

Supplemental Water Supply Planning Study

Prepared for



October 2009



ALBERT A.
WEBB
ASSOCIATES

SAN GORGONIO PASS WATER AGENCY

SUPPLEMENTAL WATER SUPPLY PLANNING STUDY

Prepared By:

ALBERT A. WEBB ASSOCIATES

3788 McCray Street
Riverside, CA 92506
(951) 686-1070



Sam I. Gershon, R.C.E.
R.C.E. No. C14489

October, 2009

TABLE OF CONTENTS

EXECUTIVE SUMMARY _____	ES-1
SECTION 1 - INTRODUCTION _____	1-1
Purpose Of the Study _____	1-2
History _____	1-2
State Water Project _____	1-2
Integrated Water Resources Plan _____	1-4
Strategic Plan _____	1-5
Beaumont Groundwater Basin _____	1-5
Study Area _____	1-6
Major Water Retailers _____	1-7
SECTION 2 - WATER DEMAND PROJECTION _____	2-1
SGPWA Service Area and Approved General Land use Plan _____	2-1
Water Demand Projections _____	2-2
Water Demand Based on Population and/or Housing _____	2-2
Urban Water Management Plans _____	2-5
Ultimate Water Demand Based on Land Use Projection _____	2-6
SECTION 3 - LOCAL WATER SUPPLY _____	3-1
Beaumont Cherry Valley Water District _____	3-1
City of Banning Water Department _____	3-2
Cabazon Water District _____	3-3
South Mesa Water Company _____	3-3
Yucaipa Valley Water District _____	3-3
Total Local Water Supply within SGPWA Service Area _____	3-4
SECTION 4 - SUPPLEMENTAL STATE WATER PROJECT WATER DEMAND _____	4-1
SECTION 5 - NEW SGPWA FACILITIES TO MEET DEMAND FOR SUPPLEMENTAL SWP WATER _____	5-1
Existing and Proposed Facilities _____	5-1
East Branch Extension Phase II _____	5-1
State Water Project Aqueduct Extension _____	5-2
Lucerne Valley Alignment _____	5-5
Lucerne Valley Loop Pipeline _____	5-7
North Pass Alignment _____	5-9
Independent SGPWA North Pass Alignment _____	5-11
Inland Feeder–Modified Pass Alignment _____	5-12

TABLE OF CONTENTS

SECTION 6 - PROJECT COST ESTIMATES	6-1
Cost Estimate Criteria	6-1
Lucerne Valley Alignment Cost Analysis	6-1
North Pass Alignment Cost Analysis	6-4
Independent SGPWA North Pass Alignment Cost Analysis	6-6
Inland Feeder–Modified Pass Alignment Cost Analysis	6-7
Summary of TOTAL Costs	6-10
Cost Analysis of Changing Pipeline Velocity	6-12
Contingencies Cost Analysis	6-13
SECTION 7 - FINDINGS, CONCLUSIONS AND RECOMMENDATIONS	7-1
Findings	7-1
Study Area	7-1
Ultimate Demand Projections	7-1
Total Local Water Supply for SGPWA	7-2
Reliability and Delivery Requirements	7-3
Current and Future Capacities Owned by SGPWA	7-4
Delivery Facilities	7-5
Cost Evaluation	7-8
Project Phasing and Implementation	7-10
Conclusions	7-15
Cost Evaluations	7-15
Implementation	7-16
Recommendations	7-16

LIST OF TABLES

Table 2-1:	SGPWA Service Area ⁽¹⁾	2-1
Table 2-2:	San Gorgonio Pass Water Agency Projection of Housing Units and Population within SGPWA	2-4
Table 2-3:	SGPWA Projected Water Demand Based Upon Population or DU's	2-5
Table 2-4:	Water Demand in the San Gorgonio Pass Water Agency Service Area by Major Water Retailers Based upon Urban Water Management Plans	2-6
Table 2-5:	Water Demand Factors	2-7
Table 2-6:	Morongo Tribal Lands Slope Analysis	2-7
Table 2-7:	Water Retailer Areas Including Sphere of Influence Boundaries	2-8
Table 2-8:	Ultimate Water Demand for Major Water Retailers, Unincorporated County, and Morongo Tribal Lands	2-9

TABLE OF CONTENTS

Table 2-9:	SGPWA Projected Ultimate Water Demand Compared with Projected 2030 Demand for Major Water Retailers within SGPWA’s Service Area	2-10
Table 2-10:	Potential Ultimate Water Demand for the San Gorgonio Pass Water Agency Service Area	2-10
Table 3-1:	BCVWD Local Water Supply ⁽¹⁾	3-2
Table 3-2:	BWD Local Water Supply ⁽¹⁾	3-2
Table 3-3:	SMWC Local Water Supply ⁽¹⁾	3-3
Table 3-4:	YVWD Local Water Supply ⁽¹⁾	3-4
Table 3-5:	SGPWA Local Water Supply	3-4
Table 4-1:	Potential Ultimate Water Demand for SGPWA	4-1
Table 4-2:	Supplemental SWP Water Requirements	4-2
Table 4-3:	SGPWA Incremental Demand, Local Supply and Supplemental SWP Water	4-3
Table 4-4:	Average and Dry Period SWP Table “A” Deliveries From the Delta Under Current Conditions ⁽¹⁾	4-5
Table 4-5:	Projected San Gorgonio Pass Water Agency Table “A” Water Requirements ⁽¹⁾	4-5
Table 4-6:	Projected San Gorgonio Pass Water Agency Table “A” Water Capacity	4-6
Table 5-1:	Supplemental SGPWA Delivery Requirements for State Water Project Water (Above an EBX Phase II Expanded Capacity of 64 cfs)	5-2
Table 5-2:	Alternative Delivery Requirements Based on 63% Reliability	5-4
Table 5-3:	Alternative Delivery Requirements Based on 80% Reliability	5-4
Table 5-4:	Lucerne Valley Alignment – Summary of Results for Required Additional Water Demand	5-5
Table 5-5:	Lucerne Valley Alignment – Pump Station Characteristics	5-6
Table 5-6:	Lucerne Valley Alignment – Hydro Power Station Characteristics	5-6
Table 5-7:	Loop Pipeline – Conveyance Criteria ⁽¹⁾	5-7
Table 5-8:	Loop Pipeline – Pump Station Characteristics	5-9
Table 5-9:	North Pass Alignment – Summary of Results for Required Additional Water	5-10
Table 5-10:	North Pass Alignment – Pump Station Characteristics	5-11
Table 5-11:	Summary of Results for Independent SGPWA North Pass Alignment	5-11
Table 5-12:	Independent SGPWA North Pass Alignment – Pump Station Characteristics	5-12
Table 5-13:	Summary of Results for Inland Feeder–Modified Pass Alignment for SGPWA and Morongo Tribal Lands Water Demand	5-13
Table 5-14:	Inland Feeder–Modified Pass Alignment – Pump Station Characteristics	5-13

TABLE OF CONTENTS

Table 6-1:	Allocated Capacity to CVWD, DWA, SGPWA and Morongo Tribal Lands for the Lucerne Valley and the North Pass Alignments (SWP 63% Reliability)	6-2
Table 6-2:	Allocated Capacity to CVWD, DWA, SGPWA and Morongo Tribal Lands for the Lucerne Valley and the North Pass Alignments (SWP 80% Reliability)	6-2
Table 6-3:	Allocated Capacity to SGPWA and Morongo Tribal Lands for the “Loop Pipeline”, Independent SGPWA North Pass Alignment and the Inland Feeder–Modified Pass Alignment (SWP 63% Reliability)	6-2
Table 6-4:	Allocated Capacity to SGPWA and Morongo Tribal Lands for the “Loop Pipeline” Alignment, Independent SGPWA North Pass Alignment, and the Inland Feeder–Modified Pass Alignment (SWP 80% Reliability)	6-2
Table 6-5:	Lucerne Valley Alignment – Cost Summary (SWP 63% Reliability)	6-3
Table 6-6:	Lucerne Valley Alignment – Cost Summary (SWP 80% Reliability)	6-4
Table 6-7:	North Pass Alignment – Cost Summary (SWP 63% Reliability)	6-5
Table 6-8:	North Pass Alignment – Cost Summary (SWP 80% Reliability)	6-5
Table 6-9:	Independent SGPWA North Pass Alignment – Cost Summary (SWP 63% Reliability)	6-6
Table 6-10:	Independent SGPWA North Pass Alignment – Cost Summary (SWP 80% Reliability)	6-7
Table 6-11:	Cost Allocation of MWD Inland Feeder (SWP 63% Reliability) ⁽¹⁾	6-7
Table 6-12:	Cost Allocation of MWD Inland Feeder (SWP 80% Reliability) ⁽¹⁾	6-8
Table 6-13:	Inland Feeder–Modified Pass Alignment – Cost Summary (SWP 63% Reliability)	6-8
Table 6-14:	Inland Feeder–Modified Pass Alignment Cost Summary (SWP 80% Reliability)	6-9
Table 6-15:	Summary of Total Cost (SWP 63% Reliability) ⁽¹⁾	6-10
Table 6-16:	Summary of Total Cost (SWP 80% Reliability) ⁽¹⁾	6-11
Table 6-17:	Summary of Results of Cost Differential for 7 fps vs. 8 fps for North Pass Alignment (SWP 63% Reliability)	6-13
Table 6-18:	SGPWA and Morongo Tribal Lands Project Cost Contingencies for Lucerne Valley Alignment Upsizing and Loop Pipeline for 63% Reliability	6-14
Table 6-19:	SGPWA and Morongo Tribal Lands Project Cost Contingencies for North Pass Alignment Upsizing for 63% Reliability	6-14
Table 6-20:	SGPWA and Morongo Tribal Lands Project Cost Contingencies for Independent SGPWA North Pass Alignment for 63% Reliability	6-14
Table 6-21:	SGPWA and Morongo Tribal Lands Project Cost Contingencies for Inland–Feeder Modified Pass Alignment for 63% Reliability	6-14

TABLE OF CONTENTS

Table 6-22: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Lucerne Valley Alignment Upsizing and Loop Pipeline for 80% Reliability	6-15
Table 6-23: SGPWA and Morongo Tribal Lands Project Cost Contingencies for North Pass Alignment Upsizing for 80% Reliability	6-15
Table 6-24: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Independent SGPWA North Pass Alignment for 80% Reliability	6-15
Table 6-25: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Inland Feeder–Modified Pass Alignment for 80% Reliability	6-15
Table 7-1: Ultimate Water Demand for Major Water Retailers, Unincorporated County	7-2
Table 7-2: Potential Ultimate Water Demand for the San Gorgonio Pass Water Agency Service Area	7-2
Table 7-3: Supplemental SWP Water Requirements	7-3
Table 7-4: Projected San Gorgonio Pass Water Agency Table “A” Water Requirements ⁽¹⁾	7-4
Table 7-5: Projected San Gorgonio Pass Water Agency Table “A” Water Capacity	7-4
Table 7-6: SGPWA Current and Projected Capacity in State Water Project	7-4
Table 7-7: SGPWA Supplemental Delivery Requirements in a Future Importation Project	7-5
Table 7-8: Facilities Parameters for Lucerne Valley Alignment	7-6
Table 7-9: Facilities Parameters for North Pass Alignment	7-7
Table 7-10: Facilities Parameters for Independent North Pass Alignment	7-7
Table 7-11: Facilities Parameters for Inland Feeder–Modified Pass Alignment	7-7
Table 7-12: Summary of Total Cost at 63% Reliability ⁽¹⁾ Allocated to	7-9
Table 7-13: Summary of Total Cost at 80% Reliability ⁽¹⁾ Allocated to	7-10
Table 7-14: SGPWA Supplemental Delivery Requirements Phased to Ultimate Buildout in Year 2045	7-12
Table 7-15: Implementation Date of SGPWA Supplemental Future Delivery Facilities	7-15
Table 7-16: Summary of Lowest Cost Alternatives to SGPWA ⁽¹⁾	7-15

LIST OF FIGURES

Figure 1-1: Regional Location Map	1-8
Figure 1-2: SGPWA Boundary Map	1-9
Figure 4-1: SGPWA Incremental Demand, Local Supply and Supplemental SWP Water	4-4
Figure 7-1: SGPWA Projected Supplemental Delivery Requirements (SWP 63% Reliability)	7-13

TABLE OF CONTENTS

Figure 7-2: SGPWA Projected Supplemental Delivery Requirements (SWP 80% Reliability)	7-14
--	------

LIST OF PLATES

Plate 1-1	SGPWA Aerial Map	1-10
Plate 1-2	SGPWA Major Water Retailers	1-11
Plate 2-1	SGPWA Cities, Counties and Morongo Tribal Lands Boundary Map	2-12
Plate 2-2	County of Riverside RCIP General Plan Land Use	2-13
Plate 2-3	City of Calimesa General Plan Land Use	2-14
Plate 2-4	City of Beaumont General Plan Land Use	2-15
Plate 2-5	City of Banning General Plan Land Use	2-16
Plate 2-6	General Plan Land Use within Agency Boundary	2-17
Plate 2-7	Riverside County Demographic Projection Units	2-18
Plate 2-8	Slope Analysis of Morongo Tribal Lands	2-19
Plate 2-9	Re-Categorized Land Use Designations within SGPWA Service Area Based on Water Retailers	2-20
Plate 5-1	DWR Existing and Proposed East Branch Extension	5-14
Plate 5-2	State Water Project Aqueduct Extension Alternative Alignments per August 2007 Development Plan	5-15
Plate 5-3	Lucerne Valley Alignment	5-16
Plate 5-4	Lucerne Valley Alignment Hydraulic Profile for 63% Reliability	5-17
Plate 5-5	Lucerne Valley Alignment Hydraulic Profile for 80% Reliability	5-18
Plate 5-6	Lucerne Valley Alignment Loop Pipeline	5-19
Plate 5-7	Lucerne Valley Alignment Loop Pipeline Hydraulic Profile For 63% Reliability	5-20
Plate 5-8	Lucerne Valley Alignment Loop Pipeline Hydraulic Profile For 80% Reliability	5-21
Plate 5-9	North Pass Alignment	5-22
Plate 5-10	North Pass Alignment Hydraulic Profile for 63% Reliability	5-23
Plate 5-11	North Pass Alignment Hydraulic Profile for 80% Reliability	5-24
Plate 5-12	Independent SGPWA North Pass Alignment	5-25
Plate 5-13	Independent SGPWA North Pass Alignment Hydraulic Profile for 63% Reliability	5-26
Plate 5-14	Independent SGPWA North Pass Alignment Hydraulic Profile for 80% Reliability	5-27
Plate 5-15	Inland Feeder-Modified Pass Alignment	5-28

TABLE OF CONTENTS

Plate 5-16	Inland Feeder-Modified Pass Alignment Hydraulic Profile for 63% Reliability_____	5-29
Plate 5-17	Inland Feeder-Modified Pass Alignment Hydraulic Profile for 80% Reliability_____	5-30

APPENDICES

- A County and Cities Land Use Designation within the SGPWA Boundaries
- B Re-Categorized Land Use Designations within Boundaries and Spheres of Influence of Major Water Retailers
- C Application of Unit Water Demand Factors to Re-Categorized Land Uses within Major Water Retailers
- D SGPWA Supplemental Calculations and SWP Table “A” Supply Requirements
- E Determination of Existing and Proposed Facilities Required to Convey Supplemental Water Demand
- F Detailed Pump Calculations for State Water Project Aqueduct Extension Alternatives
- G Cost Criteria per August 2007 Development Plan
- H Cost Percentage Allocation Calculations
- I Project Cost Estimates for State Water Project Aqueduct Extension Alternatives for 63% Reliability
- J Operations Costs for State Water Project Aqueduct Extension Alternatives for 63% Reliability
- K Maintenance Costs for State Water Project Aqueduct Extension Alternatives for 63% Reliability
- L Project Cost Estimates for State Water Project Aqueduct Extension Alternatives for 80% Reliability
- M Operations Costs for State Water Project Aqueduct Extension Alternatives for 80% Reliability
- N Maintenance Costs for State Water Project Aqueduct Extension Alternatives for 80% Reliability
- O Velocity Analysis Calculations
- P Summary of Letter Reports and Correspondence regarding Conveyance and Recharge Facilities for Beaumont, Banning and Cabazon Basins

EXECUTIVE SUMMARY

The purpose of this study is to determine the following:

1. Future supplemental water supply needs of the San Geronio Pass Water Agency (SGPWA) service area under ultimate development;
2. Research the most efficient, economical, and reliable method of securing this supplemental water supply; and
3. Determine the general alignment, capacity, and cost of the recommended conveyance system.

Future Water Supply Needs

The study determined that by the year 2045 the SGPWA will have a total water demand of 94,000 acre-feet per year. Potential water supply available from local water sources, within SGPWA's service area, is projected to be 55,000 acre feet per year by year 2045. This will leave an incremental demand above the local water supply of **39,000 acre-feet per year**¹ that SGPWA needs to secure by year 2045. An additional 20,000 acre-feet per year of supplemental water is required if the Morongo Band of Mission Indians' tribal lands are included in the study. It is proposed that SGPWA secure this supplemental water supply from the State Water Project or other parties willing to sell water rights.

(See Section 2–Water Demand Projection, Section 3–Local Water Supply, and Section 4–Supplemental State Water Project Water Demand)

Securing Future Water Supply Conveyance Facilities

The study analyzed several alternative conveyance facilities whereby SGPWA can convey the additional supplemental water supply needed to meet its future needs.

(See Section 5–New SGPWA Facilities to Meet Demand for Supplemental SWP Water)

Table “A” Water Entitlement

Table “A” refers to a table in SGPWA's contract with the California Department of Water Resources (DWR) which defines the amount of water contracted for each year the contract is in effect.

SGPWA is currently contracted with DWR for delivery of 17,300 acre feet per year of Table “A” water through the State Water Project. SGPWA needs to secure another

¹ This assumes a 100 percent reliability of imported water supply.

22,000 acre-feet per year² of supplemental water to meet the ultimate demand of 94,000 acre-feet per year by year 2045.

One of the purposes of this study is to determine the best method of delivering SWP water to SGPWA.

State Water Project Reliability

State Water Project supply is based upon a long term average reliability of 63 percent. However, should the Sacramento Delta be fixed in the future, the “Percent Reliability” factor would increase. Therefore, for the purposes of this study, the projected supplemental water demand were evaluated using a 63 percent reliability factor, and an assumed 80 percent reliability factor should the Delta be fixed.

East Branch Extension Phase II (scheduled to be complete in 2013)

With the completion of the State Water Project’s EBX II, SGPWA will have the conveyance capacity to receive its full allotment of 17,300 acre-feet per year of Table “A” water (48 cfs) from the State Water Project. In addition, SGPWA anticipates entering into negotiations with SBVMWD to obtain another 16 cfs capacity in the East Branch Extension which will provide SGPWA a total of 64 cfs from this facility.

However the ultimate water demand within the SGPWA service area (89 cfs) exceeds the capacity of SGPWA’s present and future capacity (64 cfs) in the East Branch Extension. Therefore SGPWA needs to acquire an additional 25 cfs in a future facility, along with another 46 cfs if the Morongo Band of Mission Indians become a retail customer.

State Water Project Aqueduct Extension

The study analyzed four potential alignments (see Plates 5-6, 5-9, 5-12, and 5-15) to convey additional State Water Project water to SGPWA. For two alternatives, SGPWA would be a participant with Coachella Valley Water District and Desert Water Agency in the water conveyance projects. The other two projects would be independent SGPWA (or SGPWA and Morongo Band of Mission Indians) projects.

Each of the four alternatives would provide SGPWA with sufficient capacity (25 cfs) to meet its ultimate water demand projected to occur by the year 2045.

Project Cost Estimates

This study provides a summary of the facilities required and estimates of the cost to construct each of the four alternative conveyance facilities. (*See Section 6–Project Cost Estimates*)

² This assumes 100 percent reliability of imported water. The long-term reliability of SWP water (2007) is 63 percent. For this study we projected that reliability would increase to 80 percent if the Sacramento Delta was fixed. With an 80 percent reliability of SWP water, San Gorgonio Pass Water Agency would need to secure 32,000 acre feet per year and not 22,000 acre feet per year.

Based on the cost analysis of the four proposed alternative conveyance facilities, the North Pass Alignment alternative is the lowest cost option for SGPWA with the participation of CVWD and DWA. If SGPWA prefers to independently develop its own project, the Independent SGPWA North Pass Alignment alternative is the lowest cost alternative, provided the Morongo Band of Mission Indians participate in the project. The cost savings when utilizing a reliability factor of 80% rather than 63% of SWP delivery is approximately a 50 to 60% decrease in cost. The 80% reliability factor for SWP water delivery was assumed based on a probable Delta fix. The timing of this Delta fix is unknown. Table ES-1 below summarizes these costs.

Table ES-1: Summary of SGPWA Project Cost of Alternative Alignments

Alternative Alignment	Participation Requirements	SGPWA Project Costs ⁽¹⁾	
		63% Reliability of SWP Water	80% Reliability of SWP Water
Lucerne Valley	CVWD and DWA	\$302,300,000	\$189,100,000
North Pass	CVWD and DWA	\$68,100,000	\$35,900,000
Independent SGPWA North Pass	None	\$181,700,000	\$145,400,000
Inland Feeder–Modified Pass	(2)	\$176,200,000	\$119,900,000

(1) This project cost summary is based on consideration of SGPWA capacities only and does not include Morongo capacities.

(2) SGPWA allocated project cost for the Inland Feeder–Modified Pass Alignment alternative is lower than the cost for Independent SGPWA North Pass Alignment alternative. However, this alignment requires participation in the form of capacity purchases from MWD's Inland Feeder as discussed in Section 6 and therefore is not totally independent.

Implementation

Based on assumed growth trends within the SGPWA service area, the initial phases of the supplemental SWP water delivery system are required to be on-line within a 15 to 20 year period depending on which Sacramento Delta reliability factor is used. Current growth trends have decreased as a result of the current economic decline beginning in 2007. If the depressed economic conditions continue in Southern California, it may delay the need for the State Water Project Aqueduct Extension project.

Recommendation

In order to ensure a reliable water supply into the future, it is recommended that SGPWA undertake the following actions:

1. Continue working with Coachella Valley Water District and Desert Water Agency on the planning of the proposed State Water Project Aqueduct Extension Project;
2. Initiate a financial plan to determine SGPWA's means and methods of financial participation in the Aqueduct Extension Project and the acquisition of additional water rights;
3. Initiate action to acquire water rights to meet SGPWA ultimate water demand;
4. Determine if the Morongo Band of Mission Indians intends to participate in the State Water Project Aqueduct Extension Project;
5. Evaluate the reliability of the local water supply within SGPWA's service area;
6. Initiate actions to acquire 16 cfs capacity in the East Branch Extension from SBVMWD;
and
7. Develop a conjunctive use plan to store and recover State Water Project water in the Beaumont, Cabazon, and other groundwater basins within SGPWA's service area.

SECTION 1 - INTRODUCTION

San Gorgonio Pass Water Agency's (SGPWA) mission is to "...import supplemental water and to protect and enhance local water supplies for use by present and future water users..."¹ In carrying out this mission, and in their planning for facilities and contracts for additional water, SGPWA requires reliable information on the existing water resources and reliable projections of future supplies and demands.

On May 3, 2006, the San Timoteo Watershed Management Authority and the San Gorgonio Pass Water Agency transmitted to George Spiliotis, Executive Officer of the Local Agency Formation Commission of Riverside, a letter report titled "2006 Report on Water Supply Conditions in the San Gorgonio Pass Region" prepared by Wildermuth Environmental Inc. (Wildermuth). The Wildermuth report projected that the total water demand in SGPWA's service area in 2030 will be 85,309 acre-feet per year. Based on the projected water demand for State Water Project (SWP) water from the various retailers within SGPWA's service area, the demand for SWP water will increase from about 10,500 acre-feet in 2010 to 34,500² acre-feet per year in 2030. The last conclusion of the Wildermuth letter report was "...water demands will continue to increase beyond 2030 and therefore additional supplemental water supplies beyond Table "A"³, suggested above, will be required".

Wildermuth Environmental, Inc. estimated, based upon Department of Water Resources (DWR) reports, that the average reliability of SWP water supply was 69 percent. Hence, to achieve a reliable supply of 34,500 acre-feet per year of SWP water, SGPWA will have to increase their SWP entitlement from 17,300 acre-feet per year to 50,000 acre-feet per year (34,500 acre-feet per year/69% reliability) by the year 2030.

The above projected estimate for SWP water is predicated on "...aggressively developing local water supplies including recycled water, completing the East Branch Extension of the SWP and by the securing of additional supplemental water supplies from outside the SGPWA service area."⁴

¹ San Gorgonio Pass Water Agency "Strategic Plan", April 2006.

² From Wildermuth Environmental Inc.'s letter report "2006 Report on Water Supply Conditions in the San Gorgonio Pass Region", April 14, 2006. The projected State Water Project water is based upon data presented in Tables 2, 3, 4, 5, and 6 of Wildermuth's report.

³ Table "A" water refers to a table in SGPWA's contract with the California Department of Water Resources, signed on November 16, 1962 and subsequent amendments. Article 6 of the contract defines Table "A" amounts as the amount of water a contractor has contracted for with DWR each year the contract is in effect.

⁴ From joint letter dated May 3, 2006 from San Timoteo Watershed Management Authority and San Gorgonio Pass Water Agency to George Spiliotis, Executive Officer of LAFCO.

PURPOSE OF THE STUDY

The purpose of this study is to determine SGPWA's future water demands and compare them against the existing supplies to calculate the projected water supplies required to meet these demands.

The sources of supplemental water supplies will thereby be identified along with the required facilities to meet the future water demands. The following is a summary of the purpose of this study:

- Determine SGPWA's future water demands, over and above its existing Table "A" entitlement of 17,300 acre-feet per year, in five-year increments from year 2010 to year 2030. The projected demand for supplemental water will be based upon the approved General Land Use Plans within the study area.
- Provide information on the reliability of the supplemental water supply based upon the average, maximum, and minimum projection of SWP water deliveries.
- Determine, on a reconnaissance level basis, the feasibility of recharging SWP water during years of surplus water and extracting this water during dry years in order to maximize the reliability of imported SWP water. A study of the Beaumont Groundwater Basin was completed previously and potential recharge basins were identified.
- Develop a capital improvement plan of the facilities that will be required to bring the additional supplemental water to and through SGPWA's service area.
- Determine the capital cost of distributing supplemental water supply and recharge facilities within the San Gorgonio Pass Water Agency's service area.

HISTORY

State Water Project

On November 16, 1962, SGPWA contracted with the California DWR for a maximum annual entitlement of 15,000 acre-feet of SWP water. On January 19, 1965 SGPWA, by Amendment No. 2 to their Water Supply Contract with DWR, increased their maximum annual entitlement to 17,300 acre-feet per year.

DWR published Bulletin No. 119-2 "Feasibility of Serving the San Gorgonio Pass Water Agency from the State Water Facilities" in February 1963. DWR estimated that SGPWA's 1990 urban water requirements would be 16,000 acre-feet per year and the local water supplies for urban use were 4,000 acre-feet per year. Hence, the supplemental urban water demand for imported water was projected to be 12,000 acre-feet per year starting in 1990.

At the request of SGPWA and other agencies, DWR initiated a feasibility study in December 1975 on how to provide State Water Project water to SGPWA. In 1993 SGPWA decided to proceed with their own project. SGPWA completed their Draft EIR in November 1993, and the Board certified the water importation project on April 4, 1994.⁵

In 1995 SGPWA requested that the DWR make the proposed project, to serve SGPWA, an extension of the SWP East Branch. The Department agreed and constructed the East Branch Extension's first phase.

Dedication ceremonies were held in March 2003, marking the completion of Phase I of the East Branch Extension pipeline and pump stations. This project marked the culmination of over 10 years of planning, engineering, and construction, and represented a major milestone for SGPWA in its efforts to eliminate overdraft conditions in the San Geronio Pass Area.

The extension of the East Branch of the California Aqueduct was planned to be constructed in two phases since not all of the facilities would be needed in the early part of 2000, the targeted completion date for the first phase of the project. Phase II construction of the East Branch includes additional water transmission facilities as well as additional pumping capacity. The preferred alternative includes a new Mentone Pumping Station and a regulating reservoir to take advantage of on and off-peak pumping, as well as a new Santa Ana River crossing. The planned facilities will be for SGPWA's full 17,300 acre-feet per year allotment from the SWP. The transmission piping that exists at the present time from the Crafton Hills Pumping Station to Cherry Valley is designed to deliver the full capacity of the SWP and no new piping is required in this area. Additional pumps will be required as part of Phase II at the Crafton Hills and Cherry Valley Pump Stations.

The California DWR certified the Environmental Impact Report and approved the project on March 6, 2009. Construction of the proposed project is scheduled to begin in 2009 and be complete in 2013⁶.

Integrated Water Resources Plan

In 2003 SGPWA contracted with a firm to initiate an "Integrated Water Resources Plan" (IWRP) which resulted in a report titled "IWRP Year One of the Plan Existing Conditions Draft Report", January 2004. The major tasks of the program were:

- Task 1 Definition of Values and Policies
- Task 2 Population and Water Demand Forecasts

⁵ SGPWA's Resolution No. 1994—03 "Certifying the Water Importation Final EIR."

⁶ Per California Department of Water Resources "Findings of Fact and Statement of Overriding Consideration" March 6, 2009, completion is in 2012, although per July 2009 discussion with SGPWA Agency Representative, completion is scheduled in 2013.

- Task 3 Local Resource Assessment
- Task 4 Facilities Assessment
- Task 5 Develop Screening Criteria
- Task 6 Develop Plan Alternatives
- Task 7 Evaluate Costs and Financing Alternatives
- Task 8 Develop Schedule for Plan Implementation

Tasks 1 through 3 were reported in the "IWRP Year One" draft report, January 2004. The subsequent tasks were not initiated. The IWRP clearly defined the area of SGPWA and its current reliance on local water resources as described in the following paragraphs.

"The San Gorgonio Pass Water Agency encompasses an approximate area of 220 square miles in the north central part of Riverside County in the San Gorgonio Pass area. The SGPWA, ... is bounded on the north by the San Bernardino Mountains, on the south by the San Jacinto Mountains, on the south and west by the San Timoteo Badlands, and on the east by the pass opening to the upper Coachella Valley (SGPWA, 2003). The principal cities within the SGPWA area are Banning, Beaumont, and Calimesa. Water is supplied to meet demand within the SGPWA and these cities by a combination of groundwater, local stream diversions, and spreading operations in major tributary watersheds. The principal source of water within the SGPWA is groundwater.

Groundwater is extracted from several groundwater basins within the SGPWA. These groundwater basins are: Banning, Banning Bench, Banning Canyon, Beaumont, Cabazon, Calimesa, Edgar Canyon, San Timoteo, Singleton, and South Beaumont. The groundwater basin boundaries... are generally defined by bedrock contacts and known or postulated faults. The Beaumont Storage Unit is the main groundwater basin within the SGPWA and has been found to be in a state of overdraft where more water is being extracted than is being recharged. In a recent Annual Engineer's Report on Water Conditions (SGPWA, 2003), the Beaumont Storage Unit was found to be over drafted by 3827, 6384, and 6482 acre feet (AF) for 1999, 2000, 2001, respectively. This overdraft condition within the Beaumont Storage Unit and other groundwater units experiencing similar declines in water levels has recently begun to be mitigated by the artificial recharge of water by purchasing State Water Project water."

Strategic Plan

In March 2006, SGPWA adopted a strategic plan which included among other things, a mission statement, a vision statement, and a series of priorities and objectives for the SGPWA. The plan also identified the definition of the SGPWA role as a critical factor for success... The SGPWA

role, as defined by the Board of Directors, includes the statement "The San Geronio Pass Water Agency is an advocate for the groundwater basins within our service area... It is our goal to preserve them for current and future generation... We are committed to end groundwater overdraft in our service area."

The strategic plan's specific objectives include the following, each of which is related to preserving local groundwater basins:

- Identify additional supplemental water available, including SWP and other alternatives.
- Complete the East Branch Extension, Phase II (EBXII).
- Construct additional permanent recharge facilities to augment the Little San Geronio Creek facility.
- Extend the East Branch Extension of the California Aqueduct to Cabazon.
- Continue to work with the Beaumont Basin Watermaster to provide the best possible management of the Beaumont Basin.
- Develop a comprehensive financial plan to provide funding for the projects identified above.⁷

Beaumont Groundwater Basin

A critical facet of the water supply picture in the SGPWA's service area is how the Beaumont Groundwater Basin, which is the fastest growing area within SGPWA's service area, is managed.⁸ The 2004 adjudication of the Beaumont Groundwater Basin marks a critical milestone in the way in which the groundwater and underground storage will be developed, managed, and administered in the basin. The terms of the adjudication dictate, to a large extent, the way in which future demands for water are met. More importantly, the conditions of the adjudication will determine the basin's future viability as a dependable source of water and will have a direct impact upon the quantity of supplemental water that will be required within SGPWA's service area and the timing of the proposed conveyance facilities.

⁷ From "Report on Water Conditions", March 2007.

⁸ The terms "storage unit" and "basin" as used herein are used interchangeably, and the boundaries of the said basins are as defined by the USGS.

Several of the fundamental assumptions underlying the adjudication are in conflict with observed conditions. For example, the finding that there exists a 160,000 AF surplus in the basin cannot be reconciled with the fact that the basin has been, and continues to be, in a state of overdraft. The ramifications of this are serious: planning by SGPWA, as well as planning by other water purveyors within the basin, relies on the availability and allocation of resources prescribed by the adjudication. Forecasts of future supplies and demands, and projections of the future state of overdraft are intimately tied to the terms of the adjudication.

The long-term sustainability of water resources within the Beaumont Basin may be adversely affected if the fundamental assumptions underlying the adjudication are incorrect. This may prove to be equally true of the other basins within SGPWA's service area, in cases where the inferred hydrology is incorrect, but is nonetheless used as the basis for resource management. If the local groundwater supply falls short of expectations, then additional supplemental water will be required to be provided by SGPWA. Data in the Wildermuth report⁹ leads us to project that SGPWA will need to acquire at least an additional 32,700¹⁰ acre-feet of supplemental Table "A" water from DWR to meet the supplemental water demand projected for the year 2030 based on the average reliability of water supply. In the Wildermuth report, page 6, Wildermuth noted that "With the exception of the SMWC and CCWD, water demands will continue to increase beyond 2030 and therefore additional supplemental water supplies beyond the Table "A" suggested above will be required". This has a significant impact on the potential physical facilities which will be needed to bring this proposed additional supplemental water supply (needed for the period beyond 2030) into SGPWA's service area, in addition to the financial ramifications of paying for the capital facilities and water rights.

STUDY AREA

The San Gorgonio Pass area is the narrow east-west strip of land between the San Bernardino Valley to the west and the Palm Springs/Coachella Valley to the east. SGPWA is located within this area as shown in the Regional Location map in Figure 1-1. Within the boundaries of SGPWA lie the cities of Calimesa, Beaumont, Banning and portions of unincorporated Riverside County as shown in the SGPWA boundary map in Figure 1-2. An aerial map of the area as shown in Plate 1-1 indicates that the area is generally mountainous with low flat areas with washes, creeks and rivers.

⁹ Wildermuth's "2006 Report on Water Supply Conditions in the San Gorgonio Pass Region", May 3, 2006.

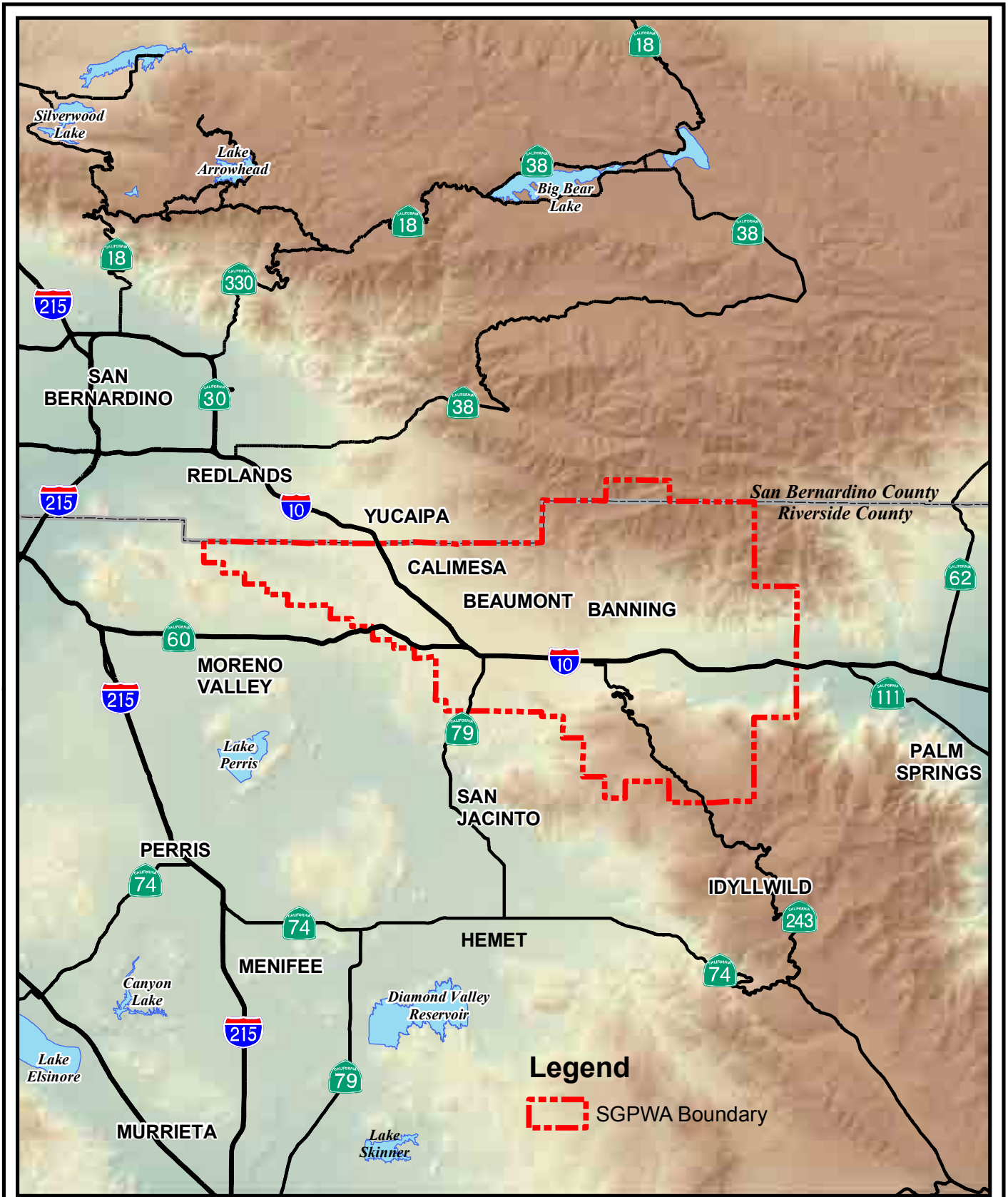
¹⁰ $[34,500 \text{ acre-feet/year} / 0.69 \text{ (average reliability of SWP water)} = 50,000 \text{ acre-feet/year} - 17,300 \text{ acre-feet/year (Table A Water)} = 32,700 \text{ acre-feet/year}]$.

MAJOR WATER RETAILERS

The following are the major water retailers within SGPWA service area:

- Beaumont Cherry Valley Water District
- City of Banning Water Department
- Yucaipa Valley Water District
- Cabazon Water District
- Banning Heights Mutual Water Company
- High Valleys Water District
- South Mesa Water Company
- Morongo Tribal Lands

The physical boundaries of these major water retailers as well as their respective spheres of influence are shown in Plate 1-2.




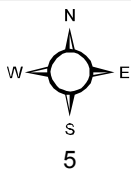
Legend
 SGPWA Boundary

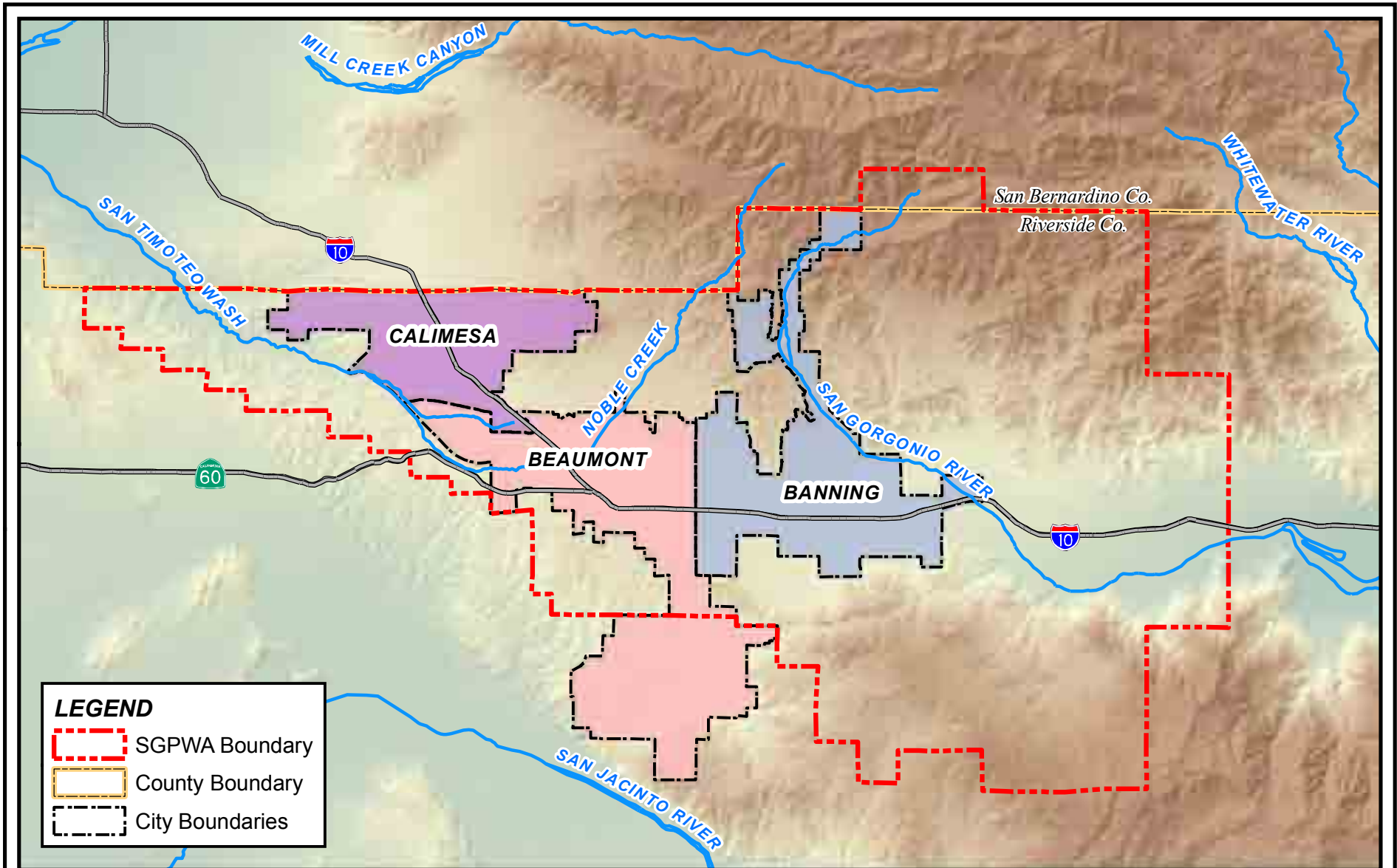
Figure 1-1

Regional Location Map



0 5 10
 Miles





Sources: Riverside Co. LAFCO, April, 2008;
 Riverside County GIS, 2008.

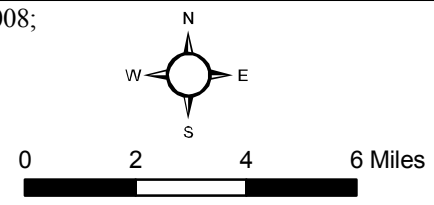
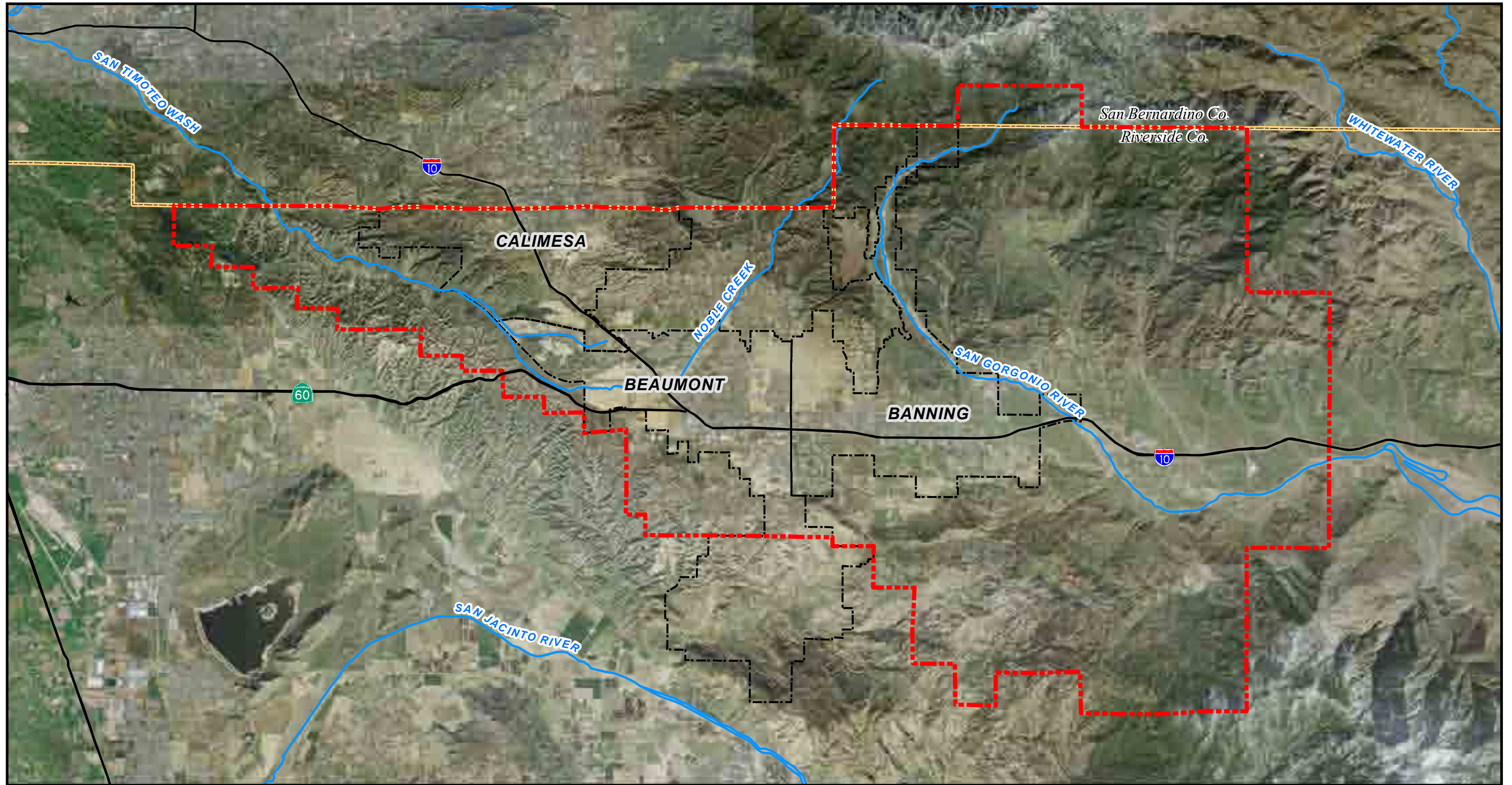
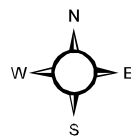


Figure 1-2

SGPWA Boundary Map



Sources: Riverside Co. LAFCO, April 2008;
Digital Globe, April 2008.



0 2 4 6 Miles

LEGEND



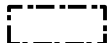
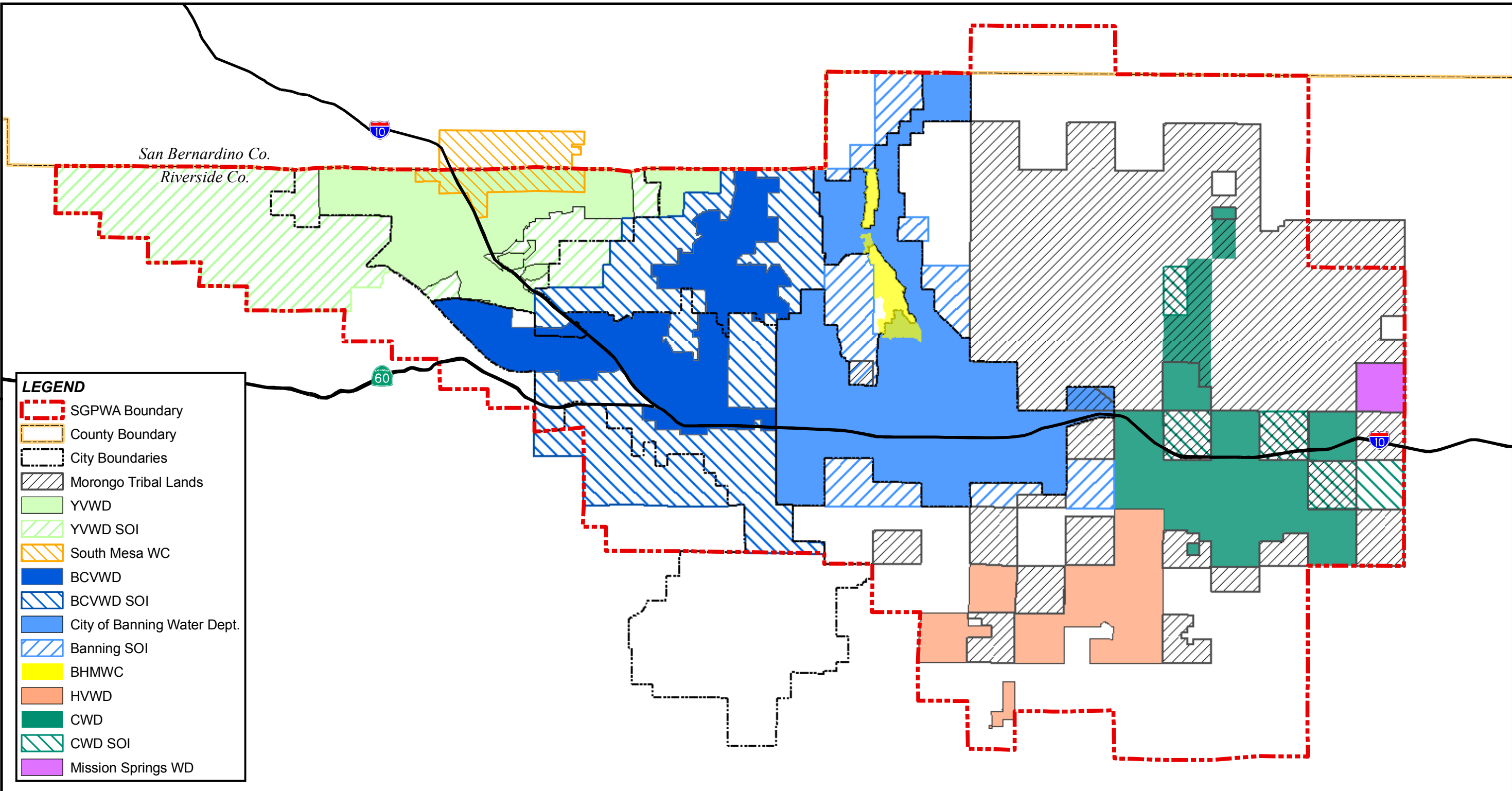
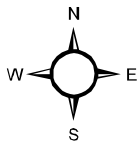
-  SGPWA Boundary
-  County Boundary
-  City Boundaries

Plate 1-1

SGPWA Aerial Map



Sources: Riverside Co. LAFCO, April, 2008; YVWD, 2008; BCVWD, 2005; BHMWC, 2008; Riverside County GIS, 2009. (all boundaries subject to verification)



0 1 2 3 Miles

SECTION 2 - WATER DEMAND PROJECTION

SGPWA SERVICE AREA AND APPROVED GENERAL LAND USE PLAN

The SGPWA service area includes incorporated cities such as Banning, Beaumont and Calimesa and unincorporated areas of Riverside and San Bernardino County. Additionally, certain portions of unincorporated Riverside County includes lands of the Morongo Band of Mission Indians. Refer to Plate 2-1 for these boundaries, which are based upon Riverside County data.

Each city and county has established its own general plan, which provides for general land uses within each respective boundary. These land use designations provide the city or county a means of regulating the type of structures and uses for areas within their boundaries. By regulating land uses, the city or county may then provide for proper planning of services such as roadways, freeways, and utilities such as water service. Approved general plan data provides a means for projecting the ultimate water demand for a given area(s). It is noted that the land uses within each city or county differ by name though have similar characteristics. A review of available land use data was conducted and the following is the land use per city and county (available sources of data based on city's and county's approved General Use Plans):

County of Riverside General Plan Land Use	Plate 2-2
City of Calimesa General Plan Land Use	Plate 2-3
City of Beaumont General Plan Land Use	Plate 2-4
City of Banning General Plan Land Use	Plate 2-5

A combined plan of land uses within SGPWA boundaries is shown in Plate 2-6 and Table 2-1 is a summary of areas encompassed by each city and area.

Table 2-1: SGPWA Service Area⁽¹⁾

City, County, and Morongo Land Areas	Area (Acres)
City of Banning (includes 277 acres of Morongo Tribal Lands)	14,843
City of Beaumont	10,996
City of Calimesa	9,533
Unincorporated Riverside County (excludes Morongo Tribal Lands)	70,798
Unincorporated San Bernardino County ⁽²⁾	1,910
Morongo Tribal Lands (within unincorporated Riverside County)	34,336
SGPWA Service Area	142,416

⁽¹⁾ Refer to Appendix A for detailed breakdown of land designation within the cities/counties and respective areas in acres.

⁽²⁾ Area was determined by San Bernardino County G.I.S. Data.

WATER DEMAND PROJECTIONS

Water demand projections within the San Gorgonio Pass Water Agency were evaluated based upon the following:

- (1) Population and/or housing growth;
- (2) Urban Water Management Plans; and
- (3) General Plan Land Use

Water Demand Based on Population and/or Housing

Incremental water demand projections are based upon housing unit and population projections made by the Riverside County Center for Demographic Research.

Riverside County Projections 2006 (RCP-06) is a five-year incremental forecast of population, housing, and employment for Riverside County, California, for the years 2005 through 2035. The Riverside County Center for Demographic Research was established in 2005 as a joint effort between Coachella Valley Association of Governments, Western Riverside Council of Governments, the County of Riverside, and the University of California, Riverside. RCP-06 was developed to provide County agencies and departments, the councils of governments, the universities and other entities a consistent standard set of population, housing, and employment forecasts for use in their operational and planning activities. A major objective for developing RCP-06 was to provide the Southern California Association of Governments (SCAG) with a set of projections for inclusion in their regional growth forecasts, which are used for both the Regional Transportation Plan update and the Regional Housing Needs Assessment program.

The Housing and Population Projections by Partial Census Tracts (PCT) is shown on Table 2-2. A PCT is created where Cities or Census Designated Places (Communities) intersect with 2000 Census Tracts, splitting Census Tracts into partial Census Tracts.

Plate 2-7 shows the Riverside County Demographic Projection Units within San Gorgonio Pass Water Agency.

Table 2-2 shows the anticipated absorption rate of housing at about 1,757 units per year between years 2010 and 2035.

Population in the SGPWA service areas is projected to increase significantly by 2035. Between 2000 and 2035, population is expected to increase from 53,035 to 193,921, an increase of 266 percent for the thirty-five year period. The projected population growth within SGPWA service area from 2000 to the year 2035 (growth forecast by Partial Census Tract No.) is shown in Table 2-2.

The incremental water demand projections for SGPWA were based on housing unit and population projections multiplied by approximate unit water use.

The three major retail water purveyors within SGPWA have projected various unit water use factors for population and/or housing units.

The City of Banning average residential water demand per equivalent dwelling unit (EDU) is 0.67 acre-feet per year. The City of Banning assumes that the residential water demand is 59% of the total water demand of the City. This multiplier along with those developed for Beaumont-Cherry Valley Water District, and Yucaipa Valley Water District were used to calculate the projected water demand within the San Gorgonio Pass Water Agency to the year 2035. Shown on Table 2-3 are the projected water demand from 2005 to 2035 based on the unit water use factors for dwelling units or population based on information gathered from master water plans and urban water management plans developed for the City of Banning, Beaumont-Cherry Valley Water District, and Yucaipa Valley Water District respectively.

The range of projections for water demand in the year 2035 varied from a low of 61,000 to 90,000 acre-feet per year.

**Table 2-2: San Gorgonio Pass Water Agency
Projection of Housing Units and Population¹ within SGPWA**

TRACT	PLACE NAME	HOUSING UNITS								POPULATION							
		2000	2005	2010	2015	2020	2025	2030	2035	2000	2005	2010	2015	2020	2025	2030	2035
43808	Cherry Valley CDP	673	706	784	989	1153	1339	1467	1587	1683	1795	1979	2493	2866	3354	3670	3966
43808	Unincorp	88	232	255	469	652	859	1117	1274	267	716	782	1438	1974	2625	3412	3892
43809	Banning	0	0	473	941	1434	1977	2620	2913	0	0	1345	2723	3887	5180	6825	7616
43809	Beaumont	32	34	222	447	563	641	678	704	92	101	678	1300	1541	1766	1870	1941
43809	Cherry Valley CDP	1363	1375	1402	1654	1799	1979	2105	2194	2893	2967	3006	3534	3789	4196	4454	4637
43805	Beaumont	792	2375	5040	7652	10045	12529	15133	15738	1966	6224	13552	19544	24188	30481	36898	38463
43808	Beaumont	36	1388	1615	1852	2043	2158	2173	2296	83	3438	4122	4496	4687	5019	5079	5394
43808	Calimesa	610	619	735	785	836	965	1195	1209	1129	1184	1664	1744	1909	1972	2484	2491
43802	Calimesa	2091	2110	2525	3140	3280	3310	3330	3340	5033	5246	7387	8994	9839	10247	10506	10539
43805	Calimesa	547	574	1169	2078	3398	4614	6211	8000	977	1060	2554	4455	6519	9129	12514	15801
43806	Banning	2452	3338	3879	4434	5167	6061	6853	7247	4111	5847	7169	8329	9071	10246	11486	12157
43806	Unincorp	631	640	736	1090	1184	1426	1574	1889	1536	1581	1792	2601	2790	3385	3737	4478
43807	Beaumont	798	1139	1369	1813	2041	2304	2600	2620	1999	3030	3737	4690	4970	5654	6383	6443
43807	Cherry Valley CDP	591	601	740	933	1021	1129	1189	1242	1315	1360	1662	2093	2263	2526	2660	2780
43807	Unincorp	1	1	1	155	308	453	581	668	4	4	4	601	1178	1745	2234	2564
43809	Unincorp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43900	Beaumont	1897	2007	2607	3237	3754	4335	4980	5025	5433	6173	8260	9751	10652	12403	14260	14401
44000	Beaumont	762	812	897	1271	1611	1971	2356	2445	1992	2276	2588	3475	4157	5148	6176	6437
44101	Banning	1037	1101	1106	1112	1117	1143	1170	1197	2632	2917	3090	3155	3375	3386	3397	3408
44102	Banning	935	950	955	959	964	987	1010	1033	2444	2596	2752	2810	3008	3017	3026	3036
44103	Banning	1855	2194	2721	3250	3867	4684	5202	5719	3863	4751	6182	7483	8318	9701	10683	11760
44103	Unincorp	0	75	75	75	75	75	77	77	0	197	197	198	199	199	201	201
44104	Banning	793	807	1457	2104	2807	3660	4312	4915	2260	2401	4550	6667	8309	10429	12183	13900
44104	Unincorp	101	116	118	146	169	195	217	231	253	296	299	370	422	491	545	580
44200	Banning	1626	1722	1763	1789	1806	1823	1840	1857	4822	5336	5764	5946	6365	6385	6404	6423
44300	Banning	1063	1327	1362	1401	1480	1558	1636	1714	3430	4435	4793	5007	5351	5369	5388	5487
44300	Unincorp	0	0	0	0	0	0	0	0	589	589	589	589	589	601	613	625
43806	Cabazon CDP	846	870	922	1175	1292	1434	1578	1725	2229	2326	2444	3082	3342	3743	4117	4501
TOTAL		21,620	27,113	34,928	44,951	53,866	63,609	73,204	78,859	53,035	68,846	92,941	117,568	135,558	158,397	181,205	193,921

¹Projections from the Riverside County Center for Demographic Research through 2035, based on 2000 Census data

The City of Banning unit water factor of 0.67 acre-feet/DU/year applied to the projected number of dwelling units in Table 2-2 yields an ultimate water demand of 89,552 acre-feet by year 2035 (Table 2-3). The Beaumont-Cherry Valley Water District unit water use factor of 0.61 acre-feet/DU/year yields 84,245 acre-feet by year 2035. Yucaipa Valley Water District based their water demand projections upon a per capita water use of 280 gallons per day/person. This unit water use factor applied to the population projection for SGPWA (Table 2-2) yields a projected water demand in year 2035 of 60,821 acre-feet, substantially less than the water demand projections based on the City of Banning or Beaumont-Cherry Valley Water District unit water use factors.

Table 2-3: SGPWA Projected Water Demand Based Upon Population or DU's
In Acre-Feet per Year

Year	2005	2010	2015	2020	2025	2030	2035
Housing Units	27,113	34,928	44,951	53,866	63,609	73,204	78,859
Population	68,846	92,941	117,568	135,558	158,397	180,205	193,921
City of Banning ⁽¹⁾	30,789	39,664	57,046	61,170	72,234	83,130	89,552
Beaumont-Cherry Valley Water District ⁽²⁾	34,313	44,573	57,445	60,092	69,288	78,204	84,245
Yucaipa Water District ⁽³⁾	21,593	29,150	36,874	45,516	49,680	56,833	60,821

⁽¹⁾ Unit water use factor for City of Banning is 0.67 acre-feet/DU/year and the residential water demand is assumed to be 59% of the total water demand of the City.

⁽²⁾ Unit water use factor for Beaumont-Cherry Valley Water District is 0.61 acre-feet/DU/year and the residential percentage of the District's total water demand varies.

⁽³⁾ Unit water use factors for Yucaipa Valley Water District is 280 gpd/person.

Urban Water Management Plans

By state law, each public water entity of a certain minimum size is required to prepare an "Urban Water Management Plan" every five years. The most recent plans were published as of 2005. Each entity is required to project their water demand to the year 2030.

The SGPWA service area includes the cities of Banning, Beaumont, and Calimesa, the community of Cherry Valley, the Morongo Tribal Lands and portions of the Cabazon area. These cities and communities are served by Beaumont Cherry Valley Water District, Cabazon Water District, South Mesa Water Company, Yucaipa Valley Water District, Banning Heights Mutual Water Company and City of Banning Water Department. Water demand projections for the SGPWA service area are identified in Table 2-4, and were derived from the UWMP's for each water retailer as well as other sources. A portion of the Yucaipa Valley Water District (YVWD) area is included in the SGPWA service area; therefore, a portion of this YVWD's estimated water demands are included in this projection.

Shown in Table 2-4 is the projected water demand by 5-year increments to the year 2030 for each of the stated water retailers. The total projected demand in 2030 is 85,600 acre-feet. Not shown is the projected demand for Banning Heights Mutual Water Company which estimated their demand to be 3,000 acre-feet per year.¹¹

Not represented in Table 2-4 is the projected water demand for the Morongo Band of Mission Indians.

Table 2-4: Water Demand in the San Gorgonio Pass Water Agency Service Area by Major Water Retailers Based upon Urban Water Management Plans
(Acre-feet per Year)

Water Retailer	2005	2010	2015	2020	2025	2030
Beaumont Cherry Valley WD ⁽¹⁾	8,767	22,286	27,888	29,292	29,994	30,452
City of Banning ⁽²⁾	9,484	12,501	15,518	18,535	21,552	24,569
Cabazon Water District ⁽³⁾	1,000	4,000	8,000	12,000	16,000	16,000
South Mesa Water Company ⁽³⁾	2,500	2,740	3,200	3,560	3,900	4,300
Yucaipa Valley Water District ⁽⁴⁾	1,700	3,000	5,000	6,935	8,610	10,285
Totals⁽⁵⁾	23,500	44,500	59,600	70,300	80,000	85,600

⁽¹⁾ Data from Table 3-1 of January 28, 2006 Urban Water Management Plan Update for Beaumont Cherry Valley Water District.

⁽²⁾ Data from Table 3-1 of December 5, 2005 Urban Water Management Plan for City of Banning. The determination of water demand for City of Banning was based on planned development delineated by land use, though the City UWMP does not appear to differentiate Morongo Tribal Lands within the City's boundaries and sphere of influence.

⁽³⁾ Data from first Table on page 2 of the May 3, 2006 Report on Water Supply Conditions in the San Gorgonio Pass Region prepared for the San Timoteo Watershed Management Authority and San Gorgonio Pass Water Agency.

⁽⁴⁾ Data from Attachment "A" Table of the February 5, 2007 letter to Jeff Davis of SGPWA from Joseph Zoba of Yucaipa Valley Water District.

⁽⁵⁾ Rounded to nearest hundred.

Ultimate Water Demand Based on Land Use Projection

A review of unit water factors based upon land use type was conducted among the retailers within SGPWA service area and in adjacent water entities. Based on these reviews and searches, water demand unit use factors for City of Banning Water Department were utilized to determine

¹¹In a March 16, 2008 correspondence with Mr. Charles Perkins of Banning Heights Mutual Water Company (BHMWC), the projected water demand for Banning Heights Mutual Water Company is estimated at 3,000 acre feet per year.

water demand for each land use category within SGPWA's service area. Table 2-5 summarizes the water demand factors with corresponding land use designations to be applied.

Table 2-5: Water Demand Factors

Land Use Type	Water Duty Factors Acre-Feet/Acre/Year
Airport	0.60
Commercial	1.21
Golf Courses	3.44
Industrial	1.27
Public Facilities	1.76
Residential Agriculture (1 DU/10 Acres)	2.09
Residential Rural (0-1 DU/Acre)	2.29
Residential Very Low (0-2 DU/Acre)	2.21
Residential Low (3-5 DU/Acre)	2.46
Residential Medium (5-12 DU/Acre)	3.76
Residential High (12-29 DU/Acre)	5.38
Mobile Home ⁽¹⁾	1.34

⁽¹⁾ Based on EMWD Duty Factor

General Plan land use designations within the Morongo Tribal Lands were unavailable. Therefore a slope analysis was conducted to evaluate potential developable areas within these lands. Table 2-6 provides for summary results of the slope analysis and Plate 2-8 depicts the developable areas. It was assumed areas with slope ranging from 0% to 10% are developable and the water demand factor applied to these areas is 2 acre-feet/acre/year.

Table 2-6: Morongo Tribal Lands Slope Analysis

Slope Range	Area
0% to 5%	12,356 acres
5% to 10%	6,685 acres
10% to 12%	2,719 acres
12% and Greater	12,576 acres
TOTAL	34,336 acres

The service area of the Morongo Tribal Lands, as indicated in Table 2-1 of this report, was based on available Riverside County Geographic Information System (GIS) data for land use designation. The slope analysis was based on analyzing available GIS data on existing ground

elevations and characteristics and has minor irregularities. For the purposes of this report, the total area for Morongo Tribal Lands as determined in Table 2-6 will be utilized.

Based on the slope analysis for Morongo Tribal Lands, a total of 19,041 acres was assumed developable. Additionally, approximately 275 acres of Morongo Tribal Lands are within the City of Banning service area. These 275 acres will be served with water by the Beaumont-Cherry Valley Water District and therefore the City of Banning land use designation was used.

A review of Plate 1-2, SGPWA Major Water Retailers Map and Plate 2-1, SGPWA Cities, Counties and Morongo Tribal Lands Boundary Map, shows the difference in boundaries between cities and the water retailers. The methodology utilized for projecting demand was the application of unit water demand factors to planned land use categories identified in the cities' and counties' General Plans. Additionally, the ultimate water demand for the Morongo Tribal Lands was based on the slope analysis with the application of a unit water use factor of 2 acre-feet/acre/year for tribal lands within the county area of SGPWA. For tribal lands within the City of Banning the appropriate unit water use factor was applied based on the City of Banning land use category for tribal lands within the City.

Plate 1-2 shows the boundaries and spheres of influences of the major water retailers. The Unincorporated Riverside and San Bernardino Counties and Morongo Tribal Lands areas comprise the balance of SGPWA's service area. The compilation of the area of each entity was based on review of data provided by LAFCO, the water retailers, and review of Riverside County tax data. Table 2-7 provides an estimate of the service area of each water retailer and County area as shown in Plate 1-2. Refer to Appendix B for a detailed breakdown of re-categorized land use designation by major water retailer.

Table 2-7: Water Retailer Areas Including Sphere of Influence Boundaries

Water Retailer	Area (Acres)
Yucaipa Valley Water District	17,388
South Mesa Water Company	974
Beaumont-Cherry Valley Water District	19,693
City of Banning Water Department	19,644
Cabazon Water District	7,990
Banning Heights Mutual Water Company	876
High Valley Water District	5,287
Unincorporated Riverside County	34,043
Unincorporated San Bernardino County	1,910
Morongo Tribal Lands	34,611 ⁽¹⁾
SGPWA Service Area	142,416

⁽¹⁾ Approximately 275 Acres of Morongo Tribal Lands within City of Banning has been shifted to Morongo Tribal Lands total acres. Morongo Tribal Lands total acres are based on acres developed in the slope analysis per Table 2-6 of this report.

To determine the ultimate water demand within each water purveyor's service area, the City and County land use data were re-categorized to overlay each major water retailer's boundaries and sphere of influence (Plate 2-9). GIS software was utilized to obtain the areas for each of the general plan land use types within each major water retailers and its sphere of influence. The ultimate water demand for the SGPWA service area was calculated by applying the unit water demand factors to the land use designation. Refer to Appendix C for detailed breakdown of demands. Table 2-8 summarizes the results of this evaluation.

Table 2-8: Ultimate Water Demand for Major Water Retailers, Unincorporated County, and Morongo Tribal Lands

Water Retailer	Total Area (Acres)	Demand (Ac-Ft/Yr) ⁽¹⁾
Yucaipa Valley Water District	17,388	20,549
South Mesa Water Company	974	2,341
Beaumont Cherry Valley Water District	19,693	37,595
City of Banning	19,644	22,911
Cabazon Water District	7,990	7,293
Banning Heights Mutual Water Company	876	1,790
High Valley Water District	5,287	400
Subtotal	71,852	92,878
Unincorporated Areas ⁽²⁾	35,953	1,420
Subtotal	35,953	1,420
Subtotal for Unincorporated Areas & Water Retailers	107,805	94,298
Morongo Tribal Lands	34,611	38,627 ⁽³⁾
Subtotal	34,611	38,627
TOTAL	142,416	132,925

⁽¹⁾ Refer to Appendix C for detailed breakdown of demands within each water retailer.

⁽²⁾ Included unincorporated areas of Riverside and San Bernardino Counties within the SGPWA Service Area.

⁽³⁾ Subsequently the water demand value for imported SWP water for Morongo Tribal Lands was reduced to 20,000 acre feet/year. This is discussed further in Section 4.

Table 2-9 compares the ultimate water demand for SGPWA based on ultimate buildout conditions to projected 2030 demands per Wildermuth's May 2006 report which is a summary of water demand based upon the retailer's Urban Water Management Plans. For the same water retail agencies as those studied in the Wildermuth report, the projected ultimate water demand equaled 92,878 acre-feet (Table 2-8) while the Wildermuth report reported 88,600 acre-feet projected water demand in 2030 based on the Urban Water Management Plans. When the water demand for the unincorporated area and Morongo Tribal Lands was applied, 132,925 acre-feet

per year was projected under ultimate demands. For this study we rounded off the ultimate demand to be equal to 133,000 acre-feet per year.

Table 2-9: SGPWA Projected Ultimate Water Demand Compared with Projected 2030 Demand for Major Water Retailers within SGPWA's Service Area

Service Area	Wildermuth Projected 2030 Demand ⁽¹⁾ (Acre-Feet/Year)	Projected 2030 Demand Per Table 2-4 of This Report	Ultimate Water Demand (Acre-Feet/Year)
Yucaipa Valley Water District	9,940	10,285	20,549 ⁽²⁾
South Mesa Water Company	4,300	4,300	2,341
Beaumont Cherry Valley Water District	30,500	30,452	37,595
City of Banning Water Department	24,569	24,569	22,911
Cabazon Water District	16,000	16,000	7,293
Banning Heights Mutual Water Company	N/A	3,000 ⁽³⁾	1,790
High Valley Water District	N/A	N/A	400 ⁽⁴⁾
Unincorporated County Areas	N/A	N/A	1,420
Morongo Tribal Lands	N/A	N/A	38,627
TOTAL	85,309	88,600⁽⁵⁾	132,925

⁽¹⁾ Wildermuth, May 2006 Report

⁽²⁾ This demand is for YVWD only and does not include demand for SMWC. Demand for SMWC determined separately.

⁽³⁾ Per March 16, 2008 correspondence from Mr. Charles Perkins of BHMWC.

⁽⁴⁾ Note: This value is based on Land Use. City of Banning provides HVWD with a set contracted amount.

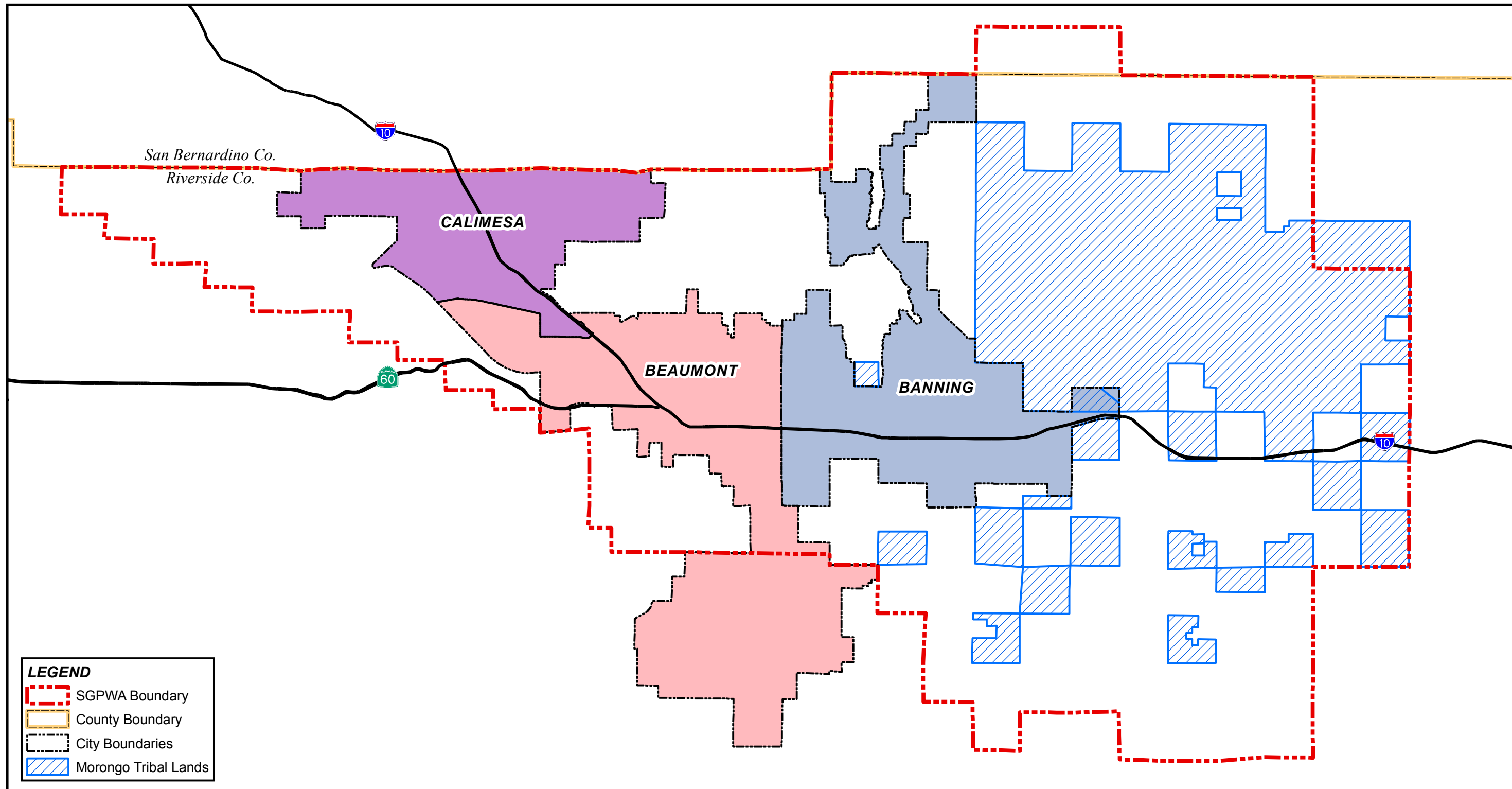
⁽⁵⁾ Rounded to nearest hundred.

Therefore, the total potential water demand for the SGPWA area is as follows:





Table 2-10: Potential Ultimate Water Demand for the San Gorgonio Pass Water Agency Service Area

Service Area	Demand (Acre-Feet/Year)
SGPWA	94,298
Morongo Tribal Lands	38,627 ⁽¹⁾
SGPWA and Morongo Tribal Lands	132,925

⁽¹⁾ Subsequently the water demand value for imported SWP water was reduced to 20,000 acre-feet/year. This is discussed further in Chapter 4.



LEGEND

-  SGPWA Boundary
-  County Boundary
-  City Boundaries
-  Morongo Tribal Lands

Sources: Riverside Co. LAFCO, April, 2008;
 Riverside County GIS, July 2009.

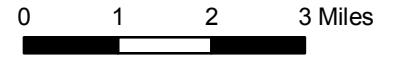
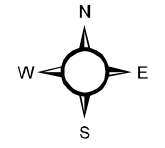
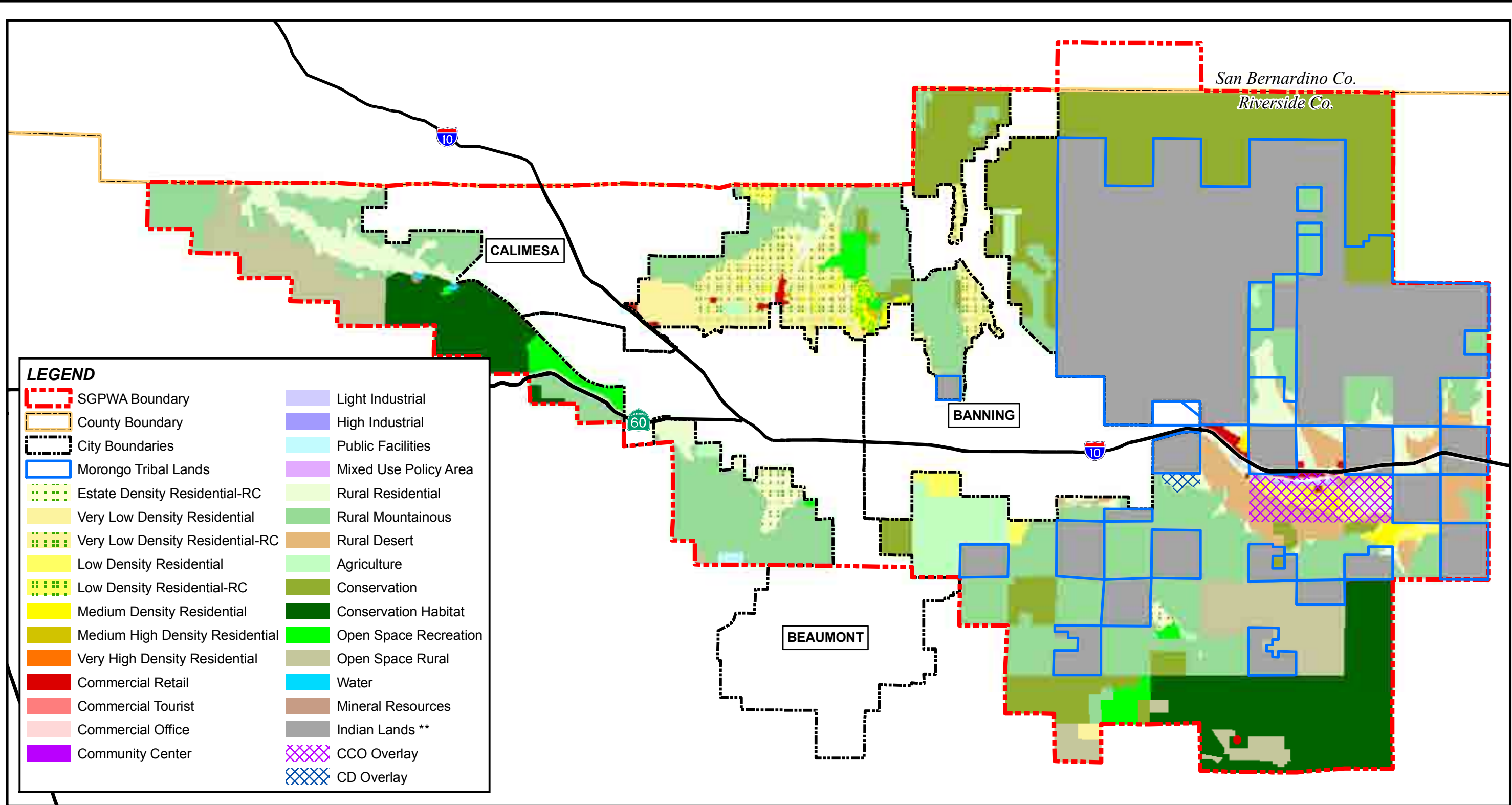


Plate 2-1

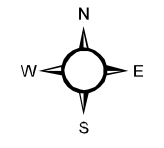
SGPWA Cities, Counties and Morongo Tribal Lands Boundary Map



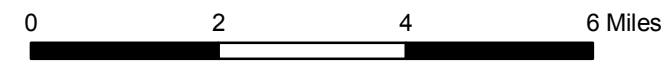
LEGEND

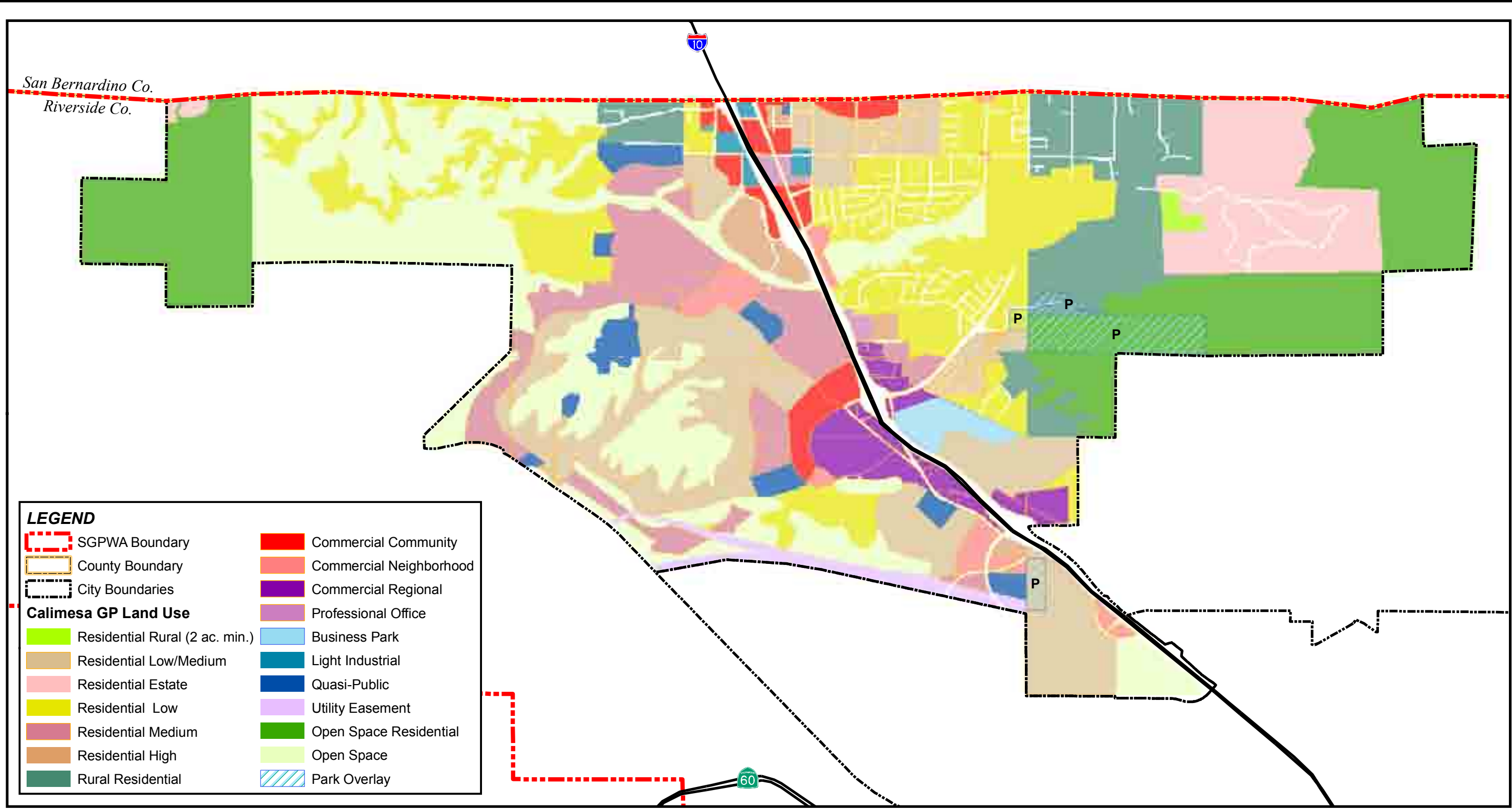
SGPWA Boundary	Light Industrial
County Boundary	High Industrial
City Boundaries	Public Facilities
Morongo Tribal Lands	Mixed Use Policy Area
Estate Density Residential-RC	Rural Residential
Very Low Density Residential	Rural Mountainous
Very Low Density Residential-RC	Rural Desert
Low Density Residential	Agriculture
Low Density Residential-RC	Conservation
Medium Density Residential	Conservation Habitat
Medium High Density Residential	Open Space Recreation
Very High Density Residential	Open Space Rural
Commercial Retail	Water
Commercial Tourist	Mineral Resources
Commercial Office	Indian Lands **
Community Center	CCO Overlay
	CD Overlay

Sources: County of Riverside, 2009;
 Riverside Co. RCIP General Plan, approved
 Oct. 2003, as amended through Nov. 2006.



** Land use designation as "Indian Lands" as per
 the Riverside County RCIP General Plan, Oct. 2003.

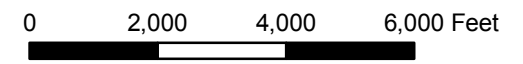
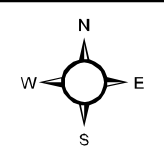


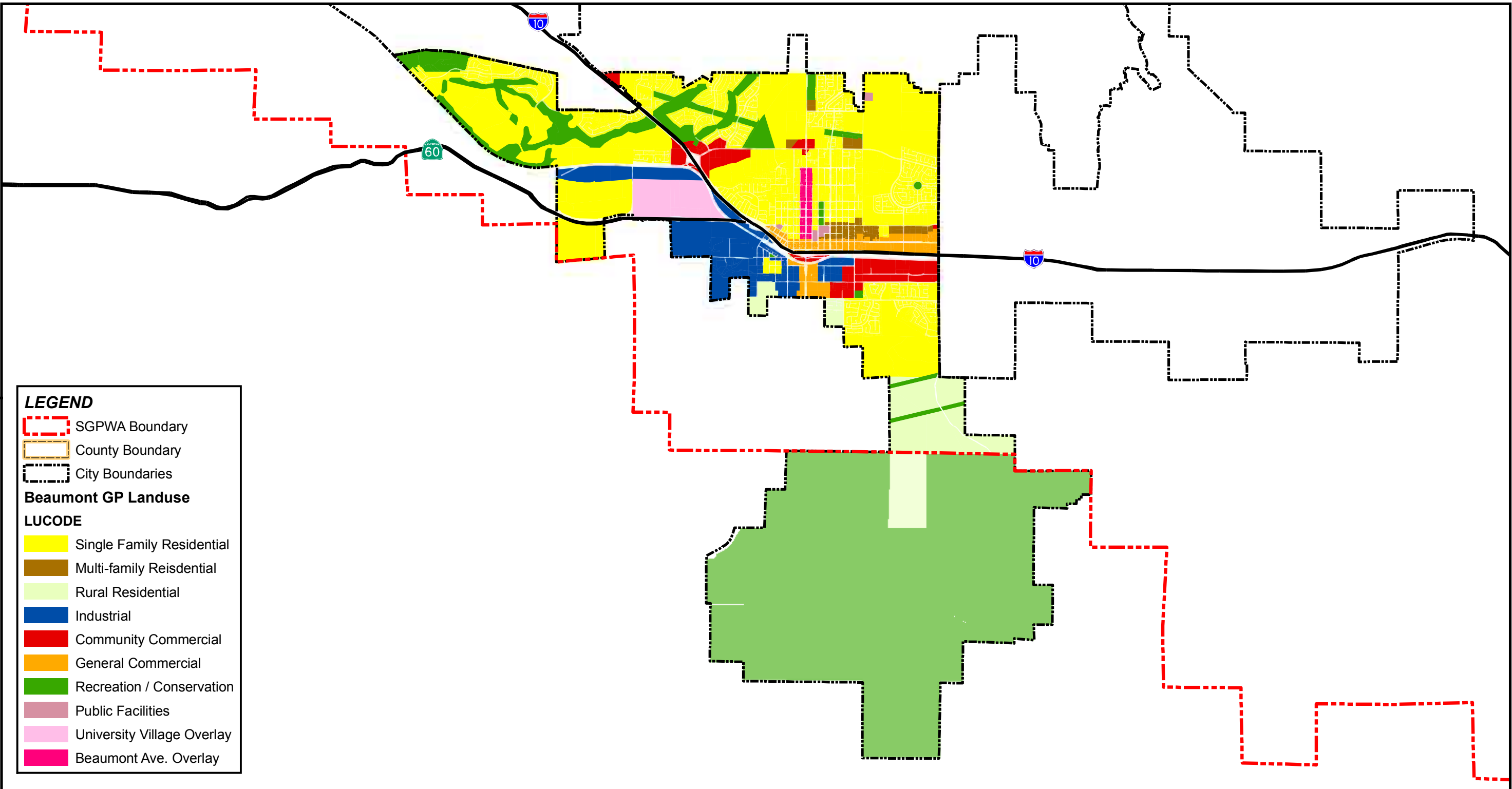


LEGEND

SGPWA Boundary	Commercial Community
County Boundary	Commercial Neighborhood
City Boundaries	Commercial Regional
Calimesa GP Land Use	
Residential Rural (2 ac. min.)	Business Park
Residential Low/Medium	Light Industrial
Residential Estate	Quasi-Public
Residential Low	Utility Easement
Residential Medium	Open Space Residential
Residential High	Open Space
Rural Residential	Park Overlay

Source: City of Calimesa Housing Element, 2002.





LEGEND

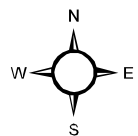
- SGPWA Boundary
- County Boundary
- City Boundaries

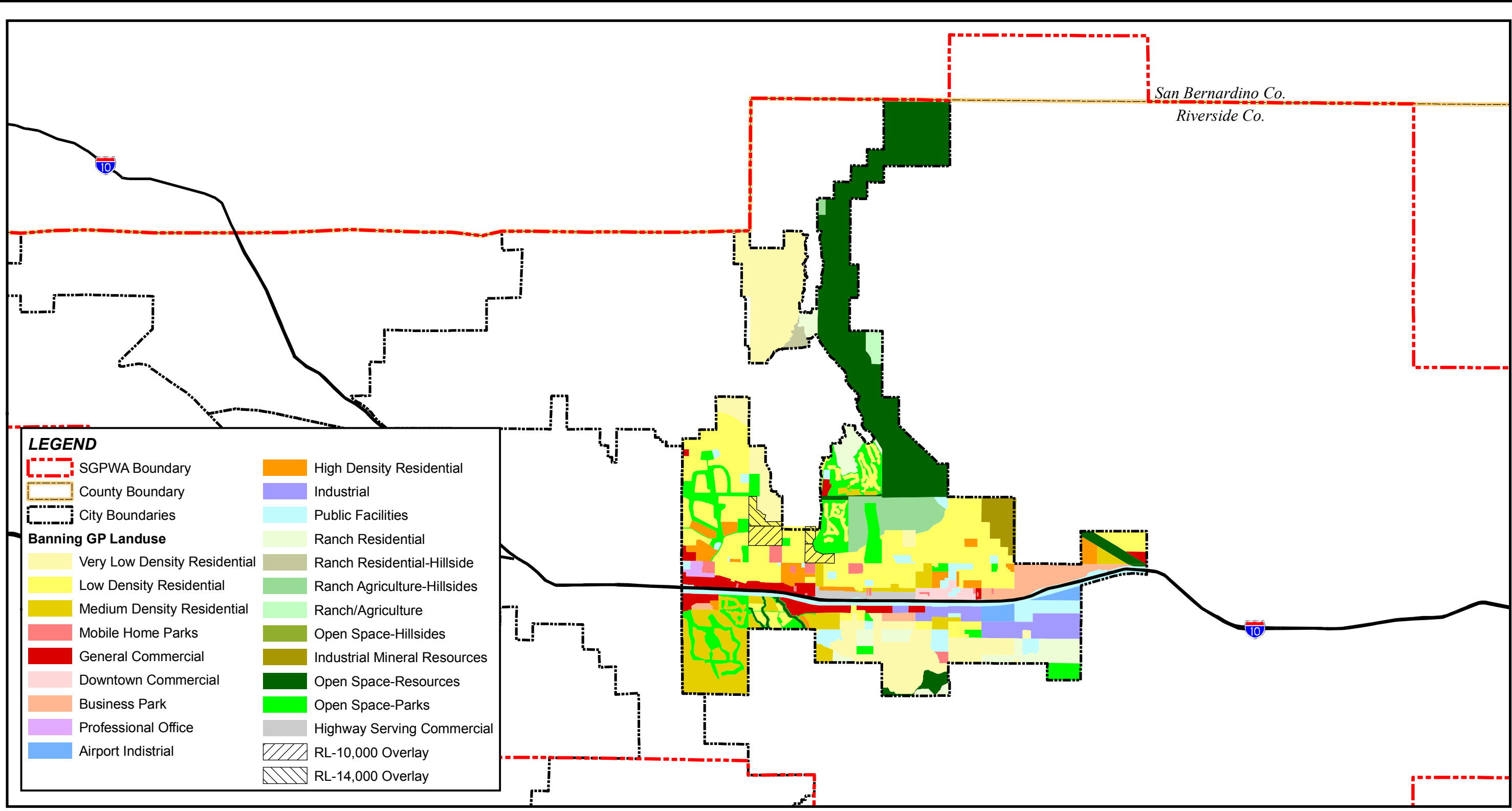
Beaumont GP Landuse

LUCODE

- Single Family Residential
- Multi-family Residential
- Rural Residential
- Industrial
- Community Commercial
- General Commercial
- Recreation / Conservation
- Public Facilities
- University Village Overlay
- Beaumont Ave. Overlay

Source: City of Beaumont General Plan, approved March, 2007; Riverside County, 2009.

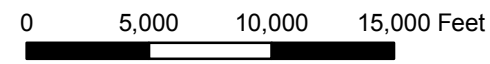
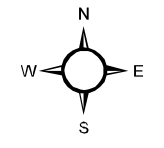




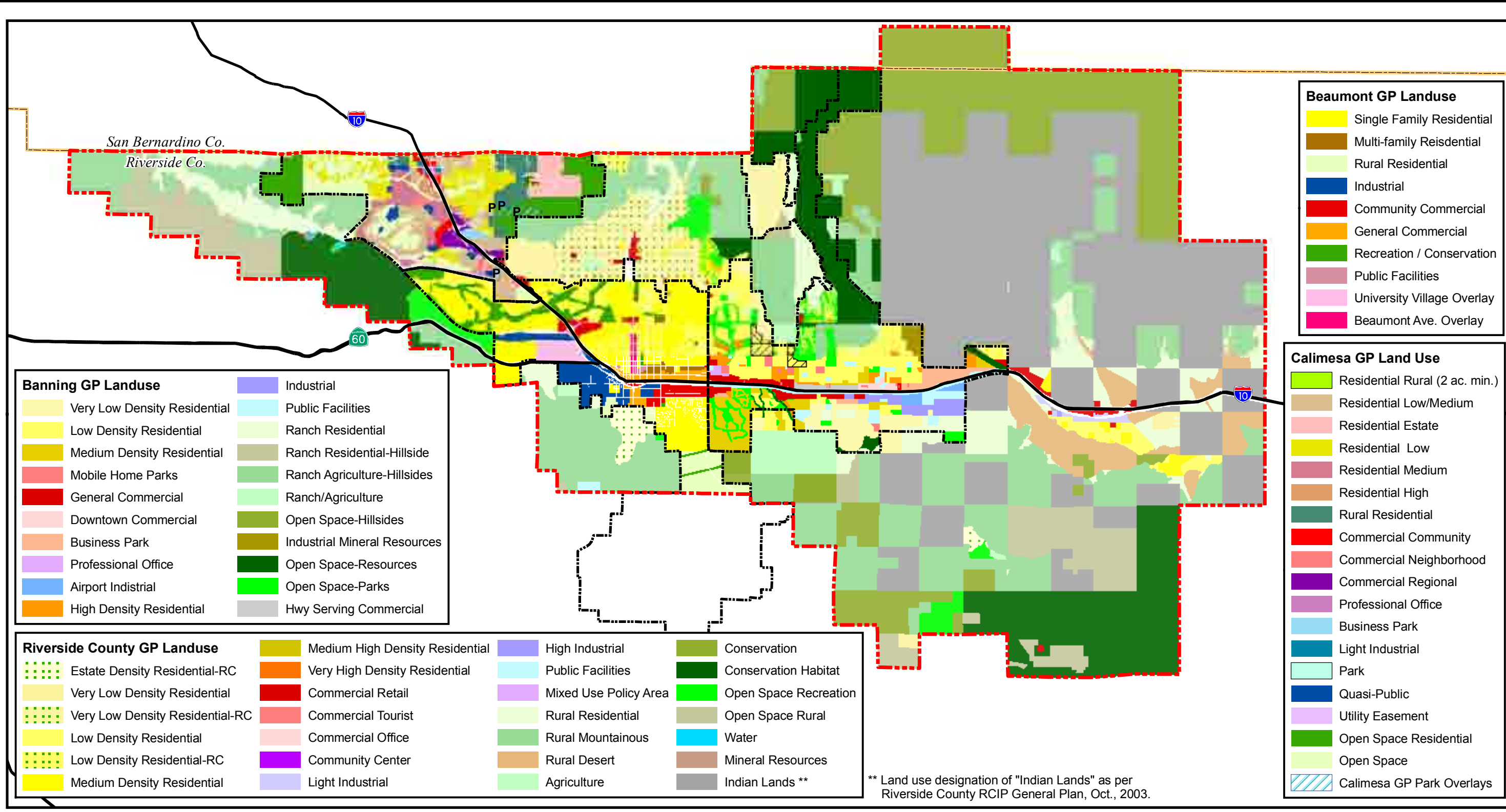
LEGEND

SGPWA Boundary	High Density Residential
County Boundary	Industrial
City Boundaries	Public Facilities
Banning GP Landuse	
Very Low Density Residential	Ranch Residential
Low Density Residential	Ranch Residential-Hillside
Medium Density Residential	Ranch Agriculture-Hillsides
Mobile Home Parks	Ranch/Agriculture
General Commercial	Open Space-Hillsides
Downtown Commercial	Industrial Mineral Resources
Business Park	Open Space-Resources
Professional Office	Open Space-Parks
Airport Industrial	Highway Serving Commercial
	RL-10,000 Overlay
	RL-14,000 Overlay

Source: City of Banning, General Plan approved March, 2007.



G:\2007\07-0269\Gis\landuse_Banning.mxd; Map revised Aug. 17, 2009



Banning GP Landuse

Very Low Density Residential	Industrial
Low Density Residential	Public Facilities
Medium Density Residential	Ranch Residential
Mobile Home Parks	Ranch Residential-Hillside
General Commercial	Ranch Agriculture-Hillsides
Downtown Commercial	Ranch/Agriculture
Business Park	Open Space-Hillsides
Professional Office	Industrial Mineral Resources
Airport Industrial	Open Space-Resources
High Density Residential	Open Space-Parks
	Hwy Serving Commercial

Riverside County GP Landuse

Estate Density Residential-RC	Medium High Density Residential	High Industrial	Conservation
Very Low Density Residential	Very High Density Residential	Public Facilities	Conservation Habitat
Very Low Density Residential-RC	Commercial Retail	Mixed Use Policy Area	Open Space Recreation
Low Density Residential	Commercial Tourist	Rural Residential	Open Space Rural
Low Density Residential-RC	Commercial Office	Rural Mountainous	Water
Medium Density Residential	Community Center	Rural Desert	Mineral Resources
	Light Industrial	Agriculture	Indian Lands **

Beaumont GP Landuse

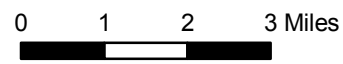
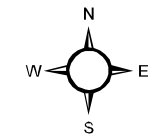
Single Family Residential
Multi-family Residential
Rural Residential
Industrial
Community Commercial
General Commercial
Recreation / Conservation
Public Facilities
University Village Overlay
Beaumont Ave. Overlay

Calimesa GP Land Use

Residential Rural (2 ac. min.)
Residential Low/Medium
Residential Estate
Residential Low
Residential Medium
Residential High
Rural Residential
Commercial Community
Commercial Neighborhood
Commercial Regional
Professional Office
Business Park
Light Industrial
Park
Quasi-Public
Utility Easement
Open Space Residential
Open Space
Calimesa GP Park Overlays

** Land use designation of "Indian Lands" as per Riverside County RCIP General Plan, Oct., 2003.

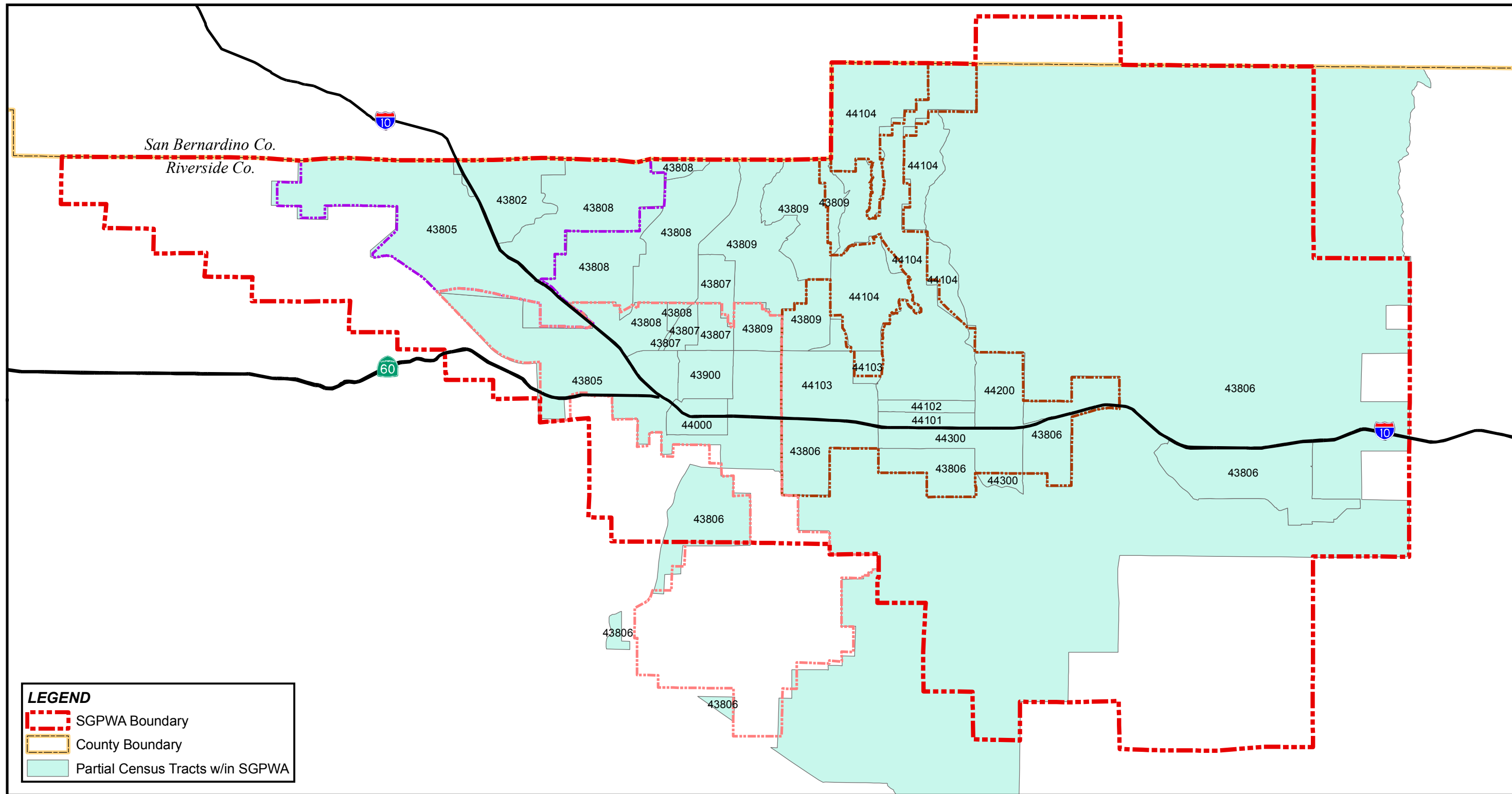
Sources: Riverside County RCIP General Plan, (Oct. 2003); City of Beaumont General Plan (March. 2007); City of Banning General Plan, (March 2007); City of Calimesa General Plan, (1994).



LEGEND

(Red dashed line)	SGPWA Boundary
(Orange dashed line)	County Boundary
(Black dashed line)	City Boundaries

Plate 2-6
General Plan Land Use within Agency Boundary



LEGEND

- SGPWA Boundary
- County Boundary
- Partial Census Tracts w/in SGPWA

Sources: Riverside Co. Center for Demographic Research, 2009

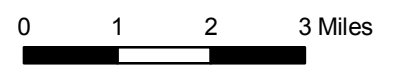
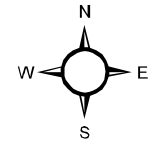
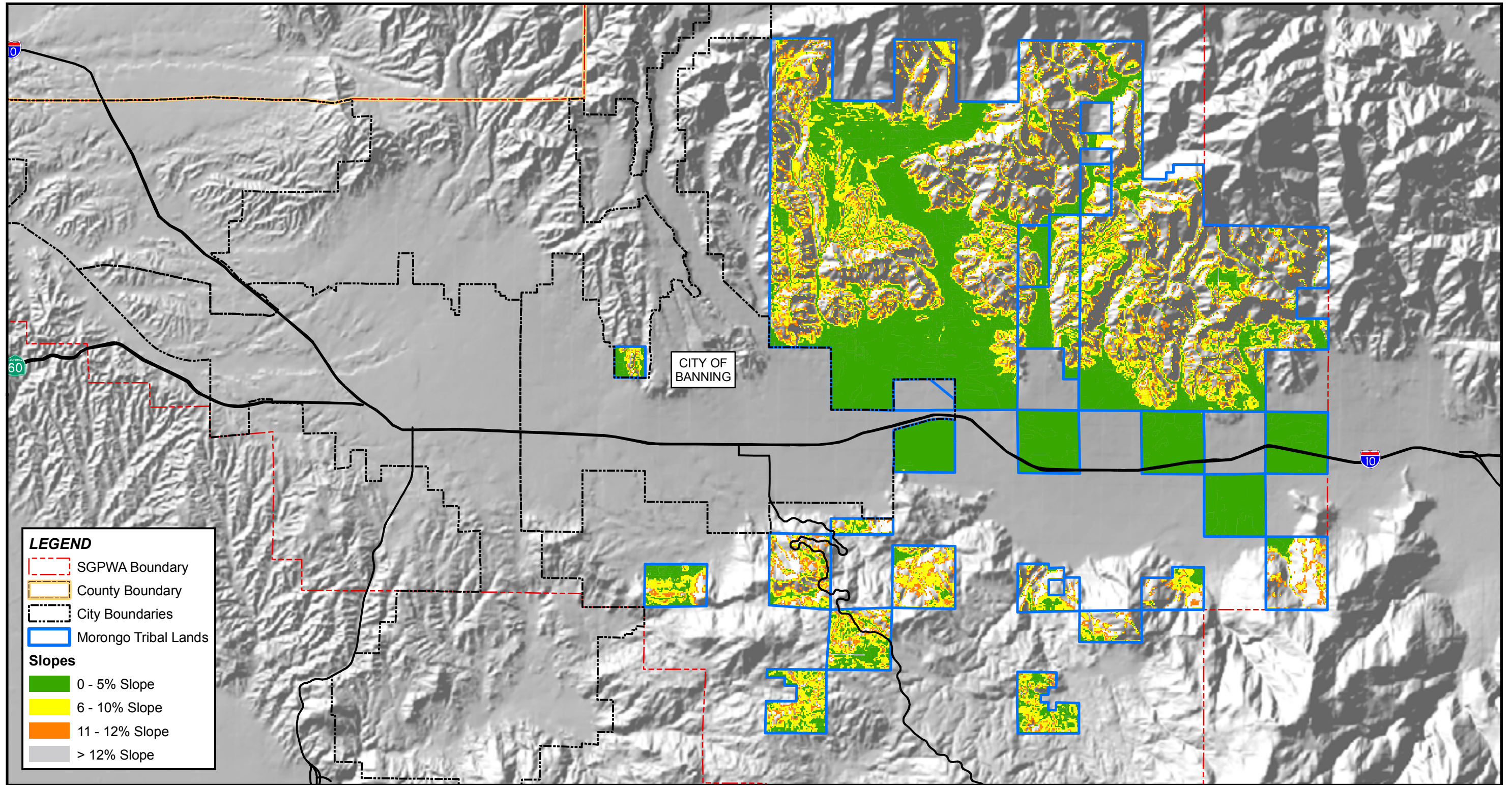


Plate 2-7

Riverside County Demographic Projection Units



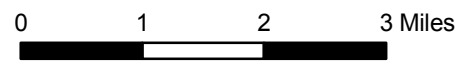
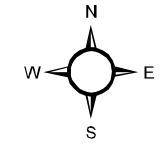
LEGEND

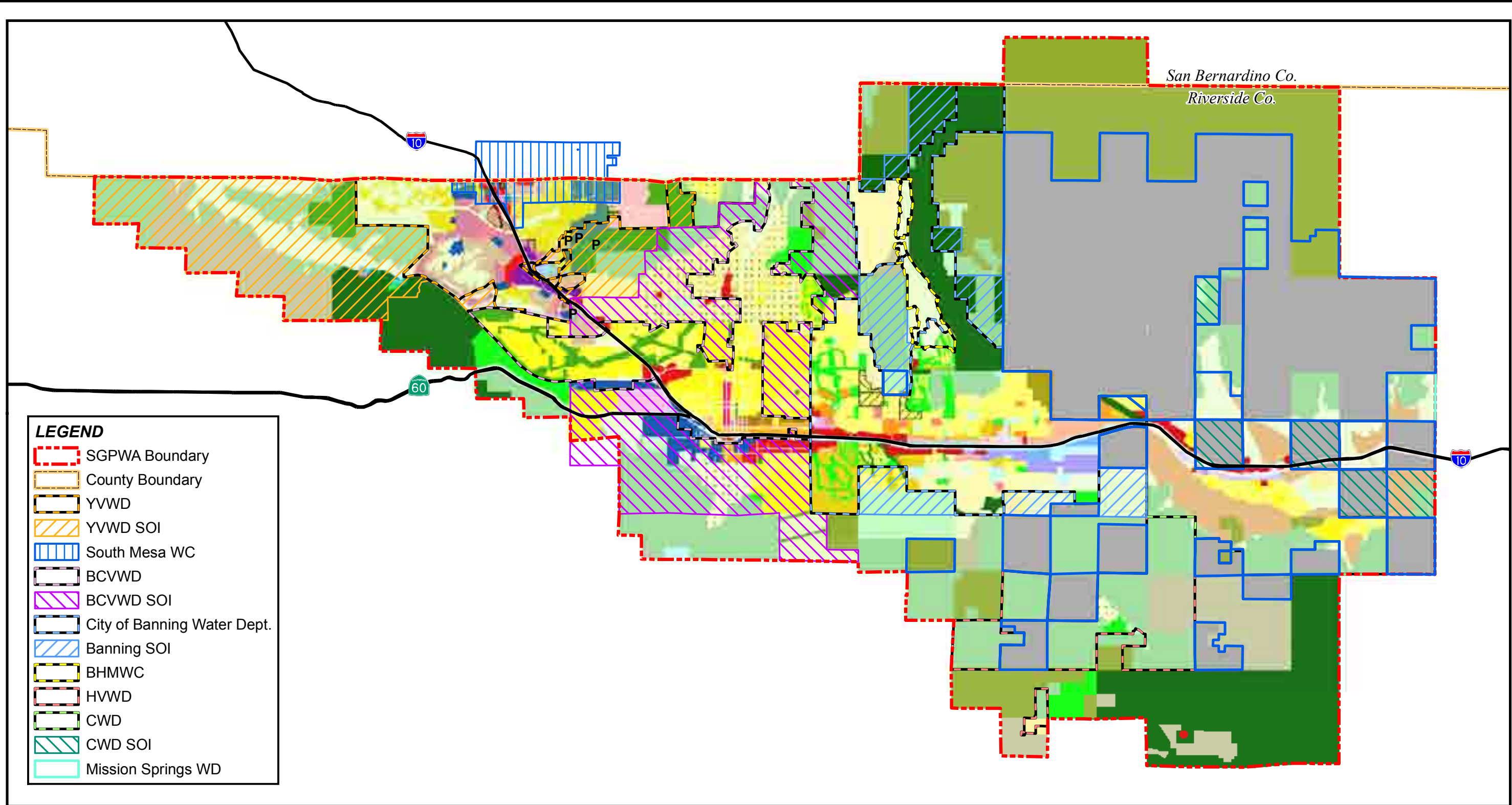
- SGPWA Boundary
- County Boundary
- City Boundaries
- Morongo Tribal Lands

Slopes

- 0 - 5% Slope
- 6 - 10% Slope
- 11 - 12% Slope
- > 12% Slope

Sources: County of Riverside, 2009;
USGS 10m DEMs.





LEGEND

- SGPWA Boundary
- County Boundary
- YVWD
- YVWD SOI
- South Mesa WC
- BCVWD
- BCVWD SOI
- City of Banning Water Dept.
- Banning SOI
- BHMWC
- HVWD
- CWD
- CWD SOI
- Mission Springs WD

Sources: Riverside County RCIP GP, (Oct. 2003); City of Beaumont GP (March. 2007); City of Banning GP, (March 2007); City of Calimesa GP, (1994); LAFCO (April 2008); YVWD (Dec. 2006); BCVWD (2005).

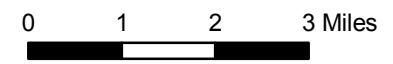
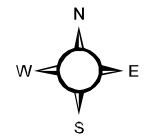


Plate 2-9

Re-Categorized Landuse Designations within SGPWA Service Area Based on Water Retailers

SECTION 3 - LOCAL WATER SUPPLY

Local water supply available to the SGPWA consists of:

- Surface water
- Ground water
- Recycled water

Based on available water supply and local demand, water retailers within SGPWA must supplement local supplies with imported water such as SWP water. The SWP water required by the various water retailers are discussed in their respective Urban Water Management Plans.

The estimate of the local water supply in the SGPWA service area is based upon "Report on Water Supply Conditions in the San Gorgonio Pass Region" prepared by Wildermuth Environmental, Inc. May 2006. We recommend that a more detailed review of the local water supply conditions be undertaken as the safe yield of the Beaumont Groundwater Basin appears to be in variance with previously published information. In addition, the assumptions with regards to the use of recycled water and the capture of local stormwater runoff appear to be overly aggressive.

Beaumont Cherry Valley Water District

The Beaumont Cherry Valley Water District (BCVWD) currently draws water from both the Beaumont Basin and the Edgar Canyon Basin for groundwater supply. Additionally, BCVWD is proposing to develop additional local water supply which includes stormwater recharge and use of reclaimed water. Table 3-1 below summarizes local water supply for the BCVWD service area projected for the year 2030.

Table 3-1: BCVWD Local Water Supply⁽¹⁾

Supply Source	Supply (Acre-Feet/Year)
Beaumont Basin	5,167 ⁽²⁾
Noble Creek Recharge Project	4,100
New Urban Storm Water Recharge	1,820
Recycled Water Recharge	3,728
Edgar Canyon	1,800
Non-Potable Direct Use Recycled Water	3,500
Total Local Supply	20,115⁽³⁾

⁽¹⁾ Data per Table 2 of May 2006, Report on Water Supply Conditions in the San Gorgonio Pass Region prepared by Wildermuth Environmental, Inc.

⁽²⁾ Excludes over production from Beaumont Basin

⁽³⁾ Per June 29, 2009 memorandum from J. Reichenberger, District Engineer, to Tony Lara, Interim General Manager of Beaumont-Cherry Valley Water District (BCVWD), BCVWD's projected local water supply in the year 2014 is 4501 acre-feet.

City of Banning Water Department

The City of Banning Water Department (BWD) currently draws from the Beaumont Basin, Banning Canyon Basin and Banning-West Basin for groundwater supply. Additionally, BWD is developing new sources with improvements to the current basins and Cabazon Basin. Table 3-2 below summarizes local water supply for the BWD service area projected for the year 2030.

Table 3-2: BWD Local Water Supply⁽¹⁾

Supply Source	Supply (Acre-Feet/Year)
Beaumont Basin	793 ⁽²⁾
Banning Storage Unit	3,730
Cabazon Storage Unit	2,050
Banning Canyon	5,000
Recycled Water	2,800
Total Local Supply	14,373

⁽¹⁾ Data per Table 3 of May 2006, Report on Water Supply Conditions in the San Gorgonio Pass Region prepared by Wildermuth Environmental, Inc.

⁽²⁾ Excludes over production from Beaumont Basin

Cabazon Water District

The Cabazon Water District (CWD) relies on local groundwater from the Cabazon Groundwater Basin area. As indicated in the May 2006 Report on Water Supply Conditions in the San Gorgonio Region by Wildermuth Environmental, it was assumed that CWD will limit pumping to 6,000 acre-feet/year and not utilize recycled water.

Boyle Engineering Corporation prepared a report entitled "Cabazon Groundwater Recharge Project Feasibility Investigation" 2005 which estimates that the safe yield varies from 7,000 acre-feet per year to 9,000 acre-feet per year. Assuming a groundwater allocation of 6,000 acre-feet per year to Cabazon Water District may be adverse to the interest of the other parties that extract water from the Cabazon Basin.

South Mesa Water Company

The South Mesa Water Company (SMWC) currently draws from the Beaumont Basin and the Calimesa Basin, a sub-basin of the Yucaipa-area Basins. The South Mesa Water Company plans to continue to utilize the Calimesa Basin along with limited use of recycled water. Table 3-3 below summarizes local water supply for the SMWC service area projected for the year 2030.

Table 3-3: SMWC Local Water Supply⁽¹⁾

Supply Source	Supply (Acre-Feet/Year)
Beaumont Basin	315 ⁽²⁾
Recycled Water	244
Yucaipa Area Groundwater Basins	1,816
Total Local Supply	2,375

⁽¹⁾ Data per Table 5 of May 2006, Report on Water Supply Conditions in the San Gorgonio Pass Region prepared by Wildermuth Environmental, Inc.

⁽²⁾ Excludes over production from Beaumont Basin.

Yucaipa Valley Water District

The Yucaipa Valley Water District (YVWD) draws from the Beaumont Basin and the Calimesa Basin for groundwater supply. Additionally, YVWD is developing new water sources including recycled water. Table 3-4 below summarizes local water supply for the YVWD service area projected for the year 2030.

Table 3-4: YVWD Local Water Supply⁽¹⁾

Supply Source	Supply (Acre-Feet/Year)
Beaumont Basin	1,697 ⁽²⁾
Recycled Water	1,718
Yucaipa Area Groundwater Basins	1,663
Total Local Supply	5,078

⁽¹⁾ Data per Table 6 of May 2006, Report on Water Supply Conditions in the San Gorgonio Pass Region prepared by Wildermuth Environmental, Inc.

⁽²⁾ Excludes over production from Beaumont Basin.

Total Local Water Supply within SGPWA Service Area

The total local water supply within the SGPWA service area is based on a summary of the local water supply allocated to each of the above major water retailers. The local water supply available to the Morongo Band of Mission Indians is unclear and therefore needs clarification. Table 3-5 below summarizes local water supply for the SGPWA service area projected for the year 2030.

Table 3-5: SGPWA Local Water Supply

Water Retailer/Supply Source	Supply (acre-feet/year)
Beaumont Cherry Valley Water District	20,115
Banning Water Department	14,373
Cabazon Water District	6,000
South Mesa Water Company	2,375
Yucaipa Valley Water District	5,078
New Returns from Use to Groundwater ⁽¹⁾	7,675
Total Local Supply	55,613

⁽¹⁾ Data per Table 7 of May 2006, Report on Water Supply Conditions in the San Gorgonio Pass Region prepared by Wildermuth Environmental, Inc.

For the purposes of determining supplemental water demand, the quantity of local water supply used in this report was rounded off to 55,000 acre-feet/year.

SECTION 4 - SUPPLEMENTAL STATE WATER PROJECT

WATER DEMAND

SGPWA’s supplemental water demand (total water demand less local water supply) is assumed to be met by the Agency’s existing entitlement of Table “A” water (17,300 acre/feet of SWP water) and the acquisition of additional SWP water in the future. Refer to Section 2 of this report for the total potential water demand within the SGPWA and Morongo Tribal Lands. For the purposes of this report, these demands will be rounded to the nearest thousand as presented in Table 4-1.

Table 4-1: Potential Ultimate Water Demand for SGPWA

Demand Criteria	Demand (Acre-Feet/Year)
SGPWA	94,000
Morongo Tribal Lands	39,000
Total	133,000

A review of the Wildermuth Environmental, Inc., May 3, 2006 “Report on Water Supply Conditions in the San Gorgonio Pass Region” was conducted to evaluate the availability of local water supply. Based on this review and as discussed in Section 3 of this report, the available local water supply was estimated to be 55,000 acre-feet/year. As the available local water supply is less than the potential ultimate water demand in both scenarios (excluding and including Morongo Tribal Lands), evaluation of additional supplemental SWP water was undertaken. This evaluation included review of SWP reliability and peak delivery requirements. Table 4-2 summarizes the supplemental SWP water requirements (refer to Appendix D for details) after local water supply was deducted from potential ultimate demand.

Additionally, a representative of the Morongo Band of Mission Indians indicated that the Morongo Tribal Lands may need up to 20,000 acre-feet of State Water Project water to supplement their local supply to meet their water demand projections. Though the ultimate demand for the Morongo Tribal Lands was projected to be 39,000 acre-feet/year, the demand of 20,000 acre-feet will be utilized for this report. The long term average local water supply available to the Morongo Band of Mission Indians is unknown at this time.

Table 4-2: Supplemental SWP Water Requirements
(SWP Reliability 100%)

Service Area	Demand (Acre-Feet/Year)
SGPWA	39,000 ⁽¹⁾
Morongo Tribal Lands	20,000
Total	59,000

⁽¹⁾ SGPWA supplemental water demand equals 39,000 acre-feet per year (potential ultimate water demand of 94,000 acre-feet/year minus 55,000 acre-feet per year local water supply).

Up to this point, SGPWA's ultimate potential demand and the supplemental SWP water requirement have been based upon the ultimate demand and projected local water supply conditions. A review of supplemental water demand and local water supply based on incremental time units would provide the SGPWA with a projected outlook and would be beneficial to the Agency for project phasing and implementation purposes. This evaluation was conducted only for the SGPWA as incremental water demand projections for Morongo Tribal Lands were not available. SGPWA has experienced significant population growth in its service area. Incremental population growth in conjunction with corresponding water demand was evaluated from 2005 through 2035 and is summarized in Table 2-2 and Table 2-4. Based on population growth and housing data, the projected water demand for the year 2035 varies from a low of 61,000 acre-feet per year to 90,000 acre-feet/year (Table 2-3). The potential ultimate water demand for the SGPWA service area was projected to be 94,000 acre-feet/year (Table 2-8) based on buildout conditions (excluding the demand for water by the Morongo Band of Mission Indians). Based on the demand trend from 2005 to 2035 as per Table 2-3 and demand trend from 2005 to 2030 as per Table 2-4, it was projected that ultimate buildout demand would occur around 2045 (Table 4-3).

The various water retailers within the SGPWA service area also have plans to develop local water supply with time, to try to match increasing demand. The incremental supplemental SWP water demand would be the difference between the incremental demand and the available local supply as shown in Table 4-3 and Figure 4-1.

Table 4-3: SGPWA Incremental Demand, Local Supply and Supplemental SWP Water
(in Acre-Feet/Year)

Year	Demand ⁽¹⁾	Local Supply ⁽²⁾	Reliability of SWP Water Supply		
			63%	80%	100%
2005	23,500	39,000	0	0	0 ⁽³⁾
2010	44,500	58,000	0	0	0 ⁽³⁾
2015	59,600	49,000	17,000	13,000	10,600
2020	70,300	52,000	29,000	23,000	18,300
2025	80,000	54,000	41,000	33,000	26,000
2030	85,600	55,000	49,000	38,000	30,600
2035 ⁽⁴⁾	89,600	55,000	55,000	43,000	34,600
2040	92,600	55,000	60,000	47,000	37,600
2045 ⁽⁵⁾	94,000	55,000	62,000	49,000	39,000

⁽¹⁾ Based on population projections per SCAG and water retailers UWMP's. Refer to Table 2-4 of this report for details.

⁽²⁾ Table 7 of 2006 Report on Water Supply Conditions in the San Geronio Pass Region by Wildermuth and is the difference between the "Total Supply Available" and "Total Imported State Project Water".

⁽³⁾ Supplement SWP water supply is not required if local water supply is greater than demand.

⁽⁴⁾ Estimated demand for year 2035 is based on projections per Table 2-3 of this report when utilizing City of Banning's unit use factor in conjunction with projected dwelling units within SGPWA's service area.

⁽⁵⁾ Ultimate buildout demand was estimate to occur in 2045 based on projected demand trends.

Based on the incremental evaluation of SGPWA's demands and local water supplies projected by the Wildermuth report, the Agency's need for supplemental water is projected to start in the year 2015 and increase to ultimate conditions in 2045. Since local water development has not occurred to the degree noted in the Wildermuth report, there is an immediate need to recharge State Water Project water into the Beaumont Basin in order to mitigate the overdraft condition of the Basin.

If the source of supplemental supply is delivered from the Sacramento Delta, then the reliability of this supply needs to be considered. Table 4-4 summarized the SWP reliability criteria of the Delta.

Figure 4-1: SGPWA Incremental Demand, Local Supply and Supplemental SWP Water (100% Reliability)

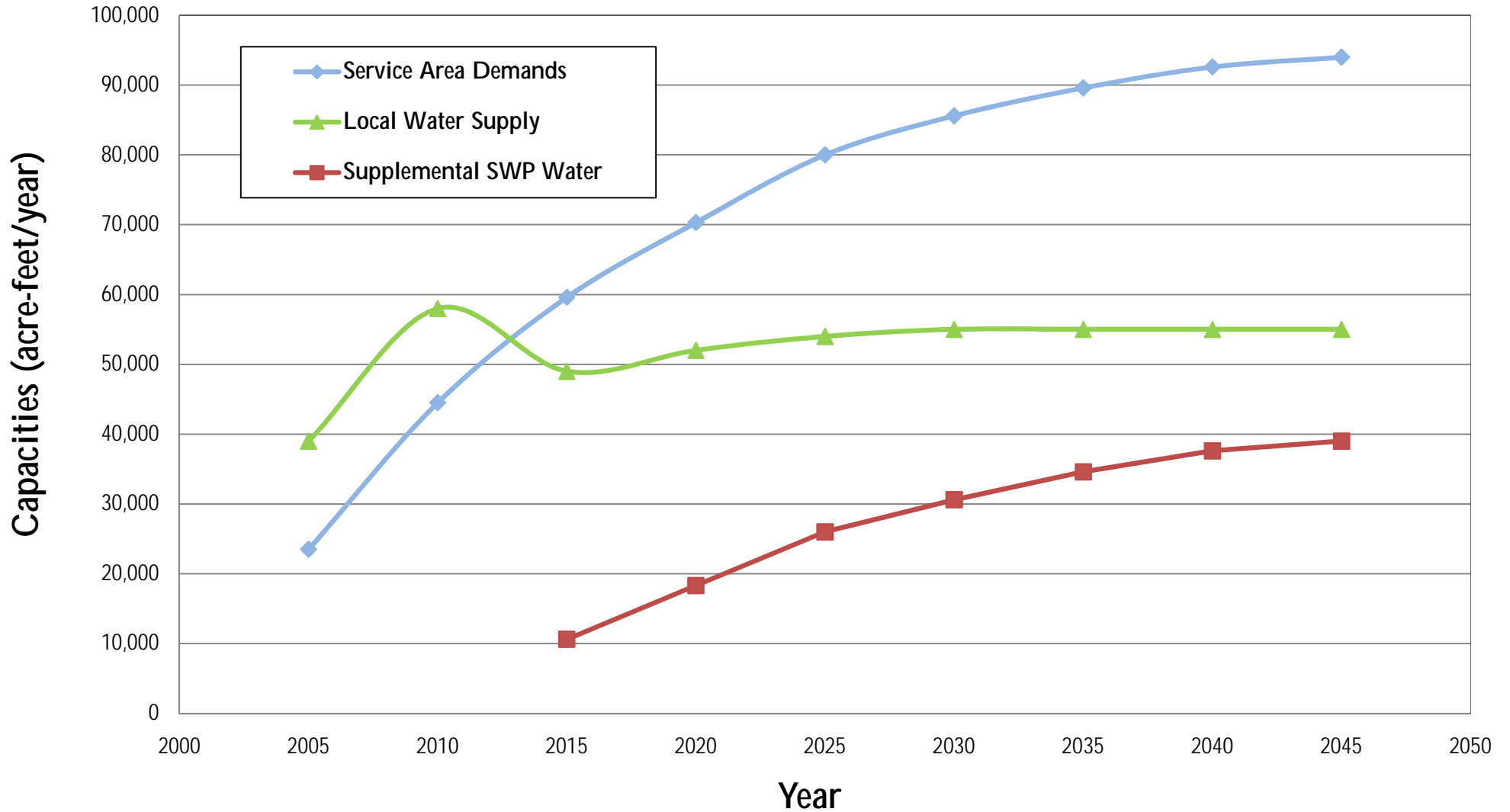


Table 4-4: Average and Dry Period SWP Table "A" Deliveries From the Delta Under Current Conditions⁽¹⁾

Time Period	Percent Reliability
Long Term Average	63%
Single Dry Year	6%
2 Year Drought	34%
4 Year Drought	35%
6 Year Drought	34%

⁽¹⁾ From Department of Water Resources "The State Water Project Reliability Project 2007" Draft December 2007, Table 6-5.

SWP Table "A" supply is based on long term average reliability of 63 percent. However, should the Sacramento Delta be fixed in the future, that would increase the "Percent Reliability" factor. Therefore, for the purposes of this report, the projected supplemental water demand will be evaluated for the 63% reliability factor, and an assumed 80% reliability factor should the Delta be fixed. Table 4-5 summarizes the projected Table "A" water required (refer to Appendix D for details).

Table 4-5: Projected San Geronio Pass Water Agency Table "A" Water Requirements⁽¹⁾

Service Area	Demand (Acre-feet/year)	
	63% Reliability	80% Reliability
SGPWA	62,000	49,000
Morongo Tribal Lands	32,000	25,000
SGPWA and Morongo Tribal Lands	94,000	74,000

⁽¹⁾ Includes SGPWA Table "A" entitlements.

DWR allows peak delivery of SWP water during wet years, therefore the conveyance facilities need to be sized to deliver peak flows. Peaking criteria is based on delivery of 100% of Table "A" supply during nine (9) months and is converted to cubic feet per second (cfs). Table 4-6 summarizes these flow scenarios. See Appendix D for details.

Table 4-6: Projected San Gorgonio Pass Water Agency Table "A" Water Capacity

Service Area	Capacity (cfs)	
	63% Reliability	80% Reliability
SGPWA	114	89
Morongo Tribal Lands	58	46
SGPWA and Morongo Tribal Lands	172	135

SECTION 5 - NEW SGPWA FACILITIES TO MEET DEMAND FOR SUPPLEMENTAL SWP WATER

EXISTING AND PROPOSED FACILITIES

Existing and proposed water facilities were evaluated to determine the feasibility of utilizing these facilities to provide SGPWA with a means to deliver SWP water to SGPWA's service area. The basis of the delivery requirements is the projected SGPWA Table "A" water capacity as summarized in Table 4-5 and Table 4-6 of Section 4 of this report. SGPWA is a State Water Contractor which currently receives water off the East Branch Extension (EBX). DWR is scheduled to start construction of EBX Phase II in 2009 and complete the proposed project in 2013.

SGPWA, in anticipation of the need for supplemental water supply (in addition to their existing Table "A" entitlement of 17,300 acre-feet per year), has been a participant with Coachella Valley Water District and Desert Water Agency in a study of the State Water Project Aqueduct Extension. As part of this supplemental water supply study, we have evaluated the feasibility of delivering additional SWP Water for the SGPWA through the proposed State Water Project Aqueduct Extension.

East Branch Extension Phase II

EXB Phase I was completed in 2003 and utilized San Bernardino Valley Municipal Water District's (SBVMWD) existing Foothill Pipeline to convey 8,650 ac-ft/year (conveyance capabilities of 24 cfs) of SGPWA entitlement via the Crafton Hills Pump Station, Crafton Hills Reservoir, pipelines and Cherry Valley Pump Station (Plate 5-1).

The DWR's EBX Phase II facilities are scheduled to be completed in 2013 which will allow SGPWA to receive their full Table "A" water entitlement of 17,300 ac-ft/year (conveyance capabilities 48 cfs). EBX Phase II consists of construction of pipeline across the Santa Ana River, Citrus Reservoir, Citrus Pump Station and upgrades/expansion to Crafton Hills Pump Station and Cherry Valley Pump Station (Plate 5-1). SGPWA indicated¹² potential negotiations to acquire an additional 16 cfs of EBX capacity from San Bernardino Valley Municipal Water District, therefore providing SGPWA a total of 64 cfs of long-term capacity in EBX. Though this additional EBX capacity would increase SGPWA's original capacity of 48 cfs to 64 cfs, it is still less than SGPWA's projected Table "A" water demand (Table 4-6). Therefore, new importation facilities will be required to convey the balance of SGPWA projected water demand above the 64 cfs capacity in the East Branch Extension (assuming the acquisition of 16 cfs capacity from SBVMWD). Table 5-1 summarizes the capacity requirements of a new importation facility to deliver supplemental water to SGPWA Water (refer to Appendix E for details).

¹² Per a July 30, 2008 correspondence and an August 13, 2008 meeting with the SGPWA representative.

Table 5-1: Supplemental SGPWA Delivery Requirements for State Water Project Water (Above an EBX Phase II Expanded Capacity of 64 cfs)

Study Area	Capacity (cfs)	
	63% Reliability	80% Reliability
SGPWA	44	25
Morongo Tribal Lands	0	0
Total	44	25

State Water Project Aqueduct Extension

The Coachella Valley Water District (CVWD) and Desert Water Agency (DWA) are in the planning phases of the proposed SWP Aqueduct Extension Project for delivery of SWP water to their service areas (Mission Creek and White Water Sub Basins) (Plate 5-2). CVWD and DWA retained GEI/Bookman-Edmonston to explore the feasibility of this project which resulted in the August 2007 “Draft Desert Aqueduct Project Development Plan, Phase I Report” (August 2007 Development Plan).

The GEI/Bookman-Edmonston report reviewed four alternative conveyance alignments of SWP water to CVWD and DWA and connections to California Aqueduct at various locations. Though this report discusses the potential demands of the various project partners, the proposed alignment and size of the SWP Aqueduct Extension was based only on CVWD and DWA water demands, which was based on a peak conveyance requirement of 311 cfs as discussed in the August 2007 Development Plan. The August 2007 Development Plan indicated that the other project partners (including SGPWA) would review the possible usage of the alternative alignments and, therefore, sizing would be increased to accommodate the potential of additional flow requirements. The pipeline was sized to 90-inch diameter and facilities design was based on the peak capacity of 311 cfs nominal (pipeline velocity of 7 fps). Four “SWP Aqueduct Extension” alignments were evaluated in the August 2007 Development Plan (Plate 5-2) and are as follows:

- Lucerne Valley Alignment
- North Pass Alignment
- South Pass Alignment
- San Jacinto Alignment

It is noted that the April 28, 2009 SWP Extension Draft Technical Memorandum No. 007, Refined Pipeline Alignment and Conceptual Design developed for Coachella Valley Water District indicates a “Small Project” with a design flow of 293 cfs and a “Large Project” with a

design flow of 395 cfs. For planning purposes, the conveyance requirements of 311 cfs as established in the August 2007 Development Plan will be utilized for this report.

As a project partner, SGPWA has evaluated these four alternatives for possible delivery options of their supplemental water demand. An initial review of these alternatives was conducted and the results are as follows. As depicted on Plate 5-2, the four SWP Aqueduct Extension alternative alignments all commence at different locations along the East Branch of the State Water Project, but share the same discharge location (Whitewater River and Mission Creek River). The Lucerne Valley Alignment is proposed to connect to the California Aqueduct (north of Lake Silverwood) and the North Pass Alignment is proposed to connect to the Devil Canyon Afterbay. The South Pass Alignment is proposed to connect to the Santa Ana Valley Pipeline (SAVP) (Plate 5-2). The proposed San Jacinto Alignment will have an intake at Lake Perris (Plate 5-2). CVWD and DWA currently have a capacity right of 138 cfs in the SAVP, hence CVWD and DWA will need to acquire, if available, an additional 173 cfs (311 cfs minus 138 cfs) capacity rights in the SAVP. It was assumed that SGPWA could not acquire an additional 25 to 108 cfs capacity in SAVP in addition to CVWD and DWA projected needs. Therefore, the South Pass Alignment and the San Jacinto Alignment were dropped from further evaluation in this study for SGPWA.

In addition to the first two alternatives mentioned above (which consist of partnering with CVWD and DWA), evaluation of two additional alternatives were conducted to explore the feasibility of SGPWA going alone with a proposed project. These alternatives were based on SGPWA constructing independent facilities to deliver their projected supplemental water demand. One of these alternatives would follow the North Pass Alignment as previously discussed. The other alternative assumed that SGPWA would construct an independent pipeline from Mentone, California and follow the North Pass Alignment to the SGPWA service area (this alternative assumes entering into an agreement with MWD to purchase capacity in their Inland Feeder to convey water from Devil Canyon to Mentone).

For the purpose of this report, the first two alternatives from the August 2007 Development Plan will be combined with SGPWA's independent alternatives as described above for a total of four alternatives. These four alternatives will be the basis of this study for evaluation of capital, operation and maintenance costs. The following are the alternative delivery facilities to deliver supplemental water to SGPWA service area:

1. Lucerne Valley Alignment (Potential upsizing with SGPWA participation and includes the proposed "Loop Pipeline" to convey water from the terminus of the Lucerne Valley Alignment to SGPWA service area)
2. North Pass Alignment (Potential upsizing with SGPWA participation)
3. Independent SGPWA North Pass Alignment (Delivery of SGPWA Supplemental Water only)
4. Inland Feeder–Modified Pass Alignment (Delivery of SGPWA Supplemental Water only)

Aqueduct capacities were evaluated based on two reliability factors (63% and 80%) of State Water Project deliveries. As there are alternatives that require joint participation with other water agencies, such as CVWD and DWA, the capacities that were established for these agencies (311 cfs) will be maintained. Table 5-2 and Table 5-3 summarize the capacities each alternative alignment will be required to deliver at 63% and 80% reliability of SWP water deliveries.

Table 5-2: Alternative Delivery Requirements Based on 63% Reliability

Alternative Alignments	Capacity (cfs)				
	CVWD and DWA ⁽¹⁾	CVWD, DWA and SGPWA	CVWD, DWA, SGPWA and Morongo Tribal Lands	SGPWA	SGPWA and Morongo Tribal Lands
Lucerne Valley	311	361	419	-	-
North Pass	311	361	419	-	-
Independent SGPWA ⁽²⁾ North Pass	-	-	-	50	108
Inland Feeder – ⁽²⁾ Modified Pass	-	-	-	50	108

⁽¹⁾ CVWD and DWA capacities of 311cfs to be maintained as established per the August 2007 Development Plan.

⁽²⁾ Alternatives not requiring CVWD and DWA participation.

Table 5-3: Alternative Delivery Requirements Based on 80% Reliability

Alternative Alignments	Capacity (cfs)				
	CVWD and DWA ⁽¹⁾	CVWD, DWA and SGPWA	CVWD, DWA, SGPWA and Morongo Tribal Lands	SGPWA	SGPWA and Morongo Tribal Lands
Lucerne Valley	311	336	382	-	-
North Pass	311	336	382	-	-
Independent SGPWA ⁽²⁾ North Pass	-	-	-	25	71
Inland Feeder – ⁽²⁾ Modified Pass	-	-	-	25	71

⁽¹⁾ CVWD and DWA capacities of 311cfs to be maintained as established per the August 2007 Development Plan.

⁽²⁾ Alternatives not requiring CVWD and DWA participation.

Lucerne Valley Alignment

The Lucerne Valley Alignment (Plate 5-3) is proposed to connect to the California Aqueduct near Mojave River Fork Reservoir through Lucerne Valley, Yucca Valley, and Morongo Valley and terminate at the proposed Mission Creek and Whitewater Discharge Facilities. The project consists of approximately 91 miles of pipeline and appurtenant pumping and power generation facilities.

Pipeline Diameter and Length.

As previously stated, the 90-inch diameter SWP Aqueduct Extension is proposed to convey a peak flow of 311 cfs of SWP water to CVWD and DWA services areas. To maintain a maximum velocity of 7 fps and accommodate additional flows, the Lucerne Alignment will require upsizing (Table 5-4 and Appendix E).

As shown in Table 5-4, the SWP Aqueduct Extension requires upsizing to accommodate SGPWA supplemental water demand and Morongo Tribal Lands water demands.

Table 5-4: Lucerne Valley Alignment – Summary of Results for Required Additional Water Demand

Conveyance Criteria	63% Reliability		80% Reliability	
	SGPWA	SGPWA and Morongo Tribal Lands ⁽¹⁾	SGPWA Excluding Morongo Tribal Lands	SGPWA Including Morongo Tribal Lands ⁽²⁾
Additional Conveyance of Required SGPWA Water (cfs)	50	108	25	71
Total required Conveyance through Lucerne Alignment ⁽³⁾ (cfs)	361	419	336	382
Pipeline Sizing ⁽⁴⁾ (inch-dia.)	96	108	96	102
Pipeline Length (feet)	480,480	480,480	480,480	480,480

⁽¹⁾ Additional 58 cfs capacity based on 63% reliability of SWP Water to be discharged into Cabazon Basin for Morongo Tribal Lands

⁽²⁾ Additional 46 cfs capacity based on 80% reliability of SWP water to be discharged into Cabazon Basin for Morongo Tribal Lands.

⁽³⁾ Base pipeline diameter for Lucerne Valley Alignment established as 90-inch dia. based on 311 cfs flow for DWA & CVWD only.

⁽⁴⁾ Pipeline sizing based on flow accumulation with pipeline velocity of approximately 7 fps.

Pumping Requirements.

In order to pump the additional SGPWA water through the Lucerne Valley Alignment, the proposed pump stations and hydro power stations along the alignment need to be upsized to accommodate the additional flows. For planning purposes, the hydraulic evaluation of the overall system (pipelines, valves, pumps) was limited to 250 psi pressure. In the August 2007 Development Plan, a total of two (2) pump stations and four (4)

hydro stations along the Lucerne Valley alignment were proposed to convey flows from the California Aqueduct to the discharge facilities. The hydraulic profile of the Lucerne Valley Alignment for both 63% and 80% reliability can be seen in Plate 5-4 and Plate 5-5 and pumping requirements are summarized in Table 5-5 and Table 5-6. See Appendix F for detailed calculations of these pumping requirements.

Table 5-5: Lucerne Valley Alignment – Pump Station Characteristics

Lucerne Valley Alignment Pump Stations	63% Reliability				80% Reliability			
	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)
CVWD, DWA & SGPWA Flows								
Pump Station #1	563	361	27,000	21,300	508	336	22,700	17,900
Pump Station #2	486	361	23,400	18,400	487	336	21,600	17,000
CVWD, DWA, SGPWA & Morongo Tribal Land Flows								
Pump Station #1	488	419	27,300	21,400	526	382	26,800	21,100
Pump Station #2	477	419	26,700	21,000	584	382	24,500	19,200

Table 5-6: Lucerne Valley Alignment – Hydro Power Station Characteristics

Lucerne Valley Alignment Hydro Power Stations	63% Reliability				80% Reliability			
	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)
CVWD, DWA & SGPWA Flows								
Hydro Station #1	627	361	21,800	15,500	636	336	20,600	14,600
Hydro Station #2	634	361	22,100	15,600	643	336	20,800	14,800
Hydro Station #3	845	361	29,400	20,800	847	336	27,400	19,400
Hydro Station #4	693	361	24,100	17,100	699	336	22,600	16,100
CVWD, DWA, SGPWA & Morongo Tribal Land Flows								
Hydro Station #1	754	451	30,500	21,600	760	382	28,000	19,800
Hydro Station #2	749	451	30,200	21,400	754	382	27,900	19,700
Hydro Station #3	871	451	35,200	25,000	872	382	32,100	22,800
Hydro Station #4	775	451	31,300	22,100	779	382	28,700	20,300

Lucerne Valley Loop Pipeline

As indicated in the August 2007 Development Plan, the Lucerne Valley Alignment is planned to discharge 311 cfs of CVWD and DWA water to the Mission Creek and Whitewater Discharge Facilities. In order for SGPWA to convey the additional supplemental water from the terminus of the Lucerne Valley Alignment to SGPWA service area, a “Loop Pipeline” is proposed to connect to the EBX facilities (Plate 5-6).

Pipeline Diameter and Length.

The sizing criteria of this pipeline is based on a pipeline velocity of approximately 7 fps to accommodate proposed flows. The Lucerne Valley Loop Pipeline is proposed to connect to the terminus of the Lucerne Valley Pipeline east of SGPWA boundary, north of the 10 Freeway and east of the Highway 62 (Plate 5-6) and traverse westerly in two reaches. The first reach is approximately 99,200 feet to discharge water into the Cabazon Basin, and the second reach continues westerly for approximately 35,000 feet to the western portion of SGPWA for connection to the proposed Banning Pipeline (Plate 5-6). This pipeline is for SGPWA use only, and in order to allow for participation of the Morongo Tribe, pipeline sizes will vary per reach. When flows are for SGPWA only, the diameter of both reaches would be the same. When flows include Morongo Tribal Lands the first reach will be a larger diameter to accommodate SGPWA and Morongo flows and the second reach would be sized smaller than the first as it would require conveying SGPWA flows only. Table 5-7 summarizes the flow, length and sizing of the Loop Pipeline. Refer to Appendix E for details.

Table 5-7: Loop Pipeline – Conveyance Criteria⁽¹⁾

Conveyance Criteria	63% Reliability		80% Reliability	
	SGPWA	SGPWA and Morongo Tribal Lands ⁽²⁾	SGPWA	SGPWA and Morongo Tribal Lands ⁽³⁾
Pipeline Capacity (cfs)	50	108	25	71
Pipeline Sizing ⁽⁴⁾ (inch) / Length (feet) (First Reach)	36/99,200	54/99,200	30/99,200	48/99,200
Pipeline Sizing ⁽⁴⁾ (inch) / Length (feet) (Second Reach)	36/35,000	36/35,000	30/35,000	36/35,000

⁽¹⁾ For loop connection at terminus of Lucerne Valley alignment to SGPWA and provide for looped connection of western and eastern portion of SGPWA service area.

⁽²⁾ Additional 58 cfs capacity based on 63% reliability of SWP Water to be discharged into Cabazon Basin for Morongo Tribal Lands.

⁽³⁾ Additional 46 cfs capacity based on 80% reliability of SWP Water to be discharged into Cabazon Basin for Morongo Tribal Lands.

⁽⁴⁾ Pipeline sizing based on flow accommodation with pipeline velocity of approximately 7 fps.

Preliminary Alignment Review of Lucerne Valley “Loop Pipeline”.

As discussed, the proposed Loop Pipeline alignment would connect to the terminus of the Lucerne Valley Alignment located north of the 10 Freeway and east of the Highway 62 (Plate 5-6). The Loop Pipeline will traverse westerly to the western portion of SGPWA at Brookside and Highland Springs Avenue and connect to the terminus of the proposed Banning Pipeline. The alignment for the Loop Pipeline has various concerns such as right-of-way design and construction and would require further detailed analysis if this alternative is selected. A preliminary list of various concerns are as follows:

- Highway 62 (Caltrans)
- Turbine Windmill Fields
- Millard Wash Crossing
- Colorado Aqueduct Crossing
- Morongo Tribal Lands
- San Gorgonio River Crossing
- Private Property
- Railroad Crossing
- 10 Freeway (Caltrans)
- Riverside County, City of Banning, Beaumont
- Dry and Wet Utilities
- Property Requirements for Pump Stations

Pumping Requirements of the Loop Pipeline.

The Loop Pipeline is proposed to begin at elevation 1100-feet, north of the proposed Whitewater Discharge Facility and connect to the proposed Banning Pipeline at Brookside and Highland Springs Avenue at approximately elevation 2850 feet (Plate 5-6). For planning purposes, the hydraulic evaluation was based on limiting the pressure of the overall system (pipelines, valves, pumps, etc.) to 250 psi. Based on these requirements and evaluation of existing topography, 3 pump stations are required to convey and boost pressure from the connection at the proposed Whitewater Discharge Facility to the connection to the future Banning Pipeline (Plate 5-6). Table 5-8 shows the pumping requirements of the Loop Pipeline (see Appendix F for detailed breakdown of all pumping requirements) and Plate 5-7 and Plate 5-8 shows the profile of the existing topography along with the hydraulic profile of this proposed Loop Pipeline for 63% and 80% reliability.

Table 5-8: Loop Pipeline – Pump Station Characteristics

Loop Pipeline Pump Stations	63% Reliability				80% Reliability			
	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)
SGPWA Flows								
Pump Station #1	604	50	4,000	3,200	515	25	1,700	1,300
Pump Station #2	572	50	3,800	3,000	493	25	1,600	1,300
Pump Station #3	567	50	3,800	3,000	549	25	1,800	1,400
SGPWA and Morongo Tribal Land Flows								
Pump Station #1	514	108	7,400	5,800	488	71	4,600	3,600
Pump Station #2	510	108	7,300	5,800	465	71	4,400	3,500
Pump Station #3	567	50	3,800	3,000	549	25	1,800	1,400

North Pass Alignment

The North Pass Alignment (Plate 5-9) is proposed to connect to the Devil Canyon Powerhouse Afterbay and then through the northern portion of the City of San Bernardino, south between City of Redlands and Mentone to Interstate 10, and then parallel Interstate 10 to connect to the proposed Whitewater Discharge Facilities and Mission Creek. The project consists of approximately 98 miles of pipeline (61 miles of 90-inch diameter and 6.5 miles of 42-inch diameter located along Highway 62 from the proposed Whitewater Discharge Facility). SGPWA would participate in the required upsizing of pipeline, pumping facilities, etc. for the initial portion of the North Pass Alignment (from Devil Canyon to Cabazon Basin). CVWD and DWA would be solely responsible for the project cost of the remaining portion from Cabazon Basin to the portion along Highway 62.

Pipeline Diameter and Length.

With both SGPWA and Morongo participation, an additional pipeline will be required to convey water from the North Pass Alignment to the Cabazon Basin, which is assumed to be located at the existing gravel pit approximately 2,000 feet north of Interstate 10 (per March 2005, Draft Report Cabazon Groundwater Recharge Project Feasibility Investigation). To maintain a maximum velocity of 7 fps and accommodate additional flows, the North Pass Alignment and appurtenant facilities will require upsizing. Table 5-9 summarizes flows, pipeline sizing and lengths for various scenario conveyance criteria. Refer to Appendix E for details.

Table 5-9: North Pass Alignment – Summary of Results for Required Additional Water

Conveyance Criteria	63% Reliability		80% Reliability	
	SGPWA	SGPWA and Morongo Tribal Lands ⁽¹⁾	SGPWA	SGPWA and Morongo Tribal Lands ⁽²⁾
Additional Conveyance of Required SGPWA Water (cfs)	50	108	25	71
Total Required Conveyance through North Pass Alignment ⁽³⁾ (cfs)	361	419	336	382
Pipeline Sizing ⁽⁴⁾ (inch-Dia.) / Length (feet) (First Reach)	96/190,000	108/190,000	96/190,000	102/190,000
Pipeline Sizing ⁽⁴⁾⁽⁵⁾ (inch-Dia.) / Length (feet) (Turnout for Cabazon Recharge Basin)	36/2,000	54/2,000	30/2,000	48/2,000
Pipeline Sizing ⁽⁴⁾⁽⁶⁾ (inch-Dia.) / Length (feet) (Second Reach)	90/132,000	90/132,000	90/132,000	90/132,000
Pipeline Sizing ⁽⁴⁾⁽⁶⁾ (inch-Dia.) / Length (feet) (Turnout for Reach Along Highway 62)	42/34,320	42/34,320	42/34,320	42/34,320

⁽¹⁾ Additional 58 cfs capacity based on 63% reliability of SWP water to be discharged into Cabazon Basin for Morongo Tribal Lands.

⁽²⁾ Additional 46 cfs capacity based on 80% reliability of SWP water to be discharged into Cabazon Basin for Morongo Tribal Lands.

⁽³⁾ Base pipeline diameter for North Pass Alignment was established as 90-inch diameter based on 311 cfs flow for CVWD and DWA only.

⁽⁴⁾ Pipeline sizing based on flow accommodation with pipeline velocity of approximately 7 fps.

⁽⁵⁾ This turnout for Cabazon Recharge Basin does not require CVWD and DWA participation.

⁽⁶⁾ This portion of the North Pass Alignment does not require participation of SGPWA.

As shown in Table 5-9, the North Pass Alignment will need to be upsized to 96 inch diameter for the additional SGPWA water demand and 102 to 108 inch diameter for additional SGPWA and Morongo Tribal Lands projected water demand. Additionally, pipelines to connect to EBX facilities and to discharge to Cabazon Basin will be necessary.

Pumping Requirements.

In order to pump additional SGPWA water through the North Pass alignment, the two (2) proposed pump stations will require upsizing to accommodate additional SGPWA flows. All SGPWA water is planned to discharge at the Cabazon Basin and SGPWA is not responsible for facilities beyond this point of discharge, including hydro power facilities, etc. (Plate 5-9). Table 5-10 summarizes the pumping requirements for the North Pass Alternative and Plate 5-10 and Plate 5-11 shows the profile of the existing topography along with the hydraulic profile for 63% and 80% reliability. See Appendix F for a detailed breakdown of pump characteristics.

Table 5-10: North Pass Alignment – Pump Station Characteristics

North Pass Alignment Pump Stations	63% Reliability				80% Reliability			
	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)
CVWD, DWA and SGPWA Flows								
Pump Station #1	580	361	27,900	21,900	566	336	25,100	19,700
Pump Station #2	484	361	23,300	18,300	474	336	21,000	16,500
CVWD, DWA, SGPWA and Morongo Tribal Land Flows								
Pump Station #1	549	419	30,700	24,000	570	382	29,100	22,800
Pump Station #2	465	419	26,000	20,400	471	382	24,000	18,900

Independent SGPWA North Pass Alignment

The Independent SGPWA North Pass Alignment follows the North Pass Alignment (Plate 5-12) as previously discussed, however the alignment terminates at the Cabazon Basin. This alternative assumes CVWD and DWA are not participants and would construct other facilities to meet their demand for SWP water.

Pipeline Diameter and Length.

The proposed sizing criteria of this pipeline is based on nominal pipeline velocity of 7 fps and to accommodate SGPWA and Morongo Tribal Land projected water demands. Table 5-11 summarizes the flow, length and sizing of alternatives (refer to Appendix E for details).

Table 5-11: Summary of Results for Independent SGPWA North Pass Alignment

Conveyance Criteria	63% Reliability		80% Reliability	
	SGPWA	SGPWA and Morongo Tribal Lands ⁽¹⁾	SGPWA	SGPWA and Morongo Tribal Lands ⁽¹⁾
Conveyance to SGPWA Region via this Pipeline (cfs)	50	108	25	71
Pipeline Sizing (inch-dia.)	36	54	30	48
Pipeline Length (feet)	192,000	192,000	192,000	192,000

⁽¹⁾ Additional 58 cfs or 46 cfs of SWP Water to be discharged into Cabazon Basin for Morongo Tribal Lands.

Pumping Requirements.

Pump station locations along the Independent SGPWA North Pass Alignment will be similar to the North Pass Alignment (Plate 5-13 and Plate 5-14). Table 5-12 following summarizes pump characteristics for the Independent SGPWA North Pass Alternative (see Appendix F for detailed breakdown of these calculations).

Table 5-12: Independent SGPWA North Pass Alignment – Pump Station Characteristics

SGPWA North Pass Alignment Pump Stations	63% Reliability				80% Reliability			
	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)
SGPWA Flows								
Pump Station #1	722	50	4,800	3,800	640	25	2,100	1,700
Pump Station #2	795	50	5,300	4,200	607	25	2,000	1,600
SGPWA and Morongo Tribal Land Flows								
Pump Station #1	579	108	8,300	6,600	602	71	5,700	4,500
Pump Station #2	641	108	9,200	7,200	543	71	5,200	4,000

Inland Feeder–Modified Pass Alignment

It was noted in the August 2007 Development Plan that CVWD and DWA could attempt to obtain capacity in The Metropolitan Water District of Southern California (MWD) Inland Feeder. MWD’s Inland Feeder is planned to convey 1000 cfs once completed and roughly parallels the North Pass Alignment for the first third of the alignment to the Mentone area and would require an independent pipeline to convey SWP water to SGPWA area (Plate 5-2). The cost of this 1000 cfs conveyance facility was estimated at \$1.2 billion (per August 2007 Development Plan). MWD may not sell approximately 34% to 42% (336 to 419 cfs, including Morongo Tribal Lands) of their capacity to CVWD, DWA and SGPWA. However, SGPWA may be able to obtain its required water demand of 25 cfs to 108 cfs since SGPWA supplemental water requirement is 2 to 11 percent of the Inland Feeder’s capacity. This alternative assumes that SGPWA can purchase its projected capacity needs in the Inland Feeder to the Mentone area. From Mentone, SGPWA could construct an independent pipeline to its service area (Plate 5-15)

Pipeline Diameter and Length.

The MWD Inland Feeder Pipeline commences at the Devil Canyon Powerhouse Afterbay and roughly parallels the North Pass alignment to the Citrus Pump Station and Citrus Reservoir in the Mentone area (Plate 5-15). If SGPWA were able to purchase 25 cfs to 108 cfs capacity rights in the MWD Inland Feeder Pipeline to convey this water to Mentone, this project would be feasible. SGPWA would construct a 30-inch to 54-inch diameter

pipeline from MWD Inland Feeder Pipeline at Mentone and follow the North Pass Alignment to discharge water into the Cabazon Basin (Plate 5-15). A summary of lengths and diameters is provided in Table 5-13 below (see Appendix E for detailed calculations).

Table 5-13: Summary of Results for Inland Feeder–Modified Pass Alignment for SGPWA and Morongo Tribal Lands Water Demand

Conveyance Criteria	63% Reliability		80% Reliability	
	SGPWA	SGPWA and Morongo Tribal Lands ⁽¹⁾	SGPWA	SGPWA and Morongo Tribal Lands ⁽²⁾
Conveyance to SGPWA Region via this Pipeline (cfs)	50	108	25	71
Pipeline Sizing ⁽³⁾ (inch-Dia.)	36	54	30	48
Pipeline Length (feet)	100,000	100,000	100,000	100,000

⁽¹⁾ Additional 58 cfs capacity based on 63% reliability of SWP Water to be discharged into Cabazon Basin for Morongo Tribal Lands.

⁽²⁾ Additional 46 cfs capacity based on 80% reliability of SWP Water to be discharged into Cabazon Basin for Morongo Tribal Lands.

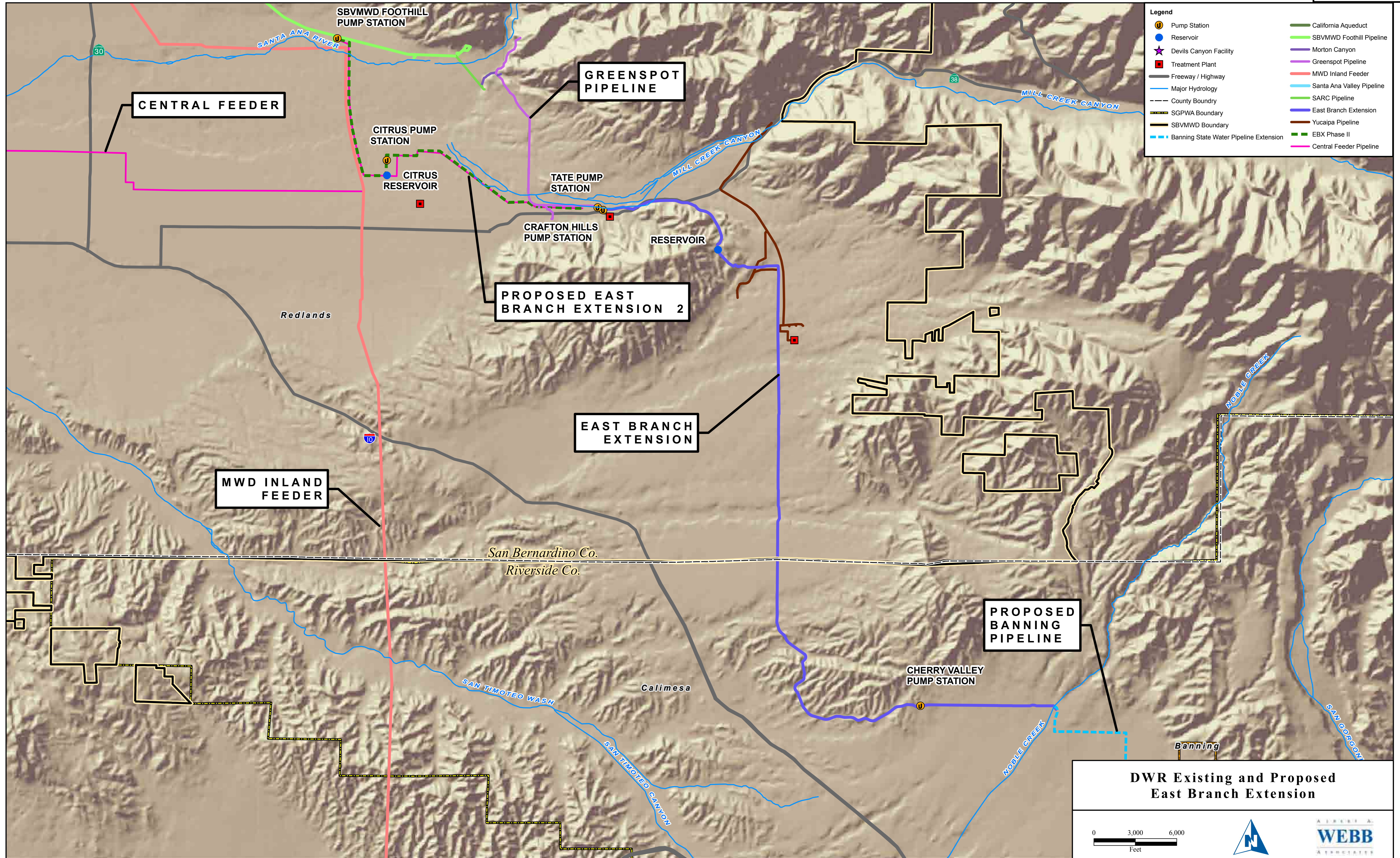
⁽³⁾ Pipeline sizing based on flow accommodation with pipeline velocity of approximately 7 fps.

Pumping Requirements.

The Inland Feeder–Modified Pass Alignment, beginning at the connection to MWD’s Inland Feeder Pipeline, will require two (2) pump stations to pump approximately 600–700 feet of elevation (Plate 5-16 and Plate 5-17). Table 5-14 below summarizes pump characteristics for this alternative (see Appendix F for detailed breakdown of these calculations).

Table 5-14: Inland Feeder–Modified Pass Alignment – Pump Station Characteristics

Inland Feeder–Modified Pass Alignment Pump Stations	63% Reliability				80% Reliability			
	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)	TDH (ft)	Q (cfs)	Power (HP)	Power (kw)
SGPWA Flows								
Pump Station #1	677	50	4,500	3,500	642	25	2,100	1,700
Pump Station #2	658	50	4,400	3,400	581	25	1,900	1,500
SGPWA and Morongo Tribal Land Flows								
Pump Station #1	632	108	9,100	7,100	620	71	5,900	4,600
Pump Station #2	532	108	7,700	6,000	521	71	4,900	3,900



Legend

- Pump Station
- Reservoir
- Devils Canyon Facility
- Treatment Plant
- Freeway / Highway
- Major Hydrology
- County Boundary
- SGPWA Boundary
- SBVMWD Boundary
- Banning State Water Pipeline Extension
- California Aqueduct
- SBVMWD Foothill Pipeline
- Morton Canyon
- Greenspot Pipeline
- MWD Inland Feeder
- Santa Ana Valley Pipeline
- SARC Pipeline
- East Branch Extension
- Yucaipa Pipeline
- EBX Phase II
- Central Feeder Pipeline

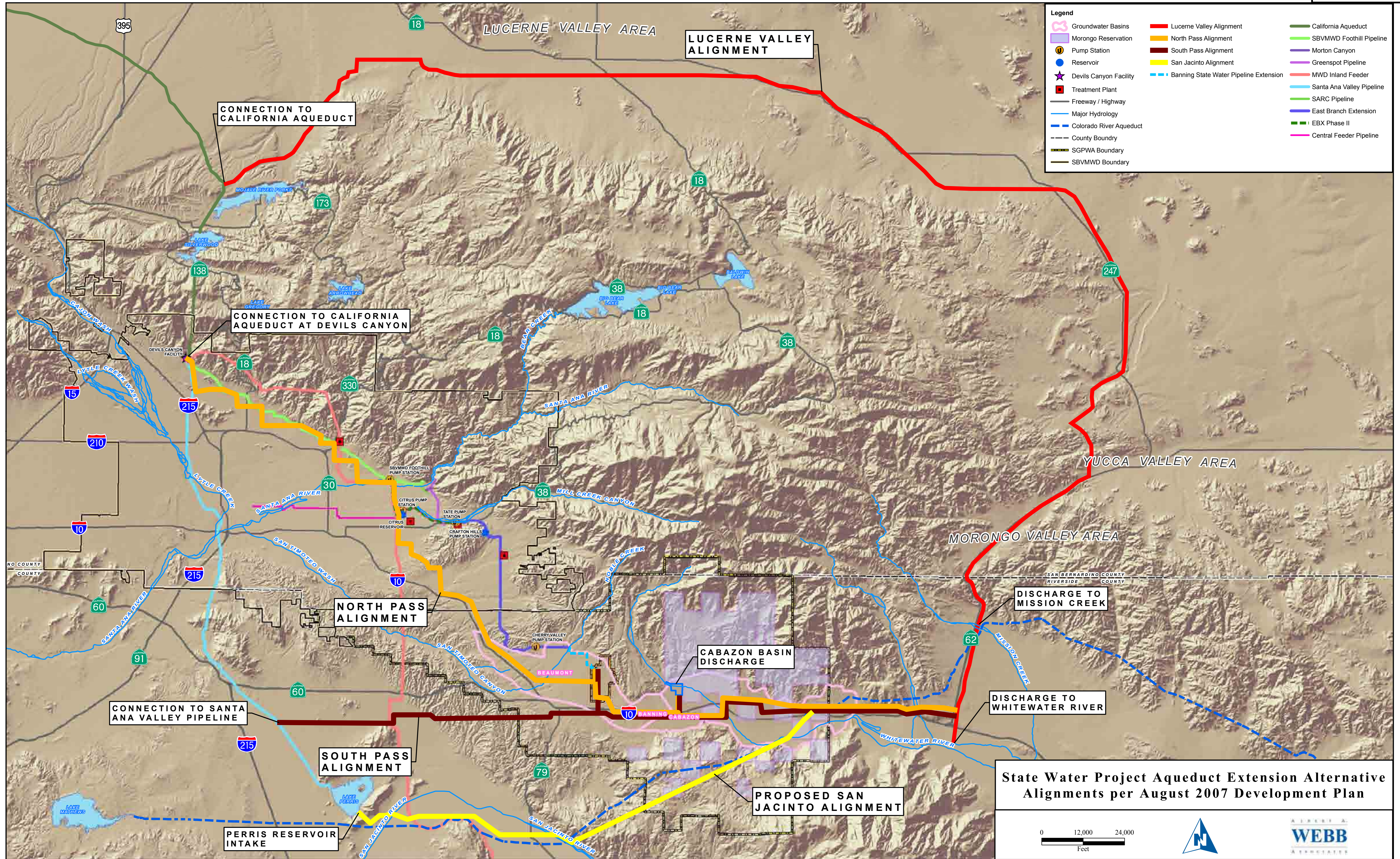
DWR Existing and Proposed East Branch Extension

0 3,000 6,000 Feet

ALBERT A. WEBB ASSOCIATES

This map contains Geographic Information owned by SBVMWD

Map revised April 10, 2009. G:\2007\07-0589\GIS\East_Branch_X.mxd



Legend

- Groundwater Basins
- Morongo Reservation
- Pump Station
- Reservoir
- Devils Canyon Facility
- Treatment Plant
- Freeway / Highway
- Major Hydrology
- Colorado River Aqueduct
- County Boundary
- SGPWA Boundary
- SBVMWD Boundary
- Lucerne Valley Alignment
- North Pass Alignment
- South Pass Alignment
- San Jacinto Alignment
- Banning State Water Pipeline Extension
- California Aqueduct
- SBVMWD Foothill Pipeline
- Morton Canyon
- Greenspot Pipeline
- MWD Inland Feeder
- Santa Ana Valley Pipeline
- SARC Pipeline
- East Branch Extension
- EBX Phase II
- Central Feeder Pipeline

CONNECTION TO CALIFORNIA AQUEDUCT

CONNECTION TO CALIFORNIA AQUEDUCT AT DEVILS CANYON

NORTH PASS ALIGNMENT

CONNECTION TO SANTA ANA VALLEY PIPELINE

SOUTH PASS ALIGNMENT

PERRIS RESERVOIR INTAKE

LUCERNE VALLEY ALIGNMENT

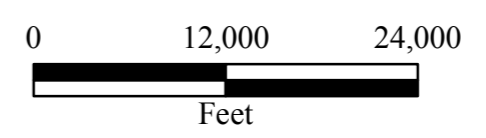
CABAZON BASIN DISCHARGE

PROPOSED SAN JACINTO ALIGNMENT

DISCHARGE TO MISSION CREEK

DISCHARGE TO WHITEWATER RIVER

State Water Project Aqueduct Extension Alternative Alignments per August 2007 Development Plan

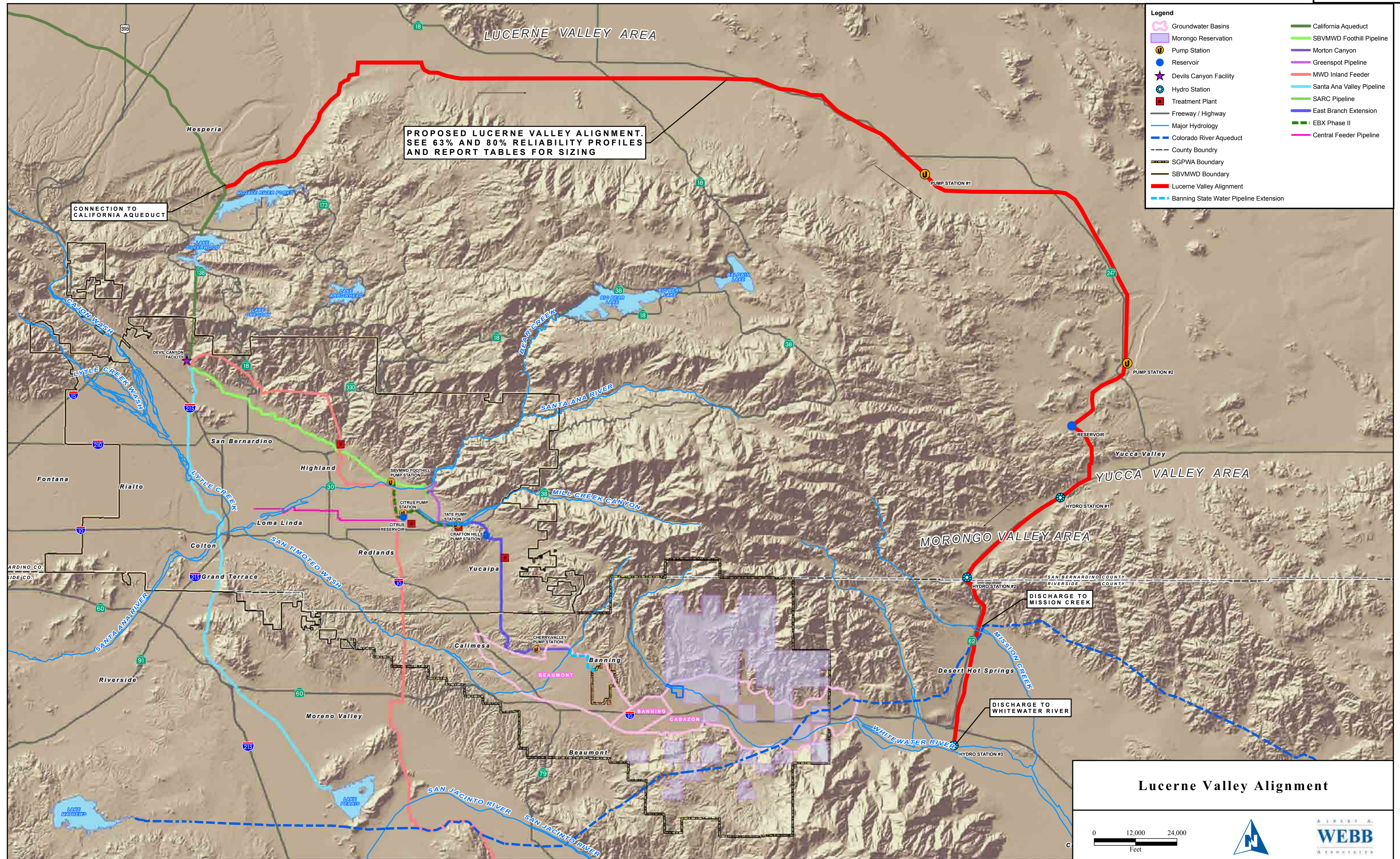


This map contains Geographic Information owned by SBVMWD

G:\2007\07-0268\GIS\Pass_Alignment.mxd

PROPOSED LUCERNE VALLEY ALIGNMENT.
SEE 63% AND 80% RELIABILITY PROFILES
AND REPORT TABLES FOR SIZING

- Legend**
- Groundwater Basins
 - Morongo Reservation
 - Pump Station
 - Reservoir
 - Devils Canyon Facility
 - Hydro Station
 - Treatment Plant
 - Freeway / Highway
 - Major Hydrology
 - Colorado River Aqueduct
 - County Boundary
 - SGPWA Boundary
 - SBVMWD Boundary
 - Lucerne Valley Alignment
 - Banning State Water Pipeline Extension
 - California Aqueduct
 - SBVMWD Foothill Pipeline
 - Morton Canyon
 - Greenspot Pipeline
 - MWD Inland Feeder
 - Santa Ana Valley Pipeline
 - SARC Pipeline
 - East Branch Extension
 - EBX Phase II
 - Central Feeder Pipeline



Lucerne Valley Alignment

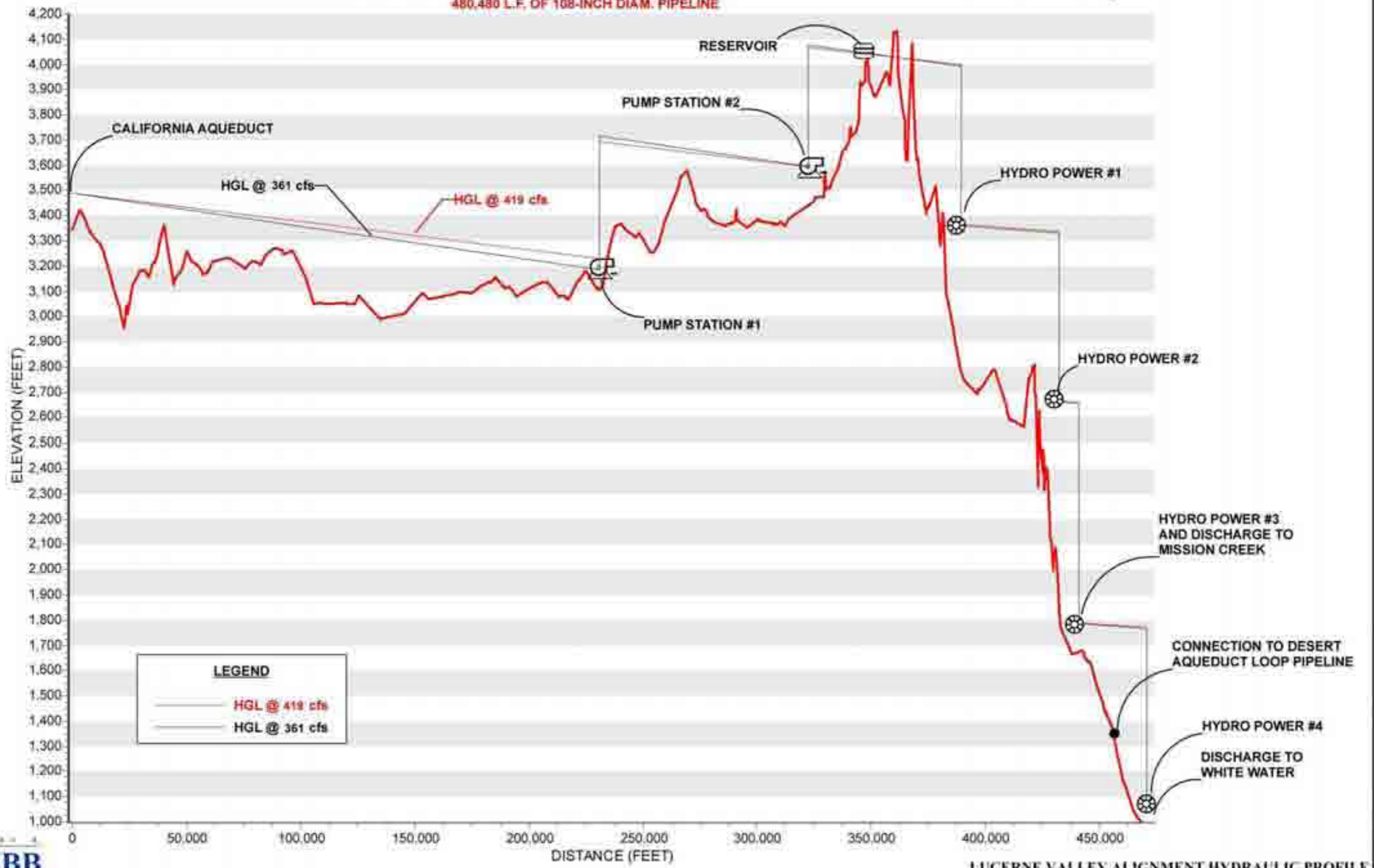
0 12,000 24,000

Feet

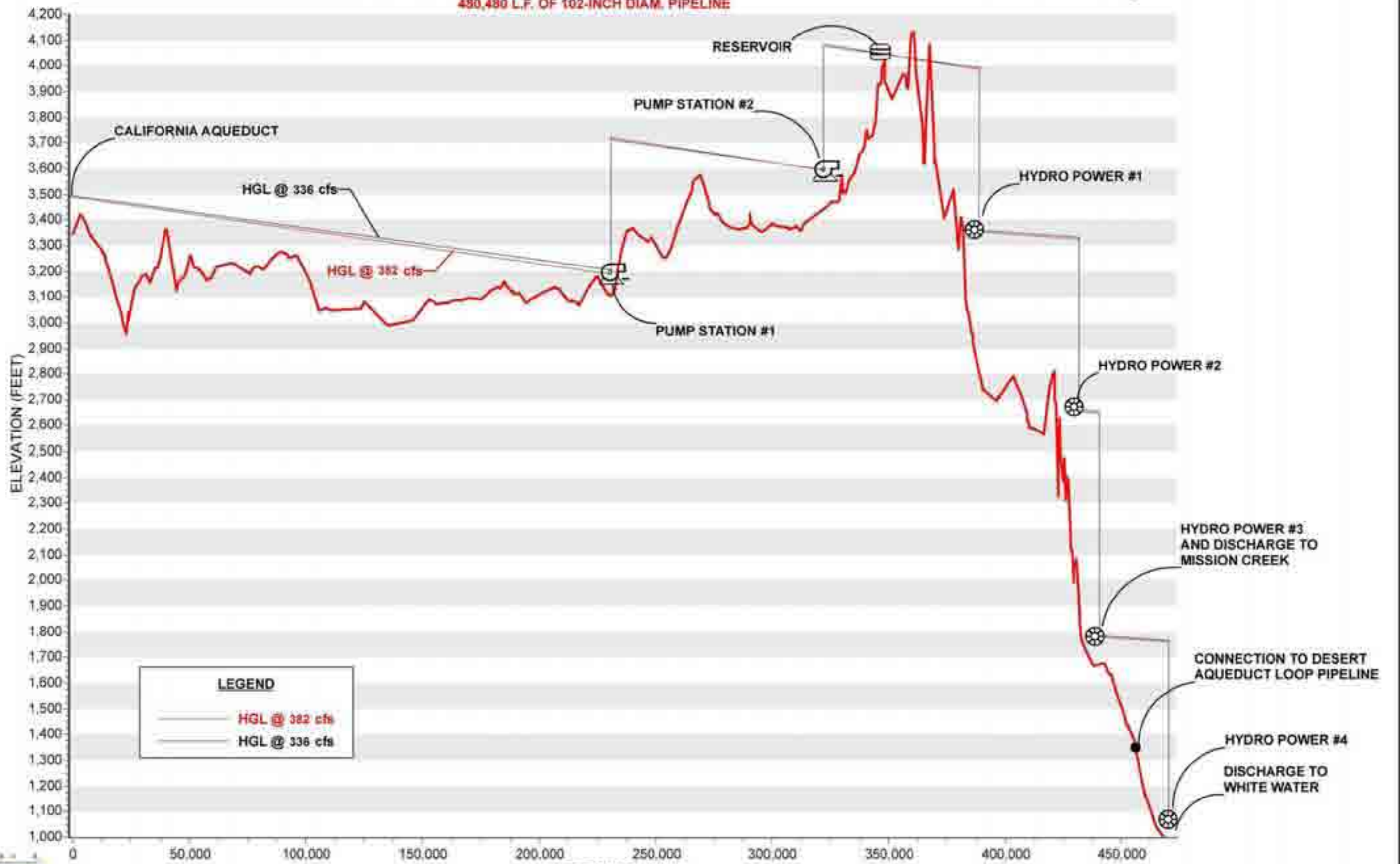
This map contains Geographic Information owned by SBVMWD

Map revised April 10, 2009. G:\2007\07-0569\GIS\Pass_Alignment_Lucerne.mxd

480,480 L.F. OF 96-INCH DIAM. PIPELINE
480,480 L.F. OF 108-INCH DIAM. PIPELINE



480,480 L.F. OF 96-INCH DIAM. PIPELINE
480,480 L.F. OF 102-INCH DIAM. PIPELINE



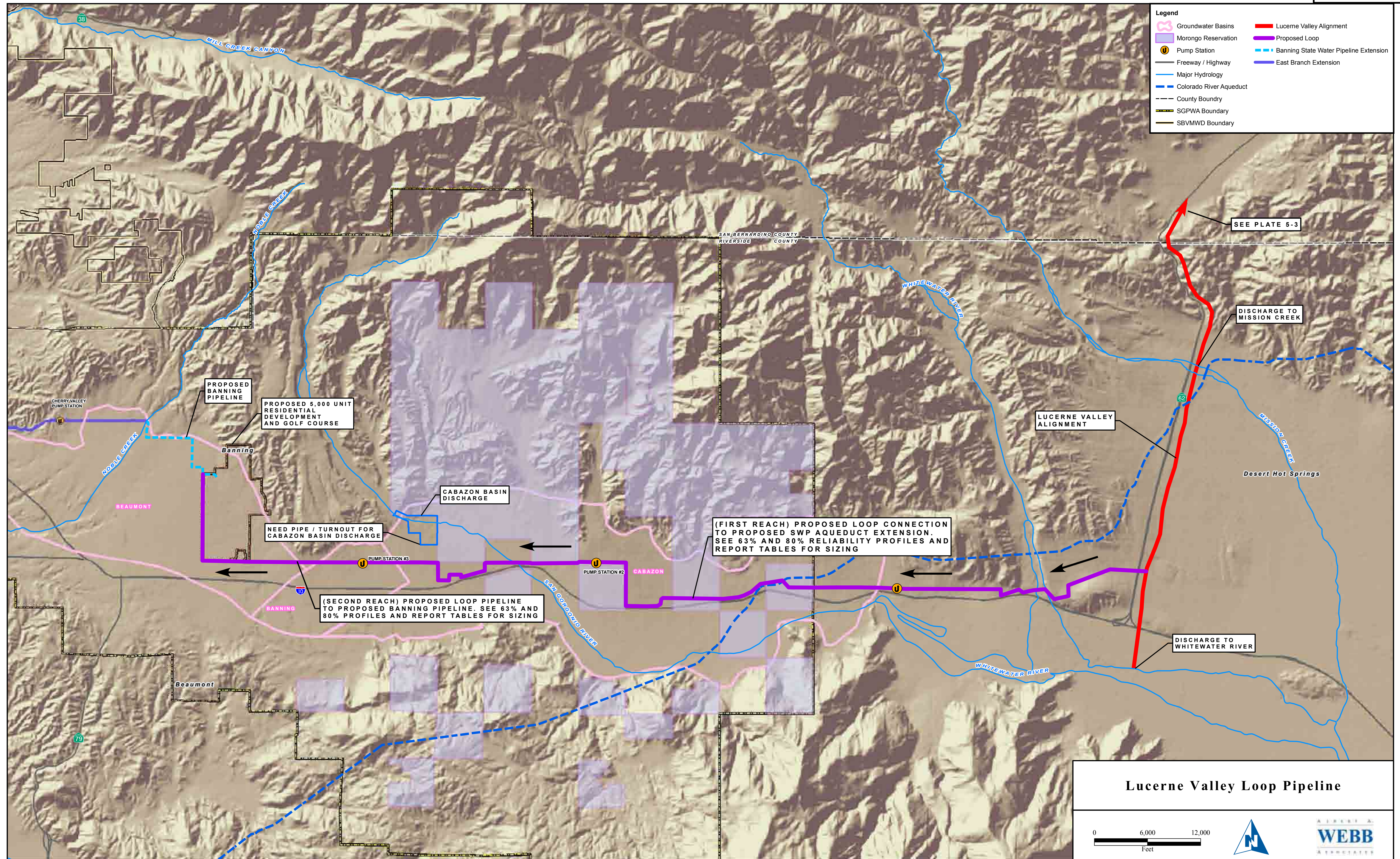
LEGEND

- HGL @ 382 cfs
- HGL @ 336 cfs

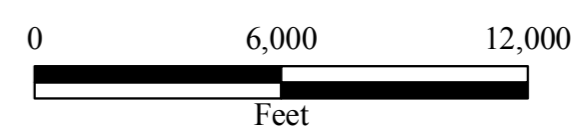


LUCERNE VALLEY ALIGNMENT HYDRAULIC PROFILE
for 80% Reliability

G:\2007\07-0269\GIS\Alignment_Profile_Lucerne_80.jpg



Lucerne Valley Loop Pipeline



This map contains Geographic Information owned by SBVMWD

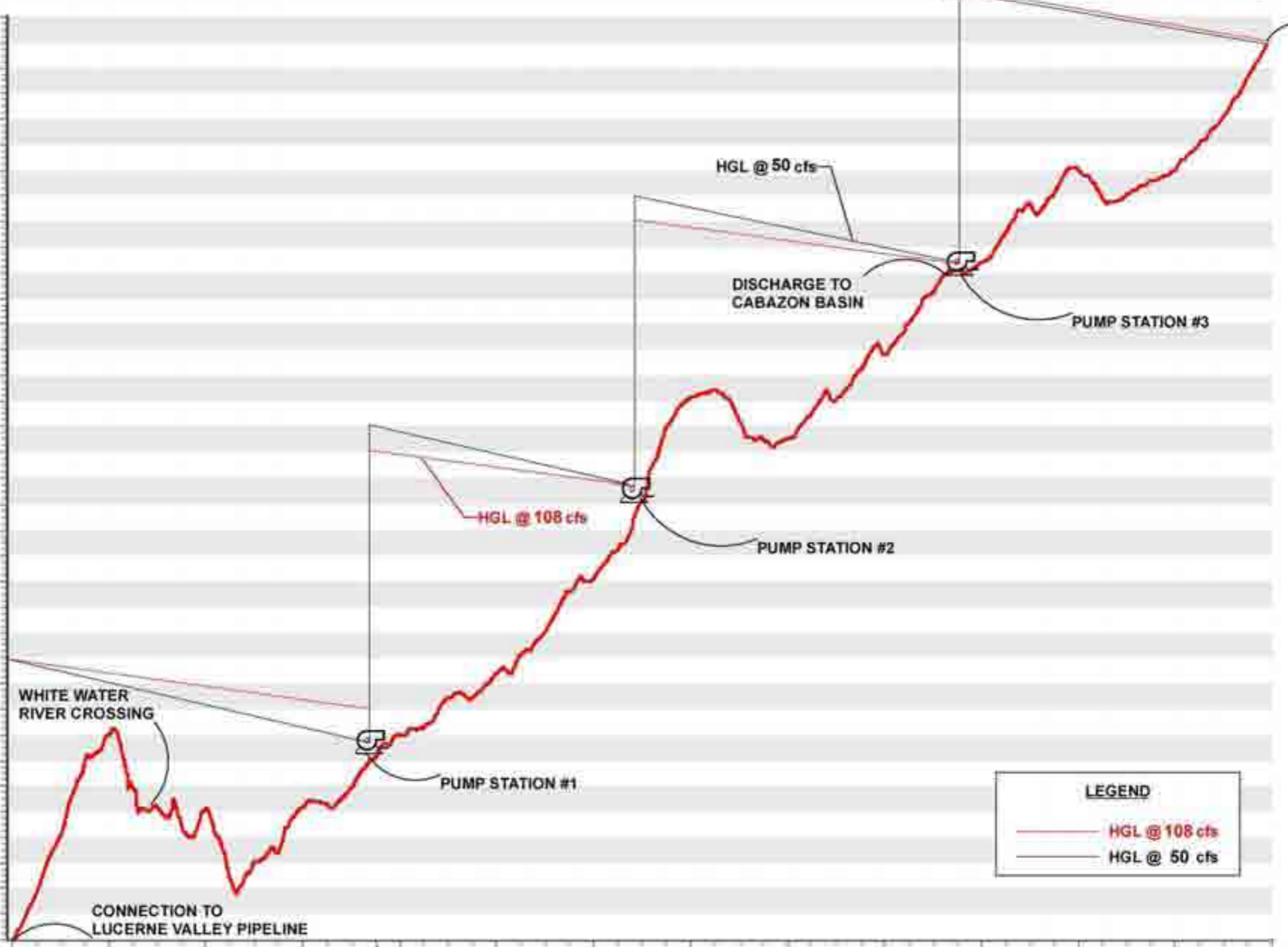
G:\2007\07-0269\GIS\Pass_Alignment_Loop.mxd
Map revised June 24, 2008.

134,200 L.F. OF 36-INCH DIAM. PIPELINE

89,200 L.F. OF 60-INCH DIAM. PIPELINE

35,000 L.F. OF 54-INCH DIAM. PIPELINE

ELEVATION (FEET)
2,900
2,850
2,800
2,750
2,700
2,650
2,600
2,550
2,500
2,450
2,400
2,350
2,300
2,250
2,200
2,150
2,100
2,050
2,000
1,950
1,900
1,850
1,800
1,750
1,700
1,650
1,600
1,550
1,500
1,450
1,400
1,350
1,300
1,250
1,200
1,150
1,100



WHITE WATER RIVER CROSSING

HGL @ 50 cfs

DISCHARGE TO CABAZON BASIN

PUMP STATION #3

HGL @ 108 cfs

PUMP STATION #2

PUMP STATION #1

CONNECTION TO LUCERNE VALLEY PIPELINE

CONNECTION TO BANNING PIPELINE

LEGEND

- HGL @ 108 cfs
- HGL @ 50 cfs

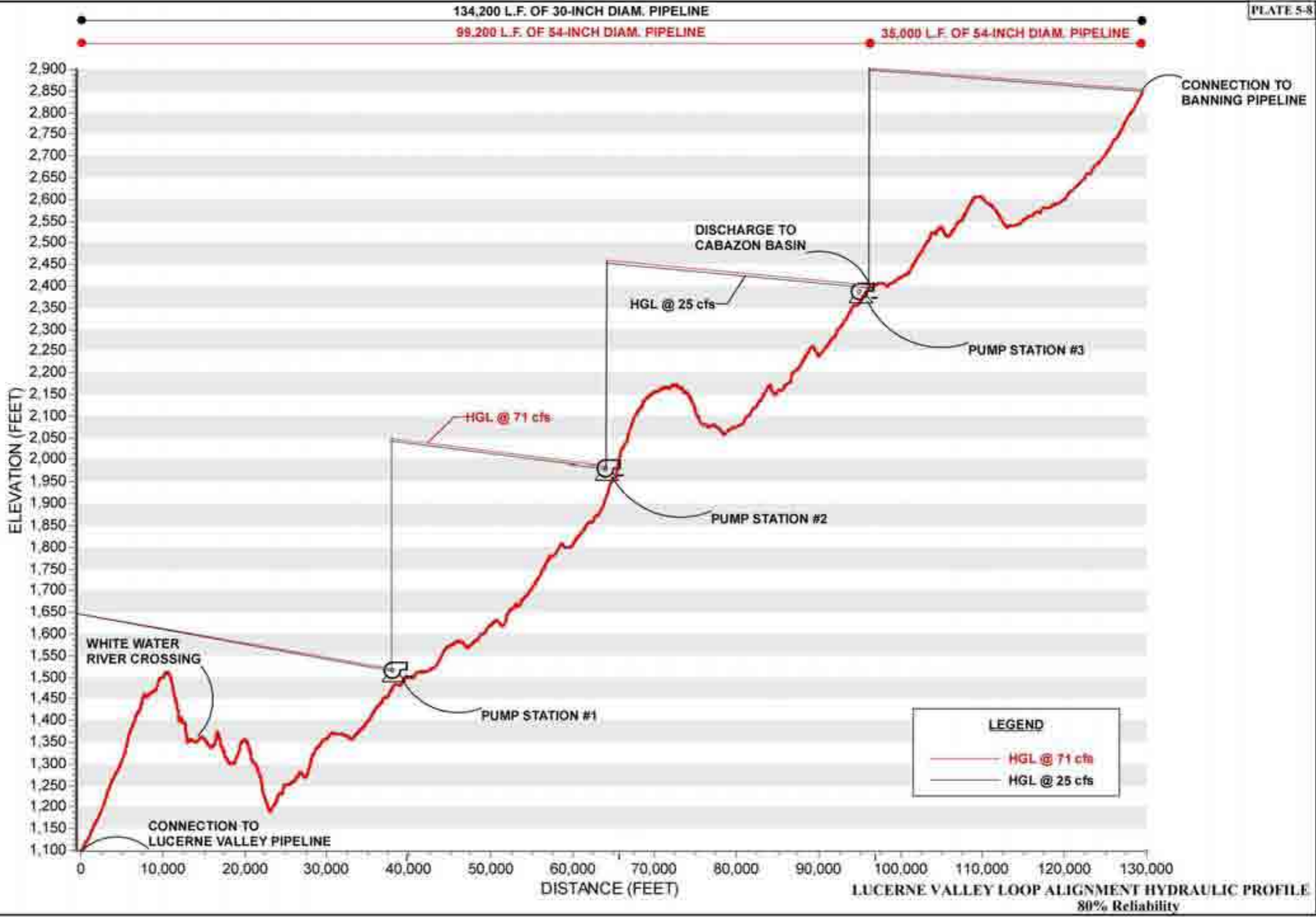


DISTANCE (FEET)

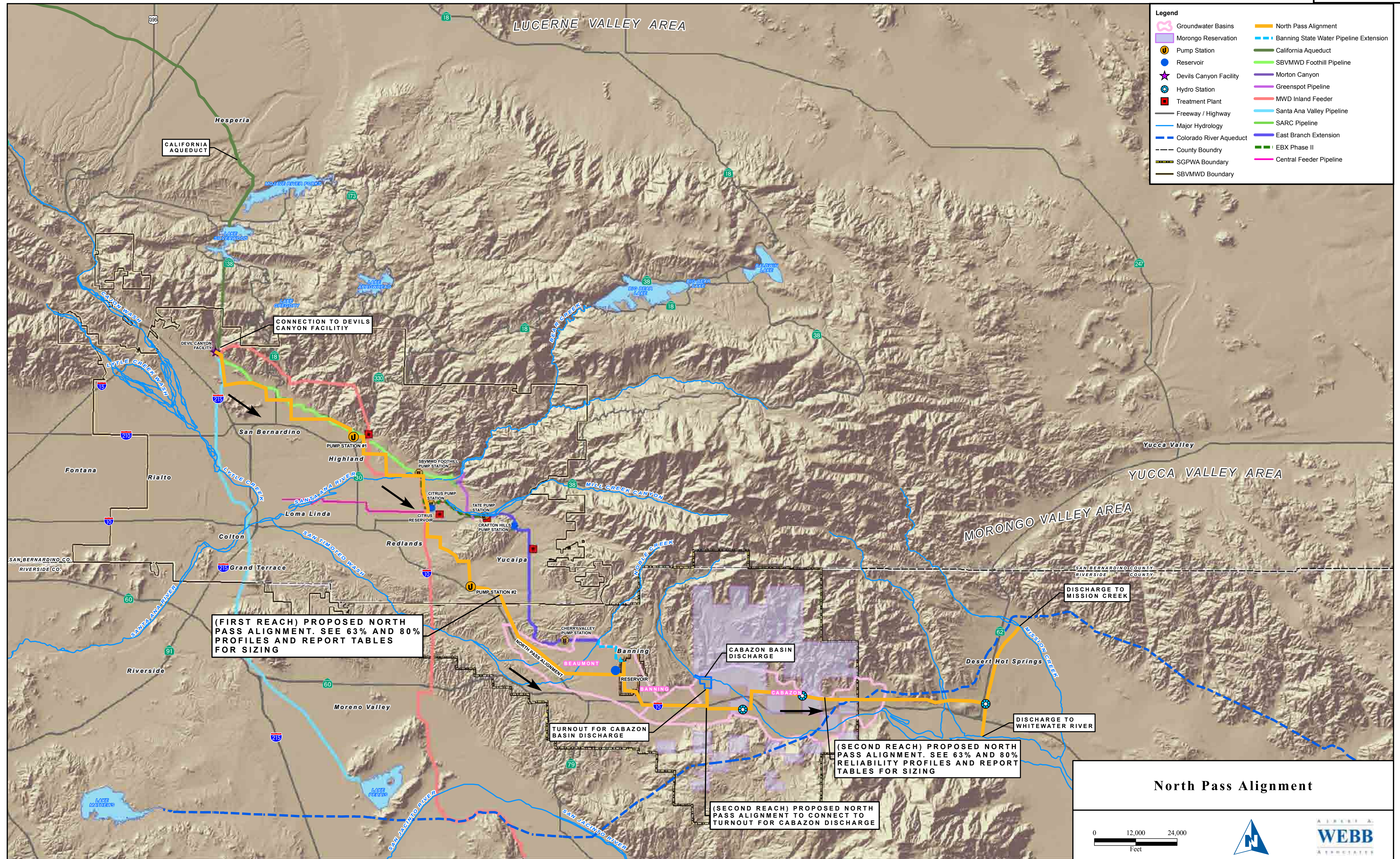
LUCERNE VALLEY LOOP ALIGNMENT HYDRAULIC PROFILE

63% Reliability

G:\2007-07-02\63636\Alignment_Profile_Loop_63.jpg



G:\2007\07-01\2007\07-01\2007\07-01\Alignment_Profile_Loop_80.jpg



- Legend**
- Groundwater Basins
 - Morongo Reservation
 - Ⓜ Pump Station
 - Reservoir
 - ★ Devils Canyon Facility
 - ⊙ Hydro Station
 - Treatment Plant
 - Freeway / Highway
 - Major Hydrology
 - Colorado River Aqueduct
 - - - County Boundary
 - SGPWA Boundary
 - SBVMWD Boundary
 - North Pass Alignment
 - Banning State Water Pipeline Extension
 - California Aqueduct
 - SBVMWD Foothill Pipeline
 - Morton Canyon
 - Greenspot Pipeline
 - MWD Inland Feeder
 - Santa Ana Valley Pipeline
 - SARC Pipeline
 - East Branch Extension
 - EBX Phase II
 - Central Feeder Pipeline

(FIRST REACH) PROPOSED NORTH PASS ALIGNMENT. SEE 63% AND 80% PROFILES AND REPORT TABLES FOR SIZING

(SECOND REACH) PROPOSED NORTH PASS ALIGNMENT. SEE 63% AND 80% RELIABILITY PROFILES AND REPORT TABLES FOR SIZING

(SECOND REACH) PROPOSED NORTH PASS ALIGNMENT TO CONNECT TO TURNOUT FOR CABAZON DISCHARGE

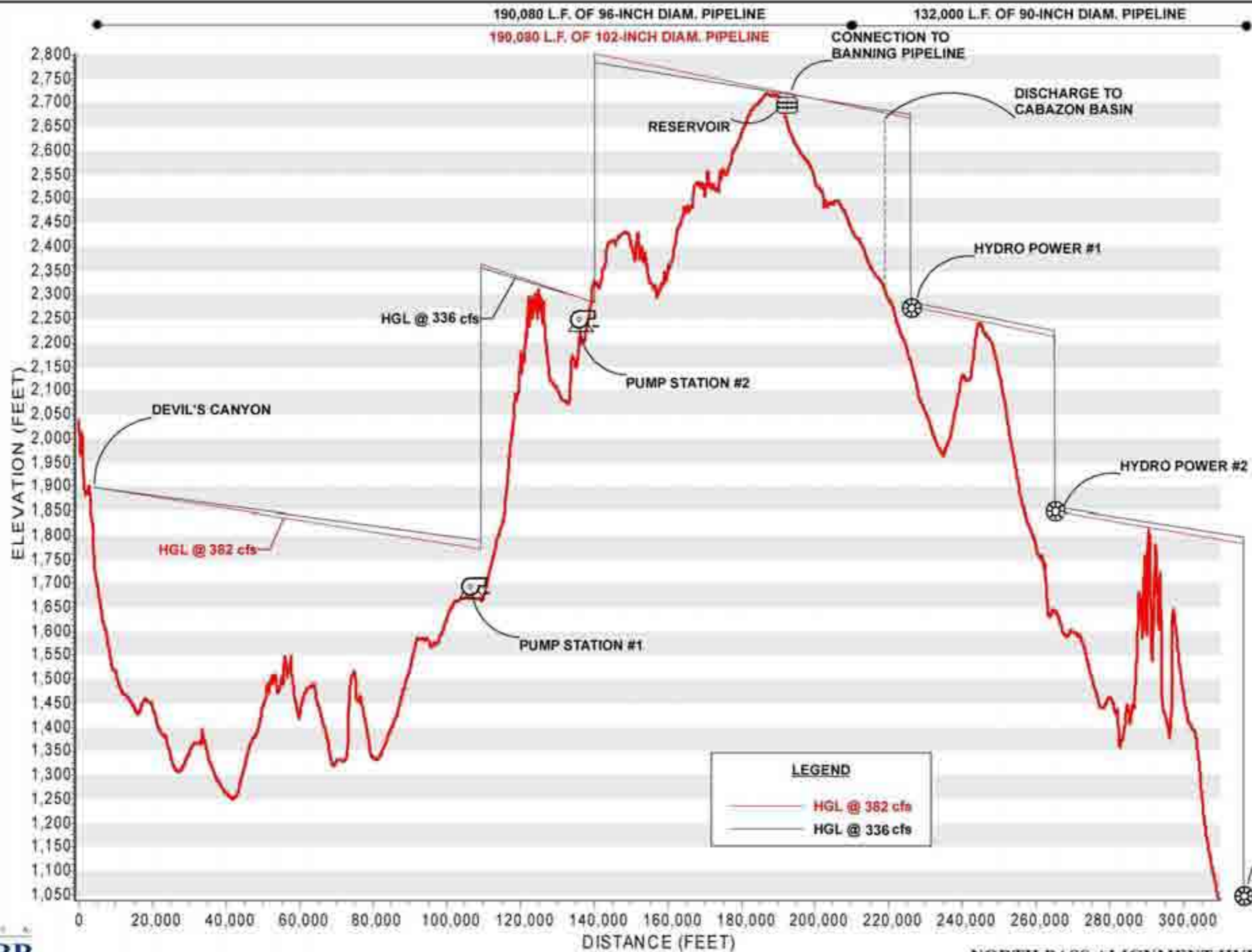
North Pass Alignment

0 12,000 24,000

Feet



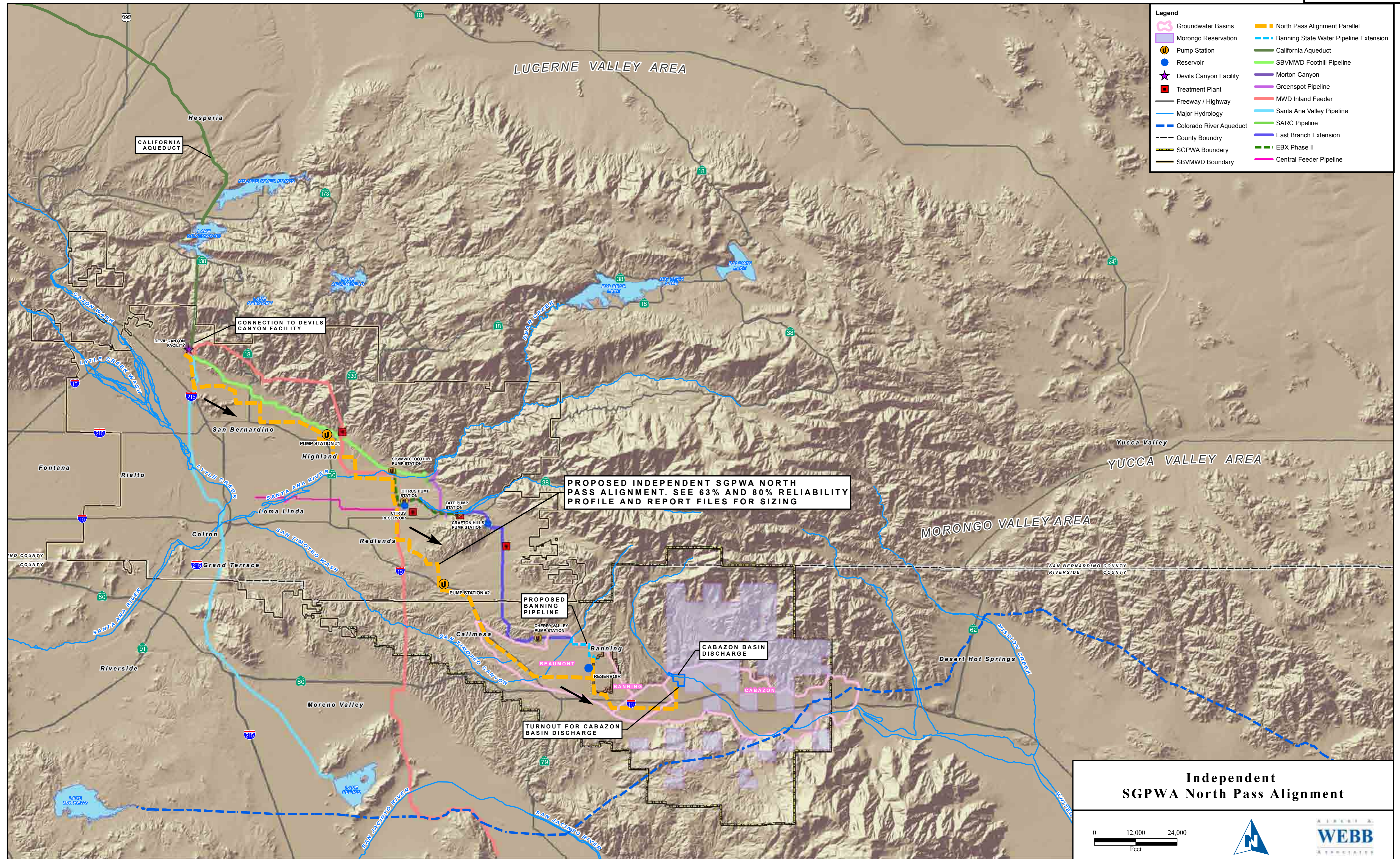
NORTH PASS ALIGNMENT HYDRAULIC PROFILE
63% Reliability



LEGEND

—	HGL @ 382 cfs
—	HGL @ 336 cfs

NORTH PASS ALIGNMENT HYDRAULIC PROFILE
80% Reliability



- Legend**
- Groundwater Basins
 - Morongo Reservation
 - Pump Station
 - Reservoir
 - Devils Canyon Facility
 - Treatment Plant
 - Freeway / Highway
 - Major Hydrology
 - Colorado River Aqueduct
 - County Boundary
 - SGPWA Boundary
 - SBVMWD Boundary
 - North Pass Alignment Parallel
 - Banning State Water Pipeline Extension
 - California Aqueduct
 - SBVMWD Foothill Pipeline
 - Morton Canyon
 - Greenspot Pipeline
 - MWD Inland Feeder
 - Santa Ana Valley Pipeline
 - SARC Pipeline
 - East Branch Extension
 - EBX Phase II
 - Central Feeder Pipeline

PROPOSED INDEPENDENT SGPWA NORTH PASS ALIGNMENT. SEE 63% AND 80% RELIABILITY PROFILE AND REPORT FILES FOR SIZING

PROPOSED BANNING PIPELINE

TURNOUT FOR CABAZON BASIN DISCHARGE

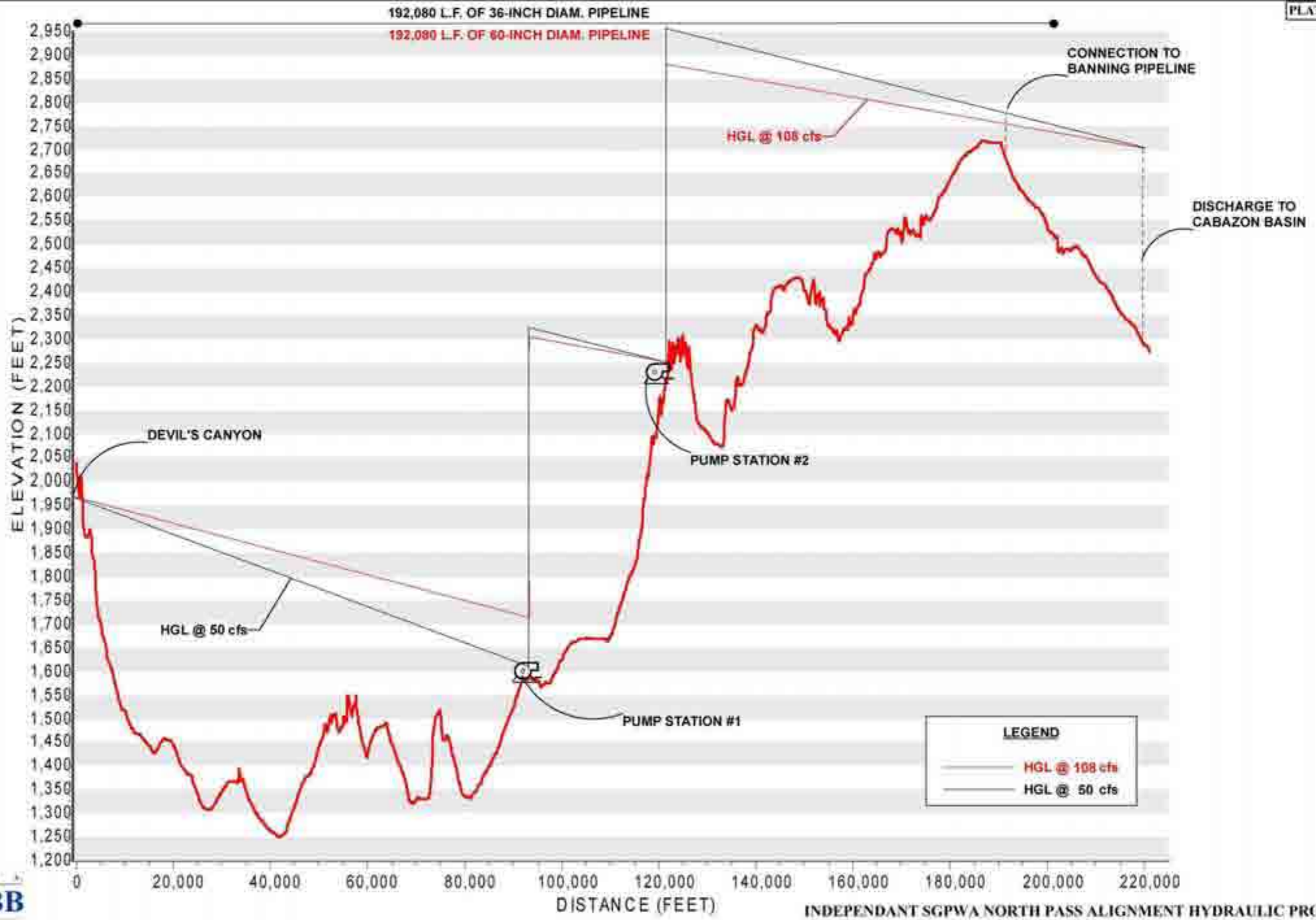
CABAZON BASIN DISCHARGE

Independent SGPWA North Pass Alignment

0 12,000 24,000
Feet

This map contains Geographic Information owned by SBVMWD

Map revised Sept. 26, 2008. G:\2007-07-02\69\GIS\Pass_Alignment_North_SGPWA.mxd



INDEPENDANT SGPWA NORTH PASS ALIGNMENT HYDRAULIC PROFILE
63% Reliability

G:\3007\07-0269\GIS\Alignment_Profile_North_SGPWA_03.dwg

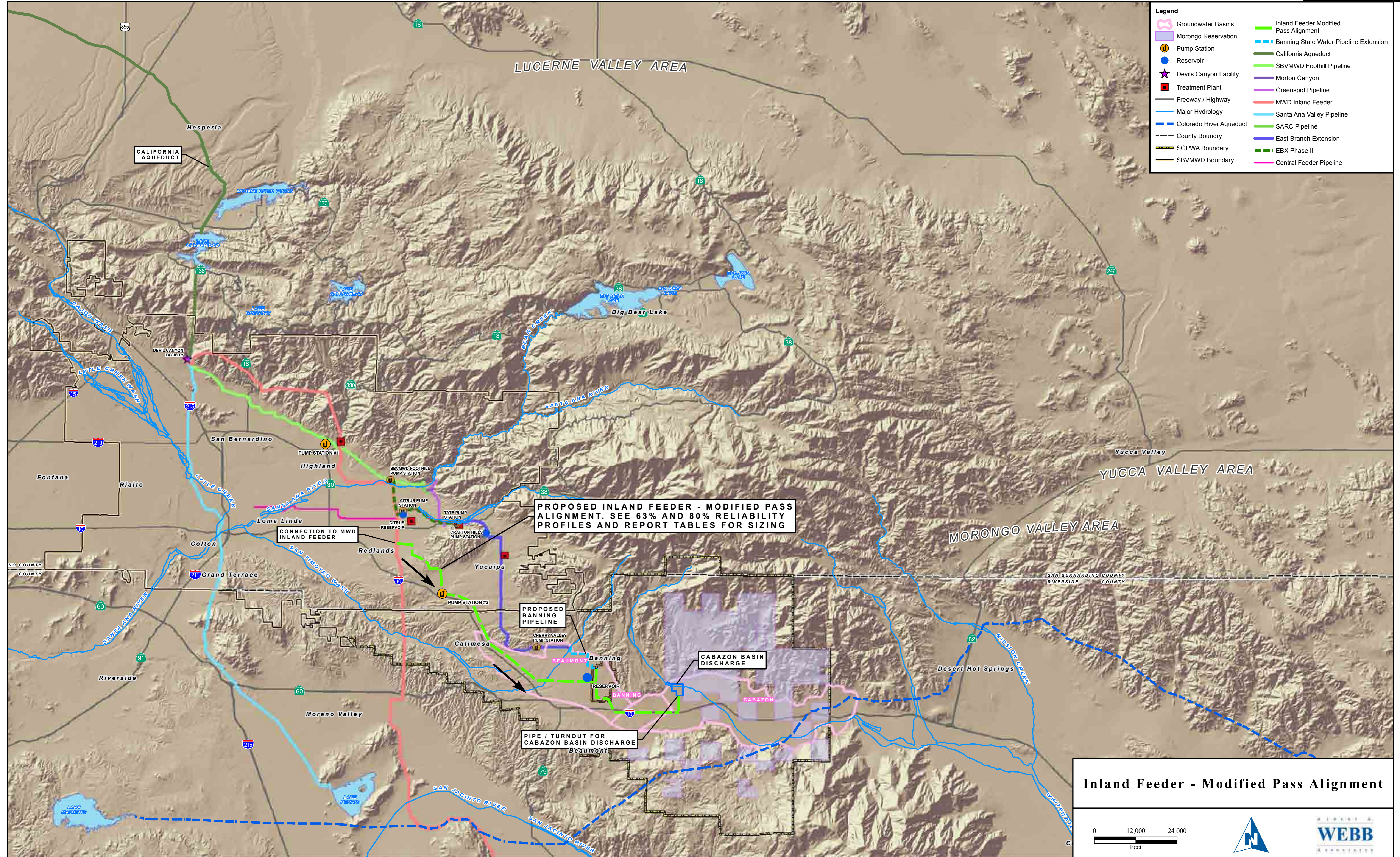
192,080 L.F. OF 30-INCH DIAM. PIPELINE

192,080 L.F. OF 54-INCH DIAM. PIPELINE



INDEPENDANT SGPWA NORTH PASS ALIGNMENT HYDRAULIC PROFILE
80% Reliability

G:\2007\07-02-09\GIS\Alignment_Profile_North_SGPWA_80.jpg



- Legend**
- Groundwater Basins
 - Morongo Reservation
 - Ⓜ Pump Station
 - Reservoir
 - ★ Devils Canyon Facility
 - Treatment Plant
 - Freeway / Highway
 - Major Hydrology
 - Colorado River Aqueduct
 - - - County Boundary
 - - - SGPWA Boundary
 - SBVMWD Boundary
 - Inland Feeder Modified Pass Alignment
 - Banning State Water Pipeline Extension
 - California Aqueduct
 - SBVMWD Foothill Pipeline
 - Morton Canyon
 - Greenspot Pipeline
 - MWD Inland Feeder
 - Santa Ana Valley Pipeline
 - SARC Pipeline
 - East Branch Extension
 - EBX Phase II
 - Central Feeder Pipeline

PROPOSED INLAND FEEDER - MODIFIED PASS ALIGNMENT. SEE 63% AND 80% RELIABILITY PROFILES AND REPORT TABLES FOR SIZING

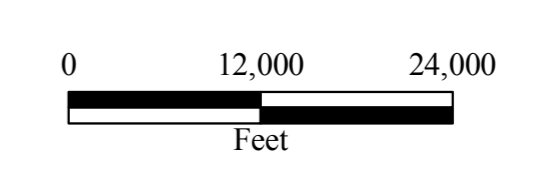
CONNECTION TO MWD INLAND FEEDER

PROPOSED BANNING PIPELINE

CABAZON BASIN DISCHARGE

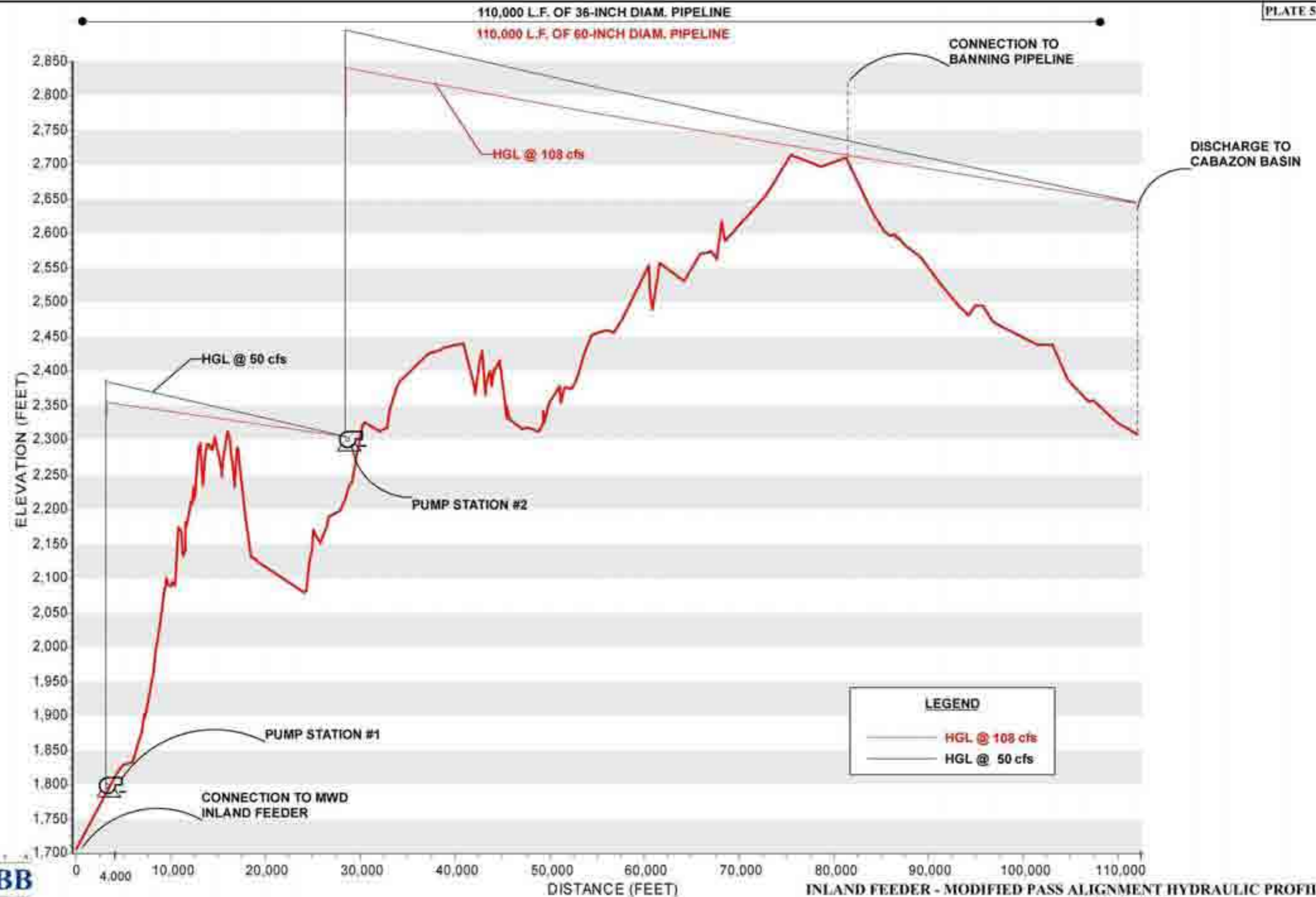
PIPE / TURNOUT FOR CABAZON BASIN DISCHARGE

Inland Feeder - Modified Pass Alignment



This map contains Geographic Information owned by SBVMWD

Map revised July 19, 2009. G:\2007\07-0269\GIS\Pass_Alignment_Memoire.mxd



INLAND FEEDER - MODIFIED PASS ALIGNMENT HYDRAULIC PROFILE
63% Reliability



SECTION 6 - PROJECT COST ESTIMATES

COST ESTIMATE CRITERIA

For purposes of comparing the cost of alternative alignments, the cost criteria and methodology presented in the August 2007 Development Plan were used where applicable. The total cost for each alternative developed herein consists of the total project cost, and the present worth of annual operation (energy) and maintenance cost. The total project costs of the Lucerne and the North Pass Alignments are based on Table 7-3 of the August 2007 Development Plan, Cost Estimating Criteria (Appendix G). These two alignments proposed a 90-inch diameter pipeline and the cost criteria included the cost of all capital facilities, engineering and administration, pipeline right-of-way acquisition, environmental mitigation, etc. The project cost of these two alternatives was then adjusted to an Engineering News Record (ENR) – Los Angeles Construction Cost Index of 9,799.19 (March 2009)¹. The same cost criterion was used to develop the project cost for the Independent SGPWA North Pass Alignment and the Inland Feeder–Modified Pass Alignment.

In addition to analyzing project costs for each alternative, a separate operations and maintenance cost analysis was performed which included energy cost to pump flows through each alternative alignment and maintenance cost for pipelines, pump stations, hydro stations, reservoirs, forebays, afterbays, etc. The annual power and operations and maintenance costs were developed using the cost basis presented in the August 2007 Development Plan (see Appendix G) and adjusted to present value based on an interest rate of 6 percent over 40 years per the August 2007 Development Plan.

Lucerne Valley Alignment Cost Analysis

The project cost estimate and operations and maintenance cost estimate for Lucerne Valley Alignment (Plate 5-3) was based on the criteria presented in the August 2007 Development Plan. However, the allocation of cost for each proposed participating agency was based on the percentage of each agency's allocated capacity (refer to Appendix H for details). Table 6-1 and Table 6-2 summarize the percentage of cost for each participating agency, based on allocated capacity in the Lucerne Valley Alignment and the North Pass Alignment based upon a SWP delivery reliability of 63% and 80%.

¹ The ENR – Los Angeles Construction Cost Index for July 2009 is 9,764.44. For planning purposes of this report, the March 2009 ENR Index was utilized.

Table 6-1: Allocated Capacity to CVWD, DWA, SGPWA and Morongo Tribal Lands for the Lucerne Valley and the North Pass Alignments (SWP 63% Reliability)

Pipeline Size	Total Capacity	CVWD and DWA		SGPWA		Morongo Tribal Lands	
		cfs	%	cfs	%	cfs	%
90-inch Dia.	311 cfs	311	100	0	0	0	0
96-inch Dia.	361 cfs	311	86.1	50	13.9	0	0
108-inch Dia.	419 cfs	311	74.2	50	11.9	58	13.8

Table 6-2: Allocated Capacity to CVWD, DWA, SGPWA and Morongo Tribal Lands for the Lucerne Valley and the North Pass Alignments (SWP 80% Reliability)

Pipeline Size	Total Capacity	CVWD and DWA		SGPWA		Morongo Tribal Lands	
		cfs	%	cfs	%	cfs	%
90-inch Dia.	311 cfs	311	100	0	0	0	0
96-inch Dia.	336 cfs	311	92.6	25	7.4	0	0
102-inch Dia.	382 cfs	311	81.4	25	6.5	46	12.0

Additionally, the project cost estimate and operations and maintenance costs for the “Loop Pipeline” (Plate 5-6) are included and costs will be allocated accordingly based on SGPWA and Morongo Tribal Lands allocated capacity (Table 6-3 and Table 6-4).

Table 6-3: Allocated Capacity to SGPWA and Morongo Tribal Lands for the “Loop Pipeline”, Independent SGPWA North Pass Alignment and the Inland Feeder–Modified Pass Alignment (SWP 63% Reliability)

Pipeline Size	Total Capacity	SGPWA		Morongo Tribal Lands	
		cfs	%	cfs	%
36-inch Dia.	50 cfs	50	100	0	0
60-inch Dia.	108 cfs	50	46.3	58	53.7

Table 6-4: Allocated Capacity to SGPWA and Morongo Tribal Lands for the “Loop Pipeline” Alignment, Independent SGPWA North Pass Alignment, and the Inland Feeder–Modified Pass Alignment (SWP 80% Reliability)

Pipeline Size	Total Capacity	SGPWA		Morongo Tribal Lands	
		cfs	%	cfs	%
30-inch Dia.	25 cfs	25	100	0	0
54-inch Dia.	71 cfs	25	35.2	46	64.8

The total cost for the Lucerne Valley Alignment, including the present worth of annual power and O&M costs (i=6%, n= 40 years and pwf= 15.046) is summarized in Table 6-5 and Table 6-6 below.

Table 6-5: Lucerne Valley Alignment – Cost Summary (SWP 63% Reliability)

Description	CVWD & DWA (311 cfs)	CVWD, DWA and SGPWA (361 cfs)	CVWD, DWA, SGPWA & Morongo Tribal Lands (419 cfs)
Total Project Cost ⁽¹⁾	\$1,083,700,000	\$1,312,600,000	\$1,488,000,000
Present Worth of Annual Power Cost ⁽²⁾⁽³⁾	\$106,300,000	\$205,100,000	\$201,900,000
Present Worth of Annual O&M Cost ⁽²⁾⁽⁴⁾	\$73,300,000	\$82,400,000	\$91,100,000
Total Cost	\$1,263,300,000	\$1,600,100,000	\$1,781,000,000
CVWD Cost (311 cfs)	\$1,263,300,000	\$1,176,200,000	\$1,071,500,000
SGPWA Cost (50 cfs)	\$0	\$423,900,000⁽⁵⁾	\$326,900,000⁽⁵⁾
Morongo Tribal Lands Cost (58 cfs)	\$0	\$0	\$382,600,000⁽⁵⁾
Total Cost	\$1,263,300,000	\$1,600,100,000	\$1,781,000,000

⁽¹⁾ See Appendix I for a detailed breakdown of project costs.

⁽²⁾ Present worth analysis for annual power and maintenance costs based on interest rate of 6%, duration of 40 years and pwf= 15.046.

⁽³⁾ See Appendix J for a detailed breakdown of annual power costs.

⁽⁴⁾ See Appendix K for a detailed breakdown of annual maintenance costs.

⁽⁵⁾ Includes cost of "Loop Pipeline".

Table 6-6: Lucerne Valley Alignment – Cost Summary (SWP 80% Reliability)

Description	CVWD & DWA (311 cfs)	CVWD, DWA and SGPWA (336 cfs)	CVWD, DWA, SGPWA & Morongo Tribal Lands (382 cfs)
Total Project Cost ⁽¹⁾	\$1,084,100,000	\$1,261,700,000	\$1,388,200,000
Present Worth of Annual Power Cost ⁽²⁾⁽³⁾	\$106,300,000	\$128,900,000	\$181,300,000
Present Worth of Annual O&M Cost ⁽²⁾⁽⁴⁾	\$73,300,000	\$78,100,000	\$85,700,000
Total Cost	\$1,263,700,000	\$1,468,700,000	\$1,655,200,000
CVWD Cost (311 cfs)	\$1,263,700,000	\$1,225,400,000	\$1,118,500,000
SGPWA Cost (25 cfs)	\$0	\$243,300,000⁽⁵⁾	\$188,900,000⁽⁵⁾
Morongo Tribal Lands Cost (46 cfs)	\$0	\$0	\$347,800,000⁽⁵⁾
Total Cost	\$1,263,700,000	\$1,468,700,000	\$1,655,200,000

⁽¹⁾ See Appendix L for a detailed breakdown of project costs.

⁽²⁾ Present worth analysis for annual power and maintenance costs based on interest rate of 6%, duration of 40 years and $pwf = 15.046$.

⁽³⁾ See Appendix M for a detailed breakdown of annual power costs.

⁽⁴⁾ See Appendix N for a detailed breakdown of annual maintenance costs.

⁽⁵⁾ Includes cost of "Loop Pipeline".

North Pass Alignment Cost Analysis

The project cost estimate and power and O&M costs for each participating agency for the North Pass Alignment alternative (Plate 5-9) are based on each agency's percentage of allocated capacity in the North Pass Alignment. Table 6-1 and Table 6-2 summarize the percentages and Table 6-7 and Table 6-8 summarize the associated costs for each agency based on allocated capacity. The cost to SGPWA and Morongo Tribal Lands for the North Pass Alignment terminates at the proposed Cabazon Basin Discharge Facilities as flows allocated to SGPWA and Morongo Tribal Lands will discharge at this point. Therefore, CVWD and DWA will be totally responsible for all facilities including pipelines, hydro stations, etc. for facilities beyond the Cabazon Basin Discharge Facilities.

Table 6-7: North Pass Alignment – Cost Summary (SWP 63% Reliability)

Description	CVWD & DWA (311 cfs)	CVWD, DWA and SGPWA (361 cfs)	CVWD, DWA, SGPWA & Morongo Tribal Lands (419 cfs)
Total Project Cost ⁽¹⁾	\$885,400,000	\$926,700,000	\$979,500,000
Present Worth of Annual Power Cost ⁽²⁾⁽³⁾	\$113,000,000	\$135,600,000	\$141,100,000
Present Worth of Annual O&M Cost ⁽²⁾⁽⁴⁾	\$58,900,000	\$61,700,000	\$63,300,000
Total Cost	\$1,057,300,000	\$1,124,000,000	\$1,183,900,000
CVWD Cost (311 cfs)	\$1,057,300,000	\$1,018,300,000	\$969,200,000
SGPWA Cost (50 cfs)	\$0	\$105,700,000	\$98,800,000
Morongo Tribal Lands Cost (58 cfs)	\$0	\$0	\$115,900,000
Total Cost	\$1,057,300,000	\$1,124,000,000	\$1,183,900,000

⁽¹⁾ See Appendix I for a detailed breakdown of project costs.

⁽²⁾ Present worth analysis for annual power and maintenance costs based on interest rate of 6%, duration of 40 years and pwf= 15.046.

⁽³⁾ See Appendix J for a detailed breakdown of annual power costs.

⁽⁴⁾ See Appendix K for a detailed breakdown of annual maintenance costs.

Table 6-8: North Pass Alignment – Cost Summary (SWP 80% Reliability)

Description	CVWD & DWA (311 cfs)	CVWD, DWA and SGPWA (336 cfs)	CVWD, DWA, SGPWA & Morongo Tribal Lands (382 cfs)
Total Project Cost ⁽¹⁾	\$885,400,000	\$920,600,000	\$953,200,000
Present Worth of Annual Power Cost ⁽²⁾⁽³⁾	\$113,000,000	\$111,000,000	\$141,700,000
Present Worth of Annual O&M Cost ⁽²⁾⁽⁴⁾	\$58,900,000	\$60,700,000	\$62,300,000
Total Cost	\$1,057,300,000	\$1,092,300,000	\$1,157,200,000
CVWD Cost (311 cfs)	\$1,057,300,000	\$1,039,200,000	\$1,006,300,000
SGPWA Cost (25 cfs)	\$0	\$53,100,000	\$53,700,000
Morongo Tribal Lands Cost (46 cfs)	\$0	\$0	\$97,200,000
Total Cost	\$1,057,300,000	\$1,092,300,000	\$1,157,200,000

⁽¹⁾ See Appendix L for a detailed breakdown of project costs.

⁽²⁾ Present worth analysis for annual power and maintenance costs based on interest rate of 6%, duration of 40 years and pwf= 15.046.

⁽³⁾ See Appendix M for a detailed breakdown of annual power costs.

⁽⁴⁾ See Appendix N for a detailed breakdown of annual maintenance costs.

Independent SGPWA North Pass Alignment Cost Analysis

The Independent SGPWA North Pass Alignment alternative (Plate 5-12) similarly parallels the North Pass Alignment. This alternative conveys water for SGPWA and Morongo Tribal Lands flows only as CVWD and DWA are not participants. Costs for the Independent SGPWA North Pass Alignment are based on the cost percentages as presented in Table 6-3 and Table 6-4.

The total cost for the Independent SGPWA North Pass Alignment, including present worth of power and O&M costs (i=6%, n=40 years) is summarized in Table 6-9 and Table 6-10 below.

Table 6-9: Independent SGPWA North Pass Alignment – Cost Summary (SWP 63% Reliability)

Description	SGPWA (50 cfs)	SGPWA & Morongo Tribal Lands (108 cfs)
Total Project Cost ⁽¹⁾	\$181,700,000	\$263,600,000
Present Worth of Annual Power Cost ⁽²⁾⁽³⁾	\$75,900,000	\$130,900,000
Present Worth of Annual O&M Cost ⁽²⁾⁽⁴⁾	\$6,500,000	\$9,600,000
Total Cost	\$264,100,000	\$404,100,000
SGPWA Cost (50 cfs)	\$264,100,000	\$185,900,000
Morongo Tribal Lands Cost (58 cfs)	\$0	\$218,200,000
Total Cost	\$264,100,000	\$404,100,000

⁽¹⁾ See Appendix I for a detailed breakdown of project costs.

⁽²⁾ Present worth analysis for annual power and maintenance costs based on interest rate of 6%, duration of 40 years and pwf= 15.046.

⁽³⁾ See Appendix J for a detailed breakdown of annual power costs.

⁽⁴⁾ See Appendix K for a detailed breakdown of annual maintenance costs.

Table 6-10: Independent SGPWA North Pass Alignment – Cost Summary (SWP 80% Reliability)

Description	SGPWA (25 cfs)	SGPWA & Morongo Tribal Lands (71 cfs)
Total Project Cost ⁽¹⁾	\$145,400,000	\$228,900,000
Present Worth of Annual Power Cost ⁽²⁾⁽³⁾	\$31,300,000	\$80,600,000
Present Worth of Annual O&M Cost ⁽²⁾⁽⁴⁾	\$3,900,000	\$7,200,000
Total Cost	\$180,600,000	\$316,700,000
SGPWA Cost (25 cfs)	\$180,600,000	\$110,800,000
Morongo Tribal Lands Cost (46 cfs)	\$0	\$205,900,000
Total Cost	\$180,600,000	\$316,700,000

⁽¹⁾ See Appendix L for a detailed breakdown of project costs.

⁽²⁾ Present worth analysis for annual power and maintenance costs based on interest rate of 6%, duration of 40 years and pwf= 15.046.

⁽³⁾ See Appendix M for a detailed breakdown of annual power costs.

⁽⁴⁾ See Appendix N for a detailed breakdown of annual maintenance costs.

Inland Feeder–Modified Pass Alignment Cost Analysis

The Inland Feeder–Modified Pass Alignment (Plate 5-15) assumes the partial utilization of 1000 cfs capacity in the MWD Inland Feeder pipeline to convey SWP water from the California Aqueduct to Mentone. The cost for the conveyance of flows through the MWD Inland Feeder is based on a percentage of the allocated capacity of the \$1.2 billion project cost (per the August 2007 Development Plan). Table 6-11 and Table 6-12 summarize the cost percentage and the costs allocated to SGPWA and the Morongo Tribal Lands based on the allocated capacity in the Inland Feeder. Please note that power and O&M costs associated with the MWD Inland Feeder have yet to be analyzed. Once cost items related to MWD Inland Feeder are more defined, a more detailed analysis can be prepared and will be provided as a separate scope.

Table 6-11: Cost Allocation of MWD Inland Feeder (SWP 63% Reliability)⁽¹⁾

Agency	Flow Capacity (cfs)	Percentage of Shared Cost	Cost
SGPWA	50	5.0%	\$60,000,000
Morongo Tribal Lands	58	5.8%	\$69,600,000

⁽¹⁾ Assumes MWD would sell capacity in the Inland Feeder for the price noted above.

Table 6-12: Cost Allocation of MWD Inland Feeder (SWP 80% Reliability)⁽¹⁾

Agency	Flow Capacity (cfs)	Percentage of Shared Cost	Cost
SGPWA	25	2.5%	\$30,000,000
Morongo Tribal Lands	46	4.6%	\$55,200,000

⁽¹⁾ Assumes MWD would sell capacity in the Inland Feeder for the price noted above.

The Inland Feeder–Modified Pass pipeline would be constructed from the proposed interconnection to the MWD Inland Feeder in the Mentone area to the SGPWA Service Area (Plate 5-15). The project cost and power and O&M costs of this alternative will be based on cost percentages presented in Table 6-3 and Table 6-4.

The total cost for the Inland Feeder–Modified Pass Alignment alternative, including the cost allocation for the MWD Inland Feeder pipeline, is summarized in Table 6-13 and Table 6-14 below.

Table 6-13: Inland Feeder–Modified Pass Alignment – Cost Summary (SWP 63% Reliability)

Description	SGPWA (50 cfs)	SGPWA & Morongo Tribal Lands (108 cfs)
Total Project Cost ⁽¹⁾	\$176,200,000	\$304,800,000
Present Worth of Annual Power Cost ⁽²⁾⁽³⁾	\$66,400,000	\$125,200,000
Present Worth of Annual O&M Cost ⁽²⁾⁽⁴⁾	\$5,400,000	\$8,300,000
Total Cost	\$248,000,000	\$438,300,000
SGPWA Cost (50 cfs)	\$248,000,000	\$201,600,000
Morongo Tribal Lands Cost (58 cfs)	\$0	\$236,700,000
Total Cost	\$248,000,000	\$438,300,000

⁽¹⁾ See Appendix I for a detailed breakdown of project costs.

⁽²⁾ Present worth analysis for annual power and maintenance costs based on interest rate of 6%, duration of 40 years and pwf= 15.046.

⁽³⁾ Present worth of power cost through MWD Feeder Pipeline was not evaluated. See Appendix J for a detailed breakdown of annual power costs.

⁽⁴⁾ Present worth of maintenance cost through MWD Feeder Pipeline was not evaluated. See Appendix K for a detailed breakdown of annual maintenance costs.

Table 6-14: Inland Feeder–Modified Pass Alignment Cost Summary (SWP 80% Reliability)

Description	SGPWA (25cfs)	SGPWA & Morongo Tribal Lands (46 cfs)
Total Project Cost ⁽¹⁾	\$119,900,000	\$232,900,000
Present Worth of Annual Power Cost ⁽²⁾⁽³⁾	\$30,400,000	\$80,600,000
Present Worth of Annual O&M Cost ⁽²⁾⁽⁴⁾	\$3,300,000	\$6,300,000
Total Cost	\$153,600,000	\$319,800,000
SGPWA Cost (25 cfs)	\$153,600,000	\$111,100,000
Morongo Tribal Lands Cost (46 cfs)	\$0	\$208,700,000
Total Cost	\$153,600,000	\$319,800,000

⁽¹⁾ See Appendix L for a detailed breakdown of project costs.

⁽²⁾ Present worth analysis for annual power and maintenance costs based on interest rate of 6%, duration of 40 years and pwf= 15.046.

⁽³⁾ Present worth of power cost through MWD Feeder Pipeline was not evaluated. See Appendix M for a detailed breakdown of annual power costs.

⁽⁴⁾ Present worth of maintenance cost through MWD Feeder Pipeline was not evaluated. See Appendix N for a detailed breakdown of annual maintenance costs.

SUMMARY OF TOTAL COSTS⁽¹⁾

Shown on Tables 6-15 and Table 6-16 are the allocated costs to SGPWA and Morongo Tribal Lands to convey the supplemental water demand via the four (4) alternatives discussed in this report.

Table 6-15: Summary of Total Cost (SWP 63% Reliability)⁽¹⁾

Alternative	Delivery of 311 cfs of SWP Water	Delivery of 361 cfs of SWP Water	Delivery of 419 cfs of SWP Water
Lucerne Valley Alignment			
CVWD & DWA	\$1,263,300,000	\$1,176,200,000	\$1,071,500,000
SGPWA	\$0	\$423,900,000 ⁽²⁾	\$326,900,000 ⁽²⁾
Morongo Tribal Lands	\$0	\$0	\$382,600,000 ⁽²⁾
Total Cost	\$1,263,300,000	\$1,600,100,000	\$1,781,000,000
North Pass Alignment			
CVWD & DWA	\$1,057,300,000	\$1,018,300,000	\$969,200,000
SGPWA	\$0	\$105,700,000	\$98,800,000
Morongo Tribal Lands	\$0	\$0	\$115,900,000
Total Cost	\$1,057,300,000	\$1,124,000,000	\$1,183,900,000
Alternative	Delivery of 311 cfs of SWP Water	Delivery of 50 cfs of SWP Water	Delivery of 108 cfs of SWP Water
Independent SGPWA North Pass Alignment			
SGPWA	\$0	\$264,100,000	\$185,900,000
Morongo Tribal Lands	\$0	\$0	\$218,200,000
Total Cost	\$0	\$264,100,000	\$404,100,000
Inland Feeder–Modified Pass Alignment			
SGPWA	\$0	\$248,000,000	\$201,600,000
Morongo Tribal Lands	\$0	\$0	\$236,400,000
Total Cost	\$0	\$248,000,000	\$438,300,000

⁽¹⁾ Total cost is the summation of project costs and present worth of power and maintenance costs.

⁽²⁾ Total cost includes cost for Lucerne Valley Alignment "Loop Pipeline".

Table 6-16: Summary of Total Cost (SWP 80% Reliability)⁽¹⁾

Alternative	Delivery of 311 cfs of SWP Water	Delivery of 336 cfs of SWP Water	Delivery of 382 cfs of SWP Water
Lucerne Valley Alignment			
CVWD & DWA	\$1,263,700,000	\$1,225,400,000	\$1,118,500,000
SGPWA	\$0	\$243,300,000 ⁽²⁾	\$188,900,000 ⁽²⁾
Morongo Tribal Lands	\$0	\$0	\$347,800,000 ⁽²⁾
Total Cost	\$1,263,700,000	\$1,468,700,000	\$1,655,200,000
North Pass Alignment			
CVWD & DWA	\$1,057,300,000	\$1,039,200,000	\$1,006,300,000
SGPWA	\$0	\$53,100,000	\$53,700,000
Morongo Tribal Lands	\$0	\$0	\$97,200,000
Total Cost	\$1,057,300,000	\$1,092,300,000	\$1,157,200,000
Alternative	Delivery of 311 cfs of SWP Water	Delivery of 25 cfs of SWP Water	Delivery of 71 cfs of SWP Water
Independent SGPWA North Pass Alignment			
SGPWA	\$0	\$180,600,000	\$110,800,000
Morongo Tribal Lands	\$0	\$0	\$205,900,000
Total Cost	\$0	\$180,600,000	\$316,700,000
Inland Feeder–Modified Pass Alignment			
SGPWA	\$0	\$153,600,000	\$111,100,000
Morongo Tribal Lands	\$0	\$0	\$208,700,000
Total Cost	\$0	\$153,600,000	\$319,800,000

⁽¹⁾ Total cost is the summation of project costs and present worth of power and maintenance costs.

⁽²⁾ Total cost includes cost for Lucerne Valley Alignment “Loop Pipeline”.

A review of the alternative alignments shows that the North Pass Alignment results in the lowest cost (\$105,700,000 for 63% reliability and \$53,100,000 for 80% reliability) for SGPWA. If the Morongo Band of Mission Indians are a participant, this alternative will result in a SGPWA allocated cost of \$98,800,000 and \$53,700,000 for 63% and 80% reliability, respectively.

Of the stand-alone alternatives, the lowest total cost to SGPWA was the Inland Feeder–Modified Pass Alignment (\$248,000,000 for 63% reliability and \$153,600,000 for 80% reliability). If the Morongo Band of Mission Indians is a participant, the Independent SGPWA North Pass Alignment results in the lowest total cost to SGPWA (\$185,900,000 and \$110,800,000) for 63% and 80% reliability respectively.

COST ANALYSIS OF CHANGING PIPELINE VELOCITY

The basis of cost estimates presented herein is directly related to maintaining a nominal pipeline velocity of 7 fps. An evaluation of increasing pipeline velocity to a nominal 8 fps was conducted to review the potential of decreasing project cost while possibly increasing O&M costs.

For purposes of this study, the total cost of the North Pass Alignment at 8 fps (Appendix O) was compared to the total cost of the North Pass Alignment based on 7 fps (Table 6-7). The North Pass Alignment was used for this comparison as this alternative resulted in the lowest cost to SGPWA.

It was determined that increasing the water velocity resulted in a lower pipeline size, therefore decreasing the total initial project cost by approximately \$15.9 million (\$9.2 million for SGPWA) (Table 6-17). However, the increase in velocity and increased friction losses in pipelines results in pump stations requiring upsizing and therefore increasing energy requirements to pump SWP water to SGPWA region. The increase in the present worth cost of energy and O&M was determined to be approximately \$36.3 million (\$0.5 million for SGPWA) (Table 6-17). Therefore, a total net increase of approximately \$20.4 million for the North Pass Alternative is calculated should velocity increase to 8 fps, although SGPWA would benefit as the SGPWA cost portion would be reduced by \$8.7 million. Overall, there are initial cost savings, though costs would increase for operations and maintenance of the facilities. Further cost analysis for all alternatives are recommended should SGPWA decide to increase velocity to 8 fps.

Table 6-17: Summary of Results of Cost Differential for 7 fps vs. 8 fps for North Pass Alignment (SWP 63% Reliability)

Cost Portions of North Pass Alignment	Pipeline Velocities Criteria		Cost Differential
	7 fps	8 fps	
Project Cost			
CVWD & DWA Portion	\$858,600,000	\$851,900,000	-\$6,700,000
SGPWA Portion	\$68,100,000	\$58,900,000	-\$9,200,000
Total Project Cost	\$926,700,000	\$893,800,000	-\$15,900,000
Energy Cost⁽¹⁾			
CVWD & DWA Portion	\$100,400,000	\$135,600,000	\$35,200,000
SGPWA Portion	\$35,200,000	\$35,600,000	\$400,000
Total Energy Cost⁽¹⁾	\$135,600,000	\$162,900,000	\$35,600,000
Maintenance Cost⁽¹⁾			
CVWD & DWA Portion	\$59,300,000	\$59,900,000	\$600,000
SGPWA Portion	\$2,400,000	\$2,500,000	\$100,000
Total Maintenance Cost⁽¹⁾	\$61,700,000	\$62,400,000	\$700,000
Total Cost			
CVWD & DWA Portion	\$1,018,300,000	\$1,047,400,000	\$29,100,000
SGPWA Portion	\$105,700,000	\$97,000,000	-\$8,700,000
Total Cost	\$1,124,000,000	\$1,144,400,000	\$20,400,000

⁽¹⁾ Costs are based on $i = 6\%$ and $n = 40$ years, $pwf = 15.046$

CONTINGENCIES COST ANALYSIS

The proposed alternatives are presently considered to be in the conceptual stages of development. Therefore, due to the extent of information available and method of preparation, an accuracy range of +30% to -10% was utilized to determine the project cost of the alternatives studied herein (Table 6-18 to 6-25)¹³. As these projects develop further and more details are defined, the accuracy of the project cost is expected to improve.

¹³ The contingency cost analysis was based upon the August 2007 Development Plan.

Table 6-18: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Lucerne Valley Alignment Upsizing and Loop Pipeline for **63% Reliability**

Alternative 1	Alternative 1-A (SGPWA Cost Participating with CVWD & DWA – 50 cfs)			Alternative 1-B (SGPWA Cost Participating with CVWD,DWA & Morongo – 50 cfs)			Alternative 1-C (Morongo Cost Participating with SGPWA,CVWD & DWA – 58 cfs)		
	Accuracy Range:	-10%	-	30%	-10%	-	30%	-10%	-
Lucerne Valley Alignment Upsizing	\$272,100,000	\$302,300,000	\$393,000,000	\$216,300,000	\$240,300,000	\$312,400,000	\$252,900,000	\$281,000,000	\$365,300,000

Table 6-19: SGPWA and Morongo Tribal Lands Project Cost Contingencies for North Pass Alignment Upsizing for **63% Reliability**

Alternative 2	Alternative 2-A (SGPWA Cost Participating with CVWD & DWA – 50 cfs)			Alternative 2-B (SGPWA Cost Participating with CVWD,DWA & Morongo – 50 cfs)			Alternative 2-C (Morongo Cost Participating with SGPWA,CVWD & DWA – 58 cfs)		
	Accuracy Range:	-10%	-	30%	-10%	-	30%	-10%	-
Independent North Pass Alignment	\$61,300,000	\$68,100,000	\$88,500,000	\$57,400,000	\$63,800,000	\$82,900,000	\$67,500,000	\$75,000,000	\$97,500,000

Table 6-20: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Independent SGPWA North Pass Alignment for **63% Reliability**

Alternative 3	Alternative 3-A (SGPWA alone – 50 cfs)			Alternative 3-B (SGPWA Cost Participating with Morongo – 50 cfs)			Alternative 3-C (Morongo Cost Participating with SGPWA – 58 cfs)		
	Accuracy Range:	-10%	-	30%	-10%	-	30%	-10%	-
Independent North Pass Alignment	\$163,500,000	\$181,700,000	\$236,200,000	\$109,200,000	\$121,300,000	\$157,700,000	\$128,100,000	\$142,300,000	\$185,000,000

Table 6-21: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Inland–Feeder Modified Pass Alignment for **63% Reliability**

Alternative 4	Alternative 4-A (SGPWA alone – 50 cfs)			Alternative 4-B (SGPWA Cost Participating with Morongo – 50 cfs)			Alternative 4-C (Morongo Cost Participating with SGPWA – 58 cfs)		
	Accuracy Range:	-10%	-	30%	-10%	-	30%	-10%	-
Inland Feeder–Modified Pass Alignment	\$158,600,000	\$176,200,000	\$229,100,000	\$126,200,000	\$140,200,000	\$182,300,000	\$148,100,000	\$164,600,000	\$214,000,000

Table 6-22: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Lucerne Valley Alignment Upsizing and Loop Pipeline for **80% Reliability**

Alternative 1	Alternative 1-A (SGPWA Cost Participating with CVWD & DWA – 25 cfs)			Alternative 1-B (SGPWA Cost Participating with CVWD,DWA & Morongo – 25 cfs)			Alternative 1-C (Morongo Cost Participating with SGPWA,CVWD & DWA – 46 cfs)		
	Accuracy Range:	-10%	-	30%	-10%	-	30%	-10%	-
Lucerne Valley Alignment Upsizing	\$170,200,000	\$189,100,000	\$245,800,000	\$125,700,000	\$139,700,000	\$181,600,000	\$222,400,000	\$247,100,000	\$321,200,000

Table 6-23: SGPWA and Morongo Tribal Lands Project Cost Contingencies for North Pass Alignment Upsizing for **80% Reliability**

Alternative 2	Alternative 2-A (SGPWA Cost Participating with CVWD & DWA – 25 cfs)			Alternative 2-B (SGPWA Cost Participating with CVWD,DWA & Morongo – 25 cfs)			Alternative 2-C (Morongo Cost Participating with SGPWA,CVWD & DWA – 46 cfs)		
	Accuracy Range:	-10%	-	30%	-10%	-	30%	-10%	-
Independent North Pass Alignment	\$32,300,000	\$35,900,000	\$46,700,000	\$31,000,000	\$34,400,000	\$44,700,000	\$57,400,000	\$63,800,000	\$82,900,000

Table 6-24: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Independent SGPWA North Pass Alignment for **80% Reliability**

Alternative 3	Alternative 3-A (SGPWA alone – 25 cfs)			Alternative 3-B (SGPWA Cost Participating with Morongo – 25 cfs)			Alternative 3-C (Morongo Cost Participating with SGPWA – 46 cfs)		
	Accuracy Range:	-10%	-	30%	-10%	-	30%	-10%	-
Independent North Pass Alignment	\$130,900,000	\$145,400,000	\$189,000,000	\$72,100,000	\$80,100,000	\$104,100,000	\$133,900,000	\$148,800,000	\$193,400,000

Table 6-25: SGPWA and Morongo Tribal Lands Project Cost Contingencies for Inland Feeder–Modified Pass Alignment for **80% Reliability**

Alternative 4	Alternative 4-A (SGPWA alone – 25 cfs)			Alternative 4-B (SGPWA Cost Participating with Morongo – 25 cfs)			Alternative 4-C (Morongo Cost Participating with SGPWA – 46 cfs)		
	Accuracy Range	-10%	-	30%	-10%	-	30%	-10%	-
Inland Feeder–Modified Pass Alignment	\$107,900,000	\$119,900,000	\$155,900,000	\$73,400,000	\$81,500,000	\$106,000,000	\$136,300,000	\$151,400,000	\$196,800,000

SECTION 7 - FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

FINDINGS

Study Area

The San Gorgonio Pass area is the narrow east-west strip of land (generally mountainous) between the San Bernardino Valley to the west and the Palm Springs/Coachella Valley to the east. San Gorgonio Pass Water Agency (SGPWA) is located within this area and within its boundaries lie the Cities of Calimesa, Beaumont, Banning and portions of unincorporated Riverside County and San Bernardino County. SGPWA provides water to the retailers within its boundaries. The following are major water retailers:

- Beaumont Cherry Valley Water District (BCVWD)
- City of Banning Water Department
- Yucaipa Valley Water District (YVWD)
- Cabazon Water District (CWD)
- Banning Heights Mutual Water Company (BHMWC)
- High Valleys Water District (HVWD)
- South Mesa Water Company (SMWC)
- Morongo Band of Mission Indians

Shown in Table 2-7 is the total acreage of SGPWA's service area (142,416 acres) and the acreage of each water retailer, Morongo Tribal Lands, and the balance of the unincorporated areas of Riverside and San Bernardino Counties.

Ultimate Demand Projections

The ultimate water demand projections were based on utilizing the Cities' and Counties' general plan and land use in conjunction with water demand factors (see Table 2-5 for a summary of the water demand factors applied to general plan land use). Tribal lands general plan land use was not available; therefore a slope analysis (see Table 2-6 for Tribal lands slope analysis) was conducted to review potentially buildable areas (areas with slopes 10% and less) and an assumed unit use factor of 2 acre-feet/acre/year was applied to these areas.

Ultimate water demand was evaluated by applying the general plan land use within each water retailer's service areas as summarized in Table 7-1. Table 7-2 summarizes the potential ultimate water demand for the San Gorgonio Pass Water Agency service area.

Table 7-1: Ultimate Water Demand for Major Water Retailers, Unincorporated County and Morongo Tribal Lands

Water Retailer	Total Area (Acres)	Demand (Ac-Ft/Yr) ⁽¹⁾
Water Retailers	71,852	92,878
Unincorporated Areas	35,953	1,420
SUBTOTAL for Unincorporated Areas & Water Retailers	107,805	94,298
Morongo Tribal Lands	34,611	38,627
TOTAL SGPWA Area	142,416	132,925

⁽¹⁾Refer to Appendix C and Table 2-8 for detailed breakdown of demands within each water retailer.

⁽²⁾Included unincorporated areas of Riverside and San Bernardino Counties within the SGPWA Service Area.

⁽³⁾These areas are undesignated areas within Cities' boundaries such as highways, and does not typically have demand

Table 7-2: Potential Ultimate Water Demand for the San Gorgonio Pass Water Agency Service Area

Demand Criteria	Demand (Ac-Ft/Yr) ⁽¹⁾
SGPWA	94,000
Morongo Tribal Lands	39,000 ⁽²⁾
SGPWA and Morongo Tribal Lands	133,000

⁽¹⁾ Rounded to nearest thousand.

⁽²⁾ Subsequent to this the Morongo Band of Mission Indians indicated that the SGPWA should assume that they would need only 20,000 acre-feet of State Water Project water.

Total Local Water Supply for SGPWA

The total local water supply for the SGPWA service area is based on the supplies per each of the various major water retailers, allocated available supply of Beaumont Groundwater Basin and new returns from use to groundwater. Table 3-5 summarizes local water supply for the SGPWA service area projected for the year 2030. Therefore the total local water supply is approximately 55,000. It is noted that the local water supply data was derived from an existing report and a critical analysis needs to be undertaken to determine the accuracy of the availability of the projected local water supply. Additionally, as discussed in Section 4 of this report, a representative of the Morongo Band of Mission Indians indicated that the Morongo Tribal Lands may need up to 20,000 acre-feet of State Water Project water rather than the 39,000 acre-feet per year noted above.

Total local water supply was deducted from ultimate water demand to determine the supplemental State Water Project water required by SGPWA and Morongo Tribal Lands (summarized in Table 7-3).

Table 7-3: Supplemental SWP Water Requirements

Service Area	Demand ⁽¹⁾ (Ac-Ft/Yr)
SGPWA	39,000 ⁽²⁾
Morongo Tribal Lands	20,000
SGPWA and Morongo Tribal Lands	59,000

⁽¹⁾ Rounded to nearest thousand.

⁽²⁾ Local water supply deducted from SGPWA water retailers.

As discussed in Section 3 of this report, the estimate of local water supply utilized in this report was based on the May 2006, "Report on Water Supply Conditions in the San Gorgonio Pass Region" prepared by Wildermuth Environmental. There is a potential that the local water supply may be over estimated hence this would lead us to under estimate the supplemental water required by SGPWA in the future. For the purposes of this report, we utilized the local water supply data from the Wildermuth Environmental report, but are not in agreement with the findings.

Reliability and Delivery Requirements

The Department of Water Resources final "The State Water Project Reliability Project 2007" August 2008 indicates a long term average reliability for delivery of State Water Project Water of 63 percent. There is a potential for the Sacramento Delta to be fixed, therefore we assumed that the long term overall reliability of State Water Project delivery would increase to 80 percent. Table 7-4 summarizes the projected Table "A" water required (refer to Appendix D for details) with consideration given to long term average reliability of SWP water utilizing both reliability factors mentioned above.

Table 7-4: Projected San Gorgonio Pass Water Agency Table "A" Water Requirements⁽¹⁾

Service Area	Demand (Acre-feet/year) ⁽²⁾	
	63% Reliability	80% Reliability
SGPWA	62,000	49,000
Morongo Tribal Lands	32,000	25,000
SGPWA and Morongo Tribal Lands⁽³⁾	94,000	74,000

⁽¹⁾ Includes SGPWA Table "A" entitlements.

⁽²⁾ Rounded to the nearest thousand

DWR allows peak delivery of SWP water during wet years, therefore the conveyance facilities are sized to deliver peak flows. Peaking criteria is based on delivery of 100% of Table "A" supply in nine (9) months and is converted to cubic feet per second (cfs). Table 7-5 (see Appendix D for details) summarizes these flow scenarios.

Table 7-5: Projected San Gorgonio Pass Water Agency Table "A" Water Capacity

Service Area	Capacity (cfs)	
	63% Reliability	80% Reliability
SGPWA	114	89
Morongo Tribal Lands	58	46
SGPWA and Morongo Tribal Lands	172	135

Current and Future Capacities Owned by SGPWA

SGPWA's capacities in the East Branch Extension are summarized in Table 7-6.

Table 7-6: SGPWA Current and Projected Capacity in State Water Project

Description	Delivery Capacities (cfs)
Phase I EBX (Current capacity)	24 cfs
Phase II EBX ⁽¹⁾ (Projected capacity in 2013)	48 cfs
Additional EBX Capacity ⁽²⁾ (From SBVMWD)	16 cfs
Total SWP Water Capacity	64 cfs

⁽¹⁾ Department of Water Resources East Branch Extension Phase II facilities are scheduled to be completed in 2012, although per July 2009 discussions with SGPWA Agency Representative, completion is scheduled in 2013.

⁽²⁾ As per a July 30, 2008 correspondence and an August 13, 2008 meeting with the SGPWA Agency representative, SGPWA indicated there will be potential negotiations with San Bernardino Valley Municipal Water District for additional EBX capacity.

The SGPWA delivery capacity in EXB Phase II (48 cfs) and acquisition of an additional 16 cfs capacity was deducted from SGPWA projected capacity values shown in Table 7-5. The resulting capacities were utilized for evaluation of new importation facilities required to convey the balance of SGPWA projected demand. Table 7-7 summarizes the new facilities delivery requirements to deliver Supplemental SGPWA Water (refer to Appendix E for details).

Table 7-7: SGPWA Supplemental Delivery Requirements in a Future Importation Project

Study Area	Capacity (cfs)	
	63% Reliability	80% Reliability
SGPWA	50	25
Morongo Tribal Lands ⁽¹⁾	58	46
SGPWA and Morongo Tribal Lands	108	71

⁽¹⁾ SGPWA owned and future delivery capacities not deducted from Morongo Tribal Lands delivery requirements.

Delivery Facilities

SGPWA, anticipating the need for supplemental water, reviewed the CVWD and DWA State Water Project Aqueduct Extension (SWP Aqueduct Extension) Study (August 2007 Development Plan) for possible usage of the following alternative alignments:

- Lucerne Valley Alignment
- North Pass Alignment
- South Pass Alignment
- San Jacinto Alignment

The South Pass and San Jacinto Alignments were omitted due to minimal capacity rights in the Santa Ana Valley Pipeline (SAVP). Two additional alignments were evaluated for potential delivery of supplemental water independent from SWP Aqueduct Extension:

- Independent SGPWA North Pass Alignment
- Inland Feeder–Modified Pass Alignment

Therefore the alignments evaluated for delivery of SGPWA supplemental water are as follows:

1. Lucerne Valley Alignment
2. North Pass Alignment
3. Independent SGPWA North Pass Alignment
4. Inland Feeder–Modified Pass Alignment

As with water delivery capacities, the delivery requirements were also evaluated with two reliability factors (63 percent and 80 percent) of SWP Project Water deliveries. Alternatives 1 and 2 noted above require joint participation with CVWD and DWA and the delivery requirements for these two entities was fixed at 311 cfs. Evaluation of the Alternatives 3 and 4 does not include conveyance capacity for CVWD and DWA.

For evaluation purposes, the following pipeline, pumping and hydraulic parameters were utilized:

- Pipeline Velocity: 7 fps
- Pressure Limitations: 250 psi
- Discharge point: Cabazon Basin
- Evaluation of existing topography versus hydraulic grade line
- Pumping Power Requirements
- Piping system characteristic such as length, diameter and friction
- Power calculation in horsepower and kilowatts

The power requirement for each pump station was evaluated based on the above parameters. The characteristics of these facilities are detailed and summarized in Table 5-4 through Table 5-14 and are designated based on the respective reliability factors. Table 7-8 through Table 7-11 summarize the facilities of each of the four alternatives.

Table 7-8: Facilities Parameters for Lucerne Valley Alignment
(Plates 5-3 to 5-8)

Facility	Description
Pipeline Length and Sizing	<ul style="list-style-type: none"> • 480,480 feet of pipeline ranging in diameters from 96-inch to 108-inch • 99,200 feet of pipeline ranging in diameters from 30-inch to 54-inch (Loop Pipeline)
Pump Stations	<ul style="list-style-type: none"> • Two (2) large pump stations ranging from 23,000 hp to 30,000 hp each • Three (3) small pump stations ranging from 1,600 hp to 4,000 hp (Loop Pipeline)
Hydro-Electric Power Plants	<ul style="list-style-type: none"> • Four (4) Hydro-Electric Power Plants ranging from 20,000 hp to 30,000 hp each

Table 7-9: Facilities Parameters for North Pass Alignment
(Plates 5-9 to 5-11)

Facility	Description
Pipeline Length and Sizing	<ul style="list-style-type: none"> • 190,000 feet of pipeline ranging in diameter from 96-inch to 102-inch • 2,000 feet of pipeline ranging in diameter from 30-inch to 54-inch (Turnout for Cabazon Recharge Basin) • 132,000 feet of 90-inch diameter pipeline (second reach, not utilized by SGPWA) • 34,320 feet of 42-inch diameter pipeline (Turnout for Reach along Highway 62, not utilized by SGPWA)
Pump Stations	<ul style="list-style-type: none"> • Two (2) pump stations ranging from 21,000 hp to 28,000 hp each
Hydro-Electric Power Plants	<ul style="list-style-type: none"> • Three (3) Hydro-Electric Power Plants ranging from 12,000 hp to 18,000 hp each (not utilized by SGPWA)

Table 7-10: Facilities Parameters for Independent North Pass Alignment
(Plates 5-12 to 5-14)

Facility	Description
Pipeline Length and Sizing	<ul style="list-style-type: none"> • 192,200 feet of pipeline ranging in diameters from 30-inch to 54-inch
Pump Stations	<ul style="list-style-type: none"> • Two (2) pump stations ranging from 2,000 hp to 9,000 hp each

Table 7-11: Facilities Parameters for Inland Feeder–Modified Pass Alignment
(Plates 5-15 to 5-17)

Facility	Description
Pipeline Length and Sizing	<ul style="list-style-type: none"> • 100,000 feet of pipeline ranging in diameters from 30-inch to 54-inch
Pump Stations	<ul style="list-style-type: none"> • Two (2) pump stations ranging from 2,000 hp to 9,000 hp each

Cost Evaluation

The cost evaluation of alternative alignments was based on the cost criteria and methodology presented in the August 2007 Development Plan prepared by GEI/Bookman-Edmonston. The total cost for each alternative developed herein consists of the total project cost, and the present worth of annual operation (energy) and maintenance cost. The project cost of these alternatives was then adjusted to an Engineering News Record (ENR) – Los Angeles Construction Cost Index – 9,799.19 (March 2009)¹⁴.

The allocation of cost for each proposed participating agency was based on the percentage of each agency's allocated capacity. Table 6-1 and Table 6-2 summarize the percentage of cost for each participating agency, based on allocated capacity at 63% and 80% reliability when all parties participate. When reviewing only SGPWA and Morongo Tribal Lands allocated capacity, refer to Table 6-3 and Table 6-4.

The Inland Feeder–Modified Pass Alignment cost evaluation included SGPWA purchasing a portion of the 1000 cfs capacity of the MWD Inland Feeder pipeline. Table 6-11 and 6-12 summarize these costs for SGPWA and Morongo Tribal Lands.

Parameters such as pipeline size and length, pump station power requirements, power cost, operation and maintenance cost were evaluated in conjunction with cost allocations for various agencies to develop project costs associated with each alignment alternative. Tables 6-15 and 6-16 summarize the total cost (project cost and present worth of maintenance and energy) allocated to each participating agency, including CVWD and DWA. Table 7-12 and Table 7-13 summarize the allocated total cost for SGPWA and Morongo Tribal Lands to convey the supplemental water based on the four (4) alternatives presented in this report.

¹⁴ The ENR-Los Angeles Construction Cost Index for July 2009 is 9,764.44. For planning purposes of this report, the March 2009 ENR Index was utilized.

Table 7-12: Summary of Total Cost Allocated to
SGPWA and Morongo Tribal Lands
SWP 63% Reliability ⁽¹⁾

Alternative Alignments	Delivery of SWP Water for SGPWA	Delivery of SWP Water for SGPWA and Morongo Tribal Lands
Lucerne Valley Alignment		
SGPWA	\$423,900,000 ⁽²⁾	\$326,900,000 ⁽²⁾
Morongo Tribal Lands	-	\$382,600,000 ⁽²⁾
Total Cost	\$423,900,000	\$709,500,000
North Pass Alignment		
SGPWA	\$105,700,000	\$98,800,000
Morongo Tribal Lands	-	\$115,900,000
Total Cost	\$105,700,000	\$214,700,000
Independent SGPWA		
North Pass Alignment		
SGPWA	\$264,100,000	\$185,900,000
Morongo Tribal Lands	-	\$218,200,000
Total Cost	\$264,100,000	\$404,100,000
Inland Feeder–Modified Pass Alignment		
SGPWA	\$248,000,000	\$201,600,000
Morongo Tribal Lands	-	\$236,700,000
Total Cost	\$248,000,000	\$438,300,000

⁽¹⁾ Total cost is the summation of project costs and present worth of power and maintenance costs.

⁽²⁾ Total cost includes cost for Lucerne Valley Alignment "Loop Pipeline".

Table 7-13: Summary of Total Cost Allocated to SGPWA and Morongo Tribal Lands SWP 80% Reliability⁽¹⁾

Alternative Alignments	Delivery of SWP Water for SGPWA	Delivery of SWP Water for SGPWA and Morongo Tribal Lands
Lucerne Valley Alignment		
SGPWA	\$243,300,000 ⁽²⁾	\$188,900,000 ⁽²⁾
Morongo Tribal Lands	-	\$347,800,000 ⁽²⁾
Total Cost	\$243,300,000	\$536,700,000
North Pass Alignment		
SGPWA	\$53,100,000	\$53,700,000
Morongo Tribal Lands	-	\$97,200,000
Total Cost	\$53,100,000	\$150,900,000
Independent SGPWA		
North Pass Alignment		
SGPWA	\$180,600,000	\$110,800,000
Morongo Tribal Lands	-	\$205,900,000
Total Cost	\$180,600,000	\$316,700,000
Inland Feeder–Modified Pass Alignment		
SGPWA	\$153,600,000	\$111,100,000
Morongo Tribal Lands	-	\$208,700,000
Total Cost	\$153,600,000	\$319,800,000

⁽¹⁾ Total cost is the summation of capital costs and present worth of power and maintenance costs.

⁽²⁾ Total cost includes cost for Lucerne Valley Alignment “Loop Pipeline”.

Project Phasing and Implementation

Project phasing and implementation was evaluated for SGPWA only, as incremental water demand projections for Morongo Tribal Lands were not available. SGPWA has experienced significant population growth in its service area. Incremental population growth in conjunction with corresponding water demand was evaluated from 2000 to 2035 and summarized in Table 2-2 and Table 2-3. Based on these methodologies, the projected water demand for 2035 ranged from 60,821 acre-feet/year to 89,552 acre-feet/year depending on the water unit use factor utilized. Review of the various local water retailer’s Urban Water Management Plans provided for an additional methodology for projecting demand.

Based on this UWMP methodology, the projected water demand for the year 2030 is 88,600 acre-feet/year.

The potential ultimate water demand for the SGPWA service area (excluding Morongo Tribal Lands) was projected to be 94,000 acre-feet/year based on buildout conditions. Using the demand trend assumptions from 2005 to 2035, it was projected that ultimate buildout demand would occur around year 2045. Based on these various parameters, the SGPWA Incremental Supplemental SWP Water was evaluated and presented in Section 4 in Table 4-3 and Figure 4-1 of this report.

The discussions in Section 4 and summaries presented in Table 4-3 and Figure 4-1 provides for the SGPWA Supplemental SWP water demand as the Agency's service area demand increases above the local water supply. Evaluation of incremental delivery requirements requires incorporation of various analysis criteria previously developed in this report:

- Department of Water Resources Reliability Factors
- Allowable Peak 9 Month Delivery During Wet Years
- The Agency's Owned and Future State Water Project Capacities.

Reliability factors of 63 and 80 percent of State Water Project water, as well as allowable peaking factors, were applied incrementally to the Supplemental SWP water requirements. The SGPWA owned and future SWP capacity was assumed in phases and was deducted from Supplemental SWP requirements to determine the incremental delivery requirements presented in Table 7-14 and Figure 7-1 and 7-2.

Table 7-14: SGPWA Supplemental Delivery Requirements Phased to Ultimate Buildout in Year 2045

Year	Table "A" Water Capacity Requirements (cfs)		SGPWA SWP Water Capacity (cfs)	Supplemental SGPWA Delivery Requirements (cfs)	
	63% Reliability	80% Reliability		63% Reliability	80% Reliability
2005	0	0	24 ⁽¹⁾	0	0
2010	0	0	24	0	0
2015	31	24	48 ⁽²⁾	0	0
2020	53	42	64 ⁽³⁾	0	0
2025	76	61	64	12	0
2030	90	70	64	26	6
2035	101	79	64	37	15
2040	110	87	64	46	23
2045	114	90	64	50	25

⁽¹⁾ Current SGPWA delivery capacity of 24 cfs in East Branch Existing Phase I.

⁽²⁾ As per July 2009 discussions with SGPWA Agency Representative, East Branch Extension Phase II is scheduled to be completed by 2013. This would increase SGPWA delivery capacity to 48 cfs.

⁽³⁾ Potential purchase of 16 cfs of SWP water from SBVMWD

Figure 7-1: SGPWA Projected Supplement Delivery Requirements (SWP 63% Reliability)

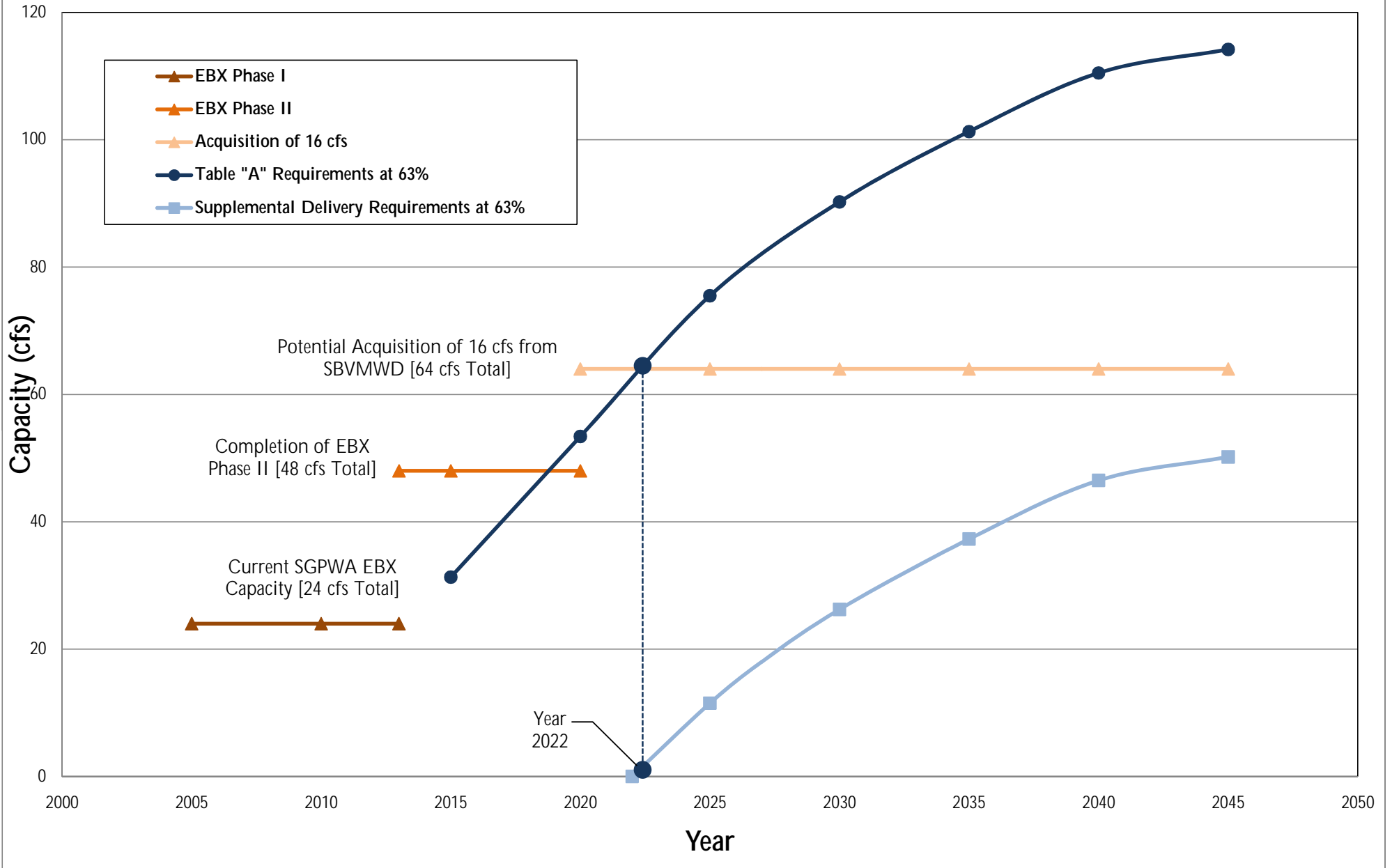
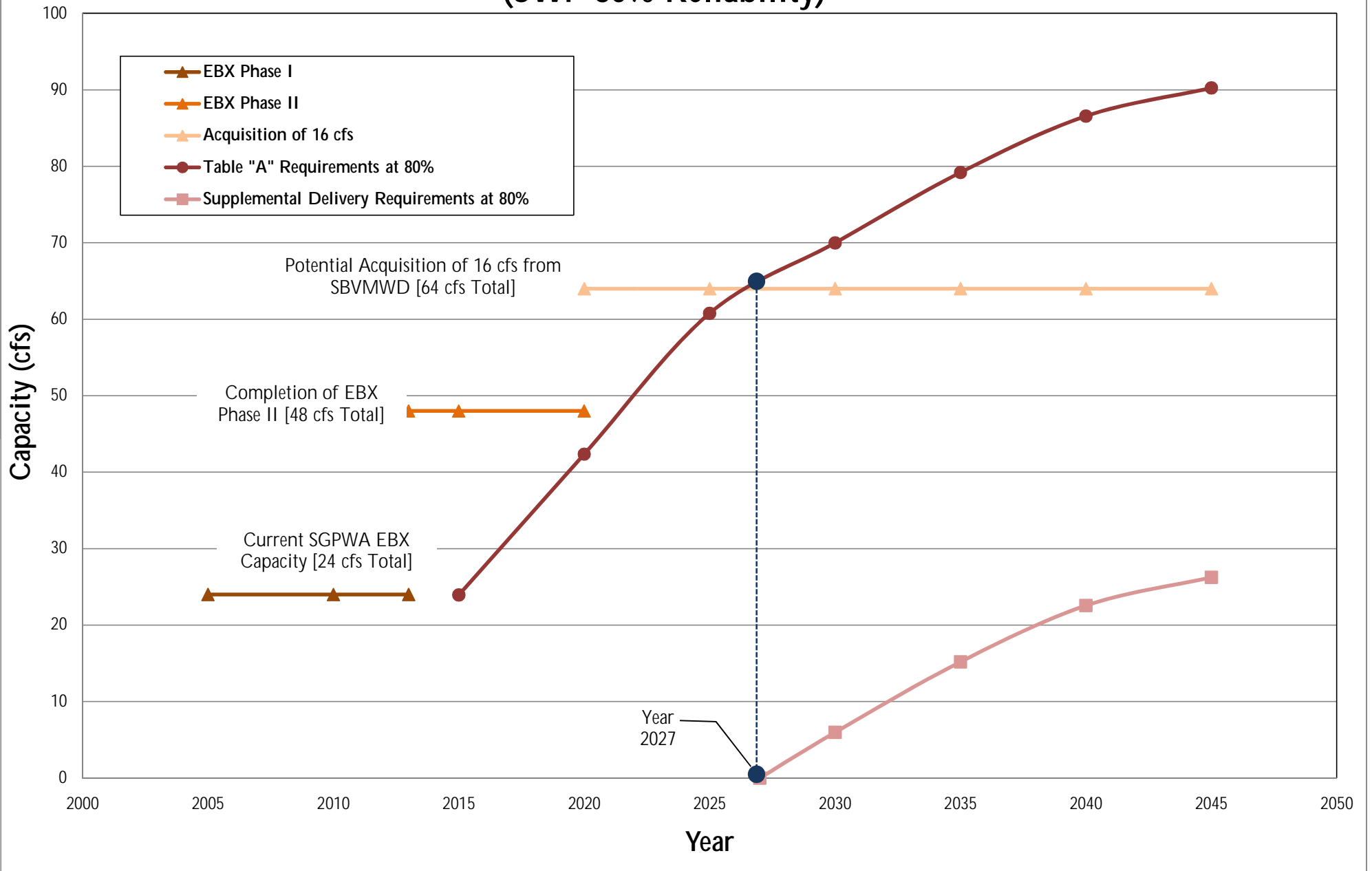


Figure 7-2: SGPWA Projected Supplement Delivery Requirements (SWP 80% Reliability)



As indicated in Figure 7-1 and 7-2, the SGPWA's Table "A" requirements for both 63% and 80% reliability exceed their total (owned and future) SWP Water. The approximate time frame for implementation of supplemental water delivery facilities is presented in Table 7-15.

Table 7-15: Implementation Date of SGPWA Supplemental Future Delivery Facilities

Supplemental SGPWA Delivery Requirements (cfs)	SGPWA Implementation of Facilities Date (year)
63% Reliability	2022
80% Reliability	2027

CONCLUSIONS

Based on findings, the ultimate water demand within the SGPWA service area exceeds the capacity of the local water supply and SGPWA's present and future capacity in the East Branch Extension.

Cost Evaluations

Based on the cost analysis of the four alternatives studied herein, the North Pass Alignment Alternative is the lowest cost option for SGPWA with the participation of CVWD and DWA. If SGPWA prefers to independently develop their own project, the Independent SGPWA North Pass Alternative is the lowest cost alternative, provided the Morongo Band of Mission Indians participate in the project. The cost savings when utilizing a reliability factor of 80% rather than 63% of SWP delivery is approximately a 50% to 60% decrease in cost. The 80% reliability factor for State Water Project water delivery was assumed based on a probable Delta fix. The timing of this Delta fix is unknown. Table 7-16 summarizes these costs.

Table 7-16: Summary of Lowest Project Cost Alternatives to SGPWA⁽¹⁾

Alternative Alignment	Participation Requirements	SGPWA Project Costs	
		63% Reliability of SWP Water	80% Reliability of SWP Water
North Pass	CVWD and DWA	\$68,100,000	\$35,900,000
Independent SGPWA North Pass	None	\$181,700,000	\$145,400,000
Inland Feeder–Modified Pass	(2)	\$176,200,000	\$119,900,000

⁽¹⁾ This project cost summary is based on consideration of SGPWA capacities only and does not include Morongo capacities.

⁽²⁾ SGPWA allocated project cost for the Inland Feeder–Modified Pass Alignment Alternative is lower than the cost for Independent SGPWA North Pass Alignment Alternative. However this alignment requires participation in the form of capacity purchase from MWD's Inland Feeder as discussed in Section 6 and therefore is not totally independent.

In addition to costs summarized in Table 7-16 above, other costs need to be taken into consideration to convey water to proposed recharge basins in the Beaumont and Cabazon Groundwater Basins. These improvements consist of the Beaumont Basin Site 4 Recharge Facility, and the Cabazon Basin Recharge Facility located on property currently owned by Robertson Ready Mix. These improvements require \$18 million (Appendix P) in addition to the costs outlined in Table 7-16

Implementation

Based on probable growth trends within the SGPWA service area, it would appear that the initial phases of the supplemental SWP water delivery system is required to be on-line within a 15 to 20 year period depending on which Sacramento Delta reliability factor is utilized. Current growth trends have decreased as a result of the current economic decline beginning in 2007. If the depressed economic conditions continue it may delay the need for the State Water Project Aqueduct Extension.

RECOMMENDATIONS

We recommend the following based on the study herein:

1. Continue working with Coachella Valley Water District and Desert Water Agency on the planning of the proposed State Water Project Aqueduct Extension Project.
2. Initiate a financial plan to determine SGPWA's means and methods of financial participation in the Aqueduct Extension Project and the acquisition of additional water rights.
3. Initiate action to acquire water rights to obtain 100 percent reliability of State Water Project water deliveries, or other water supplies.
4. Determine if the Morongo Band of Mission Indians intends to participate in the State Water Project Aqueduct Extension Project.
5. Evaluate the reliability of the local water supply within SGPWA's service area.
6. Initiate actions to acquire 16 cfs capacity in the East Branch Extension from SBVMWD.
7. Develop a conjunctive use plan to store and recover State Water Project water in the Beaumont, Cabazon, and other groundwater basins within SGPWA's service area.

APPENDIX A

County and Cities Land Use Designation within the SGPWA Boundaries

**Table A-1
San Gorgonio Pass Water Agency
County of Riverside Land Use Designation and Respective Areas (Acres)**

County Lands (excluding Tribal Lands):

LANDUSE	ACRES
AG	2,214.6
CO	4.1
CR	288.8
CR-CCO	75.2
CT	15.6
EDR-RC	638.4
HDR	8.6
HI-CCO	10.0
IND	24.7
LDR	556.7
LDR-CCO	483.7
LDR-RC	197.1
LI	26.9
LI-CCO	140.3
MDR	597.1
MDR-CCO	108.5
MHDR	35.7
OS-C	14,316.3
OS-CH	9,261.8
OS-R	1,535.3
OS-RUR	6,104.3
OS-W	48.2
PF	84.8
RD	2,313.3
RD-CCO	652.7
RM	21,149.7
RR	4,189.4
RR-CCO	276.8
RR-CD	152.4
VLDR	933.7
VLDR-CCO	145.5
VLDR-RC	3,747.0
Other	460.9
Total	70,798.0

Morongo Tribal Lands:

LANDUSE	ACRES
AG	53.0
OS-C	571.4
OS-RUR	45.4
RD	4.0
RM	1,656.4
RR	355.6
IND	31,450.7
Other	474.4
Total	34,610.9

Riverside County: 105,408.9

Morongo Tribal Lands: 34,610.9

Riverside County Only: 70,798.0

XXX-CD is with a Community Development Overlay

XXX-CCO is with a Community Center Overlay

Table A-2
San Geronio Pass Water Agency
City of Calimesa Land Use Designation and Respective Areas (Acres)

LANDUSE	ACRES
Business Park	78.7
Commercial Community	195.8
Commercial Neighborhood	132.6
Commercial Regional	240.6
Light Industrial	34.9
Open Space	1,791.9
Open Space Residential	1,581.2
Professional Office	32.1
Quasi-Public	191.2
Residential Estate	580.7
Residential High	110.0
Residential Low	1,362.8
Residential Low/Medium	1,248.7
Residential Medium	623.7
Residential Rural	679.7
Residential Rural (2 ac. min.)	24.0
Utility Easement	121.3
Other/Not Designated	502.8
Grand Total	9,533.0

Table A-3
San Gorgonio Pass Water Agency
City of Beaumont Land Use Designation and Respective Areas (Acres)

LANDUSE	ACRES
Beaumont Avenue Overlay	67.6
Community Commercial	449.9
General Commercial	295.8
Industrial	882.8
Multiple-family Residential	141.1
Public Facilities	26.7
Recreation & Conservation	1,024.5
Rural Residential	789.8
Single Family Residential	5,406.6
Urban Village Overlay	326.8
Other/Not Designated	1,584.6
Grand Total	10,996.2

Table A-4
San Geronio Pass Water Agency
City of Banning Land Use Designation and Respective Areas (Acres)

City of Banning (Excluding Tribal Lands)

LANDUSE	ACRES
Airport Industrial	135.9
Business Park	384.0
Downtown Commercial	97.4
General Commercial	436.3
High Density Residential (11-18 du/ac)	317.5
Highway Serving Commercial	110.4
Industrial	421.1
Industrial-Mineral Resources	216.4
Low Density Residential (0-5 du/ac)	3,079.9
Medium Density Residential (0-10 du/ac)	978.2
Mobile Home Parks	130.5
Open Space - Parks	1,227.2
Open Space - Resources	2,697.8
Professional Office	41.6
Public Facilities - Airport	144.5
Public Facilities - Cemetery	15.4
Public Facilities - Fire Station	3.6
Public Facilities - Government	64.1
Public Facilities - Hospital	10.7
Public Facilities - Railroad/Interstate	468.7
Public Facilities - School	233.8
Ranch Residential - Hillside (0-1 du/ac)	56.2
Ranch Residential (0-1 du/ac)	594.2
Ranch/Agriculture - Hillside (10 ac min.)	473.2
Ranch/Agriculture (10 ac min.)	71.8
Very Low Density Residential (0-2 du/ac)	2,148.1
Other/Not Designated	284.3
Grand Total	14,842.9

Morongo Tribal Lands Inside City Limits

LANDUSE	ACRES
General Commercial	19.7
High Density Residential (11-18 du/ac)	55.5
Low Density Residential (0-5 du/ac)	70.1
Medium Density Residential (0-10 du/ac)	41.3
Open Space - Resources	88.5
Grand Total	275.1

City of Banning	14,842.9
Morongo Tribal Lands	275.1
City outside Tribal Lands	14,567.8

APPENDIX B

Re-Categorized Land Use Designations within Boundaries and Spheres of Influence of Major Water Retailers

Table B-1
San Gorgonio Pass Water Agency
City of Banning Sphere of Influence Designated Land Uses

Banning Sphere (using 2006 Banning GP SOI designations)

LANDUSE	ACRES
High Density Residential (11-18 du/ac)	9.6
Low Density Residential (0-5 du/ac)	167.2
Medium Density Residential (0-10 du/ac)	49.4
Open Space - Parks	19.9
Open Space - Resources	1,482.1
Public Facilities - Fire Station	2.9
Ranch Residential - Hillside (0-1 du/ac)	85.1
Ranch Residential (0-1 du/ac)	915.7
Ranch/Agriculture - Hillside (10 ac min.)	1,547.2
Ranch/Agriculture (10 ac min.)	640.6
Ranch/Agriculture (10 ac min.) - Morongo	158.7
Very Low Density Residential (0-2 du/ac)	220.6
Total	5,299.1

Banning Sphere (using County RCIP designations)

LANDUSE	ACRES
AG	787.9
IND - Morongo	160.7
LDR	260.4
OS-C	1,288.1
RD	54.8
RM	2,436.6
RR	113.8
RR-CDO	152.4
VLDR-RC	69.0
Total	5,323.8

XXX-Morongo is in Morongo Tribal Lands

Table B-2
San Gorgonio Pass Water Agency
Beaumont Cherry Valley Water District- Re-Catagorized Land Use

City of Beaumont GP LU	
Landuse	Acres
Beaumont Avenue Overlay	67.6
Community Commercial	190.5
General Commercial	206.1
Industrial	189.3
Multiple-family Residential	141.0
Public Facilities	18.7
Recreation & Conservation	918.9
Single Family Residential	2,722.1
Urban Village Overlay	0.1
Grand Total	4,454.4

City of Calimesa GP LU	
Landuse	Acres
Residential Low/Medium	58.3
Open Space	61.3
Grand Total	119.6

Riverside County RCIP	
Landuse	Acres
CO	3.9
CR	66.0
HDR	8.6
LI	2.5
MDR	280.9
MHDR	9.8
OS-C	11.5
OS-R	301.6
RM	303.6
RR	253.5
VLDR	62.1
VLDR-RC	1,625.5
Grand Total	2,929.4

Table B-3
San Geronio Pass Water Agency
Beaumont Cherry Valley Water District Sphere of Influence
Re-Categorized Land Uses

City of Beaumont GP LU	
Landuse	Acres
Community Commercial	259.4
General Commercial	89.7
Industrial	693.5
Multiple-family Residential	0.1
Public Facilities	8.0
Recreation & Conservation	92.2
Rural Residential	789.6
Single Family Residential	2,601.5
Urban Village Overlay	326.7
Grand Total	4,860.7

Riverside County RCIP LU	
Landuse	Acres
AG	177.1
CO	0.2
CR	63.2
EDR-RC	464.7
LDR-RC	23.8
MDR	99.8
MHDR	25.9
OS-C	276.7
OS-R	203.8
OS-W	16.2
RM	3,356.9
RR	445.2
VLDR	443.9
VLDR-RC	1,445.9
Grand Total	7,043.3

City of Calimesa GP LU	
Landuse	Acres
Commercial Neighborhood	12.3
Open Space	15.5
Open Space Residential	78.8
Park Overlay (see Note)	21.4
Residential Low/Medium	157.9
Grand Total	285.9

Note:

This is IN ADDITION TO underlying landuses

Table B-4
San Geronio Pass Water Agency
Banning Heights Mutual Water Company- Re-Categorized Land Uses

City of Banning GP LU (not from RCIP)	
Landuse	Acres
Ranch Residential (0-1 du/ac)	138.2
Ranch Residential - Hillside (0-1 du/ac)	11.6
Low Density Residential (0-5 du/ac)	32.0
Open Space - Parks	56.8
SUB-TOTAL	238.6

Riverside County RCIP (not City of Banning GP)	
Landuse	Acres
Very Low Density Residential-RC	632.5
Rural Mountainous	4.7
SUB-TOTAL	637.2

TOTAL	875.8
--------------	--------------

Note:

Refer to Appendix A, Table A-4 for deduction of Banning Heights Mutual Water Company (BHMWC) land use data from City of Banning.

**Table B-5
San Geronio Pass Water Agency
Cabazon Water District - Re-Categorized Land Uses**

Riverside County RCIP Landuse

Cabazon WD, Excluding Tribal Lands

LANDUSE	ACRES
CR	142.7
CR-CCO	75.1
FWY	284.8
HI-CCO	10.0
LDR	185.1
LDR-CCO	483.7
LI	24.3
LI-CCO	140.3
MDR	214.5
MDR-CCO	108.5
OS-C	249.6
RD	1,614.4
RD-CCO	652.7
RM	1,506.6
RR	1,302.4
RR-CCO	276.8
VLDR	4.7
VLDR-CCO	145.4
Total	7,421.6

Morongo Tribal Lands

LANDUSE	ACRES
IND	318.6
RD	3.9
RM	824.8
RR	209.7
Total	1,357.0

Cabazon Water District:
8,778.6

Morongo Tribal Lands:
1,357.0

Non-Tribal Lands:
7,421.6

XXX-CCO is with a Community Center Overlay

Table B-6
San Geronio Pass Agency
Cabazon Water District Sphere of Influence - Re-Categorized Land Uses

Riverside County RCIP LU

Excluding Tribal Lands

LANDUSE	ACRES
RD	453.1
RM	197.1
Total	650.2

Morongo Tribal Lands

LANDUSE	ACRES
AG	53.0
FWY	146.9
IND	1,796.3
LI	0.2
MDR	0.2
RM	265.8
RR	0.4
Total	2,262.7

Cabazon WD SOI: 2,912.92
Morongo Tribal Lands: 2,262.70
Non-Tribal Lands: 650.20

Table B-7
San Geronio Pass Water Agency
High Valley Water District- Re-Categorized Land Uses

County of Riverside	
Landuse	Acres
AG	22.9
EDR-RC	112.3
IND	0.4
OS-C	69.1
OS-CH	0.9
OS-R	88.2
OS-RUR	766.6
RM	4,135.1
RR	16.6
VLDR	74.6
Grand Total	5,286.8

Table B-8
San Gorgonio Pass Water Agency
Yucaipa Valley Water District - Re-Catagorized Land Uses
(Including South Mesa Water District)

City of Calimesa GP LU	Acres		
	YVWD/SMWC	SMWC	YVWD
Business Park	65.2		65.2
Commercial Community	195.8	96.5	99.3
Commercial Neighborhood	120.3	17.8	102.5
Commercial Regional	170.1		170.1
Light Industrial	34.9	34.2	0.7
Open Space	1,644.5	18	1,626.5
Open Space Residential	128.8		128.8
Professional Office	32.1	19.3	12.8
Quasi-Public	191.2	2.2	189.0
Residential Estate	526.5	8.1	518.4
Residential High	109.7	7.4	102.3
Residential Low	1,288.4	240.5	1,047.9
Residential Low/Medium	927.2	183	744.2
Residential Medium	584.6		584.6
Residential Rural	498.7	347.2	151.5
Residential Rural (2 ac. min.)	24.0		24.0
Utility Easement	75.8		75.8
Grand Total	6,618.0	974.2	5,643.8

Riverside County RCIP LU	Acres
Landuse	YVWD
EDR-RC	5.2
LDR-RC	173.2
OS-CH	0.4
RM	373.6
RR	54.1
VLDR	8.7
Grand Total	615.2

G:\2009\09-0033\Report\Table B-8 YVWD&SMWC_LU.xls, 8/17/09

Table B-9
San Gorgonio Pass Water Agency
Yucaipa Valley Water District Sphere of Influence- Re-Categorized Land Uses

City of Calimesa GP LU	
Landuse	Acres
Business Park	13.4
Commercial Regional	70.6
Open Space	70.5
Open Space Residential	1,375.2
Park Overlay (see Note)	174.2
Residential Estate	54.2
Residential High	0.3
Residential Low	74.3
Residential Low/Medium	105.2
Residential Medium	39.0
Residential Rural	180.8
Utility Easement	45.7
Grand Total	2,203.5

Note:

This is IN ADDITION TO other landuses

Riverside County RCIP LU	
Landuse	Acres
AG	11.7
CT	15.6
OS-CH	931.7
OS-R	19.7
OS-RUR	2,641.7
OS-W	32.1
RM	3,174.0
RR	1,785.4
VLDR	314
Grand Total	8,925.8

Table B-10
San Geronio Pass Water Agency
RCIP Landuse of all County Lands within Subagency Boundaries and in Unserved County Area
Outside Subagency Boundaries (Landuse within Unserved/Unincorporated Areas of SGPWA)

LANDUSE	ACRES							UNSERVED AREAS
	COUNTY	YVWD	BCVWD	CWD	HVWD	Banning SOI	BHMWC	
AG	2,214.6	11.7	177.1		22.9	787.9		1,215
AG-Morongo	53.0							53
CO	4.1		4.1					0
CR	288.8		129.2	142.7				17
CR-CCO	75.2			75.3				0
CT	15.6	15.6						0
EDR-RC	638.4	5.2	464.7		112.3			56
HDR	8.6		8.6					0
HI-CCO	10.0			10.0				0
IND-Morongo	31,475.4			318.7	0.4	160.0		30,996
LDR	556.7			185.1		260.4		111
LDR-CCO	483.7			483.7				0
LDR-RC	197.1	173.2	23.8					0
LI	26.9		2.5	24.3				0
LI-CCO	140.3			140.3				0
MDR	597.1		380.7	214.5				2
MDR-CCO	108.5			108.5				0
MHDR	35.7		35.7					0
OS-C	14,316.3		288.2	167.4	69.1	1,288.1		12,504
OS-CH	9,261.8	932.1			0.9			8,329
OS-C-Morongo	571.4			82.2				489
OS-R	1,535.3	19.7	505.4		88.2			922
OS-RUR	6,104.3	2,641.7			766.6			2,696
OS-RUR-Morongo	45.4							45
OS-W	48.2	32.1	16.2					0
PF	84.8							85
RD	2,313.3			2,067.5		54.8		191
RD-Morongo	4.0			4.0				0
RD-CCO	652.7			652.7				0
RM	21,149.7	3,547.6	3,660.5	1,703.7	4,135.1	2,436.6	4.7	5,662
RM-Morongo	1,656.4			824.8				832
RR	4,189.4	1,839.5	698.7	1,302.4	16.6	113.8		218
RR-CCO	276.8			276.8				0
RR-CD	152.4					152.4		0
RR-Morongo	355.6			209.7				146
VLDR	933.7	322.7	506.0	4.7	74.6			26
VLDR-CCO	145.4			145.4				0
VLDR-RC	3,747.0		3,045.5			69.0	632.5	0
Other	935.3			284.8				0
Grand Total	105,408.8	9,541.1	9,946.9	9,144.4	5,286.7	5,323.0	637.2	65,530

Notes:

1. XXX-CD is within a Community Development Overlay
2. XXX-CCO is within a Community Center Overlay
3. XXX-Morongo is in Morongo Tribal Lands
4. City of Banning already taken out of County

G:\2007\07-0269\GIS\Tables\ SGPWA_LU_County(Subract_wtr_RtIs)_NP.xls, 8/17/09

Table B-11
San Geronio Pass Water Agency
Slope Analysis for the Morongo Tribal Lands

% SLOPE	ACRES
0-5%	12,356
6-10%	6,685
11-12%	2,719
> 12%	12,576
TOTAL	34,336

APPENDIX C

Application of Unit Water Demand Factors to Re-Categorized Land Uses within Major Water Retailers

Table C-1A (Page 1 of 2)
San Geronio Pass Water Agency
YVWD Buildout Demand from General Plan Land Use
(Demand calculations excludes SMWC)

Yucaipa Valley Water District General Plan Land Use Type	Area within YVWD (Acres)	Area within YVWD Sphere of Influence (Acres)	Total Area within YVWD (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
City of Calimesa Land Use					
Business Park (BP), also Professional Office & Industrial	65.2	13.4	78.6	1.27	100
Commercial Community (CC), Commercial	99.3		99.3	1.21	120
Commercial Neighborhood (CN), Commercial	102.5		102.5	1.21	124
Commercial Regional (CR), Commercial	170.1	70.6	240.6	1.21	291
Light Industrial (LI), Industrial	0.7		0.7	1.27	1
Open Space (OS), Resource	1626.5	70.5	1697.0	0.00	0
Open Space Residential (OSR), 1 DU / 10 AC, Resource	128.8	1375.2	1504.1	2.21	3,324
Park Overlay		174.2	174.2	0.00	0
Professional Office	12.8		12.8	1.21	15
Quasi-Public, Resource	189.0		189.0	1.76	333
Residential Estate (RE), 1 DU / 5 AC, Resource	518.4	54.2	572.6	2.09	1,197
Residential High (Res H), 14-20 DU / AC	102.3	0.3	102.6	5.38	552
Residential Low / Medium (Res LM), 4-7 DU / AC	744.2	105.2	849.4	3.76	3,194
Residential Low (Res Low), 2-4 DU / AC	1047.9	74.3	1122.2	2.46	2,761
Residential Medium (Res Medium), 7-14 DU / AC	584.6	39.0	623.7	3.76	2,345
Rural Residential (RR), 0-2 DU / AC	151.5	180.8	332.3	2.29	761
Rural Residential (RR-2), 2 AC Minimum	24.0	0.0	24.0	2.09	50
Utility Easement (UT EA), Resources	75.8	45.7	121.5	0.00	0
SUBTOTAL	5643.7	2203.5	7847.2		15,167

Table C-1A (Page 2 of 2)
San Geronio Pass Water Agency
YVWD Buildout Demand from General Plan Land Use
(Demand calculations excludes SMWC)

Yucaipa Valley Water District General Plan Land Use Type	Area within YVWD (Acres)	Area within YVWD Sphere of Influence (Acres)	Total Area within YVWD (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
Riverside County Landuse					
AG		11.7	11.7	0.00	0
CT		15.6	15.6	1.21	19
EDR-RC	5.2		5.2	2.21	11
LDR-RC	173.2		173.2	2.46	426
OS-CH	0.4	931.7	932.1	0.00	0
OS-R		19.7	19.7	0.00	0
OS-RUR		2641.7	2641.7	0.00	0
OS-OW		32.1	32.1	0.00	0
RM	373.6	3174.0	3547.6	0.00	0
RR	54.1	1785.4	1839.5	2.29	4,212
VLDR	8.7	314.0	322.7	2.21	713
SUBTOTAL	615.2	8925.9	9541.1		5,382

TOTAL	6,258.9	11,129.4	17,388.3		20,549
--------------	----------------	-----------------	-----------------	--	---------------

Table C-1B (Page 1 of 1)
San Geronio Pass Water Agency
SMWC Buildout Demand from General Plan Land Use

South Mesa Water Company General Plan Land Use Type	Area within SMWC (Acres)	Area within SMWC Sphere of Influence (Acres)	Total Area within SMWC (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
City of Calimesa Land Use					
Commercial Community (CC), Commercial	96.5		96.5	1.21	117
Commercial Neighborhood (CN), Commercial	17.8		17.8	1.21	22
Light Industrial (LI), Industrial	34.2		34.2	1.27	43
Open Space (OS), Resource	18.0		18.0	0.00	0
Professional Office	19.3		19.3	1.21	23
Quasi-Public, Resource	2.2		2.2	1.76	4
Residential Estate (RE), 1 DU / 5 AC, Resource	8.1		8.1	2.09	17
Residential High (Res H), 14-20 DU / AC	7.4		7.4	5.38	40
Residential Low / Medium (Res LM), 4-7 DU / AC	183.0		183.0	3.76	688
Residential Low (Res Low), 2-4 DU / AC	240.5		240.5	2.46	592
Rural Residential (RR), 0-2 DU / AC	347.2		347.2	2.29	795
SUBTOTAL	974.2	0.0	974.2		2,341

Table C-2 (Page 1 of 2)
San Geronio Pass Water Agency
BCVWD Buildout Demand from General Plan Land Use

Beaumont Cherry Valley Water District General Plan Land Use Type	Area within BCVWD (Acres)	Area within BCVWD Sphere of Influence (Acres)	Total Area within BCVWD (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
City of Beaumont Land Use					
Beaumont Avenue Overlay	67.6		67.6	1.21	82
Community Commercial	190.5	259.4	449.9	1.21	544
General Commercial	206.1	89.7	295.8	1.21	358
Industrial	189.3	693.5	882.8	1.27	1,121
Multiple-family Residential	141.0	0.1	141.1	5.38	759
Public Facilities	18.7	8.0	26.7	1.76	47
Recreation & Conservation	918.9	92.2	1011.1	0.00	0
Rural Residential		789.6	789.6	2.29	1,808
Single Family Residential	2722.1	2601.5	5323.6	3.76	20,017
Urban Village Overlay	0.1	326.7	326.8	1.21	395
SUBTOTAL	4454.3	4860.6	9314.9		25,132
City of Calimesa Land Use					
Commercial Neighborhood		12.3	12.3	1.21	15
Open Space	61.3	15.5	76.8	0.00	0
Open Space Residential		78.8	78.8	2.29	180
Park Overlay		21.4	21.4	0.00	0
Residential Low/Medium	58.3	157.9	216.2	3.76	813
SUBTOTAL	119.6	285.9	405.5		1008.4

Table C-2 (Page 2 of 2)
San Gorgonio Pass Water Agency
BCVWD Buildout Demand from General Plan Land Use

Beaumont Cherry Valley Water District General Plan Land Use Type	Area within BCVWD (Acres)	Area within BCVWD Sphere of Influence (Acres)	Total Area within BCVWD (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
Riverside County Landuse					
AG		177.1	177.1	0.00	0
CO	3.9	0.2	4.1	1.21	5
CR	66.0	63.2	129.2	1.21	156
EDR-RC		464.7	464.7	2.29	1,064
LDR-RC		23.8	23.8	2.46	59
High Density Residential (HDR)	8.6		8.6	5.38	46
Light Industrial (LI)	2.5		2.5	1.27	3
MDR	280.9	99.8	380.7	3.76	1,431
MHDR	9.8	25.9	35.7	5.38	192
OS-C	11.5	276.7	288.2	0.00	0
OS-R	301.6	203.8	505.4	0.00	0
OS-W		16.2	16.2	0.00	0
RM	303.6	3356.9	3660.5	0.00	0
RR	253.5	445.2	698.7	2.29	1,600
VLDR	62.1	443.9	506.0	2.21	1,118
VLDR-RC	1,625.5	1445.9	3071.4	2.21	6,788
TOTAL	2929.6	7043.3	9972.9		12,463
TOTAL	7503.5	12189.9	19693.3		37,595

Table C-3A (Page 1 of 2)
San Gorgonio Pass Water Agency
Banning Buildout Demand from General Plan Land Use

City of Banning General Plan Land Use Type	Area within Banning (Acres)	Area within Sphere of Influence Banning (Acres)	Total Area within Banning (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
City of Banning Land Use					
Airport Industrial	135.9		135.9	0.60	82
Business Park	384.0		384.0	1.21	465
Downtown Commercial	97.4		97.4	1.21	118
General Commercial	436.3		436.3	1.21	528
High Density Residential (11-18 du/ac)	317.5		317.5	5.38	1,708
Highway Serving Commercial	110.4		110.4	0.00	0
Industrial	421.1		421.1	1.27	535
Industrial-Mineral Resources	216.4		216.4	0.00	0
Low Density Residential (0-5 du/ac)	3,047.9		3047.9	2.46	7,498
Medium Density Residential (0-10 du/ac)	978.2		978.2	3.76	3,678
Mobile Home Parks	130.5		130.5	1.34	175
Open Space - Parks	1,170.4		1170.4	0.00	0
Open Space - Resources	2,697.8		2697.8	0.00	0
Professional Office	41.6		41.6	1.21	50
Public Facilities - Airport	144.5		144.5	0.60	87
Public Facilities - Cemetery	15.4		15.4	1.76	27
Public Facilities - Fire Station	3.6		3.6	1.76	6
Public Facilities - Government	64.1		64.1	1.76	113
Public Facilities - Hospital	10.7		10.7	1.76	19
Public Facilities - Railroad/Interstate	468.7		468.7	1.76	825
Public Facilities - School	233.8		233.8	1.76	411
Ranch Residential - Hillside (0-1 du/ac)	44.6		44.6	2.09	93
Ranch Residential (0-1 du/ac)	456.0		456.0	2.09	953
Ranch/Agriculture - Hillside (10 ac min.)	473.2		473.2	0.00	0
Ranch/Agriculture (10 ac min.)	71.8		71.8	0.00	0
Very Low Density Residential (0-2 du/ac)	2,148.1		2148.1	2.21	4,747
SUBTOTAL	14320.0	0.0	14320.0		22,118

Table C-3A (Page 2 of 2)
San Geronio Pass Water Agency
Banning Buildout Demand from General Plan Land Use

City of Banning General Plan Land Use Type	Area within Banning (Acres)	Area within Sphere of Influence Banning (Acres)	Total Area within Banning (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
Riverside County Landuse					
AG		787.9	787.9	0.00	0
IND-Morongo		160.7	160.7	0.00	0
LDR		260.4	260.4	2.46	641
OS-C		1288.1	1288.1	0.00	0
RD		54.8	54.8	0.00	0
RM		2436.6	2436.6	0.00	0
RR		113.8	113.8	0.00	0
RR-CDO		152.4	152.4	0.00	0
VLDR-RC		69.0	69.0	2.21	152
SUBTOTAL	0.0	5323.7	5323.7		793.1
TOTAL	14,320.0	5,323.7	19,643.7		22,910.9

Table C-3B
San Gorgonio Pass Water Agency
BHMWC Buildout Demand from General Plan Land Use

Banning Heights Mutual Water Company General Plan Land Use Type	Area within BHMWC (Acres)	Area within Sphere of Influence BHMWC (Acres)	Total Area within BHMWC (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
Riverside County Land Use					
VLDR-RC	632.5		632.5	2.21	1,398
RM	4.7		4.7	0.00	0
SUBTOTAL	637.2	0.0	637.2		1,398
City of Banning Land Use					
Low Density Residential (0-5 du/ac)	32.0		32.0	2.46	79
Open Space - Parks	56.8		56.8	0.00	0
Ranch Residential - Hillside (0-1 du/ac)	11.6		11.6	2.09	24
Ranch Residential (0-1 du/ac)	138.2		138.2	2.09	289
SUBTOTAL	238.6	0.0	238.6		392
TOTAL	875.8	0.0	875.8		1789.6

Table C-4A
San Gorgonio Pass Water Agency
CWD Buildout Demand from General Plan Land Use

Cabazon Water District General Plan Land Use Type	Area within CWD (Acres)	Area within Sphere of Influence CWD (Acres)	Total Area within CCWD (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
Riverside County Land Use					
AG				0.00	0
CR	142.7		142.7	1.21	173
CR-CCO	75.1		75.1	1.21	91
FWY	284.8		284.8	0.00	0
HI-CCO	10.0		10.0	1.27	13
IND			0.0	0.00	0
LDR	185.1		185.1	2.46	455
LDR-CCO	483.7		483.7	2.46	1,190
LI	24.3		24.3	1.27	31
LI-CCO	140.3		140.3	1.27	178
MDR	214.5		214.5	3.76	807
MDR-CCO	108.5		108.5	3.76	408
OS-C	167.4		167.4	0.00	0
OS-C in Morongo			0.0	0.00	0
RD	1,614.4	453.1	2067.5	0.00	0
RD-CCO	652.7		652.7	0.00	0
RM	1,506.6	197.1	1703.7	0.00	0
RR	1,302.4	0.0	1302.4	2.29	2,982
RR-CCO	276.8		276.8	2.29	634
VLDR	4.7		4.7	2.21	10
VLDR-CCO	145.4		145.4	2.21	321
TOTAL	7339.4	650.2	7989.6		7,293

Table C-4B
San Geronio Pass Water Agency
HVWD Buildout Demand from General Plan Land Use

High Valley Water District General Plan Land Use Type	Area within HVWD (Acres)	Area within Sphere of Influence HVWD (Acres)	Total Area within HVWD (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
Riverside County Land Use					
AG	22.9		22.9	0	0
EDR-RC	112.3		112.3	2.09	235
IND	0.4		0.4	0	0
OS-C	69.1		69.1	0	0
OS-CH	0.9		0.9	0	0
OS-R	88.2		88.2	0	0
OS-RUR	766.6		766.6	0	0
RM	4135.1		4135.1	0	0
RR	16.6		16.6	0.00	0
VLDR	74.6		74.6	2.21	165
TOTAL	5286.7		5286.7		400

Table C-5 (Page 1 of 2)
Unincorporated Areas Buildout Demand from General Plan Land Use

Unincorporated Areas General Plan Land Use Type	Unincorporated Areas (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
Riverside County Land Use Unincorporated Areas			
AG	1216.0	0	0
AG-Morongo		0	0
CO		1.21	0
CR	17.0	1.21	21
CR-CCO		1.21	0
CT		1.21	0
EDR-RC	56.0	2.09	117
FWY	370.0	0	0
HDR		5.38	0
HI-CCO		1.27	0
IND		0	0
LDR	111.2	2.46	274
LDR-CCO		2.46	0
LDR-RC		2.46	0
LI		1.27	0
LI-CCO		1.27	0
MDR	2.0	3.76	8
MDR-CCO		3.76	0
MHDR		3.76	0
OS-C	12504.0	0	0
OS-CH	8329.0	0	0
OS-C-Morongo		0	0
OS-R	922.0	0	0
OS-RUR	2696.0	0	0
OS-RUR-Morongo		0	0
OS-W		0	0
PF	84.8	0	0

Table C-5 (Page 2 of 2)
Unincorporated Areas Buildout Demand from General Plan Land Use

Unincorporated Areas General Plan Land Use Type	Unincorporated Areas (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
RD	149.1	0	0
RD-Morongo		0	0
RD-CCO		0	0
RM	5668.0	0	0
RM-Morongo		0	0
RR	223.0	2.29	511
RR-CDO		0	0
RR-CCO		2.29	0
RR-Morongo		2.29	0
VLDR	171.0	2.21	378
VLDR-CCO		2.21	0
VLDR-RC	51.0	2.21	113
Unincorporated San Bernardino County	1917.3	0	0
TOTAL	34487.4		1420.0

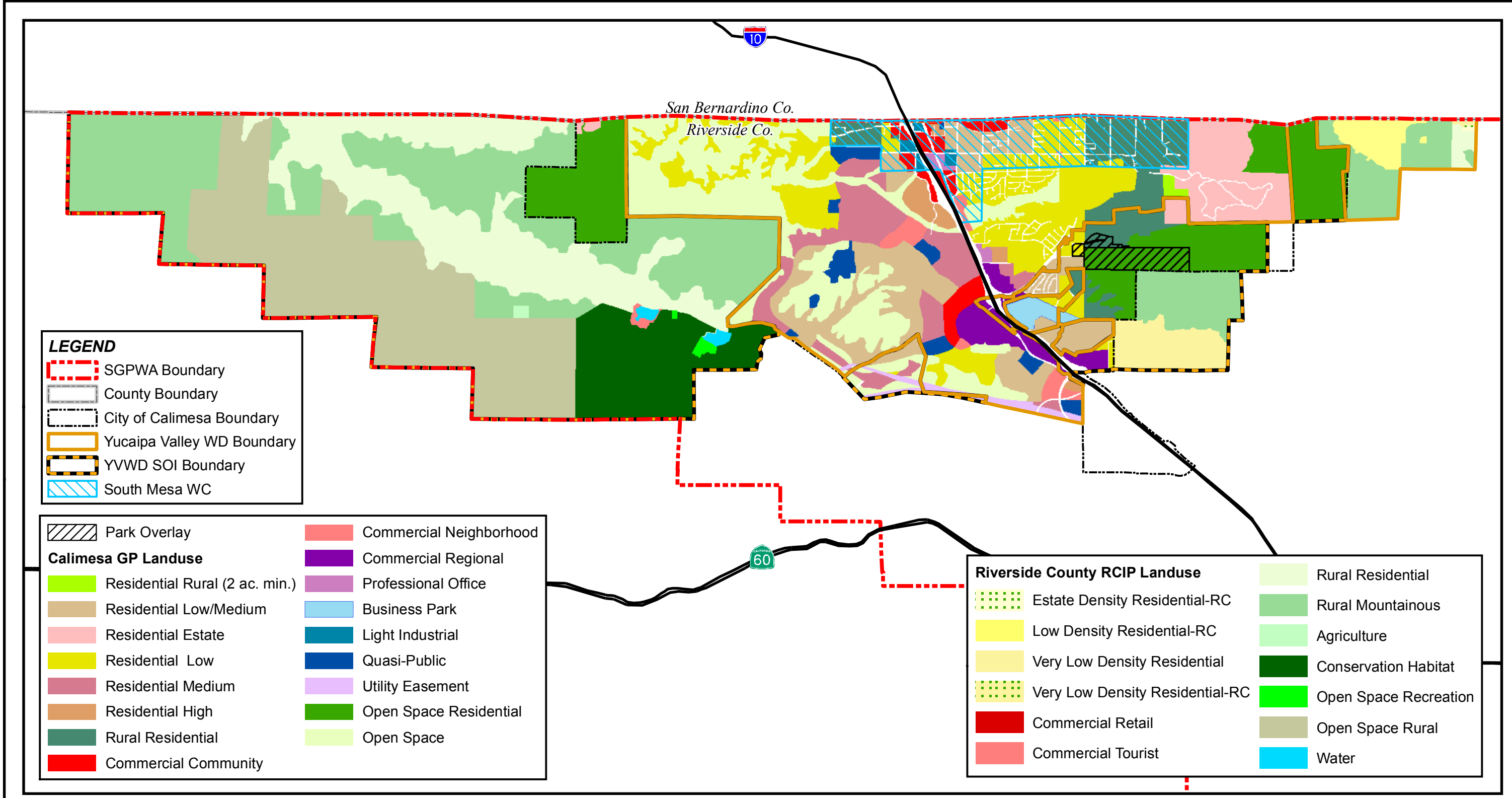
**Table C-6
San Gorgonio Pass Water Agency
Morongo Tribal Lands Areas Buildout Demand from General Plan Land Use**

Land Use Analysis Criteria	Morongo Tribal Lands Areas (Acres)	Unit Use Factor Ac-Ft/Ac/Yr	Demand Ac-Ft/Yr
Slope Analysis Land Use			
0% To 5% Sloped Areas	12,341.0	2.0	24,682
5% To 10% Sloped Areas	6,655.0	2.0	13,310
10% To 12% Sloped Areas	2,706.0	0.0	0
Sloped Areas Greater Than 12%	12,476.0	0.0	0
SUBTOTAL	34,178.0		37,992
Morongo Tribal Lands within the City of Banning Land Use			
Airport Industrial		0.60	0
Business Park		1.21	0
Downtown Commercial		1.21	0
General Commercial	20.0	1.21	24
High Density Residential (11-18 du/ac)	52.7	5.38	284
Highway Serving Commercial		0.00	0
Industrial		1.27	0
Industrial-Mineral Resources		0.00	0
Low Density Residential (0-5 du/ac)	70.1	2.46	172
Medium Density Residential (0-10 du/ac)	41.3	3.76	155
Mobile Home Parks		1.34	0
Open Space - Parks		0.00	0
Open Space - Resources	92.6	0.00	0
Public Facilities - Government		1.76	0
Public Facilities - Railroad/Interstate		1.76	0
Public Facilities - School		1.76	0
Ranch Residential - Hillside (0-1 du/ac)		2.09	0
Ranch Residential (0-1 du/ac)		2.09	0
Very Low Density Residential (0-2 du/ac)		2.21	0
SUBTOTAL	276.7		635.5
TOTAL	34454.7		38627.5

**Table C-7
San Gorgonio Pass Water Agency
Summary of Buildout Demands**

Water Retailer	Total Area (Acres)	Demand (Ac-Ft/Yr)
Yucaipa Valley Water District	17,388	20,549
South Mesa Water Company	974	2,341
Beaumont Cherry Valley Water District	19,693	37,595
City of Banning	19,644	22,911
Cabazon Water District	7,990	7,293
Banning Heights Mutual Water Company	876	1,790
High Valley Water District	5,287	400
SUBTOTAL	71,852	92,878
Unincorporated Areas	34,487	1,420
SUBTOTAL	34,487	1,420
SUBTOTAL for Unincorporated Areas & Water Retailers	106,339	94,298
Morongo Tribal Lands Areas	34,455	38,627
SUBTOTAL	34,455	38,627
TOTAL SGPWA Area	140,794	132,925

** Morongo Lands Demands Per April 15, 2009 E-mail correspondence from SGPWA.



LEGEND

- SGPWA Boundary
- County Boundary
- City of Calimesa Boundary
- Yucaipa Valley WD Boundary
- YVWD SOI Boundary
- South Mesa WC

 Park Overlay	 Commercial Neighborhood
Calimesa GP Landuse	 Commercial Regional
 Residential Rural (2 ac. min.)	 Professional Office
 Residential Low/Medium	 Business Park
 Residential Estate	 Light Industrial
 Residential Low	 Quasi-Public
 Residential Medium	 Utility Easement
 Residential High	 Open Space Residential
 Rural Residential	 Open Space
 Commercial Community	

Riverside County RCIP Landuse	 Rural Residential
 Estate Density Residential-RC	 Rural Mountainous
 Low Density Residential-RC	 Agriculture
 Very Low Density Residential	 Conservation Habitat
 Very Low Density Residential-RC	 Open Space Recreation
 Commercial Retail	 Open Space Rural
 Commercial Tourist	 Water

Sources: Riverside County RCIP, 2003, Updated Nov. 2006; City of Calimesa General Plan, 1994; Yucaipa Valley Water District, 2008.

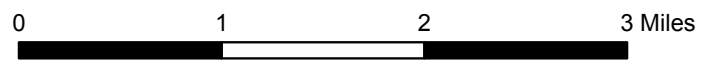
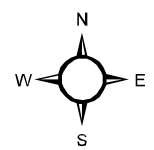
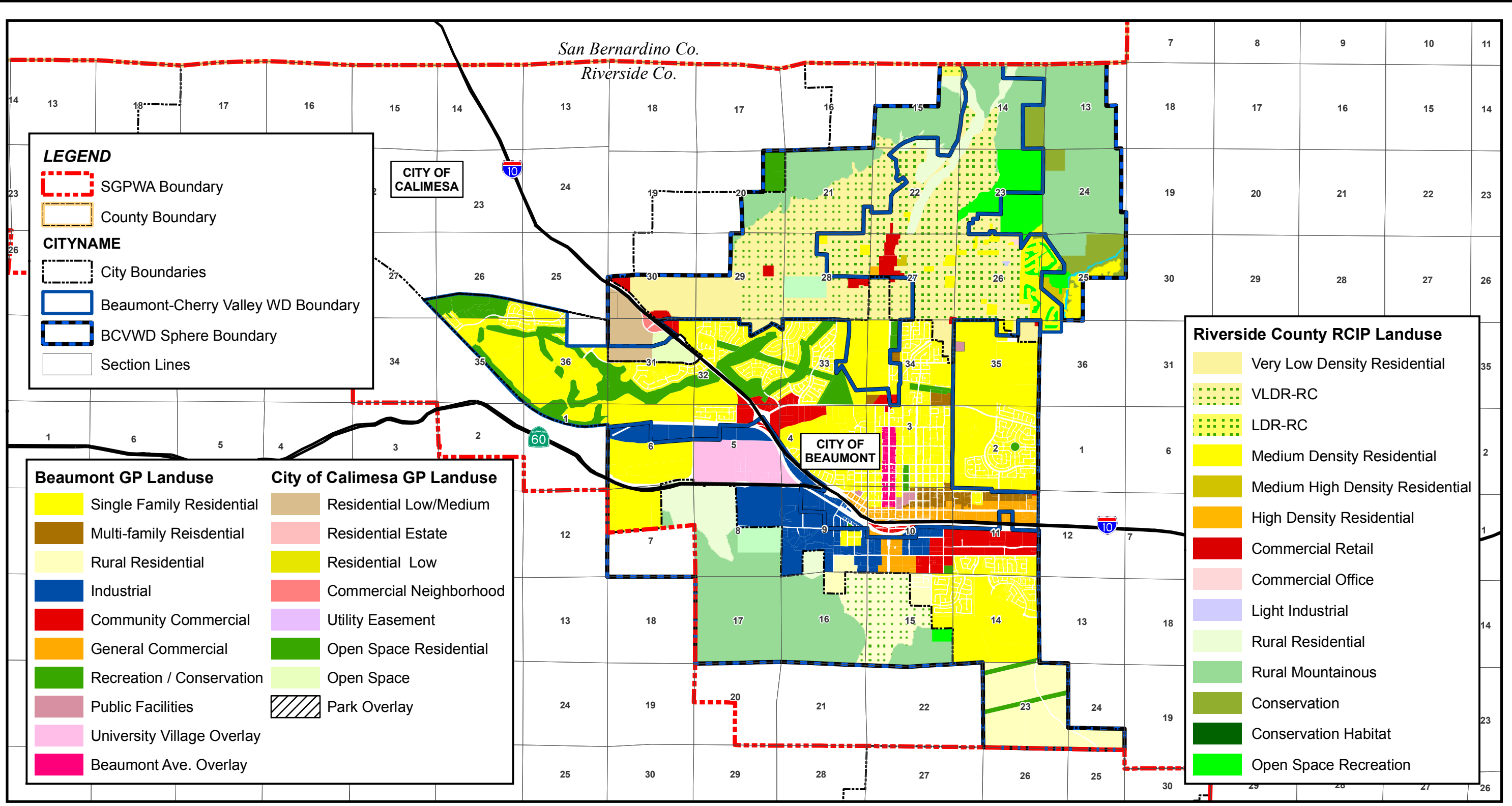
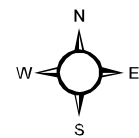


Plate C-1

Landuse Within Yucaipa Valley Water District Boundary, Yucaipa Valley Water District Sphere of Influence and South Mesa Water Company



Sources: City of Beaumont General Plan March, 2007;
 Riverside County RCIP, 2003, Updated Nov. 2006;
 City of Calimesa General Plan, 1994; BCVWD, 2005.



0 5,000 10,000 15,000 Feet



Plate C-2

**Landuse Within Beaumont-Cherry Valley
 Water District and Sphere of Influence**

LEGEND

- SGPWA Boundary
- County Boundary
- Banning City Boundary
- Banning SOI Boundary
- Banning Heights MWC Boundary
- Morongo Tribal Lands

BHMWC LU (County)

- Very Low Density Residential-RC
- Rural Mountainous
- Conservation

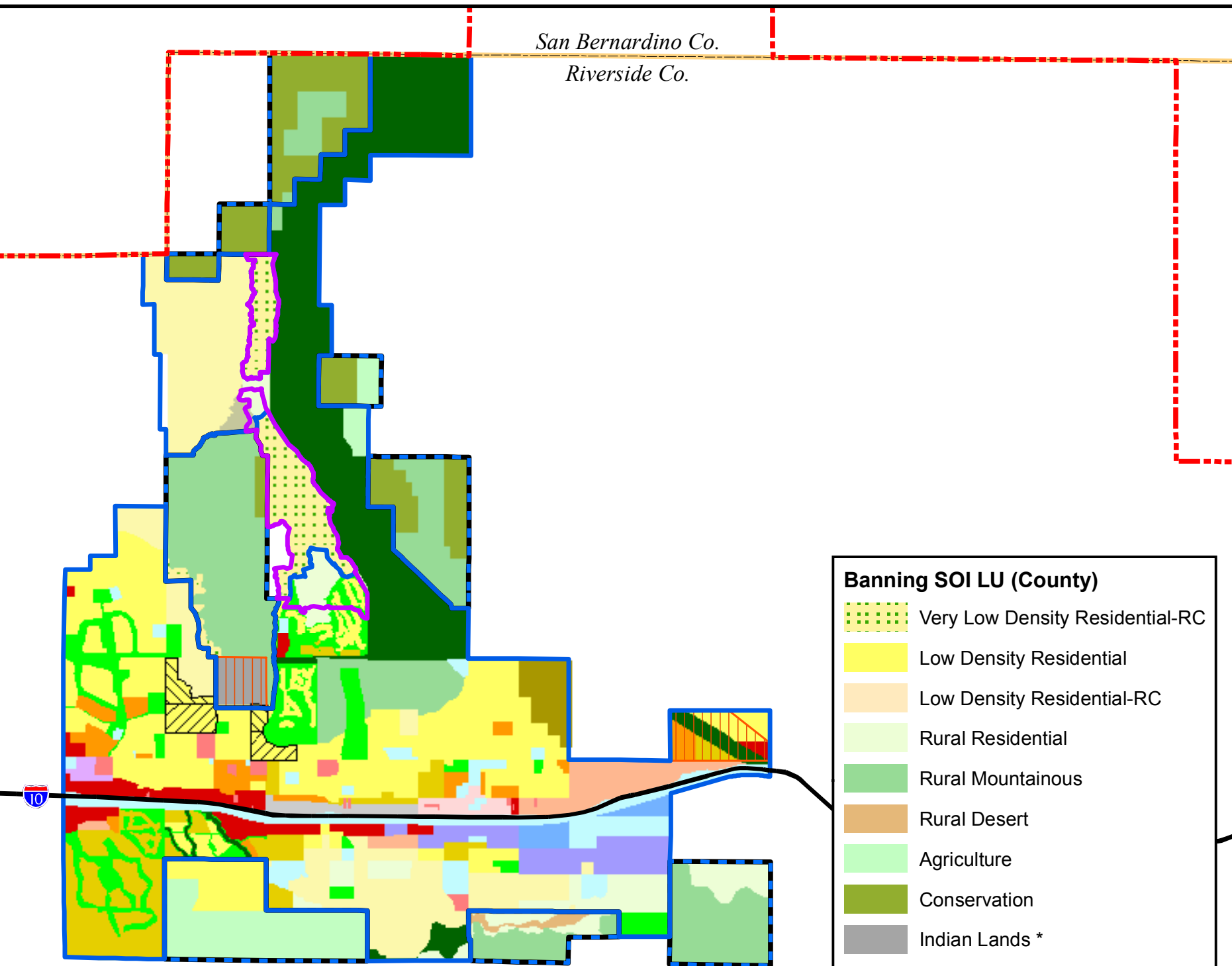
Banning GP Landuse

Very Low Density Residential	Industrial
Low Density Residential	Public Facilities
Medium Density Residential	Ranch Residential
Mobile Home Parks	Ranch Residential-Hillside
General Commercial	Ranch Agriculture-Hillsides
Downtown Commercial	Ranch/Agriculture
Business Park	Open Space-Hillsides
Professional Office	Industrial Mineral Resources
Airport Industrial	Open Space-Resources
High Density Residential	Open Space-Parks
	Highway Serving Commercial
	RL-10,000 Overlay
	RL-14,000 Overlay

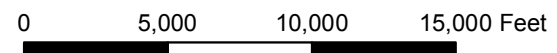
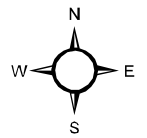
Banning SOI LU (County)

- Very Low Density Residential-RC
- Low Density Residential
- Low Density Residential-RC
- Rural Residential
- Rural Mountainous
- Rural Desert
- Agriculture
- Conservation
- Indian Lands *

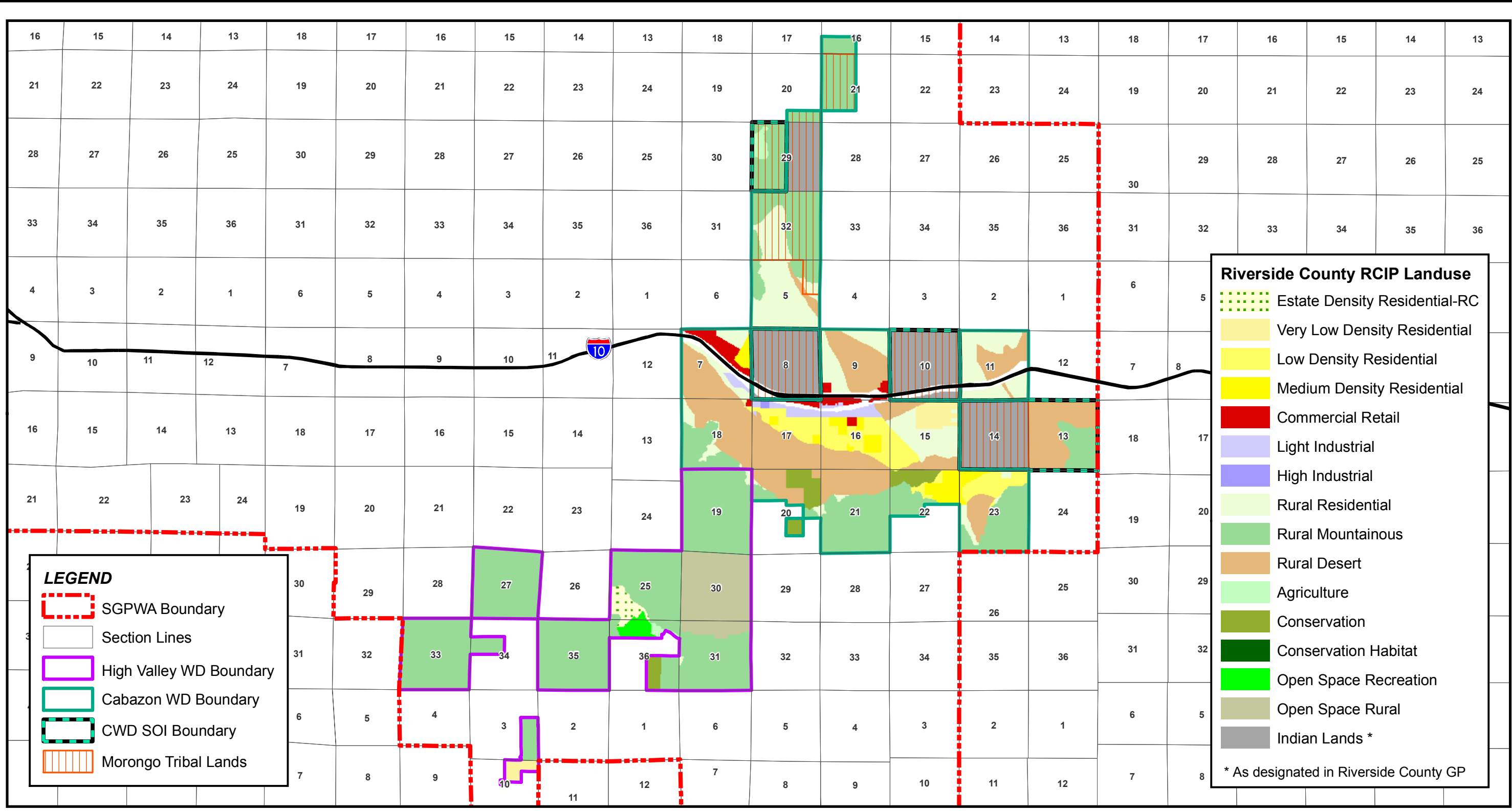
* As designated by Riverside County GP



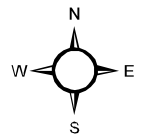
Sources: City of Banning, General Plan March, 2007; Riverside County RCIP, 2003, Updated Nov. 2006; Riverside County GIS, 2008.



Landuse Within City of Banning Water Department Boundary, City of Banning Sphere of Influence, and Banning Heights Mutual Water Company



Sources: Riverside County RCIP, 2003,
 Updated Nov. 2006;
 Riverside County GIS, 2008.

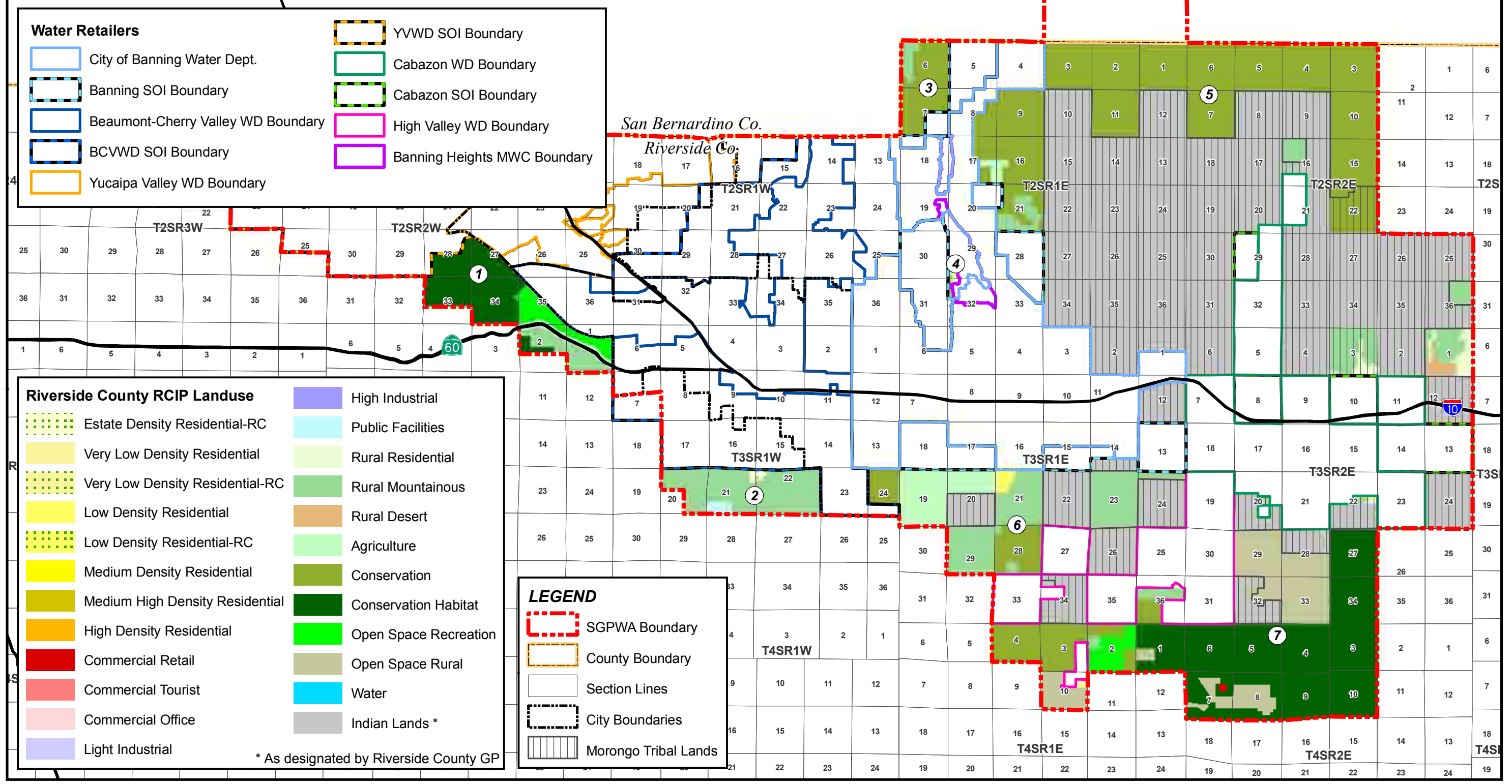


0 5,000 10,000 15,000 Feet

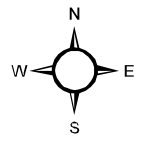


Plate C-4

**Landuse Within High Valley Water District Boundary and
 Cabazon Water District Boundary and Sphere of Influence**



Sources: Riverside County RCIP, 2003, Updated Nov. 2006; Riverside County GIS, 2009.

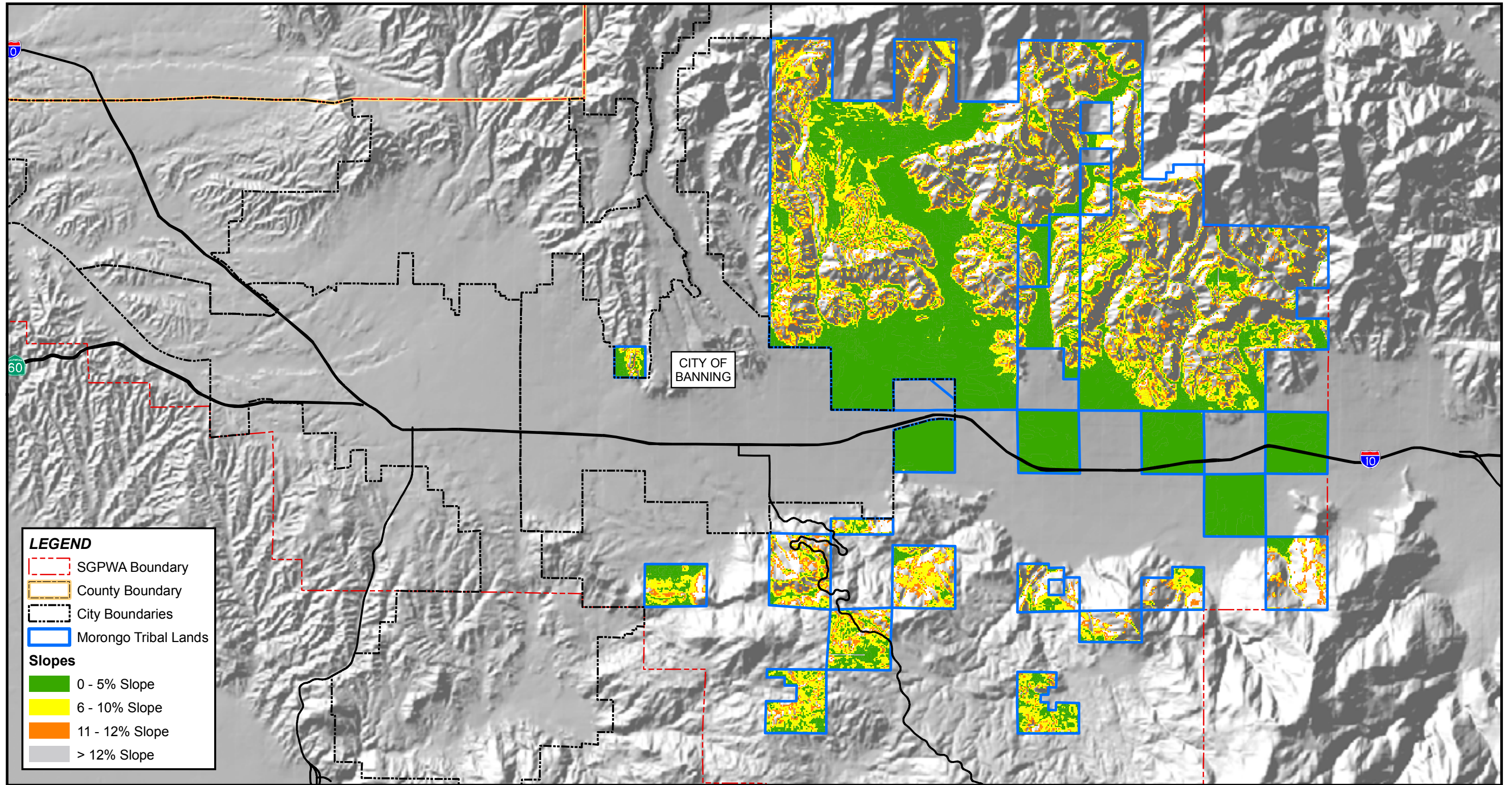


0 5,000 10,000 15,000 Feet



Plate C-5

Landuse Within Unincorporated Areas of SGPWA



LEGEND

- SGPWA Boundary
- County Boundary
- City Boundaries
- Morongo Tribal Lands

Slopes

- 0 - 5% Slope
- 6 - 10% Slope
- 11 - 12% Slope
- > 12% Slope

Sources: County of Riverside, 2009;
USGS 10m DEMs.

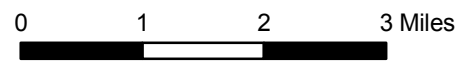
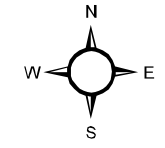
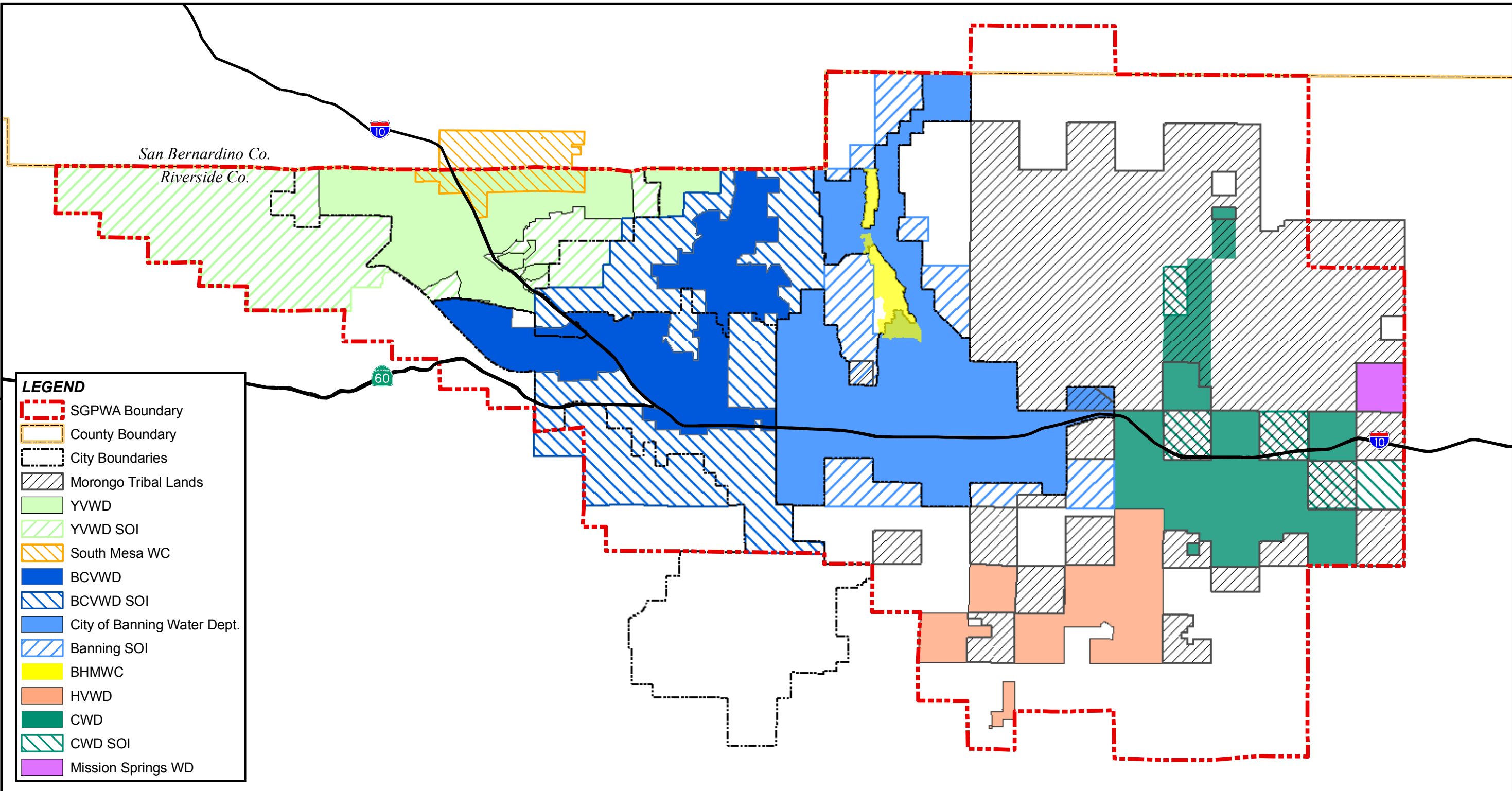
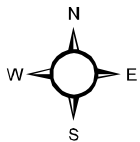


Plate C-6

Slope Analysis of Morongo Tribal Lands



Sources: Riverside Co. LAFCO, April, 2008; YVWD, 2008; BCVWD, 2005; BHMWC, 2008; Riverside County GIS, 2009. (all boundaries subject to verification)



0 1 2 3 Miles

Plate C-7

SGPWA Major Water Retailers

APPENDIX D

SGPWA Supplemental Calculations and SWP

Table "A" Supply Requirements

**San Gorgonio Pass Water Agency (SGPWA) Supplement Water Supply Study
Supplemental Water Required for Ultimate Conditions
for Table “A” Supply Requirements**

Purpose:

The purpose of these calculations are to determine the amount of supplemental water required based on ultimate conditions.

Assumptions:

- Delivery of annual SWP water reliability factor based upon 63%, 80% and 100%
- Peak design of facilities based upon 100% of SWP water within 9 month period.

Calculations:

- Per Table 7 (see attached) of May 2006 Report on Water Supply Conditions in San Gorgonio Pass Region by Wildermuth Environmental, Inc.
- Projected Total Water Supply by 2030 → 85,460 Ac-ft/yr
- Projected Total State Water Project water by 2030 → 30,400 Ac-ft/yr
- Projected Estimated Local Water Supply = [85,460 – 30,400] Ac-ft/yr
= 55,060 Ac-ft/yr
= **55,000 Ac-ft/yr [Section 3 of this report]**

SGPWA Projected Water Demand: 94,000 Ac-ft/yr (SGPWA Only)
20,000 (Morongo Tribal Lands Only)
114,000 Ac-ft/yr (SGPWA & Morongo Tribal Lands)

Required Supplemental Water: [94,000 – 55,000] = **39,000 Ac-ft/yr**
[20,000 – 0] = **20,000 Ac-ft/yr**
[114,000 – 55,000] = **59,000 Ac-ft/yr**

63% Reliability:

- Required Supply (SGPWA Only)
 - 39,000 Ac-ft/yr / 0.63 = 61,904 Ac-ft/yr
 - 61,904 Ac-ft/yr / 9 month = 6,878 Ac-ft/month
 - 6,878 Ac-ft/mo /30.42 day/month = 226 Ac-ft/day
 - 226 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **114 cfs**
- Required Supply (Morongo Tribal Lands Only)
 - 20,000 Ac-ft/yr / 0.63 = 31,746 Ac-ft/yr
 - 31,746 Ac-ft/yr / 9 month = 3,527 Ac-ft/month
 - 3,527 Ac-ft/mo /30.42 day/month = 116 Ac-ft/day
 - 116 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **58 cfs**
- Required Supply (SGPWA & Morongo Tribal Lands)
 - 59,000 Ac-ft/yr / 0.63 = 93,651 Ac-ft/yr
 - 93,651 Ac-ft/yr / 9 month = 10,406 Ac-ft/month
 - 10,406 Ac-ft/mo/ 30.42 day/month = 342 Ac-ft/day
 - 342 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **172 cfs**

80% Reliability:

- Required Supply (SGPWA Only)
 - 39,000 Ac-ft/yr / 0.8 = 48,750 Ac-ft/yr
 - 48,750 Ac-ft/yr / 9 month = 5,417 Ac-ft/month
 - 5,417 Ac-ft/mo / 30.42 day/month = 178 Ac-ft/day
 - 178 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **89 cfs**

- Required Supply (Morongo Tribal Lands Only)
 - 20,000 Ac-ft/yr / 0.8 = 25,000 Ac-ft/yr
 - 25,000 Ac-ft/yr / 9 month = 2,778 Ac-ft/month
 - 2,778 Ac-ft/mo / 30.42 day/month = 91 Ac-ft/day
 - 91 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **46 cfs**

- Required Supply (SGPWA & Morongo Tribal Lands)
 - 59,000 Ac-ft/yr / 0.8 = 73,750 Ac-ft/yr
 - 73,750 Ac-ft/yr / 9 month = 8,194 Ac-ft/month
 - 8,194 Ac-ft/mo / 30.42 day/month = 269 Ac-ft/day
 - 269 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **135 cfs**

100% Reliability:

- Required Supply (SGPWA Only)
 - 39,000 Ac-ft/yr / 9 month = 4,333 Ac-ft/month
 - 4,333 Ac-ft/mo / 30.42 day/month = 142 Ac-ft / day
 - 142 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **72 cfs**

- Required Supply (Morongo Tribal Lands Only)
 - 20,000 Ac-ft/yr / 9 month = 2,222 Ac-ft/month
 - 2,222 Ac-ft/mo / 30.42 day/month = 73 Ac-ft/day
 - 73 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **37 cfs**

- Required Supply (including Morongo Tribal Lands)
 - 59,000 Ac-ft/yr / 9 month = 6,556 Ac-ft/month
 - 6,556 Ac-ft/mo / 30.42 day/month = 215 Ac-ft/day
 - 215 Ac-ft/day x 0.5042 cfs/Ac-ft/day = **108 cfs**

Table D-1: SGPWA Summary of Projected Demand for Supplemental Water

Service Area	63%	80%	100%*
SGPWA Only	114 cfs	89 cfs	72 cfs
Morongo Tribal Lands Only	58 cfs	46 cfs	37 cfs
SGPWA and Morongo Tribal Lands	172 cfs	135 cfs	108 cfs

* 100 % Reliability not utilized in this report per August 13, 2008 meeting with Agency Representative.

APPENDIX E

Determination of Existing and Proposed Facilities Required to Convey Supplemental Water Demand

**San Geronio Pass Water Agency
Supplement Water Supply Study
Determination of Existing and Proposed Facilities Required
to Convey Supplemental Water Demand**

Purpose: The purpose of these calculations is to determine existing and proposed facilities required to convey supplemental water demand.

- Assumptions:**
- 311 cfs peak capacity (for deliver in 9 months) in original Desert Aqueduct design per State Water Project (SWP) contract (Table A amounts for DWA and CVWD, pg. 4-31, Table 4-4)
 - 48 cfs of SGPWA Demand can be conveyed through East Branch Extension once Phase 2 is complete.
 - Per July 10, 2008 communications with Jeff Davis of SGPWA, incorporate additional 16 cfs as this may be purchased through Foothill pipeline from SBMWD.
 - Flow velocity not to exceed 7 fps in proposed pipe sizing..

Calculations: Ultimate Water Demand in SGPWA to be conveyed via DWA and CVWD Proposed Pipeline:

- 63% Reliability:
 - 114 cfs – 48 cfs – 16 cfs = 50 cfs (SGPWA)
 - 172 cfs – 48 cfs – 16 cfs = 108 cfs (SGPWA and Morongo Tribal Lands)
- 80% Reliability:
 - 89 cfs – 48 cfs – 16 cfs = 25 cfs (SGPWA)
 - 135 cfs – 48 cfs – 16 cfs = 71 cfs (SGPWA and Morongo Tribal Lands)
- 100% Reliability*:
 - 72 cfs – 48 cfs – 16 cfs = 8 cfs (SGPWA)
 - 108 cfs – 48 cfs – 16 cfs = 44 cfs (SGPWA and Morongo Tribal Lands)

Pipe Diameter Sizes:

Pipe Diameter sizes to be based upon flow (Q, cfs) and velocity (v, fps).

* 100 % Reliability not utilized in this report per August 13, 2008 meeting with Agency Representative.

Table E-1: Pipe Sizing for Conveyance of SGPWA Supplemental Water Demand

Summary	Flow (cfs)	Velocity (fps)	Pipe Diameter (in)
Upsizing of DWA & CVWD Pipeline ⁽¹⁾			
- 63% Reliability	355	7.066	96
- 80% Reliability	336	6.688	96
- 100% Reliability*	319	7.224	90
SGPWA Pipeline			
- 63% Reliability	50	7.077	36
- 80% Reliability	25	5.096	30 ⁽²⁾
- 100% Reliability*	8	5.732	16 ⁽²⁾

* 100 % Reliability not utilized in this report per August 13, 2008 meeting with Agency Representative.

Table E-2: Pipe Sizing for Conveyance of SGPWA Supplemental Water Demand and Morongo Tribal Lands

Summary	Flow (cfs)	Velocity (fps)	Pipe Diameter (in)
Upsizing of DWA & CVWD Pipeline ⁽¹⁾			
- 63% Reliability	419	6.590	108
- 80% Reliability	382	6.735	102
- 100% Reliability*	355	7.066	96
SGPWA Pipeline			
- 63% Reliability	108	6.794	54
- 80% Reliability	71	5.653	48
- 100% Reliability*	44	6.228	36

* 100 % Reliability not utilized in this report per August 13, 2008 meeting with Agency Representative.

⁽¹⁾ DWA & CVWD Proposed pipeline to be 90-inch diameter to convey 311 cfs. The proposed 90-inch diameter pipeline would require upsizing with addition of SGPWA Demand. The DWA & CVWD initial capacity of 311 cfs utilized a 63% reliability and was not analyzed for 80% and 100% reliability.

⁽²⁾ Pipe sizes of less than 36-inch diameter is not recommended as there is no economic justifications for the magnitude of this project.

- Linkage to a potential solution for Lake Perris – could provide enhanced water quality and short-term storage benefits to reduce downstream pipeline capacity.
- Conjunctive operation of surface storage and groundwater basins – provides improved opportunities to store imported water during times of surplus for use in years of shortage.
- Water supply for Native American tribes – provides facilities to convey water to supplement existing groundwater supplies of tribes. The tribes would need to provide the water to be conveyed.
- Increased flexibility for moving water within the Coachella Valley – adds another conveyance facility to provide water to Coachella Valley allowing water to be readily moved to locations where needed.

Because CVWD has access to both Colorado River and SWP supplies and overlies a large groundwater basin, it is uniquely situated to take advantage of these opportunities.

2.2 SWP Conveyance

CVWD and DWA have acquired Table A amounts through their original SWP contracts and through subsequent water transfers. Currently they have combined Table A amounts of 171,100 acre-ft per year. To convey this water, they need 236 cfs of continuous flow capacity or 311 cfs of peak capacity (for delivery in nine months). Pending water transfers will increase their Table A amount to 194,100 acre-ft per year in 2010. Planning studies underway for CVWD and DWA indicate a future need of as much as 280,000 acre-ft per year of Table A amount by 2040. The capacity required to deliver existing and future SWP water needs would be 387 cfs on a continuous basis or 510 cfs of peak capacity. For engineering and cost estimating purposes and for comparison with previous studies, the capacity of 311 cfs has been selected for Phase 1 of this study.

CVWD and DWA have limited conveyance capacity in the SWP. Table 2-1 shows these capacities by SWP reach. This limited capacity may present a challenge for all alignments and may be a critical flaw for the South Pass and San Jacinto Alignments.

Table 4-4
Desert Aqueduct Capacities

Agency	Basic Conveyance (cfs)	Conjunctive Use (cfs)	Total (cfs)
Cochise Valley Water District and Desert Water Agency – Existing Table A	236-311		236-311
Cochise Valley Water District and Desert Water Agency – Future Table A	151-199 ¹		151-199
Metropolitan Water District of Southern California	0	207 ²	207
San Geronimo Pass Water Agency	14	103 – 207 ³	118-221
Mojave Water Agency	TBD	TBD	TBD
San Bernardino Valley MWD	0	TBD	TBD
Hi-Desert Water District	TBD	TBD	TBD
Total	403-526	310-414	713-940

1 – Continuous flow and peak flow assuming 130% peaking factor for 171,100 acre-ft/yr of existing Table A water.

2 – Continuous flow and peak flow assuming 132% peaking factor for 106,900 acre-ft per year of additional Table A water (280,000 – 171,100 acre-ft per year).

3 – Assumes 150,000 acre-ft per year for conjunctive use operated continuously; could be delivered from Colorado River Aqueduct.

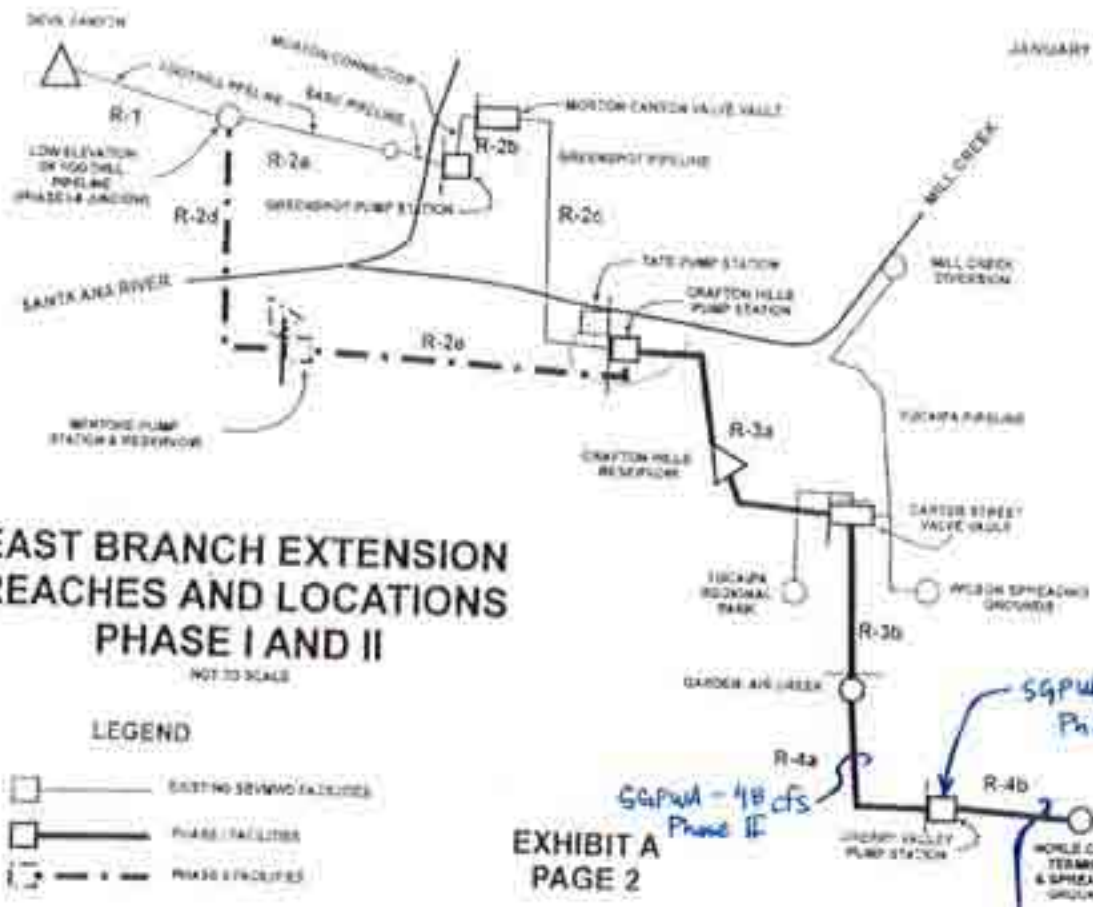
4 – Assumes 75,000 to 150,000 acre-ft per year for conjunctive use operated continuously; could be delivered from Colorado River Aqueduct.

TBD – To be determined; agencies have studies underway.

It should be noted that the minimum capacity required by CVWD and DWA would be 387 cfs to deliver 280,000 acre-ft per year of Table A water on a continuous basis. Additional capacity would provide increased flexibility of deliveries as well as capacity to take Article 21 or Turnback Pool water. Since Article 21 water deliveries must not impact Table A deliveries, and this water is available about 11 percent of the time, primarily in January through March, CVWD and DWA may wish to consider including 10 to 20 percent additional capacity. An evaluation of the cost-effectiveness of providing additional capacity to receive Article 21 water should be performed in Phase 2. The decision to include additional capacity should be compared with the incremental supply provided by that capacity. This evaluation should also consider the potential for continued use of Colorado River exchanges during periods of abundant supply.

As indicated previously, CVWD and DWA may be limited in their current SWP capacity. This would require them to rely on “as-available” capacity to convey a portion of their water supply. A review of the frequency of flows at several key pumping stations and power plants – Edmonston, Pearblossom, Mojave, and Devil Canyon – was performed using daily operations data for January 2002 through February 2005 (DWR, 2005). These data indicate that there is significant capacity available during “off-peak” delivery periods. As shown in Table 4-5, for the period evaluated, there was about 1.2 million acre-ft of available delivery potential on the East Branch. During this period, SWP deliveries averaged about 72 percent of Table A amounts. Consequently, if full-Table A amounts were available and delivery patterns were similar, then about 890,000 acre-ft of additional delivery capability may still be

JANUARY 8, 1999



Per T20500 Exhibit A - Reach Detail

**EAST BRANCH EXTENSION PROJECT
DEFINITION OF FACILITIES**

Repayment Reach	Reach Limits	Reach Facilities
-----------------	--------------	------------------

PHASE I FACILITIES

1	DEVL DIXON POWERPLANT TO JUNCTION FOOTHILL PIPELINE NEAR CONE CAMP ROAD	Foot Hill Pipeline (Existing)
2A	JUNCTION, FOOTHILL PIPELINE NEAR CONE CAMP ROAD TO GREENSPOT PUMP STATION	Foot Hill Pipeline (Existing)
2B	GREENSPOT PUMP STATION TO MORTON CANYON VALVE VAULT	Greenspot Pump Station with chambers (New) Morton Canyon Connector (Existing)
2C	MORTON CANYON VALVE VAULT TO DRAYTON HILLS PUMP STATION	Morton Canyon Valve Vault (New) Greenspot Pipeline (Existing)
3A	DRAYTON HILLS PUMP STATION TO CARTER STREET VALVE VAULT	Drayton Hills Pump Station with chamber & gate (New) Drayton Hills Pipeline w/ regulator Reservoir (New)
3B	CARTER STREET VALVE VAULT TO GARDEN AIR CREEK, SOUTH OF SKS BERNARDINO-SIVERSIDE COUNTY LINE	Carter Street Valve Vault (New) Yucaipa Lakes Turboid (New) Bryant Pipeline (New)
4A	GARDEN AIR CREEK TO CHERRY VALLEY PUMP STATION	Singleton Pipeline (New)
4B	CHERRY VALLEY PUMP STATION TO TERMINUS AT NOBLE CREEK	Cherry Valley Pump Station (New) Noble Creek Pipeline (New)

PHASE II FACILITIES

2A	JUNCTION, FOOTHILL PIPELINE NEAR CONE CAMP ROAD TO MENTONE PUMP STATION	South leg of Mentone Connector Pipeline (New) 200 AF Reservoir (New)
3B	MENTONE PUMP STATION TO DRAYTON HILLS PUMP STATION	Mentone Pump Station (New) East leg of Mentone Connector Pipeline (New)
3A	DRAYTON HILLS PUMP STATION TO CARTER STREET VALVE VAULT	Add 20 cfs pumped new capacity 340 cfs pumps (to Drayton Hills Pump Station (Phase I facility))
4B	CHERRY VALLEY PUMP STATION TO TERMINUS AT NOBLE CREEK	130 to 140 Pumps to (Cherry Valley Pump Station (Phase I facility))

Per E20001 DMS email Exhibit A - Reach Descriptions

**EAST BRANCH EXTENSION
PHASE B—PLANNED CAPACITIES**

Based upon Phase C as designed and currently under construction, information obtained and checked, some since August 1996. Project configuration is the original L Plan shown in the August 1996 agreement. Other configurations and costs are being evaluated. Facilities, capacities and sizes which have been added or changed from the Original are highlighted in yellow.

REPAYMENT REACH	REACH LIMITS	REACH FACILITIES	SIZE	TOTAL CAPACITY cfs	SRVSWD CAPACITY cfs	SRPDA CAPACITY cfs
1	Desert Canyon Reservoir to Junction, Foothill Pipeline near Core Camp Road.	Foothill Pipeline (existing)	12", 10" and 78"	283	240	43
2A	Junction, Foothill Pipeline near Core Camp Road to Crafts Hill's Pump Station.	Foothill Pump Station Foothill Pipeline (existing) SMRC Pipeline (existing) GreenSpot Pump Station Morton Canyon Pipeline Morton Canyon Valve Structure GreenSpot Pipeline	3 at 10, 3 at 20 cfs 78" 42" 3 at 10, 2 at 20 cfs 42" 10" 20" 18" and 42"	90 90 70 70 70 70 20	90 90 70 70 70 70 10	Res. 22 Not used in Phase B.
2B	Junction, Foothill Pipeline near Core Camp Road to Mentone Pump Station.	Mentone South Pipeline	78"	538	240	43
3A	Mentone Pump Station to Crafts Hill's Pump Station.	New Mentone Reservoir Mentone Pump Station	400 to 500 af 2 at 10, 3 at 20 cfs and 2 at 40 cfs	180	112	26
3	Crafts Hill's Pump Station to Garden All Creek, south of Site B, behind Riverside County Line.	Mentone East Pipeline Crafts Hill's Pump Station Crafts Hill Pipeline (Reach 1), Pump Station to Reservoir Crafts Hill Reservoir Crafts Hill Pipeline (Reach 2), Reservoir to Carter Street Valve Structure Bryant Pipeline (Reach 2)	72" 2 at 10, 2 at 20 cfs and 1 at 20 cfs 54" 90 af 54" 54"	190 120 120 120 104	112 72 72 72 59	39 48 48 48 48

• Per August 1996 Agreement

**EAST BRANCH EXTENSION
PHASE II--PLANNED CAPACITIES**

*

REPAYMENT REACH	REACH LIMITS	REACH FACILITIES	SIZE	TOTAL CAPACITY cfs	SBVMWD CAPACITY cfs	SGPWA CAPACITY cfs
4	Garden Air Creek to terminus at Noble Creek	Singleton Pipeline (Reach 3)	54"	48	0	48
		Cherry Valley Pump Station	2 at 8, 2 at 16 cfs	48	0	48
		Noble Creek Pipeline (Reach 3)	36"	32	0	32

* Per the January 2009 DWR East Branch Extension Phase II Final EIR, the current capacity of the Cherry Valley Pump Station is 56 cfs. For the purposes of this report, the August 1996 Agreement of 48 cfs for the Cherry Valley Pump Station will be utilized.

APPENDIX F

Detailed Pump Calculations for State Water Project Aqueduct Extension Alternatives

**San Geronio Pass Water Agency
Supplement Water Supply Study**

- Conversions:**
- 1 cfs = 449 gpm
 - 1 hp = 0.75 kW (kilowatts)

Formulas:

1. Hazen-Williams:

$$F = \frac{10.44 \times L \times Q^{1.85}}{C^{1.85} \times D^{4.8665}} = \text{Frictional Head Losses in Feet}$$

L = Length (feet)

Q = Flow Rate in gpm, where cfs x 449 = gpm

C = Hazen-Williams frictional “c-value”, for this report c = 120

D = Nominal diameter of pipeline in inches.

2. Horse Power Required by Booster Station

$$HP = \frac{Q \times TDH}{3960 \times n} = \text{Horsepower}$$

n = Pump efficiency, assumed 85% or 0.85

Q = Flow Rate in gpm, where cfs x 449 = gpm

TDH = Total Discharge Head = F + Delta H

Delta H = Pipeline Discharge Elevation – Pump Station Elevation

Once HP is calculated, conversion to kilowatts per above conversion factor

3. Horse Power Produced by Hydro Station

$$HP = \frac{Q \times TDH}{3960 \times 1/n} \text{ (Note the abbreviations above)}$$

Note, for Hydro Stations, for the conversion from HP to kW, this requires a 95% reduction due to minor losses.

SAN GORGONIO PASS WATER AGENCY
Table F-1: Hydraulic and Pumping Calculations Based on 63% Reliability

	Q (cfs)	Dia (in)	Length (ft)	Pump/inlet Elevation (ft)	Discharge/ Hydro Station Elevation (ft)	Static Head (ft)	Friction Loss (ft)	Total Dynamic Head (ft)	Power (HP)	Power (kW)
LUCERNE VALLEY ALIGNMENT										
SGPWA Demand										
Pump #1	361	96	95,000	3,175	3,600	425	138	563	27,132	21,306
Pump #2	361	96	25,000	3,600	4,050	450	36	486	23,424	18,394
Hydro Pump #1	361	96	50,000	4,050	3,350	-700	73	-627	-21,819	-15,463
Hydro Pump #2	361	96	45,000	3,350	2,650	-700	66	-634	-22,073	-15,643
Hydro Pump #3	361	96	10,000	2,650	1,790	-860	15	-845	-29,414	-20,846
Hydro Pump #4	361	96	32,000	1,790	1,050	-740	47	-693	-24,124	-17,096
SGPWA and Morongo Tribal Lands Demand										
Pump #1	419	108	95,000	3,215	3,600	385	103	488	27,264	21,410
Pump #2	419	108	25,000	3,600	4,050	450	27	477	26,663	20,938
Hydro Pump #1	419	108	50,000	4,050	3,350	-700	54	-754	-30,452	-21,581
Hydro Pump #2	419	108	45,000	3,350	2,650	-700	49	-749	-30,234	-21,427
Hydro Pump #3	419	108	10,000	2,650	1,790	-860	11	-871	-35,165	-24,922
Hydro Pump #4	419	108	32,000	1,790	1,050	-740	35	-775	-31,281	-22,169
LUCERNE VALLEY ALIGNMENT "LOOP" PIPELINE										
SGPWA Demand										
Pump #1	50	36	27,000	1,516	2,000	484	120	604	4,029	3,164
Pump #2	50	36	33,000	2,000	2,425	425	147	572	3,814	2,995
Pump #3	50	36	32,000	2,425	2,850	425	142	567	3,784	2,971
SGPWA and Morongo Tribal Lands Demand										
Pump #1	108	54	27,000	1,555	2,000	445	69	514	7,411	5,819
Pump #2	108	54	33,000	2,000	2,425	425	85	510	7,345	5,768
Pump #3	50	36	32,000	2,425	2,850	425	142	567	3,784	2,971
NORTH PASS ALIGNMENT										
SGPWA Demand										
Pump #1	361	96	31,000	1,775	2,310	535	45	580	27,938	21,939
Pump #2	361	96	51,000	2,310	2,720	410	74	484	23,322	18,314
SGPWA and Morongo Tribal Lands Demand										
Pump #1	419	108	31,000	1,795	2,310	515	34	549	30,659	24,076
Pump #2	419	108	51,000	2,310	2,720	410	55	465	26,000	20,417
INDEPENDENT SGPWA NORTH PASS ALIGNMENT										
SGPWA Demand										
Pump #1	50	36	23,000	1,630	2,250	620	102	722	4,818	3,783
Pump #2	50	36	82,000	2,250	2,680	430	365	795	5,301	4,163
SGPWA and Morongo Tribal Lands Demand										
Pump #1	108	54	23,000	1,730	2,250	520	59	579	8,343	6,551
Pump #2	108	54	82,000	2,250	2,680	430	211	641	9,231	7,249
INLAND FEEDER MODIFIED PASS ALIGNMENT										
SGPWA Demand										
Pump #1	50	36	24,000	1,750	2,320	570	107	677	4,514	3,545
Pump #2	50	36	67,000	2,320	2,680	360	298	658	4,389	3,447
SGPWA and Morongo Tribal Lands Demand										
Pump #1	108	54	24,000	1,750	2,320	570	62	632	9,100	7,146
Pump #2	108	54	67,000	2,320	2,680	360	172	532	7,667	6,021

SAN GORGONIO PASS WATER AGENCY
Table F-2: Hydraulic and Pumping Calculations Based on 80% Reliability

	Q (cfs)	Dia (in)	Length (ft)	Pump/inlet Elevation (ft)	Discharge/Hydro Station Elevation (ft)	Static Head (ft)	Friction Loss (ft)	Total Dynamic Head (ft)	Power (HP)	Power (kW)
LUCERNE VALLEY ALIGNMENT										
SGPWA Demand										
Pump #1	336	96	95,000	3,213	3,600	387	121	508	22,779	17,887
Pump #2	336	96	25,000	3,600	4,050	450	32	482	21,599	16,961
Hydro Pump #1	336	96	50,000	4,050	3,350	-700	64	-636	-20,602	-14,600
Hydro Pump #2	336	96	45,000	3,350	2,650	-700	57	-643	-20,808	-14,747
Hydro Pump #3	336	96	10,000	2,650	1,790	-860	13	-847	-27,436	-19,444
Hydro Pump #4	336	96	32,000	1,790	1,050	-740	41	-699	-22,641	-16,045
SGPWA and Morongo Tribal Lands Demand										
Pump #1	382	102	95,000	3,188	3,600	412	114	526	26,825	21,065
Pump #2	382	102	25,000	3,600	4,050	450	30	480	24,465	19,211
Hydro Pump #1	382	102	50,000	4,050	3,350	-700	60	-760	-27,988	-19,835
Hydro Pump #2	382	102	45,000	3,350	2,650	-700	54	-754	-27,767	-19,678
Hydro Pump #3	382	102	10,000	2,650	1,790	-860	12	-872	-32,105	-22,753
Hydro Pump #4	382	102	32,000	1,790	1,050	-740	39	-779	-28,663	-20,313
LUCERNE VALLEY ALIGNMENT "LOOP" PIPELINE										
SGPWA Demand										
Pump #1	25	30	26,000	1,563	2,000	437	78	515	1,717	1,348
Pump #2	25	30	31,000	2,000	2,400	400	93	493	1,644	1,291
Pump #3	25	30	33,000	2,400	2,850	450	99	549	1,830	1,437
SGPWA and Morongo Tribal Lands Demand										
Pump #1	71	48	26,000	1,567	2,000	433	55	488	4,618	3,626
Pump #2	71	48	31,000	2,000	2,400	400	65	465	4,405	3,459
Pump #3	25	30	33,000	2,400	2,850	450	99	549	1,830	1,437
NORTH PASS ALIGNMENT										
SGPWA Demand										
Pump #1	336	96	31,000	1,793	2,320	527	40	567	25,393	19,940
Pump #2	336	96	51,000	2,310	2,720	410	65	475	21,293	16,721
SGPWA and Morongo Tribal Lands Demand										
Pump #1	382	102	31,000	1,787	2,320	533	37	570	29,062	22,822
Pump #2	382	102	51,000	2,310	2,720	410	61	471	24,022	18,864
INDEPENDENT SGPWA NORTH PASS ALIGNMENT										
SGPWA Demand										
Pump #1	25	30	29,000	1,747	2,300	553	87	640	2,134	1,676
Pump #2	25	30	69,000	2,300	2,700	400	207	607	2,023	1,589
SGPWA and Morongo Tribal Lands Demand										
Pump #1	71	48	29,000	1,758	2,300	542	61	603	5,710	4,484
Pump #2	71	48	69,000	2,300	2,700	400	145	545	5,160	4,052
INLAND FEEDER MODIFIED PASS ALIGNMENT										
SGPWA Demand										
Pump #1	25	30	24,000	1,750	2,320	570	72	642	2,141	1,681
Pump #2	25	30	67,000	2,320	2,700	380	201	581	1,937	1,521
SGPWA and Morongo Tribal Lands Demand										
Pump #1	71	48	24,000	1,750	2,320	570	50	620	5,875	4,614
Pump #2	71	48	67,000	2,320	2,700	380	141	521	4,931	3,872

APPENDIX G

Cost Criteria per August 2007 Development Plan

**San Gorgonio Pass Water Agency
Supplemental Water Supply Study
Explanation of Cost Criteria**

- Item 1:** Table 7-3, page 7-6, Summary of Cost Estimating Criteria from August 2007 Development Plan, which provides for methodology for calculations of cost of various facility, energy, land cost, etc. was utilized herein. It is noted that the details of each criteria calculations were provided within the Section 7 of the August 2007 Development Plan Report and these methodologies were applied for cost evaluation for SGPWA's Supplemental Water Supply Study Report. In addition to cost evaluation, cost allocation was reviewed due to potential partnership of the various alternatives and presented in Appendix H.
- Item 2:** Multiplication Factors, page 7-7 of August 2007 Development Plan and Attached Calculations, was utilized on the basis of degree of difficulty for construction of pipeline facilities.

**San Gorgonio Pass Water Agency
Supplemental Water Supply Study
Determination of Pipeline Cost Multiplication
Factors Based on Type of Installation**

Purpose: The purpose of these calculations are to determine the Cost Multiplication factors for each alignment based on the type of installation conditions that are expected during construction.

Assumptions: Per August 2007 GEI/Bookman-Edmonston Desert Aqueduct Development Plan (Per page 7-7 of the August 2007 Development Plan)

- Open Country 0.74
- Rural Street 1.00
- Commercial/Residential Streets 1.19
- Busy City Street 1.32
- Tunnels 5 to 8 (assumed 5.5)

Calculations:

Lucerne Valley Pipeline Cost Multiplication Factor

Installation Conditions	Percent	Multiplication Factors	Factor
Open Country	35%	0.74	0.259
Rural Streets	44%	1.00	0.44
Commercial Streets	20%	1.19	0.238
City Streets	0%	1.32	0
Tunnel	1%	5.5	0.55
Total Factor =			0.992

North Pass Pipeline Cost Multiplication Factor

Installation Conditions	Percent	Multiplication Factors	Factor
Open Country	3%	0.74	0.0222
Rural Streets	31%	1.00	0.31
Commercial Streets	17%	1.19	0.2023
City Streets	48%	1.32	0.6336
Tunnel	0%	5.5	0
Total Factor =			1.168

**Table 7-3
Summary of Cost Estimating Criteria**

Project Component	Estimating Criteria
Capital Facility Costs	
Base Pipeline Cost ^a	\$1.2/diameter
Pump Stations	$\$ = 400510^{-4}Q^{1.66}$ Where Q = flow in cfs (cubic feet per second)
Hydro Power Facilities	$\$ = (1.5)400510^{-4}Q^{1.66}$ Where Q = flow in cfs
Foothills (50 acre-foot Earth Embankments)	\$15,000 per acre-foot
Allerhays (25 acre-foot Earth Embankments)	\$15,000 per acre-foot
Regulating Reservoirs (250 acre-foot Earth Embankment)	\$15,000 per acre-foot
Whitewater Discharge Facilities (0.1 cfs)	Lump Sum \$1,000,000
Mission Creek Discharge Facilities (50 cfs)	Lump Sum \$500,000
Power Transmission Facilities	\$2,000,000 per pump or hydro station
Land Costs	
Pipeline Right-of-Way (100 feet wide Easement)	\$560/LF
Regulating Reservoirs	\$1,000,000/applicable site
Foothills	\$500,000/applicable site
Pump Stations	\$150,000/applicable site
Hydro Power Stations	\$150,000/applicable site
Allerhays	\$150,000/applicable site
Maintenance Costs	
Pipelines	0.1% capital cost
Pump Stations	1.5% capital cost
Hydro Power Stations	2.0% capital cost
Reservoirs, Foothills and Allerhays	0.1% capital cost
Other Cost Factors	
Pump Efficiency	85%
Turbine Efficiency	40%
Motor Efficiency	95%
Power Costs - Purchase price	\$0.07/kWh
Power Revenue - Selling price	0.0325/kWh
Tax cost Rate	6%
Planning Period	40 Years
Governmental Mitigation	Values per alternative alignment
Variable Other Costs	±2.5% of capital cost

^aRegulating facilities will be applied to each pipeline and based on installation conditions.

7.2.2 Pipeline Costs

The pipeline base unit cost of \$1.2 per diameter-inch per linear-foot (\$/diameter-inch) was based on average recent construction costs for large diameter pipeline projects in the western United States, over the past three to five years. The base unit costs, presented in this document will be used as a means to compare alternatives and provide a conceptual level type of estimate for the project costs. In the next phase of the project, a more detailed

analysis of actual pipeline costs in the southern California area will be examined to confirm the base unit costs used for this comparison of alternatives.

Cost multiplication factors were applied to the base pipeline cost for each reach of the alignment based on the type of installation conditions that are expected during construction. The use of these multiplication cost factors is based on the application of "cultural modifiers," or difficulty factors, developed as part of the US EPA sanitary sewer system needs assessment work in the 1970s. Based on the type of terrain and installation conditions expected during construction of the Desert and Pass Aqueducts, the following four basic multiplication factors were used:

Open country	—	0.74
Rural street	—	1.00
Commercial/residential Streets	—	1.19
Busy city street	—	1.32
Tunnels	—	5 to 8

The installation conditions of the open country case are fairly self-explanatory and include minimal utility congestion and surface restoration requirements. Pipeline production rates in open country conditions are considerably more than the other type of installation conditions.

The rural street category is characteristic of installation next to or in a two-lane type of rural highway or street with low traffic volumes and minor utility congestion.

The commercial/residential street category is characteristic of fairly congested urban business and residential areas; it is typically applied to arterial streets and modern commercial areas serving residential areas. It is expected that moderate level of traffic control will be required for construction in these areas and that utility congestion is moderate.

The busy city street condition is typical for dense urban congested areas typical of town centers, downtown areas, and congested commercial areas.

Typically, tunnels can cost 3 to 6 times the base pipeline cost, and for this analysis it is assumed that they are 5.5 times the base cost. Therefore, tunnel costs are estimated at \$6000/LF for South Pass and Lucerne Valley tunnels and \$8000/LF for San Jacinto tunnels.

During the next phase of this project, a more detailed review of the tunneling locations will be examined to confirm the multiplication factor that should be used for comparing alternatives.

Other multiplication factors that should be considered include increased costs for groundwater and rock excavation. At this phase of the evaluation of alternatives, these

APPENDIX H

Cost Percentage Allocation Calculations

**San Gorgonio Pass Water Agency
Supplement Water Supply Study
Determination of Cost Allocation Factors Based
on Each Agency's Participating Demand**

Purpose: The purpose of these calculations is to determine the cost percentage allocation for each participating agency based on demand.

Assumptions: • Participating demand for each agency based on 63% Reliability.

- CVWD & DWA: 311 cfs
- SGPWA: 50 cfs
- Morongo Tribal Lands: 58 cfs

• Participating demand for each agency based on 80% Reliability.

- CVWD & DWA: 311 cfs
- SGPWA: 25 cfs
- Morongo Tribal Lands: 46 cfs

Calculations:

- Cost percentage allocation for 63% Reliability:
 - 90-inch diameter (CVWD & DWA demand only), 311 cfs total
 - CVWD & DWA $311/311 = 100\%$
 - 96-inch diameter (CVWD & DWA and SGPWA demand), 361 cfs total
 - CVWD & DWA $311/361 = 86.1\%$
 - SGPWA $50/361 = 13.9\%$
 - 108-inch diameter (CVWD & DWA, SGPWA and Morongo demand), 419 cfs total
 - CVWD & DWA $311/419 = 74.2\%$
 - SGPWA $50/419 = 11.9\%$
 - Morongo Tribal Lands $58/419 = 13.8\%$
 - 36-inch diameter (SGPWA demand only), 50 cfs total
 - SGPWA $50/50 = 100\%$
 - 60-inch diameter (SGPWA and Morongo demand), 108 cfs total
 - SGPWA $50/108 = 46.3\%$
 - Morongo Tribal Lands $58/108 = 53.7\%$

Cost percentage allocation for 80% Reliability:

- 90-inch diameter (CVWD & DWA demand only), 311 cfs total
 - CVWD & DWA $311/311 = 100\%$

- 96-inch diameter (CVWD & DWA and SGPWA demand), 336 cfs total
 - CVWD & DWA $311/336 = 92.6\%$
 - SGPWA $25/336 = 7.4\%$

- 102-inch diameter (CVWD & DWA, SGPWA and Morongo demand), 382 cfs total
 - CVWD & DWA $311/382 = 81.4\%$
 - SGPWA $25/382 = 6.5\%$
 - Morongo Tribal Lands $46/382 = 12.0\%$

- 36-inch diameter (SGPWA demand only), 25 cfs total
 - SGPWA $25/25 = 100\%$

- 54-inch diameter (SGPWA and Morongo demand), 71 cfs total
 - SGPWA $25/71 = 35.2\%$
 - Morongo Tribal Lands $46/71 = 64.8\%$

APPENDIX I

Project Cost Estimates for State Water Project Aqueduct Extension Alternatives for 63% Reliability

SAN GORGONIO PASS WATER AGENCY
Table I-1: Cost Estimation for Lucerne Valley Alignment for 63% Reliability

Project Component	Estimating Criteria	Unit	Quantity	Unit Price	Total Price	
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	480,480	\$12	\$518,918,400
Pump Stations	311 cfs	$\$ = 400,510 * Q^{0.7461}$ where Q = Flow in cfs	EA	2	\$29,004,267	\$58,008,533
Hydro Power Facilities	311 cfs	$\$ = (1.5) * 400,510 * Q^{0.7461}$ where Q = Flow in cfs	EA	4	\$43,506,400	\$174,025,600
Forebays	50 acre-feet	\$15,000 per acre-feet	EA	1	\$750,000	\$750,000
Afterbays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Regulating Reservoirs	210 acre-feet	\$15,000 per acre-feet	EA	1	\$3,150,000	\$3,150,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	6	\$2,000,000	\$12,000,000
Sub Total						\$768,727,534
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	4	\$150,000	\$600,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,250,000
Total Capital Cost						\$770,977,534
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$181,179,720	\$181,179,720
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	480,480	\$50	\$24,024,000
Environmental Mitigation		\$4,000,000	LS	1	\$4,000,000	\$4,000,000
Total Project Cost						\$980,181,254
Adjusted Total Project Cost⁽²⁾	1.106					\$1,083,700,000

⁽¹⁾ Multiplication factor of 0.99 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-2: Cost Estimation for Lucerne Valley Alignment with Additional SGPWA Water Demand 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	96 in.	\$12/diam-in/lf	LF	480,480	\$12	\$553,512,960
Pump Station #1	27100 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$36,105,812	\$36,105,812
Pump Station #2	23400 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$32,560,773	\$32,560,773
Hydro Power Facilities	361 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	4	\$48,625,127	\$194,500,507
Forebays	60 acre-feet	\$15,000 per acre-feet	EA	1	\$900,000	\$900,000
Afterbays	30 acre-feet	\$15,000 per acre-feet	EA	1	\$450,000	\$450,000
Regulating Reservoirs	260 acre-feet	\$15,000 per acre-feet	EA	1	\$3,900,000	\$3,900,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	6	\$2,000,000	\$12,000,000
Sub Total						\$835,430,052
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	4	\$150,000	\$600,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,250,000
Total Capital Cost						\$837,680,052
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$196,854,812	\$196,854,812
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	480,480	\$50	\$24,024,000
Environmental Mitigation		\$4,000,000	LS	1	\$4,000,000	\$4,000,000
Total Project Cost						\$1,062,558,864
Adjusted Total Project Cost⁽²⁾	1.106					\$1,174,800,000

⁽¹⁾ Multiplication factor of 0.99 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-3: Cost Estimation for Loop Pipeline for SGPWA Water Demand for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost	36 in.	\$12/diam-in/lf	LF	134,200	\$12	\$57,974,400
Pump Station #1	4000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$9,388,949	\$9,388,949
Pump Station #2	3800 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$9,055,958	\$9,055,958
Pump Station #3	3800 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$9,055,958	\$9,055,958
Hydro Power Facilities	0 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	0	\$0	\$0
Forebays	20 acre-feet	\$15,000 per acre-feet	EA	1	\$300,000	\$300,000
Afterbays	10 acre-feet	\$15,000 per acre-feet	EA	1	\$150,000	\$150,000
Regulating Reservoirs	50 acre-feet	\$15,000 per acre-feet	EA	1	\$750,000	\$750,000
Cabazon Discharge Facilities	50 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	3	\$2,000,000	\$6,000,000
Sub Total						\$93,425,264
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Hydro Power Stations		\$150,000/applicable site	EA	0	\$150,000	\$0
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,800,000
Total Capital Cost						\$95,225,264
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$22,377,937	\$22,377,937
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	134,200	\$30	\$4,026,000
Environmental Mitigation		\$3,000,000	LS	1	\$3,000,000	\$3,000,000
Total Project Cost						\$124,629,202
Adjusted Total Project Cost⁽¹⁾	1.106					\$137,800,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-4: Cost Estimation for Lucerne Valley Alignment with Additional SGPWA and Morongo Tribal Lands Water Demand for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	108 in.	\$12/diam-in/lf	LF	480,480	\$12	\$622,702,080
Pump Station #1	27300 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$36,293,198	\$36,293,198
Pump Station #2	26700 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$35,729,807	\$35,729,807
Hydro Power Facilities	419 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	4	\$54,342,361	\$217,369,445
Forebays	70 acre-feet	\$15,000 per acre-feet	EA	1	\$1,050,000	\$1,050,000
Afterbays	45 acre-feet	\$15,000 per acre-feet	EA	1	\$675,000	\$675,000
Regulating Reservoirs	300 acre-feet	\$15,000 per acre-feet	EA	1	\$4,500,000	\$4,500,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	6	\$2,000,000	\$12,000,000
Sub Total						\$931,819,530
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	4	\$150,000	\$600,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,250,000
Total Capital Cost						\$934,069,530
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$219,506,340	\$219,506,340
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	480,480	\$50	\$24,024,000
Environmental Mitigation		\$4,000,000	LS	1	\$4,000,000	\$4,000,000
Total Project Cost						\$1,181,599,870
Adjusted Total Project Cost⁽²⁾	1.106					\$1,306,400,000

⁽¹⁾ Multiplication factor of 0.99 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-5: Cost Estimation for Loop Pipeline for SGPWA and Morongo Tribal Lands Water Demand for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost	54 in.	\$12/diam-in/lf	LF	99,200	\$12	\$64,281,600
Base Pipeline Cost	36 in.	\$12/diam-in/lf	LF	35,000	\$12	\$15,120,000
Pump Station #1	7400 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$14,477,910	\$14,477,910
Pump Station #2	7300 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$14,339,897	\$14,339,897
Pump Station #3	3800 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$9,055,958	\$9,055,958
Hydro Power Facilities	0 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	0	\$0	\$0
Forebays	20 acre-feet	\$15,000 per acre-feet	EA	1	\$300,000	\$300,000
Afterbays	10 acre-feet	\$15,000 per acre-feet	EA	1	\$150,000	\$150,000
Regulating Reservoirs	50 acre-feet	\$15,000 per acre-feet	EA	1	\$750,000	\$750,000
Cabazon Discharge Facilities	108 cfs	Assumed Lump Sum \$750,000	LS	1	\$750,000	\$750,000
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	3	\$2,000,000	\$6,000,000
Sub Total						\$125,475,365
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Hydro Power Stations		\$150,000/applicable site	EA	0	\$150,000	\$0
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,800,000
Total Capital Cost						\$127,275,365
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$29,909,711	\$29,909,711
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	134,200	\$30	\$4,026,000
Environmental Mitigation		\$3,000,000	LS	1	\$3,000,000	\$3,000,000
Total Project Cost						\$164,211,075
Adjusted Total Project Cost⁽¹⁾	1.106					\$181,600,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-6: Summary of Cost Estimates for Lucerne Valley Alignment for 63% Reliability

Lucerne Valley Alignment Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.)	Pipeline Capacity Including SGPWA Water Demand at 361 cfs (96-Inch Dia.)	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 419 cfs (108-Inch Dia.)
Construction Costs	\$770,977,534	\$837,680,052	\$934,069,530
Engineering and Administration @ 23.5%	\$181,179,720	\$196,854,812	\$219,506,340
Pipeline Right-of-Way	\$24,024,000	\$24,024,000	\$24,024,000
Environmental Mitigation	\$4,000,000	\$4,000,000	\$4,000,000
Total Project Cost	\$980,181,254	\$1,062,558,864	\$1,181,599,870
Adjusted Total Project Cost⁽¹⁾	\$1,083,700,000	\$1,174,800,000	\$1,306,400,000
CVWD and DWA Cost	\$1,083,700,000	\$1,010,300,000	\$966,700,000
SGPWA Cost	\$0	\$164,500,000	\$156,800,000
Morongo Tribal Lands Cost	\$0	\$0	\$182,900,000

Loop Pipeline Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.) ⁽²⁾	Pipeline Capacity Including SGPWA Water Demand at 361 cfs (96-Inch Dia.) ⁽³⁾	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 419 cfs (108-Inch Dia.) ⁽⁴⁾
Construction Costs	n/a	\$95,225,264	\$127,275,365
Engineering and Administration @ 23.5%	n/a	\$22,377,937	\$29,909,711
Pipeline Right-of-Way	n/a	\$4,026,000	\$4,026,000
Environmental Mitigation	n/a	\$3,000,000	\$3,000,000
Total Project Cost	\$0	\$124,629,202	\$164,211,075
Adjusted Total Project Cost⁽¹⁾	\$0	\$137,800,000	\$181,600,000
SGPWA Cost	\$0	\$137,800,000	\$83,500,000
Morongo Tribal Lands Cost	\$0	\$0	\$98,100,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ All 311 cfs of CVWD and DWA water will discharge to Mission Creek and Whitewater; therefore, loop pipeline will not be necessary.

⁽³⁾ Of the 355 cfs of SWP water, 311 cfs of CVWD and DWA water will discharge to Mission Creek and Whitewater and the remaining 44 cfs of SWPWA water will be conveyed through 36-inch Desert Loop Pipeline; therefore, SGPWA will be responsible for 100% of Desert Aqueduct Loop Pipeline cost.

⁽⁴⁾ Of the 419 cfs of SWP water, 311 cfs of CVWD and DWA water will discharge to Mission Creek and Whitewater and 108 cfs of SWPWA and Morongo Tribal Lands water will be conveyed through 54-inch and 36-inch Dia. Desert Loop Pipeline; therefore, SGPWA (46%) and Morongo Tribal Lands (54%) will be responsible for Desert Aqueduct Loop Pipeline cost.

SAN GORGONIO PASS WATER AGENCY

Table I-7: Summary of Project Cost Estimates for Lucerne Valley Alignment with Loop Pipeline for 63% Reliability

Lucerne Valley Alignment Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.)	Pipeline Capacity Including SGPWA Water Demand at 361 cfs (96-Inch Dia.)	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 419 cfs (108-Inch Dia.)
CVWD and DWA Total Cost	\$1,083,700,000	\$1,010,300,000	\$966,700,000
SGPWA Total Cost	\$0	\$302,300,000	\$240,300,000
Morongo Tribal Lands Total Cost	\$0	\$0	\$281,000,000
Total Project Cost	\$1,083,700,000	\$1,312,600,000	\$1,488,000,000

SAN GORGONIO PASS WATER AGENCY
Table I-8: Cost Estimation for North Pass Alignment for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	322,080	\$12	\$406,284,595
Base Pipeline Cost ⁽¹⁾	42 in.	\$12/diam-in/lf	LF	34,320	\$12	\$20,203,223
Pump Stations	311 cfs	\$ = 400,510*Q ^{0.7461} where Q = Flow in cfs	EA	2	\$29,004,267	\$58,008,533
Hydro Power Facilities	311 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	3	\$43,506,400	\$130,519,200
Forebays	50 acre-feet	\$15,000 per acre-feet	EA	1	\$750,000	\$750,000
Afterbays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Regulating Reservoirs	210 acre-feet	\$15,000 per acre-feet	EA	1	\$3,150,000	\$3,150,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	5	\$2,000,000	\$10,000,000
Sub Total						\$630,790,552
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,100,000
Total Capital Cost						\$632,890,552
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$148,729,280	\$148,729,280
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	356,400	\$50	\$17,820,000
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$800,499,832
Adjusted Total Project Cost⁽²⁾	1.106					\$885,400,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY
Table I-9: Cost Estimation for North Pass Alignment with Additional SGPWA Water Demand for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	96 in.	\$12/diam-in/lf	LF	190,080	\$12	\$255,759,483
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	132,000	\$12	\$166,510,080
Base Pipeline Cost ⁽¹⁾	42 in.	\$12/diam-in/lf	LF	34,320	\$12	\$20,203,223
Base Pipeline Cost to Connect Cabazon Discharge ⁽¹⁾	36 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,009,152
Pump Station #1	28000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$36,945,878	\$36,945,878
Pump Station #2	23300 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$32,462,750	\$32,462,750
Hydro Power Facilities	311 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	3	\$43,506,400	\$130,519,200
Forebays	60 acre-feet	\$15,000 per acre-feet	EA	1	\$900,000	\$900,000
Afterbays	30 acre-feet	\$15,000 per acre-feet	EA	1	\$450,000	\$450,000
Regulating Reservoirs	260 acre-feet	\$15,000 per acre-feet	EA	1	\$3,900,000	\$3,900,000
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	50 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	5	\$2,000,000	\$10,000,000
Sub Total						\$660,909,766
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,100,000
Total Capital Cost						\$663,009,766
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$155,807,295	\$155,807,295
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	358,400	\$50	\$17,920,000
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$837,857,061
Adjusted Total Project Cost⁽²⁾	1.106					\$926,700,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-10: Cost Estimation for North Pass Alignment with Additional SGPWA and Morongo Tribal Lands Water Demand for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	108 in.	\$12/diam-in/lf	LF	190,080	\$12	\$287,729,418
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	132,000	\$12	\$166,510,080
Base Pipeline Cost ⁽¹⁾	42 in.	\$12/diam-in/lf	LF	34,320	\$12	\$20,203,223
Base Pipeline Cost to Connect Cabazon Discharge ⁽¹⁾	54 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,513,728
Pump Station #1	30700 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$39,419,595	\$39,419,595
Pump Station #2	26000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$35,067,756	\$35,067,756
Hydro Power Facilities	311 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	3	\$43,506,400	\$130,519,200
Forebays	70 acre-feet	\$15,000 per acre-feet	EA	1	\$1,050,000	\$1,050,000
Afterbays	45 acre-feet	\$15,000 per acre-feet	EA	1	\$600,000	\$600,000
Regulating Reservoirs	300 acre-feet	\$15,000 per acre-feet	EA	1	\$4,500,000	\$4,500,000
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	58 cfs	Assumed Lump Sum \$750,000	LS	1	\$750,000	\$750,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	5	\$2,000,000	\$10,000,000
Sub Total						\$699,613,000
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,100,000
Total Capital Cost						\$701,713,000
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$164,902,555	\$164,902,555
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	358,400	\$50	\$17,920,000
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$885,655,555
Adjusted Total Project Cost⁽²⁾	1.106					\$979,500,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-11: SGPWA Cost Estimation for Portion of North Pass Alignment with Additional SGPWA Water Demand for 63% Reliability

Project Component	Estimating Criteria	Unit	Quantity	Unit Price	Total Price	
SGPWA Shared Facilities Cost						
Base Pipeline Cost	96 in.	\$12/diam-in/lf	LF	190,080	\$12	\$255,759,483
Pump Station #1	28000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$36,945,878	\$36,945,878
Pump Station #2	23300 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$32,462,750	\$32,462,750
Forebays	60 acre-feet	\$15,000 per acre-feet	EA	1	\$900,000	\$900,000
Afterbays	30 acre-feet	\$15,000 per acre-feet	EA	1	\$450,000	\$450,000
Regulating Reservoirs	260 acre-feet	\$15,000 per acre-feet	EA	1	\$3,900,000	\$3,900,000
Land Cost for Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Land Cost for Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Land Cost for Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Land Cost for Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Sub Total						\$332,068,111
SGPWA Sub Total⁽¹⁾		14% of Total Shared Facilities Cost				\$46,489,536
SGPWA Additional Facilities Cost⁽²⁾						
Base Pipeline Cost to Connect Cabazon Discharge	36 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,009,152
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	50 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Sub Total						\$1,759,152
Total Capital Cost						\$48,248,688
Engineering and Administration @ 23.5% of Total Capital Cost	23.5%	23.5% of Total Capital Cost	LS	1	\$11,338,442	\$11,338,442
Upsized Pipeline Right-of-Way (100 foot wide Easment)⁽¹⁾		\$50/lf	LF	190,080	\$50	\$1,748,736
Pipeline Right-of-Way (80 foot wide Easment)⁽²⁾		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation⁽¹⁾		\$1,060,000	LS	1	\$1,060,000	\$195,040
SGPWA Total Project Cost						\$61,590,905
Adjusted Total Project Cost⁽³⁾	1.106					\$68,100,000

⁽¹⁾ All SGPWA cost was adjusted based on percentage factor of 12.4% of total construction cost, land costs, etc. of necessary upsized facilities in Table I-9 to accommodate additional flow (44 cfs).

⁽²⁾ SGPWA facilities necessary to convey additional 44 cfs in which SGPWA is 100% responsible for

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-12: SGPWA and Morongo Tribal Lands Cost Estimation for Portion of North Pass Alignment with Additional SGPWA and Morongo Tribal Lands Water Demand for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
SGPWA and Morongo Tribal Lands Shared Facilities Cost						
Base Pipeline Cost	108 in.	\$12/diam-in/lf	LF	190,080	\$12	\$287,729,418
Pump Station #1	30700 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$39,419,595	\$39,419,595
Pump Station #2	26000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$35,067,756	\$35,067,756
Forebays	70 acre-feet	\$15,000 per acre-feet	EA	1	\$1,050,000	\$1,050,000
Afterbays	45 acre-feet	\$15,000 per acre-feet	EA	1	\$675,000	\$675,000
Regulating Reservoirs	300 acre-feet	\$15,000 per acre-feet	EA	1	\$4,500,000	\$4,500,000
Land Cost for Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Land Cost for Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Land Cost for Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Land Cost for Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Sub Total						\$370,091,769
SGPWA and Morongo Tribal Lands Sub Total⁽¹⁾		26% of Total Shared Facilities Cost				\$96,223,860
SGPWA and Morongo Tribal Lands Additional Facilities Cost⁽²⁾						
Base Pipeline Cost to Connect Cabazon Discharge	54 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,513,728
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	58 cfs	Assumed Lump Sum \$750,000	LS	1	\$750,000	\$750,000
Sub Total						\$2,513,728
Total Capital Cost						\$98,737,588
Engineering and Administration @ 23.5% of Total Capital Cost	23.5%	23.5% of Total Capital Cost	LS	1	\$23,203,333	\$23,203,333
Upsized Pipeline Right-of-Way (100 foot wide Easment)⁽¹⁾		\$50/lf	LF	190,080	\$50	\$3,174,336
Pipeline Right-of-Way (80 foot wide Easment)⁽²⁾		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation⁽¹⁾		\$4,000,000	LS	1	\$1,060,000	\$354,040
Total Project Cost						\$125,529,297
Adjusted Project Cost⁽³⁾	1.106					\$138,800,000
Total SGPWA Project Cost		46% of Total Project Cost				\$63,800,000
Total Morongo Tribal Lands Project Cost		54% of Total Project Cost				\$75,000,000

⁽¹⁾ All SGPWA and Morongo Tribal Lands cost was adjusted based on percentage factor of 31% of total construction cost, land costs, etc. of necessary upsized facilities in Table I-10 to accommodate additional flow (140 cfs).

⁽²⁾ SGPWA and Morongo Tribal Lands facilities necessary to convey additional 140 cfs in which SGPWA and Morongo Tribal Lands is 100% responsible for.

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-13: Summary of Cost Estimates for North Pass Alignment for 63% Reliability

North Pass Alignment Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.)	Pipeline Capacity Including SGPWA Water Demand at 361 cfs (102-Inch Dia.) ⁽²⁾	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 419 cfs (114-Inch Dia.) ⁽³⁾
Construction Costs	\$632,890,552	\$663,009,766	\$701,713,000
Engineering and Administration @ 23.5%	\$148,729,280	\$155,807,295	\$164,902,555
Pipeline Right-of-Way	\$17,820,000	\$17,980,000	\$17,980,000
Environmental Mitigation	\$1,060,000	\$1,060,000	\$1,060,000
Total Project Cost	\$800,499,832	\$837,857,061	\$885,655,555
Adjusted Total Project Cost⁽¹⁾	\$885,400,000	\$926,700,000	\$979,500,000
CVWD and DWA Cost	\$885,400,000	\$858,600,000	\$840,700,000
SGPWA Cost	\$0	\$68,100,000	\$63,800,000
Morongo Tribal Lands Cost	\$0	\$0	\$75,000,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ SGPWA is responsible for 12.4% of project cost for North Pass Alternative from the connection at Devil Canyon to proposed Cabazon Basin Discharge Facilities only.

⁽³⁾ SGPWA and Moronogo Tribal Lands is responsible for a total of 26% of project cost for North Pass Alternative from the connection at Devils Canyon to proposed Cabazon Basin Discharge Facilities.

SAN GORGONIO PASS WATER AGENCY

Table I-14: Summary of Project Cost Estimates for North Pass Alignment for 63% Reliability

North Pass Alignment Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.)	Pipeline Capacity Including SGPWA Water Demand at 361 cfs (102-Inch Dia.)	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 419 cfs (108-Inch Dia.)
CVWD and DWA Total Cost	\$885,400,000	\$858,600,000	\$840,700,000
SGPWA Total Cost	\$0	\$68,100,000	\$63,800,000
Morongo Tribal Lands Total Cost	\$0	\$0	\$75,000,000
Total Project Cost	\$885,400,000	\$926,700,000	\$979,500,000

SAN GORGONIO PASS WATER AGENCY
Table I-15: Cost Estimation for Independent SGPWA North Pass Alignment for 63% Reliability

Project Component	Estimating Criteria	Unit	Quantity	Unit Price	Total Price	
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	36 in.	\$12/diam-in/lf	LF	192,080	\$12	\$96,918,958
Pump Station #1	4800 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$10,674,820	\$10,674,820
Pump Station #2	5300 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$11,446,085	\$11,446,085
Forebays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Afterbays	12 acre-feet	\$15,000 per acre-feet	EA	1	\$180,000	\$180,000
Regulating Reservoirs	100 acre-feet	\$15,000 per acre-feet	EA	1	\$1,500,000	\$1,500,000
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	50 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	2	\$2,000,000	\$4,000,000
Sub Total						\$125,844,863
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,650,000
Total Capital Cost						\$127,494,863
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$29,961,293	\$29,961,293
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	192,080	\$30	\$5,762,400
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$164,278,556
Adjusted Total Project Cost⁽²⁾	1.106					\$181,700,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-16: Cost Estimation for Independent SGPWA North Pass Alignment with Additional Morongo Tribal Land Water Demand for 63% Reliability

Project Component	Estimating Criteria	Unit	Quantity	Unit Price	Total Price	
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	54 in.	\$12/diam-in/lf	LF	192,080	\$12	\$145,378,437
Pump Station #1	8300 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$15,696,315	\$15,696,315
Pump Station #2	9231 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$16,916,163	\$16,916,163
Forebays	35 acre-feet	\$15,000 per acre-feet	EA	1	\$525,000	\$525,000
Afterbays	15 acre-feet	\$15,000 per acre-feet	EA	1	\$225,000	\$225,000
Regulating Reservoirs	145 acre-feet	\$15,000 per acre-feet	EA	1	\$2,175,000	\$2,175,000
Connection to Banning Pipeline	108 cfs	Assumed Lump Sum \$300,000	LS	1	\$300,000	\$300,000
Cabazon Discharge Facilities	108 cfs	Assumed Lump Sum \$600,000	LS	1	\$600,000	\$600,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	2	\$2,000,000	\$4,000,000
Sub Total						\$185,815,915
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,650,000
Total Capital Cost					\$187,465,915	
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$44,054,490	\$44,054,490
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	192,080	\$30	\$5,762,400
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost					\$238,342,806	
Adjusted Total Project Cost⁽²⁾	1.106					\$263,600,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-17: Summary of Cost Estimates for Independent SGPWA North Pass Alignment for 63% Reliability

SGPWA North Pass Alignment Cost Estimate	SGPWA Pipeline Capacity at 50 cfs (36-inch Dia.)	SGPWA Pipeline Capacity Including Morongo Tribal Lands Water Demand at 108 cfs (54-Inch Dia.)
Construction Costs	\$127,494,863	\$187,465,915
Engineering and Administration @ 23.5%	\$29,961,293	\$44,054,490
Pipeline Right-of-Way	\$5,762,400	\$5,762,400
Environmental Mitigation	\$1,060,000	\$1,060,000
Total Project Cost	\$164,278,556	\$238,342,806
Adjusted Total Project Cost⁽¹⁾	\$181,700,000	\$263,600,000
SGPWA Cost⁽²⁾	\$181,700,000	\$121,300,000
Morongo Tribal Lands Cost⁽²⁾	\$0	\$142,300,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ SGPWA is responsible for 46% and Morongo Tribal Lands is responsible for 54%.

SAN GORGONIO PASS WATER AGENCY

Table I-18: Summary of Project Cost Estimates for Independent SGPWA North Pass Alignment for 63% Reliability

SGPWA North Pass Alignment Cost Estimate	SGPWA Pipeline Capacity at 50 cfs (36-inch Dia.)	SGPWA Pipeline Capacity Including Morongo Tribal Lands Water Demand at 108 cfs (54-Inch Dia.)
SGPWA Total Cost	\$181,700,000	\$121,300,000
Morongo Tribal Lands Total Cost	\$0	\$142,300,000
Total Project Cost	\$181,700,000	\$263,600,000

SAN GORGONIO PASS WATER AGENCY

Table I-19: Cost Estimation for Inland Feeder Modified Pass Alignment for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	36 in.	\$12/diam-in/lf	LF	100,000	\$12	\$50,457,600
Pump Station #1	4500 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$10,200,662	\$10,200,662
Pump Station #2	4400 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$10,040,548	\$10,040,548
Forebays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Afterbays	12 acre-feet	\$15,000 per acre-feet	EA	1	\$180,000	\$180,000
Regulating Reservoirs	100 acre-feet	\$15,000 per acre-feet	EA	1	\$1,500,000	\$1,500,000
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	50 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	1	\$2,000,000	\$2,000,000
Sub Total						\$75,503,810
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,650,000
Total Capital Cost						\$77,153,810
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$18,131,145	\$18,131,145
Pipeline Right-of-Way (80 foot wide Easement)		\$30/lf	LF	100,000	\$30	\$3,000,000
Environmental Mitigation		\$4,000,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$99,344,955
MWD Feeder Pipeline Cost for 50 cfs⁽²⁾	5.0%	1,200,000,000	LS	1	\$60,000,000	\$60,000,000
Adjusted Total Project Cost⁽³⁾						\$176,200,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Based on 5% (50 cfs/1000 cfs) of estimated project cost of \$1.2 billion for MWD Feeder Pipeline

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-20: Cost Estimation for Inland Feeder Modified Pass Alignment with Additional Morongo Tribal Land Water Demand for 63% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	54 in.	\$12/diam-in/lf	LF	100,000	\$12	\$75,686,400
Pump Station #1	9100 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$16,746,802	\$16,746,802
Pump Station #2	7700 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$14,888,680	\$14,888,680
Forebays	35 acre-feet	\$15,000 per acre-feet	EA	1	\$525,000	\$525,000
Afterbays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Regulating Reservoirs	145 acre-feet	\$15,000 per acre-feet	EA	1	\$2,175,000	\$2,175,000
Connection to Banning Pipeline	108 cfs	Assumed Lump Sum \$300,000	LS	1	\$300,000	\$300,000
Cabazon Discharge Facilities	108 cfs	Assumed Lump Sum \$600,000	LS	1	\$600,000	\$600,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	1	\$2,000,000	\$2,000,000
Sub Total						\$113,296,882
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,650,000
Total Capital Cost						\$114,946,882
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$27,012,517	\$27,012,517
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	100,000	\$30	\$3,000,000
Environmental Mitigation		\$4,000,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$146,019,400
MWD Feeder Pipeline Cost for 108 cfs⁽²⁾	10.8%	1,200,000,000	LS	1	\$129,600,000	\$129,600,000
Adjusted Total Project Cost⁽³⁾	1.106					\$304,800,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Based on 10.8% (108 cfs/1000 cfs) of estimated project cost of \$1.2 billion for MWD Feeder Pipeline

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table I-21: Summary of Cost Estimates for Inland Feeder Modified Pass Alignment for 63% Reliability

SGPWA Mentone Alignment Cost Estimate	SGPWA Pipeline Capacity at 50 cfs (36-inch Dia.)	SGPWA Pipeline Capacity Including Morongo Tribal Lands Water Demand at 108 cfs (54-Inch Dia.)
Construction Costs	\$77,153,810	\$114,946,882
Engineering and Administration @ 23.5%	\$18,131,145	\$27,012,517
Pipeline Right-of-Way	\$3,000,000	\$3,000,000
Environmental Mitigation	\$1,060,000	\$1,060,000
Total Project Cost	\$99,344,955	\$146,019,400
MWD Feeder Pipeline Cost	\$60,000,000	\$129,600,000
Adjusted Total Project Cost⁽¹⁾	\$176,200,000	\$304,800,000
SGPWA Cost⁽²⁾	\$176,200,000	\$140,200,000
Morongo Tribal Lands Cost⁽²⁾	\$0	\$164,600,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ SGPWA is responsible for 46% and Morongo Tribal Lands is responsible for 54%.

SAN GORGONIO PASS WATER AGENCY

Table I-22: Summary of Project Cost Estimates for Inland Feeder Modified Pass Alignment for 63% Reliability

SGPWA Mentone Alignment Cost Estimate	SGPWA Pipeline Capacity at 50 cfs (36-inch Dia.)	SGPWA Pipeline Capacity Including Morongo Tribal Lands Water Demand at 108 cfs (54-Inch Dia.)
SGPWA Total Cost	\$176,200,000	\$140,200,000
Morongo Tribal Lands Total Cost	\$0	\$164,600,000
Total Project Cost	\$176,200,000	\$304,800,000

SAN GORGONIO PASS WATER AGENCY
 Table I-23: Summary of Project Cost Estimates for 63% Reliability

Alternative Alignment	Delivery of 311 cfs of SWP Water	Delivery of 361 cfs of SWP Water	Delivery of 419 cfs of SWP Water
Lucerne Valley			
CVWD & DWA	\$1,083,700,000	\$1,010,300,000	\$966,700,000
SGPWA	\$0	\$302,300,000	\$240,300,000
Morongo Tribal Lands	\$0	\$0	\$281,000,000
Total Cost	\$1,083,700,000	\$1,312,600,000	\$1,488,000,000
North Pass			
CVWD & DWA	\$885,400,000	\$858,600,000	\$840,700,000
SGPWA	\$0	\$68,100,000	\$63,800,000
Morongo Tribal Lands	\$0	\$0	\$75,000,000
Total Cost	\$885,400,000	\$926,700,000	\$979,500,000
Independent North Pass			
SGPWA	\$0	\$181,700,000	\$121,300,000
Morongo Tribal Lands	\$0	\$0	\$142,300,000
Total Cost	\$0	\$181,700,000	\$263,600,000
Inland Feeder Modified Pass			
SGPWA	\$0	\$176,200,000	\$140,200,000
Morongo Tribal Lands	\$0	\$0	\$164,600,000
Total Cost	\$0	\$176,200,000	\$304,800,000

APPENDIX J

Energy Costs for State Water Project Aqueduct Extension Alternatives for 63% Reliability

Table J-1: Lucerne Valley Alignment Annual Energy Cost for 63% Reliability⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct ⁽²⁾			Generation Energy of Proposed Desert Aqueduct ⁽³⁾			Generation Energy at Mojave Siphon and Devils Canyon ⁽⁴⁾			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
Lucerne Valley Alignment (311 cfs)	171,100	34,325	58,405	1,318	0.096	127	2,243	0.038	85	0	0.038	0	41	7,068,072
Lucerne Valley Alignment (361 cfs)	196,000	39,700	68,700	1,331	0.096	128	2,303	0.038	88	0	0.038	0	40	7,887,942
Desert Loop Pipeline (50 cfs)	27,100	9,100	0	2,206	0.096	212	0	0.038	0	0	0.038	0	212	5,739,552
Lucerne Valley Alignment (419 cfs)	228,000	42,350	90,100	1,220	0.096	117	2,596	0.038	99	0	0.038	0	18	4,216,626
Desert Loop Pipeline (108 cfs)	58,600	14,600	0	1,637	0.096	157	0	0.038	0	0	0.038	0	157	9,208,512

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

Table J-2: North Pass Alignment Annual Energy Cost for 63% Reliability⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct			Generation Energy of Proposed Desert Aqueduct			Generation Energy at Mojave Siphon and Devils Canyon			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
North Pass Alignment (311 cfs)	171,100	36,125	0	1,387	0.096	133	0	0.038	0	1,165	0.038	44	89	15,210,163
North Pass Alignment (361 cfs)	196,000	40,253	0	1,349	0.096	130	0	0.038	0	1,165	0.038	44	85	16,711,452
North Pass Alignment (419 cfs)	228,000	44,500	0	1,282	0.096	123	0	0.038	0	1,165	0.038	44	79	17,973,480

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

Table J-3: Independent SGPWA North Pass Alignment Annual Energy Cost for 63% Reliability⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct			Generation Energy of Proposed Desert Aqueduct			Generation Energy at Mojave Siphon and Devils Canyon			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
Independent SGPWA North Pass Alignment (50 cfs)	27,100	8,000	0	1,939	0.096	186	0	0.038	0	1,165	0.038	44	186	5,045,760
Independent SGPWA North Pass Alignment (108 cfs)	58,600	13,800	0	1,547	0.096	149	0	0.038	0	1,165	0.038	44	149	8,703,936

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

Table J-4: Inland Feeder Modified Pass Alignment Annual Energy Cost for 63% Reliability⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct			Generation Energy of Proposed Desert Aqueduct			Generation Energy at Mojave Siphon and Devils Canyon			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
Inland Feeder Modified Pass Alignment (50 cfs)	24,200	7,000	0	1,900	0.096	182	0	0.038	0	1,165	0.038	44	182	4,415,040
Inland Feeder Modified Pass Alignment (108 cfs)	58,600	13,200	0	1,480	0.096	142	0	0.038	0	1,165	0.038	44	142	8,325,504

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

Table J-5: Summary of Annual Energy Cost for 63% Reliability

	Delivery of 311 cfs	Delivery of 361 cfs	Delivery of 419 cfs
Lucerne Valley Alternative			
CVWD & DWA	\$7,068,072	\$6,783,630	\$3,120,303
SGPWA	\$0	\$6,843,864	\$4,741,911
Morongo Tribal Lands	\$0	\$0	\$5,562,924
Total	\$7,068,072	\$13,627,494	\$13,425,138
North Pass Alternative			
CVWD & DWA ⁽¹⁾	\$7,510,163	\$6,671,849	\$4,701,701
SGPWA*	\$0	\$2,339,603	\$2,156,818
Morongo Tribal Lands*	\$0	\$0	\$2,516,287
Total	\$7,510,163	\$9,011,452	\$10,273,480
Independent SGPWA North Pass Alternative			
CVWD & DWA	\$0	\$0	\$0
SGPWA	\$0	\$5,045,760	\$4,003,811
Morongo Tribal Lands	\$0	\$0	\$4,700,125
Total	\$0	\$5,045,760	\$8,703,936
Inland Feeder Modified Pass Alternative			
CVWD & DWA	\$0	\$0	\$0
SGPWA	\$0	\$4,415,040	\$3,829,732
Morongo Tribal Lands	\$0	\$0	\$4,495,772
Total	\$0	\$4,415,040	\$8,325,504

(1) CVWD & DWA to generate approximately \$7.7 million of power from its hydro power facilities (based on generation of 30,873 kW at \$0.038/kW-hr). Therefore, \$7.7 million will be deducted from total operations cost for CVWD and DWA.

Table J-6: Present Value of Annual Energy Cost Adjusted for 63% Reliability⁽¹⁾

	Delivery of 311 cfs	Delivery of 361 cfs	Delivery of 419 cfs
Lucerne Valley Alternative			
CVWD & DWA	\$106,300,000	\$102,100,000	\$46,900,000
SGPWA	\$0	\$103,000,000	\$71,300,000
Morongo Tribal Lands	\$0	\$0	\$83,700,000
Total	\$106,300,000	\$205,100,000	\$201,900,000
North Pass Alternative			
CVWD & DWA	\$113,000,000	\$100,400,000	\$70,700,000
SGPWA*	\$0	\$35,200,000	\$32,500,000
Morongo Tribal Lands*	\$0	\$0	\$37,900,000
Total	\$113,000,000	\$135,600,000	\$141,100,000
Independent SGPWA North Pass Alternative			
CVWD & DWA	\$0	\$0	\$0
SGPWA	\$0	\$75,900,000	\$60,200,000
Morongo Tribal Lands	\$0	\$0	\$70,700,000
Total	\$0	\$75,900,000	\$130,900,000
Inland Feeder Modified Pass Alternative			
CVWD & DWA	\$0	\$0	\$0
SGPWA	\$0	\$66,400,000	\$57,600,000
Morongo Tribal Lands	\$0	\$0	\$67,600,000
Total	\$0	\$66,400,000	\$125,200,000

(1) Present value of costs based on n=40, i=6%, pwf=15.046. Values are rounded to the nearest 100,000.

* When incorporating SGPWA and/or Morongo capacities for North Pass Alignment Alternative, cost allocations were evaluated up to the Cabazon Basin Discharge Point only as discussed in Section 6.

SAN GORGONIO PASS WATER AGENCY
Table J-7: Summary of Energy Cost for 63% Reliability

Alternative Alignment	Delivery of 311 cfs of SWP Water	Delivery of 361 cfs of SWP Water	Delivery of 419 cfs of SWP Water
Lucerne Valley			
CVWD & DWA	\$106,300,000	\$102,100,000	\$46,900,000
SGPWA	\$0	\$103,000,000	\$71,300,000
Morongo Tribal Lands	\$0	\$0	\$83,700,000
Total Cost	\$106,300,000	\$205,100,000	\$201,900,000
North Pass			
CVWD & DWA	\$113,000,000	\$100,400,000	\$70,700,000
SGPWA	\$0	\$35,200,000	\$32,500,000
Morongo Tribal Lands	\$0	\$0	\$37,900,000
Total Cost	\$113,000,000	\$135,600,000	\$141,100,000
Independent North Pass			
SGPWA	\$0	\$75,900,000	\$60,200,000
Morongo Tribal Lands	\$0	\$0	\$70,700,000
Total Cost	\$0	\$75,900,000	\$130,900,000
Inland Feeder Modified Pass			
SGPWA	\$0	\$66,400,000	\$57,600,000
Morongo Tribal Lands	\$0	\$0	\$67,600,000
Total Cost	\$0	\$66,400,000	\$125,200,000

APPENDIX K

Maintenance Costs for State Water Project Aqueduct Extension Alternatives for 63% Reliability

SAN GORGONIO PASS WATER AGENCY

Table K-1: Annual Maintenance Cost for Lucerne Valley Alignment for 63% Reliability

Lucerne Valley (311 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$518,918,400	\$518,918
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$58,008,533	\$870,128
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$174,025,600	\$3,480,512
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,150,000	\$3,150
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$750,000	\$750
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$375,000	\$375
Sub Total					\$4,873,833

Lucerne Valley (361 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$553,512,960	\$553,513
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$68,666,585	\$1,029,999
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$194,500,507	\$3,890,010
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,900,000	\$3,900
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$900,000	\$900
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$450,000	\$450
Sub Total					\$5,478,772

Lucerne Valley (419 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$622,702,080	\$622,702
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$72,023,005	\$1,080,345
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$217,369,445	\$4,347,389
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$4,500,000	\$4,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$1,050,000	\$1,050
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$675,000	\$675
Sub Total					\$6,056,661

Table K-2: Summary of Annual Maintenance Cost for Lucerne Valley Alignment for 63% Reliability

Project	Annual Maintenance Cost
Lucerne Valley (311 cfs)	\$4,873,833
Lucerne Valley (361 cfs)	\$5,478,772
Lucerne Valley (419 cfs)	\$6,056,661

SAN GORGONIO PASS WATER AGENCY

Table K-3: Annual Maintenance Cost for Lucerne Valley Alignment Loop Pipeline for 63% Reliability

Loop Pipeline (50 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$57,974,400	\$57,974
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$27,500,864	\$412,513
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$750,000	\$750
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$300,000	\$300
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$150,000	\$150
Sub Total					\$471,687

Loop Pipeline (108 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$64,281,600	\$64,282
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$37,873,765	\$568,106
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$750,000	\$750
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$300,000	\$300
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$150,000	\$150
Sub Total					\$633,588

Table K-4: Summary of Annual Maintenance Cost for Lucerne Valley Alignment Loop Pipeline for 63% Reliability

Project	Annual Maintenance Cost
Loop Pipeline (50 cfs)	\$471,687
Loop Pipeline (108 cfs)	\$633,588

SAN GORGONIO PASS WATER AGENCY

Table K-5: Summary of Annual Maintenance Cost for Lucerne Valley Alignment for 63% Reliability

Project	Annual Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Lucerne Valley (311 cfs)	\$4,873,833	\$0	\$0
Lucerne Valley (361 cfs)	\$4,240,056	\$1,238,715	\$0
Lucerne Valley (419 cfs)	\$3,848,341	\$1,018,250	\$1,190,070

Table K-6: Present Value of Annual Maintenance Cost for Lucerne Valley Alignment for 63% Reliability

n=40, i=6%, pwf=15.046	Total Present Value for Maintenance Cost		
Project	CVWD & DWA	SGPWA	Morongo
Lucerne Valley (311 cfs)	\$73,333,144	\$0	\$0
Lucerne Valley (361 cfs)	\$63,797,148	\$18,638,080	\$0
Lucerne Valley (419 cfs)	\$57,903,283	\$15,320,889	\$17,906,148

SAN GORGONIO PASS WATER AGENCY

Table K-7: CVWD & DWA Annual Maintenance Cost for North Pass Alignment for 63% Reliability

North Pass (311 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$426,487,818	\$426,488
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$58,008,533	\$870,128
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$130,519,200	\$2,610,384
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,150,000	\$3,150
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$750,000	\$750
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$375,000	\$375
Sub Total					\$3,911,275
<hr/>					
North Pass (361 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$443,481,938	\$443,482
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$69,408,628	\$1,041,129
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$130,519,200	\$2,610,384
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,900,000	\$3,900
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$900,000	\$900
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$450,000	\$450
Sub Total					\$4,100,245
<hr/>					
North Pass (419 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$475,956,449	\$475,956
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$74,487,351	\$1,117,310
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$130,519,200	\$2,610,384
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$4,500,000	\$4,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$1,050,000	\$1,050
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$600,000	\$600
Sub Total					\$4,209,801

Table K-8: Summary of CVWD and DWA Annual Maintenance Cost for North Pass Alignment

Project	Annual Maintenance Cost
North Pass (311 cfs)	\$3,911,275
North Pass (361 cfs)	\$4,100,245
North Pass (419 cfs)	\$4,209,801

SAN GORGONIO PASS WATER AGENCY

Table K-9: SGPWA Annual Maintenance Cost for North Pass Alignment for 63% Reliability

North Pass (361 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$255,759,483	\$255,759
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$69,408,628	\$1,041,129
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,900,000	\$3,900
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$900,000	\$900
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$450,000	\$450
Sub Total					\$1,302,139
SGPWA Sub Total	12.4% of Total Maintenance Cost				\$161,465
<hr/>					
North Pass (419 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$287,729,418	\$287,729
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$74,487,351	\$1,117,310
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$4,500,000	\$4,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$1,050,000	\$1,050
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$675,000	\$675
Sub Total					\$1,411,265
SGPWA Sub Total	26% of Total Maintenance Cost				\$366,929

Table K-10: Summary of SGPWA Annual Maintenance Cost for North Pass Alignment

Project	Annual Maintenance Cost
North Pass (361 cfs)	\$161,465
North Pass (419 cfs)	\$366,929

SAN GORGONIO PASS WATER AGENCY

Table K-11: Summary of Annual Maintenance Cost for North Pass Alignment for 63% Reliability

Project	Annual Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
North Pass (311 cfs)	\$3,911,275	\$0	\$0
North Pass (361 cfs)	\$3,938,780	\$161,465	\$0
North Pass (419 cfs)	\$3,842,872	\$168,787	\$198,142

Table K-12: Present Value of Annual Maintenance Cost for North Pass Alignment for 63% Reliability

n=40, i=6%, pwf=15.046	Total Present Value Maintenance Cost		
Project	CVWD & DWA	SGPWA	Morongo
North Pass (311 cfs)	\$58,850,202	\$0	\$0
North Pass (361 cfs)	\$59,264,055	\$2,429,454	\$0
North Pass (419 cfs)	\$57,820,991	\$2,539,623	\$2,981,297

Note - When incorporating SGPWA and/or Morongo capacities for North Pass Alignment Alternative, cost allocations were evaluated up to the Cabazon Basin Discharge Point only as discussed in Section 6.

SAN GORGONIO PASS WATER AGENCY

Table K-13: Annual Maintenance Cost for Independent SGPWA North Pass Alignment for 63% Reliability

Independent SGPWA North Pass (50 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$96,918,958	\$96,919
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$22,120,905	\$331,814
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$1,500,000	\$1,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$375,000	\$375
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$180,000	\$180
Sub Total					\$430,788

Independent SGPWA North Pass (108 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$145,378,437	\$145,378
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$32,612,478	\$489,187
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$2,175,000	\$2,175
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$525,000	\$525
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$225,000	\$225
Sub Total					\$637,491

Table K-14: Summary of Annual Maintenance Cost for Independent SGPWA North Pass Alignment for 63% Reliability

Project	Annual Maintenance Cost
Independent SGPWA North Pass (50 cfs)	\$430,788
Independent SGPWA North Pass (108 cfs)	\$637,491

SAN GORGONIO PASS WATER AGENCY

Table K-13: Annual Maintenance Cost for Independent SGPWA North Pass Alignment for 63% Reliability

Independent SGPWA North Pass (50 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$96,918,958	\$96,919
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$22,120,905	\$331,814
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$1,500,000	\$1,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$375,000	\$375
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$180,000	\$180
Sub Total					\$430,788

Independent SGPWA North Pass (108 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$145,378,437	\$145,378
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$32,612,478	\$489,187
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$2,175,000	\$2,175
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$525,000	\$525
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$225,000	\$225
Sub Total					\$637,491

Table K-14: Summary of Annual Maintenance Cost for Independent SGPWA North Pass Alignment for 63% Reliability

Project	Annual Maintenance Cost
Independent SGPWA North Pass (50 cfs)	\$430,788
Independent SGPWA North Pass (108 cfs)	\$637,491

SAN GORGONIO PASS WATER AGENCY

Table K-15: Summary of Annual Maintenance Cost for Independent SGPWA North Pass Alignment for 63% Reliability

Project	Annual Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Independent SGPWA North Pass (50 cfs)	\$0	\$430,788	\$0
Independent SGPWA North Pass (108 cfs)	\$0	\$293,246	\$344,245

Table K-16: Present Value of Annual Maintenance Cost for Independent SGPWA North Pass Alignment for 63% Reliability

Project	n=40, i=6%, pwf=15.046	Total Present Value Maintenance Cost		
		CVWD & DWA	SGPWA	Morongo
Independent SGPWA North Pass (50 cfs)		\$0	\$6,481,757	\$0
Independent SGPWA North Pass (108 cfs)		\$0	\$4,412,262	\$5,179,611

SAN GORGONIO PASS WATER AGENCY

Table K-17: Annual Maintenance Cost for Inland Feeder Modified Pass Alignment for 63% Reliability

Inland Feeder Modified Pass (50 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$50,457,600	\$50,458
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$20,241,210	\$303,618
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$1,500,000	\$1,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$375,000	\$375
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$180,000	\$180
Sub Total					\$356,131

Inland Feeder Modified Pass (108 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$75,686,400	\$75,686
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$31,635,482	\$474,532
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$2,175,000	\$2,175
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$525,000	\$525
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$375,000	\$375
Sub Total					\$553,294

Table K-18: Summary of Annual Maintenance Cost for Inland Feeder Modified Pass Alignment for 63% Reliability

Project	Annual Maintenance Cost
Inland Feeder Modified Pass (50 cfs)	\$356,131
Inland Feeder Modified Pass (108 cfs)	\$553,294

SAN GORGONIO PASS WATER AGENCY

Table K-19: Summary of Annual Maintenance Cost for Inland Feeder Modified Pass Alignment for 63% Reliability

Project	Annual Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Inland Feeder Modified Pass (50 cfs)	\$0	\$356,131	\$0
Inland Feeder Modified Pass (108 cfs)	\$0	\$254,515	\$298,779

Table K-20: Present Value of Annual Maintenance Cost for Inland Feeder Modified Pass Alignment for 63% Reliability

Project	n=40, i=6%, pwf=15.046	Total Present Value Maintenance Cost		
		CVWD & DWA	SGPWA	Morongo
Inland Feeder Modified Pass (50 cfs)		\$0	\$5,358,449	\$0
Inland Feeder Modified Pass (108 cfs)		\$0	\$3,829,509	\$4,495,511

SAN GORGONIO PASS WATER AGENCY
Table K-21: Summary of Maintenance Cost for 63% Reliability

Alternative Alignment	Delivery of 311 cfs of SWP Water	Delivery of 361 cfs of SWP Water	Delivery of 419 cfs of SWP Water
Lucerne Valley			
CVWD & DWA	\$73,300,000	\$63,800,000	\$57,900,000
SGPWA	\$0	\$18,600,000	\$15,300,000
Morongo Tribal Lands	\$0	\$0	\$17,900,000
Total Cost	\$73,300,000	\$82,400,000	\$91,100,000
North Pass			
CVWD & DWA	\$58,900,000	\$59,300,000	\$57,800,000
SGPWA	\$0	\$2,400,000	\$2,500,000
Morongo Tribal Lands	\$0	\$0	\$3,000,000
Total Cost	\$58,900,000	\$61,700,000	\$63,300,000
Independent North Pass			
SGPWA	\$0	\$6,500,000	\$4,400,000
Morongo Tribal Lands	\$0	\$0	\$5,200,000
Total Cost	\$0	\$6,500,000	\$9,600,000
Inland Feeder Modified Pass			
SGPWA	\$0	\$0	#VALUE!
Morongo Tribal Lands	\$0	\$0	#VALUE!
Total Cost	\$0	\$0	#VALUE!

APPENDIX L

Project Cost Estimates for State Water Project Aqueduct Extension Alternatives for 80% Reliability

SAN GORGONIO PASS WATER AGENCY
Table L-1: Cost Estimation for Lucerne Valley Alignment for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	480,480	\$12	\$518,918,400
Pump Stations	311 cfs	\$ = 400,510*Q ^{0.7461} where Q = Flow in cfs	EA	2	\$29,004,267	\$58,008,533
Hydro Power Facilities	311 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	4	\$43,506,400	\$174,025,600
Forebays	50 acre-feet	\$15,000 per acre-feet	EA	1	\$750,000	\$750,000
Afterbays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Regulating Reservoirs	210 acre-feet	\$15,000 per acre-feet	EA	1	\$3,150,000	\$3,150,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	6	\$2,000,000	\$12,000,000
Sub Total						\$768,727,534
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	4	\$150,000	\$600,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,250,000
Total Capital Cost						\$770,977,534
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$181,179,720	\$181,179,720
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	480,480	\$50	\$24,024,000
Environmental Mitigation		\$4,000,000	LS	1	\$4,000,000	\$4,000,000
Total Project Cost						\$980,181,254
Adjusted Total Project Cost⁽²⁾	1.106					\$1,084,100,000

⁽¹⁾ Multiplication factor of 0.99 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-2: Cost Estimation for Lucerne Valley Alignment for Additional SGPWA Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	96 in.	\$12/diam-in/lf	LF	480,480	\$12	\$553,512,960
Pump Station #1	22800 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$31,970,753	\$31,970,753
Pump Station #2	21600 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$30,776,709	\$30,776,709
Hydro Power Facilities	336 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	4	\$46,089,963	\$184,359,851
Forebays	60 acre-feet	\$15,000 per acre-feet	EA	1	\$900,000	\$900,000
Afterbays	30 acre-feet	\$15,000 per acre-feet	EA	1	\$450,000	\$450,000
Regulating Reservoirs	260 acre-feet	\$15,000 per acre-feet	EA	1	\$3,900,000	\$3,900,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	6	\$2,000,000	\$12,000,000
Sub Total						\$819,370,274
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	4	\$150,000	\$600,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,250,000
Total Capital Cost						\$821,620,274
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$193,080,764	\$193,080,764
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	480,480	\$50	\$24,024,000
Environmental Mitigation		\$4,000,000	LS	1	\$4,000,000	\$4,000,000
Total Project Cost						\$1,042,725,038
Adjusted Total Project Cost⁽²⁾	1.106					\$1,153,300,000

⁽¹⁾ Multiplication factor of 0.99 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-3: Cost Estimation for Loop Pipeline for SGPWA Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost	30 in.	\$12/diam-in/lf	LF	134,200	\$12	\$48,312,000
Pump Station #1	1700 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$5,140,469	\$5,140,469
Pump Station #2	1650 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$5,033,562	\$5,033,562
Pump Station #3	1830 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$5,414,175	\$5,414,175
Hydro Power Facilities	0 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	0	\$0	\$0
Forebays	20 acre-feet	\$15,000 per acre-feet	EA	1	\$300,000	\$300,000
Afterbays	10 acre-feet	\$15,000 per acre-feet	EA	1	\$150,000	\$150,000
Regulating Reservoirs	50 acre-feet	\$15,000 per acre-feet	EA	1	\$750,000	\$750,000
Cabazon Discharge Facilities	25 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Connection to Banning Pipeline	25 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	3	\$2,000,000	\$6,000,000
Sub Total						\$71,850,207
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Hydro Power Stations		\$150,000/applicable site	EA	0	\$150,000	\$0
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,800,000
Total Capital Cost						\$73,650,207
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$17,307,799	\$17,307,799
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	134,200	\$30	\$4,026,000
Environmental Mitigation		\$3,000,000	LS	1	\$3,000,000	\$3,000,000
Total Project Cost						\$97,984,005
Adjusted Total Project Cost⁽¹⁾	1.106					\$108,400,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-4: Cost Estimation for Lucerne Valley Alignment with Additional SGPWA and Morongo Tribal Lands Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	102 in.	\$12/diam-in/lf	LF	480,480	\$12	\$588,107,520
Pump Station #1	26800 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$35,823,964	\$35,823,964
Pump Station #2	24500 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$33,630,991	\$33,630,991
Hydro Power Facilities	382 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	4	\$50,720,333	\$202,881,333
Forebays	70 acre-feet	\$15,000 per acre-feet	EA	1	\$1,050,000	\$1,050,000
Afterbays	45 acre-feet	\$15,000 per acre-feet	EA	1	\$675,000	\$675,000
Regulating Reservoirs	300 acre-feet	\$15,000 per acre-feet	EA	1	\$4,500,000	\$4,500,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	6	\$2,000,000	\$12,000,000
Sub Total						\$880,168,807
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	4	\$150,000	\$600,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,250,000
Total Capital Cost						\$882,418,807
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$207,368,420	\$207,368,420
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	480,480	\$50	\$24,024,000
Environmental Mitigation		\$4,000,000	LS	1	\$4,000,000	\$4,000,000
Total Project Cost						\$1,117,811,227
Adjusted Total Project Cost⁽²⁾	1.106					\$1,236,300,000

⁽¹⁾ Multiplication factor of 0.99 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-5: Cost Estimation for Loop Pipeline for SGPWA and Morongo Tribal Lands Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost	48 in.	\$12/diam-in/lf	LF	99,200	\$12	\$57,139,200
Base Pipeline Cost	30 in.	\$12/diam-in/lf	LF	35,000	\$12	\$12,600,000
Pump Station #1	4600 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$10,359,726	\$10,359,726
Pump Station #2	4400 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$10,040,548	\$10,040,548
Pump Station #3	1800 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$5,351,538	\$5,351,538
Hydro Power Facilities	0 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	0	\$0	\$0
Forebays	20 acre-feet	\$15,000 per acre-feet	EA	1	\$300,000	\$300,000
Afterbays	10 acre-feet	\$15,000 per acre-feet	EA	1	\$150,000	\$150,000
Regulating Reservoirs	50 acre-feet	\$15,000 per acre-feet	EA	1	\$750,000	\$750,000
Cabazon Discharge Facilities	71 cfs	Assumed Lump Sum \$750,000	LS	1	\$750,000	\$750,000
Connection to Banning Pipeline	25 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	3	\$2,000,000	\$6,000,000
Sub Total						\$103,691,011
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Hydro Power Stations		\$150,000/applicable site	EA	0	\$150,000	\$0
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,800,000
Total Capital Cost						\$105,491,011
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$24,790,388	\$24,790,388
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	134,200	\$30	\$4,026,000
Environmental Mitigation		\$3,000,000	LS	1	\$3,000,000	\$3,000,000
Total Project Cost						\$137,307,399
Adjusted Total Project Cost⁽¹⁾	1.106					\$151,900,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-6: Summary of Cost Estimates for Lucerne Valley Alignment for 80% Reliability

Lucerne Valley Alignment Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.)	Pipeline Capacity Including SGPWA Water Demand at 336 cfs (96-Inch Dia.)	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 382 cfs (102-Inch Dia.)
Construction Costs	\$770,977,534	\$821,620,274	\$882,418,807
Engineering and Administration @ 23.5%	\$181,179,720	\$193,080,764	\$207,368,420
Pipeline Right-of-Way	\$24,024,000	\$24,024,000	\$24,024,000
Environmental Mitigation	\$4,000,000	\$4,000,000	\$4,000,000
Total Project Cost	\$980,181,254	\$1,042,725,038	\$1,117,811,227
Adjusted Total Project Cost⁽¹⁾	\$1,084,100,000	\$1,153,300,000	\$1,236,300,000
CVWD and DWA Cost	\$1,084,100,000	\$1,072,600,000	\$1,001,400,000
SGPWA Cost	\$0	\$80,700,000	\$86,500,000
Morongo Tribal Lands Cost	\$0	\$0	\$148,400,000

Loop Pipeline Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.) ⁽²⁾	Pipeline Capacity Including SGPWA Water Demand at 336 cfs (96-Inch Dia.) ⁽³⁾	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 382 cfs (102-Inch Dia.) ⁽⁴⁾
Construction Costs	n/a	\$73,650,207	\$105,491,011
Engineering and Administration @ 23.5%	n/a	\$17,307,799	\$24,790,388
Pipeline Right-of-Way	n/a	\$4,026,000	\$4,026,000
Environmental Mitigation	n/a	\$3,000,000	\$3,000,000
Total Project Cost	\$0	\$97,984,005	\$137,307,399
Adjusted Total Project Cost⁽¹⁾	\$0	\$108,400,000	\$151,900,000
SGPWA Cost	\$0	\$108,400,000	\$53,200,000
Morongo Tribal Lands Cost	\$0	\$0	\$98,700,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ All 311 cfs of CVWD and DWA water will discharge to Mission Creek and Whitewater; therefore, loop pipeline will not be necessary.

⁽³⁾ Of the 332 cfs of SWP water, 311 cfs of CVWD and DWA water will discharge to Mission Creek and Whitewater and the remaining 25 cfs of SGPWA water will be conveyed through 36-inch Desert Loop Pipeline; therefore, SGPWA will be responsible for 100% of Desert Aqueduct Loop Pipeline cost.

⁽⁴⁾ Of the 382 cfs of SWP water, 311 cfs of CVWD and DWA water will discharge to Mission Creek and Whitewater and 96 cfs of SGPWA and Morongo Tribal Lands water will be conveyed through 48-inch and 30-inch Dia. Desert Loop Pipeline; therefore, SGPWA (35%) and Morongo Tribal Lands (65%) will be responsible for Desert Aqueduct Loop Pipeline cost.

SAN GORGONIO PASS WATER AGENCY

Table L-7: Summary of Project Cost Estimates for Lucerne Valley Alignment with Desert Aqueduct Loop Pipeline for 80% Reliability

Lucerne Valley Alignment Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.)	Pipeline Capacity Including SGPWA Water Demand at 336 cfs (96-Inch Dia.)	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 382 cfs (102-Inch Dia.)
CVWD and DWA Total Cost	\$1,084,100,000	\$1,072,600,000	\$1,001,400,000
SGPWA Total Cost	\$0	\$189,100,000	\$139,700,000
Morongo Tribal Lands Total Cost	\$0	\$0	\$247,100,000
Total Project Cost	\$1,084,100,000	\$1,261,700,000	\$1,388,200,000

SAN GORGONIO PASS WATER AGENCY
Table L-8: Cost Estimation for North Pass Alignment for 80% Reliability

Project Component	Estimating Criteria	Unit	Quantity	Unit Price	Total Price	
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	322,080	\$12	\$406,284,595
Base Pipeline Cost ⁽¹⁾	42 in.	\$12/diam-in/lf	LF	34,320	\$12	\$20,203,223
Pump Stations	311 cfs	$\$ = 400,510 * Q^{0.7461}$ where Q = Flow in cfs	EA	2	\$29,004,267	\$58,008,533
Hydro Power Facilities	311 cfs	$\$ = (1.5) * 400,510 * Q^{0.7461}$ where Q = Flow in cfs	EA	3	\$43,506,400	\$130,519,200
Forebays	50 acre-feet	\$15,000 per acre-feet	EA	1	\$750,000	\$750,000
Afterbays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Regulating Reservoirs	210 acre-feet	\$15,000 per acre-feet	EA	1	\$3,150,000	\$3,150,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	5	\$2,000,000	\$10,000,000
Sub Total						\$630,790,552
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,100,000
Total Capital Cost						\$632,890,552
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$148,729,280	\$148,729,280
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	356,400	\$50	\$17,820,000
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$800,499,832
Adjusted Total Project Cost⁽²⁾	1.106					\$885,400,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY
Table L-9: Cost Estimation for North Pass Alignment with Additional SGPWA Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	96 in.	\$12/diam-in/lf	LF	190,080	\$12	\$255,759,483
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	132,000	\$12	\$166,510,080
Base Pipeline Cost ⁽¹⁾	42 in.	\$12/diam-in/lf	LF	34,320	\$12	\$20,203,223
Base Pipeline Cost to Connect Cabazon Discharge ⁽¹⁾	36 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,009,152
Pump Station #1	25400 HP	$\$ = 27338 * HP^{0.704}$ where HP = Horsepower	EA	1	\$34,496,074	\$34,496,074
Pump Station #2	21300 HP	$\$ = 27338 * HP^{0.704}$ where HP = Horsepower	EA	1	\$30,475,159	\$30,475,159
Hydro Power Facilities	311 cfs	$\$ = (1.5) * 400,510 * Q^{0.7461}$ where Q = Flow in cfs	EA	3	\$43,506,400	\$130,519,200
Forebays	60 acre-feet	\$15,000 per acre-feet	EA	1	\$900,000	\$900,000
Afterbays	30 acre-feet	\$15,000 per acre-feet	EA	1	\$450,000	\$450,000
Regulating Reservoirs	260 acre-feet	\$15,000 per acre-feet	EA	1	\$3,900,000	\$3,900,000
Connection to Banning Pipeline	25 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	25 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	5	\$2,000,000	\$10,000,000
Sub Total						\$656,472,372
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,100,000
Total Capital Cost						\$658,572,372
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$154,764,507	\$154,764,507
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	358,400	\$50	\$17,920,000
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$832,376,879
Adjusted Total Project Cost⁽²⁾	1.106					\$920,600,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-10: Cost Estimation for North Pass Alignment with Additional SGPWA and Morongo Tribal Lands Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	102 in.	\$12/diam-in/lf	LF	190,080	\$12	\$271,744,451
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	132,000	\$12	\$166,510,080
Base Pipeline Cost ⁽¹⁾	42 in.	\$12/diam-in/lf	LF	34,320	\$12	\$20,203,223
Base Pipeline Cost to Connect Cabazon Discharge ⁽¹⁾	60 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,681,920
Pump Station #1	29000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$37,869,967	\$37,869,967
Pump Station #2	24000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$33,146,330	\$33,146,330
Hydro Power Facilities	311 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	3	\$43,506,400	\$130,519,200
Forebays	70 acre-feet	\$15,000 per acre-feet	EA	1	\$1,050,000	\$1,050,000
Afterbays	45 acre-feet	\$15,000 per acre-feet	EA	1	\$600,000	\$600,000
Regulating Reservoirs	300 acre-feet	\$15,000 per acre-feet	EA	1	\$4,500,000	\$4,500,000
Connection to Banning Pipeline	25 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	71 cfs	Assumed Lump Sum \$750,000	LS	1	\$750,000	\$750,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	5	\$2,000,000	\$10,000,000
Sub Total						\$680,325,171
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,100,000
Total Capital Cost						\$682,425,171
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$160,369,915	\$160,369,915
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	358,400	\$50	\$17,920,000
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$861,835,087
Adjusted Total Project Cost⁽²⁾	1.106					\$953,200,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-11: SGPWA Cost Estimation for Portion of North Pass Alignment with Additional SGPWA Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
SGPWA Shared Facilities Cost						
Base Pipeline Cost	96 in.	\$12/diam-in/lf	LF	190,080	\$12	\$255,759,483
Pump Station #1	25400 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$34,496,074	\$34,496,074
Pump Station #2	21300 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$30,475,159	\$30,475,159
Forebays	60 acre-feet	\$15,000 per acre-feet	EA	1	\$900,000	\$900,000
Afterbays	30 acre-feet	\$15,000 per acre-feet	EA	1	\$450,000	\$450,000
Regulating Reservoirs	260 acre-feet	\$15,000 per acre-feet	EA	1	\$3,900,000	\$3,900,000
Land Cost for Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Land Cost for Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Land Cost for Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Land Cost for Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Sub Total						\$327,630,716
SGPWA Sub Total⁽¹⁾		7% of Total Shared Facilities Cost				\$22,934,150
SGPWA Additional Facilities Cost⁽²⁾						
Base Pipeline Cost to Connect Cabazon Discharge	36 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,009,152
Connection to Banning Pipeline	25 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	25 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Sub Total						\$1,759,152
Total Capital Cost						\$24,693,302
Engineering and Administration @ 23.5% of Total Capital Cost	23.5%	23.5% of Total Capital Cost	LS	1	\$5,802,926	\$5,802,926
Upsized Pipeline Right-of-Way (100 foot wide Easment)⁽¹⁾		\$50/lf	LF	190,080	\$50	\$1,748,736
Pipeline Right-of-Way (80 foot wide Easment)⁽²⁾		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation⁽¹⁾		\$1,060,000	LS	1	\$1,060,000	\$195,040
SGPWA Total Project Cost						\$32,500,004
Adjusted Total Project Cost⁽³⁾	1.106					\$35,900,000

⁽¹⁾ All SGPWA cost was adjusted based on percentage factor of 7% (7% = 25 cfs [SGPWA] / 336 cfs [Total]) of total construction cost, land costs, etc. of necessary upsized facilities in Table L-9 to accommodate additional flow (25 cfs).

⁽²⁾ SGPWA facilities necessary to convey additional 25 cfs in which SGPWA is 100% responsible for

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY
 Table L-12: SGPWA and Morongo Tribal Lands Cost Estimation for Portion of North Pass Alignment
 with Additional SGPWA and Morongo Tribal Lands Water Demand for 80% Reliability

Project Component	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
SGPWA and Morongo Tribal Lands Shared Facilities Cost					
Base Pipeline Cost	102 in.			\$12/diam-in/lf	LF 190,080 \$12 \$271,744,451
Pump Station #1	29100 HP		1	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA \$37,961,853 \$37,961,853
Pump Station #2	24000 HP		1	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA \$33,146,330 \$33,146,330
Forebays	70 acre-feet		1	\$15,000 per acre-feet	EA \$1,050,000 \$1,050,000
Afterbays	45 acre-feet		1	\$15,000 per acre-feet	EA \$675,000 \$675,000
Regulating Reservoirs	300 acre-feet		1	\$15,000 per acre-feet	EA \$4,500,000 \$4,500,000
Land Cost for Pump Stations			2	\$150,000/applicable site	EA \$150,000 \$300,000
Land Cost for Forebays			1	\$200,000/applicable site	EA \$200,000 \$200,000
Land Cost for Afterbays			1	\$150,000/applicable site	EA \$150,000 \$150,000
Land Cost for Regulating Reservoirs			1	\$1,000,000/applicable site	EA \$1,000,000 \$1,000,000
Sub Total					\$350,727,634
SGPWA and Morongo Tribal Lands Sub Total⁽¹⁾		19% of Total Shared Facilities Cost			\$66,638,250
SGPWA and Morongo Tribal Lands Additional Facilities Cost⁽²⁾					
Base Pipeline Cost to Connect Cabazon Discharge	48 in.		2,000	\$12/diam-in/lf	LF \$1,345,536
Connection to Banning Pipeline	25 cfs		1	Assumed Lump Sum \$250,000	LS \$250,000 \$250,000
Cabazon Discharge Facilities	46 cfs		1	Assumed Lump Sum \$750,000	LS \$750,000 \$750,000
Sub Total					\$2,345,536
Total Capital Cost					\$68,983,786
Engineering and Administration @ 23.5% of Total Capital Cost	23.5%	23.5% of Total Capital Cost	1	\$16,211,190	LS \$16,211,190
Upsized Pipeline Right-of-Way (100 foot wide Easment)⁽¹⁾		\$50/lf	190,080	\$50	LF \$3,174,336
Pipeline Right-of-Way (80 foot wide Easment)⁽²⁾		\$30/lf	2,000	\$30	LF \$60,000
Environmental Mitigation⁽¹⁾		\$1,060,000	1	\$1,060,000	LS \$354,040
Total Project Cost					\$88,783,352
Adjusted Project Cost⁽³⁾	1.106				\$98,200,000
Total SGPWA Project Cost					\$34,400,000
Total Morongo Tribal Lands Project Cost					\$63,800,000

⁽¹⁾ All SGPWA and Morongo Tribal Lands cost was adjusted based on percentage factor of 19% (19% = 71 cfs [SGPWA&Morongo] / 382 cfs [Total]) of total construction cost, land costs, etc. of necessary upsized facilities in Table L-10 to accommodate additional flow (71 cfs).

⁽²⁾ SGPWA and Morongo Tribal Lands facilities necessary to convey additional 71 cfs in which SGPWA and Morongo Tribal Lands is 100% responsible for.

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-13: Summary of Cost Estimates for North Pass Alignment for 80% Reliability

North Pass Alignment Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.)	Pipeline Capacity Including SGPWA Water Demand at 336 cfs (96-Inch Dia.)⁽²⁾	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 382 cfs (102-Inch Dia.)⁽³⁾
Construction Costs	\$632,890,552	\$658,572,372	\$682,425,171
Engineering and Administration @ 23.5%	\$148,729,280	\$154,764,507	\$160,369,915
Pipeline Right-of-Way	\$17,820,000	\$17,980,000	\$17,980,000
Environmental Mitigation	\$1,060,000	\$1,060,000	\$1,060,000
Total Project Cost	\$800,499,832	\$832,376,879	\$861,835,087
Adjusted Total Project Cost⁽¹⁾	\$885,400,000	\$920,600,000	\$953,200,000
CVWD and DWA Cost	\$885,400,000	\$884,700,000	\$855,000,000
SGPWA Cost	\$0	\$35,900,000	\$34,400,000
Morongo Tribal Lands Cost	\$0	\$0	\$63,800,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ SGPWA is responsible for 7% of project cost for North Pass Alternative from the connection at Devil Canyon to proposed Cabazon Basin Discharge Facilities only.

⁽³⁾ SGPWA and Moronogo Tribal Lands is responsible for a total of 19% of project cost for North Pass Alternative from the connection at Devils Canyon to proposed Cabazon Basin Discharge Facilities.

SAN GORGONIO PASS WATER AGENCY

Table L-14: Summary of Project Cost Estimates for North Pass Alignment for 80% Reliability

North Pass Alignment Cost Estimate	Pipeline Capacity at 311 cfs (90-inch Dia.)	Pipeline Capacity Including SGPWA Water Demand at 336 cfs (96-Inch Dia.)	Pipeline Capacity Including SGPWA and Morongo Tribal Lands Water Demand at 382 cfs (102-Inch Dia.)
CVWD and DWA Total Cost	\$885,400,000	\$884,700,000	\$855,000,000
SGPWA Total Cost	\$0	\$35,900,000	\$34,400,000
Morongo Tribal Lands Total Cost	\$0	\$0	\$63,800,000
Total Project Cost	\$885,400,000	\$920,600,000	\$953,200,000

SAN GORGONIO PASS WATER AGENCY

Table L-15: Cost Estimation for Independent SGPWA North Pass Alignment for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	30 in.	\$12/diam-in/lf	LF	192,080	\$12	\$80,765,798
Pump Station #1	2100 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$5,964,982	\$5,964,982
Pump Station #2	2000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$5,763,574	\$5,763,574
Forebays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Afterbays	12 acre-feet	\$15,000 per acre-feet	EA	1	\$180,000	\$180,000
Regulating Reservoirs	100 acre-feet	\$15,000 per acre-feet	EA	1	\$1,500,000	\$1,500,000
Connection to Banning Pipeline	25 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	25 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	2	\$2,000,000	\$4,000,000
Sub Total						\$99,299,354
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,650,000
Total Capital Cost						\$100,949,354
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$23,723,098	\$23,723,098
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	192,080	\$30	\$5,762,400
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$131,494,852
Adjusted Total Project Cost⁽²⁾	1.106					\$145,400,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-16: Cost Estimation for Independent SGPWA North Pass Alignment with Additional Morongo Tribal Land Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	48 in.	\$12/diam-in/lf	LF	192,080	\$12	\$129,225,277
Pump Station #1	5700 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$12,047,658	\$12,047,658
Pump Station #2	5200 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$11,293,618	\$11,293,618
Forebays	35 acre-feet	\$15,000 per acre-feet	EA	1	\$525,000	\$525,000
Afterbays	15 acre-feet	\$15,000 per acre-feet	EA	1	\$225,000	\$225,000
Regulating Reservoirs	145 acre-feet	\$15,000 per acre-feet	EA	1	\$2,175,000	\$2,175,000
Connection to Banning Pipeline	71 cfs	Assumed Lump Sum \$300,000	LS	1	\$300,000	\$300,000
Cabazon Discharge Facilities	71 cfs	Assumed Lump Sum \$600,000	LS	1	\$600,000	\$600,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	2	\$2,000,000	\$4,000,000
Sub Total						\$160,391,554
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,650,000
Total Capital Cost						\$162,041,554
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$38,079,765	\$38,079,765
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	192,080	\$30	\$5,762,400
Environmental Mitigation		\$1,060,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$206,943,719
Adjusted Total Project Cost⁽²⁾	1.106					\$228,900,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-17: Summary of Cost Estimates for Independent SGPWA North Pass Alignment for 80% Reliability

Independent SGPWA North Pass Alignment Cost Estimate	SGPWA Pipeline Capacity at 25 cfs (30-inch Dia.)	SGPWA Pipeline Capacity Including Morongo Tribal Lands Water Demand at 71 cfs (48-Inch Dia.)
Construction Costs	\$100,949,354	\$162,041,554
Engineering and Administration @ 23.5%	\$23,723,098	\$38,079,765
Pipeline Right-of-Way	\$5,762,400	\$5,762,400
Environmental Mitigation	\$1,060,000	\$1,060,000
Total Project Cost	\$131,494,852	\$206,943,719
Adjusted Total Project Cost⁽¹⁾	\$145,400,000	\$228,900,000
SGPWA Cost⁽²⁾	\$145,400,000	\$80,100,000
Morongo Tribal Lands Cost⁽²⁾	\$0	\$148,800,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ SGPWA is responsible for 35% and Morongo Tribal Lands is responsible for 65%.

SAN GORGONIO PASS WATER AGENCY

Table L-18: Summary of Project Cost Estimates for Independent SGPWA North Pass Alignment for 80% Reliability

Independent SGPWA North Pass Alignment Cost Estimate	SGPWA Pipeline Capacity at 25 cfs (30-inch Dia.)	SGPWA Pipeline Capacity Including Morongo Tribal Lands Water Demand at 71 cfs (48-Inch Dia.)
SGPWA Total Cost	\$145,400,000	\$80,100,000
Morongo Tribal Lands Total Cost	\$0	\$148,800,000
Total Project Cost	\$145,400,000	\$228,900,000

SAN GORGONIO PASS WATER AGENCY
Table L-19: Cost Estimation for Inland Feeder Modified Pass Alignment for 80% Reliability

Project Component	Estimating Criteria	Unit	Quantity	Unit Price	Total Price	
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	30 in.	\$12/diam-in/lf	LF	100,000	\$12	\$42,048,000
Pump Station #1	2100 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$5,964,982	\$5,964,982
Pump Station #2	2000 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$5,763,574	\$5,763,574
Forebays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Afterbays	12 acre-feet	\$15,000 per acre-feet	EA	1	\$180,000	\$180,000
Regulating Reservoirs	100 acre-feet	\$15,000 per acre-feet	EA	1	\$1,500,000	\$1,500,000
Connection to Banning Pipeline	25 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	25 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	1	\$2,000,000	\$2,000,000
Sub Total						\$58,581,556
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,650,000
Total Capital Cost						\$60,231,556
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$14,154,416	\$14,154,416
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	100,000	\$30	\$3,000,000
Environmental Mitigation		\$4,000,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$78,445,971
MWD Feeder Pipeline Cost for 21 cfs⁽²⁾	2.5%	1,200,000,000	LS	1	\$30,000,000	\$30,000,000
Adjusted Total Project Cost⁽³⁾	1.106					\$119,900,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Based on 2.5% (25 cfs/1000 cfs) of estimated project cost of \$1.2 billion for MWD Feeder Pipeline

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-20: Cost Estimation for Inland Feeder Modified Pass Alignment with Additional Morongo Tribal Land Water Demand for 80% Reliability

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	48 in.	\$12/diam-in/lf	LF	100,000	\$12	\$67,276,800
Pump Station #1	5700 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$12,047,658	\$12,047,658
Pump Station #2	5200 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$11,293,618	\$11,293,618
Forebays	35 acre-feet	\$15,000 per acre-feet	EA	1	\$525,000	\$525,000
Afterbays	25 acre-feet	\$15,000 per acre-feet	EA	1	\$375,000	\$375,000
Regulating Reservoirs	145 acre-feet	\$15,000 per acre-feet	EA	1	\$2,175,000	\$2,175,000
Connection to Banning Pipeline	71 cfs	Assumed Lump Sum \$300,000	LS	1	\$300,000	\$300,000
Cabazon Discharge Facilities	71 cfs	Assumed Lump Sum \$600,000	LS	1	\$600,000	\$600,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	1	\$2,000,000	\$2,000,000
Sub Total						\$96,593,076
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$1,650,000
Total Capital Cost						\$98,243,076
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$23,087,123	\$23,087,123
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	100,000	\$30	\$3,000,000
Environmental Mitigation		\$4,000,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$125,390,199
MWD Feeder Pipeline Cost for 96 cfs⁽²⁾	7.1%	1,200,000,000	LS	1	\$85,200,000	\$85,200,000
Adjusted Total Project Cost⁽³⁾	1.106					\$232,900,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Based on 7.1% (71 cfs/1000 cfs) of estimated project cost of \$1.2 billion for MWD Feeder Pipeline

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table L-21: Summary of Cost Estimates for Inland Feeder Modified Pass Alignment for 80% Reliability

Inland Feeder Modified Pass Alignment Cost Estimate	SGPWA Pipeline Capacity at 25 cfs (30-inch Dia.)	SGPWA Pipeline Capacity Including Morongo Tribal Lands Water Demand at 71 cfs (48-Inch Dia.)
Construction Costs	\$60,231,556	\$98,243,076
Engineering and Administration @ 23.5%	\$14,154,416	\$23,087,123
Pipeline Right-of-Way	\$3,000,000	\$3,000,000
Environmental Mitigation	\$1,060,000	\$1,060,000
Total Project Cost	\$78,445,971	\$125,390,199
MWD Feeder Pipeline Cost	\$30,000,000	\$85,200,000
Adjusted Total Project Cost⁽¹⁾	\$119,900,000	\$232,900,000
SGPWA Cost⁽²⁾	\$119,900,000	\$81,500,000
Morongo Tribal Lands Cost⁽²⁾	\$0	\$151,400,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ SGPWA is responsible for 35% and Morongo Tribal Lands is responsible for 65%.

SAN GORGONIO PASS WATER AGENCY

Table L-22: Summary of Project Cost Estimates for Inland Feeder Modified Pass Alignment for 80% Reliability

Inland Feeder Modified Pass Alignment Cost Estimate	SGPWA Pipeline Capacity at 25 cfs (30-inch Dia.)	SGPWA Pipeline Capacity Including Morongo Tribal Lands Water Demand at 71 cfs (48-Inch Dia.)
SGPWA Total Cost	\$119,900,000	\$81,500,000
Morongo Tribal Lands Total Cost	\$0	\$151,400,000
Total Project Cost	\$119,900,000	\$232,900,000

SAN GORGONIO PASS WATER AGENCY

Table L-23: Summary of Project Cost Estimates for 80% Reliability

	Delivery of 311 cfs of SWP Water	Delivery of 336 cfs of SWP Water	Delivery of 382 cfs of SWP Water
Lucerne Valley			
CVWD & DWA	\$1,084,100,000	\$1,072,600,000	\$1,001,400,000
SGPWA	\$0	\$189,100,000	\$139,700,000
Morongo Tribal Lands	\$0	\$0	\$247,100,000
Total Cost	\$1,084,100,000	\$1,261,700,000	\$1,388,200,000
North Pass			
CVWD & DWA	\$885,400,000	\$884,700,000	\$855,000,000
SGPWA	\$0	\$35,900,000	\$34,400,000
Morongo Tribal Lands	\$0	\$0	\$63,800,000
Total Cost	\$885,400,000	\$920,600,000	\$953,200,000
Independent North Pass			
SGPWA	\$0	\$145,400,000	\$80,100,000
Morongo Tribal Lands	\$0	\$0	\$148,800,000
Total Cost	\$0	\$145,400,000	\$228,900,000
Inland Feeder Modified Pass			
SGPWA	\$0	\$119,900,000	\$81,500,000
Morongo Tribal Lands	\$0	\$0	\$151,400,000
Total Cost	\$0	\$119,900,000	\$232,900,000

APPENDIX M

Energy Cost for State Water Project Aqueduct Extension Alternatives for 80% Reliability

SAN GORGONIO PASS WATER AGENCY

Table M-1: Lucerne Valley Alignment Annual Energy Cost for 80% Reliability⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct ⁽²⁾			Generation Energy of Proposed Desert Aqueduct ⁽³⁾			Generation Energy at Mojave Siphon and Devils Canyon ⁽⁴⁾			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
Lucerne Valley Alignment (311 cfs)	171,100	34,325	58,405	1,318	0.096	127	2,243	0.038	85	0	0.038	0	41	7,068,072
Lucerne Valley Alignment (336 cfs)	182,400	34,900	64,152	1,257	0.096	121	2,311	0.038	88	0	0.038	0	33	5,995,940
Desert Loop Pipeline (25 cfs)	13,600	4,076	0	1,969	0.096	189	0	0.038	0	0	0.038	0	189	2,570,815
Lucerne Valley Alignment (382 cfs)	207,400	40,300	82,600	1,277	0.096	123	2,617	0.038	99	0	0.038	0	23	4,796,100
Desert Loop Pipeline (71 cfs)	38,600	11,500	0	1,957	0.096	188	0	0.038	0	0	0.038	0	188	7,253,280

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

Table M-2: North Pass Alignment Annual Energy Cost for 80% Reliability⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct			Generation Energy of Proposed Desert Aqueduct			Generation Energy at Mojave Siphon and Devils Canyon			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
North Pass Alignment (311 cfs)	171,100	36,125	0	1,387	0.096	133	0	0.038	0	1,165	0.038	44	89	15,210,163
North Pass Alignment (336 cfs)	182,400	36,700	0	1,322	0.096	127	0	0.038	0	1,165	0.038	44	83	15,072,576
North Pass Alignment (382 cfs)	207,400	41,700	0	1,321	0.096	127	0	0.038	0	1,165	0.038	44	83	17,119,426

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

Table M-3: Independent SGPWA North Pass Alignment Annual Energy Cost for 80% Reliability⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct			Generation Energy of Proposed Desert Aqueduct			Generation Energy at Mojave Siphon and Devils Canyon			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
Independent SGPWA North Pass Alignment (25 cfs)	13,600	3,300	0	1,594	0.096	153	0	0.038	0	1,165	0.038	44	153	2,081,376
Independent SGPWA North Pass Alignment (71 cfs)	38,600	8,500	0	1,447	0.096	139	0	0.038	0	1,165	0.038	44	139	5,361,120

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

Table M-4: Inland Feeder Modified Pass Alignment Annual Energy Cost for 80% Reliability⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct			Generation Energy of Proposed Desert Aqueduct			Generation Energy at Mojave Siphon and Devils Canyon			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
Inland Feeder Modified Pass Alignment (25 cfs)	13,600	3,200	0	1,546	0.096	148	0	0.038	0	1,165	0.038	44	148	2,018,304
Inland Feeder Modified Pass Alignment (71 cfs)	38,600	8,500	0	1,447	0.096	139	0	0.038	0	1,165	0.038	44	139	5,361,120

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

SAN GORGONIO PASS WATER AGENCY

Table M-5: Summary of Annual Energy Cost for 80% Reliability

	Delivery of 311 cfs	Delivery of 336 cfs	Delivery of 382 cfs
Lucerne Valley Alternative			
CVWD & DWA	\$7,068,072	\$5,576,224	\$3,884,841
SGPWA	\$0	\$2,990,530	\$2,874,375
Morongo Tribal Lands	\$0	\$0	\$5,290,164
Total	\$7,068,072	\$8,566,754	\$12,049,380
North Pass Alternative			
CVWD & DWA ⁽¹⁾	\$7,510,163	\$6,317,496	\$6,166,735
SGPWA*	\$0	\$1,055,080	\$1,198,360
Morongo Tribal Lands*	\$0	\$0	\$2,054,331
Total	\$7,510,163	\$7,372,576	\$9,419,426
Independent SGPWA North Pass Alternative			
CVWD & DWA	\$0	\$0	\$0
SGPWA	\$0	\$2,081,376	\$1,876,392
Morongo Tribal Lands	\$0	\$0	\$3,484,728
Total	\$0	\$2,081,376	\$5,361,120
Inland Feeder Modified Pass Alternative			
CVWD & DWA	\$0	\$0	\$0
SGPWA	\$0	\$2,018,304	\$1,876,392
Morongo Tribal Lands	\$0	\$0	\$3,484,728
Total	\$0	\$2,018,304	\$5,361,120

(1) CVWD & DWA to generate approximately \$7.7 million of power from its hyro power facilities (based on generation of 30,873 kW at \$0.038/kW-hr). Therefore, \$7.7 million will be deducted from total operations cost for CVWD and DWA.

Table M-6: Present Value of Energy Cost Adjusted for 80% Reliability ⁽¹⁾

	Delivery of 311 cfs	Delivery of 336 cfs	Delivery of 382 cfs
Lucerne Valley Alternative			
CVWD & DWA	\$106,300,000	\$83,900,000	\$58,500,000
SGPWA	\$0	\$45,000,000	\$43,200,000
Morongo Tribal Lands	\$0	\$0	\$79,600,000
Total	\$106,300,000	\$128,900,000	\$181,300,000
North Pass Alternative			
CVWD & DWA	\$113,000,000	\$95,100,000	\$92,800,000
SGPWA	\$0	\$15,900,000	\$18,000,000
Morongo Tribal Lands	\$0	\$0	\$30,900,000
Total	\$113,000,000	\$111,000,000	\$141,700,000
Independent SGPWA North Pass Alternative			
CVWD & DWA	\$0	\$0	\$0
SGPWA	\$0	\$31,300,000	\$28,200,000
Morongo Tribal Lands	\$0	\$0	\$52,400,000
Total	\$0	\$31,300,000	\$80,600,000
Inland Feeder Modified Pass Alternative			
CVWD & DWA	\$0	\$0	\$0
SGPWA	\$0	\$30,400,000	\$28,200,000
Morongo Tribal Lands	\$0	\$0	\$52,400,000
Total	\$0	\$30,400,000	\$80,700,000

(1) Present value of costs based on n=40, i=6%, pwf=15.046. All values rounded to the nearest 100,000.

** When incorporating SGPWA and/or Morongo capacities for North Pass Alignment Alternative, cost allocations were evaluated up to the Cabazon Basin Discharge Point only as discussed in Section 6.

SAN GORGONIO PASS WATER AGENCY

Table M-7: Summary of Energy Cost Estimates for 80% Reliability

	Delivery of 311 cfs of SWP Water	Delivery of 336 cfs of SWP Water	Delivery of 382 cfs of SWP Water
Lucerne Valley			
CVWD & DWA	\$106,300,000	\$83,900,000	\$58,500,000
SGPWA	\$0	\$45,000,000	\$43,200,000
Morongo Tribal Lands	\$0	\$0	\$79,600,000
Total Cost	\$106,300,000	\$128,900,000	\$181,300,000
North Pass			
CVWD & DWA	\$113,000,000	\$95,100,000	\$92,800,000
SGPWA	\$0	\$15,900,000	\$18,000,000
Morongo Tribal Lands	\$0	\$0	\$30,900,000
Total Cost	\$113,000,000	\$111,000,000	\$141,700,000
Independent North Pass			
SGPWA	\$0	\$31,300,000	\$28,200,000
Morongo Tribal Lands	\$0	\$0	\$52,400,000
Total Cost	\$0	\$31,300,000	\$80,600,000
Inland Feeder Modified Pass			
SGPWA	\$0	\$30,400,000	\$28,200,000
Morongo Tribal Lands	\$0	\$0	\$52,400,000
Total Cost	\$0	\$30,400,000	\$80,600,000

APPENDIX N

Maintenance Costs for State Water Project Aqueduct Extension Alternatives for 80% Reliability

SAN GORGONIO PASS WATER AGENCY

Table N-1: Annual Maintenance Cost for Lucerne Valley Alignment for 80% Reliability

Lucerne Valley (311 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$518,918,400	\$518,918
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$58,008,533	\$870,128
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$174,025,600	\$3,480,512
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,150,000	\$3,150
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$750,000	\$750
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$375,000	\$375
Sub Total					\$4,873,833
<hr/>					
Lucerne Valley (336 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$553,512,960	\$553,513
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$62,747,463	\$941,212
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$184,359,851	\$3,687,197
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,900,000	\$3,900
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$900,000	\$900
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$450,000	\$450
Sub Total					\$5,187,172
<hr/>					
Lucerne Valley (382 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$588,107,520	\$588,108
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$69,454,954	\$1,041,824
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$202,881,333	\$4,057,627
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$4,500,000	\$4,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$1,050,000	\$1,050
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$675,000	\$675
Sub Total					\$5,693,783

Table N-2: Summary of Annual Maintenance Cost for Lucerne Valley Alignment for 80% Reliability

Project	Annual Maintenance Cost
Lucerne Valley (311 cfs)	\$4,873,833
Lucerne Valley (336 cfs)	\$5,187,172
Lucerne Valley (382 cfs)	\$5,693,783

SAN GORGONIO PASS WATER AGENCY

Table N-3: Annual Maintenance Cost for Loop Pipeline for 80% Reliability

Loop Pipeline (25 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$48,312,000	\$48,312
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$15,588,207	\$233,823
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$750,000	\$750
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$300,000	\$300
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$150,000	\$150
Sub Total					\$283,335

Loop Pipeline (71 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$69,739,200	\$69,739
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$25,751,811	\$386,277
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$750,000	\$750
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$300,000	\$300
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$150,000	\$150
Sub Total					\$457,216

Table N-4: Summary of Annual Maintenance Cost for Loop Pipeline for 80% Reliability

Project	Annual Maintenance Cost
Loop Pipeline (25 cfs)	\$283,335
Loop Pipeline (71 cfs)	\$457,216

SAN GORGONIO PASS WATER AGENCY

Table N-5: Summary of Annual Maintenance Cost Summary for Lucerne Valley Alignment for 80% Reliability

Project	Annual Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Lucerne Valley (311 cfs)	\$4,873,833	\$0	\$0
Lucerne Valley (336 cfs)	\$4,577,045	\$610,127	\$0
Lucerne Valley (382 cfs)	\$3,892,834	\$396,207	\$1,404,742

Table N-6: Present Value of Annual Maintenance Cost for Lucerne Valley Alignment for 80% Reliability

Project	Total Present Value for Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Lucerne Valley (311 cfs)	\$73,300,000	\$0	\$0
Lucerne Valley (336 cfs)	\$68,900,000	\$9,200,000	\$0
Lucerne Valley (382 cfs)	\$58,600,000	\$6,000,000	\$21,100,000

SAN GORGONIO PASS WATER AGENCY

Table N-7: CVWD & DWA Annual Maintenance Cost for North Pass Alignment for 80% Reliability

North Pass (311 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$426,487,818	\$426,488
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$58,008,533	\$870,128
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$130,519,200	\$2,610,384
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,150,000	\$3,150
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$750,000	\$750
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$375,000	\$375
Sub Total					\$3,911,275

North Pass (336 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$443,481,938	\$443,482
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$64,971,233	\$974,569
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$130,519,200	\$2,610,384
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,900,000	\$3,900
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$900,000	\$900
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$450,000	\$450
Sub Total					\$4,033,684

North Pass (382 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$460,139,674	\$460,140
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$71,016,298	\$1,065,244
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$130,519,200	\$2,610,384
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$4,500,000	\$4,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$1,050,000	\$1,050
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$600,000	\$600
Sub Total					\$4,141,918

Table N-8: Summary of CVWD and DWA Annual Maintenance Cost for North Pass Alignment for 80% Reliability

Project	Annual Maintenance Cost
North Pass (311 cfs)	\$3,911,275
North Pass (336 cfs)	\$4,033,684
North Pass (382 cfs)	\$4,141,918

SAN GORGONIO PASS WATER AGENCY

Table N-9: SGPWA Annual Maintenance Cost for North Pass Alignment for 80% Reliability

North Pass (336 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$255,759,483	\$255,759
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$64,971,233	\$974,569
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,900,000	\$3,900
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$900,000	\$900
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$450,000	\$450
Sub Total					\$1,235,578
SGPWA Sub Total	7% of Total Maintenance Cost				\$86,490
<hr/>					
North Pass (382 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$271,744,451	\$271,744
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$71,108,183	\$1,066,623
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$4,500,000	\$4,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$1,050,000	\$1,050
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$675,000	\$675
Sub Total					\$1,344,592
SGPWA Sub Total	19% of Total Maintenance Cost				\$255,473

Table N-10: Summary of SGPWA Annual Maintenance Cost for North Pass Alignment for 80% Reliability

Project	Annual Maintenance Cost
North Pass (336 cfs)	\$86,490
North Pass (382 cfs)	\$255,473

SAN GORGONIO PASS WATER AGENCY

Table N-11: Summary of Annual Maintenance Cost for North Pass Alignment for 80% Reliability

Project	Annual Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
North Pass (311 cfs)	\$3,911,275	\$0	\$0
North Pass (336 cfs)	\$3,947,194	\$86,490	\$0
North Pass (382 cfs)	\$3,886,446	\$89,415	\$166,057

Table N-12: Present Value of Annual Maintenance Cost for North Pass Alignment for 80% Reliability

Project	Total Present Value Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
North Pass (311 cfs)	\$58,900,000	\$0	\$0
North Pass (336 cfs)	\$59,400,000	\$1,300,000	\$0
North Pass (382 cfs)	\$58,500,000	\$1,300,000	\$2,500,000

SAN GORGONIO PASS WATER AGENCY

Table N-13: Annual Maintenance Cost for Independent SGPWA North Pass Alignment for 80% Reliability

Independent SGPWA North Pass (25 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$80,765,798	\$80,766
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$11,728,556	\$175,928
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$1,500,000	\$1,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$375,000	\$375
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$180,000	\$180
Sub Total					\$258,749

Independent SGPWA North Pass (71 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$129,225,277	\$129,225
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$23,341,276	\$350,119
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$2,175,000	\$2,175
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$525,000	\$525
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$225,000	\$225
Sub Total					\$482,269

Table N-14: Summary of Annual Maintenance Cost for SGPWA North Pass Alignment for 80% Reliability

Project	Annual Maintenance Cost
Independent SGPWA North Pass (25 cfs)	\$258,749
Independent SGPWA North Pass (71 cfs)	\$482,269

SAN GORGONIO PASS WATER AGENCY

Table N-15: Summary of Annual Maintenance Cost Summary for Independent SGPWA North Pass Alignment for 80% Reliability

Project	Annual Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Independent SGPWA North Pass (25 cfs)	\$0	\$258,749	\$0
Independent SGPWA North Pass (71 cfs)	\$0	\$168,794	\$313,475

Table N-16: Present Value of Annual Maintenance Cost for Independent SGPWA North Pass Alignment for 80% Reliability

Project	Total Present Value Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Independent SGPWA North Pass (25 cfs)	\$0	\$3,900,000	\$0
Independent SGPWA North Pass (71 cfs)	\$0	\$2,500,000	\$4,700,000

SAN GORGONIO PASS WATER AGENCY

Table N-17: Annual Maintenance Cost for Inland Feeder Modified Pass Alignment for 80% Reliability

Inland Feeder Modified Pass (25 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$42,048,000	\$42,048
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$11,728,556	\$175,928
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$1,500,000	\$1,500
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$375,000	\$375
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$180,000	\$180
Sub Total					\$220,031

Inland Feeder Modified Pass (71 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$67,276,800	\$67,277
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$23,341,276	\$350,119
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$2,175,000	\$2,175
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$525,000	\$525
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$375,000	\$375
Sub Total					\$420,471

Table N-18: Summary of Annual Maintenance Cost for Inland Feeder Modified Pass Alignment for 80% Reliability

Project	Annual Maintenance Cost
Inland Feeder Modified Pass (25 cfs)	\$220,031
Inland Feeder Modified Pass (71 cfs)	\$420,471

SAN GORGONIO PASS WATER AGENCY

Table N-19: Summary of Annual Maintenance Cost for Inland Feeder Modified Pass Alignment for 80% Reliability

Project	Annual Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Inland Feeder Modified Pass (25 cfs)	\$0	\$220,031	\$0
Inland Feeder Modified Pass (71 cfs)	\$0	\$92,083	\$328,388

Table N-20: Present Value of Annual Maintenance Cost for Inland Feeder Modified Pass Alignment for 80% Reliability

Project	Total Present Value Maintenance Cost		
	CVWD & DWA	SGPWA	Morongo
Inland Feeder Modified Pass (25 cfs)	\$0	\$3,300,000	\$0
Inland Feeder Modified Pass (71 cfs)	\$0	\$1,400,000	\$4,900,000

SAN GORGONIO PASS WATER AGENCY

Table N-21: Summary of Maintenance Cost for 80% Reliability

	Delivery of 311 cfs of SWP Water	Delivery of 336 cfs of SWP Water	Delivery of 382 cfs of SWP Water
Lucerne Valley			
CVWD & DWA	\$73,300,000	\$68,900,000	\$58,600,000
SGPWA	\$0	\$9,200,000	\$6,000,000
Morongo Tribal Lands	\$0	\$0	\$21,100,000
Total Cost	\$73,300,000	\$78,100,000	\$85,700,000
North Pass			
CVWD & DWA	\$58,900,000	\$59,400,000	\$58,500,000
SGPWA	\$0	\$1,300,000	\$1,300,000
Morongo Tribal Lands	\$0	\$0	\$2,500,000
Total Cost	\$58,900,000	\$60,700,000	\$62,300,000
Independent North Pass			
SGPWA	\$0	\$3,900,000	\$2,500,000
Morongo Tribal Lands	\$0	\$0	\$4,700,000
Total Cost	\$0	\$3,900,000	\$7,200,000
Inland Feeder Modified Pass			
SGPWA	\$0	\$3,300,000	\$1,400,000
Morongo Tribal Lands	\$0	\$0	\$4,900,000
Total Cost	\$0	\$3,300,000	\$6,300,000

APPENDIX O

Velocity Analysis Calculations

SAN GORGONIO PASS WATER AGENCY

Table O-1: Hydraulic and Pumping Calculations for North Pass Alignment Based on 63% Reliability (8 fps)

	Q (cfs)	Dia (in)	Length (ft)	Pump/inlet Elevation (ft)	Discharge/Hydro Station Elevation (ft)	Static Head (ft)	Friction Loss (ft)	Total Dynamic Head (ft)	Power (HP)	Power (kW)
NORTH PASS ALIGNMENT										
SGPWA Demand										
Pump #1	361	90	31,000	1,720	2,310	590	62	652	31,389	24,649
Pump #2	361	90	51,000	2,310	2,720	410	102	512	24,643	19,351

SAN GORGONIO PASS WATER AGENCY

Table O-2: Cost Estimation for North Pass Alignment with Additional SGPWA Water Demand for 63% Reliability (8 fps)

Project Component	Estimating Criteria	Unit	Quantity	Unit Price	Total Price	
Capital Facility Construction Costs						
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	190,080	\$12	\$239,774,515
Base Pipeline Cost ⁽¹⁾	90 in.	\$12/diam-in/lf	LF	132,000	\$12	\$166,510,080
Base Pipeline Cost ⁽¹⁾	42 in.	\$12/diam-in/lf	LF	34,320	\$12	\$20,203,223
Base Pipeline Cost to Connect Cabazon Discharge ⁽¹⁾	36 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,009,152
Pump Station #1	31400 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$40,050,248	\$40,050,248
Pump Station #2	24600 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$33,727,570	\$33,727,570
Hydro Power Facilities	311 cfs	\$ = (1.5)*400,510*Q ^{0.7461} where Q = Flow in cfs	EA	3	\$43,506,400	\$130,519,200
Forebays	60 acre-feet	\$15,000 per acre-feet	EA	1	\$900,000	\$900,000
Afterbays	30 acre-feet	\$15,000 per acre-feet	EA	1	\$450,000	\$450,000
Regulating Reservoirs	260 acre-feet	\$15,000 per acre-feet	EA	1	\$3,900,000	\$3,900,000
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	50 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Whitewater Discharge Facilities	311 cfs	Lump Sum \$1,000,000	LS	1	\$1,000,000	\$1,000,000
Mission Creek Discharge Facilities	50 cfs	Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Power Transmission Facilities		\$2,000,000 per pump or hydro station	EA	5	\$2,000,000	\$10,000,000
Sub Total						\$649,293,989
Land Costs						
Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Hydro Power Stations		\$150,000/applicable site	EA	3	\$150,000	\$450,000
Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Sub Total						\$2,100,000
Total Capital Cost						\$651,393,989
Engineering and Administration @ 23.5%	23.5%	23.5% of Total Capital Cost	LS	1	\$153,077,587	\$153,077,587
Pipeline Right-of-Way (100 foot wide Easment)		\$50/lf	LF	358,400	\$50	\$17,920,000
Pipeline Right-of-Way (80 foot wide Easment)		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation		\$4,000,000	LS	1	\$1,060,000	\$1,060,000
Total Project Cost						\$823,511,576
Adjusted Total Project Cost⁽²⁾	1.106					\$910,800,000

⁽¹⁾ Multiplication factor of 1.168 were applied to base pipeline costs based on installation conditions in August 2007 Development Plan

⁽²⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table O-3: SGPWA Cost Estimation for Portion of North Pass Alignment with Additional SGPWA Water Demand for 63% Reliability (8 fps)

Project Component		Estimating Criteria	Unit	Quantity	Unit Price	Total Price
SGPWA Shared Facilities Cost						
Base Pipeline Cost	90 in.	\$12/diam-in/lf	LF	190,080	\$12	\$239,774,515
Pump Station #1	31400 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$40,050,248	\$40,050,248
Pump Station #2	24600 HP	\$ = 27338*HP ^{0.704} where HP = Horsepower	EA	1	\$33,727,570	\$33,727,570
Forebays	60 acre-feet	\$15,000 per acre-feet	EA	1	\$900,000	\$900,000
Afterbays	30 acre-feet	\$15,000 per acre-feet	EA	1	\$450,000	\$450,000
Regulating Reservoirs	260 acre-feet	\$15,000 per acre-feet	EA	1	\$3,900,000	\$3,900,000
Land Cost for Pump Stations		\$150,000/applicable site	EA	2	\$150,000	\$300,000
Land Cost for Forebays		\$200,000/applicable site	EA	1	\$200,000	\$200,000
Land Cost for Afterbays		\$150,000/applicable site	EA	1	\$150,000	\$150,000
Land Cost for Regulating Reservoirs		\$1,000,000/applicable site	EA	1	\$1,000,000	\$1,000,000
Sub Total						\$320,452,334
SGPWA Sub Total⁽¹⁾		12.4% of Total Shared Facilities Cost				\$39,736,089
SGPWA Additional Facilities Cost⁽²⁾						
Base Pipeline Cost to Connect Cabazon Discharge	36 in.	\$12/diam-in/lf	LF	2,000	\$12	\$1,009,152
Connection to Banning Pipeline	50 cfs	Assumed Lump Sum \$250,000	LS	1	\$250,000	\$250,000
Cabazon Discharge Facilities	50 cfs	Assumed Lump Sum \$500,000	LS	1	\$500,000	\$500,000
Sub Total						\$1,759,152
Total Capital Cost						\$41,495,241
Engineering and Administration @ 23.5% of Total Capital Cost	23.5%	23.5% of Total Capital Cost	LS	1	\$9,751,382	\$9,751,382
Upsized Pipeline Right-of-Way (100 foot wide Easment)⁽¹⁾		\$50/lf	LF	190,080	\$50	\$1,748,736
Pipeline Right-of-Way (80 foot wide Easment)⁽²⁾		\$30/lf	LF	2,000	\$30	\$60,000
Environmental Mitigation⁽¹⁾		\$4,000,000	LS	1	\$1,060,000	\$195,040
SGPWA Total Project Cost						\$53,250,399
Adjusted Total Project Cost⁽³⁾	1.106					\$58,900,000

⁽¹⁾ All SGPWA cost was adjusted based on percentage factor of 12.4% of total construction cost, land costs, etc. of necessary upsized facilities in Table I-9 to accommodate additional flow (44 cfs).

⁽²⁾ SGPWA facilities necessary to convey additional 44 cfs in which SGPWA is 100% responsible for

⁽³⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

SAN GORGONIO PASS WATER AGENCY

Table O-4: Summary of Cost Estimates for North Pass Alignment for 63% Reliability (8 fps)

North Pass Alignment Cost Estimate	Pipeline Capacity Including SGPWA Water Demand at 361 cfs (90-Inch Dia.) ⁽²⁾
Construction Costs	\$651,393,989
Engineering and Administration @ 23.5%	\$153,077,587
Pipeline Right-of-Way	\$17,980,000
Environmental Mitigation	\$1,060,000
Total Project Cost	\$823,511,576
Adjusted Total Project Cost⁽¹⁾	\$910,800,000
CVWD and DWA Cost	\$851,900,000
SGPWA Cost	\$58,900,000

⁽¹⁾ Project cost are rounded up to the nearest \$100,000 and are based on Engineering News Record (E.N.R.). The Engineering News Record Construction Cost Index for the Los Angeles Areas for March 2009 was utilized. This value is 9799.19. Escalation, financing, interest during construction, legal, land, R.O.W. agent, and environmental impact report costs are not included in construction costs.

⁽²⁾ SGPWA is responsible for 12.4% of project cost for North Pass Alternative from the connection at Devil Canyon to proposed Cabazon Basin Discharge Facilities only.

SAN GORGONIO PASS WATER AGENCY

Table O-5: Summary of Cost Estimates for North Pass Alignment for 63% Reliability (8 fps)

North Pass Alignment Cost Estimate	Pipeline Capacity Including SGPWA Water Demand at 361 cfs (90-Inch Dia.)
CVWD and DWA Total Cost	\$851,900,000
SGPWA Total Cost	\$58,900,000

SAN GORGONIO PASS WATER AGENCY

Table O-6: North Pass Alignment Pump Cost for 63% Reliability (8 fps)⁽¹⁾

	Annual Flow (ac-ft/year)	Total Pumping Power (kW)	Total Hydro Power (kW)	Pumping Energy of Proposed Desert Aqueduct			Generation Energy of Proposed Desert Aqueduct			Generation Energy at Mojave Siphon and Devils Canyon			Net Energy Cost	
				kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	kWhr/ac-ft	\$/kWhr	\$/ac-ft	\$/ac-ft	\$/year
North Pass Alignment (355 cfs)	196,000	44,000	0	1,475	0.096	142	0	0.038	0	1,165	0.038	44	97	19,074,760

⁽¹⁾ Energy calculations based on delivery of flow in 9 months.

SAN GORGONIO PASS WATER AGENCY

Table O-7: Summary of Energy Cost for 63% Reliability (8 fps)

	Delivery of 361 cfs
North Pass Alternative*	
Total	\$11,374,760
CVWD & DWA ⁽¹⁾	\$9,009,490
SGPWA	\$2,365,270

(1) CVWD & DWA to generate approximately \$7.7 million of power from it's hyro power facilities (based on generation of 30,873 kW at \$0.038/kW-hr). Therefore, \$7.7 million will be deducted from total operations cost for CVWD and DWA.

Table O-8: Summary of Energy Cost Adjusted to Present Value for 63% Reliability (8 fps)⁽¹⁾

	Delivery of 361 cfs
North Pass Alternative*	
Total	\$171,200,000
CVWD & DWA ⁽¹⁾	\$135,600,000
SGPWA	\$35,600,000

(1) All costs are rounded to the nearest \$10,000. Present value of costs based on n=40,i=6%,pwf=15.046

* When incorporating SGPWA and/or Morongo capacities for North Pass Alignment Alternative, cost allocations were evaluated up to the Cabazon Basin Discharge Point only as discussed in Section 6.

SAN GORGONIO PASS WATER AGENCY

Table O-9: CVWD & DWA Annual Maintenance Cost for North Pass Alignment for 63% Reliability (8 fps)

North Pass (361 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$427,496,970	\$427,497
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$73,777,818	\$1,106,667
Hydro Power Stations	2% Capital Cost of Hydro Power Stations	LS/yr	2.0%	\$130,519,200	\$2,610,384
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,900,000	\$3,900
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$900,000	\$900
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$450,000	\$450
Sub Total					\$4,149,798
Project	Annual Maintenance Cost				
North Pass (361 cfs)	\$4,149,798				

SAN GORGONIO PASS WATER AGENCY

Table O-10: SGPWA Annual Maintenance Cost for North Pass Alignment for 63% Reliability (8 fps)

North Pass (361 cfs)	Estimating Criteria	Unit	Quantity	Unit Price	Total Price
Maintenance Cost					
Pipelines	0.1% Capital Cost of Pipeline	LS/yr	0.1%	\$239,774,515	\$239,775
Pump Stations	1.5% Capital Cost of Pump Stations	LS/yr	1.5%	\$73,777,818	\$1,106,667
Reservoirs	0.1% Capital Cost of Reservoirs	LS/yr	0.1%	\$3,900,000	\$3,900
Forebays	0.1% Capital Cost of Forebays	LS/yr	0.1%	\$900,000	\$900
Afterbays	0.1% Capital Cost of Afterbays	LS/yr	0.1%	\$450,000	\$450
Sub Total					\$1,351,692
SGPWA Sub Total	12.4% of Total Maintenance Cost				\$167,610
Project	Annual Maintenance Cost				
North Pass (361 cfs)	\$167,610				

SAN GORGONIO PASS WATER AGENCY

Table O-11: Summary of Annual Maintenance Cost for North Pass Alignment for 63% Reliability (8 fps

	Annual Maintenance Cost	
Project	CVWD & DWA	SGPWA
North Pass (361 cfs)	\$3,982,188	\$167,610

Table O-12: Present Value of Annual Maintenance Cost for North Pass Alignment for 63% Reliability (8 fps

n=40, i=6%, pwf=15.046	Total Present Value Maintenance Cost	
Project	CVWD & DWA	SGPWA
North Pass (361 cfs)	\$59,900,000	\$2,500,000

* When incorporating SGPWA and/or Morongo capacities for North Pass Alignment Alternative, cost allocations were evaluated up to the Cabazon Basin Discharge Point only as discussed in Section 6.

SAN GORGONIO PASS WATER AGENCY

Table O-13: Summary of Project Cost at 63% Reliability (7 fps vs. 8 fps)

Delivery of 361 cfs of SWP Water	
North Pass Alternative Cost (7 fps)	
CVWD & DWA	\$858,600,000
SGPWA	\$68,100,000
Total	\$926,700,000
North Pass Alternative Cost (8 fps)	
CVWD & DWA	\$851,900,000
SGPWA	\$58,900,000
Total	\$910,800,000

SAN GORGONIO PASS WATER AGENCY

Table O-14: Summary of Present Worth Energy Cost at 63% Reliability (7 fps vs. 8 fps)⁽¹⁾

		Delivery of 361 cfs of SWP Water
North Pass Alternative Cost (7 fps)		
CVWD & DWA		\$100,400,000
SGPWA		\$35,200,000
Total		\$135,600,000
North Pass Alternative Cost (8 fps)		
CVWD & DWA		\$135,600,000
SGPWA		\$35,600,000
Total		\$171,200,000

(1) Based on I = 6%, n = 40 years, pwf=15.046

SAN GORGONIO PASS WATER AGENCY

Table O-15: Summary of Present Worth Maintenance Cost at 63% Reliability (7 fps vs. 8 fps)⁽¹⁾

		Delivery of 361 cfs of SWP Water
North Pass Alternative Cost (7 fps)		
CVWD & DWA		\$59,300,000
SGPWA		\$2,400,000
Total		\$61,700,000
 North Pass Alternative Cost (8 fps)		
CVWD & DWA		\$59,900,000
SGPWA		\$2,500,000
Total		\$62,400,000

(1) Based on I = 6%, n = 40 years, pwf=15.046

SAN GORGONIO PASS WATER AGENCY

Table O-16: Summary of Total Cost at 63% Reliability (7 fps vs. 8 fps)

Delivery of 361 cfs of SWP Water

North Pass Alternative Cost (7 fps)	
CVWD & DWA	\$1,018,300,000
SGPWA	\$105,700,000
North Pass Alternative Cost (8 fps)	
CVWD & DWA	\$1,047,400,000
SGPWA	\$97,000,000

SAN GORGONIO PASS WATER AGENCY

Table O-17: North Pass Alignment Cost Summary (7 fps)

	CVWD, DWA and SGPWA (361 cfs)
Total Project Cost	\$926,700,000
PW of Annual Energy Costs (i = 6%, n = 40 years, pwf=15.046)	\$135,600,000
PW of Annual Maintenance Costs (i = 6%, n = 40 years, pwf=15.046)	\$61,700,000
Total Cost	\$1,124,000,000
CVWD Cost (311 cfs)	\$1,018,300,000
SGPWA Cost (50 cfs)	\$105,700,000

Table O-18: North Pass Alignment Cost Summary (8 fps)

	CVWD, DWA and SGPWA (361 cfs)
Total Project Cost	\$910,800,000
PW of Annual Energy Costs (i = 6%, n = 40 years, pwf=15.046)	\$171,200,000
PW of Annual Maintenance Costs (i = 6%, n = 40 years, pwf=15.046)	\$62,400,000
Total Cost	\$1,144,400,000
CVWD Cost (311 cfs)	\$1,047,400,000
SGPWA Cost (50 cfs)	\$97,000,000

SAN GORGONIO PASS WATER AGENCY

Table O-19: North Pass Alignment Cost Difference (7 fps vs. 8 fps)

Cost Portions of North Pass Alignment	Pipeline Velocities Criteria		Cost Differential
	7 fps	8 fps	
Total Project Cost	\$926,700,000	\$910,800,000	-\$15,900,000
CVWD & DWA Portion	\$858,600,000	\$851,900,000	-\$6,700,000
SGPWA Portion	\$68,100,000	\$58,900,000	-\$9,200,000
Total Energy Cost⁽¹⁾	\$135,600,000	\$171,200,000	\$35,600,000
CVWD & DWA Portion	\$100,400,000	\$135,600,000	\$35,200,000
SGPWA Portion	\$35,200,000	\$35,600,000	\$400,000
Total Maintenance Cost⁽¹⁾	\$61,700,000	\$62,400,000	\$700,000
CVWD & DWA Portion	\$59,300,000	\$59,900,000	\$600,000
SGPWA Portion	\$2,400,000	\$2,500,000	\$100,000
Total Cost Differential	\$1,124,000,000	\$1,144,400,000	\$20,400,000
CVWD & DWA Portion	\$1,018,300,000	\$1,047,400,000	\$29,100,000
SGPWA Portion	\$105,700,000	\$97,000,000	-\$8,700,000

(1) Costs are based on $i = 6\%$ and $n = 40$ years, $pwf=15.046$

APPENDIX P

Upsizing of Banning Pipeline,
Cabazon Pipeline,
Beaumont Basin Site 4 Recharge Facility, and
Cabazon Basin Recharge Facility
at Robertson Ready Mix Property

APPENDIX P

San Gorgonio Pass Water Agency Supplement Water Supply Study Summary of Letter Reports & Correspondence Regarding Conveyance and Recharge Facilities for Beaumont, Banning and Cabazon Basins

The purpose of this appendix is to summarize the various costs for San Gorgonio Pass Water Agency (SGPWA) in regards to the costs associated with providing pipeline conveyance and recharge facilities for the Beaumont, Banning⁽¹⁾ and Cabazon Basins. It is noted that the cost of land acquisition is not included in these costs.

The following is the summary of the associated project costs for various of pipeline and recharge facility projects:

Beaumont Basin

Site 4 Recharge Facility ⁽²⁾	\$3,541,020
Assumed Conveyance via Mountain View Chanel Outfall	

Cabazon Basin

Recharge Facility at Robertson's Ready Mix Site ⁽³⁾	\$14,065,556
Cabazon Pipeline ⁽⁴⁾	N/A

Total: \$18,000,000⁽⁵⁾

⁽¹⁾ The January 30, 2009 Webb Associates Letter to San Gorgonio Pass Water Agency regarding "Update to Hydraulic and Sizing Review of City of Banning's Proposed Pipeline Extended from the Department of Water Resources East Branch Extension", discusses the costs associated with the upsizing of the Banning Pipeline. It is noted that this upsizing would not be required as a conveyance alternative because conveyance to the Banning basin would be accomplished by alternative projects as listed in this SGPWA Supplemental Water Supply Report herein.

⁽²⁾ The cost for the "Site 4 Recharge Facility" was based the cost as indicated in the August 15, 2008 Webb Associates Letter (see Attachment P-1) to San Gorgonio Pass Water Agency regarding "Cost Evaluation for Upsizing the Proposed Banning Pipeline Extending from the Department of Water Recourses East Branch Extension to Proposed Ground Water Recharge Basin at Pardee Homes Development and Construction of Recharge Facilities".

⁽³⁾ The cost for the "Recharge Facility at Robertson's Ready Mix Site" was based the cost indicated as an attachment to the April 9, 2009 Webb Associates E-Mail (see Attachment P-2) to San Gorgonio Pass Water Agency regarding "Capacity Fee Study for SGPWA"

⁽⁴⁾ As indicated in the March 11, 2009 letter, the Cabazon Pipeline would allow for conveyance between the Banning Pipeline and the Cabazon Basin and the cost associated with this project is \$17,856,000. It is noted that this conveyance pipeline is within the alternative projects as listed in this SGPWA Supplemental Water Supply Report herein and therefore the cost for this pipeline is already reflected herein.

⁽⁵⁾ ENR Index was not utilized in this summary as the index peaked in October 2008 and then gradually decreased. Sum of these costs was rounded.