WATER PLANNING AREA #4 – SAN LUIS OBISPO/AVILA

WPA 4 includes San Luis Obispo Creek watershed as well as the area from Avila Beach to Montana De Oro State Park. WPA 4 extends into Edna Valley up to the Pismo Creek watershed divide. Purveyors include the City of San Luis Obispo and Avila Beach CSD.

DEMAND

The development of demands for the San Luis Obispo (SLO) MWP Update involved collection and analysis of four types of existing data: 1) urban demand; 2) agricultural demand; 3) rural demand; and 4) environmental demand. Following the review of existing plans and data, existing demands for each of the four categories were prepared for each of the 12 WPAs. Next, data regarding growth and future water use was analyzed to develop a preferred approach for the development of future water demands. These future demands were then prepared and projected by the same four demand categories for each of the WPAs.

The total existing and future demands for WPA 4 are listed in Table 1. A discussion of demands by each category follows.

Table 1
WPA 4 Demand by Category[a]

Category of Demand	Existing Demand (ac-ft/yr)	Projected Demand (ac-ft/yr)
Urban	8,470	13,260 – 14,490
Agricultural	4,970	4,020 -- 6,060
Rural	770	1,100
Environmental	NA	NA
Subtotal	**14,210**	**18,380 – 21,650**

a. All figures have been rounded to the nearest 10's.

Urban Demand

This section documents existing and projected urban water demands for WPA 4. The existing and projected figures have been prepared upon review of the water master plan of the City of San Luis Obispo and the County growth figures and historical per capita demand levels for the community of Avila Beach. Table 2 summarizes the current and projected urban water demands for WPA 4.

Table 2
WPA 4 Urban Water Demands[a]
(acre-feet/yr)

Existing Demand	2020 Demand	Buildout Demand
8,470	13,260	14,490

a. All figures have been rounded to the nearest 10's.

Existing and Future Water Demands

Many incorporated cities within the County and/or purveyors to those cities have prepared water master plans for planning purposes. The City of San Luis Obispo prepared an Urban Water Management Plan in 1994. Where such recent plans were available, the analyses within these plans were relied on rather than the use of County data.

The City's Plan analyzed two approaches in determining future water demands. The two methods included: 1) Production and Population (use of a per capita based on historic demand, population, and conservation); and 2) Metered Use by Land Use Development Type and Land Use Element (based on land use, historic demand and conservation). The two methods resulted in a range of per capita figures from 145 to 152 gpcd. Based on the analysis and the inclusion of a long term water conservation program, 145 gpcd was used throughout the plan for long term water supply planning purposes.

A calculation of existing (1994) demand using the 145 gpcd, resulted in an existing demand in the plan of 7,052 AF. (Demand for Cal Poly is not included in this figure, but was outlined in the plan as averaging 600 AF annually.) For calculation of future water demands, buildout was estimated by the plan as occurring at a population of 56,000. Given that buildout population, ultimate water demand for the city would be 9,096 AF annually. However, the City also includes within their demands 2,000 AF as a reliability reserve and 500 AF as a siltation reserve, for a total demand of 11,596 AF annually. This figure does not include the additional 600 AF annual water use at Cal Poly. Table 3 includes the existing and projected water demand for the city of San Luis Obispo.

Table 3
Summary of Urban Water Demands for San Luis Obispo

Existing Demand (AF/yr)	2020Demand (AF/yr)	BuildoutDemand (AF/yr)
7,652	12,196	13,143

Demands for San Luis Obispo include 600 AF annually for water demand at Cal Poly.

In order to determine additional existing and future urban water demand for WPA 4, an average water production figure of 59 AF was calculated from the County's *Annual Resource Summary Report* for the period 1993 to 1997 for the unincorporated community of Avila Beach. This average production figure was then used in combination with a 1995 population figure (see Table 3) to determine an existing per capita water use rate of 139 gpcd.

In order to determine future water demands for Avila Beach, the existing per capita water value was applied to the projected 2020 and buildout population figures obtained from the County. Projected population figures are shown in Table 4 and the future water demands are reflected in Table 5.

Although per capita use is expected to go down in the future, the number of people per households is generally expected to increase. Therefore, the same per capita value was maintained under existing and future scenarios. A discussion on the uncertainty of per capita water use is discussed in Chapter 2.

Table 4
Existing and Projected Population Figures for Avila Beach

1990[1]	1995[2]	2020[3]	Buildout[4]
381	379	494	2,295

Source: San Luis Obispo County Planning Department.

1. Population numbers are from the U.S. Census of Population and Housing. Avila Beach and Santa Margarita were developed by County Planning Department.
2. 1995 figures based upon the California Department of Finance and County Planning, and include group quarters.
3. 2020 figures have been projected by the County.
4. Buildout figures were obtained from the County

Table 5
Summary of Water Demands for Avila Beach
(acre-feet/yr)

Community	Existing Demand	2020 Demand	Buildout Demand
Avila Beach	59	77	357
SLO-Group Quarters[1]	760	930	990

1. Includes the water demand for the Group Quarters within the unincorporated portion of the County

Uncertainties

Group quarters are tracked by the County and have been included within the population of the incorporated cities where appropriate. Because the bulk of unincorporated group quarters are located in close vicinity to San Luis Obispo, we have included them within WPA 4. The unincorporated group quarters are broken out separately to maintain consistency with County Planning population data.

Total population for these facilities has been estimated by the County at 11,345, and includes the Cal Poly dormatories, the California Mens Colony and the County Jail. Current population at these facilities is as follows: Cal Poly dorms - 2,935, California Men's Colony - 6,385, and the County Jail - 368, for a total of 9,691. An additional population of 1,654 people would be included other facilities considered group quarters such as nursing homes, school dormitories, military barracks, and hospitals. A gross per capita water use has been estimated for the entire grouping at 60 gpcd, which would result in a total existing water demand of 760 AF annually. The County has projected that unincorporated group quarters would increase to a population of 13,846. Based on the earlier per capita of 60 gpcd, this would result in a future water demand of 930 AF annually.

Agricultural Demand

This section documents existing and projected Gross Irrigation Water Requirements (GIWRs) for WPA 4. The existing and projected demand figures relied upon published data and accepted methods, along with information gathered from extension agents, consultants, growers, and irrigation specialists. Tables 6 and 7 summarize the current and projected agricultural water demands for WPA 4. Anticipated future changes in cropping acreage in the SLO/Avila WPA include an increase in citrus, vegetable, and deciduous crop plus a decline in vineyard. The combined effect of these anticipated changes contributes to an increase in future agricultural water demand.

Table 6
Existing GIWR for WPA 4 (AF/Yr).

Low	High	Average
3,982	5,955	4,969

Table 7
Projected GIWR for WPA 4 (AF/Yr).

Low	High	Average
4,016	6,055	5,036

Procedures and Concepts

Estimating GIWR for local conditions can be characterized by the following general formula:

$$\text{GIWR} = \frac{\text{Crop ET} - \text{Contrib. from rain or shallow water table}}{(1 - \text{Leaching Requirement}) \times \frac{\text{Irrigation Efficiency}}{100}} + \text{Climate Control}$$

This analysis must be completed for each crop group, acreage, and weather pattern to calculate total GIWR (in AF) by WPA (WPA).). The elements of the formula and the corresponding values associated with WPA1 are described in the following sections.

Cropping Patterns
Table 8 summarizes estimates of irrigated cropping acreage for WPA 4.

Table 8
Estimated cropping acreage for WPA 4

Pasture	Permanent		Veg.	Vineyard	Total
	Citrus	Decid.			
200	250	250	1,500	1,350	5,550

Estimated from annual crop report, county GIS records and pesticide use records.

Crop Evapotranspiration
Several UC Cooperative Extension Leaflets describe estimating crop evapotranspiration (ETc) where:

ETc = ETo x Kc

ETc is estimated by multiplying the weather factor (ETo) with the crop coefficient (Kc). ETo values for the San Luis Obispo climate group (43.8 in/yr) were assigned to WPA 4 and Kc values are specific to the crop groupings (see Chapter 2). Yearly ETc totals for the crops in WPA 4 are summarized in Table 9.

Table 9
Yearly crop evapotranspiration (ft) for each crop group in WPA 4

Pasture	Permanent		Vegetable	Vineyard
	Citrus	Decid.		
3.0	2.0	2.5	1.5	1.2

Effective Rainfall

WPA 4 was assigned the San Luis Obispo rainfall group (21.9 in/yr) for the purpose of estimating effective rainfall (See chapter 2). Ranges of percentage of effective precipitation were applied to the crop groupings in WPA 4 and are listed in Table 10. Higher percentages were assigned to the deeper rooted crops according to their larger rootzone water holding capacity.

Table 10
Assigned ranges of typical effective precipitation for crop groups in WPA 4

Crop Group	Effective Precipitation Range (%) [1]	
	Low	High
Pasture	40	60
Permanent		
Citrus	40	60
Deciduous	40	60
Vegetable [2]	15	25
Vineyard	30	50

1 As a percentage of total annual rainfall.

2 2x adjustment factor for multiple cropping.

Frost Protection

Irrigation water is commonly applied for frost protection on grapes and strawberries in WPA4. The amount of water used for frost protection varies from season to season depending on the weather, and it varies from farm to farm depending on the system application rate. For the purpose of calculating applied water, 0.5 AF/Ac/Year is utilized for the water applied for frost protection on grapes. For the purpose of calculating applied water, 0.8 AF/Ac/Year is utilized for the water applied for frost protection on strawberries

Leaching Requirements

The amount of extra irrigation water, which needs to be applied to satisfy the leaching requirement for a particular crop, depends on the salt tolerance of the crop and the irrigation water quality. Ground water quality in San Luis Obispo County is typically adequate for crop production and does not necessitate additional *irrigation* water applied for leaching since it is typically satisfied by normal rainfall. Chipping et al. 1993 reports that of the wells tested in the Paso Robles Ground Water Basin Study, most of the wells tested have EC levels < 1.0 dS/m. Given these water qualities and salt tolerances typical with central coast crops, leaching requirements would be satisfied by rainfall.

Irrigation Efficiencies

Irrigation efficiency can be expressed by the following relationship:

$$\text{Irrigation Efficiency} = \text{Distribution Uniformity} \times (1 - \text{Losses})$$

The Cachuma Resource Conservation District routinely conducts irrigation evaluations in Santa Barbara and San Luis Obispo Counties and are excellent resource in describing the

actual performances of irrigation systems in the region. Irrigation efficiencies were assigned to crop group according to prevalent irrigation system type and knowledge of typical local uniformities (Table 11).

Table 11
Assigned irrigation efficiency averages for each crop group in WPA 4

Crop Group	Irrigation Efficiency Range (%)	
	Low	High
Pasture	60	70
Permanent	60	70
Vegetable	65	75
Vineyard	65	75

Existing Gross Irrigation Water Requirement by Crop Group
Existing GIWRs for WPA 4 are summarized in Table 7. The ranges provided in Table 7 do not represent the extremes in GIWR, but do represent the typical ranges in a normal year given local variations in effective precipitation and irrigation efficiencies. Table 12 summarizes the current agricultural water demands for WPA 4.

Table 12
Summary of Existing GIWR for WPA 4 by crop group (AF/Ac/Yr)

Pasture		Permanent-Citrus		Permanent-Deciduous		Vegetable		Vineyard	
Low	High	Low	High	Low	High	Low	High	Low	High
2.7	3.7	1.4	2.2	2.0	3.0	1.3	1.8	0.8	1.4

Future Gross Irrigation Water Requirements by Crop Group
Several issues would affect changes in future irrigation water requirements:

- Changes in cropping acreage and type of crop
- Changes in irrigation methods

Cropping Patterns
Trends in cropping patterns were examined through historical crop reports and previous water use projections completed by the Department of Water Resources. Table 13 summarizes projected crop acreages in WPA 4.

Table 13
Projected cropping acreage for WPA 4

Pasture	Permanent		Veg.	Vineyard	Total
	Citrus	Decid.			
500	**350**	**300**	**1,300**	**1,800**	**3,950**

Irrigation Methods

Table 14 reflects the projected irrigation efficiencies by crop group in WPA 4.

Table 14
Projected irrigation efficiencies by crop group in WPA 4

Crop Group	Irrigation Efficiency Range (%)	
	Low	High
Pasture	60	70
Permanent	70	80
Vegetable	70	80
Vineyard	70	80

The same procedures that were utilized to calculate existing agricultural demands were utilized in estimating projected irrigation water requirements. The projected values reflect the changes in cropping acreage and irrigation efficiencies. Table 15 summarizes the projected agricultural water demands for WPA 4.

Table 15
Summary of Projected GIWR by crop group for WPA 4 (AF/Ac/Yr)

Pasture		Permanent-Citrus		Permanent-Deciduous		Vegetable		Vineyard	
Low	High	Low	High	Low	High	Low	High	Low	High
2.7	3.7	1.2	1.9	1.8	2.6	1.3	1.7	0.8	1.4

Rural Demands

Rural water demands in the SLO/Avila WPA include dwelling units scattered throughout the hills and valleys. The commercial areas are not included in Table 16 and 17 below, but included in the urban demand for San Luis Obispo and Avila Beach. Water is produced in private wells from the groundwater basins in the area.

Table 16
Current Demand – 1995

Population	Pop/Du	Houses	Duty (ac-ft/ac)	Demand[a] (ac-ft/yr)
1,452	2.44	595	1.3	770

a. Demand figure has been rounded to the nearest 10's.

Table 17
Projected Demand – 2020

Population	Pop/Du	Houses	Duty (ac-ft/ac)	Demand[a] (ac-ft/yr)
2,056	2.44	843	1.3	1,100

a. Demand figure has been rounded to the nearest 10's.

Data Deficiencies

The following additional data would improve the accuracy of this study:

- **Dwelling Units**. The study was based upon population numbers, with an estimate of dwelling units derived from population figures divided by persons per household. Demand should be based upon a count of dwelling units by WPA. This information would be derived from assessor data.

- **Certificate Lots**. Many parcels of land may be buildable. It is difficult to ascertain how many will be built upon.

- **Golf Courses.** There are several golf courses in the area that may not be accounted for in the urban demand section. These use between 1.5 to 2.5 acre feet/acre/year. An 18-hole course would have approximately 100 acres of irrigated turf, resulting in the use of between 150 and 250 acre feet per year. Return flow from golf course irrigation is estimated to be 15%. This information should be added to the rural demand.

Environmental Demands

Current Demands
Information on current environmental water demands is available from two sources: 1) conditions on water rights permits and licenses and associated orders on file with the State Water Resources Control Board, and 2) agreements between the California Department of Fish and Game and other entities. A discussion of current environmental demands in WPA 4, as reflected in actual permit conditions, is presented below.

San Luis Obispo Creek Basin
Davenport Creek:

"Licensee shall during the period from December 1 through March 31 bypass a minimum of 60 gallons per minute. The total streamflow shall be bypassed whenever it is less than 60 gallons per minute." (App 24914, Lic 11947)

See Canyon

"Once the diversion facilities authorized under this permit are in operation, permittee, in consultation with the California Department of Fish and Game, shall conduct studies of sufficient detail and duration to determine if the authorized underflow diversion in any way affects the quantity or duration of surface flow in See Canyon Dreek. Such studies shall encompass not less than three different hydrological type water years. Permittee's diversion shall not diminish surface flow in See Canyon Creek at any time." (App 28995, Permit 20708)

Future Demands
The CDFG is currently developing a protocol for determining stream flow needs to protect environmental values (Waithman, CDFG, Yountville, personal communication, February 1998). This protocol is under development and has not been formally accepted or even formally proposed. It is presented here to indicate one estimate of possible future demand. This protocol has not been adopted by CDFG and if it were, other groups or agencies may not accept it. Key provisions may include the following:

- Reservation of 60% of the average annual unimpaired wet-season flow for instream habitat.
- Bypass of all natural flow during dry season (June to September).
- No diversions until stream flows to the ocean (sandbar breached).

Watersheds on the west side of the coast range generally receive higher rainfall than the streams draining inland areas. These watersheds are also somewhat cooler during the summer than inland areas and are more likely to support steelhead. Tidewater goby are also found in lagoons at the mouths of streams in the coastal watersheds. Annual runoff during

drought years in these streams can be 10% or less of the average runoff and result in extreme conditions for aquatic life. Extreme high flow events can also occur and these can also be detrimental to aquatic life in the streams. Based on these considerations future environmental water demand for minimum instream uses in WPA 4 was estimated to range from 10% of unimpaired average annual runoff during drought years to 100% of unimpaired average annual runoff in wet years. This assumes that some uncontrolled high flows will still occur with a frequency that maintains basic stream habitat features.

Data Deficiencies

There has been no organized complete effort to quantify instream flow needs in streams of San Luis Obispo County. Studies have been conducted on some streams and restrictions have been placed on certain water rights permit holders to protect instream uses but these have generally focused on the needs of one or a few key species and have not resulted in clear, objective assessments of instream flow needs.

There is not sufficient data to complete a detailed analysis of environmental water demands for all streams in the County. There is no known data for unimpaired runoff for any stream though it is possible estimates could be developed from available rainfall data. The only readily available (electronic) data is from USGS and County maintained streamflow gaging stations. The USGS data presents average runoff estimates as well as minimum and maximum runoff for each station but this data reflects existing water use and water project operations and in most cases does not reflect unimpaired conditions. Average runoff estimates could also be developed for the SLO gage data and discontinued USGS gages but the information would need to be in an accessible database.

A generic approach to instream flow needs assessment may be useful and data for such an assessment may be available. The County should consider a Tennant type approach using unimpaired runoff estimates generated from rainfall data. Given the wide annual variability in rainfall and runoff, an instream flow needs assessment should account for differences in normal, wet, and dry year flow needs. The County should also have all streamflow data entered in a computer database to facilitate its use.

Uncertainties

In many cases permit or license conditions do not specify a reservation of stream flow for environmental benefit. Rather, they are restrictions on use by individual rights holders. These restrictions are intended to provide benefits to fish and wildlife. However, it is not usually clear how restrictions on an individual water right interact with other water rights and effect streamflows. In addition, it is not always clear how permit conditions are interpreted in terms of an environmental demand. For example, many of the permit conditions call for a “visible surface flow” in a given stream but it is not clear how much water this represents.

Future environmental water demand is subject to great uncertainty due to lack of knowledge of instream flow needed to protect the aquatic resources, lack of information on existing runoff conditions and diversions, and the inherent annual variability in rainfall and runoff. For planning purposes, one could assume that the upper range of future demand will be defined by a percentage of the average annual unimpaired runoff (UAAR) during the wet season and no diversion during the dry season. This task is complicated since many streams are not gaged streams and unimpaired flow must be estimated using hydrologic modeling. This information is not presently available.

References

Stalnaker, C., B.L.Lamb, J. Henriksen, K. Bovee, and J. Bartholow. 1995. The Instream Flow Incremental Methodology: A primer for IFIM. Biological Report 29. U.S.D.I., National Biological Survey, Washington, D.C.

SWRCB, 1997. Staff Report Russian River Watershed. Proposed Actions to be taken by the Division of Water Rights on Pending Water Right Applications within the Russian River Watershed. Division of Water Rights. Sacramento, California

SUPPLY

The City of San Luis Obispo receives water from Whale Rock Reservoir and from Salinas Reservoir (Santa Margarita Lake). The Coastal Branch of the State Water Project traverses the City, although the City does not have an entitlement or turnout from the system. Water from Salinas Reservoir is conveyed to the City water treatment plant via 9.2 miles of 24" diameter reinforced concrete pipe. One primary pump station conveys water. Also, Salinas Water gravity flows through Cuesta Tunnel. Avila Beach Community Services District purveys water to Avila and is one of the Lopez contractors. Lopez Reservoir provides supplies to Avila Beach, Port San Luis, Pismo Beach, Grover Beach, Oceano, and Arroyo Grande via the Lopez pipeline system. All of these communities are interconnected by virtue of the Lopez system. Further, Avila Community Services District's water system is within two miles of the Port San Luis Obispo system. Avila Beach CSD, San Miguelito MWC, and San Luis Coastal Unified School District also receive State Water. The Diablo Canyon Nuclear Power Plant complex is supplied by a seawater desalination plant and does not share common elements with neighboring systems.

Groundwater Supply

Table 18 lists the ground water basins in WPA 4. Estimates of "basin yield" are provided for those basins that have been studied, coupled with estimates of ground water production. An estimate of annual ground water production is provided on the table, along with the year representing the estimate and a reference to the source of information.

The ground water basin in WPA 4 is the San Luis Obispo Basin. This basin has been studied by the DWR for the County of San Luis Obispo, and by consultants for the City of San Luis Obispo including Boyle Engineering Corporation, John L. Wallace & Associates/Cleath & Associates and, for the downstream portion, by Stetson Engineers. A draft of the report prepared by the DWR has been circulated for public comment and when completed will be the most recent document upon which ground water management can be based. The main management issues relate to ground water use in the Airport Area, municipal wastewater reuse, aquifer compaction, and some water quality issues such as PCE and nitrates and salinity.

Table 18
WPA 4 Ground Water Basins

Basin Name	Basin Area in Square Miles	Basin yield with original descriptive term in acre-feet per year	Production - year in acre-feet
San Luis Obispo	18 (11)	5,900 sustained yield (11)	6,000 – 1,990 (11)

11. Boyle Engineering Corporation, January 1991, City of San Luis Obispo - Ground Water Basin Evaluation.

Uncertainties
The "basin yield" values described in the table reflect the results of a variety of methods of determining yield, including annual recharge, safe yield, seasonal replenishment, and net safe annual extractions, and thus may or may not reflect an accurate perennial yield value for the basin.

Surface Water Supply

A list of existing water supplies in WPA 4 is included in Table 19. Surface supplies to WPA 4 include water from Salinas and Whale Rock Reservoirs (principally supplying the City of San Luis Obispo), Lopez Reservoir (to Avila Beach) plus State Water supplies (to Avila CSD, Avila Valley MWC, and others). A seawater desalination plant is operated at the Diablo Canyon Nuclear Power Plant to satisfy high quality process water needs at the plant. Appropriated stream flows comprise a small percentage of water supplies to WPA 4.

Table 19
Existing, Developed Water Sources Other Than Ground Water
(Approx. Yield, acre-feet per year)

Existing Source	Approx. Yield
Whale Rock Reservoir	2724
Seawater Desalination	? (PG&E)
Salinas Reservoir	4800
Lopez Reservoir	65
State Water Supply Project	402
Appropriated Stream Flows	82
TOTAL NON-GROUND WATER YIELD [1]	**8,073**

1. Source: Water Rights Information Management System printout dated April 23, 1998 from the State Water Resources Control Board for all water rights in SLO County. Figures shown are "Maximum Annual Use" totals by WPA as noted in water rights filings. Figures do not include estimated supplies to entities whose app. rights state a max. direct diversion (in cfs) or a max. storage volume (in acre-feet). Due to this, appropriated stream flows stated here are probably under-stated.

Uncertainties
While the water rights information states the amount of water individuals and agencies are entitled to withdraw, it does not tabulate actual withdrawals. For example, an owner may be entitled to divert 86,000 gallons per day from May through October of each year. This does not mean that the owner typically diverts this each and every day for six months. On the other hand, this same owner may, in a dry year, want to divert his full entitlement over the six month period. However, if there is not enough water in the creek to support his diversion, it may not be physically possible to divert the full amount.

The reader is alerted to this especially when interpreting the estimates of appropriated stream flows stated in Table 19.

DEFICIENCIES

The City of San Luis Obispo is considering options for future supply—Nacimiento, Salinas Dam and water reuse. The City experienced severe shortages during drought. San Luis Obispo Creek will change with wastewater re-use program.

Table 20

Existing (ac-ft/yr)

Demand	Grndwater Supply	NonGrndwater Supply	Total Supplies	Balance[a] (Deficiency)
14,210	5,900	8,073	13,973	(240)

a. Balance (Deficiency) figure has been rounded to the nearest 10's.

Table 21
Projected (ac-ft/yr)

Demand	Grndwater Supply	NonGrndwater Supply	Total Supplies	Balance[a] (Deficiency)
18,380 – 21,650	5,900	8,073	13,973	(4,410) - (7,680)

a. Balance (Deficiency) figure has been rounded to the nearest 10's.

ALTERNATIVES

This section is an evaluation of future water supply options for WPA 4. The criteria previously selected by the WRAC are:

- Cost
- Risk
- Reliability
- Water Rights
- Local Control
- Water Quality
- Timing
- Environmental Impacts
- Agricultural Impacts
- Institutional Constraints
- Recreation
- Hydroelectric Potential

Each water supply option summary includes a comparative ranking of the criteria listed above. The rankings are based on the following:

Comparative Rankings

Features of water supply options are ranked 1 to 5, with 5 being the best. A "0" implies a fatal flaw which may render the supply option infeasible. The basis of comparison, in general, is:

Cost: The lower the unit cost ($/AFY), the higher the ranking.

Risk: Primarily a subjective comparison of the potential for project cost escalation.

Reliability: Primarily a comparison of project yield, AFY, during years of below-average rainfall.

Water Rights: A favorable 5 ranking indicates no known problems; a 3 indicates potential challenges; and a 1 indicates known opposition which may stop the project.

Local Control: A favorable 5 indicates physically located in and administered by an agency within the County; a 3 indicates some involvement of outside agencies; and a 1 indicates control from outside the County.

Water Quality: A favorable 5 indicates projects which enhance water quality; a 3 indicates no change; and a 1 indicates a negative impact on water quality.

Timing: A favorable 5 indicates projects with designs complete; a 3 indicates projects for which predesign at least is underway; and a 1 indicates projects for which design is 5 years or more away.

Environmental: A favorable 5 indicates certified EIR in place; a 3 indicates environmental review underway and no significant unmitigable issues identified; and a 1 indicates significant impacts foreseen. A "0" in this category indicates a potential environmental fatal flaw.

Agricultural Impacts: A favorable 5 indicates projects which help agricultural, particularly by reducing competition for ground water and by other means.

Institutional Constraints: Reflects the degree of organizational support. A low ranking is indicative of the need for complex agreements.

Recreation: Reflects the degree to which the project may enhance recreational opportunities. A 3 indicates no direct impact.

Hydroelectric Potential: Indicates the degree to which the project may provide opportunities for hydroelectric power generation. Little information is available regarding hydroelectric power generation opportunities for the supply options examined. In general, options with little or no opportunity for power generation were ranked "1". Options that may expand existing power generation facilities were ranked "3".

At this point, the ranking is subjective and left to the discretion of the author and to the extent of data available for a particular option. WRAC input on the supply source ranking as discussed at the April 1998 meeting has also been included.

Potential water supply projects that may benefit this WPA (and for which information exists), include the Nacimiento Water Supply Project, the Salinas Dam Expansion and the City of San Luis Obipso Water Reuse Project. This is not to say that these are the only supplemental water sources available. Rather, published data are currently available for only these potential sources.

Nacimiento

The Nacimiento Water Supply Project described herein is as described in the August 1997 Draft EIR. It involves construction of over 60 miles of pipelines ranging in size from 33- to 8-inches in diameter, plus pump stations, storage tanks, and outlet works. The project is planned to supply 17,500 AFY to 18 water purveyors from Paso Robles to Coastal San Luis Obispo County.

Category	Remarks	Comparative Ranking
Cost[i]	$120 million project cost. *WPA 2*: $625 - $1,097 per AFY *WPA 3*: $1,167 - $2,198 per AFY *WPA 4*: $669 - $1,135 per AFY (SLO City) *WPA 4*: $2,488 - $3,783 per AFY (Others) *WPA 9a*: $368 - $1,000 per AFY *WPA 10*: < $200 per AFY (opinion; cursory estimate).	4
Risk[ii,iii]	Long distance conveyance - risk of delivery interruption EIR seismic evaluation - "Insignificant after mitigation". Cost sensitive to participation level. Moderate risk of construction cost escalation. Forecasted deliveries can be maintained even with a planned 1-month annual maintenance outage.	4
Reliability[ii,iii]	17,500 AF yield even through 1987-1991 drought. Complements groundwater supply in planning areas 3, 4, and 9a.	5
Water Rights[iii]	Strong contractual position with Monterey County. Pending legal challenge originating in Monterey County.	3
Local Control[iv]	Watershed and dam within SLO County, operated by Monterey County Water Resources Agency. Potential Monterey County and Division of Safety of Dams issues.	4
Water Quality[iv]	Limited data indicates favorable quality.	3
Timing[iv]	High participation needed to advance. Minimum 3 years for delivery. Little opportunity for staging (matching supply with demand).	2
Environmental Impacts[ii]	Long term significant residual impacts to recreation and growth inducement. Cumulative impacts in areas of water resources and fisheries. Short-term impacts on traffic, air quality and biological resources. Helps minimize potential overdrafts in regions 9a, 3, and 4.	2

Nacimiento (cont'd)

Category	Remarks	Comparative Ranking
Agricultural Impacts[ii]	No short- or long-term significant residual impacts. Reduces competition between urban and agricultural groundwater users.	4
Institutional Constraints[v]	Usual permitting process for similar pipeline projects. High project participation required.	3
Recreation[ii]	Associated lake-level impacts may negatively affect recreation.	2
Hydroelectric Potential[iv]	Reduce power generation capability at the dam by < 10 percent. No new hydro potential identified along pipeline.	1

Salinas Dam Expansion

The Salinas Dam Expansion project examined herein is based on the May 1997 Revised Draft EIR. The project involves installation of the flood gates at the existing dam which would result in a greater storage capacity as well as an increase in annual yield.

Category	Remarks	Comparative Ranking
Cost	$16 million ($10 million for project, including relocation of recreation area; plus $6 million for biological mitigation)	4
Risk[vi]	Recent studies established seismic stability of dam. Moderate conveyance risk associated with 50 year old system. Envir. mitigation cost uncertain (wide range, est. at $6 million).	4
Reliability[vi]	1,650 AFY yield	3
Water Rights	Additional rights to benefit City of SLO Potential downstream challenges (State Water Resources Control Board hearing pending)	3
Local Control	Watershed and dam within SLO County. Potential transfer of ownership from Army COE to SLO Co. Flood Control District.	3
Water Quality	Long history of favorable water quality.	3
Timing	Potential permitting delays due to downstream challenges. +/-5 years to delivery after Council direction to proceed. Little opportunity for staging (matching supply with demand).	3
Environmental Impacts[vii]	Potentially significant residual impacts: 1) water resources, 2) vegetation, 3) wildlife, and 4) aquatic ecology. Increases shoreline habitat.	3
Agricultural Impacts	None anticipated. If North County participates, ground water basin recharge would be enhanced, thus benefiting ag pumpers, too.	3
Institutional Constraints	COE and County approvals required as owner and operator, respectively. Potential ownership transfer from COE to a local agency. DSOD approvals anticipated. Potential objections from downstream users. Participation limited to City of San Luis Obispo. Potential permit constraints from government agencies (404 permits, Fish & Wildlife and Fish & Game permits, etc.)	2

Salinas Dam Expansion (coninued)

Category	Remarks	Comparative Ranking
Recreation	No swimming permitted now or with planned expansion/ boating uses to be affected. Relocation/reconstruction of recreation facilities.	3
Hydroelectric Potential[vii]	Little opportunity for hydroelectric generation at the dam; need the head to get flow to the booster station.	3

City of San Luis Obispo Water Reuse Project

The City of San Luis Obipso water reuse project examined herein is as defined in the December 1995 Draft EIR. This involves utilization of tertiary treated wastewater for irrigation primarily to parks and other areas that currently receive potable water off of the City system. The Water Reuse project also involves planned irrigation of some areas that currently use ground water (i.e. not currently on the City system).

Category	Remarks	Comparative Ranking
Cost[viii]	$9,300,000; $600 to $900 per AF.	5
Risk	No unusual design or construction issues. Uses commonly applied engineering and construction techniques. Low risk of construction cost escalation. California Inland Surface Water Program (CISWP) requirements may increase treatment costs but this would occur with or without the Water Reuse Project.[viii]	5
Reliability[viii]	1,233 AFY yield	3
Water Rights[viii]	Petition filed and water right protests have been dismissed by SWRCB' some remaining environmental issues.	5
Local Control	Only the City of SLO would be involved.	5
Water Quality	Disinfected tertiary treated water would be distributed with a chlorine residual. Using effluent for reuse irrigation may help nitrate and phosphate levels in SLO Creek.[viii]	4
Timing	Currently under design. EIR shows 4 years from CEQA review completion to Phase II construction.	3
Environmental Impacts[viii]	Residual impacts determined insignificant after mitigations.	4
Agricultural Impacts	Reduces agricultural and urban competition for ground water. Natural water is sufficient to support ag although some wells may have to replace stream diversions.	3
Institutional Constraints	City and State policies encourage water reuse.[viii] EIR completed and certified. CEQA approval received. CISWP may require more stringent discharge standards. Resolve Fish & Game issues	4
Recreation	No positive or negative impacts identified.	3
Hydroelectric Potential	Not applicable.	1

Data Deficiencies

No data exist for Water Conservation Programs.

References

[i] "Lake Nacimiento Water Supply Project Financing Analysis" by Leifer Capital for San Luis Obispo County Flood Control Water Conservation District, December 1997.
[ii] "Draft EIR Nacimiento Water Project" by Ogden Environmental and Energy Services for County of San Luis Obispo, August 1997.
[iii] "Preliminary Evaluation for the Nacimiento Water Supply Project, Reliability Evaluation" by Boyle Engineering Corporation for San Luis Obispo County Flood Control Water Conservation District, 1992.
[iv] "Nacimiento Water Supply Project EIR preparation Phase Engineering Draft Report" by Carollo Engineers for County of San Luis Obispo, July 1996.
[v] "Nacimiento Water Supply Project Permit Outline" by Boyle Engineering Corporation for San Luis Obispo County, 1997.
[vi] "Phase I Report, Salinas Reservoir Expansion Project; Part I: Geotechnical Seismicity and Dam Safety Evaluation; Part II: Hydrology, Reservoir Yield and Evaluation of Alternatives" by Woodward-Clyde, 1989 (Revised in December 1990).
[vii] "Revised Draft EIR for Proposed Salinas Reservoir Expansion Project" by Woodward-Clyde for City of San Luis Obispo, May 1997.
[viii] "City of San Luis Obispo Water Reuse Project Draft EIR" by staff for City of San Luis Obispo, December 1995.