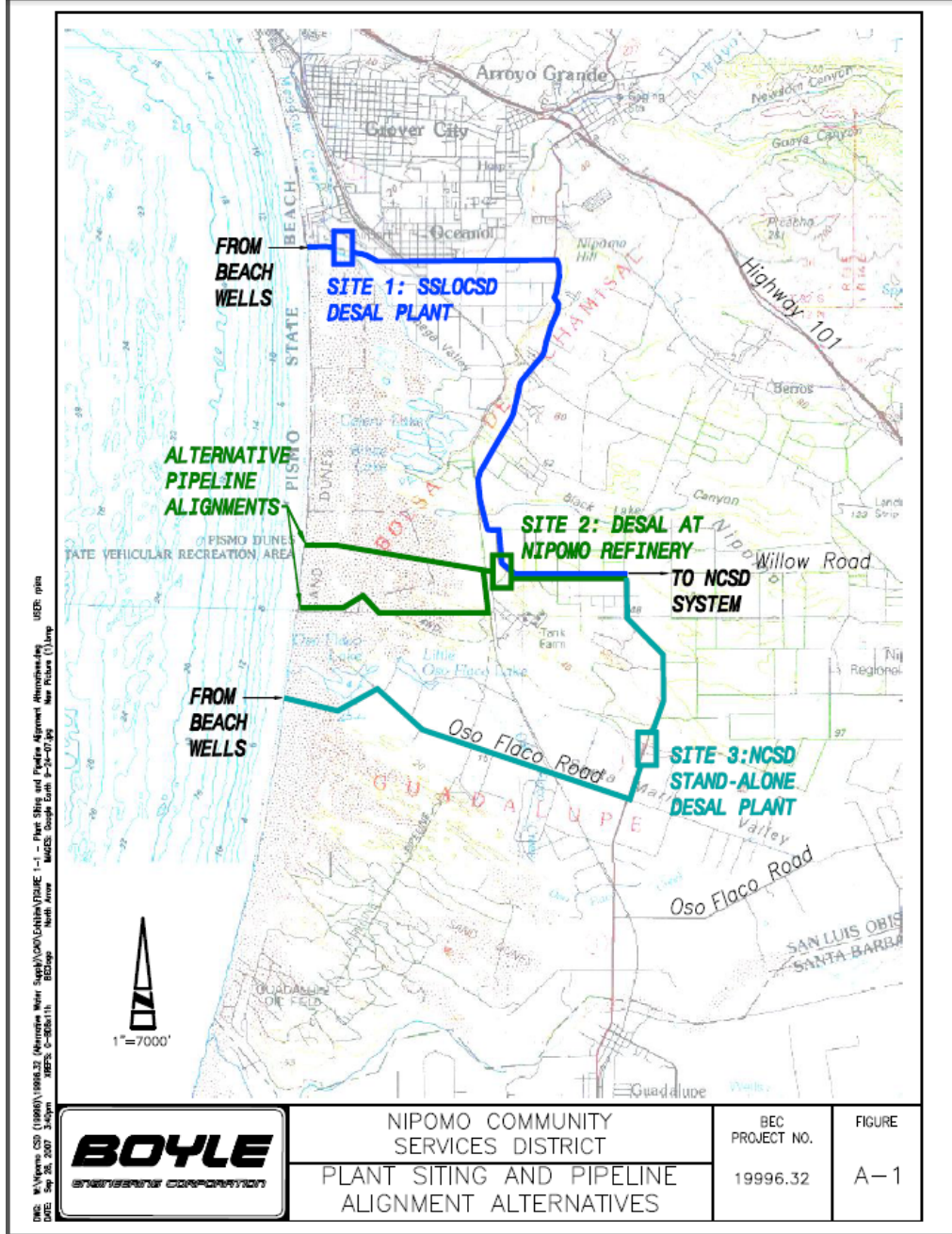


Figure 2 Bathymetry offshore Nipomo [NOAA National Physical Data Center].

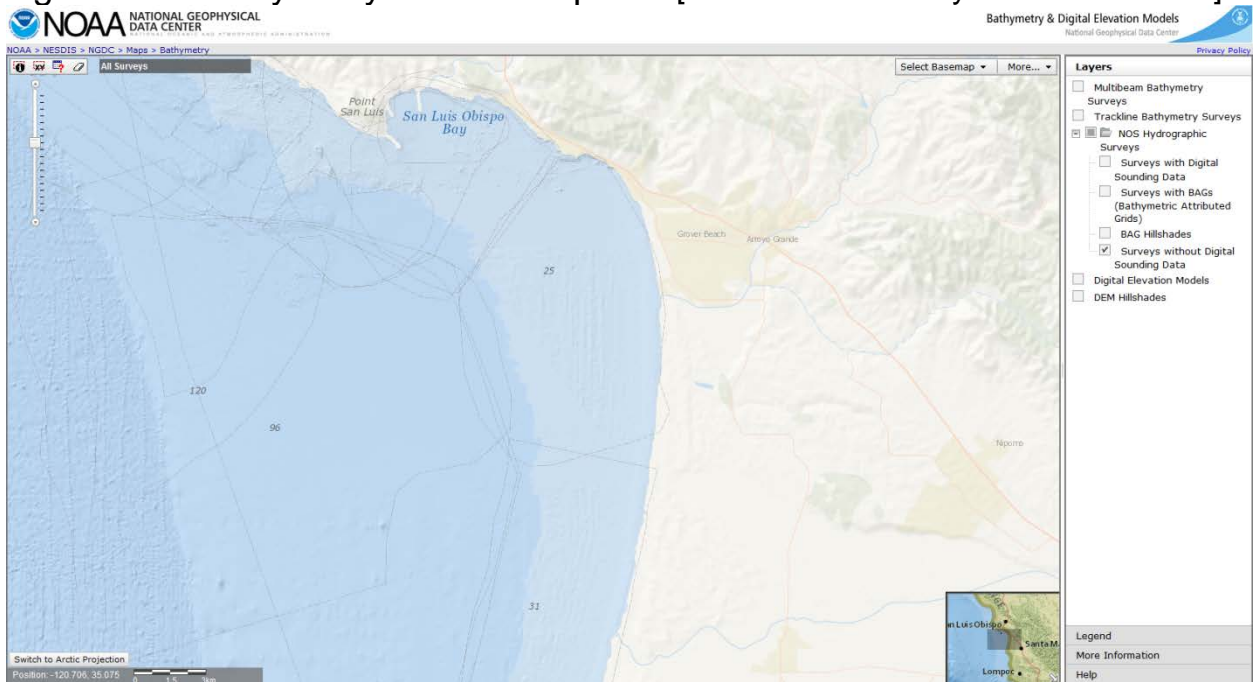
























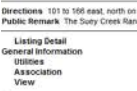




Figure 3 Listing of example property for solar still site [Coldwell Banker Jan. 14, 2013]


Client Detail with Addl Pics Report

Listings as of 02/01/13 at 8:55am

Active 649412	Listing # 195302 County: San Luis Obispo	Suey Creek Rd Ripomo, CA 93454 Cross St Hwy 196	Map	Listing Price: \$2,750,000
	Prop Type Area	Lots and Land Ripomo	Prop Subtype(s) Sub-area	Map: 489_11
	APN DOMCDDMI	095-191-005 303203	Price/Acre Lot Sq Ft (approx) Lot Acres (approx)	Agri: 509/ah Trl: 99 \$2,500.00 47916000 ((DMAR)) 1100.000
				
				
				
				
				
				
				
				

Directions: 101 to 196 east, north on Suey Creek Road. CLA.
Public Remark: The Suey Creek Ranch is a classic California cattle ranch northeast of Santa Maria in SLO County. Rolling hills with oaks, beautiful but no improvements other than road culverts. Could be a wonderful cattle ranch. Once owned by Fess Parker.

Listing Detail	Other	Lot Characteristics	Creek/Stream, Other Agriculture
General Information	None	Wait List Type	Other
Utilities	Up		
Association	Ocean, Greenbelt, Panoramic, Wooded, Other		
View			

Presented By:  February 2013

Mary A Jacob
Lic: 01378751
Primary: 805-361-9442
Secondary: 805-361-9442
Other:
E-mail: maryajacob@realstate@yahoo.com
Web Page: http://www.YourCentralCoastRealtor.com

Coldwell Banker Premier Real Estate
Lic: 01020590
2542 Professional Pkwy
Santa Maria Circuit, CA 93455
805-934-1000
Fax: 805-934-1190
See our listings online:
http://www.cbpremieronline.com

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U.S. Patent 6,919,045

Figure 4 Example of a Simple Solar Still

How a simple solar still works

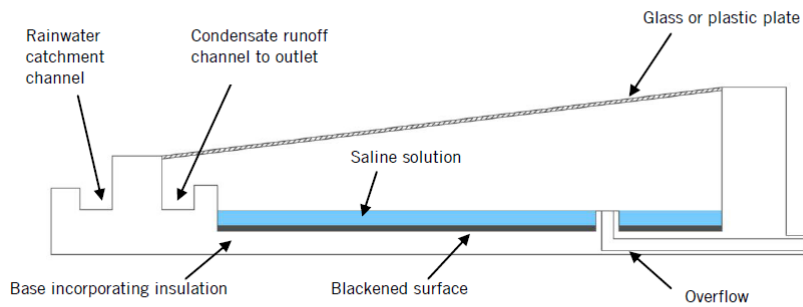


Figure 1: Shows a single-basin still. Illustration: Martin Bounds.

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Patron HRH The Prince of Wales, KG, KT, GCB



Figure 5 Seitch Home Made Solar Water Distiller



Figure 6 USA Insolation Map – Annual Average kWh/m²/day [National Renewable Energy Laboratory]

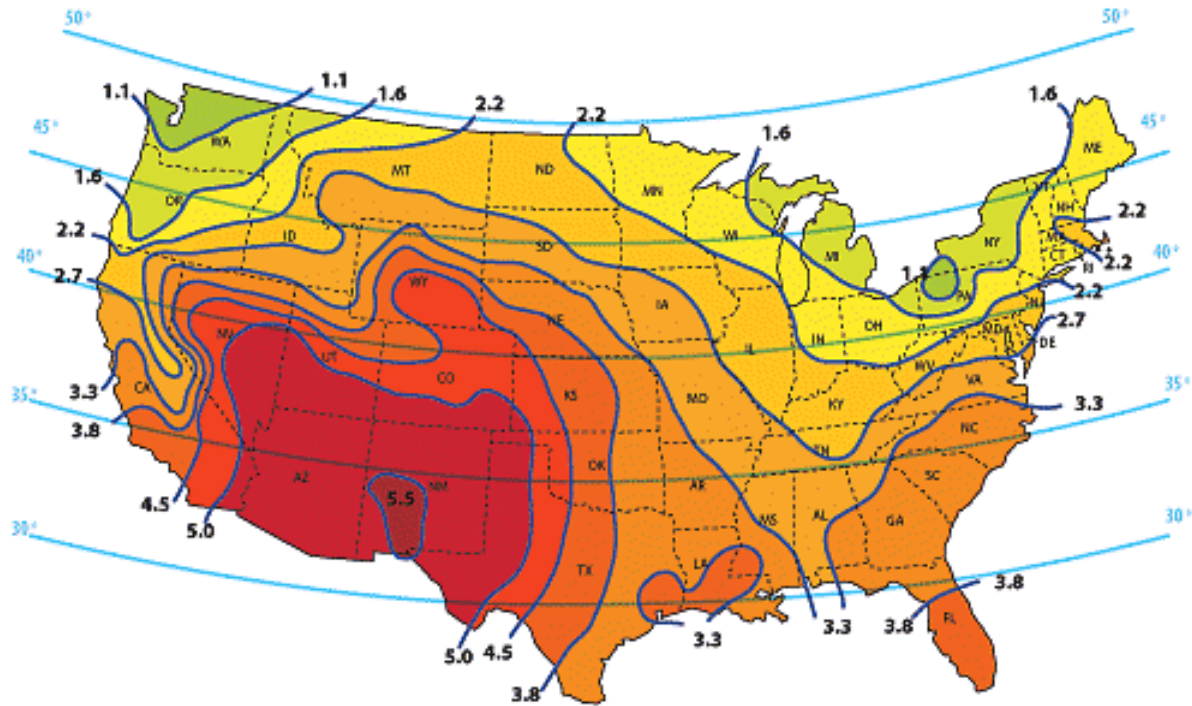


Table 1 Estimated Costs for the Alternatives

Sea Water Desalination Scenarios																	
Case	Source	Site	Rate in	FW rate out	Efficiency	Land	Wells	PL length	Outfalls	Plant Capital	Plant Capital	Land	Pipeline	Outfall	Well	Total Capital	O&M costs
			Rate AF/Y			500		\$k/mile				\$k/acre		\$k			
			AF/Y	AF/Y		acres	miles			\$/AFY	\$M	\$M	\$M	\$M	\$M	\$M	\$/AF
19A-SEA	Seawater & P 66 cooling water	Boyle Fig. A-1, Site 2	1,791	1,000	56%	20	4	5.5	0.2	16,000	16	0.1	8	1	2	27	1,000
19A-SEA	Seawater & P 66 cooling water	Boyle Fig. A-1, Site 2	5,769	3,000	52%	20	12	5.5	0.2	16,000	48	0.1	8	1	5	62	1,000
19A-SEA	Seawater & P 66 cooling water	Boyle Fig. A-1, Site 2	12,157	6,200	51%	20	25	5.5	0.2	16,000	99	0.1	8	1	10	119	1,000
19B-SEA	Seawater	Boyle Fig. A-1, Site 3	2,000	1,000	50%	20	5	6.5	1	16,000	16	0.1	10	5	2	33	1,000
19B-SEA	Seawater	Boyle Fig. A-1, Site 3	6,000	3,000	50%	20	13	6.5	1	16,000	48	0.1	10	5	5	68	1,000
19B-SEA	Seawater	Boyle Fig. A-1, Site 3	12,400	6,200	50%	20	25	6.5	1	16,000	99	0.1	10	5	10	124	1,000
19C-SEA	Brackish water	Boyle Fig. A-1, Site 3	1,176	1,000	85%	20	3	6.5	1	14,000	14	0.1	10	5	1	30	800
19C-SEA	Brackish water	Boyle Fig. A-1, Site 3	3,529	3,000	85%	20	8	6.5	1	14,000	42	0.1	10	5	3	60	800
19C-SEA	Brackish water	Boyle Fig. A-1, Site 3	7,294	6,200	85%	20	15	6.5	1	14,000	87	0.1	10	5	6	108	800
20A-SEA	Solar distillation inland	Suey Road, eg.	1,667	1,000	60%	4,000	4	28	1	10,000	10	10.0	42	5	2	69	400
20A-SEA	Solar distillation inland	Suey Road, eg.	5,000	3,000	60%	4,000	11	28	1	10,000	30	10.0	42	5	4	91	400
20A-SEA	Solar distillation inland	Suey Road, eg.	10,333	6,200	60%	4,000	21	28	1	10,000	62	10.0	42	5	8	127	400
20B-SEA	Solar distillation coastal	South of Dunes SP	1,667	1,000	60%	4,000	4	9	1	10,000	10	10.0	14	5	2	40	400
20B-SEA	Solar distillation coastal	South of Dunes SP	5,000	3,000	60%	4,000	11	9	1	10,000	30	10.0	14	5	4	63	400
20B-SEA	Solar distillation coastal	South of Dunes SP	10,333	6,200	60%	4,000	21	9	1	10,000	62	10.0	14	5	8	99	400

Section IV
RANKING MATRIX

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RANKING MATRIX

Over a period of several months, the SWAEC developed the following matrix which records the scores assigned for 18 evaluation criteria to each of the supplemental water alternatives. The SWAEC developed and refined a scoring rubric, which follows the matrix.

The summary matrix in the Executive Summary provides a graphical representation of the scores for each of the three major evaluation criteria categories: supply, cost, and feasibility.

FINAL - SUPPLEMENTAL WATER ALTERNATIVES EVALUATION COMMITTEE RANKING MATRIX - FINAL

2/25/2013

SHOW RANKINGS

MAJOR ALTERNATIVE CATEGORIES	ALTERNATIVES	SUPPLY CRITERIA AND WEIGHTING										COST CRITERIA AND WEIGHTING			FEASIBILITY CRITERIA AND WEIGHTING								RAW SCORE	WEIGHTED FINAL SCORE	RANK			
		SUPPLY POTENTIAL			CRITICAL MILESTONES FOR DELIVERY			COURT ORDER (Part 1)		RELI-ABILITY	WEIGHTED AVERAGE SUPPLY SCORE	CAPITAL	O&M	WEIGHTED AVERAGE COST SCORE	COURT ORDER (Part 2) METHOD	PHASING	QUALITY		FEAS-IBILITY	SUSTAIN-ABILITY	PUBLIC SUPPORT	WEIGHTED AVG FEAS-IBILITY SCORE						
		1,000 AFY	3,000 AFY	6,200 AFY	1,000 BY 2015	3,000 BY 2020	6,200 BY 2030	QUANTITY	SOURCE								RAW	FINISHED										
		3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	3.70%	33.33%	16.67%	16.67%	33.33%	4.76%	4.76%	4.76%	4.76%	4.76%	4.76%	4.76%	33.33%				100.0%		
SW State Water Project	A 01A-SW	Acquire Unused Table A Amount from SLOCCFWCD		10	10	10	1	1	10	10	10	2	2.37	1	3	0.67	5	10	2	10	1	10	1	1.86	107	4.89	15	
	B 01B-SW	Acquire Excess Table A Allocation identified by CCWA-SLOCCFWCD & Buy-into CCWA Pipeline		10	10	1	1	10	1	10	10	2	2.04	2	2	0.67	5	10	10	10	2	10	1	2.29	107	4.99	14	
	C 02-SW	Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline		10	3	1	10	1	1	1	10	2	1.44	8	1	1.50	5	1	10	10	3	10	1	1.90	88	4.85	16	
C Demand Management / Conservation	D 04-C	Conservation Programs (Current and Future)		5	1	1	2	1	1	1	1	10	0.85	9	9	3.00	5	1	10	10	10	10	10	2.67	97	6.52	3	
AIR Agricultural and Industrial Reuse	E 06-AIR	Agricultural Water Reuse		3	1	1	1	1	1	1	1	5	0.56	1	1	0.33	5	1	1	10	3	7	5	1.52	49	2.41	19	
	F 07-AIR	Phillips 66 Refinery Process Water Reuse		1	1	1	1	1	1	1	10	8	0.93	7	7	2.33	5	1	5	10	8	10	10	2.33	88	5.59	11	
	G 09-AIR	PXP Arroyo Grande Production Wastewater Reuse		9	1	1	10	1	1	1	10	8	1.56	9	1	1.67	5	1	10	10	7	5	3	1.95	93	5.17	13	
RWI Regional Waterline Intertie Projects	H 10A-RWI	Santa Maria Intertie - Phase 1		10	10	10	10	10	10	10	10	9	3.30	7	3	1.67	10	8	9	7	10	5	5	2.57	153	7.53	2	
	I 10B-RWI	Santa Maria Intertie - Full		10	10	10	10	10	10	10	10	9	3.30	8	4	2.00	10	8	9	7	10	5	5	2.57	155	7.87	1	
	J 10C-RWI	Oceano Intertie		5	2	1	1	1	1	1	10	5	1.00	3	4	1.17	5	3	9	7	5	4	4	1.76	71	3.93	17	
	K 10D-RWI	Nacimiento Water Project Intertie		10	7	1	1	1	1	1	10	9	1.52	1	2	0.50	5	6	2	8	2	8	1	1.52	76	3.54	18	
RWW Recycled Wastewater Supplies	L 11-RWW	Acquire Wastewater Supply from South SLO County Sanitation District		10	7	1	1	1	1	10	10	10	1.89	6	5	1.83	5	5	5	9	7	8	5	2.10	106	5.82	9	
	M 12-RWW	Acquire Wastewater Supply from Pismo Beach		10	5	1	1	1	1	1	10	10	1.48	6	5	1.83	5	5	5	9	7	8	5	2.10	95	5.41	12	
LG Local Groundwater	N 13-LG	Local Shallow Aquifer (Basin-wide Aquifer Study and Modeling in SLO and SB Counties Required)		10	5	1	10	1	1	1	1	5	1.30	10	10	3.33	1	1	7	5	5	5	8	1.52	87	6.15	6	
	O 14-LG	Dana Wells		1	1	1	1	1	1	1	1	3	0.41	1	1	0.33	1	1	5	5	9	5	8	1.62	47	2.36	20	
SFW Surface Water	P 16-SFW	Oso Flaco Lake		1	1	1	1	1	1	1	1	3	0.41	1	1	0.33	1	2	1	9	1	3	3	0.95	33	1.69	21	
SEA Seawater / Brackish / Other Desalination	Q 19A-SEA	Seawater Desalination - P66 Outfall		10	10	10	1	1	10	10	10	10	2.67	4	5	1.50	1	10	1	10	3	7	5	1.76	118	5.93	8	
	R 19B-SEA	Seawater Desalination - New Outfall		10	10	10	1	1	10	10	10	10	2.67	3	5	1.33	1	10	1	10	3	7	5	1.76	117	5.76	10	
	S 19C-SEA	Brackish Water Desalination		10	10	10	1	1	10	10	10	10	2.67	4	7	1.83	1	10	3	10	3	9	5	1.95	124	6.45	4	
	T 20A-SEA	Solar Distillation - Inland (Pilot Project Required for Proof of Concept)		10	10	10	1	1	10	10	10	10	10	2.67	2	8	1.67	1	7	3	10	2	6	5	1.62	116	5.95	7
	U 20B-SEA	Solar Distillation - Coastal (Pilot Project Required for Proof of Concept)		10	10	10	1	1	10	10	10	10	10	2.67	4	8	2.00	1	7	3	10	2	6	5	1.62	118	6.29	5
REMOVED FROM CONSIDERATION				SUPPLY STATISTICS										COST STATISTICS				FEASIBILITY STATISTICS										
SW State Water Project	03-SW	Reactivate Desal Plant in SB / Exchange for SWP Supplies -NOT FEASIBLE PER CITY OF S.B. Graywater Programs - ALTERNATIVE		HIGHEST SCORE										3.30	HIGHEST SCORE				3.33	HIGHEST SCORE								2.67
C Demand Management / Conservation	05-C	ADDRESSSED IN 04-C AS AN ELEMENT OF CONSERVATION		LOWEST SCORE										0.41	LOWEST SCORE				0.33	LOWEST SCORE								0.95
AIR Agricultural and Industrial Reuse	08-AIR	Phillips 66 Refinery Thermal Waste Recapture - NOT FEASIBLE PER P66		AVERAGE SCORE										1.79	AVERAGE SCORE				1.50	AVERAGE SCORE								1.90
LG Local Groundwater	15-LG	Riverside Wells - NOT FEASIBLE PER LEGAL OPINION		MEDIAN SCORE										1.56	MEDIAN SCORE				1.67	MEDIAN SCORE								1.86
SFW Surface Water	17-SFW	Santa Maria River - NOT FEASIBLE PER LEGAL OPINION		TOP QUARTILE >=										2.57	TOP QUARTILE >=				2.58	TOP QUARTILE >=								2.24
	18-SFW	Lopez Reservoir ALTERNATIVE ADDRESSSED IN RWW Enhanced Reverse Osmosis (VSEF) Circutt Oil Fields - NOT APPROPRIATE FOR POTABLE USE		3RD QUARTILE >=										1.85	3RD QUARTILE >=				1.83	3RD QUARTILE >=								1.81
SEA Seawater / Brackish / Other Desalination	21-SEA	Liquid-Liquid Extraction of Brine		2ND QUARTILE >=										1.13	2ND QUARTILE >=				1.08	2ND QUARTILE >=								1.38
	22-SEA	EVOLVING TECHNOLOGY NOT IN USE		BOTTOM QUARTILE >=										0.41	BOTTOM QUARTILE >=				0.33	BOTTOM QUARTILE >=								0.95

FINAL - SWAEC SCORING RUBRIC

2/25/2013

SCORING CATEGORIES	POINT ASSIGNMENT		
	1-3	4-7	8-10
Supply Potential: 1000 AFY	Alternative can deliver up to 350 AFY.	Alternative can deliver 350 to 750 AFY.	Alternative can deliver 750 to 1000 AFY.
Supply Potential: 3000 AFY	Alternative can deliver up to 1050 AFY.	Alternative can deliver 1050 to 2250 AFY.	Alternative can deliver 2250 to 3000 AFY.
Supply Potential: 6200 AFY	Alternative can deliver up to 2170 AFY.	Alternative can deliver 2170 to 4650 AFY.	Alternative can deliver 4650 to 6200 AFY.
Cost Considerations: Capital	Capital Cost Scoring Protocol: 1. Approximate total capital cost to deliver the alternative's max design flow up to 3,000 AFY. 2. Approximate unit capital cost (\$/AFY) by dividing capital cost by the max annual design flow. 3. Rank all alternatives by the unit capital cost. 4. Assign an integer point score (1-10) to each alternative based on its rank. 5. Assign 1 point when capital costs can not be approximated.		
Cost Considerations: Operation & Maintenance	O&M Cost Scoring Protocol: 1. Approximate unit O&M cost (\$/AFY) to deliver alternative's max design flow up to 3,000 AFY. 2. Rank all alternatives by the unit O&M cost. 3. Assign an integer point score (1-10) to each alternative based on its rank. 4. Assign 1 point to when O&M costs can not be approximated.		
Court Compliance: Method	1 Point - Does not import water via connection to the City of Santa Maria.	5 Points - Consistent with intent and likely to receive support from stipulating parties.	10 Points - Imports water via connection to the City of Santa Maria.
Court Compliance: Source	1 Point - Does not import water to the Mesa.	--	10 Points - Imports water to the Mesa.
Court Compliance: Quantity	1 Point - Does not deliver 2500 AFY.	--	10 Points - Delivers 2500 AFY.
Critical Milestones for Delivery: 1000 AFY by 2015	1 Point - Cannot deliver 1000 AFY by Jun 2015.	--	10 Points - Can deliver 1000 AFY by Jun 2015.
Critical Milestones for Delivery: 3000 AFY by 2020	1 Point - Cannot deliver 3000 AFY by 2020.	--	10 Points - Can deliver 3000 AFY by 2020.
Critical Milestones for Delivery: 6200 AFY by 2030	1 Point - Cannot ultimately deliver 6200 AFY by 2030.	--	10 Points - Can ultimately deliver 6200 AFY in future by 2030.

SCORING CATEGORIES	POINT ASSIGNMENT		
	1-3	4-7	8-10
Reliability	Considered not reliable (<80%) on a long-term basis based on historic performance or availability of "design flow". Projects may not be able to produce at least 80% of "design flow" or may not be able to do so reliably.	Considered moderately reliable (80%+) on a long-term basis based on historic performance or availability of "design flow" (ex. only 80% of "design flow" may be available at some times). Subject to seasonal limitations or fluctuations that would impact supplies available to District.	Considered highly reliable on a long-term basis based on historic performance or availability of 80% of "design flow". Not subject to seasonal limitations or fluctuations that would impact supplies available to District.
Feasibility	Permitting is expected to represent a significant hurdle - either adding five (5)+ years to project implementation for delivery of "design flow", or may be opposed by resource agencies or in conflict with their policies. May require significant contract negotiations with multiple outside entities that are expected to challenge the project. May have a "fatal flaw".	May require CEQA permitting and some contract negotiation with an outside entity, but negotiation is not expected to be challenged by outside entities or to take longer than 2-5 years.	Can be accomplished without new CEQA or additional "major" resource agency permits (CDFG, NOAA Fisheries, CA Coastal Commission, etc.) or can acquire permits/authorizations within 1-2 years. Can be accomplished with minor effort to update existing contracts or without any contract modifications requiring more than 1-2 years to finalize.
Phasing	Project either cannot be upgraded from 1000 to 3000 AFY or will require more than 100% of the initial (1000 AFY) capital cost.	Project can be upgraded from 1000 to 3000 AFY but will require 60 to 80% of the initial (1000 AFY) capital cost.	Project can be upgraded from 1000 to 3000 AFY without requiring more than 50% of the initial (1000 AFY) capital cost.
Water Quality: Raw	Requires "high" level of treatment - reverse osmosis or similar desalination - for intended use, or has significant health/safety concerns or risks.	Requires "moderate" level of treatment - basic filtration & disinfection - for intended use.	Requires minor chemical addition (disinfection) or no treatment for intended use.
Water Quality: Finished	Total dissolved solids (TDS) concentrations greater than 750 mg/L.	TDS concentrations of 500-750 mg/L.	TDS concentrations less than 500 mg/L.
Sustainability	Significant negative environmental impact due to energy usage, carbon footprint, greenhouse gas emissions, or other similar measures.	Some environmental impact with an increase in carbon footprint, greenhouse gas emissions, or other similar measures.	Positive environmental impact or no increase in carbon footprint, greenhouse gas emissions, or other similar measures.
Public Support	Opposition is anticipated	Indifferent	Positive

Section V
COST SCORING SUMMARY

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COST SCORING SUMMARY

The table on the next page summarizes the rough cost opinions that were developed by the SWAEC. Supporting information is provided in the Evaluation section of the report.

The SWAEC does not have the resources needed to produce detailed engineering cost estimates. The approximations presented in the table are offered simply for the purpose of ranking various alternatives. They are appropriate for the purpose, but are not intended to replace more detailed estimates needed for budgeting and project development.

Strategy for Cost Scoring Analysis:

In deciding how to score alternative costs, the Committee voted to evaluate capital costs and costs for facilities operation and maintenance (O&M) separately. O&M costs are also combined with purchased water cost into a single annual cost approximation.

Normally, when projects are evaluated for selection by industry, a detailed life-cycle cost analysis is prepared that recognizes differing project lifespans, component replacement requirements, investment strategies, etc. However, the SWAEC's tasking was not intended to begin a budgeting and project development process. Rather, it was to rank many alternatives under several different objective and subjective criteria in addition to cost, and to assist the NCSD Board of Directors in their decision process.

The Committee decided to evaluate capital and O&M costs individually rather than by a single life-cycle cost because, unlike industry, communities generally consider these costs individually.

In practice, project capital costs and annual O&M costs are decided under separate actions. Although an important consideration, ballots are not conducted based on a single life-cycle cost, but rather first for project construction, and later as recurring annual expense when rate adjustment is needed.

Methodology for Ranking and Scoring Individual Alternatives:

The Committee looked at three methods to rank and score alternatives.

Method 1: Rank alternatives by their total capital cost, and by their annual O&M cost with no consideration for the volume of water delivered. Using this method for capital cost would give smaller projects – which are usually less expensive and have smaller supply potential – much higher scores. More expensive larger projects with greater supply potential would usually receive the lower scores. For O&M cost, on average, the opposite is true since economies of scale are more likely found in larger projects.

Method 2 (Selected): Rank and score alternatives by reducing their initial capital cost to a cost per acre-foot per year (AFY) by dividing the total capital cost by the annual

volume of water they are expected to deliver. Since O&M costs are already displayed on an annual basis, no further calculation of O&M cost is needed.

This method does not introduce a factor to compensate for differing benefits of one alternative over another. However it is the simplest to calculate and understand, and tends to give smaller scope alternatives slightly higher scores. Small alternatives can be combined to increase water delivery, so giving them some extra scoring advantage was considered an attribute by the Committee.

Method 3: For both capital cost and O&M cost, this method performs a cost-benefit analysis to establish a common basis for ranking and scoring alternatives. Capital and O&M costs are unitized in dollars per AFY. Benefits arise from both delivered volume (design flow), and the size of the reservoir (supply potential) - larger reservoirs are more drought tolerant, increase reliability, and reduce flow variability.

(As an analogy, the size of your water glass would equate to “supply potential”, while the size of your straw would equate to “design flow”.)

Both capital and O&M costs are divided by a ratio of supply potential to design flow where the maximum design flow is 3,000 AFY, and the maximum supply potential is 6,200 AFY as prescribed in the SWAEC Bylaws.

This approach allows ranking and scoring to acknowledge the greater benefits of a larger supply potential. For example, if two alternatives have the identical capital costs per AFY, a decision maker would prefer to build to the larger reservoir, so the alternative with the larger reservoir would be ranked higher, and get a higher score.

In the end, the Committee decided that there were ample supply criteria already being considered in the full analysis, so adding a supply potential component to cost scoring was unnecessary.

FINAL - COST SUMMARY FOR SWAEC RANKING MATRIX

2/25/2013

ALTERNATIVES DESIGN FLOW: 3,000 AFY OR MORE	COMMENTS	CAPITAL COST (MILLIONS)	O&M COST (\$/AF)	DESIGN FLOW (AFY)	SUPPLY POTENTIAL (AFY)	CAPITAL COST PER ACRE-FOOT PER YEAR (1,000s \$/AFY)	UNIT CAPITAL COST SCORE BY RANK (1-10)	UNIT CAPITAL COST SCORE BY RANK (ROUNDED)	O&M COST PER ACRE-FOOT PER YEAR (100s \$/AFY)	UNIT O&M COST SCORE BY RANK (1-10)	UNIT O&M COST SCORE by rank (ROUNDED)
A 01A-SW Acquire Unused Table A Amount from SLOCFCWCD		300	1,800	3000	6200	100.0	0.6	1	18.0	3.3	3
B 01B-SW Acquire Excess Table A Allocation identified by CCWA-SLOCFCWCD & Buy-into CCWA Pipeline		120	2,500	3000	3300	40.0	1.7	2	25.0	1.7	2
I 10B-RWI Santa Maria Intertie - Full	Capital cost is from 2012 Assessment Engineer's Report and includes contingencies. O&M cost based on Fee Schedule for FY 2014 +\$94/AF District O&M costs.	30	1,734	3000	6200	10.0	8.3	8	17.3	3.9	4
Q 19A-SEA Seawater Desalination - P66 Outfall	Capital cost does not include permitting or cost escalation due to 10+ years of permitting anticipated	62	1,000	3000	6200	20.7	3.9	4	10.0	5.0	5
R 19B-SEA Seawater Desalination - New Outfall	Capital cost does not include cost escalation due to 10+ years of permitting anticipated	68	1,000	3000	6200	22.7	3.3	3	10.0	5.0	5
S 19C-SEA Brackish Water Desalination	Capital cost does not include permitting or cost escalation due to 10+ years of permitting anticipated	60	800	3000	6200	20.0	4.4	4	8.0	7.2	7
T 20A-SEA Solar Distillation - Inland (Pilot Project Required for Proof of Concept)	Capital cost does not include permitting or cost escalation due to 10+ years of permitting anticipated	90	400	3000	6200	30.0	2.2	2	4.0	8.3	8
U 20B-SEA Solar Distillation - Coastal (Pilot Project Required for Proof of Concept)	Capital cost does not include permitting or cost escalation due to 10+ years of permitting anticipated	60	400	3000	6200	20.0	4.4	4	4.0	8.3	8

ALTERNATIVES DESIGN FLOW: LESS THAN 3,000 AFY	COMMENTS	CAPITAL COST (MILLIONS)	O&M COST (\$/AF)	DESIGN FLOW (AFY)	SUPPLY POTENTIAL (AFY)	UNIT CAPITAL COST (1,000s \$/AFY)	UNIT CAPITAL COST SCORE BY RANK (1-10)	UNIT CAPITAL COST SCORE BY RANK (ROUNDED)	O&M COST (100s \$/AFY)	O&M COST SCORE BY RANK (1-10)	O&M COST SCORE (ROUNDED)
C 02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline		7	5,000	600	600	11.7	7.8	8	50.0	1.1	1
D 04-C Conservation Programs (Current and Future)		1	210	500	500	2.0	9.4	9	2.1	9.4	9
E 06-AIR Agricultural Water Reuse	Score of 1 to be assigned to both categories. Insufficient information available about tailwater sources and recover and recycling opportunities							1			1
F 07-AIR Phillips 66 Refinery Process Water Reuse		4	800	270	270	14.8	6.7	7	8.0	7.2	7
G 09-AIR PXP Arroyo Grande Production Wastewater Reuse		8	8,400	940	940	8.5	8.9	9	84.0	0.6	1
H 10A-RWI Santa Maria Intertie - Phase 1	O&M Cost based on Fee Schedule for FY 2014 + \$180/AF for District O&M costs assuming 1000 AF delivery. City of Santa Maria is evaluating whether Phase I project could deliver 1000 AFY. Escalation will occur per contract but may be similar to cost escalation for power, chemicals, O&M, etc., in other alternatives.	13	1,820	1000	6200	13.0	7.2	7	18.2	2.8	3
J 10C-RWI Oceano Intertie	O&M Cost based on \$1500 Minimum Cost (T. Geaslen, SWAEC Mtg 11/25/13)+ Assumed 10% Markup	17	1,650	700	700	24.3	2.8	3	16.5	4.4	4
K 10D-RWI Nacimiento Water Project Intertie		95	2,500	2148	2148	44.2	1.1	1	25.0	1.7	2
L 11-RWW Acquire Wastewater Supply from South SLO County Sanitation District	Capital cost assumes reverse osmosis is applied for salt removal	34	1,000	2250	2250	15.1	6.1	6	10.0	5.0	5
M 12-RWW Acquire Wastewater Supply from Pismo Beach	Capital cost assumes reverse osmosis is applied for salt removal	24	1,000	1450	1450	16.6	5.6	6	10.0	5.0	5
N 13-LG Local Shallow Aquifer (Basin-wide Aquifer Study and Modeling in SLO and SB Counties Required)	Insufficient information available. Requires basin-wide aquifer study and modeling	2	200	1500	1500	1.3	10.0	10	2.0	10.0	10
O 14-LG Dana Wells	Score of 1 to be assigned to both categories							1			1
P 16-SFW Oso Flaco Lake	Score of 1 to be assigned to both categories							1			1

EXHIBIT 1

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APPENDIX A
QUALIFICATIONS OF
COMMITTEE MEMBERS

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Supplemental Water Alternatives Evaluation Committee

Member Application

(Approved by NCS D BOD, July 11, 2012)
(electronic (MS Word) version available)

Name Craig Armstrong	
Contact e-mail [REDACTED] Phone [REDACTED]	
Desired Position (May Check More Than One) <input type="checkbox"/> Engineering/Water Resources Management <input checked="" type="checkbox"/> Finance <input type="checkbox"/> Environmental <input type="checkbox"/> Citizen-at-Large	
Qualifications (Fill in response in this column.)	
Education •College(s) •Degree(s), Year(s) •Major/minor/specialty	University of Southern California Bachelor of Science 1966 Accounting
Additional training/certifications	Certified Public Accountant (inactive) in California
Applicable Experience •Employment	Vice President in corporate Finance at Hilton Hotels Corporation (now Hilton Worldwide) 1972—2009 Captain US Army 1967-1969 Auditor with national CPA firm 1966, 1970-1972

<ul style="list-style-type: none"> • Specific to potential alternatives • Alternatives analysis & evaluation • Advisory committee participation 	<p>Position in Hilton Finance included (1) corporate accounting, (2) profit and loss budgeting, (3) balance sheet forecasting, including cash flow projections, (4) project management, (5) capital budget tracking, (6) feasibility analysis and evaluation of multi-million dollar capital projects, (7) major debt financings including fixed/variable rate bond issues.</p> <p>Role at Hilton included reviewing and analyzing options for best uses of capital funds. Feasibility analyses included long range P&L forecasts, financing options, alternative deal structures, etc.</p> <p>While at Hilton, participated in numerous committees/working groups tasked with various operating and functional objectives.</p>
<p>Familiarity with government policies, regulations, and approval processes</p>	<p>No specific experience with government policies, regulations, etc. related to community service districts. However, Hilton has formal policies and procedures covering operations and approvals for capital expenditures, so have experience working within a hierarchy of rules and regulations.</p>
<p>Additional Information (Attach additional materials as needed)</p>	<p>Have been interested in water issues for a number of years so have stayed fairly current with ongoing water availability challenges and possible solutions.</p>

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Supplemental Water Alternatives Evaluation Committee

Member Application

(Approved by NCS D BOD, July 11, 2012)
 (electronic (MS Word) version available)

Name Dan R. Garson	
Contact	
e-mail dgarson94041@yahoo.com Phone (805) 310-2498	
Desired Position (May Check More Than One)	
<input type="checkbox"/> Engineering/Water Resources Management <input type="checkbox"/> Finance <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Citizen-at-Large	
Qualifications (Fill in response in this column.)	
Education •College(s) •Degree(s), Year(s) •Major/minor/specialty	Michigan State University BA 1979 AA 1981 Political Science, Turfgrass Management
Additional training/certifications	Experienced and respected residential and land development project manager offering progressive and diversified expertise in infrastructure, entitlement, due diligence, budgeting, and construction management for complex, multi-phase land development projects in domestic and international locales. Exceptional communication and organizational skills credited with removing barriers that impede progress.
Applicable Experience •Employment	Woodlands Ventures, Project Manager responsible for all project infrastructure development including water and wastewater. President – Board of Directors – Woodlands Mutual Water Co

<ul style="list-style-type: none"> • Specific to potential alternatives • Alternatives analysis & evaluation • Advisory committee participation 	<p>I have spent a significant amount of time working with the Woodlands community and NCS D to address the Supplemental Water issue.</p> <p>Was a member of the committee working with Katcho to address water rates in communities on the Central Coast</p> <p>President – Board of Directors – Woodlands Master Assoc.</p> <p>President – Board of Directors – Rice Ranch HOA</p> <p>Vice President – Board of Directors – Central Coast HOA</p> <p>Vice President – Board of Directors – Monarch Ridge HOA</p> <p>Vice President – Board of Directors – Mesa Verde HOA</p>
<p>Familiarity with government policies, regulations, and approval processes</p>	<p>I routinely work with San Luis County staff (Public Works, Planning, etc) in addressing the policies, regulation, codes, and approval processes for the Woodlands Development. Additionally, I work with Santa Barbara County staff on a similar level as it relates to the Rice Ranch Development.</p>
<p>Additional Information (Attach additional materials as needed)</p>	

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**Supplemental Water Alternatives Evaluation Committee
Member Application**

(Approved by NCSD BOD, July 11, 2012)

Name: Dennis J. Graue, Ph.D.	
Contact [REDACTED] [REDACTED]	
Desired Position (May Check More Than One) <input checked="" type="checkbox"/> Engineering/Water Resources Management <input type="checkbox"/> Finance <input type="checkbox"/> Environmental <input type="checkbox"/> Citizen-at-Large	
Qualifications (Fill in response in this column.)	
Education <ul style="list-style-type: none"> • College(s) • Degree(s), Year(s) • Major/minor/specialty 	University of Colorado; BS (with highest honors), 1961, Chemical Engineering California Institute of Technology; MS, 1962, Chemical Engineering California Institute of Technology; Ph.D., 1965, Chemical Engineering; for this degree I carried out research on Thermodynamic and Transport Properties of Binary Hydrocarbon Mixtures
Additional training/certifications	Numerous courses in reservoir studies, formation evaluation, reservoir simulation, interpretation of well tests, economic evaluation, etc. Graduate studies included analysis of flow through porous media and economic analysis.
Applicable Experience <ul style="list-style-type: none"> • Employment For details, please see attached resume <ul style="list-style-type: none"> • Specific to potential alternatives 	47 years of work in analyzing and modeling porous underground reservoirs 8 years of research on porous reservoir performance, 15 years in operations on porous underground reservoirs in two oil companies – Chevron and BreitBurn

<ul style="list-style-type: none"> • Alternatives analysis & evaluation • Advisory committee participation 	<p>Energy 24 years in consultancy for many private and government companies worldwide Managed a group of 18 engineers and geoscientists on contract to US DOE for 10 years to analyze performance of Elk Hills Oil Field on site Every reservoir study requires analysis of alternatives and I have done scores of such studies Have knowledge of surface chemical and physical processes, including pipelining, reverse osmosis, chemical processing, etc. Built and used a computer model of pipeline flow of temperature, pressure and composition of three phase flow.</p>
<p>Familiarity with government policies, regulations, and approval processes</p>	<p>Managed a group of 18 engineers and geoscientists on contract to US DOE for 10 years to analyze performance of Elk Hills Oil Field on site Won many contracts for work for US federal or state government bodies, such as Texas Bureau of Economic Development, Gas Research Institute, DOE, etc.</p>
<p>Additional Information (Attach additional materials as needed)</p>	<p>Details are in attached resume. More available on request.</p>

DENNIS J. GRAUE, Ph.D.

◇ EXPERTISE

My main concentration has been reservoir engineering, reservoir simulation, project management and enhanced oil recovery. I worked many years in enhanced oil recovery with almost every method within that technology. I managed or performed extensive projects in the laboratory, in the field, in sweet and sour gas plants, and in integrated reservoir engineering studies.

◇ EMPLOYMENT

2010 – Present Consulting, Nipomo, California
Consultant for oil and gas field development and reservoir engineering

2000 – 2010 BreitBurn Energy Company LLC, Los Angeles, California
Manager, Exploitation

Managed the development group of reservoir engineers and geologists and carried out studies of the Company's oil and gas reservoirs to optimize their efficient exploitation. At times managed reserve reporting of the Company's properties.

1995 - 2000 NITEC, LLC, Denver, Colorado
Principal Member, 1995-2000

Consulted; managed and participated in integrated studies of oil and gas fields, principally in North and South America. Worked on and gave witness on court cases in oil and gas production.

1978 - 1995 Scientific Software - Intercomp Inc., Denver, Colorado
Senior Vice President, 1988-1995

Managed Exploration and Production Consulting Division worldwide. Responsible for quality, growth, profit & loss, personnel, technology, etc. for offices in Denver, Houston, Calgary and Bakersfield; representatives in Argentina, Ecuador and India. Managed numerous major consulting projects; consulted in engineering studies from primary oil and gas recovery, gas storage to enhanced recovery processes. Worked on and gave witness on court cases in oil and gas production and gas storage.

Senior Vice President, Exploration and Production Consulting Division, 1986-1988

Responsible for business development, emphasis on US, China and India. Visited clients and developed sales of services and software.

Division Vice President, Exploration and Production Consulting Division, 1984-1986

Responsible for profit and loss and sales of the Division of SSI in 5 offices worldwide: Denver, Bakersfield, Calgary, London and Houston. Supervised application consulting in oil and gas fields and development of related software. Consulted on gas storage court case.

Division Vice President, Exploration and Production Software Products Division, 1983-1984

Responsible for profit and loss of the Software Products Division of the combined company after Scientific Software Corp. and Intercomp Resource and Development Inc. merged in July 1983.

Vice President, Enhanced Oil Recovery, 1981-1983

Responsible for profit and loss and technical management of numerous projects in all types of enhanced oil recovery studies in all parts of the world. In particular, carried out many integrated CO₂ flooding studies for fields in the United States.

Manager, Enhanced Oil Recovery, 1978-1981

Founded the Enhanced Oil Recovery Department and was responsible for its profit and loss and sales. Managed or engineered numerous enhanced recovery studies in all parts of the world. Wrote the text and taught enhanced oil recovery courses for oil companies in North America and in other countries.

1962 - 1978 Chevron Oil Company

Senior Staff Reservoir Engineer, 1976-1978, Chevron USA, Denver, Colorado

Responsible for major reservoir engineering studies for West Texas and the Mid-continent. Most notable fields studied were SACROC Unit Texas CO₂ flood project, at the time the largest in the world, and Rangely, Colorado CO₂ flood project.

Senior Research Associate, 1973-1976, Chevron Oil Field Research Company, La Habra, CA

Managed research teams for enhanced oil recovery processes, including CO₂ Flooding, Polymer, Surfactant, Steam, In Situ Combustion, Alkali injection. Worked with field trial engineers in Chevron operating companies in the field implementation of these processes.

Senior Research Engineer, 1972-1973, Chevron Oil Field Research Company, La Habra, CA

Researched and modeled mathematically enhanced oil recovery processes, particularly CO₂ injection.

Gas Plant Engineer, 1971-1972, Chevron Canada, Edmonton, Alberta

Responsible for engineering in the sulfur plant during construction and startup of Kaybob South Plant 3. Designed, built and used a mathematical model of three phase gas gathering system for the very large gas condensate field in Kaybob South. Worked on field development of multiphase flow measurement systems for Kaybob South.

Reservoir Engineer, 1970-1971, Chevron Canada, Edmonton, Alberta

Carried out reservoir engineering and modeling studies of the major oil and gas fields in central and northern Alberta. Notable were Kaybob Beaverhill Lake Oil Field and Kaybob South Beaverhill Lake Gas Field.

Petroleum Engineer, 1969-1970, Chevron Canada, Red Deer, Alberta

Planned and executed well workovers and well drilling in central Alberta.

Research Engineer, 1965-1969, Chevron Oil Field Research Company, La Habra, CA

Researched enhanced oil recovery processes, principally including polymer, caustic and surfactant injection. Supervised small group of researchers.

Research Engineer, Summer 1962, Chevron Oil Field Research Company, La Habra, CA

Carried out research on enhanced oil recovery by CO₂ injection

1960-1961 E.I. du Pont de Nemours

Plant Technical Engineer, Summer 1961, Sabine River Works, Orange, Texas

Worked on the optimization of a plant making adipic acid (a nylon 66 intermediate) from cyclohexanol and cyclohexanone.

Research Engineer, 1960, Sabine River Works, Orange, Texas

Researched new methods to create nylon intermediates for nylon 6

◇ EDUCATION

- Ph.D. Chemical Engineering, 1965, California Institute of Technology
Topic: Thermodynamic and Transport Properties of Binary Hydrocarbon Mixtures
Advisor: Dr. Bruce H. Sage
- National Science Foundation Fellow 1961-1965
- M. S. Chemical Engineering, 1962, California Institute of Technology
- B. S. (Highest Honors) Chemical Engineering, 1961, University of Colorado

◇ PROFESSIONAL MEMBERSHIPS AND ACTIVITIES

- Society of Petroleum Engineers
- Tau Beta Pi Honor Society – Honor Junior
- Sigma Xi Honor Society
- Sigma Tau Honor Society
- Phi Lambda Upsilon Honor Society
- Alpha Chi Sigma
- Served on numerous committees in the SPE:
- Most notable: *Editor of Enhanced Oil Recovery Field Reports*, 1974-1976, JPT Special Series Committee, 1993-1996
- Distinguished Lecturer for the SPE on *Economics of Enhanced Oil Recovery*, 1983-1984.
- Taught *Enhanced Oil Recovery by CO₂ Flooding* numerous times for the SPE and companies in-house in both English and spanish
- Taught reservoir engineering and reservoir simulation courses numerous times in-house for companies in both English and spanish
- As adjunct professor taught *Enhanced Oil Recovery* at the University of Southern California, Spring 1976

◇ LANGUAGES

Fluent in Spanish and English

◇ PUBLICATIONS

- Graue, D.J. and W. N. Larson, "Field Case Study: Libertador Field, Ecuador", presented at LAPEC II, Caracas, Venezuela (1992)
- Graue, D.J., "Field Case Study: Ramos Field, Argentina", presented at LAPEC II, Caracas, Venezuela (1992)
- Graue, D.J. and M. Gorriti, "Field Case Study: Boomerang Hills Fields, Bolivia" presented at LAPEC II, Caracas, Venezuela (1992)
- Graue, D.J. and Scheig, G.L.; "The Economics of Enhanced Oil Recovery," presented at the Third ASEAN Council on Petroleum (ASCOPE) Conference & Exhibition, Kuala Lumpur, Malaysia (December 2-5, 1985).
- Breit, V.S. and Graue, D.J.; "Scaling of Flow Parameters for Miscible Gas Flood Simulation Studies," Second Joint Symposium-Enhanced Oil Recovery, Tulsa, Oklahoma (April 5-8, 1981).
- Graue, D.J. and Zana, E.N.; "Study of Possible CO₂ Flood in the Rangley Field, Colorado," *Journal of Petroleum Technology* (July 1981) , pp. 1312-1318
- Graue, D. J. and Whatley, W.F. "Reservoir Engineering Methods for Enhanced Oil Recovery Processes," Symposium on Assisted Oil Recovery, Lima, Peru (September 25, 1980)
- Graue, D. J. and McFarlane, R.C.; "Conduct and Analysis of Well Tests for Determination of Gas Reservoir Parameters," American Gas Associates/Stanford University Joint Symposium (February 16-17, 1979).
- Graue, D. J. and Blevins, T.R.; "SACROC Tertiary CO₂ Pilot Project," Fifth Symposium on Improved Methods of Oil Recovery, Tulsa, Oklahoma, Paper No. SPE 7090 (April 16-19, 1978)
- Graue, D. J. and Johnson, C.E., Jr.; "Field Trial of Caustic Flooding Process," *Journal of Petroleum Technology*, (December 5 1974) pp.1353-1358.
- Graue, D. J. and Filgate, R.A.; "A Study of Water Coning in the Kaybob South Beaverhill Lake Field," SPE 3623, 46th Annual Fall Meeting, New Orleans, LA (October 3-6, 1971).
- Graue, D. J.; "A Prediction Method for Fluids of Reduced Mobility," 43rd Annual Fall Meeting, Houston, Texas, Paper No. SPE 2257 (September 29-October 2, 1968).
- Graue, D. J. and Sage, B.H.; "Partial Volumetric Behavior in Binary Hydrocarbon Systems Propane and n-Decane System," *Journal of Chemical and Engineering Data*, Vol. 12, No.2 (January 1967) pp.49-59.
- Graue, D. J., Berry, V., and Sage, B.H., "Heat of Vaporization of Light Hydrocarbons," *Hydrocarbon Processing*, Vol. 45, No. 6, (June 1966) p. 191-194

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- Graue, D. J. and Sage, B.H.; "Diffusion Coefficients in Binary Hydrocarbon Liquids," 30th Midyear Meeting of American Petroleum Institute Division of Refining, Montreal, Quebec, Canada, (May 10, 1965).
 - Simon, R. and Graue, D. J.; "Generalized correlations for Predicting Solubility, Swelling and Viscosity Behavior of CO₂-Crude Oil Systems," *Journal of Petroleum Technology* (January, 1965) pp. 102-106
 - ◊ Patents
 - Graue, D. J., U.S. Serial No. 09/490,958, "Upgrading and Recovery of Heavy Crude Oils and Natural Bitumens by in Situ Hydrovisbreaking"


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Supplemental Water Alternatives Evaluation Committee

Member Application

(Approved by NCS D BOD, July 11, 2012)

(electronic (MS Word) version available)

Name Kathie Matsuyama	
Contact  ✓	
Desired Position (May Check More Than One) <input checked="" type="checkbox"/> Engineering/Water Resources Management <input checked="" type="checkbox"/> Finance <input checked="" type="checkbox"/> Environmental <input checked="" type="checkbox"/> Citizen-at-Large	
Qualifications (Fill in response in this column.)	
Education <ul style="list-style-type: none">• College(s) • Degree(s), Year(s) • Major/minor/specialty	<ul style="list-style-type: none">• University of California at Davis• Bachelor of Science• Environmental Planning & Management/Landscape Architecture
Additional training/certifications	<ul style="list-style-type: none">• State Of California Registered Landscape Architect #2277, 1984 To Present• University of California at Berkeley, Certificate in California Water Management and Ecosystem Restoration, 2007

<p>Applicable Experience</p> <ul style="list-style-type: none"> • Employment • Specific to potential alternatives • Alternatives analysis & evaluation 	<p><u>Employment</u></p> <p>2011-PRESENT CAPITAL CAMPAIGN AND FUNDRAISING CONSULTANT <i>5Cities Homeless Coalition</i> <i>Grover Beach, CA</i></p> <ul style="list-style-type: none"> • Completed an extensive Fund Development Feasibility Study in support of a capital campaign and annual operating funds for the 5Cities Homeless Coalition with a high probability of reaching a \$5 Million goal. • Authored “Capital Campaign Fund Development Feasibility Study for the South County Community Services Center – a project of the 5Cities Homeless Coalition” <p>2005-2008 WATERSHED AND NATURAL RESOURCES MANAGER <i>Guadalupe-Nipomo Dunes Center,</i> <i>Guadalupe, CA</i></p> <ul style="list-style-type: none"> • Administrator of the Guadalupe-Nipomo Dunes Collaborative; a partnership including the US Fish and Wildlife Service, CA Coastal Conservancy, State of California Parks Dept., County of Santa Barbara Parks Dept., private, and non-profit organizations restoring coastal dune habitats, recovering threatened and endangered species, and providing quality visitor experiences of a world class unique and fragile dunes ecosystem. • Directly responsible for administering \$2.12 Million in resources contracts. <p>2007-2008 ACTING EXECUTIVE DIRECTOR <i>Guadalupe-Nipomo Dunes Center,</i> <i>Guadalupe, CA</i></p> <ul style="list-style-type: none"> • Initiated negotiations for a 5 year, up to \$750,000, endowment from
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the Guadalupe Oil Spill Settlement Fund to the Dunes Center for general operation expenses.

- Obtained \$30,000 in grants to support overhaul of office computer infrastructure.

2004-2005 SENIOR PROJECT MANAGER
Land Conservancy of San Luis Obispo
County, San Luis Obispo, CA

- Developed grant proposals for Dunes Collaborative, state and federal grants to support Guadalupe-Nipomo Dunes projects and programs.
- Drafted the *Guadalupe-Nipomo Dunes Ecosystem Management Plan*.

1999-2004 WATERSHED PLANNER
Watershed and Coastal Resources
Division, County of Orange, Santa Ana, CA

- Coordinated regional assessment of watershed and coastal resources issues including water quality degradation, habitat restoration and re-creation, stewardship of resources, infrastructure protection, flood prevention and water conservation.
- Working closely with the US Army Corps of Engineers, managed stakeholder groups developing watershed plans for two 150 square mile watersheds. Stakeholders included 27 cities, other Orange County departments, LA County, resource and regulatory agencies, environmental groups, developers, water and sewer agencies and the public.
- Created cooperative funding agreements with 19 local, state, federal and non-governmental agencies/groups to insure equitable


<p>•Advisory committee participation</p>	<p>cost sharing of two watershed programs costing \$5.6 million.</p> <ul style="list-style-type: none"> • Met with local, State and federal officials and in Sacramento with legislators, to discuss financing, planning and implementation of watershed projects. <p>1988-1998 SENIOR LANDSCAPE ARCHITECT <i>Harbors, Beaches & Parks Division , County of Orange, Santa Ana, CA</i></p> <p><u>Advisory committee participation:</u></p> <ul style="list-style-type: none"> • Board of Directors, Coastal San Luis Resource Conservation District • Treasurer, Central Coast Resource Conservation & Development Council • Alternate, San Luis Obispo County Water Resources Advisory Committee • Campaign Treasurer for a County Board of Supervisors candidate • State of California Watershed Committee • Co-Chair, Guadalupe-Nipomo Dunes Collaborative. • Chairman, the Guadalupe-Nipomo Dunes Collaborative Restoration Task Force. • Co-chair, Orange County Task Force of the Southern California Wetlands Recovery Project an alliance of 19 federal, state and local officials • Chairman, Dana Point Harbor Water Quality Task Force working with the City of Dana Point Harbor, the County Health Care Agency, water and sewer agencies and public citizens on urban runoff, beach contamination, dredging, boat fuel and holding tank
--	---

	<ul style="list-style-type: none"> • contamination, sewer lines and future harbor projects • Staff to the Orange County Coastal Coalition, a coalition of cities, county government, regulatory and resource agencies, assemblymen, legislators, environmental groups and the public implementing a unified strategy to preserve, protect and enhance coastal watersheds and water resources • Board member of the State of California San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy. • City of Los Alamitos Parks and Recreation Commissioner. • Los Alamitos Armed Forces Reserve Center Restoration Advisory Board Committee Member including working with US Environmental Protection Agency. • President of the Rossmoor/Los Alamitos Area Sewer District Board of Directors (A Community Services District) and knowledgeable regarding Community Services District law.
<p>Familiarity with government policies, regulations, and approval processes</p>	<p>See the above. In my 30+ year career in County and State government as well as a Community Volunteer in technical capacities, I have become very familiar with government policies, regulations and approval processes.</p>

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Supplemental Water Alternatives Evaluation Committee Member Application

(Approved by NCSD BOD, July 11, 2012)
(electronic (MS Word) version available)

Name Robert S. Miller	
Contact 	
Desired Position (May Check More Than One) <input type="checkbox"/> Citizen at Large <input type="checkbox"/> Finance <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Engineering/Water Resources Management	
Qualifications (Fill in response in this column.)	
Education •College(s) •Degree(s), Year(s) •Major/minor/specialty	Cal Poly, San Luis Obispo BS in Civil Engineering (1994)
Additional training/certifications	California Professional Engineer in Civil Engineering RCE 57474 (1996)
Applicable Experience •Employment •Specific to potential alternatives •Alternatives analysis & evaluation •Advisory committee participation	Wallace Group – Principal in Charge of Water Resources, with 18 years of water resources experience General Manager – Woodlands Mutual Water Company since 2006 Chairperson, Nipomo Mesa Management Area Technical Group since 2008 District Engineer – Los Osos Community Services District Vice Chair Person, 2006 Technical Advisory Committee to San Luis Obispo County for the Los Osos Wastewater Project. The

	<p>final committee report included an extensive alternatives analysis with community input.</p> <p>Principal in Charge for comprehensive water master plans, including alternatives analysis, for Los Osos, Arroyo Grande, Pismo Beach, and others</p> <p>Project engineer for similar infrastructure projects throughout San Luis Obispo County, including pump stations, pipelines, and storage tanks</p>
<p>Familiarity with government policies, regulations, and approval processes</p>	<p>Well-versed in public financing and related processes, including serving as Assessment Engineer for projects of similar scope</p> <p>Familiar with CEQA processes, including public works projects within the Coastal Zone</p> <p>Routinely manages approval processes through the California Department of Public Health in accordance with adopted Water Works Standards</p> <p>18 years of experiencing delivering all phases of public works projects for Special Districts</p>
<p>Additional Information (Attach additional materials as needed)</p>	

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Supplemental Water Alternatives Evaluation Committee

Member Application

(Approved by NCS D BOD, July 11, 2012)
(electronic (MS Word) version available)

Name	Samuel Saltoun
Contact	[REDACTED]
e-mail	[REDACTED]
Phone	[REDACTED]
Desired Position (May Check More Than One)	
<input checked="" type="checkbox"/> Engineering/Water Resources Management <input type="checkbox"/> Finance <input type="checkbox"/> Environmental <input checked="" type="checkbox"/> Citizen-at-Large	
See Additional Information <i>(references)</i>	
Qualifications (Fill in response in this column.)	
Education	
• College(s)	1967 B.S. Civil Engineering, Clarkson College of Technology (later renamed Clarkson University)
• Degree(s), Year(s)	1974 M.Eng. Civil Engineering and Construction Management, Rensselaer Polytechnic Institute
• Major/minor/specialty	1998 – 2005 Graduate coursework under the GI Bill – University of California, San Diego, and George Mason University, Virginia
Additional training/certifications	
	1982 Professional Engineer, State of New York, License Number: 59209
	1974 – 1995 Warranted Contracting Officer – Department of Navy, Naval Facilities Engineering Command. Federal contracting authority for award of construction, architect-engineering (A-E) services, and Naval Construction Force procurements.
Applicable Experience	Employment:
• Employment	1966 – 1995 U.S. Navy, Civil Engineer Corps. Retired rank: Captain (O-6.) Positions held include Commanding Officer, Officer in Charge of Construction, Public Works Officer, Program Director, Executive Officer, Department Head, Company Commander.
• Specific to potential alternatives	1996 – 2001 Private practice engineering and management consultant – California
	1996 – 2001 Community action volunteer at local schools, in community organizations, and as a Home Owner's Association Board President, Eastlake Greens – California
	2004 – 2008 Science Instructor, George Mason University, Lifelong Learning Institute - Virginia

Samuel Saltoun (continued)

<p>• Alternatives analysis & evaluation</p> <p>• Advisory committee participation</p>	<p>Specific to Potential Alternatives:</p> <p>I directed public works operations, and supervised construction contract administration and oversight at Navy bases and major Naval industrial complexes world-wide. I also served with the Naval Construction Forces (Seabees), and commanded a Construction Battalion Center.</p> <p>My experience most applicable to supplemental water alternatives for Nipomo includes executive level responsibilities for:</p> <ul style="list-style-type: none"> • Management of multi-discipline engineering departments providing facilities planning and design services. This included preparation of technical studies, EIS submissions, drawings, specifications, and contract bidding documents either by in-house engineers, under supervised A-E contracts, or as a professional consultant. • Operation of potable water distribution systems supporting industrial and residential uses including reservoir and wellfield management, purification, desalination (cogeneration / MSF-vacuum distillation), pumping, tank storage, controls, metering, and compliance testing. • Construction, upgrade and maintenance of distribution piping systems including potable and non-potable water, steam, petroleum products, natural gas, and compressed air; collection systems for storm drainage, sanitary sewer, and wastewater treatment. <p>Alternatives analysis & evaluation / Advisory committee participation:</p> <p>Illustrative example: While stationed at Naval Air Warfare Center, China Lake, CA in the early 1980's, I was on the review team for development of the Coso Range geothermal field. Of the alternatives considered, construction of a geothermal steam power plant larger than that needed for Navy use could attract private investment. By creating a public-private partnership, a 270-MW facility was constructed, and is still in service.</p> <p>This endeavor had some parallels to a brackish water desalination alternative for Nipomo. In addition to the funding challenges, it involved processing a high mineral content water source, drilling extraction and reinjection wellfields, and permitting reviews by Federal and State agencies.</p>
<p>Familiarity with government policies, regulations, and approval processes</p>	<p>I have had long experience in working with complex government contracting and environmental regulations at Federal and State levels, which may translate well into California specific policies, regulations, and processes.</p>
<p>Additional Information (Attach additional materials as needed)</p>	<p>I have been a Nipomo Mesa Woodlands resident for about two years. I have studied our water issues and become well informed on the challenges we face. However, as a relatively new resident, my contribution may be greater as an engineer than as "Citizen-at Large". I am available to serve in either capacity.</p> <p>References provided separately.</p>

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Supplemental Water Alternatives Evaluation Committee

Member Application

(Approved by NCS D BOD, July 11, 2012)

(electronic (MS Word) version available)

Name Dave Watson	
Contact <div style="background-color: black; width: 100%; height: 15px; margin-top: 5px;"></div> <div style="background-color: black; width: 100%; height: 15px; margin-top: 5px;"></div>	
Desired Position (May Check More Than One) <input checked="" type="checkbox"/> Engineering/Water Resources Management <input checked="" type="checkbox"/> Finance <input checked="" type="checkbox"/> Environmental <input type="checkbox"/> Citizen-at-Large	
Qualifications (Fill in response in this column.)	
Education <ul style="list-style-type: none"> • College(s) • Degree(s), Year(s) • Major/minor/specialty 	-Cal Poly SLO, BS City & Regional Planning (graduated 1980) -University San Francisco, Masters Public Administration (graduated 1985)
Additional training/certifications	-American Institute of Certified Planners -American Planning Association -Municipal Management Assistants of Southern California -American Public Works Association
Applicable Experience • Employment	-City of Pismo Beach (1980-1989) Director of Public Services ... department head for Planning, Building, Engineering, Public Works. Recreation, Redevelopment

<ul style="list-style-type: none"> • Specific to potential alternatives • Alternatives analysis & evaluation • Advisory committee participation 	<p>-City PB responsibilities included conceptualizing, engineering, permitting and construction of city infrastructure such as water wells and treatment systems, wastewater collection, treatment and disposal systems, roads, parks, water-sewer main lines, pier and waterfront construction, etc.</p> <p>-Many of these projects included assessment district creation and financing, including experience with various forms of Bond and Certificates of Participation fundings, Community Facilities Districts (Mello-Roose CFD's), etc.</p> <p>-City PB work included extensive public outreach and participation in developing consensus on major public works and community development short and long range plans</p> <p>-Principal, Watson Planning Consultants (1989 to present) Consulting business for planning and development projects, primarily for private sector clients</p> <p>-WPC responsibilities include all aspects of planning, engineering and construction of residential and commercial development</p> <p>-WPC projects have included conventional private financing methods, creation and implementation of assessments and CFD's to support private projects, multi-developer collaborations on funding with reimbursement programs adopted by public agencies, and creative phasing of infrastructure to complete projects</p> <p>-During both City and WPC work, have participated in extensive advisory committee efforts, including more recently Nipomo Traffic Advisory Committee, SLO County Housing Task Force citizens committee, Pismo Beach Friends of Price House</p>
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<p>Famillarity with government policies, regulations, and approval processes</p>	<p>-My professional experience on the Central Coast since graduating from Cal Poly has been focused on the review and development of public and private sector projects that include all stages of schematic and conceptual design and budgeting, feasibility analysis, plan and specification preparation, entitlement and permitting processing, CEQA and NEPA environmental reviews, public hearings and entitlement approvals, construction plan and specification preparation and construction</p> <p>-The challenges to NCS D to secure new and sustainable water supplies are not that different from the role I manage for clients every day</p> <p>-My public works background, public and private sector financing experience, and results-oriented approach to public participation and implementation of desired goals will be assets to the NCS D and community</p> <p>-I look forward to the opportunity to assist in this effort</p>
<p>Additional Information (Attach additional materials as needed)</p>	

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Supplemental Water Alternatives Evaluation Committee Member Application

(Approved by NCSD BOD, July 11, 2012)
(electronic (MS Word) version available)

Name Dan Woodson	
Contact e-mail: [REDACTED] Phone: [REDACTED]	
Desired Position (May Check More Than One) <input checked="" type="checkbox"/> Engineering/Water Resources Management <input type="checkbox"/> Finance <input checked="" type="checkbox"/> Environmental <input checked="" type="checkbox"/> Citizen-at-Large	
Qualifications (Fill in response in this column.)	
Education • College(s) • Degree(s), Year(s) • Major/minor/specialty	Fresno State College BA, 1972 Civil Engineering Courses in Advanced Hydraulics, Water Resource Engineering, Hydrology and Wastewater Treatment Graduate Courses in Hydrogeology, Geohydrology, Groundwater Geology and Advanced Water and Wastewater Treatment.
Additional training/certifications	Engineering and Environmental Qualifiers Licensed Civil Engineer/Land Surveyor RCE 23517. EPA Water and Wastewater Treatment Courses. Former Member: Save the Mesa Former Member: Nipomo Creek Committee. Citizen-at-Large Qualifiers Immediate Past Chair: Nipomo

	<p>Community Advisory Council. Chair: Nipomo Traffic and Circulation Committee. Member: Nipomo Land Use Committee Immediate Past Chair: SLOCOG Citizens Transportation Advisory Committee. Member: Dana Adobe Amigos. Member: de Anza Trail Amigos Member: Blacklake Gyros. Member Nipomo Newcomers. Member: Five Cities Rams. Member: Nipomo Arts Commission</p>
<p>Applicable Experience •Employment</p> <p>•Specific to potential alternatives</p>	<p>I spent 32 years with the U. S, Forest Service as a Civil Engineer</p> <p>Engineering: Planning, survey, design, and contract administration of approximately 30 small water and wastewater systems. Accommodated maintenance and operation of 40 small water systems</p> <p>Environmental: Coordinated Forest Service Projects with EPA, Corps of Engineers, Fish and Wildlife Services, CalFire and in-house archeologists, historians, zoologists, fisheries biologists, botanists and landscape architects.</p> <p>As an 11 year veteran of the South County Advisory Council I have developed a degree familiarity with Titles 22 and 23 of the Land Use Ordinances, Inland and Coastal for San Luis Obispo County and have dealt with many members of County Planning I have followed those project proposals in Santa Barbara County that might impact South County. In my transportation related activities I have numerous meetings with members of County Public Works.</p>

<ul style="list-style-type: none"> • Alternatives analysis & evaluation • Advisory committee participation 	<p>Citizen-at-Large: In addition to the to the community participation items listed in <i>Additional training/certifications</i> I have dealt with numerous individuals and groups to solve transportation related problems.</p> <p>While employed there were ample, sometimes complex public works projects to be evaluated. Evaluation was accommodated by cost-benefit analysis and life cycle cost processes that were not allowed to stray from National Environmental Protection Act requirements.</p> <p>I am currently serving as a member of the South County Advisory Council, the Nipomo Land Use Committee, the Nipomo Traffic and circulation Committee and the SLOCOG Citizens Transportation Advisory Committee.</p>
<p>Familiarity with government policies, regulations, and approval processes</p>	<p>As a member of the SCAC I have seen numerous projects find their way through the County process. Projects ranging from mere discretionary permits to those projects requiring CEQA compliance, EIR certification and BOS approval.</p>
<p>Additional Information (Attach additional materials as needed)</p>	

APPENDIX B
COMMITTEE BYLAWS

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Bylaws

Supplemental Water Alternatives Evaluation Committee (SWAEC)

(APPROVED BY NCSD Board of Directors ON JUNE 27, 2012
- REVISED JULY 25, 2012)



1. Name

The name of this organization shall be the “**Supplemental Water Alternatives Evaluation Committee**” (SWAEC), hereafter referred to as the Committee.

2. Purpose and Authority

a. On June 27, 2012, the NCSD Board of Directors authorized formation of the Committee to analyze alternatives to providing Supplemental Water to the Nipomo Mesa region.

b. The purpose of the Committee is to provide the NCSD Board of Directors a thorough, accurate, and objective analysis of means to provide supplemental water to the Nipomo Mesa region.

c. The Committee exists under the authority of the NCSD Board of Directors. The Committee and its members are not empowered to commit the NCSD to any action, participation, or financial involvement. The Committee is not authorized to take any legal action on behalf of the NCSD, or to legally bind the NCSD in any way.

3. Areas of Responsibility

a. The Committee shall be responsible for performing analysis and evaluation for the Board of Directors, using the following process and sequence:

i. The Committee shall develop a list of viable supplemental water alternatives that includes as a minimum:

- AECOM-designed 3,000 AFY Santa Maria pipeline
- AECOM-revised TBD AFY Santa Maria pipeline
- Interconnection with Central Coast Water Authority (CCWA) pipeline
- Seawater desalination
- Other alternative water supply/alternative treatment (including recycled water)

ii. The Committee shall assign the analysis and evaluation of each alternative to specific and identified Committee members.

iii. The Committee will develop a matrix of Pro's and Con's for each alternative, measured against the CONSTRAINTS and their ability to meet the SUPPLEMENTAL WATER GOALS:

CONSTRAINTS:

As constraints, the Committee will consider:

- 2005 Stipulation and 2008 Court Order
- Annual delivered water volume and flow variation (availability)
- Cost
- Schedule
- Reliability of supply
- Effluent disposal requirements (if any)
- Environmental regulations and required approvals
- Permitting requirements of the California Coastal Commission, CA Department of Fish and Game, US Fish and Wildlife Services, Army Corps of Engineers, Environmental Protection Agency, Central Coast Regional Water Quality Control Board, County Planning, Building, and Public Utilities requirements in San Luis Obispo and Santa Barbara Counties.

SUPPLEMENTAL WATER GOALS:

- Deliver an uninterrupted supply of 3000 AFY of imported potable water to the Nipomo Mesa region, with the capability to increase the delivery to 6,200 AFY at minimum cost increase
- Provide initial water deliveries of +/- 1000 AFY by June 2015
- Lowest construction, system operation and maintenance, and delivered water cost
- Provide compliance with the 2008 Court Order

iv. The Committee will develop a numerical ranking for each alternative with reference to the CONSTRAINTS and their ability to meet the SUPPLEMENTAL WATER GOALS.

b. The Committee and its members shall conduct its meetings and discussions with respect to the diversity of opinions, to its members, and to all individuals from the public and other organizations.

c. The committee will seek technical input from the community and recognized authorities. The following documents will be used as the primary reference authorities in the analyses:

- 2010 Santa Maria Urban Water Management Plan
- 2010 NCSD Urban Water Management Plan
- 2010 CCWA Urban Water Management Plan
- 2007 Boyle Alternatives Analysis
- 2011 NMMA TG Annual Report

- 2009 NCS D Supplemental Water Project EIR
- 2005 Stipulation
- 2008 Court Order

Other published technical analyses may be used if the SWAEC finds them to be rigorously accurate.

4. Membership

a. Membership on the SWAEC is by appointment of the NCS D Board of Directors based on the recommendation of the Nomination Committee. The Nomination Committee will consist of:

- One member appointed by the SLO County Fourth District Supervisor
- One member appointed by the management of Rural Water Company
- One member appointed by the management of Golden State Water Company
- Two members appointed by the management of the Woodlands Mutual Water Company
- Four members appointed by the NCS D Board of Directors

b. Applications for the voting members of the SWAEC will be submitted via the NCS D Water Resources Policy Committee.

c. The Nomination Committee will review applications submitted and forward nominations for the seven voting seats to the NCS D Board of Directors for approval.

d. The SWAEC will have seven voting members, one Chairperson, and one Vice Chairperson as follows:

- Committee Chair/Facilitator (non-voting, except to break a tie)
- Vice Chair (NCS D District Engineer, non-voting)
- Two Engineering/Water Management members
- Two Financial members
- Two Environmental members
- One Citizen-at-Large member

e. No NCS D Board member will serve on the Committee.

f. The term of membership shall be for the duration of the Committee, beginning on the effective date that members are appointed by the NCS D Board of Directors, and shall continue through the sunset date (TBD) of the Committee.

g. No member may assign or transfer their membership on the Committee.

h. The Committee's voting members shall serve without compensation except that provided in their current employment.

5. Officers

- a. The Committee Chair shall be nominated by the NCS D General Manager and ratified by the NCS D Board of Directors. The Committee Vice Chair shall be the NCS D District Engineer. The Secretary to the Committee is to be determined.
- b. It shall be the duty of the Chair to:
 - Preside over the meetings
 - Prepare the agenda for the Committee meetings
 - Call special meetings as necessary
 - Coordinate communication and issue all reports
- c. It shall be the duty of the Vice Chair to:
 - Preside over meetings in the absence of the Chair
 - Assist the Chair in any of the Chair's duties as the Chair shall require
 - Provide technical advice as to the compatibility of the alternatives with the NCS D water supply system
- d. It shall be the duty of the Secretary to take notes and provide meeting minutes. Meeting minutes will be posted on the NCS D website (ncsd.ca.gov) after they are approved by the Committee.
- e. It shall be the duty of all the voting members to actively participate in the alternatives analysis and contribute opinions and findings in the interim and final reports and presentations.
- f. Any member may resign their position at any time by submitting a written letter of resignation to the Chair.
- g. Any member who misses three consecutive meetings will be subject to removal from the Committee at the discretion of the Chair.
- h. The replacement for any seat vacated by resignation or dismissal may be nominated by the voting members of the Committee, and ratified by the Board; but the Committee shall continue its work whether or not this is done.

6. Standard Meetings

- a. Meetings shall be held on a schedule established by the Committee. The frequency of the meetings will be determined by the Committee. Meetings shall be noticed and held in a manner consistent with applicable law, including the Brown Act, California Government Code Sections 54950 et seq.
- b. A majority of the voting members shall constitute a quorum.

c. Special meetings may be called by the Chair with notification posted to the NCSD website and NCSD's automatic e-mail notification system at least 24 hours before the scheduled time of the special meeting.

d. All regular and special meetings will be open to the public, and a portion of each meeting will be reserved for public comment on issues within the purview of the Committee.

e. Any finding by the Committee will require a majority vote of the voting Committee members.

f. Draft minutes of each meeting shall be posted by the NCSD on its website and replaced only if, on subsequent approval, the Committee makes changes.

7. Reports

a. The Committee will provide written reports and oral presentations to the NCSD Board of Directors.

b. As a minimum, the Committee will report:

- The minutes of each Committee meeting within two weeks of each meeting.
- The description of alternatives to be analyzed under 3.a.i. TO-BE-DETERMINED weeks after Committee formation.
- Identification of the Committee members assigned to each evaluation four weeks after Committee formation
- A rough draft of the Pro's and Con's of each alternative
- A final draft of the Pro's and Con's of each alternative
- A relative numerical ranking of each alternative as the final work product.

APPENDIX C
DRAFT RANKING MATRIX –
FEBRUARY 4, 2013

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WORKING DRAFT - SUPPLEMENTAL WATER ALTERNATIVES EVALUATION COMMITTEE RANKING MATRIX - WORKING DRAFT

DATE: 2/4/2013

SHOW RANKINGS

MAJOR ALTERNATIVES	VARIATIONS	CRITERIA																		FINAL SCORE	RANK		
		SUPPLY POTENTIAL			COST CONSIDERATIONS		COURT COMPLIANCE			CRITICAL MILESTONES FOR DELIVERY			RELI-ABILITY	PHASING	QUALITY		FEAS-ABILITY	SUSTAIN-ABILITY	PUBLIC SUPPORT			RAW SCORES	
		1,000 AFY	3,000 AFY	6,200 AFY	CAPITAL	O&M	Method	Quantity	Source	1,000 BY 2015	3,000 BY 2020	6,200 (Future)			Raw	Finished							
																				0.0%			
SW State Water Project	01A-SW	Acquire Unused Table A Allocation from SLOFCWCD		10	10	10	1	7	1	10	10	1	1	1	2	10	10	10	1	10	1	106	
	01B-SW	Acquire Excess Table A Allocation identified by CCWA & SLOFCWCD		10	10	1	2	7	1	10	10	1	5	1	2	10	10	10	2	10	1	103	
	02-SW	Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline		10	3	1	8	1	1	1	10	10	1	1	2	1	10	10	3	10	1	84	
	03-SW	Reactivate Desal Plant in SB / Exchange for SWP Supplies - NOT FEASIBLE PER CITY OF SB		10	10	1	8	1	1	1	10	10	10	10	1	5	10	10	2	6	1	107	
C Demand Management / Conservation /	04-C	Conservation Programs (Current and Future)		1	1	1	10	10	1	1	10	1	1	1	10	10	10	10	10	10	10	99	
AIR Agricultural and Industrial Reuse	06-AIR	Agricultural Tailwater Reuse		3	1	1	1	1	1	1	1	1	1	5	1	1	10	3	10	5	48		
	07-AIR	Phillips 66 Refinery Process Water Reuse		1	1	1	4	8	1	1	10	1	1	1	8	1	5	10	8	10	10	82	
	08-AIR	Phillips 66 Refinery Thermal Waste Recapture - NOT FEASIBLE PER P66																					
	09-AIR	PXP Arroyo Grande Production Wastewater Reuse		9	1	1	5	3	1	1	10	10	1	1	10	1	10	10	7	5	3	89	
SM Regional Waterline Intertie Projects	10A-SM	Santa Maria Intertie - Phase 1		10	10	10	8	8	10	10	10	10	10	5	9	8	9	7	10	5	5	154	
	10B-SM	Santa Maria Intertie (Full)		10	10	10	8	8	10	10	10	10	10	5	9	8	9	7	10	5	5	154	
	10C	OCSD Intertie		5	2	1	4	7	1	1	10	1	1	1	5	3	9	7	5	4	4	71	
RWW Recycled Water Supplies	11-RWW	Acquire Supply from South SLO County Sanitary District		10	7	1	7	7	6	7	5	2	5	1	10	5	5	9	7	8	8	110	
	12-RWW	Acquire Supply from Pismo Beach		10	5	1	7	7	6	3	5	2	4	1	10	5	5	9	7	8	8	103	
LG Local Groundwater	13-LG	Local Shallow Aquifer		10	10	10	10	10	1	10	1	10	10	10	5	3	7	5	5	5	8	130	
	14-LG	Dana Wells		1	1	1	1	1	1	1	1	1	1	1	3	1	5	5	9	5	8	47	
	15-LG	Riverside Wells - NOT FEASIBLE PER LEGAL OPINION																					
SFW Surface Water	16-SFW	Oso Flaco Lake		1	1	1	2	2	1	3	1	1	1	1	3	2	1	9	1	3	3	37	
	17-SFW	Santa Maria River - NOT FEASIBLE PER LEGAL OPINION																					
SEA Seawater / Brackish / Other Desalination Options	19A-SEA	Seawater Desalination - P66 Outfall		10	10	10	2	9	1	10	10	1	1	10	10	10	1	10	3	9	5	122	
	19B-SEA	Seawater Desalination - New Outfall		10	10	10	2	9	1	10	10	1	1	10	10	10	1	10	3	9	5	122	
	19C-SEA	Brackish Water Desalination		10	10	10	2	9	1	10	10	1	1	10	10	10	3	10	3	9	5	124	
	20A-SEA	Solar Distillation - Inland (Pilot Project Required)		10	10	10	1	10	1	10	10	1	1	10	10	9	3	10	3	10	6	125	
	20B-SEA	Solar Distillation - Coastal (Pilot Project Required)		10	10	10	3	10	1	10	10	1	1	10	10	9	3	10	2	10	8	128	

APPENDIX D
DRAFT WEIGHTED SCORES –
FEBRUARY 4, 2013

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DRAFT - WEIGHTING CALCULATIONS - DRAFT

DATE: 2/5/2013

MEMBER	RATIO HIGHEST TO LOWEST SCORE (SEE NOTES)	RANK	CRITERIA (USING RANK: HIGHEST 1 THRU LOWEST 18) (USING POINTS: WHOLE NUMBER FROM ZERO TO 1000)																	TOTAL	
			SUPPLY 1,000 AFY	SUPPLY 3,000 AFY	SUPPLY 6,200 AFY	COST CAPITAL	COST O&M	COURT COMPLIANCE METHOD	COURT COMPLIANCE QUANTITY	COURT COMPLIANCE SOURCE	MILESTONE 1,000 BY 2015	MILESTONE 3,000 BY 2020	MILESTONE 6,200 (FUTURE)	RELIABILITY	PHASING	QUALITY RAW	QUALITY FINISHED	FEASIBILITY	SUSTAIN-ABILITY		PUBLIC SUPPORT
Garson, Dan	0.0 : 1	POINTS (0-1000)																			
		%																			
Graue, Dennis	0.0 : 1	POINTS (0-1000)				500	500	222	222	222								1000		666	3332
		%	0.00%	0.00%	0.00%	15.01%	15.01%	6.66%	6.66%	6.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	30.01%	0.00%	19.99%	100.00%
Matsuyama, Kathie	0.0 : 1	POINTS (0-1000)	0	0	6	3	4	0	0	8	0	0	0	1	0	0	7	9	2	5	45
		%	0.00%	0.00%	13.33%	6.67%	8.89%	0.00%	0.00%	17.78%	0.00%	0.00%	0.00%	2.22%	0.00%	0.00%	15.56%	20.00%	4.44%	11.11%	100.00%
Miller, Robert	0.0 : 1	POINTS (0-1000)																			
		%																			
Saltoun, Sam	0.0 : 1	POINTS (0-1000)	1000	0	1000	1000	1000	250	1000	750	1000	250	750	1000	500	1000	0	1000	0	1000	12500
		%	8.00%	0.00%	8.00%	8.00%	8.00%	2.00%	8.00%	6.00%	8.00%	2.00%	6.00%	8.00%	4.00%	8.00%	0.00%	8.00%	0.00%	8.00%	100.00%
Watson, Dave	0.0 : 1	POINTS (0-1000)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	18000
		%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	5.56%	100.00%
Woodson, Dan	0.0 : 1	POINTS (0-1000)	913	830	240	673	719	620	959	980	887	797	0	937	860	557	760	1000	380	480	12592
		%	7.25%	6.59%	1.91%	5.34%	5.71%	4.92%	7.62%	7.78%	7.04%	6.33%	0.00%	7.44%	6.83%	4.42%	6.04%	7.94%	3.02%	3.81%	100.00%
CALCULATE AVERAGE WEIGHTING	%		4.16%	2.43%	5.76%	8.11%	8.63%	3.83%	5.57%	8.76%	4.12%	2.78%	2.31%	4.64%	3.28%	3.60%	5.43%	14.30%	2.60%	9.69%	100.00%
		RANK	10	17	6	5	4	12	7	3	11	15	18	9	14	13	8	1	16	2	

NOTES:

- EXAMPLES OF RATIOS:
 - 1:1 WEIGHTS ARE DISTRIBUTED EQUALLY TO ALL CRITERIA
 - 1.5:1 WEIGHTS ARE DISTRIBUTED WITH THE NUMBER ONE RANKED CRITERIA WEIGHTED 1.5 TIMES MORE THAN 18.
 - 5:1 WEIGHTS ARE DISTRIBUTED WITH THE NUMBER ONE RANKED CRITERIA WEIGHTED 5 TIMES MORE THAN 18.
- TO BYPASS WEIGHT DISTRIBUTION BY RANK, ENTER A ZERO RATIO (0 : 1). THEN ASSIGN POINTS TO EACH CRITERION USING ANY WHOLE NUMBERS FROM ZERO TO 1000.
- ALGORITHM USED FOR WEIGHT DISTRIBUTION CALCULATION:
 $RATIO = [(RATIO - 1) \times (RANK - 1)] / (\# \text{ OF CRITERIA} - 1)$

MAJOR ALTERNATIVES	VARIATIONS	CRITERIA																			FINAL SCORE	RANK
		SUPPLY POTENTIAL			COST CONSIDERATIONS		COURT COMPLIANCE			CRITICAL MILESTONES FOR DELIVERY			RELI-ABILITY	PHASING	QUALITY		FEAS-ABILITY	SUSTAIN-ABILITY	PUBLIC SUPPORT	RAW SCORES		
		1,000 AFY	3,000 AFY	6,200 AFY	CAPITAL	O&M	METHOD	QUANTITY	SOURCE	1,000 BY 2015	3,000 BY 2020	6,200 (FUTURE)			RAW	FINISHED						
		4.16%	2.43%	5.76%	8.11%	8.63%	3.83%	5.57%	8.76%	4.12%	2.78%	2.31%	4.64%	3.28%	3.60%	5.43%	14.30%	2.60%	9.69%	100.0%		
SW State Water Project	01A-SW Acquire Unused Table A Allocation from SLOFCWCD	10	10	10	1	7	1	10	10	1	1	1	2	10	10	10	1	10	1	106	5.3073	14
	01B-SW Acquire Excess Table A Allocation identified by CCWA & SLOFCWCD	10	10	1	2	7	1	10	10	1	5	1	2	10	10	10	2	10	1	103	5.1242	15
	02-SW Purchase Unused Table A Allocation from SWP Participants & Buy-into CCWA Pipeline	10	3	1	8	1	1	1	10	10	1	1	2	1	10	10	3	10	1	84	4.5290	17
C Demand Management / Conservation /	04-C Conservation Programs (Current and Future)	1	1	1	10	10	1	1	10	1	1	1	10	1	10	10	10	10	10	99	6.9184	4
AIR Agricultural and Industrial Reuse	06-AIR Agricultural Water Reuse	3	1	1	1	1	1	1	1	1	1	1	5	1	1	10	3	10	5	48	2.6651	19
	07-AIR Phillips 66 Refinery Process Water Reuse	1	1	1	4	8	1	1	10	1	1	1	8	1	5	10	8	10	10	82	5.7004	12
	09-AIR PXP Arroyo Grande Production Wastewater Reuse	9	1	1	5	3	1	1	10	10	1	1	10	1	10	10	7	5	3	89	5.3751	13
RWI Regional Waterline Intertie Projects	10A-RWI Santa Maria Intertie - Phase 1	10	10	10	8	8	10	10	10	10	10	5	9	8	9	7	10	5	5	154	8.6243	1
	10B-RWI Santa Maria Intertie - Full	10	10	10	8	8	10	10	10	10	10	5	9	8	9	7	10	5	5	154	8.6243	1
	10C-RWI Oceano Intertie	5	2	1	4	7	1	1	10	1	1	1	5	3	9	7	5	4	4	71	4.5459	16
	10D-RWI Nacimiento Water Project Intertie																					
RWW Recycled Water Supplies	11-RWW Acquire Supply from South SLO County Sanitary District	10	7	1	7	7	6	7	5	2	5	1	10	5	5	9	7	8	8	110	6.3986	10
	12-RWW Acquire Supply from Pismo Beach	10	5	1	7	7	6	3	5	2	4	1	10	5	5	9	7	8	8	103	6.0994	11
LG Local Groundwater	13-LG Local Shallow Aquifer	10	10	10	10	10	1	10	1	10	10	10	5	3	7	5	5	5	8	130	6.9870	3
	14-LG Dana Wells	1	1	1	1	1	1	1	1	1	1	1	3	1	5	5	9	5	8	47	3.3803	18
SFW Surface Water	16-SFW Oso Flaco Lake	1	1	1	2	2	1	3	1	1	1	1	3	2	1	9	1	3	3	37	2.0846	20
SEA Seawater / Brackish / Other Desalination	19A-SEA Seawater Desalination - P66 Outfall	10	10	10	2	9	1	10	10	1	1	10	10	10	1	10	3	9	5	122	6.4637	8
	19B-SEA Seawater Desalination - New Outfall	10	10	10	2	9	1	10	10	1	1	10	10	10	1	10	3	9	5	122	6.4637	8
	19C-SEA Brackish Water Desalination	10	10	10	2	9	1	10	10	1	1	10	10	10	3	10	3	9	5	124	6.5357	7
	20A-SEA Solar Distillation - Inland (Pilot Project Required)	10	10	10	1	10	1	10	10	1	1	10	10	9	3	10	3	10	6	125	6.6310	6
	20B-SEA Solar Distillation - Coastal (Pilot Project Required)	10	10	10	3	10	1	10	10	1	1	10	10	9	3	10	2	10	8	128	6.8440	5
REMOVED FROM CONSIDERATION																						
SW State Water Project	03-SW Reactivate Desal Plant in SB / Exchange for SWP Supplies -NOT FEASIBLE PER CITY OF SB																					
C Demand Management / Conservation /	05-C Graywater Programs - NOT FEASIBLE DUE TO LACK OF A GRAYWATER COLLECTION SYSTEM																					
AIR Agricultural and Industrial Reuse	08-AIR Phillips 66 Refinery Thermal Waste Recapture - NOT FEASIBLE PER P66																					
LG Local Groundwater	15-LG Riverside Wells - NOT FEASIBLE PER LEGAL OPINION																					
SFW Surface Water	17-SFW Santa Maria River - NOT FEASIBLE PER LEGAL OPINION																					
	18-SFW Lopez Reservoir ALTERNATIVE ADDRESSED IN RWW																					
SEA Seawater / Brackish / Other Desalination	21-SEA Enhanced Reverse Osmosis (VSEP) Orcutt Oil Fields																					
	22-SEA Liquid-Liquid Extraction of Brine EVOLVING TECHNOLOGY NOT IN USE																					

APPENDIX E

REFERENCES

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REFERENCES

The following documents were identified in the Bylaws, or subsequently approved by the Committee, for use in this analysis:

- 2010 Santa Maria Urban Water Management Plan
- 2010 NCSO Urban Water Management Plan
- 2010 CCWA Urban Water Management Plan
- 2007 Boyle Alternatives Analysis
- 2011 NMMA TG Annual Report
- 2009 NCSO Supplemental Water Project EIR
- 2005 Stipulation
- 2008 Court Order
- 2011 Northern Cities Management Area Monitoring Report
- 2011 Santa Maria Valley Management Area Monitoring Report
- Final Supplemental Water Project Phasing Study (August 8, 2012)
- Nipomo CSD Water Conservation Program (February, 2008)
- City of Arroyo Grande Recycled Water Distribution System Conceptual Plan – City of Pismo Beach WWTP (Wallace Group - June, 2010)
- City of Arroyo Grande Recycled Water Distribution System Conceptual Plan – South SLO County Sanitation District WWTP (Wallace Group - June, 2010)
- South SLO County Sanitation District Water Recycling Update Report (Wallace Group - January, 2009)
- Sweetwater Authority Groundwater Desalination Facility Brochures (provided by Director Eby at November 1, 2012, Committee Meeting)
- San Luis Obispo County Master Water Plan – May 2012
- San Luis Obispo County Conservation Manual
- Appellate Court Ruling (November 21, 2012)
- Capacity Assessment of the Coastal Branch, Chorro Valley, and Lopez Pipelines (WSC – November, 2011)

In addition, the Committee met or corresponded with the following individuals to collect information:

Jim Anderson, PE	Superintendent, Phillips 66, Nipomo
Rebecca Bjork, PE	Water Resources Manager, City of Santa Barbara
William J. Brennan	Executive Director of CCWA
Pet Corboy	Engineer, New Logic Corp, Emeryville
Steve Foellmi, PE	Vice President, Black & Veatch
Jacqueline Frederick	Attorney, Nipomo Mesa Management Area Technical Group
Charlie Guylash	Nipomo Native Garden

Dick Hart	General Manager, Pacific Coast Energy, Orcutt
Mary Jacob	Real Estate Broker, Coldwell Banker
César López, PE & David Chamberlain, PE	San Diego County Water Authority
Ron Munds	Utility Conservation Manager, SLO City
Dr. Brad Newton	Hydrogeologist
Paavo Ogren & Courtney Howard, PE	SLO County Public Works Director
Bill Petrick, Pat Eby, Liam Bennett, John Sonksen, Vincent McCarthy	MCA
Andrew Romer, PE & Richard Haberman, PE	AECOM
Rick Sweet, PE & Shannon Sweeney, PE	Utilities Department, City of Santa Maria
Mike Thomas	Bulk of Liquid Transport, Inc.
Jim Vickers, PE	Vice President, Separation Processes Inc
Jean-Pierre Wolff	Regional Water Quality Control Board