Report

Redding Basin Water Resources Management Plan Environmental Impact Report

Prepared for

Shasta County Water Agency

January 2007

CH2MHILL
2525 Airpark Drive
Redding, CA 96001

Executive Summary

The Redding Basin (Basin) is bisected by the Sacramento River, the largest river in California, and is bounded on the north by the largest reservoir in California, Shasta Lake. The Basin also typically receives the most precipitation in California's Central Valley. Despite these water supply attributes, the water supplies available to a majority of the Basin's water purveyors are not adequate to meet current water demands in dry years.

Historically, the Redding Basin has been characterized by low population density and abundant natural resources. However, population growth in the Basin and potential cutbacks in surface-water supplies during drought conditions increase the possibility and magnitude of water supply shortfalls in the near term. Additionally, increased competition for surface-water supplies in other parts of the state for urban, agricultural, and environmental uses has stretched the current water delivery system beyond its original intended purposes. Operation of the current statewide system under drought conditions further impedes future water availability for many water purveyors.

Recognition of these challenges led to the initiation of the Redding Basin Water Resources Management Plan (Plan), which has resulted in several important findings:

- Collectively, basin purveyors will be water short in a critical dry year.
- Comprehensive and affordable solutions exist that would improve water supply reliability.
- Water transfers involving additional water from conjunctive use and/or water use efficiency projects are key to meeting Basin needs.
- A new institutional framework is necessary to implement the Plan and preserve autonomy of the purveyors.
- Monitoring is necessary to adapt the Plan and respond to future uncertainties.

Flexible, affordable solutions exist that both preserve the autonomy of water purveyors and ensure adequate water supply reliability through the planning horizon, which is the year 2030.

This Environmental Impact Report (EIR) evaluates the physical and social effects of implementing various water resources management actions identified in earlier phases of this regional planning effort. The Shasta County Water Agency is lead agency for preparation of the document under the California Environmental Policy Act (CEQA). This document was also developed to comply with the National Environmental Policy Act (NEPA). The U.S. Bureau of Reclamation (Reclamation) agreed in February 2005 to act as a lead agency under NEPA during the development of the EIR. After the release of the administrative draft document, Reclamation determined that the proposed actions were not defined well enough to justify its participation in that role. This delayed the release of the draft document while additional analysis was performed. However, additional analysis did not resolve Reclamation's concerns. After extensive consideration, the Shasta County Water

Agency made the decision to publish a CEQA-only document without a NEPA lead. Future actions that result from the Plan will be subject to NEPA review, and this document has been developed to facilitate that.

Study Area

The study area for this report is bounded on the north by Shasta Lake, on the south by the southerly boundary of Anderson-Cottonwood Irrigation District (ACID), on the west by Whiskeytown Lake, and on the east by the Palo Cedro area. The study area includes the Cities of Redding, Anderson, and Shasta Lake, the Town of Cottonwood, and surrounding unincorporated areas. The Basin has a population of about 150,000 people, encompasses approximately 275,000 acres, and includes the service areas of the water purveyors shown on Figure ES-1.

Basin water purveyors supply water for a variety of municipal and industrial (M&I), agricultural, and recreational water uses. Various physical, legal, economic, and institutional factors affect the availability and reliability of surface-water and groundwater supplies. These factors affect different purveyors in different ways and to different degrees. Some purveyors have access to multiple supply sources through different surface-water diversions or multiple surface-water or ground-water pumping facilities.

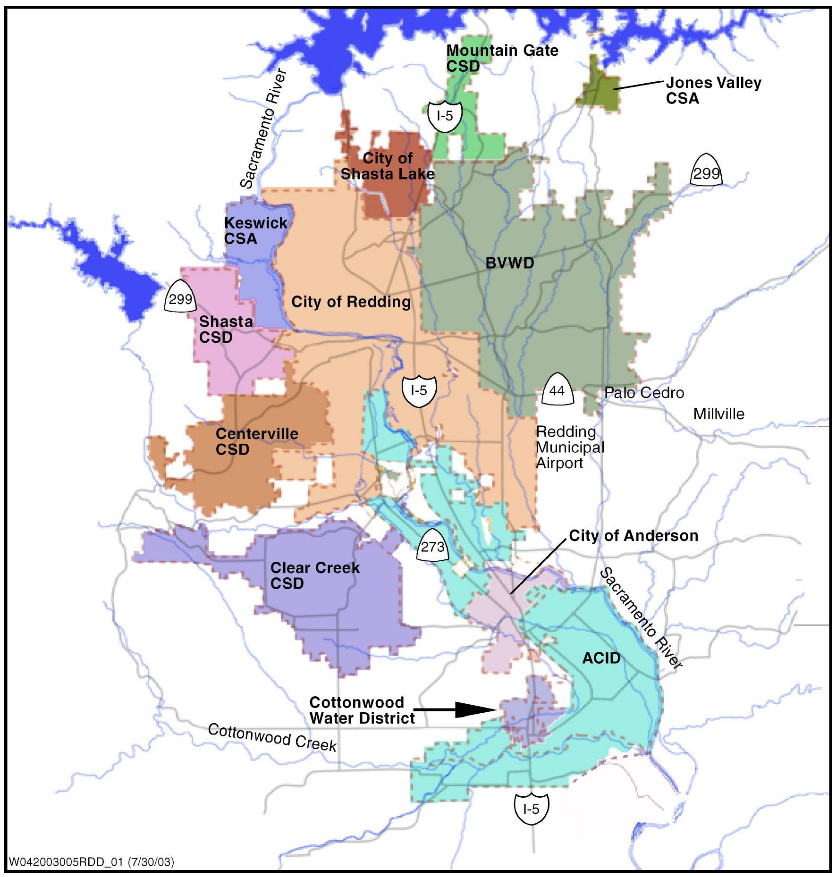


FIGURE ES-1
REDDING BASIN WATER PURVEYORS

Purpose and Need Statement

The purpose of the action is to implement a regional water resources scheme to improve water supply reliability throughout the Basin. This proactive regional approach would preserve local decision-making authority and local water rights, thus insulating local resources from the full impact of statewide droughts. Additionally, the Plan would promote better water management in the Basin, particularly during drought years, through groundwater management, system improvements, and better integration of surface-water and groundwater supplies.

This action is needed because of increasing demands on existing water supplies, especially during drought years when purveyors that rely exclusively on Central Valley Project (CVP) water supply contracts are particularly vulnerable to supply shortfalls.

Alternatives Considered

Previous phases identified conceptual alternatives to increase water supply reliability, specifically:

- Emphasis on surface-water transfers
- Emphasis on groundwater development
- A mix of surface-water transfers and groundwater development

These alternatives rely on water transfers to address geographic imbalances of water supply and demand. These alternatives have been refined for consideration in this document. Based on detailed review of water demands, water budgets, and recent renewals of federal water supply contracts, the conceptual alternatives outlined above have been revised and parsed into current and projected levels of development.

Current Level of Development (2005 Condition)

Alternatives to address *current* conditions are compared against a baseline condition called the No Project Alternative. The No Project Alternative is simply the current condition in the absence of the Plan. All of the proposed "Action" Alternatives include measures that could be implemented immediately to increase water supply reliability. These measures include the following:

- **Common Resources Pool** (common pool) for shared use of water resources in the Basin. The common pool would provide a mechanism for water to be transferred within the Basin on a long-term or short-term (year to year) basis. The advantages of a common pool are that transfers could be accomplished under pre-approved "umbrella" contract terms with the resource management agencies as opposed to negotiating individual agreements and seeking regulatory approval for transfers on a case-by-case basis.

- **Target Reliability Factors** (TRF) would be implemented in critical dry years. TRF indicate voluntary demand reductions that purveyors would enact in critical dry years. Demand would be reduced to 90 percent of the average annual M&I demand and 75 percent of the average annual agricultural demands for each purveyor under critical dry year conditions (a 1-in-10-year supply cutback).

Future Level of Development (2030 Condition)

Alternatives to address *future* conditions are compared against a baseline condition called the No Action Alternative. The No Action Alternative is the likely condition that would develop by the year 2030 in the absence of the Plan. The proposed "Action" Alternatives include physical projects that would be developed as needed, but before 2030, that would improve water supply reliability. These Alternatives include the following:

- **Alternative 1 – Conjunctive Use** would develop a series of groundwater wells within the ACID service area. The wells would allow ACID to provide groundwater to its customers, thus freeing up surface water for transfer to other purveyors in the Basin. The wells would be installed incrementally, as needed to meet growing demands. It is estimated that approximately 20 new agricultural wells capable of pumping 2,000 to 4,000 acre-feet each would be installed at full build out, with a maximum annual withdrawal of 44,000 acre-feet. The wells would be distributed throughout the ACID service district, just south of the City of Anderson.

- **Alternative 2 – Water Use Efficiency** would provide water savings from improvements to ACID's aging system of canals and laterals. Inefficient system facilities result in inordinately high system losses; about 50 percent of water entering the system is lost to seepage, operational spills, or other losses before delivery to customers. System improvements would consist of three canal lining projects along the main canal that would reduce seepage in sections of the canal identified to contribute greatly to water losses. Lining of these sections would result in an estimated water savings of 4,000 acre-feet which could be redirected throughout the Basin.
- **Alternative 3 – Combination** would combine the Conjunctive Use and Water Use Efficiency alternatives, as described above, to meet critical dry year demand projections for the year 2030.

Preferred Alternative

For this document, the preferred alternative is Alternative 3, which maximizes the operational flexibility of the Basin's water resources and best improves water supply reliability in the Basin.

Impact Summary

A number of potentially significant impacts have been identified in the EIR, all of which can be mitigated to a less-than-significant level. Areas of particular concern are biological resources impacted by lowered water tables near the ACID Main Canal and air quality during construction of agricultural wells. It is anticipated that mitigation will be necessary to offset these impacts. Based on current analyses, impacts to surface-water and groundwater resources are anticipated to be less than significant.

Summary of Impacts and Mitigation

Land Use

Less-than-significant impacts to existing land use, with mitigation. Mitigation includes locating potential groundwater wells in areas of compatible uses.

Biological Resources

Less-than-significant impact to habitat for sensitive or endangered species, following mitigation. Mitigation includes pre-construction surveys and following established guidelines for sensitive species, and will include avoidance and buffer zones where appropriate. Replacement habitat may also be required, per established mitigation ratios.

Cultural Resources

Less-than-significant impact to possible unidentified cultural resources, following mitigation. Mitigation includes preconstruction survey, where appropriate, and establishment of specific construction practices meant to protect cultural resources, should they be discovered during construction.

Aesthetic

Impacts would be less than significant without mitigation.

Water Resources

Impacts would be less than significant without mitigation.

Groundwater

Impacts would be less than significant without mitigation.

Power Resources

Impacts would be less than significant without mitigation.

Health and Safety

Impacts would be less than significant following mitigation. Mitigation includes implementation of spill-prevention practices during construction and use of appropriate fire-prevention equipment and practices on-site.

Air Quality Resources

Impacts would be less than significant without mitigation. However, established best management practices would be implemented to provide additional assurance of compliance with air quality regulations.

Noise

Impacts would be less than significant without mitigation.

Indian Trust Assets

Impacts would be less than significant without mitigation.

Environmental Justice

Impacts would be less than significant without mitigation.

Growth-inducing Impacts

Impacts would be less than significant without mitigation.

Possible Areas of Controversy

Actions taken under alternatives include construction of facilities that would change the way water is managed, particularly within the ACID service area. Construction of a conjunctive use project may be controversial to local landowners expressed concern over groundwater levels and the viability of their private wells. Lining portions of the ACID canal may also be controversial to people who have expressed an aesthetic preference for an unlined canal with vegetation over a concrete-lined canal. Concerns may also be raised regarding the potential impact of the Plan on population growth in the Basin. Concerns may be raised about the possibility of secure water supplies acting as a precursor to growth in the Basin.

New Institutional Requirements

Implementation of the Plan will require that a variety of new administrative activities be performed. These include administering the common pool, allocating the costs and benefits associated with the pool operation, monitoring the impacts of regional actions over time, adapting the Plan to respond to changing conditions, and reporting to the participants and federal and state resource management agencies.

Members of the Policy Advisory Committee that was established for this planning effort have voiced their concerns about supplanting the existing authorities of the participants or creating duplicative administrative processes to administer the Plan. However, the Shasta County Water Agency Act of 1957 provides a framework for administering the Plan without affecting, restricting, or superseding the rights or authorities of other municipalities, districts, or water supply entities in the Basin. Shasta County Water Agency's roles as the lead agency for preparation of this environmental document and for prior phases of this planning effort are consistent with the Agency's authorities and powers for managing basinwide water resources for regional benefit.

Contents

Page

Contents, Continued

Contents, Continued

Contents, Continued

Contents, Continued

Page

Figures

Acronyms and Abbreviations

--	no established standard
$\mu g/m^3$	micrograms per cubic meter
ac-ft	acre-feet (foot)
ac-ft/yr	acre-feet per year
ACHP	Advisory Council on Historic Preservation
ACID	Anderson-Cottonwood Irrigation District
APCD	Air Pollution Control District
APE	area of potential effect
AFRP	Anadromous Fish Restoration Program
AQMD	Air Quality Management District
Basin	Redding Basin
bgs	below ground surface
BMP	Best Management Practice
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQ	President's Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
COA	Coordinated Operating Agreement
CSA	Community Service Area

CSD	Community Service(s) District
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CWA	Clean Water Act
dBA	A-weighted decibel scale
Department	California Department of Water Resources
DOF	Department of Finance
DWR	Department of Water Resources
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EWA	Environmental Water Account
GAP	Gap Analysis Project
GIS	geographic information system
gpm	gallons per minute
GPS	global positioning system
ITA	Indian Trust Asset
kW	kilowatt
kWh	kilowatt hour
lb/day	pounds per day
L_{eq}	equivalent sound pressure level
M&I	municipal and industrial
MAF	million acre feet
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
mgd	million gallons per day
MOU	Memorandum of Understanding
msl	mean sea level
MWh	megawatt hours
NAAQS	national ambient air quality standards

NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOD	Notice of Determination
NOP	Notice of Preparation
No_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
OCAP	Operations Criteria and Plan
Other	Other Land
PAC	Policy Advisory Committee
PEIS	Programmatic Environmental Impact Statement
PG&E	Pacific Gas and Electric Company
Plan	Redding Basin Water Resource Management Plan
PM_{10}	particulate matter measuring 10 microns or less in aerodynamic diameter
$PM_{2.5}$	particulate matter measuring 2.5 microns or less in aerodynamic diameter
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
ppm	parts per million
PSD	prevention of significant deterioration
RAWC	Redding Area Water Council
Reclamation	U.S. Bureau of Reclamation
Regional Water Board	California Regional Water Quality Control Boards
REU	Redding Electric Utility
ROG	reactive organic gases

SCAQMD	Shasta County Air Quality Management District
SCWA	Shasta County Water Agency
Service	U.S. Fish and Wildlife Service
SIP	State Implementation Plan for Clean Air Act nonattainment areas
SO_2	sulfur dioxide
State Water Board	California State Water Resources Control Board
SWP	State Water Project
TAC	Technical Advisory Committee
TCD	Temperature Control Device
TDS	total dissolved solids
TMDL	Total Maximum Daily Loads
TRD	Trinity River Diversion
TRF	Target Reliability Factors
USC	United States Code
USCA	United States Code Amended
USGS	U.S. Geological Survey
VOC	volatile organic compound
Water Code	California State Water Code
Western	Western Area Power Administration

SECTION 1.0

Introduction

This Environmental Impact Report (EIR) addresses the implementation of the Redding Basin Water Resources Management Plan (Plan). The document evaluates the potential environmental impacts resulting from the comprehensive implementation of the Plan and implementation of specific actions recommended in the Plan. The EIR provides a framework for the adoption of individual site-specific evaluations for water projects because it is anticipated that the components of the alternatives would be built incrementally (e.g., individual wells would be installed as necessary, rather than all at once). The EIR assesses broad impacts (e.g., hydrologic changes throughout the Redding Basin [Basin], defined under study area, below), and site-specific impacts (e.g., location of projects near sensitive habitats and communities) where known.

Shasta County Water Agency (SCWA) is the lead agency under California Environmental Policy Act (CEQA). SCWA, which represents water purveyors in the Basin as a regional water planning agency, proposes to implement the Plan in a cooperative manner with the purveyors and applicable regulatory agencies. Although there is no lead agency identified, this document also complies with the National Environmental Policy Act (NEPA). The U.S. Bureau of Reclamation (Reclamation) initially agreed in February 2005 to act as a lead agency under NEPA during the development of the EIR. After circulation of the administrative draft, Reclamation determined that the proposed actions were not defined well enough to justify its participation in that role. This delayed release of the document while additional analysis was performed. Ultimately, the additional analysis did not resolve Reclamation's concerns. After extensive consideration, SCWA made the decision to publish a CEQA-only document without a NEPA lead. Future actions that result from the plan will, however, be subject to NEPA review. Accordingly, this document has retained its NEPA analysis to facilitate NEPA review at a future date.

Future water transfers resulting from implementation of the Plan would be subject to Reclamation review. In addition, the Plan recommends facilities, including groundwater development and other system improvements, that are outside the purview of Reclamation. Construction-related activities have the greatest likelihood of resulting in significant, unavoidable impacts. If such impacts were to occur, CEQA review would necessitate an EIR. Therefore, this report is structured to serve as an Environmental Assessment under NEPA (if a federal lead agency were to use this document to comply with NEPA) and an EIR under CEQA.

1.1 Study Area

The study area for this report is bounded on the north by Shasta Lake, on the south by the southerly boundary of the Anderson-Cottonwood Irrigation District (ACID), on the west by Whiskeytown Lake, and on the east by the Palo Cedro area. The study area includes the Cities of Redding, Anderson, and Shasta Lake, the Town of Cottonwood, and surrounding unincorporated areas. The Basin has a population of about 150,000, encompasses approximately 275,000 acres, and includes the service areas of the water purveyors shown on Figure 1-1.

Basin water purveyors supply water for a variety of municipal and industrial (M&I), agricultural, and recreational water uses. Various physical, legal, economic, and institutional factors affect the availability and reliability of surface-water and groundwater supplies. These factors affect different purveyors in different ways and to different degrees. Some purveyors have access to multiple supply sources through different surface-water diversions or multiple surface-water or groundwater pumping facilities. Figure 1-2 shows the current water sources of the Basin water purveyors.

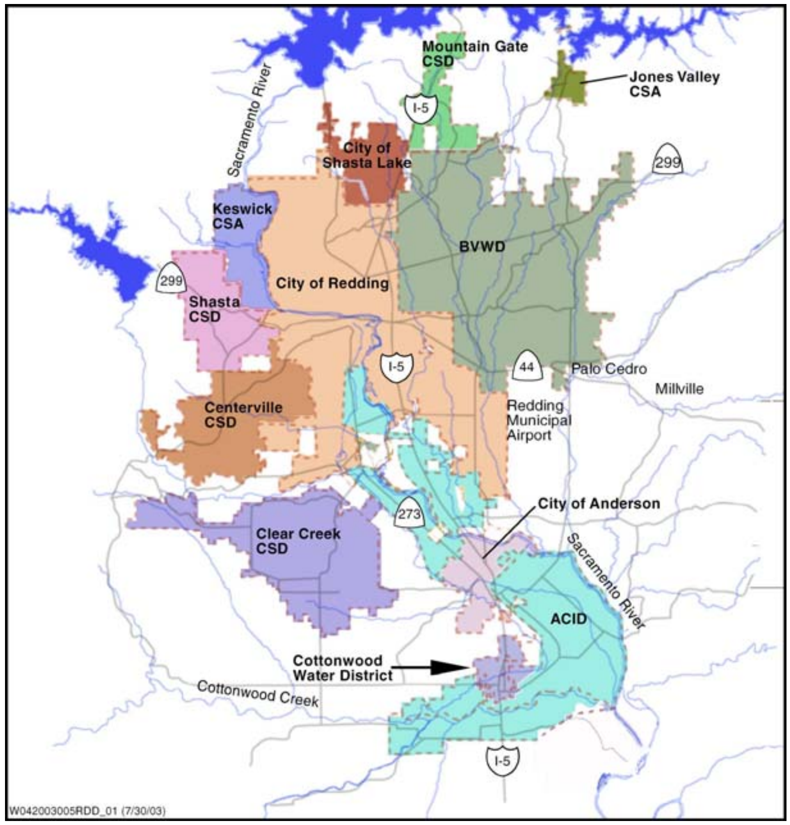


FIGURE 1-1
REDDING BASIN WATER PURVEYORS

1.2 Problem Statement

Local water purveyors who contract with Reclamation for all or part of their water supply were subject to cutbacks of up to 75 percent of their contract allocations during the drought of the late 1980s and early 1990s. Cutbacks in supply have continued in the ensuing years, even during periods of average precipitation and runoff. Reductions in supply are becoming more common as additional demands are placed on the state's water supply systems. Potential reductions might be even more severe and more frequent as additional demands are placed on the state's water supply systems.

Shortages in supply create severe hardships among the local water users. Table 1-1 outlines water demands for purveyors at the current (2005) and future (2030) levels of development. Table 1-1 also outlines projected critical dry-year supplies for both 2005 and 2030. Overall, the Basin is projected to be in a water supply deficit for both the 2005 and 2030 levels of development.

Reductions in surface-water supply can have negative impacts on purveyors that do not have access to alternative sources. As demand is expected to increase, future shortages are more likely to occur. The Plan would provide the mechanism for reliability that the purveyors need to meet current and future water needs both in normal and critical dry years.

PURVEYORS	WATER SUPPLY SOURCES			
	Settlement Contract (Pre-1914 Water Right)	Post-1914 Water Right	CVP Water Supply Contract	Groundwater
City of Anderson				●
ACID	◒		○	
Bella Vista Water District		○[a]	◒[b]	○
Centerville Community Services District (CCSD)			●	
Clear Creek Community Services District (CSD)			●[b,d]	
Cottonwood Water District				●
Jones Valley County Service Area (CSA)		◒	◒	
Keswick County Service Area (CSA)			●	
Mountain Gate (CSD)			◒	◒
City of Redding	◒		◒	◒
City of Shasta Lake			●	
Shasta (CSD)			●	
The McConnell Foundation			●[e]	
Large Industrial				●[f]

WB012007005RDD_09 (1/22/07)

a Privately held water rights.
b CVP contract includes provisions for M&I and agricultural uses.
c Centerville has purchased a portion of the Townsend Flat WaterDitch Company's water supplies, which were pre-1914 water rights but are now covered by a CVP water supply contract.
d Clear Creek CSD has two wells, but they may only be used for emergencies.
e Privately held CVP exchange contract water may be used within existing CVP service areas in Shasta County.
f ACID supplies a small portion of industrial demands.

Legend:
● Sole Source
◒ Primary Source
○ Minor Source

FIGURE 1-2
REDDING BASIN WATER PURVEYORS' SOURCES OF SUPPLY

TABLE 1-1
Water Demand Estimates Compared to Supply in Critical Dry Water Years
Redding Basin Water Resources Management Plan EIR

Water Purveyor	Water Demand 2005	Critical Dry-year Water Supply 2005	Water Demand 2030	Critical Dry-year Water Supply 2030
Mountain Gate CSD	1,270	810	1,900	810
Jones Valley CSA	260	0	400	0
City of Shasta Lake	3,440	2,640	6,200	2,640
Keswick CSA	210	0	300	0
Shasta CSD	800	919	1,900	600
City of Redding	35,600	29,460	62,000	58,316
Bella Vista Water District	23,700	16,926	26,800	8,324
Centerville CSD	1,700	2,100	3,600	2,100
Clear Creek CSD	9,400	8,568	10,600	5,508
City of Anderson	2,900	3,700	5,400	7,500
Cottonwood Water District	800	1,000	1,100	1,100
ACID	92,700	93,431	92,700	93,750
McConnell Foundation	0	5,100	0	5,100
SCWA	0	613	0	613
Total	172,780	169,123	212,900	190,045

Notes:

Jones Valley Community Service Area has no permanent allocation; they subcontract with SCWA.

Keswick Community Service Area water supply is currently zero because 500 acre-feet (ac-ft) of surface water were transferred to SCWA.

Units are in ac-ft.

1.3 Purpose, Need, and Objectives

Purposes and objectives of the proposed plans are used by lead agencies to help develop a reasonable range of alternatives to evaluate in an EIR and to guide selection of alternatives.

1.3.1 Statement of Purpose and Need

The purpose of the action is to implement a regional water resources scheme to improve water supply reliability throughout the Basin. This proactive regional approach would preserve local decisionmaking authority and local water rights, thus insulating local resources from the full impact of statewide droughts. Additionally, the Plan would promote better water management in the Basin, particularly during drought years, through groundwater management, system improvements, and surface-water and groundwater planning.

This action is needed because of increasing demands on existing water supplies, especially during droughts when purveyors rely exclusively on CVP water supply contracts and are particularly vulnerable to supply shortfalls.

1.3.2 Objectives

The following project objectives are based on the goals and principles set forth by the Plan:

1. Provide affordable, high-quality water supplies to support a diversified and stable economy and preserve environmental values in the Basin.
2. Improve basinwide water supply reliability under dry-year hydrologic conditions and extended droughts.
3. Improve local and regional control of water resources in the Basin.
4. Increase flexibility to use alternative sources of supply during droughts or emergencies.
5. Preserve the autonomy of existing water purveyors to set user rates and establish policies that are appropriate for their respective service area.
6. Develop regional guidelines to encourage efficient water use.
7. Provide a planning framework and analytical tools to help facilitate ongoing regional water management.

1.4 Background and History

The Redding area has an abundance of water resources. It is bisected by California's largest river, the Sacramento River; overlies one of the state's largest groundwater basins; and is near major federal facilities used to manage water in the state, the Shasta and Trinity River Divisions of the CVP. However, since the early 1990s, Redding area surface-water purveyors have been subjected to seasonal shortages because of reductions in their CVP supply allocations. These shortages are a result of the highly variable hydrology of California and the increasing pressure on water supply systems from population growth and increased water allocations for environmental purposes. Shortages for purveyors in the water-rich Basin demonstrate the need for a more diversified and reliable water supply.

Opportunities exist for improving water supply reliability in the Basin through cooperative actions of local water purveyors. Available supplies and estimated demands for the local purveyors are identified in Table 1-1. The year 2005 represents current level of development; the year 2030 is an estimate of the future level of development consistent with accepted planning horizon of general plans in the region. Table 1-1 identifies a deficit of approximately 3,600 ac-ft in the potential 2005 drought year, and a larger water shortage of 23,000 ac-ft for a critical dry year at the 2030 projected level of development. These projected shortages are the basis for cooperative arrangements in the near term and highlight the need for additional water sources in the future.

Reclamation operates the CVP, the largest water supply system in California, encompassing reservoirs, canals, and diversion facilities throughout the Central Valley. Overall, the Basin is heavily dependent on CVP water supply contracts. All of the surface water delivered in the Basin is delivered from CVP facilities. The CVP provides water to individual entities through various types of contracts. Nine purveyors in the Basin rely in whole or in part on CVP contracts for their water supply.

1.4.1 Redding Area Water Council

Implementation of the Plan would be administered by a cooperative agreement of the Redding Area Water Council (RAWC). The RAWC is a consortium of water purveyors, which was formed in June 1993. The RAWC was an outgrowth of the Redding Area Groundwater Committee, which had been established several years earlier. The RAWC provided a forum for local water interests to address water supply planning issues as the 1986 to 1992 drought continued and serious impacts were being experienced by local water users. The RAWC representatives provide input to their governing boards or city councils, but RAWC is not legally authorized to take action on behalf of these governing entities. The following members of RAWC have participated in the regional planning efforts to date:

- City of Anderson
- ACID
- Bella Vista Water District
- Centerville CSD
- Clear Creek CSD
- Cottonwood Water District
- Jones Valley CSA
- Keswick CSA
- Mountain Gate CSD
- McConnell Foundation
- City of Redding
- Shasta CSD
- SCWA
- City of Shasta Lake

The RAWC's governing entities initiated a long-term regional water resources planning effort for the Basin in June 1996. SCWA was the lead agency for this effort, providing staff time to coordinate the effort and support specific activities.

1.4.2 Prior Phases of Planning

As shown on Figure 1-3, an iterative process was used to develop, evaluate, and compare alternative concepts for improving water supply reliability in the Basin. The process began with the development of three concept-level alternatives to achieve overall water supply reliability goals. For this study, the three alternatives embody varying degrees of reliance on surface water and groundwater, plus other potential management actions. At one end of the spectrum, the use of the surface-water supplies available through CVP water supply contracts and Sacramento River Settlement Contracts would be maximized. At the other end of the spectrum, a significant shift to greater reliance on groundwater would occur. Between these two boundary conditions, an alternative was developed to provide balanced use of both resources. This process provided a starting point for further analysis and refinement of these basic concepts. The analysis has proceeded through three phases.

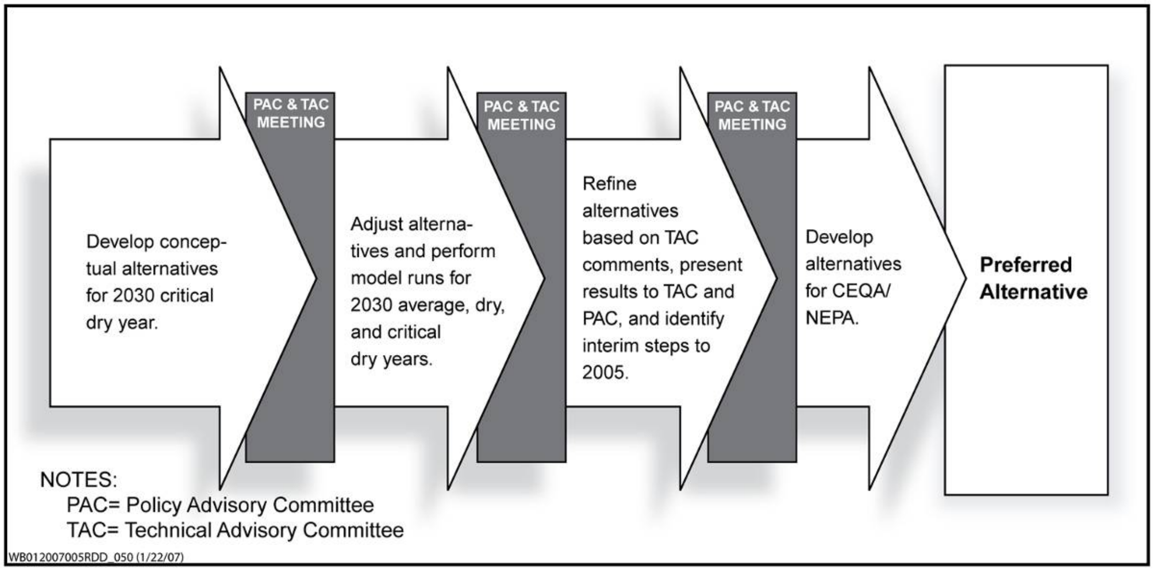


FIGURE 1-3
PLANNING PROCESS

1.4.2.1 Phase 1

Phase 1 of the planning process was initiated in September 1996 and completed in October 1997. Phase 1 documented current land uses in Shasta County and the Basin, current water supplies, and current and projected land uses and associated water needs through the year 2030. The Phase 1 Report, *Current and Future Water Needs,* documented the results of Phase 1.

Land uses for 1995 were identified from the aerial photographs and a geographic information system (GIS) database from the California Department of Water Resources (Department) Northern District office in Red Bluff. Mapping provided by the Department was reviewed with the water purveyors, and minor adjustments were made to reflect actual land uses for the period of analysis. Projections of future population and land uses were developed from State Department of Finance (DOF) projected growth rates and the applicable general plans of the local agencies.

The Phase 1 report documented 55,300 acres of land using water in the Basin for the year 1995 (the base year for the report). Land uses were distributed as follows:

- 42.1 percent for agricultural uses
- 41.2 percent for urban uses
- 9.1 percent for recreational and environmental uses
- 7.6 percent for commercial and industrial uses

In 1995, 280,460 ac-ft of water were diverted (surface water and groundwater) to meet these needs. These diversions included those of the Basin’s water purveyors, major industrial users, private water users in unincorporated areas, and water delivered through the ACID system to irrigators in Tehama County. Approximately two-thirds of the Basin’s water needs are met by 12 water purveyors.

The estimated population of the Basin in 1995 was 130,225 and this population was projected to grow to 261,275 by 2030. The projected water need for the year 2030 was

342,350 ac-ft, an increase of about 62,000 ac-ft over the total diversions in 1995. The predominant changes in land use projected for the future involve a continuing conversion of non-water-using lands and some agricultural lands to urban, commercial, and industrial uses. Growth in commercial and industrial water use was assumed to increase at about the same rate as basinwide population growth (3 percent per year).

In Phase 1, it was concluded that current water supplies are inadequate to meet the existing water needs of some purveyors during critical dry-year conditions. Some that have adequate supplies now will need new supplies to fully meet the future requirements of a growing population. The Phase 1 report suggested that by the year 2030, more than 81,000 ac-ft of supplemental supplies would be needed to meet the total water requirements (including industrial groundwater pumping) in the Basin during a critical dry year. It is likely that CVP contractors might face more frequent cutbacks than was anticipated then; therefore, the impact of supply shortfalls might be even greater than was originally projected.

The Phase 1 report provided recommendations for potential interim actions to help address the current and projected supply shortfalls. It was also recommended that development and evaluation of alternative concepts for basinwide water management solutions be completed.

1.4.2.2 Phase 2

Phase 2A. Phase 2 of the planning process was initiated in October 1998. Initial elements of Phase 2 (Phase 2A) included forming committees to guide the study efforts, identifying water supply problems and opportunities for each purveyor, setting preliminary goals, listing environmental and institutional concerns, establishing an approach for developing an integrated groundwater/surface-water model of the Basin, developing a Memorandum of Understanding (MOU) among the participants, developing a groundwater management plan, and developing a work plan for future activities. A public information component was also developed to inform and obtain input from affected agencies and the public.

In November 1998, RAWC adopted the Redding Basin Groundwater Management Plan developed in Phase 2A. The agencies that signed the MOU provided input during the development and review of the Plan. The purposes of the plan were as follows:

- Avoid or minimize conditions that adversely affect groundwater availability and quality in the Basin.
- Develop a monitoring and data collection program to help protect local beneficial use of Basin groundwater resources.
- Implement the elements of the Redding Basin Groundwater Management Plan by achieving basinwide consensus, whenever possible.

The Redding Basin Groundwater Management Plan was developed because of the vital role that groundwater will play in meeting the Basin's water supply needs for the future. The plan is effective within the jurisdictional boundaries of the participating public entities. It includes sections addressing data development, groundwater monitoring, public entity coordination and monitoring, public information and education, export limitations, water quality, wellhead protection, land use, conjunctive use operations, groundwater management facilities, and groundwater overdraft and well interference. The plan is intended to provide a starting point for regional cooperation in managing local groundwater resources. The Redding Basin Groundwater Management Plan will be updated as specific actions are defined under the regional plan.

Phase 2B. Phase 2B was initiated in March 1999. The scope of work for this phase included establishing goals for the Plan and identifying and screening potential actions to increase the reliability of water supplies within the Basin. It also included the development of an integrated water resources model for the Basin. Numerous public outreach activities were also conducted during this phase of the work. Presentations were made to the city council or governing board of each purveyor, three public presentations were made (Cities of Shasta Lake, Redding, and Anderson), and presentations were made to several community groups.

The development of the integrated water resources model was a major element of the work in Phase 2B. The model is a useful tool to help evaluate the seasonal and long-term impacts of future water management plans within the Basin. Examples of the types of impacts that can be evaluated using the model are changes in groundwater levels and stream flows, and availability of water during droughts.

The model was developed to readily facilitate future updates, as additional information is collected as part of the monitoring program included in the Redding Basin Groundwater Management Plan. The model includes separate land use, water conveyance, surface hydrology, and subsurface hydrology modules.

Land use data for 1969, 1976, 1982, and 1995 were input to a GIS database. The GIS database also includes the boundaries of purveyor service areas, sources of water supply, wastewater service areas, consumptive use factors for each land use, specific geographic units by which to assess groundwater conditions, and surface-water drainage areas. The GIS database is linked to a Microsoft® Access database that is used to compute the monthly water demand for each geographic area of the Basin, determine the water supply source that would be used to meet that demand, determine the fate of the delivered water, estimate the groundwater recharge for each model node, compute the water demand for each purveyor, and compute the return flow for each water delivery.

The surface hydrology module is used to account for flow in surface streams and canals on a monthly basis. The surface-water drainage network was divided into different reaches of the major creeks, canals and drains, and the Sacramento River. The water budget for each reach is computed by summing various groundwater inflows and outflows so that reasonable estimates of the linkage between surface water and groundwater can be developed.

The subsurface hydrology module consists of a four-layer groundwater flow model that incorporates information on hydraulic conductivity, aquifer thickness, streambed permeability, and aquifer storativity. This module computes groundwater levels throughout the Basin using water budget information developed for the other modules.

Hydrologic information was also developed for years from 1969 through 1995. This provided a representative range of land use and hydrologic conditions by which to calibrate the model to known conditions. The model was calibrated against known historical data.

Phase 2C. Phase 2C included the development and evaluation of preliminary regional water resources management alternatives. Employing various combinations of the actions identified in Phase 2B developed these alternatives. Initial work included the establishment of a PAC, which provided input for the development of policy guidelines that were used to develop and evaluate initial conceptual alternatives. The TAC, which was developed in Phase 1, also provided input to the study effort; and both the PAC and TAC reviewed draft work products. The PAC and TAC reviewed planning assumptions identified in Phase 2B, and adjustments were made as appropriate. These assumptions and policy guidelines provided a framework for developing three conceptual alternatives, which were then presented to TAC and PAC for discussion.

The three conceptual alternatives embody varying degrees of reliance on surface water and groundwater, plus other potential management actions. At one end of the spectrum, the use of surface-water supplies available through CVP water supply contracts and Sacramento River Settlement Contracts would be maximized. At the other end of the spectrum, a significant shift to greater reliance on groundwater would occur. Between these two boundary conditions, an alternative was developed to provide balanced use of both surface water and groundwater. This set of conceptual alternatives provided a starting place for further analysis and refinement of these basic strategies. Model runs were then performed to evaluate the physical impacts of these alternatives on groundwater levels and flows in surface streams. The model runs provided an initial assessment of the impacts of each alternative on the basinwide water budget. Refinements were then made to the alternative involving balanced use of surface water and groundwater, and additional model runs were performed. All of these results were presented to PAC and TAC.

1.4.2.3 Phase 3

Phase 3 will include preparation of environmental documentation leading to selection of a preferred basinwide alternative and initial tasks to support implementation of the long-term plan. The implementation plan will include a recommendation concerning the institutional framework and methodology to allocate costs and benefits to the participants.

1.5 Applicable Regulatory Requirements and Required Coordination

This section describes key approvals and permits that will be necessary to implement the project and the mechanisms and agency consultations required to comply with various regulations.

1.5.1 State and Local Requirements

1.5.1.1 California Environmental Quality Act

CEQA (Public Resource Code 21000 et seq.) is regarded as the foundation of environmental law and policy in California. CEQA's primary objectives are as follows:

- Disclose to decisionmakers and the public the significant environmental impacts of proposed activities.

- Identify ways to avoid or reduce environmental damage.
- Prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures.
- Disclose to the public the reasons for agency approval of projects with significant environmental impacts.
- Foster interagency coordination in the review of projects.
- Enhance public participation in the planning process.

CEQA applies to all discretionary activities that are proposed or approved by California public agencies, including state, regional, county, and local agencies, unless an exemption applies. CEQA mandates that public agencies comply with both procedural and substantive requirements. Procedural requirements include the preparation of the appropriate environmental documents, mitigation measures, alternatives, mitigation monitoring, findings, statements of overriding considerations, public notices, scoping, responses to comments, legal enforcement procedures, citizen access to the courts, notice of preparation (NOP), agency consultation, and State Clearinghouse review.

CEQA's substantive provisions require that agencies address environmental impacts, disclosed in an appropriate document. When avoiding or minimizing environmental damage is not feasible, CEQA requires that agencies prepare a written statement of the overriding considerations that resulted in approval of a project that will cause one or more significant impacts on the environment. CEQA establishes a series of action-forcing procedures to ensure that agencies accomplish the purposes of the law. In addition, under the direction of CEQA, the California Resources Agency has adopted regulations, known as the "State CEQA Guidelines," which provide detailed procedures that agencies must follow to implement the law.

1.5.1.2 California Endangered Species Act

The California Endangered Species Act (ESA) (Fish and Game Code Sections 2050 to 2097) is similar to the federal ESA. California's Fish and Game Commission is responsible for maintaining lists of threatened and endangered species under California ESA. The California ESA prohibits the "take" of listed and candidate (petitioned to be listed) species. "Take" under California law means to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (see California Fish and Game Code, Section 86).

1.5.1.3 Natural Community Conservation Planning Act

The Natural Community Conservation Planning Act (Fish and Game Code, Section 2800 et seq.) was enacted to form a basis for broad-based planning to provide for effective protection and conservation of the state's wildlife heritage, while continuing to allow appropriate development and growth. The purpose of natural community conservation planning is to sustain and restore those species and their habitats identified by the California Department of Fish and Game (CDFG) that are necessary to maintain the continued viability of biological communities impacted by human changes to the landscape. A Natural Community Conservation Plan identifies and provides for those measures necessary to conserve and manage natural biological diversity within the plan area while allowing compatible use of the land. CDFG may authorize the take of any identified species, including listed and non-listed species, pursuant to Section 2835 of the Natural Community Conservation Planning Act, if the conservation and management of such species is provided for in an Natural Community Conservation Plan approved by CDFG.

1.5.1.4 Porter-Cologne Water Quality Control Act

In 1967, the Porter-Cologne Water Quality Control Act (Porter-Cologne Act) established the California State Water Resources Control Board (State Water Board) and nine California Regional Water Quality Control Boards (Regional Water Board) as the primary state agencies with regulatory authority over water quality and appropriative surface-water-rights allocations. The State Water Board administers the Porter-Cologne Act, which provides the authority to establish water quality control plans that are reviewed and revised periodically; the Porter-Cologne Act also gives the State Water Board the authority to establish statewide plans.

The nine Regional Water Boards carry out State Water Board policies and procedures throughout the state. The State Water Board and the Regional Water Boards also carry out sections of the Clean Water Act (CWA), administered by U.S. Environmental Protection Agency (EPA), including the National Pollutant Discharge Elimination System (NPDES) permitting process for point-source discharges and CWA Section 303 water quality standards program.

Water quality control plans, also known as Basin plans, designate beneficial uses for specific surface-water and groundwater resources and establish water quality objectives to protect those uses. These plans can be developed at the State Water Board or Regional Water Board level. Regional Water Boards issue waste discharge requirements for the major point-source waste dischargers, such as municipal wastewater treatment plants and industrial facilities. While acting on water rights applications, the State Water Board might establish terms and conditions in a permit to carry out water quality control plans.

1.5.2 Federal Requirements

1.5.2.1 National Environmental Policy Act

NEPA (42 United States of Code [USC] 4321; 40 Code of Federal Regulations [CFR] 1500.1) applies to all federal agencies and to most of the activities they manage, regulate, or fund that affect the environment. It requires all agencies to disclose and consider the environmental implications of their proposed actions. NEPA establishes environmental policies, provides an interdisciplinary framework for preventing environmental damage, and contains “action-forcing” procedures to ensure that federal agency decisionmakers take environmental factors into account.

NEPA requires the preparation of an appropriate document to ensure that federal agencies accomplish the law’s purposes. The President’s Council on Environmental Quality (CEQ) has adopted regulations and other guidance, including detailed procedures that federal agencies must follow to implement NEPA. CEQ regulations (Section 1506.6) include provisions for public involvement. Agency pursuit of public involvement might include the following:

- Providing public notice of NEPA-related hearings, public meetings, and the availability of environmental documents

- Holding or sponsoring public hearings or public meetings
- Soliciting appropriate information from the public
- Explaining in its procedures where interested persons can get information or status reports on Environmental Impact Statements (EIS) and other elements of the NEPA process
- Making EISs, the comments received, and any underlying documents available to the public pursuant to the provisions of the Freedom of Information Act (5 USC 552)

A federal lead agency would use this document to comply with CEQ regulations and document its decisionmaking process under NEPA.

1.5.2.2 Federal Endangered Species Act

The ESA requires that both U.S. Fish and Wildlife Service (Service) and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) maintain lists of threatened and endangered species. An endangered species is defined as “any species which is in danger of extinction throughout all or a significant portion of its range.” A threatened species is defined as “any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range” (16 United States Code Amended [USCA] Section 1532). Section 9 of the ESA makes it illegal to take any endangered species of fish or wildlife and most threatened species of fish or wildlife (16 USCA Section 1538). Section 7 of the ESA requires that federal agencies consult with the Service on any actions that might destroy or adversely modify critical habitat. Critical habitat is defined as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of the ESA, on which are found those physical or biological features (1) essential to the conservation of the species and (2) which might require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of the ESA, upon a determination by the Secretary of the Interior or the Secretary of Commerce that such areas are essential for the conservation of the species (16 USCA Section 1532). NOAA Fisheries’ jurisdiction under ESA is limited to the protection of marine mammals, and fish and anadromous fish; all other species are within the Service’s jurisdiction.

Section 7 of ESA requires that all federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of habitat critical to such species’ survival. To ensure against jeopardy, each federal agency must consult with the Service or NOAA Fisheries, or both, regarding federal agency actions. The consultation is initiated when the federal agency determines that its action might affect a listed species and submits a written request for initiation to the Service or NOAA Fisheries, along with the agency’s biological assessment of its proposed action. If the Service or NOAA Fisheries concurs with the action agency that the action is not likely to adversely affect a listed species, the action may be carried forward without further review under ESA. Otherwise, the Service or NOAA Fisheries, or both, must prepare a written Biological Opinion describing how the agency action will affect the listed species and its critical habitat.

1.5.2.3 Clean Water Act

The CWA is the principal federal legislation designed to protect the quality of the nation's waters. The purposes of CWA include "the protection and propagation of fish, shellfish, and wildlife." The EPA is charged with implementing most of CWA, including Section 303, which contains provisions for establishing and meeting water quality standards. The CWA provides for establishment of Total Maximum Daily Loads (TMDL) where water bodies are not meeting established water quality standards. The CWA includes provisions for states to assume much of the implementation responsibility, which is largely the case in California. (See previous discussion on the Porter-Cologne Water Quality Control Act.) The CWA programs implemented by California include the NPDES program under CWA Section 402.

1.5.2.4 Central Valley Project Improvement Act

The Central Valley Project Improvement Act (CVPIA) granted the right to all individuals who receive CVP water (through contracts for water service, repayment contracts, water right settlements, or exchange contracts) to sell this water to other parties for reasonable and beneficial purposes.

The Secretary of the Interior must approve each transfer and might not approve a transfer involving water under CVP contracts if it will impair CVP's ability to meet its obligations to CVP users or to fish and wildlife. Transfers of more than 20 percent of the amount of water under contract within any controlling district require mandatory public review and the approval of the district. Transfers of CVP water must be authorized within 90 days from the date a complete transfer proposal is received by Reclamation, the reviewing agency. If Reclamation fails to make a decision within the time allotted, the transfer is deemed approved.

Reclamation issues its decision regarding potential CVP transfers in coordination with the Service, contingent upon the evaluation of impacts on fish and wildlife. A CVP transfer approval must be accompanied by appropriate documentation under NEPA and must be in compliance with other applicable state and federal laws.

The State Water Board generally considers transfers of water under CVP water service or repayment contracts, water rights settlement contracts, or exchange contracts within the CVP place of use to be internal actions and not subject to State Water Board review. However, where a water right limits the place of use to a specific watershed, it is anticipated that transfers of water outside the watershed would require State Water Board approval. Transfers of CVP water outside the CVP service area require State Water Board review and approval. Transfers to non-CVP parties are allowed, although Reclamation levies an additional fee on these transfers. Transfers to CVP users for lands outside the CVP service area are limited to the average quantity of contract water delivered to the contracting district or agency during the last 3 years of normal water deliveries prior to the date of enactment of CVPIA.

1.6 Decision to Be Made Regarding Potential Actions

1.6.1 Alternatives

This EIR considers the Proposed Project and alternatives to the project. The following alternatives are compared against No Project (CEQA baseline in 2005) and No Action (NEPA baseline in 2030) conditions in Section 3. Detailed descriptions of these alternatives are presented in Section 2.

- No Project Alternative and No Action Alternative – Purveyors would not work collectively to meet projected demands in the Basin. Each purveyor would meet increased demand with its own water resource.
- Alternative 1 – Development of conjunctive use program to meet projected deficits.
- Alternative 2 – Development of water use efficiency program to meet predicted deficits.
- Alternative 3 – A mix of conjunctive use and water use efficiency.

1.6.2 Preferred Alternative and Potential Decision Outcomes

Reclamation and SCWA, with input from the Service, NOAA Fisheries, CDFG, and other regulatory decisonmakers, will use this EIR to select an alternative for implementing the Plan. This decision will be made on the basis of a full understanding of the environmental consequences of each alternative. Possible decision outcomes include the following:

- Take no action
- Approve the proposed action, which is to implement the Plan
- Recommend another action

1.6.3 Decision Timeline

The final decision is scheduled to be made in March 2007, pending a full review of comments received on this Public Draft EIR.

1.7 Areas of Controversy

Actions taken under alternatives include construction of facilities that would change the way water is managed, particularly within the ACID service area. Construction of a conjunctive use project might be controversial to local landowners who have expressed concern over groundwater levels and the viability of their private wells. Lining of portions of the ACID canal might also be controversial to people who have expressed an aesthetic preference for an unlined canal with vegetation over a concrete-lined canal. Reclamation staff has taken issue with the proposed transfer of water conserved through canal lining. Concerns might also be raised regarding the potential impact of a water plan on population growth in the Basin. Some people might consider the availability of secure water supplies to be a precursor to growth in the Basin.

SECTION 2.0

Alternatives

This section summarizes the development of alternatives for Plan implementation and describes those considered in this EIR. Information in this section builds on earlier planning phases.

2.1 Initial Screening

Under CEQA, Section 15126.6, an EIR must identify a range of reasonable alternatives to the Project or the location of the Project "which would feasibly attain most of the basic objectives of the Project but would avoid or substantially lessen any of the significant effect of the Project."

The lead agency and Basin water purveyors comprehensively reviewed a range of preliminary alternatives during earlier phases of this project. Public scoping meetings were held to obtain additional input and guidance for potential project alternatives. The purpose and need statement outlined in Section 1, Purpose, Need, and Objectives, limited the range of alternatives considered in this document. Based on these objectives, a range of alternatives were identified and evaluated for improving water supply reliability in the Basin.

2.2 Development of Alternatives

The alternatives described in this report are part of a three-phase process conducted to develop the Plan. The following summarizes actions and results of each phase.

2.2.1 Phase 1

The first phase identified current and projected land and water use in the Basin. Land uses for 1995 were identified from the aerial photographs and a GIS database developed by the Department of Water Resources (DWR) Northern District office. Phase 1 assessed water use on 55,300 acres of land.

2.2.2 Phase 2

The second phase of the process included several steps, grouped into Phase 2A, 2B, and 2C. Phase 2A included the formation of two committees – PAC and the TAC, composed of purveyor representatives. The PAC and TAC were chartered to guide study efforts, identify water supply problems and opportunities for each purveyor, set preliminary goals for the planning effort, establish groundwater and surface-water models of the Basin, and develop an MOU for the Plan. The MOU provided the basis for regional cooperation in local groundwater management.

The MOU identified the following purposes, which were used to guide the process:

- Avoid or minimize conditions that adversely affect groundwater availability and quality within the Basin.
- Develop a monitoring and data collection program to help protect local beneficial uses of the Basin's groundwater resources.
- Implement the elements of the Plan by achieving basinwide consensus, whenever possible.

Phase 2B identified potential alternatives to increase reliability of water supplies within the Basin and developed an integrated water resource model. The model was used to help evaluate the seasonal and long-term impact of potential water management plans within the Basin.

Phase 2C established the following three concept-level alternatives for consideration by the PAC and TAC:

- **Conceptual Alternative 1** – Primary Reliance on Surface Water or Water Use Efficiency. This alternative relies primarily on surface water, with modest increases in groundwater pumping to accommodate growth or to help accommodate transfers of surface water.
- **Conceptual Alternative 2** – Primary Reliance on Groundwater or Conjunctive Use. This alternative relies primarily on groundwater development. Surface-water transfers would be used to address future demands in areas where groundwater pumping is not feasible.
- **Conceptual Alternative 3** – Balanced Reliance on Groundwater and Surface Water. This alternative relies primarily on groundwater development, but also involves substantial surface-water transfers.

The concept-level alternatives embodied varying degrees of reliance on surface water and groundwater, plus other potential management actions.

For each conceptual alternative, the possible sources of supply, the quantities of surface water to be transferred, the quantities of groundwater to be pumped, the institutional and contractual considerations, and other factors were identified. The integrated groundwater/ surface-water model was used to assess the physical impacts of each conceptual alternative on seasonal groundwater levels and other components of the Basin's water budget. This information was presented to the PAC and TAC for input on the political acceptability and technical feasibility of each alternative, and to identify other issues of concern to the study participants. Potential cost impacts, institutional and legal issues, environmental issues, and public acceptance issues were also discussed at a reconnaissance level. The three conceptual alternatives met the fundamental goal of providing the target quantity and reliability of water supply for all purveyors with in the Basin in critical dry-year condition in 2030. In addition, for all three conceptual alternatives, voluntary reductions in municipal and agricultural demands were developed for the purveyors. These voluntary reductions became Target Reliability Factors (TRF), discussed under the description of alternatives later in this section.

From the PAC and TAC evaluation of the conceptual alternatives, it was concluded that a balanced reliance on groundwater and surface water was the optimum concept to meet future water supply needs in the Basin.

2.2.3 Phase 3

Phase 3 included the refinement of Conceptual Alternative 3, into two more specific alternatives. The two refined alternatives would improve water supply reliability by transferring conserved surface water directly from one purveyor to another, or by implementing a conjunctive use program to help facilitate surface-water transfers. Refined Alternative 3A called for direct surface-water transfers, while Alternative 3B called for conjunctive use of groundwater and surface water to facilitate the transfer of surface water. The refined alternatives, described as follows, were designed to meet water needs in both normal and critical dry-year conditions:

- **Alternative 3A – Direct Surface-water Transfers** – This alternative relied on direct transfers of surface water between purveyors in the Basin. This alternative would help to avoid costs associated with the development of infrastructure to support greater levels of groundwater use throughout the Basin. All surface-water transfers during a 1-in 4-year or more frequent condition would be long-term transfers from ACID. All critical dry-year transfers would be achieved through short-term (annual) agreements, with the McConnell Foundation, ACID, and the City of Redding as potential suppliers to a common pool. The common pool would provide enough water to accommodate users' critical dry-year water needs.
- **Alternative 3B – Transfers through Conjunctive Management** – This alternative formalized the conjunctive management of groundwater and surface water to accommodate transfers. The conjunctive management program included ACID as the main supplier. ACID would have a central role in the conjunctive management program because of its location over the high yielding areas of the groundwater Basin and because its canal system can be used to convey pumped groundwater to Basin water users. The ACID system is also an important source of groundwater recharge to the groundwater Basin. ACID would pump groundwater into its canals to enable a portion of its surface-water supply to be transferred to other purveyors. Transfer provisions would be developed for both 1-in-4-year (long-term) and 1-in-10-year (short-term) surface-water transfers.

In addition, the concept of a common pool, allowing rapid transfer of water in the Basin, was included in these alternatives. The common pool concept, discussed in the Description of Alternatives, would provide an overall framework allowing water transfers within the Basin on both long- and short-term (year-to-year) bases.

2.3 Description of Alternatives

This environmental document evaluates the no project no action alternative and three alternatives based on refined Alternatives 3A and 3B. To meet the requirements of both

NEPA and CEQA, this section describes both the no project and no action alternatives, and the following three project/action alternatives:

- Alternative 1 – Conjunctive Use: Proposes to develop a series of groundwater wells within the ACID service area.
- Alternative 2 – Water Use Efficiency: Provides additional water to Basin purveyors through water savings from improvements to the ACID canal system.
- Alternative 3 – Combination: Involves using a combination of the conjunctive use and water use efficiency alternatives to meet critical dry-year demand projections for the year 2030.

Table 2-1 quantifies the water demand in the Basin and how it would be met under each of the alternatives at both the beginning (2005) and the end (2030) of the planning period. Quantification is provided for normal and drought year conditions.

The three proposed alternatives described in this section are intended to provide a reasonable range for evaluation in this EIR to meet the goals and objectives of the Plan.

2.3.1 No Project Alternative (CEQA Baseline)

CEQA requires that among the alternatives discussed in an EIR, a "No Project" alternative is considered. CEQA Guidelines state:

- The no project analysis shall discuss the existing conditions… at the time environmental analysis is commenced, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.
- …where failure to proceed with the project will not result in preservation of existing environmental conditions, the analysis should identify the practical result of the project's non-approval and not create and analyze a set of artificial assumptions that would be required to preserve the existing physical environment.

Under this alternative, purveyors in the Basin would continue to operate independently of one another, with limited transfers conducted on a case-by-case basis. Voluntary drought-year demand reduction would occur only when triggered by response to severe water supply shortages. Under the No Project Alternative, specific, coordinated development or coordination of distribution of water resources within the Basin or other actions to contribute to water supply reliability would not occur. No new facilities would be constructed for this alternative. The No Project Alternative reflects conditions at the onset of the environmental analysis, that is, in 2005.

2.3.2 No Action Alternative (NEPA Baseline)

The No Action Alternative describes conditions that would be reasonably expected to occur if the Plan were not implemented. For this alternative, foreseeable future is defined as the planning horizon for the Phase 2C Report, that is, the year 2030. Water demand served by Basin purveyors would increase consistent with projections developed under the Phase 2C

TABLE 2-1
Quantification of Demand Management under Each Alternative
Redding Basin Water Resources Management Plan EIR

	Alternatives											
	No Project (2005)		All Action Alternatives (2005)[a]		No Action (2030)		1 – Conjunctive Use Alternative (2030)		2 – Water Use Efficiency Alternative (2030)		3 – Combination Alternative (2030)	
Scenario	**Normal**	**Drought**	**Normal**	**Drought**	**Normal**	**Drought**	**Normal**	**Drought**	**Normal**	**Drought**	**Normal**	**Drought**
Basin Water Demand[b]	201	201	201	160	241	241	241	196	233	188	233	188
Basin Water Supply (surface and groundwater)[b]	224	170	224	170	254	188	241	212	237	184	237	208
Basin Groundwater Pumping[b]	16	24	16	24	53	43	33	77	29	49	29	73
Basin Surplus or (Deficit)[b]	23	(30)	23	10	12	(53)	0	16	4	(4)	4	19
Basin Water Transfers	As needed, case-by-case basis		As needed via common pool		As needed case-by-case basis		As needed via common pool		As needed via common pool		As needed via common pool	
Target Reliability Factors	None		M&I 90% of normal supply Agriculture 75% of normal supply		None		M&I 90% of normal supply Agriculture 75% of normal supply		M&I 90% of normal supply Agriculture 75% of normal supply		M&I 90% of normal supply Agriculture 75% of normal supply	
New Facilities	No new facilities		No new facilities		City of Redding increases ground-water production facilities (up to 43 thousand ac-ft and conveyance infrastructure to deliver water within service area		Incremental construction of agricultural wells in ACID service area (up to 44 thousand ac-ft) to facilitate common pool transfers		Construction of canal lining and water control structure projects on ACID Main Canal (up to 4 thousand ac-ft) to facilitate common pool transfers City of Redding increases ground-water production facilities (up to 38 thousand ac-ft) and conveyance infrastructure to deliver water within service area		Incremental construction of agricul-tural wells in ACID service area (up to 44 thousand ac-ft) and construction of canal lining pipeline, and water control structure projects on ACID Main Canal (up to 8 thousand ac-ft) to facilitate common pool transfers	

[a]Action Alternatives include the same short-term management actions to meet drought-year demand in 2005 and are, therefore, presented collectively here. These actions would not be implemented if 2005 was a normal water year.
[b]Basin supply and demand numbers are provided for water purveyors only. Private residences, industrial, and commercial groundwater pumpers are not included.

Note:

All quantities in thousand ac-ft.

Report. However, critical dry-year supplies for agricultural reclamation water service contracts would be reduced to zero resulting from increasing demands on the CVP system as a whole.

Under the No Action Alternative, there would be no specific coordinated development of water resources within the Basin or other actions to contribute to water supply reliability. Drought-year demand reduction would not occur, and water transfers within the Basin would be conducted on a case-by-case basis where possible. Under this alternative, it is anticipated that the City of Redding would expand its groundwater facilities and infrastructure to supply up to 43 thousand ac-ft of groundwater to its customers. This equates to approximately two-thirds of Redding's total water supply.

2.3.3 Elements Common to All Action Alternatives

Alternatives 1, 2, and 3 (collectively the Action Alternatives) include cooperative arrangements that would improve water supply reliability without construction of new facilities. Accordingly, under the 2005 level of development, all Action Alternatives are the same.

2.3.3.1 Groundwater Pumping

Under all Action Alternatives, purveyors with access to groundwater would continue to pump a portion of their supply. Additional groundwater pumping would occur in drought years, primarily by the City of Redding. Table 2-1 shows that total pumping in the Basin would be the same under the Action Alternatives as under the No Project Alternative.

2.3.3.2 Common Pool

The Basin includes the service area of 13 water purveyors. This project involves the creation of a common pool for shared use of water resources in the Basin. The common pool would provide a mechanism for water to be transferred within the Basin on a long-term or short-term (year-to-year) basis. The advantages of a common pool are that transfers could be accomplished under pre-approved "umbrella" contract terms with the resource management agencies as opposed to negotiating individual agreements and seeking regulatory approval for transfers on a case-by-case basis. For this document, purveyors are differentiated according to the federal facilities that deliver water to the purveyors. For example, ACID takes water from the Sacramento River, below Shasta Dam, a federally owned facility. The Centerville CSD takes water from the Muletown conduit, which diverts water from Whiskeytown Reservoir, a separate federally owned facility. A transfer from ACID to Centerville CSD would require replacing Sacramento River water with Clear Creek or Trinity River water (the sources of water for Whiskeytown).

2.3.3.3 Target Reliability Factors

As a part of this alternative, TRFs would be implemented in critical dry years. TRFs indicate voluntary demand reductions that purveyors would enact in critical dry years. Demand would be reduced to 90 percent of the average annual M&I demand and 75 percent of the average annual agricultural demands for each purveyor under a 1-in-10-year supply cutback (the definition of a critical dry year, consistent with the Phase 2C Report) condition. During critical dry years, the remaining 10 percent reduction in M&I needs would be achieved through additional demand reduction actions such as voluntary conservation and tiered pricing. The 25 percent reduction in agricultural needs would be achieved through crop changes, fallowing, water recycling, or other demand reduction methods. The specific actions to achieve these demand reductions would be selected and implemented by each purveyor, in accordance with their individual supply and demand factors and management policies. The TRFs serve as initial planning targets. If the demand reduction cannot be achieved at a reasonable cost or without causing undue revenue or other impacts, each purveyor would need to take actions that are appropriate for its individual situation and customer base to implement additional conservation measures, select a lower acceptable level of reliability, and/or plan for the related supply shortage impacts accordingly. Implementation of TRFs would result in a slight surplus of water in a drought condition, making it feasible to transfer water from purveyors that successfully reduce demand to purveyors that cannot.

2.3.4 Alternative 1 – Conjunctive Use Alternative

The conjunctive use Alternative would develop a series of groundwater wells within the ACID service area. The wells would allow ACID to provide groundwater to its customers, thus freeing up surface water for transfer to other purveyors in the Basin. The wells would be installed incrementally, as needed to meet growing demands. It is estimated that approximately 20 new agricultural wells capable of pumping 2,000 to 4,000 ac-ft each would be installed at full build out, with a maximum annual withdrawal of 44,000 ac-ft. The wells would be distributed throughout the ACID service district, just south of the City of Anderson (Figure 2-1). The new wells would pump groundwater into ACID's Main Canal and associated laterals for conveyance to ACID customers in southern Shasta County and northern Tehama County. Some improvements to check structures and flow-control devices would also be necessary to properly manage and distribute water within the ACID service area.

As currently construed, the conjunctive use alternative would only operate during critical dry years to offset surface-water shortages elsewhere in the Basin. However, it is possible that individual purveyors could fund construction of individual wells and request that ACID substitute groundwater for surface water in other, non-critical year types. The maximum withdrawal of 44,000 ac-ft is consistent with local groundwater protection ordinances and permitting. Any Basin shortfall in water supply not met by this alternative would be offset by additional pumping within the City of Redding. Actual funding for this alternative has not been identified and precise operating criteria have not been established.

2.3.4.1 New Facilities

The conjunctive use alternative involves the installation of new agricultural wells in the ACID service area associated conveyance systems needed to move water to district facilities, and any infrastructure needed to supply power to the pumps during critical dry years. The wells could also provide water in normal years. Wells would be constructed over a 25-year period from 2005-2030, as population and water demands increase. Specific locations of wells would be determined on the basis of ongoing monitoring of groundwater levels. The well sites would be selected such that road access would already exist for maintenance purposes, and minimize conveyance distance to the canal or lateral to be served. Phased well installation would allow flexibility during implementation of the alternative, enable

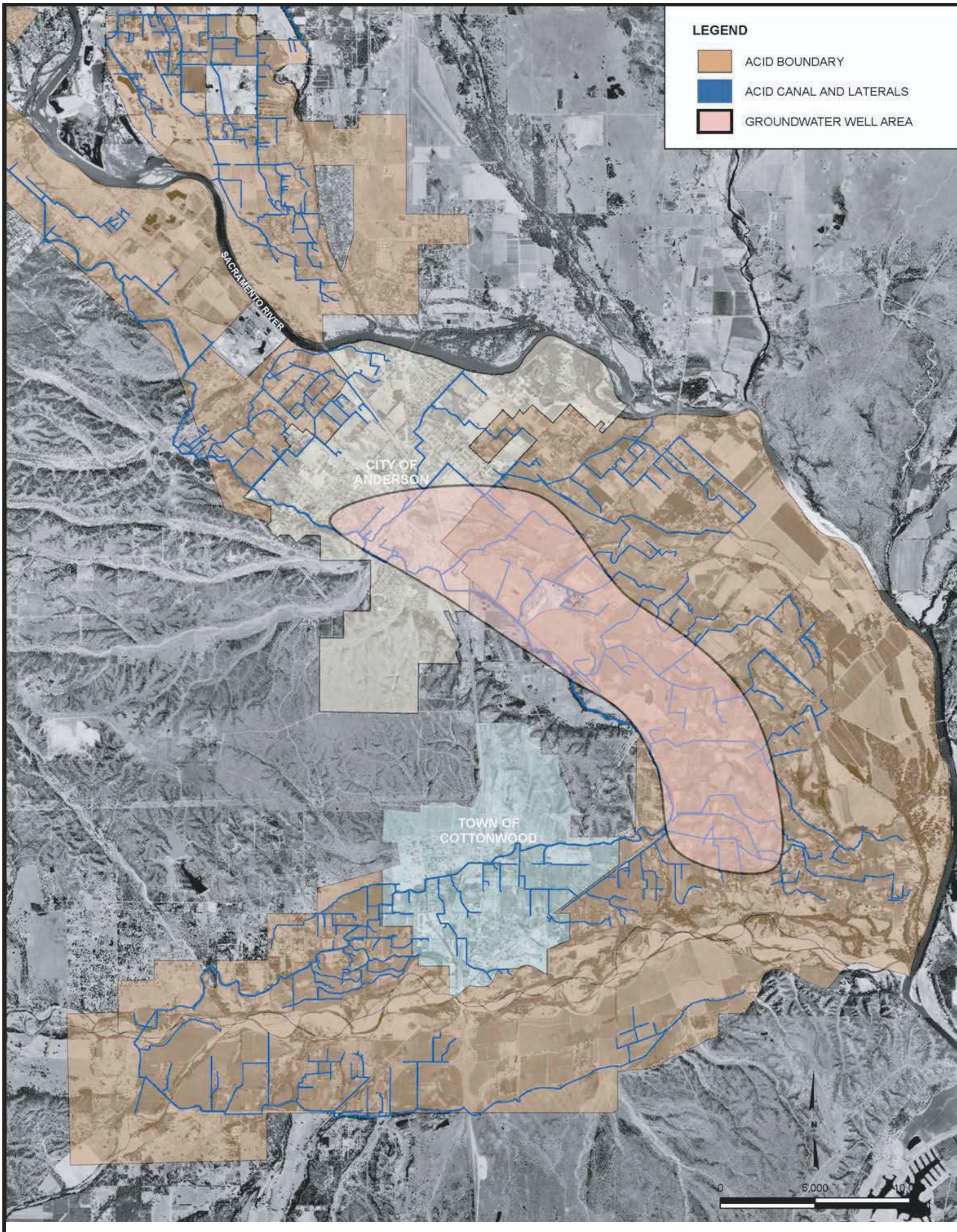


FIGURE 2-1
GROUNDWATER WELL AREA
REDDING BASINWIDE WATER RESOURCES MANAGEMENT PLAN EIR

WB012007005RDD_02 (1/17/07)

CH2MHILL

well siting to be refined in response to ongoing groundwater level monitoring, and eliminate the need for large up-front capital expenditures.

Typical well footprints would accommodate associated pumps and equipment located on concrete pads of approximately 100 square feet (Figure 2-2). Up to 5,000 square feet for access and staging areas might be required during construction. Wells would be installed using standard drilling.

FIGURE 2-2
TYPICAL WELL FOOTPRINT

2.3.5 Alternative 2 – Water Use Efficiency Alternative

The water use efficiency alternative provides water savings from improvements to ACID facilities, which has an aging system of canals and laterals in need of repair and modernization. Inefficient system facilities result in inordinate system losses; about 50 percent of water entering the system is lost to seepage, operational spills, or other losses before delivery to customers. System improvements would consist of three canal lining projects along the Main Canal that would reduce seepage in sections that contribute greatly to water losses. Lining these sections would result in an estimated water savings of 4,000 ac-ft, which could be redirected throughout the Basin. Efficiency improvements would also increase overall Basin water transfer flexibility and system reliability. Implementation of the canal lining and lateral conversion would not accomplish the goal of meeting critical dry-year water demand in the Basin by the year 2030. Any Basin shortfall in water supply not met by this alternative would be offset by additional pumping within the City of Redding.

2.3.5.1 New Facilities

The Proposed Project would line four sections of the ACID canal in three areas as shown on Figure 2-3. For the lining sections, concrete or an alternate material would be used to seal the canal bottom and prevent leakage in these sections. The lengths of the sections are approximately 3,000 feet for sections A and C and approximately 1,500 feet for Segment B, covering a total distance of approximately 7,500 feet (1.4 miles). To the extent feasible, construction operations would avoid existing wetlands and biological resources of concern. Canal lining construction would occur during periods when the canal is not needed for water supply deliveries to agricultural operations within ACID. In a typical year, the canal is needed to deliver these supplies between April 15 and October 31. The start and end dates for construction, would occur during the non-irrigation season. Depending on final authorization of the project, construction could take 1 to 2 years.

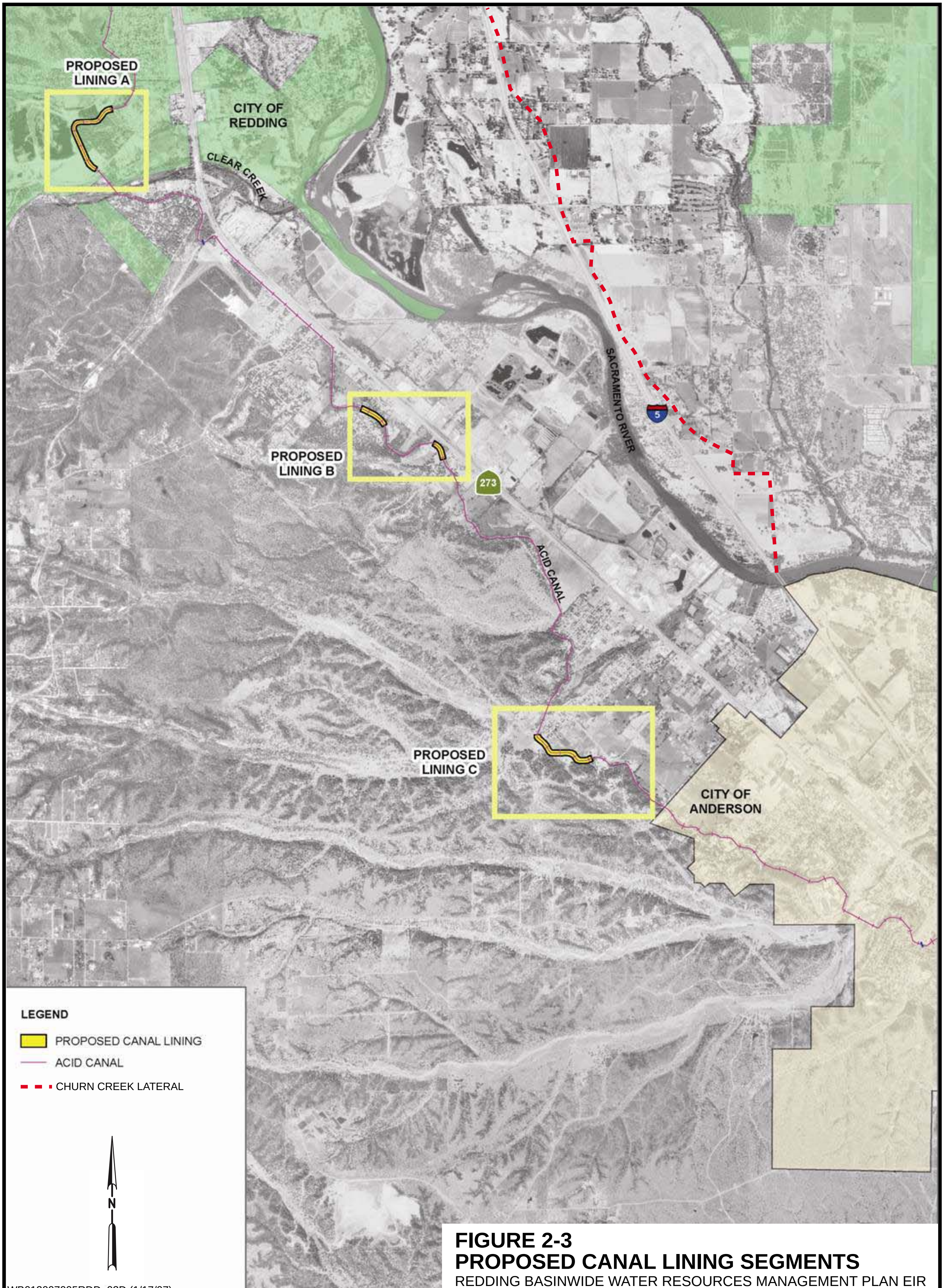


FIGURE 2-3
PROPOSED CANAL LINING SEGMENTS
REDDING BASINWIDE WATER RESOURCES MANAGEMENT PLAN EIR
CH2MHILL

Lining would require clearing vegetation, removing rubble, excavating the canal prism, and constructing embankments to establish a generally trapezoidal cross section. Following re-grading, the bottom and up to 9 feet of the sides of the canal would be lined (see Figure 2-4). The method of lining most of the canal would be slipline (using a lining machine).

The number of construction vehicles and pieces of equipment would vary depending on the construction phase. During the initial rubble removal phase, trucks with a 20-cubic-yard capacity would be used to move rubble from the canal. This phase would require approximately 25 trucks per day with a 20-cubic-yard capacity. Rubble removal would require approximately 3 to 7 workdays.

During the earthwork phase of construction, up to 30 construction workers would be required to operate equipment and facilitate the delivery of fill material from locations outside of the immediate canal area. Equipment would include graders and excavators.

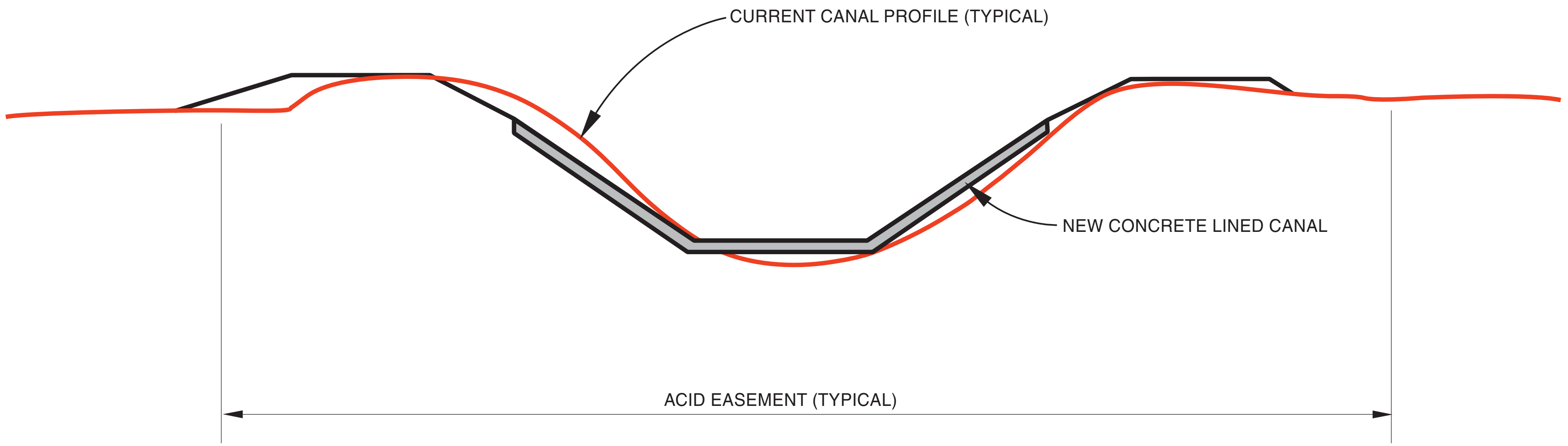
The lining phase of construction would require approximately 30 construction workers to operate 15 pieces of concrete lining equipment and facilitate the delivery of concrete to the lining equipment. Approximately 25 concrete trucks with an 8- to 10-cubic-yard capacity would deliver concrete each day. These trucks would deliver concrete from either an outside concrete plant or from a portable batch plant operated by the construction contractor near the construction site. If a batch plant is used, it would require raw material deliveries approximately 15 times per day. These deliveries would be made with 20-cubic-yard capacity trucks. Lining would require approximately 15 workdays per mile of canal.

Additionally, another 25 vehicles per day could be associated with construction. These vehicles would be involved with a wide range of miscellaneous activities, including equipment repair, construction inspection, engineering review, and general maintenance. All trucks would enter the canal from access points near the most convenient point of the construction right-of-way. These access points would likely be near main thoroughfares.

During the canal lining, construction equipment and workers would require physical access to the canal and adjacent areas. ACID holds various interests in property along the canal, including easements, rights-of-way, and fee simple title. The width of these property interests at any given point along the canal ranges from approximately 50 feet to approximately 120 feet. For the most part, the area covered by ACID’s existing property interests would permit access necessary for activities associated with canal lining. In some cases, ACID could need to secure temporary workspace from landowners along the canal. ACID would do so by negotiating with willing property owners or by exercising its power of eminent domain. No new access roads would be required for the canal lining, as sufficient access is available over existing County bridges that cross the canal, as well as the previously mentioned temporary and existing rights-of-way.

2.3.6 Alternative 3 – Combination Alternative

This alternative combines the conjunctive use and water use efficiency alternatives to meet critical dry-year demand projections for the year 2030. Any Basin shortfall in water supply not met by this alternative would be offset by additional pumping within the City of Redding.



NOT TO SCALE

FIGURE 2-4
TYPICAL CANAL PROFILE
REDDING BASINWIDE WATER RESOURCES MANAGEMENT PLAN EIR

WB012007005RDD_04 (1/17/07)

CH2MHILL

2.3.6.1 New Facilities

The Combination Alternative would involve the construction of wells and lining of three ACID canal sections as described for Alternatives 1 and 2, respectively.

SECTION 3.0

Existing Setting, Impacts, and Mitigation

This section describes the affected environment and the environmental consequences of implementing the alternatives identified in Section 2. The following resource areas are included in this evaluation:

- Land Use and Planning
- Biological Resources
- Cultural Resources
- Aesthetic Resources
- Water Resources
- Groundwater Resources
- Power Resources
- Health and Safety
- Air Quality
- Noise
- Indian Trust Assets
- Growth-Inducing
- Irreversible and Irretrievable Commitments of Resources

Each resources section describes the baseline and evaluates each alternative against both the No Project (2005 level of development) and the No Action (2030 level of development). Each resource area is organized in the following manner:

- **Affected Environment**, which details the specific resource or policies that could be affected by the alternatives.
- **Environmental Impacts**, which outlines the methods for determining impacts, significance criteria used to determine whether negative impacts to a resource are significant, and whether mitigation is available to reduce any significant impact to a less-than-significant level.

Basis of Comparison

Although there is not a NEPA lead agency for this effort, this document is intended to address both NEPA and CEQA requirements. NEPA and CEQA use different terms for similar definitions. NEPA and CEQA are similar laws enacted to protect public resources to both federal and state levels, respectively. For this document, the differences between NEPA and CEQA aid the evaluation of alternatives through considerations of different time frames; specifically 2005 project level of development and 2030 project level of development.

Under CEQA Guidelines, the basis of comparison, or the benchmark from which to compare the “proposed project” with the condition of “no project,” is called the “environmental setting,” usually defined as the physical environmental conditions in the vicinity of a project that exist at the time the NOP is filed. The Shasta County Water Agency filed an NOP on April 11, 2005 (Appendix A). Alternatives described in Section 2 are somewhat incremental because they were mainly developed to address the projected growth in the Basin. The incremental nature of the projects allows purveyors to avoid over investment in facilities while maintaining flexibility for the potential of future growth. A comparison of alternatives at the 2005 level matches the administrative requirements of CEQA and provides a starting point for comparison of the alternatives against what would likely occur in the absence of the plan.

NEPA guidelines require a lead agency to evaluate a No Action alternative that describes conditions that would likely occur without the project. Alternatives were developed to address conditions that would likely occur in the year 2030, specifically increased demand for municipal water supplies. This future condition matches the administrative requirements for NEPA and provides an assessment of impacts at the end of the planning horizon for the Plan. Therefore, for each resource, impacts from alternatives are assessed and compared to current and future conditions. In this manner, the requirements of both NEPA and CEQA are met, and this document facilitates comprehensive assessment by decisionmakers.

Impacts Assumptions

Alternatives include construction of water facilities and other infrastructure that would result in direct impacts to the environment. Examples include groundwater extraction wells and water control facilities. Additionally, project components could result in indirect impact through changed management of the system that would result from cooperative actions such as use of a common pool for water transfers.

Three distinct planning assumptions were addressed in the development of the Plan. The assumptions include (1) available water supply, transfers, and wheeling that would occur in the Basin, (2) the average annual water supply needed for each purveyor in the Basin, and (3) the water supply reliability targets, which involve future critical dry-year conditions.

3.1 Land Use and Planning

This section presents an overview of land use conditions based on general plan policies for the cities and counties in the Basin, that is, the Cities of Shasta Lake, Redding, and Anderson; Shasta County; and Tehama County. Specific attention is given to land uses that could be affected by the implementation of any of the alternatives. In summary, implementation of the Plan is not expected to result in significant changes to land use conditions in the Basin.

3.1.1 Affected Environment/Existing Conditions

3.1.1.1 City of Shasta Lake

The City of Shasta Lake encompasses approximately 6,942 acres of land. The City of Shasta Lake was incorporated in 1993 and has an estimated population of 9,800. The population projected for ultimate buildout of land within the current limits and area proposed for future annexation by the City of Shasta Lake General Plan is 27,895. The City of Shasta Lake provides water for domestic and industrial uses within an area formerly served by the Shasta Dam Area Public Utility District and the Summit City Public Utility District. The city currently serves 3,500 connections, with a current total water demand of approximately 34,400 acre- feet. The city obtains water exclusively from Shasta Lake via a pump station at Shasta Dam. Refer to the *Redding Basin Water Resource Management Plan* Phase 2B and Phase 2C reports for detailed descriptions of the City of Shasta Lake's current operating system and practices.

Land use in the City of Shasta Lake follows the General Plan objectives, policies, and implementation measures listed in the Land Use Element. These objectives, policies, and implementation measures address the city's specific land use concerns, which include establishing the urban and rural boundaries, and land use compatibility adjacent to the City of Redding and Shasta County. The General Plan proposes inclusion of an additional 1,948 acres (3 square miles) within the City Sphere of Influence. The proposed inclusion of additional land also includes a population increase as a result of incorporating this new acreage. The following objectives and polices support the proposed City of Shasta Lake growth:

- LU-1: Promote a development pattern which will accommodate, consistent with the other objectives of the Plan, the growth which will be experienced by City of Shasta Lake during the planning period (1999-2020), and as such period is extended by future revisions of the Plan.
- LU-2: Guide development in a pattern that will provide opportunities for present and future City residents to enjoy the variety of living environments, which currently exist within the City, which are served by the full range of urban services.
- LU-4: Guide development in a pattern that will establish an acceptable balance between public facility and service costs and public revenues derived from new development.
- LU-b: The City shall ensure the availability of an inventory of developable lands sufficient to accommodate growth projected for the planning period.

In addition to land use objectives and policies, water resource and water quality objectives and policies also address the following General Plan growth goals for the city:

- W-1: Conserve and manage all surface and groundwater resources so that all City residents, both now and in the future, have reasonable assurances that an adequate quantity and quality of water exists.
- W-2: Develop and establish regional relationships to insure flexible water supply sources.
- W-c: Preserve and/or enhance Central Valley Project water allocations.
- W-d: The City shall work cooperatively with water agencies in Shasta County.

3.1.1.2 City of Redding

The City of Redding is the largest city in Shasta County, with an estimated 2000 population of 80,865. Redding was founded in 1872, and incorporated in 1887, at the northern terminus of the California and Oregon Railroad. Redding's early growth was stimulated by the railroad and mining. In recent years, Redding has become a major regional center for shopping, health care, education, and government services. It is also the fastest growing community in the Basin. The total current water demand is approximately 35,600 ac-ft. The DOF population projections suggest Redding's population will increase to approximately 150,000 in the year 2030. Redding currently provides service to more than 32,000 connections, with urban land uses dominating. The limited agricultural uses are served by ACID or from individual onsite wells. Refer to the *Redding Basin Water Resource Management Plan* Phase 2B and Phase 2C reports for a detailed description of the City of Redding's current operating system and practices.

General Plan policies for the City of Redding were reviewed for consistency with the Plan. Specific sections include the land use plan, surface and groundwater resources, and agricultural land goals and policies. In addition, the *City of Redding Water Master Plan* was reviewed for consistency. The General Plan suggests a current annual water demand of approximately 32,000 ac-ft and forecasts the city water system to have an annual demand of approximately 62,000 ac-ft by the year 2003.

It is the City of Redding's policy to encourage new urban development within the City Sphere of Influence and within the city boundaries. The General Plan goal is to encourage urban growth to occur within the city and provide a development pattern that establishes an orderly urban service area. The following land use policies are those relevant to the Plan:

- **CDD1E** – Encourage adjacent jurisdictions to adopt development standards consistent with the City's.
- **CDD1G** – Require annexation before services are provided by the City, except under extraordinary circumstances.
- **CDD2** – Require construction of private development projects to be coordinated with the timing and location of public services. Ensure through a combination of development fees and other appropriate funding mechanisms that development pays its fair

share of the costs of constructing/providing new facilities and services as determined by the direct impacts that such development has on these essential services.

- **CDD2B** – Ensure that new development will not degrade public services below established service levels, that it contributes to the enhancement of services as appropriate, and that the costs of providing public services do not exceed anticipated revenue from the development of the project over the long term.
- **CDD2C** – Evaluate public-service impacts as part of environmental review for proposed development projects and require applicants to obtain "will-serve" letters from service providers prior to receiving approval of a final subdivision map or, in the absence of the need for a final subdivision map, prior to receiving approval of any required building permits.
- **CDD2E** – Maintain adequate capacity for urban growth by continuously monitoring and when required, increasing the capacity of the City's water, sewer, storm drainage, electric, and solid waste disposal systems.

The General Plan goals and policies identified under the Surface and Groundwater Resources section include the following:

- Develop and maintain adequate water supplies for domestic and fire suppression purposes.

  Policies established to achieve this goal are as follows:

  – **NR2A** – Continues to evaluate options for increasing the City's and other water providers' water supplies, including, but not limited to acquiring additional allocations from the Sacramento River, development of additional wells, and enhancement of water-storage and treatment facilities.

  – **NR2B** – Encourage water-conservation practices including, but not limited to, use of the following;

    - A tiered pricing system for water which is tied to the amount consumed by a household or business.
    - Native plants or other plants with low water requirements in public and private development projects.
    - Drip irrigation systems.
    - "Gray water" for landscape irrigation if approved by Shasta County.

  – **NR2C** – Utilize water reclamation projects in landscape and agricultural uses if approved by the California Regional Water Quality Control Board and California Department of Health Services.

  – **NR2C** – Support efforts to limit exportation of surface water to other areas of the State and to protect local water rights.

- Preserve and protect the quantity and quality of groundwater resources within the planning area.

Policies established to achieve this goal are as follows:

- **NR3A** – Provide maximum groundwater-recharge opportunities by maintaining the natural condition of waterways and floodplains to the extent feasible given flood-control requirements.
- **NR3B** – Comply with the Regional Water Quality Control Board's regulations and standards to maintain and improve groundwater quality in the Planning Area.
- **NR3C** – Support the preparation of a groundwater management plan for the Redding Groundwater Basin that will address long-term sustainability of the resource.
- **NR3E** – Work with appropriate State, Federal, and local agencies to protect, improve and enhance groundwater quality in the region.

Agricultural land in the City of Redding planning area totals 5,019 acres of Prime Farmland. The General Plan has established a goal to promote the economic viability of agriculture in the areas suited for agricultural use. The following are the policies to achieve this goal:

- **NR15A** – Protect existing prime agricultural soils outside the primary and secondary growth areas and freeway interchange areas with lot sizes (five acres and larger) capable of supporting agricultural operations.
- **NR15B** – Discourage the cancellation of Williamson Act contracts until it demonstrated that the lands with such contracts will be needed for urban development in the immediate future.
- **NR15C** – Establish performance criteria to minimize impacts of urban development near existing income-producing agricultural lands on agricultural practices and reduce conflicts between urban and agricultural uses.

3.1.1.3 City of Anderson

The City of Anderson is located in the southern portion of Shasta County along Interstate 5 and is considered one of the three urban centers in the county. In 1995, the City of Anderson had an estimated population of 8, 865, and the City's 2,250 service connections delivered 1,900 ac-ft of water. The population was approximately 9,060 in 2000 and rates were increasing at an estimated rate of 9.2 percent. Anderson relies solely on groundwater to serve its M&I water users. Most of the limited agricultural land uses within the city are served by surface water through the ACID canal system, or individual onsite wells. The ACID canal system provides a major source of recharge to replenish groundwater pumped by the city. Refer to the *Redding Basin Water Resource Management Plan* Phase 2B and Phase 2C reports for a detailed description of the City of Anderson's current operating system and practices.

Land use policies addressed in the City of Andersen General Plan include the following:

- Provide sufficient areas for each type of land use to permit full development needed to meet the demands of population growth and economic advancement.

- Develop vacant areas within the city limits to provide services to residents more efficiently.
- Encourage new, diversified industries to locate in the area.
- Keep those areas identified as most suitable for retaining Anderson's rural lifestyle in a rural estate and agriculture designation. These areas include lands having soils suited to food production and adequate to meet the health department criteria for septic system.
- Preserve agricultural lands for the future.
- Strive to protect and promote the character and value of existing land uses.

The City of Anderson's General Plan addresses specific water resource policies and implementation measures relevant to the Plan to ensure the city is adequately served. These policies are as follows:

- Maintain high levels of water quality and quantity in rivers, streams, and groundwater Basins.
- Preserve future water rights of all sources; rivers, streams, groundwater and ACID water for residential, commercial, industrial and commercial and agriculture uses.
- Prohibit significant reduction of water quality or quantity.
- Cooperate with county and state agencies on water related issues.

3.1.1.4 Shasta County

In 2000, Shasta County had a population of 163,256. Forecasts show that by the year 2020, Shasta County's total population will reach approximately 231,000 (DOF, 2001). Of the 1,021,213 acres mapped in Shasta County in 2000, 444,829 acres were in agricultural use; 31,252 acres were urbanized; 5,875 acres were water; and 538,829 acres were other (Department of Conservation, 2001). Over the past few decades, the number of farms in the county has been increasing; however, the average farm size has been decreasing. With an increasing population trend in the county, farmland will be converted to urban uses over the next several decades. The total acreage in Shasta County designated as Prime Farmland is 19,815 acres, approximately 2 percent of the total county acreage. Prime Farmland decreased by 403 acres from 1998 to 2000. Farmland designated as Local Importance in Shasta County includes farmland that is irrigated but does not meet the soil characteristics of Prime or Statewide Importance. The majority of this farmland is located within the ACID boundary.

Land use objectives concerning the Plan for Shasta County are as follows:

- **CO-1** – To promote a development pattern which will accommodate, consistent with the other objectives of the Plan, the growth which will be experienced by Shasta County during the planning period (2005-2025), and/or such periods as may be extended by future revisions of the Plan.

- **CO-2** – To guide development in a pattern that will provide opportunities for present and future County residents to enjoy the variety of living environments which currently exist within the County, including the following:
  - Incorporated communities serve by the full range of urban services.
  - Unincorporated communities served by most but not all urban services.
  - Unincorporated rural communities provided with very limited or no urban services.
  - Rural homesites located outside of community centers on relatively large lots or in clustered development accompanied by open space areas within the project provided that the clustering does not create an adverse impact on neighboring properties.
- **CO-3** – To guide development in a pattern that will respect the natural resource values of County lands and their contributions to the County's economic base.
- **CO-4** – To guide development in a pattern that will minimize land use conflicts between adjacent land users.
- **CO-5** – To guide development in a pattern that will establish an acceptable balance between public facility and service costs and public revenues derived from new development.

Polices to achieve the objectives are as follows:

- **CO-a** – The County shall, in coordination with the Cities of Anderson, Redding, and Shasta Lake ensure the availability within the County of an inventory of developable lands sufficient to accommodate growth projected for the planning period.
- **CO-b** – The County shall monitor, on a yearly basis, the rate at which the developable land inventory is being consumed, the population and employment growth of the County, and other useful indicators of the County growth.

The water resource and water quality objective for Shasta County states the following:

- **W-1** – Protection of the surface and groundwater resources so that all County residents, both now and in the future, have reasonable assurances that an adequate quantity and quality of water exists.

Water resource policies that are relevant to the Plan include the following:

- **W-c** – All proposed land divisions and developments in Shasta County shall have an adequate water supply, from a quantity and quality standpoint, for the planned uses. Furthermore, the potential adverse impacts on the existing reasonable and beneficial uses of utilizing that same water supply should not be significant. Project proponents shall submit date and reports, when requested, which demonstrate that these criteria can be met. In the case of land divisions, the reports shall be submitted to the County for review and acceptance prior to completeness determination of a tentative map. This policy will not apply to developments in special districts which have committed and documented, in writing, the ability to provide the needed water supply.

- **W-e** – SCWA should encourage and promote interagency water planning efforts within the County, particularly in the South Central Urban Region.
- **W-f** – The County shall encourage and participate in interagency planning efforts to protect and enhance stream and river water quality.

3.1.1.5 Tehama County

In 2000, Tehama County had a population of 56,039. Forecasts show that by the year 2020, Tehama County's total population will reach approximately 85,100 (DOF, 2001). Tehama County's Prime Farmland decreased from 77,463 acres in 1998 to 73,772 acres in 2000. Prime Farmland accounts for approximately 4 percent of the total county acreage. Farmland of Local Importance includes (1) all land not included in Prime, Statewide Importance, or Unique Farmland that is cropped continuously or on a cyclic basis; and (2) non-irrigated land that has soil mapping units listed for Prime Farmland or Statewide Importance.

Land use objectives and policies concerning the Plan for Tehama County include the following:

- **CO-1** – Plan development within the County in a manner which will provide opportunities for current and future residents to enjoy small-scale, community oriented living environments that are similar to those currently found in the County. Encourage higher densities, where appropriate, to reduce agricultural land conversion demands.
- **CO-6** – Promote a development pattern which will accommodate growth, consistent with other stated objectives, the growth projected for the County during the planning period (1983-2000).
- **CO-7** – Govern new development with subdivision, zoning, and other regulations that explicitly define government and private sector responsibilities and expectations with regard to an acceptable balance between public facility and service costs and public revenues derived from new growth.
- **CO-8** – Accommodate growth in a manner that preserves the predominate rural lifestyle and unique qualities that make the County an attractive place to live and that recognize that a rural lifestyle does not always necessitate the provisions of the full complement of services normally found in urban communities.
- **CO-12** – Accommodate urban growth and other non-agricultural development by utilizing, whenever possible lands which do not have agricultural viability.
- **CO-a** – The County shall in coordination with the Cities Red Bluff, Corning and Tehama, ensure the availability of an inventory of developable land sufficient to accommodate growth projected for the planning period (1983-2000).

In addition to the general land use policies outlined above, policies are addressed in the Tehama County General Plan that refer to specific planning areas. The county planning area within the Basin is the North Interstate 5 Planning Area. Policy CO (NI-5) states that , "The development pattern shall recognize this planning area's major role in accommodating growth experienced by the County."

Table 3.1-1 shows the 2001 acreage for Shasta and Tehama Counties under the Williamson Act and the Farmland Security Zone. The majority of the Shasta County farmlands are located within ACID. However, according to the most recent Farmland Mapping and Monitoring Program Report, Shasta County is rapidly losing its agricultural lands to urbanization. This is also true for the Tehama County northern border along the Shasta County line.

TABLE 3.1-1
2001 Williamson Act and Farmland Security Zone Enrolled Acreage
Redding Basin Water Resources Management Plan EIR

			Farmland Security Zone				
	Williamson Act		Urban		Non-urban		
County	**Prime[a]**	**Non-prime**	**Prime**	**Non-prime**	**Prime**	**Non-prime**	**Total**
Shasta	15,952	154,853					170,805
Tehama	50,996	745,101	2,655	2,467	1,190	1,128	803,537

[a]Under the Williamson Act, agricultural land can be designated Prime if it meets certain economic or production criteria.

Note: Totals include both continuing term and non-renewal contracts.

Source: Department of Conservation, 2002b.

3.1.2 Environmental Consequences/Environmental Impacts

3.1.2.1 Methodology

Potential land use impacts, including consistency with land use, water resources, air quality, and noise general plans, and policies and compatibility with adjacent existing land uses, were evaluated by reviewing local general plans.

3.1.2.2 Significance Criteria

Implementing the Plan would significantly affect land use if an action resulted in any one of the following:

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, or zoning ordinance) adopted specifically to avoid or mitigate an environmental impact
- Conflict with existing land uses on lands adjacent to the project site
- Substantial permanent conversion of land enrolled in the Williamson Act or other land protection programs to an incompatible use

3.1.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, the proposed project would not be constructed; therefore, no impacts would result from construction activities. Under the No Project Alternative, land use in the Basin would be consistent with the general plans for the following municipalities and counties:

- City of Shasta Lake
- City of Redding
- City of Anderson

- Shasta County
- Tehama County

Operational Impacts. Under the No Project Alternative, no changes in operating conditions would occur during the baseline year, which was a normal water year; therefore, no operational impacts to land use would be expected.

3.1.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, no construction would occur in 2005; therefore, there would be no impacts from new construction activities.

Operational Impacts. Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions, resulting in no change to land use. If 2005 were a normal water year, management actions would not need to be implemented, and land use would not be affected.

3.1.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, no construction would occur during the baseline year; therefore, there would be no impacts from new construction activities.

Operational Impacts. Under Alternative 2, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions, resulting in no change to land use. If the baseline year were a normal water year, management actions would not need to be implemented and land use would not be affected.

3.1.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, no new construction would occur during the baseline year; therefore, there would be no impacts from new construction activities.

Operational Impacts. Under Alternative 3, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions, resulting in no change to land use. If the baseline year were a normal water year, management actions would not need to be implemented, and land use would not be affected.

3.1.2.7 No Project Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Project Alternative, the proposed project would not be constructed; therefore, no impacts would result from construction activities. Under the No

Project Alternative, land use in the Basin would be consistent with the general plans for the following municipalities and counties:

- City of Shasta Lake
- City of Redding
- City of Anderson

- Shasta County
- Tehama County

Operational Impacts. Under a normal water year at the 2030 level of development, implementation of the No Project Alternative would result in a slight surplus of available water resources, and sufficient supplies could be delivered to M&I and agricultural users. Therefore, changes to land use are not anticipated to occur.

Under a drought water year at the 2030 level of development, implementation of the No Project Alternative would result in a deficit of available water resources and supplies delivered to M&I and agricultural users. M&I users might respond to water rationing by implementing a range of water-saving measures, including ceasing watering of landscaped areas and educating employees about the need to reduce optional water use. Impacts, however, are not expected to affect land use. Reductions in deliveries to agricultural users could result in landowners curtailing irrigation, or landowners could let less productive land lie fallow or increase the reuse of drainwater. Effects, however, are anticipated to be temporary, lasting only until normal water deliveries resume. Therefore, changes to land use are not anticipated to occur.

3.1.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Construction of agricultural wells and conveyance structures would permanently reduce the area available to the current land use. However, the purpose of the wells would be to support current agricultural land use. Also, the converted area would be small; therefore, the potential impacts resulting from implementation of this alternative would be less than significant. To further reduce impacts, wells would be sited in areas minimizing the reduction of areas available to current land uses.

Establishing staging areas and constructing utility corridors and access road would temporarily reduce a relatively small area available to the current land use. However, the conversion would be temporary; therefore, the impact to current land use would be less than significant.

Operational Impacts. Operation of agricultural wells and subsequent transfer of water to other purveyors in the Basin would not affect existing land use. No impacts would occur. Implementation of the Plan is consistent with applicable general plans.

3.1.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Lining of canals would not permanently convert existing land uses to other uses; therefore, implementation of Alternative 2 would not affect land use.

Establishing staging areas and constructing access road would temporarily reduce a relatively small area available to the current land use. However, the conversion would be temporary; therefore, the impact to current land use would be less than significant.

Operational Impacts. Lining of canals would not affect land uses; therefore, implementation of Alternative 2 would not result in impacts to land use. Implementation of the Plan is consistent with applicable general plans.

3.1.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Potential impacts resulting from construction associated with implementation of Alternative 3 would be as those described for Alternatives 1 and 2.

Operational Impacts. Potential impacts resulting from operation under implementation of Alternative 3 would be as those described for Alternatives 1 and 2.

3.1.3 Mitigation Measures

3.1.3.1 MM Alternatives 1 and 3 – 2030

Siting of new wells in areas to minimize reduction of areas available to current land uses. Implementation of this mitigation measure would ensure that any impacts are less than significant.

3.1.3.2 MM Alternatives 1 and 3 – 2030

Siting of construction staging and access areas to minimize interruption of operations associated with current land uses. Implementation of this mitigation measure would ensure that any impacts are less than significant.

3.1.4 References

California Department of Conservation. 2002b. Division of Land Protection Farmland Mapping and Monitoring Program. *California Farmland Conversion Report 1998-2000.* http://www.consrv.ca.gov/dlrp/fmmp/pubs/1998_2000/FMMP_1998-00_FCR.htm

CH2M HILL. 2001. *Redding Basin Water Resource Management Plan,* Phase 2B.

CH2M HILL. 2003. *Redding Basin Water Resource Management Plan,* Phase 2C.

City of Anderson. 1989. *General Plan.*

City of Redding. 2000. *General Plan*.

Department of Finance (DOF). 2001. http://www.dof.ca.gov/default.asp

Shasta County. 2004. *General Plan.*

Shasta Lake City. 1999. *General Plan.*

Tehama County. 1983. *General Plan.*

3.2 Biological Resources

This section presents an overview of existing biological resources, including special-status plant and wildlife species, sensitive communities, and wetland types with the potential to occur in the Basin and evaluates the potential consequences of the Plan from identified impacts to these resources.

3.2.1 Affected Environment/Existing Condition

The following description of existing biological resources focuses on areas potentially affected by the implementation of the Plan. Potential adverse impacts resulting from construction of conjunctive use management and water use efficiency projects could disturb known and unknown biological and wetland resources in specific project areas.

The biological resource analysis focuses on the Basin area near Redding, Anderson, and Cottonwood. The Basin encompasses the south central region of Shasta County bounded at the north by Shasta Lake, extending south approximately 5 miles from Cottonwood Creek in northern Tehama County. Project locations cluster east of Interstate 5 and north of the Shasta-Tehama County line and at various points along the ACID Main Canal. For this biological resource evaluation, the area of analysis will be discussed in terms of the agricultural well study area and the ACID Main Canal in the vicinity of the three proposed canal lining areas.

The study area is characterized by scattered single-family residential development, agricultural, industrial use, and mining development. The terrain is generally flat with views to the west influenced by the grasslands and rolling foothills typical of the northern portion of the Sacramento Valley. To the north, south, and east, the area includes grasslands, rolling hills, agricultural development, industrial, and residential use. Aside from the rural residences, residential and commercial/industrial development is limited to the Cities of Redding and Anderson and unincorporated areas of Shasta County. Vegetation within the project area is dominated by oak woodland as well as grasslands and urban vegetation associated with residential use.

The sites within the study area include a range of habitats from heavily disturbed gravel mining areas to dense, mature riparian vegetation. The sites where the wells would be located, proposed under Alternative 1, are primarily adjacent to large tracks of grain fields or non-native annual grassland with live oak, residential development, industrial and mining development, and, in several places, high-traffic roadways. All the sites proposed under Alternative 2 are accessible by a well-maintained levee road.

3.2.1.1 Vegetation and Wildlife Communities

The Basin is located at the northern end of the Sacramento Valley and incorporates approximately 510 square miles within Shasta and Tehama Counties. Land uses within the Basin include urban, residential, agricultural, industrial, and open space. A large portion of the land designated as open space is owned and managed by federal agencies for recreation, timber, or watershed management.

A diverse range of vegetated community types is supported in the study area, reflecting the gradient of geologic substrates and hydrologic conditions progressing out from the valley floor to higher elevations in the foothills. A variety of riparian forest habitats are supported along the Sacramento River and its major tributaries. Non-native grassland occurs on the lowest portions of the valley floor adjacent to riparian areas. Blue oak woodland appears on the upper valley alluvial plains, with foothill pine-oak woodland intergrading with the blue oak woodland on steeper terraces in areas having more xeric or nutrient-poor soil conditions. Vegetated habitats include agricultural and urban that support wildlife species alongside industrial and residential uses. Wildlife species occurring in the study area are those typically associated with the habitats listed above.

Information on vegetation in the study area was obtained by reviewing mapped habitat units from the Information Center for the Environment (University of California – Davis, 2005). The Web site contains vegetative layers from the California Gap Analysis Project (GAP) vegetative classifications that follow habitat types used in the CDFG's Wildlife-Habitat Relationships for California Plant Communities (Mayer and Laudenslayer, 1988). Information from the GAP analysis provides a general characterization of the natural community types in the project area, but does not provide specific information on the community structure or composition of any individual areas. Additional site-specific information on general habitat types in the study area were obtained from observations made during field reconnaissance visits.

Vegetation and wildlife communities within and adjacent to the project area consist of the following six dominant community types:

- Agriculture
- Blue oak woodland
- Foothill pine–oak woodland
- Interior live oak forest
- Non-native grassland
- Urban/residential/developed

Agricultural (Grazed or Cropped Lands). This category applies to lands that support non-woody agricultural crops or to lands for which there was visible evidence of recent grazing or agricultural activity (such as disking). In upland areas adjacent to the agricultural fields, species such as black walnut *(Juglans californica),* Johnson grass *(Sorghum halepense),* and black mustard *(Brassica nigra)* occur adjacent to the agricultural fields.

Blue Oak Woodland. Blue oak woodland is a highly variable climax woodland dominated by blue oak, but usually includes individuals of several other oaks and foothill pine. Stands vary from open savannas with grassy understories (usually at lower elevations) to fairly dense woodlands with shrubby understories. This type occurs on well-drained soils below 4,000 feet. It is supplanted at higher elevations and more mesic sites by black oak woodland or foothill pine-oak woodlands. It intergrades on more mesic sites at lower elevations with grasslands, where it is largely confined to north slopes and canyons.

Blue oak woodlands provide habitat for a diversity of wildlife species, although no species appear to be completely dependent on this habitat type. Acorns produced by oaks are an important food resource for a diversity of bird and mammal species. Typical species inhabiting oak woodlands include scrub jay, yellow-billed magpie (*Pica nuttalli*), gray squirrel (*Sciurus griseus*), and California ground squirrel (*Spermophilus beecheyi*). Studies by the Service indicate that 29 species of amphibians and reptiles, 57 species of birds, and 10 species of mammals find mature stages of this type suitable or optimum for breeding.

Foothill Pine-Oak Woodland. Foothill pine-oak woodland is a climax woodland consisting of a mixture of gray pine (*Pinus sabiniana*) and blue oak (*Quercus douglasii*). Pure stands of either tree species do occur, but mixed stands are much more common. Gray pine usually towers over the oaks in undisturbed stands. Understories usually are dominated by introduced annuals. This community type is found on well-drained sites, usually in rocky or exposed areas along ridges or canyons with poor or shallow soils. It intergrades on more mesic sites with chaparral or scrubby, dense stands of blue oak woodland.

Foothill pine-oak woodland provides breeding habitats for a variety of wildlife species although no species is specifically dependent on this habitat for breeding, feeding, or cover. In the western Sierra Nevada, 29 species of amphibians and reptiles, 79 species of birds, and 22 mammal species find suitable habitat conditions for breeding in this habitat (Mayer and Laudenslayer, 1988). The oak component of this habitat provides important food resources for many bird and mammal species.

Interior Live Oak Forest. This habitat type is characterized as a dense, closed-canopy evergreen forest dominated by interior live oak (*Quercus wislizenii*). Shrub species are usually present in the understory. Interior live oak forest is not a fire type, but vigorously stump-sprouts following fire or logging which often results in even-aged stands. In the Sierran foothills, interior live oak forest occurs below approximately 2,000 feet, below the montane conifer forest. Other plant species found in this habitat include gray pine (*Pinus sabineana*), buck brush (*Ceanothus* sp.), toyon (*Heteromeles arbutifolia*), madrone (*Arbutus menziesii*) (infrequently), virgin's bower (*Clematis* sp.), and hoary coffeeberry (*Rhamnus tomentella* ssp. *tomentella*).

Non-native Grassland. Non-native grasslands are open habitats composed primarily of annual grass species. Introduced annual grasses are the dominant plant species in this habitat and include wild oats (*Avena fatua*), soft chess (*Bromus mollis*), ripgut brome (*Bromus diandrus*), wild barley (*Hordeum marinum* sp. *cussoneanum*), and foxtail fescue (*Festuca megalura*). Common forbs include broadleaf filaree (*Erodium moschatum*), redstem filaree (*Erodium cicutarium*), turkey mullein (*Eremocarpus setigerus*), clovers (*Trifolium* sp.), and many others. California poppy (*Eschscholzia californica*) is often found in this habitat. These grassland habitats are found on fine-textured, usually clay soils, moist or even waterlogged during the winter rainy season and very dry during the summer and fall.

Wildlife species that can occur in annual grasslands are the western fence lizard (*Sceleporus occidentalis*), common garter snake (*Thamnophis sirtalis*), western rattlesnake (*Crotalus viridis*), black-tailed hare (*Lepus californicus*), California ground squirrel, Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), badger (*Taxidea taxus*), and coyote (*Canis latrans*). Common birds that use grassland habitat include horned lark (*Eremophilia alpestris*), western meadowlark (*Sturnella neglecta*), turkey vulture (*Cathartus aura*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius),* white-tailed kite (*Elanus leucurus*), and prairie falcon (*Falco mexicanus*).

Urban/Residential/Developed. Areas that support buildings or other structures or that are otherwise developed within or nearby city boundaries are shown on project vegetation maps as urban/residential/developed. This is not a vegetation type as described in Holland (1986). Vegetation and wildlife in these areas, if present, are typical of urbanized, landscaped areas and are not described in further detail.

3.2.1.2 Sensitive Plant Communities

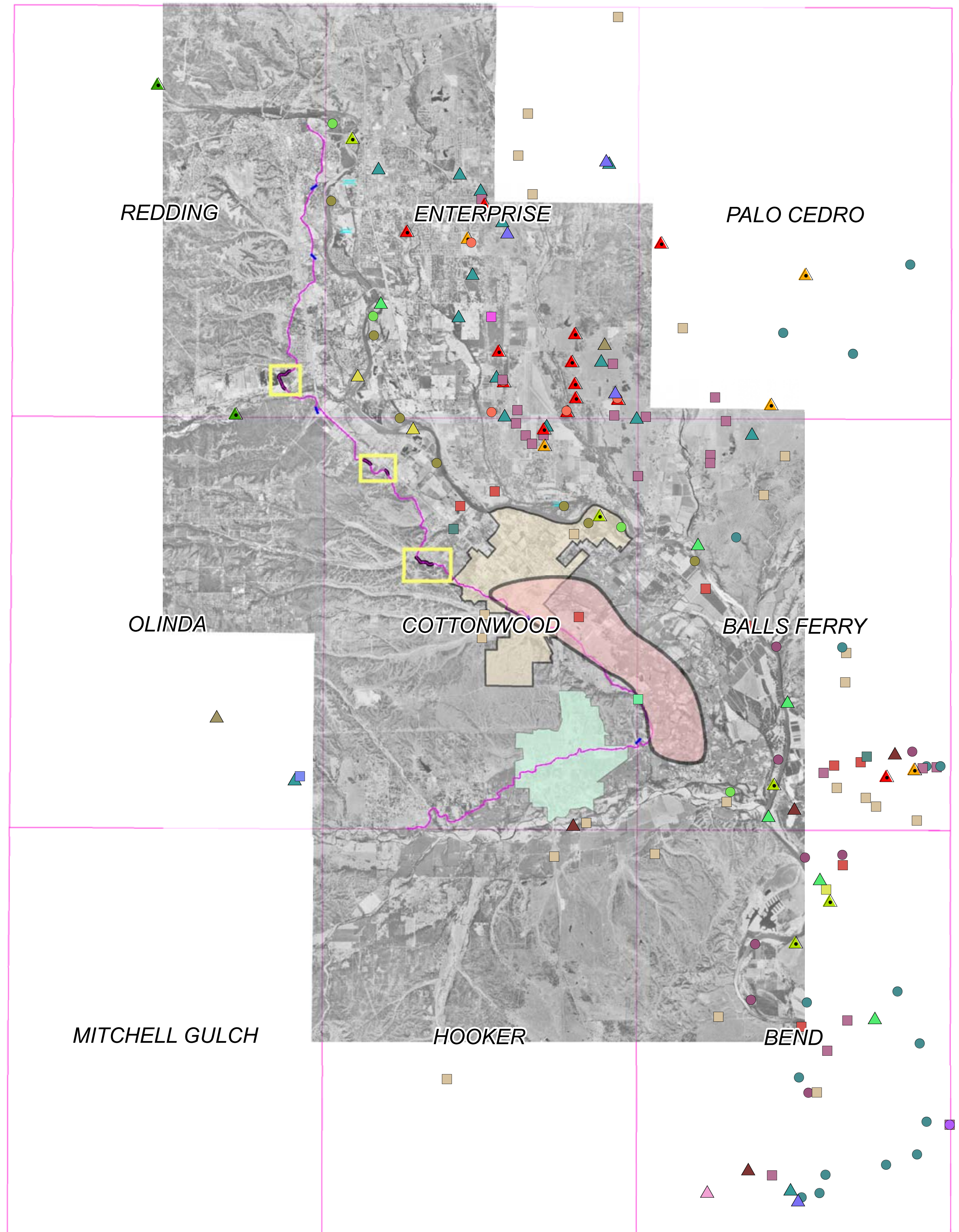
Historically, the Sacramento Valley contained a variety of riverine, wetland, and riparian habitat along rivers and streams, with surrounding terrestrial habitats consisting of perennial grassland and oak woodland. With settlement of the Sacramento Valley, agricultural and urban development converted land from native habitats to cultivated fields, pastures, residences, water impoundments, flood control structures, and other developments. As a result, native habitats generally are restricted in their distribution and size and are highly fragmented.

Information on special-status plant communities with the potential to occur in the study area was obtained from the California Natural Diversity Database (CNDDB) (CDFG, 2006). The literature and database review covered nine United States Geological Survey (USGS) 7.5-minute topographic quadrangles that included the study area and its adjacent quadrangles. The CNDDB included information on special-status species identified in the study area.

Four sensitive plant communities were identified during the CNDDB literature search. These communities are generally scattered, isolated communities that are decreasing in number due to agriculture, industrial, and urban land uses. These communities are tracked, to some extent, through the CNDDB due to their status as native plant communities, and are identified on Figure 3.2-1. The following four communities were identified in the project area:

- Great Valley Cottonwood Riparian Forest
- Great Valley Mixed Riparian Forest
- Great Valley Valley Oak Riparian Forest
- Great Valley Willow Scrub

Great Valley Cottonwood Riparian Forest. This habitat type is a dense broadleafed, winter deciduous riparian forest usually found below 1,000 feet in the north and 300 feet in the south (Holland, 1986). The understory is characterized by dense abundant vegetation with a scattering of seedlings and saplings. It occurs in fine-grained alluvial soils near or close to perennial streams with subsurface irrigation (even when channels are dry). Sites are inundated with water during the spring. Characteristic species include Fremont cottonwood (*Populus fremontii*) and Goodding's black willow (*Salix gooddingii variabilis*). Understory vegetation consists of California wild grape (*Vitis californica*), box elder (*Acer negundo californica*), buttonbush (*Cephalanthus occidentalis*) and Oregon ash (*Fraxinus latifolia*). This habitat type was extensive along depositional streams throughout the Great Valley, but is now located in scattered isolated remnants.



Legend

- Ahart's paronychia
- Boggs Lake hedge-hyssop
- California linderiella
- Great Valley Cottonwood Riparian Forest
- Great Valley Mixed Riparian Forest
- Great Valley Valley Oak Riparian Forest
- Great Valley Willow Scrub
- Henderson's bent grass
- Red Bluff dwarf rush
- bald eagle
- bank swallow
- chinook salmon winter run
- four-angled spikerush
- fox sedge
- legenere
- northwestern pond turtle
- osprey
- pink creamsacs
- pointed broom sedge
- silky cryptantha
- slender orcutt grass
- spring-run chinook salmon
- valley elderberry longhorn beetle
- vernal pool fairy shrimp
- vernal pool tadpole shrimp
- Proposed Canal Linings
- Groundwater Study Area

0 14,180 Feet

N

FIGURE 3.2-1
CALIFORNIA NATIONAL DIVERSITY DATABASE SPECIAL STATUS SPECIES AND COMMUNITIES
REDDING BASINWIDE WATER RESOURCE MANAGEMENT PLAN EIR

NOTE: Souce CNDDB January 1 through July 15, 2005 version

WB01200705RDD_16 (1/17/07)

CH2MHILL

This community type has been identified within the Anderson City Limits, south of Anderson River Park on the west bank of the Sacramento River. It has also been identified along Cottonwood Creek between Interstate 5 and the Sacramento River.

Great Valley Mixed Riparian Forest. This habitat type is a tall, dense, winter-deciduous, broadleaved riparian forest. This mixed riparian forest occurs on floodplains of low-gradient, depositional streams of the Great Valley, usually below about 500 feet (Holland, 1986). Within the project area, this riparian forest habitat type is found along streams, creeks, rivers, and in scattered areas adjacent to some drainage ditches and ponds south of Lake Oroville. To the north of Lake Oroville, the Great Valley riparian forest habitat transitions into an alder-dominated riparian forest found at higher elevations. The Great Valley mixed riparian forest tree canopy is usually fairly well closed and moderately to densely stocked with several species including valley oak (*Quercus lobata),* black walnut (planted) (*Juglans californica var. hindsii)*, California sycamore (*Platanus racemosa*), and Fremont cottonwood. Understory components include California button willow (*Cephalanthus occidentalis* var. *californicus*), Oregon ash, blue elderberry (*Sambucus mexicana*), Himalyan blackberry *(Rubus discolor)*, California wild grape (*Vitis californica)*, poison oak (*Toxicodendron diversilobum)*, mugwort *(Artemisia douglasiana),* and verbena (*Verbena* sp.). Several willows occur in this mixed riparian forest, including narrow-leaved willow (*Salix exigua*), red willow (*Salix laevigata),* arroyo willow (*Salix lasiolepis*), and Goodding's black willow.

This community type has been identified several times within the project area along the banks of the Sacramento River beginning east of Anderson and occurring repeatedly to the south.

Great Valley Valley Oak Riparian Forest. This oak-dominated habitat is characterized by medium to tall broadleafed, winter deciduous closed canopy riparian forest. The dominant species is valley oak. Understory species consist of scattered Oregon ash, black walnut, California sycamore, and young valley oak. This community is generally restricted to the highest parts of floodplains, distant from or higher above active river channels. They are less likely to be subject to disturbance by flooding, but still receive alluvium soil inputs and subsurface irrigation. This community was formerly extensive on major streams of the Sacramento and northern San Joaquin valleys, but are now practically eliminated by agricultural and firewood harvesting (Holland, 1986).

This community type begins near the project area along the Sacramento River east of the Anderson City Limits, and continues with several occurrences north into the City of Redding, along the Sacramento River.

Great Valley Willow Scrub. This shrub-dominated habitat type is characterized as an open to dense, broadleafed, winter-deciduous streamside thicket dominated by any of several willow (*Salix*) species. Dense stands usually have little understory or herbaceous component and non-native grasslands occur in more open areas. This habitat type is widespread and it occurs along of the major rivers and most of the smaller streams throughout the Great Valley watershed, usually below 1,000 feet (Holland, 1986).

This community type has been identified within Shasta County, north of the City of Anderson on the west bank of the Sacramento River.

3.2.1.3 Wetlands

The study area supports a variety of wetland habitats. The plants and wildlife species supported in wetland habitats vary depending on the hydrologic regime, substrate, water source, and water quality of the site.

The National Wetlands Inventory (NWI) database was queried on November 9, 2006, to identify wetland types within the project area (Service, 2006a). Nine quads were included in the study: Redding, Cottonwood, Enterprise, Palo Cedro, Olinda, Balls Ferry, Mitchell Gulch, Hooker, and Bend. Of the nine quads searched, only Redding, Enterprise, Palo Cedro, and Olinda documented wetlands (Figure 3.2-2). The remaining five quads had not been mapped through the NWI Database. Wetland habitat types within the Redding quad, adjacent to the proposed canal lining section along Clear Creek Road are described, because it is the only quad with supporting wetland data directly adjacent to an area of the proposed project. The following wetland types were identified within the project area:

- Emergent
- Forested
- Aquatic bed
- Riverine

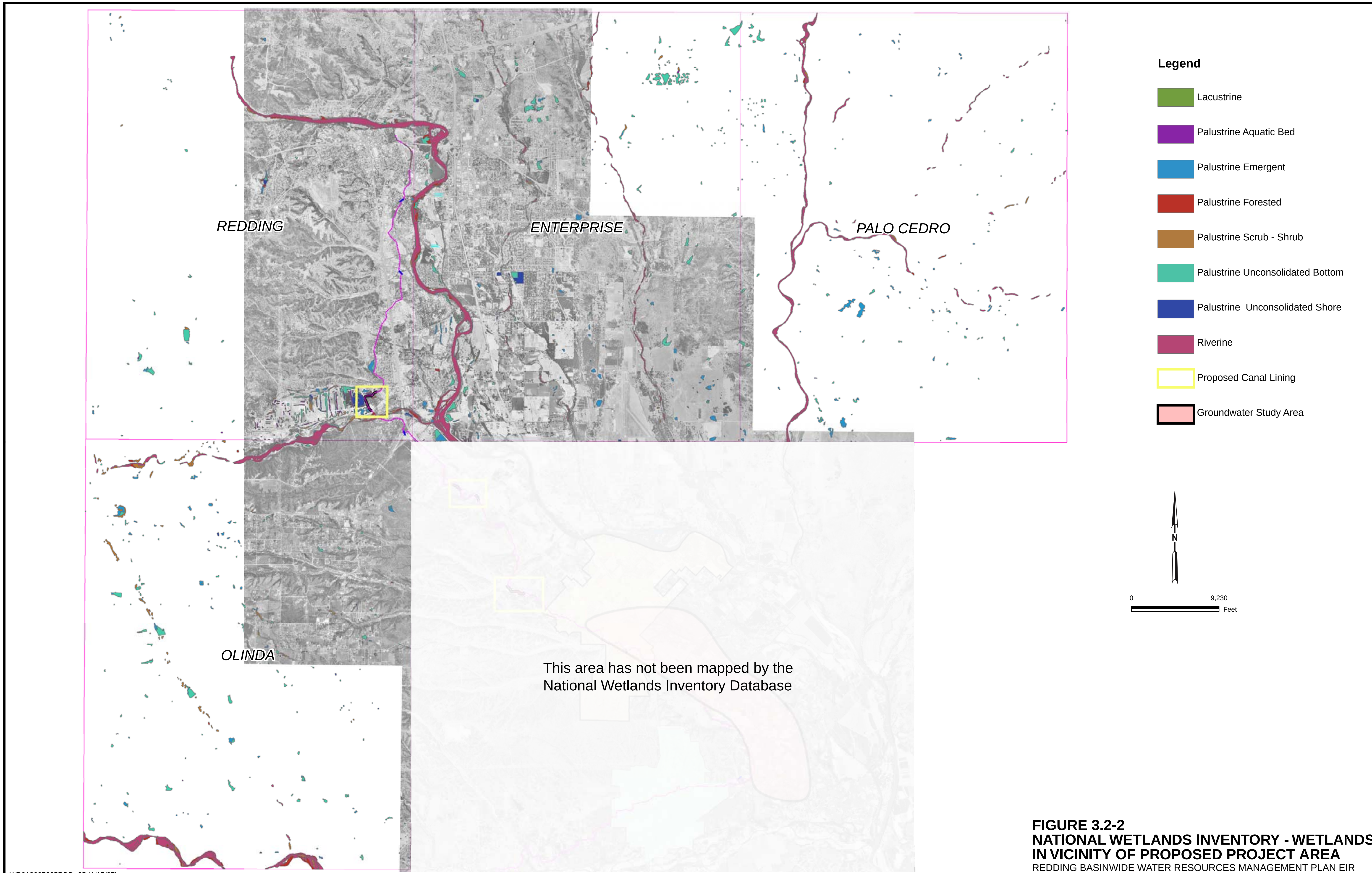
Wetland habitats are further discussed in Section 3.2.3, Reconnaissance Surveys.

Emergent. Emergent wetlands occur in areas that are seasonally or perennially inundated with water. They form a transitional habitat between open water and upland habitats and occur in backwater areas of rivers, streams, and lakes, and in the floodplains of rivers and streams. Emergent wetlands are characterized by erect, rooted, herbaceous vegetation that emerges above the water surface.

Forested. Generally characterized by woody vegetation that is at least 6 meters (19.7 feet) tall, this habitat is dominated by trees, shrubs, emergents, mosses, or lichens. Surface water may be present for brief or extended periods depending on the season and depth of the water table. Forested wetlands may be seasonally flooded with surface water for extended periods, such as in early spring, and may be without surface water at the end of the growing season in the summer months (Cowardin, et al., 1979).

Aquatic Bed. Aquatic bed habitat includes all non-tidal wetlands dominated by trees, shrubs, emergents, mosses, or lichens. Included are wetlands with deepwater habitats dominated by plants that grow principally on or below the water surface for most of the growing season in most years. Aquatic beds generally occur in water that is less than 2 meters (6.6 feet) deep (Cowardin, et al., 1979).

Although the NWI database does not provide information on the remaining proposed project sites, it is anticipated that similar wetlands types would be present throughout the study area, as were identified near the proposed Clear Creek Road canal lining.



WB012007005RDD_05 (1/17/07)

FIGURE 3.2-2
NATIONAL WETLANDS INVENTORY - WETLANDS IN VICINITY OF PROPOSED PROJECT AREA
REDDING BASINWIDE WATER RESOURCES MANAGEMENT PLAN EIR

CH2MHILL

3.2.1.4 Reconnaissance Surveys

Reconnaissance-level field surveys were conducted in 2002 on April 23, May 9 and 10, and June 7, and in 2005 on February 17 and 18 to characterize the biological settings and assess the potential for wildlife. During these field reconnaissance surveys, information on the biological resources such as dominant vegetation type, wildlife species present, and overall site conditions were noted.

The ACID Main Canal is deep, and "U" shaped, with fast-moving water. There are no shallow shorelines along its length where wetland vegetation has established, and little floating or in-stream vegetation was observed. Although much of the outer canal bank and levee is kept clear of perennial vegetation, the existing Main Canal supports riparian vegetation. The land on either side of the canal is characterized by widely spaced individual riparian trees to dense riparian forest. Oak (*Quercus* spp.), Fremont cottonwood, willow (*Salix* spp.), and gray pine are found throughout. Native and non-native species have been planted on the canal banks and levees in areas adjacent to residential development. Where present, the understory is dominated by Himalayan blackberry. Ephemeral and perennial creek crossings are characterized by dense and diverse riparian communities. In other areas, the canal is adjacent to large tracks of grain fields or non-native annual grassland with live oak. The proposed canal lining sections and the Churn Creek lateral are both adjacent to residential, industrial and mining development, and in several places run parallel to and cross high-traffic roadways.

The three areas surveyed include the Churn Creek laterals, groundwater well study area and the three proposed canal lining sections.

3.2.1.5 Churn Creek Lateral

The Churn Creek lateral is an extended stretch of lateral canal characterized by assorted adjacent land uses and variable habitat quality. The canal is unlined, and deep with swift water east of the Churn Creek pumping plant.

Several mature valley oaks, blue elderberry, and cottonwoods (*Populus* sp.) are rooted in the banks or levee. Otherwise, the banks and levee are primarily clear of perennial growth. The vegetation along the canal is dense at a bend in Churn Creek adjoining the canal and along the easternmost lateral. Adjacent land uses are characterized by residential and industrial development, an expansive grain field, and open grassland. Potential staging areas are located within agricultural or ruderal areas.

ACID laterals within the Churn Creek area provide modest habitat for a range of wildlife species. Mosquito fish (*Gambusia affinis*) and possibly bullfrogs (*Rana catesbeiana*) were observed in or around the canal. The canal is inhabited by crayfish (*Pacifastacus leniusculus*) as evidenced in river otter (*Lutra canadensis*) scat found along the bank. The canal provides marginal habitat for waterfowl; however, several mallards (*Anas platyrhynchos*) and Canada geese (*Branta canadensis*) were observed with their young in the channel with their young. Great egrets (*Casmerodius alba*) and great blue herons (*Ardea herodias*) were observed. Additional waterfowl and aquatic species likely frequent the canal because of its proximity to Churn Creek.

The areas surrounding the canal footprint is heavily disturbed and has been highly modified. The riparian vegetation along the canal and Churn Creek represent the highest quality habitat along the canal lateral in the project area and functions as an important wildlife movement corridor. The canal zone provides habitat for observed species such as Anna's hummingbird (*Calypte anna*), Nuttall's woodpecker (*Picoides nuttallii*), black phoebe (*Sayornis nigricans*), tree swallow (*Tachycineta bicolor*), yellow-rumped warbler (*Dendrocia coronata*), spotted towhee (*Pipilo erythrophthalmus*), California towhee (*Pipilo crissalis*), and western gray squirrel.

The adjacent open areas with mature oaks provide valuable nesting and foraging habitat for ring-necked pheasant (*Phasianus colchicus*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), western kingbird (*Tyrannis verticalis*), western bluebird (*Sialia mexicana*), and nesting raptors.

3.2.1.6 Proposed Groundwater Well Study Area

The conjunctive use alternative proposes 20 new groundwater production wells near ACID Main Canal and laterals, between the City of Anderson and Town of Cottonwood. The proposed well sites are mainly adjacent to large tracks of grain fields or non-native annual grassland with live oak, residential development, industrial and mining development, and, in several places, high-traffic roadways. Observed plant and wildlife species were similar to those near the Churn Creek lateral area.

3.2.1.7 Main Canal in Vicinity of Proposed Canal Linings

Near the proposed canal linings, the Main Canal is characterized by a range of habitats from heavily disturbed gravel mining areas to dense mature riparian vegetation. The sites are accessible by public roadways and contain maintained levee road owned and operated by ACID. In addition, ACID owns a right-of-way 50 feet on either side of the Main Canal channel. Observed plant and wildlife species are similar to those of the Churn Creek lateral and proposed groundwater well areas.

Riparian vegetation is intermittent along this stretch of canal, with some areas completely open and clear of tall vegetation. Areas adjacent to a residential development are characterized by a mixture of landscaped vegetation and natives such as willows and cattails (*Typha latifolia*) growing in the wet ditch at the toe of the levee. Although this area is likely subject to disturbance from humans and domesticated animals, Canada geese were observed in the canal and backyard bird feeders are also an attractant to passerines. An unoccupied wood duck (*Aix sponsa*) nest box was observed mounted on a tree at the toe of the levee behind one residence.

Adjacent areas are characterized by open annual grassland/rangeland with young to mature oaks, cottonwoods, and non-native trees. An active red-tailed hawk (*Buteo jamaicensis*) nest was observed in a mature oak approximately 300 to 500 feet from the canal centerline, in May 2002. One open area includes a large pond with dense clusters of water-lily (*Nuphar* sp.), surrounded by planted native and non-native trees. Approximately six northwestern pond turtles (*Clemmys marmorata marmorata*) were observed basking on partially submerged logs along the shore of this pond.

One portion of the Main Canal segment is adjacent to a substantial mixed tree forest. This area also includes small ephemeral drainages with willow thickets.

The southern end of the segment is adjacent to a large gravel mining operation. This area is highly disturbed but includes large ponds and excavated areas where willow thickets grow due to the high water table. The ponds are large, one with a small island and a complex of beaver (*Castor canadensis*) lodges. An osprey (*Pandion haliaetus*) was also observed perched above the pond. No potential osprey nest structures were observed in the area. Egrets, herons, double-crested cormorants (*Phalacrocorax auritus*), and mallards were also observed.

3.2.1.8 Proposed Canal Lining near Spring Gulch Road

The Spring Gulch canal lining section is adjacent to rural development including a few ranch-style homes with large annual grassland fields. The vegetation along the canal is limited to a narrow line of young oak trees. It is adjacent to rolling foothills to the west characterized by an oak woodland community. Plant and wildlife species are similar to those listed for the Clear Creek proposed canal lining section.

3.2.1.9 Proposed Canal Lining near Thomas Road

The Thomas Road canal linings are adjacent to rural development and include residences directly adjacent to the canal right-of-way as well as grassland fields and mixed urban vegetation. In the southern portion of the proposed linings, industrial uses are adjacent to the canal bank. Vegetation along the canal is generally riparian with oaks and grasses. It is also adjacent to rolling foothills to the west characterized by an oak woodland community. Plant and wildlife species are similar to those listed for the Clear Creek proposed canal lining section.

3.2.1.10 Special-status Species

Information on special-status species with the potential to occur in the study area was obtained from the Service (2006b), and the CNDDB (CDFG, 2006). The literature and database reviews covered the nine USGS 7.5-minute topographic quadrangles that include the study area and the adjacent quadrangles. This broad regional context was included to develop a comprehensive list of special-status species that potentially occur in the project area. The database search was intended to develop a target list of special-status species that may require more detailed study. Many of the species identified through the literature review might not occur in the project area because it lacks suitable habitat or the species have restricted distribution ranges. However, the lack of a species record on the database did not eliminate the potential for a species to occur in the project area. Research included the following nine USGS quadrangles: Redding, Cottonwood, Enterprise, Palo Cedro, Olinda, Balls Ferry, Mitchell Gulch, Hooker, and Bend.

Table 3.2-1 presents a comprehensive list of special-status species for the proposed project area. Special-status species are defined as any state- or federally-listed threatened or endangered species, federal or state species of concern, or any other species currently tracked by the CNDDB. Special-status species were identified, including 12 federally listed threatened or endangered species, 6 state-listed threatened or endangered species, 2 federal candidate species, 3 California species of concern, and 10 species listed by the CNPS. The

CNDDB search identified 3 species, osprey, tri-colored blackbird and pointed broom sedge, each with a reported occurrence within or immediately adjacent to the study area.

TABLE 3.2-1
Special-status Wildlife and Plant Species Potentially Occurring in the Project Area
Redding Basin Water Resources Management Plan EIR

Scientific Name	Common Name	Status	Habitat
Fish			
Hypomesus transpacificus	Delta smelt	FT, CT	Open waters of bays, tidal rivers, channels, and sloughs.
Oncorhynchus mykiss	Central valley steelhead	FT	Migrates between freshwater breeding and marine nonbreeding habitats.
Oncorhynchus tshawytscha	Central Valley spring-run Chinook salmon	FT, CT	Spawning in the Central Valley area is restricted to the Sacramento River.
Oncorhynchus tshawytscha	Winter-run Chinook salmon – Sacramento River	FE, CE	Spawning in the Central Valley area is restricted to the Sacramento River.
Oncorhynchus tshawytscha	Central Valley fall/late-fall-run Chinook salmon	FC	Spawning in the Central Valley area is restricted to the Sacramento River.
Reptiles and Amphibians			
Clemmys marmorata marmorata	Northwestern pond turtle	CSC	Associated with permanent or nearly permanent water in a variety of habitats. Requires basking sites. Nesting sites may be found up to 0.5 kilometer from water.
Rana aurora draytonii	California red-legged frog	FT, CSC	Usually found in or near quiet permanent water of streams, marshes, or (less often) ponds and other quiet bodies of water; also damp woods and meadows some distance from water.
Invertebrates			
Branchinecta conservatio	Conservancy fairy shrimp	FE	Inhabits the turbid, ephemeral water of swales and vernal pools within grassland areas.
Branchinecta lynchi	Vernal pool fairy shrimp	FT	Inhabit small, clear-water sandstone depression pools and grassed swale, earth slump or basalt flow depression pools.
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT	Found in elderberry shrubs in riparian areas of the Central Valley from Redding to Bakersfield.
Lepidurus packardi	Vernal pool tadpole shrimp	FE	Pools commonly found in grass bottomed swales of unplowed grasslands. Some pools are mud bottomed and highly turbid.
Birds			
Agelaius tricolor	Tricolored blackbird	CSC	Colonies typically nest in dense emergent vegetation or riparian scrub near open water in a variety of habitat types.
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	FC, CE	Narrow and often widely separated riparian patches.
Haliaeetus leucocephalus	Bald eagle	FT, CE	Nest in large trees with open branches usually within 1 mile of open water.
Pandion haliaetus	Osprey	CSC	Open tall trees and snags with 15 miles of open water areas that support fish.
Riparia riparia	Bank swallow	ST	Nest sites located on cliffs behind waterfalls

TABLE 3.2-1
Special-status Wildlife and Plant Species Potentially Occurring in the Project Area
Redding Basin Water Resources Management Plan EIR

Scientific Name	Common Name	Status	Habitat
			in deep canyons; forages widely.
Strix occidentalis caurina	Northern spotted owl	FT	Riparian and forest habitats (mixed and conifer). Standing snag or hollow tree.
Plants			
Agrostis hendersonii	Henderson's bent grass	3	Valley and foothill grassland, vernal pools.
Carex scoparia	Pointed broom sedge	2	Great Basin scrub. Wet open places.
Carex vulpinoidea	Fox sedge	2	Marshes and swamps, riparian woodland.
Castilleja rubicundula spp. *Rubicundula*	Pink creamsacs	1B	Chaparral, meadows and seeps, valley and foothill grassland. Openings in chaparral or grassland.
Cryptantha crinita	Silky cryptantha	1B	Cismontane woodland, valley foothill grassland, lower montaine coniferous forest, riparian forest, riparian woodland. In gravelly streambeds.
Eleocharis quadrangulata	Four-angled spikerush	2	Marshes and swamps. Freshwater marshes, lake and pond margins.
Gratiola heterosepala	Boggs Lake hedge-hyssop	SE, 1B	Marshes and swamps (freshwater), vernal pools.
Juncus leiospermus var. *leiospermus*	Red Bluff dwarf rush	1B	Chaparral, grasslands, cismontane woodlands; seasonally wet sites and edges of vernal pools; March – May.
Legenere limosa	Legenere	1B	Vernal pools. Many historical occurrences are extirpated.
Orcuttia tenuis	Slender orcutt grass	FT, SE	Vernal pools.
Paronychia ahartii	Ahart's paronychia	1B	Valley and foothill grassland, vernal pools, cismontane woodland.

Sources: California Natural Diversity Database (CNDDB, 2006), U.S. Fish and Wildlife Service (Service, 2006a)

Notes:

Federal Threatened and Endangered Species
FE – Federal Endangered Species
FT – Federal Threatened Species
FP – Federal Proposed Species for Listing as Threatened or Endangered
FC – Federal Candidate to become a Proposed Species

D – Federal Delisted Species

California Threatened and Endangered Species
CE – California State Endangered Species
CT – California State Threatened Species
CSC – California Species of Concern

California Native Plant Society
1B – Plants rare, threatened, or endangered
2 – Plants rare, threatened, or endangered in California but more common elsewhere
3 – Plants about which more information in needed to determine the status of the species

ssp. = subspecies

var. = variant

3.2.1.11 Potential for Federal and State Listed and Proposed Species Occurrence

The federal and state species of concern and proposed plant and animal species identified through the CNDDB and Service species lists have a common association with wetland habitats. The Main Canal provides marginal habitat for wetland species. Its banks are steep and subject to maintenance activities, and are deep with moderately swift water. There are no areas of shallow inundation along its length where these wetland species would be expected to grow. Ponds, creeks, swales, and seeps adjacent to the canal provide more appropriate habitat for these species.

The pointed broom sedge (*Carex scoparia*) is a native plant to California and is associated with Great Basin scrub habitat generally in wet, open places. The CNDDB identified this species on the southwest edge of the groundwater well study area. The area in which the sighting occurred is heavily disturbed with the primary land use being agricultural. Because of the lack of recent reported occurrences (the last was in 1982), it is unlikely that this species would continue to occur within the project area.

The Service and CNDDB list the delta smelt (*Hypomesus transpacificu*), the Central Valley steelhead (*Oncorhynchus mykiss*), and the spring run Chinook salmon (*Onchohynchus tshawytscha* spring-run) as a federal or state threatened species within the vicinity of the study area. The winter-run Chinook salmon (*Onchohynchus tshawytscha* winter-run) is listed as a federal and California state endangered species, and the Central Valley fall/late fall-run Chinook salmon (Oncorhynchus tshawytscha fall-run), is listed as a federal candidate species. The ACID canal is not accessible to fish species due to the presence of fish screens on both the northern and southern ends of the canal. Though the Main Canal crosses natural waterways throughout its 34 mile length, none of the natural surface water resources (creeks, streams, gulches) that have the potential to carry fish species, come in contact with water being delivered through the ACID Main Canal. Because of the lack of access to fish species into the Main Canal, impacts to fisheries would not occur.

The bank swallow (*Riparia riparia*) and tricolored blackbird (*Agelaius tricolor)* are bird species associated with riparian or wetland habitats. Sufficient steep bank or cliff habitat for bank swallow nest colonies was not observed near the Main Canal or groundwater well study area. According to the CNDDB, sightings of bank swallow are confined to areas along the Sacramento River. Significant stands of cattails or other appropriate tricolored blackbird nesting habitat were not observed within any of the ponds, creeks, or seeps adjacent to the work areas. Because of the lack of sufficient habitat, the bank swallow and tricolored blackbird are not anticipated to exist within the study area.

The northern spotted owl (*Strix occidentalis caurina)* is a bird species that is typically associated with mixed and coniferous forest habitat. Habitat for the owl includes a multilayered canopy dominated by large overstory trees with a high presence of tree cavities, broken tops, large snags, and a heavy accumulation of logs and other woody debris on the forest floor. Habitat conditions generally occur within old growth forests for the northern spotted owl (NatureServe, 2006). Because of the lack of sufficient habitat near the proposed project, the northern spotted owl is not expected to occur within the study area.

As stated above, several of the species listed by the CNDDB and Service are unlikely to occur in the project area because of insufficient habitat. The species described below have the potential to occur based on sightings during the reconnaissance survey, CNDDB occurrences listed within or directly adjacent to the study areas, or the presence of suitable habitat within the proposed project vicinity.

California Red-legged Frog. The database search indicated potential for the presence of the California red-legged frog (*Rana aurora draytoni*) in the project vicinity (Service, 2006). Habitat for the frog includes quiet permanent water of streams, marshes, ponds, and other quiet bodies of water. The frog may also be found in damp woods and meadows (NatureServe, 2006).

The frog may occur in sites with dense vegetation close to water and some shading. This species is known to burrow in leaf litter or moist sites near riparian areas, and can occupy ephemeral pools if the water is present until late spring or early summer. The frog generally breeds in permanent water and seeks refuge in deep water. It may be found burrowing in soil and/or fallen logs and debris (NatureServe, 2006).

The project area contains various sizes of ponds, willow thickets, and adjacent upland areas that may be suitable habitat for the frog, though the presence of predators (bullfrogs and crayfish) may indicate this species is not likely to occur. The CNDDB did not contain recorded occurrences of the frog in the search area (CNDDB, 2006).

Valley Elderberry Longhorn Beetle. The CNDDB contained occurrences of the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) in the project vicinity, though no occurrences have been recorded in the study area. Blue elderberry, the beetle's primary habitat, is likely to occur within the project area.

The beetle is entirely dependent on elderberry (*Sambucus* sp.) shrubs for reproduction and survival. Females lay their eggs in crevices on the bark. After hatching, larvae burrow into the stems, where they grow and develop for up to 2 years. The elderberry is their sole food source (Service, 2006c). Adults are active from March to June, feeding and mating during this time.

The beetle is nearly always found on or close to its host plant, preferring stems that are 1 inch or greater in diameter at ground level. Use of the plants by the beetle is rarely apparent. Frequently, the only exterior evidence of the beetle is an exit hole created in the shrub by the larva just before the pupal stage.

Bald Eagle. Bald eagles (*Haliaeetus leucocephalus*) are year-round and winter residents in California. In California, nesting territories usually are found in mixed conifer and ponderosa pine forests and are always associated with a lake, river, or other large body of water. Nests are typically a platform structure constructed in dominant or codominant trees within 1 mile of water and with unobstructed views of the water body. Snags and dead-topped trees provide perch and roost sites for the nesting birds. Individuals usually nest in the same territories each year and often reuse the same nest. Breeding occurs from January through July, with peak activity from March to June. Bald eagles are monogamous, and both the male and female tend the nests. A clutch size of two eggs is typical.

Bald eagles winter along rivers, lakes, or reservoirs with abundant prey and adjacent snags or mature trees for perch sites. Mature trees or snags with an open branching structure that are isolated from human disturbance are used for roosting during winter. Bald eagles often roost communally during winter. The most important component of bald eagle wintering habitat is an adequate food source. Bald eagles predominantly forage on fish, but also prey on waterfowl.

The CNDDB search identified bald eagle nest sites within the project vicinity. Potential cliff or large tree nest sites were not observed in the project areas. The mature trees within view of the canal provide nesting opportunities for a number of raptor species. It may be necessary to conduct preconstruction surveys during the appropriate breeding season to identify and avoid active bald eagle nests.

Osprey. The osprey (*Pandion haliaetus*), breeds in northern California typically from Lake Tahoe north to the Cascade Ranges and along the coast south to Marin County. Regular breeding sites include inland lakes and reservoirs and northwest river systems. The osprey preys mostly on fish, though its prey also includes mammals, birds, reptiles, amphibians and invertebrates. Open clear water is required for foraging. The osprey uses large trees, snags and human made structures (such as nesting platforms) for nesting and cover.

An osprey was observed perched over one of the gravel mining property ponds in May of 2002, adjacent to the proposed canal linings. No osprey nests were observed in the immediate areas of the Main Canal. However, an active nest was incidentally observed on top of a utility pole less than a mile away from the groundwater well study area. It is unlikely that proposed activities would disturb the observed nest, although the osprey could return to the nesting site, and additional nests could be found within range of the work area. It may be necessary to conduct preconstruction surveys during the appropriate breeding season in order to identify and avoid active osprey nests.

Tricolored Blackbird. The tricolored blackbird (*Agelaius tricolor*), typically nests in dense emergent vegetation or riparian scrub near open water in a variety of habitat types. Nesting habitats may include fresh water marshes and thickets. The bird has been known to nest in non-native vegetation and on the ground. During the nonbreeding season, the tricolored blackbird may be found in open cultivated land and pasture land. This species is known to roost and forage in flocks. (NatureServe, 2006).

The tricolored blackbird was identified in the groundwater well study area in June 2005 during a statewide tricolored blackbird survey. During the 2005 survey, the tricolored blackbird did not appear to be nesting. In May 2006, nesting adults were observed at the site. Nesting substrate was primarily Himalaya blackberry within a wetland area. (CNDDB, 2006).

Western Yellow-billed Cuckoo. The western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) prefers open woodland habitat with clearings, and low, dense, scrubby vegetation. The species is often associated with watercourses, and can be found in orchards adjacent to river bottoms in California. During the spring and fall migrations, the western yellow-billed cuckoo may be found from sea level to elevation 2,500 meters in coastal scrub, second growth, hedgerows, and the forest edge (Hughes, 1999).

The western yellow-billed cuckoo was not observed during the reconnaissance survey, and no records exist of this species in the CNDDB; therefore, it is not likely that the cuckoo would be present in the project vicinity. However, it may be necessary to conduct preconstruction surveys during the appropriate breeding season (approximately mid-June to late July) to identify and avoid active nests in areas with suitable habitat.

Northwestern Pond Turtle. The northwestern pond turtle (*Clemmys marmorata mamorata*) is a native turtle to California normally found in permanent ponds, lakes, streams, irrigation ditches or permanent pools along intermittent streams.

Food for the northwestern pond turtle includes aquatic plant material, beetles and a variety of aquatic invertebrates as well as fishes and frogs. Pond turtles require basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks. Turtles slip from basking sites to underwater retreats at the approach of humans or potential predators. In colder areas, the turtle hibernates underwater in bottom mud.

During the spring or early summer, females move overland for up to 100 meters (325 feet) to find suitable sites for egg-laying. From 3 to 11 eggs (Ernst and Barbour 1972) are laid from March to August depending on local conditions. Western pond turtles reach sexual maturity in about 8 years. Females may find suitable nesting sites along foothill streams and may climb hillsides, sometimes moving considerable distances to find a nest site.

The northwestern pond turtle is the only special-status reptile species listed in the CNDDB search within the project vicinity. It is unlikely that pond turtles would frequent the Main Canal. The canal is uniformly deep, with fairly swift–moving water, and provides little in terms of cover or basking resources. Nevertheless, northwestern pond turtles were observed in ponds adjacent to the canal. Egg laying and dispersing turtles will travel considerable distance over upland habitat. Therefore, turtles could be encountered within the proposed work areas, and preconstruction surveys should be conducted for this species.

Yellow-breasted Chat and Yellow Warbler. The yellow-breasted chat and yellow warbler are listed by CDFG as California species of special concern. Though no sitings have been recorded in the CNDDB for these species, both were observed approximately 1 mile north of the Clear Creek proposed canal lining section.

The yellow-breasted chat and the yellow warbler are associated with riparian habitat throughout California. The surrounding riparian habitat within the project area provides potential nesting habitat for these riparian associated birds.

3.2.2 Environmental Consequences/Environmental Impacts

3.2.2.1 Methodology

The locations of the proposed improvements were surveyed at a reconnaissance level to assess potential impacts to existing habitat. Implementation of the proposed project was evaluated with respect to direct affects to biological resources through construction, operation, and maintenance of new facilities. Potential indirect impacts of the proposed project on biological resources could result from changes in habitat associated with unlined canals and hydrologic impacts due to groundwater pumping in critically dry years. The assessment was divided into construction and operational impacts.

3.2.2.2 Construction Impacts

Construction impacts encompass the permanent and temporary affects of constructing new facilities, including temporary and permanent loss of vegetation and potential disruption to wildlife during construction (e.g., disturbance from noise and human activity). Potential construction impacts were evaluated by estimating the acreage affected by activities required to support construction (e.g., staging areas) and the acreage in the footprint of the new facility. The types of habitats likely to be affected are predicted based on the known or general location of the facilities. Impacts to wildlife, including special-status species, are determined according to changes in the amount and/or quality of habitat in the proposed project area. This evaluation considers the collective impact of construction of all new wells and canal linings proposed in the alternatives.

3.2.2.3 Operational Impacts

Operational impacts fall into two general categories: (1) facility-related operational impacts and (2) hydrologic operational impacts.

Facility-related Operational Impacts. Facility-related operational impacts consist of potential impacts to biological resources in the immediate vicinity of a facility that could result from noise and/or maintenance activities associated with the facilities. The potential for these types of impacts is evaluated by determining the types of habitats likely to occur near the facilities, the potential for species sensitive to noise and/or maintenance activities to occur in these habitats, and the magnitude and duration of noise and maintenance activities as compared to existing conditions.

Hydrological Operational Impacts. The proposed project could influence groundwater levels. Under Alternative 1 for the year 2030, groundwater pumping would increase during the irrigation season of generally drier years. Riparian vegetation such as cottonwoods and willows require access to groundwater throughout the summer. Seasonal reductions in groundwater levels could adversely affect riparian vegetation. Potential impacts to riparian vegetation from increased groundwater pumping under the proposed project were evaluated by determining the magnitude of groundwater reductions in areas supporting or potentially supporting riparian vegetation.

The impact of the proposed project on groundwater levels was evaluated using the groundwater model described in Section 3.6, Groundwater Resources. This spatially explicit model was used to predict changes in groundwater elevations under the No Action/No Project Alternative in comparison to the alternatives. Because the model does not predict actual groundwater levels, results were used to provide average monthly reductions (in feet) in groundwater elevations relative to the No Action/No Project Alternative. For this analysis, the average reduction in groundwater elevation at the end of October was used to assess potential impacts to riparian vegetation. The end of October, which corresponds to the end of the pumping season, represents the maximum potential impact to riparian vegetation from groundwater changes because it is the end of the growing season and water becomes available through precipitation in November and December.

An impact to riparian vegetation could occur if groundwater pumping under the proposed project reduces groundwater elevations beyond the maximum reach of cottonwoods and willows in areas supporting these species. The maximum depth to groundwater for willows is approximately 10 feet and 15 to 20 feet for cottonwoods (Stromberg et al., 1996; Caicco et al., 1993). However, groundwater model results indicate that this will not occur.

3.2.2.4 Significance Criteria

To assess potential impacts that could result from implementation of the proposed action, impacts to terrestrial biological resources would be significant if the proposed action would result in any of the following:

- Substantial adverse effect on a special-status species either directly or through habitat modification
- Substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFG or Service
- Substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA (including, but not limited to marsh, vernal pool, and coastal) through direct removal, filling, hydrological interruption or other means
- Substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or obstruction to the use of native wildlife nursery sites
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance
- Conflict with the provisions of an adopted Habitat Conservation Plan, NCCP, or other approved local, regional, or state habitat conservation plan

Federal Endangered Species Act [ESA]. The federal ESA protects plants and wildlife that are listed as endangered or threatened by the Service and NOAA Fisheries. Section 9 of the federal ESA prohibits the taking of endangered wildlife, where taking is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct" (50 CFR 17.3). For plants, this statute governs removing, possessing, maliciously damaging, or destroying any endangered plant on federal land and removing, cutting, digging up, damaging, or destroying any endangered plant on non-federal land in knowing violation of the law (16 USC 1538). Under Section 7 of Federal ESA, federal agencies are required to consult with the Service if their actions, including permit approvals or funding, could adversely affect an endangered species (including plants) or its critical habitat. Through consultation and the issuance of a biological opinion, the Service may issue an incidental take statement allowing take of the species that is incidental to another authorized activity provided the action will not jeopardize the continued existence of the species. Section 10 of Federal ESA provides for issuance of incidental take permits to private parties if a habitat conservation plan is developed.

Migratory Bird Treaty Act. The Migratory Bird Treaty Act implements international treaties between the United States and other nations to protect migratory birds, any of their parts, eggs, and nests from activities such as hunting, pursuing, capturing, killing, selling, and shipping, unless expressly authorized in the regulations or by permit. As authorized by the Migratory Bird Treaty Act, the Service issues permits to qualified applicants for the following types of activities: falconry, raptor propagation, scientific collecting, special purposes (rehabilitation, education, migratory game bird propagation, and salvage), take of depredating birds, taxidermy, and waterfowl sale and disposal. The regulations governing migratory bird permits can be found in 50 CFR part 13 General Permit Procedures and

50 CFR part 21 Migratory Bird Permits. The state has incorporated the protection of birds of prey into Sections 3800, 3513, and 3503.5 of the CDFG Code.

Federal Clean Water Act. The purpose of the CWA is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." Section 404 of the CWA prohibits the discharge of dredged or fill material into "waters of the United States" without a permit from the U.S. Army Corps of Engineers. The definition of waters of the United States includes rivers, streams, estuaries, the territorial seas, ponds, lakes, and wetlands. Wetlands are defined as those areas "that are inundated or saturated by surface or ground water (sic) at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3 7b). EPA also has authority over wetlands and may override a U.S. Army Corps of Engineers' permit.

Substantial impacts to wetlands may require an individual permit. Projects that only minimally affect wetlands may meet the conditions of one of the existing nationwide permits. A water quality certification or waiver pursuant to Section 401 of the CWA is required for Section 404 permit actions; this certification or waiver is issued by the Regional Water Board.

California Endangered Species Act. The California ESA generally parallels the main provisions of the Federal ESA, but unlike its federal counterpart, California ESA applies the take prohibitions to species proposed for listing (called candidates by the state). Section 2080 of the CDFG Code prohibits the taking, possessing, purchasing, selling, and importing or exporting endangered, threatened, or candidate species, unless otherwise authorized by permit or in the regulations. California ESA allows for take incidental to otherwise lawful development projects. State lead agencies are required to consult with CDFG to ensure that any action they undertake is not likely to jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of essential habitat.

Fully Protected Species. The state first began to designate species as "Fully Protected" prior to the creation of the California ESA and the Federal ESA. Lists of fully protected species were initially developed to protect those animals that were rare or faced possible extinction and included fish, mammals, amphibians, reptiles, birds, and mammals. Most fully protected species have since been listed as threatened or endangered under California ESA and/or Federal ESA. The regulations that implement the Fully Protected Species Statute (CDFG Code Section 4700) provide that fully protected species may not be taken or possessed at any time. Furthermore, the CDFG prohibits any state agency from issuing incidental take permits for fully protected species, except for necessary scientific research.

Native Plant Protection Act. The Native Plant Protection Act (NPPA) of 1977 (Fish and Game Code Sections 1900-1913) was created with the intent to "preserve, protect and enhance rare and endangered plants in this State." The NPPA is administered by the CDFG. The CDFG Fish and Game Commission has the authority to designate native plants as endangered or rare and to protect endangered and rare plants from take. The California ESA of 1984 (CDFG Code Section 2050-2116) provided further protection for rare and endangered plant species, but the NPPA remains part of the CDFG Code.

3.2.2.5 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction.

Operational Impacts. Under the No Project Alternative, the Basin would continue to implement its current water management program. Current conditions would not change under the No Project Alternative.

3.2.2.6 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF, which would be within the range of flow variation in the water conveyance systems over time, thus resulting in no change in conditions for biological resources. Because the baseline year is a normal water year, management actions would not be implemented and biological resources would not be impacted.

3.2.2.7 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts Under Alternative 2, operational impacts would be similar to those described for Alternative 1.

3.2.2.8 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Operation impacts associated with the combined use alternative would be identical to those addressed in Alternative 1.

3.2.2.9 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, there would be no construction.

Operational Impacts. Under the No Action Alternative, current operations would continue toward the 2030 level of development.

3.2.2.10 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. **Impact BR-1: Construction of groundwater wells and associated infrastructure would result in the permanent and temporary loss of native habitat within the Basin.** New wells would be distributed throughout the groundwater well study area. The wells are anticipated to be located on agricultural or disturbed lands. Approximately 1.8 acres of temporary disturbance would occur at the groundwater well sites, and approximately 0.25 acre of permanent land conversion would occur. Considering the location of the proposed wells and the relatively small footprint of the construction and staging areas, no significant loss of native habitat is anticipated as a result of implementing this alternative. Preconstruction surveys would be conducted and the well locations and staging areas sited so that impacts to native habitat would be avoided or minimized to the extent feasible. If native habitat were lost, it would cause a significant impact and mitigation would be required (see Mitigation Measure BR-1.)

Impact BR-2: Construction activities would adversely affect wildlife using agricultural fields or adjacent habitats. Construction activities would disturb and displace any wildlife species occurring in the construction area of the new groundwater wells. A few special-status species may use the margins of agricultural fields or disturbed areas for foraging or nesting. Because the area disturbed would be relatively small and the species rely on a greater total area for foraging, it is anticipated that disturbance would result in less-than-significant impacts. Construction would take place at a minimum of 20 feet from trees, and would therefore, minimize impact on nesting. The new groundwater wells would be located in agricultural fields and disturbed areas. Thus, any species using these areas experience regular disturbance from agricultural and water management activities. In addition, the area that would be affected during construction of each well site is small, approximately 1.8 acres. Furthermore, the duration of construction activities would be short, approximately 10 to 30 days.

Construction of groundwater wells would require heavy equipment, such as bulldozers, backhoes, and drilling equipment, and would result in increased human activity. This increased noise and activity could disturb wildlife using habitats adjacent to the construction areas. Because the well sites are in areas of active agricultural production, wildlife using habitats adjacent to agricultural fields and roadways regularly experience exposure to equipment noise and human activity. Species using habitats adjacent to agricultural fields are typically tolerant of human activity.

Construction of the new wells and conveyance piping would require some excavation and trenching (e.g., for installing underground piping). Wildlife species such as ground squirrels, lizards, snakes, small mammals, or burrowing animals could fall into open trenches and become trapped. Because of the short duration of the construction activities associated with each well site, it is not anticipated that the presence of open trenches during the construction period would result in a substantial number of animals being trapped and this potential impact is not significant.

The CNDDB search identified osprey and bald eagle nests near the canal linings, and an osprey nesting site was observed approximately 1 mile outside the study area during the reconnaissance survey. It is possible that proposed activities would disturb the osprey and bald eagle and there is a potential that additional nests may be found within range of the work area. It may be necessary to conduct preconstruction surveys during the appropriate breeding season to identify and avoid active osprey and bald eagle nests. If an active nest is discovered, avoidance until fledgling would occur. (See Mitigation Measure BR-2.)

Given the short duration of construction activities and the existing activity levels at well sites, construction activities would not be expected to significantly impact wildlife.

3.2.2.11 Operational Impacts

Facility-related Impacts. **Impact BR-3: Operation of groundwater wells and maintenance activities would disturb wildlife.** Groundwater wells located adjacent to agricultural fields would periodically generate noise during periods when they are in operation, primarily during critically dry seasons. Wildlife species currently using areas within or adjacent to agricultural fields currently experience noise from farming equipment and operation of existing groundwater wells. The periodic noise generated during groundwater pumping is not expected to result in noise at a level that would significantly disturb wildlife. Noise levels are anticipated to be either below or at levels that are typically encountered on a routine basis at each site.

Well sites would need to be inspected and maintenance activities conducted periodically. These activities would be infrequent and limited to the well site and access roads. Because of the low frequency and intensity of maintenance activities, these activities are expected to present a less-than-significant impact to wildlife in the area.

3.2.2.12 Alternative 2 – Water Use Efficiency (2030)

Construction Impacts. **Impact BR-5**: **Construction of canal linings would result in the temporary and permanent loss of riparian and wetland habitat, reducing habitat availability for riparian- and wetland-associated wildlife.** Four canal sections are proposed for lining to minimize water loss through leakage. The temporary impacted riparian and wetland habitat would consist of areas that would need to be cleared and individual trees that would need to be removed to support the construction of canal linings. In some cases, individual trees may need to be trimmed to allow access to the project site by construction equipment. Riparian vegetation may need to be removed to allow construction equipment access, but following construction, vegetation could recolonize the disturbed area, thus constituting a temporary impact to riparian vegetation located in staging areas and outside of the Main Canal channel.

Riparian vegetation within the canal that would be removed during the installation of canal linings would result in a permanent impact to riparian vegetation. The amount of riparian vegetation that would be permanently impacted would depend on the vegetation located in different areas of the main channel of the canal in the proposed canal lining sections. Riparian vegetation that could be permanently or temporarily affected during construction of canal linings would be surveyed prior to construction activities. This permanent impact would be significant; therefore, mitigation would be required.

Temporary impacts to wetlands outside of the Main Canal channel could occur during construction activities from incidental intrusion by equipment into toe drains during construction activities, or from incidental discharge of sediment into these areas. Wetland vegetation would recover after completion of construction.

In general, construction staging areas for the proposed canal lings would take place on land already developed for access to and maintenance of the Main Canal. The majority of the Main Canal is accessible by levee roads that run adjacent to the canal on both banks. Construction equipment could stage on main roads near the canal or on the levee access roads, which are relatively free of vegetation such as trees and shrubs. Though the access roads may be relatively free of vegetation, construction of the canal lining would eliminate areas of emergent vegetation in some sections within the canal, resulting in the permanent loss of riparian or wetland habitat. The temporary and permanent loss of wetland and riparian habitat is a potentially significant impact. Potential impacts would be mitigated to less-than-significant levels by obtaining a Section 404 permit and complying with the permit requirements. (See Mitigation Measure BR-5.)

Impact BR-6: Construction of canal linings could adversely affect wildlife, including special-status wildlife species. Construction of canal linings could displace or directly injure wildlife. If special-status species are found at project sites and would be at risk of direct injury, the project would be adjusted or other appropriate actions taken to avoid these impacts. Although some wildlife would be displaced by construction activities, this displacement is not anticipated to result in significant impacts to wildlife populations because only a small amount of habitat would be affected. Impacts would be further reduced by implementing Mitigation Measure BR-6.

Construction of canal linings would require using heavy equipment such as bulldozers, backhoes, and drilling equipment and result in increased human activity during construction. This increased noise and activity could disturb wildlife using habitats on or adjacent to the construction areas. Construction activities would be of short duration, extending from 10 to 30 days; therefore, would affect only one breeding season, at most. Further, the water use efficiency projects are associated with the existing Main Canal that requires regular maintenance. Species that inhabit areas adjacent to construction areas are likely accustomed to some degree of human activity. Given these considerations, the potential for disturbance of special-status species using habitats adjacent to construction areas is not a significant impact.

Potential impacts to the valley elderberry longhorn beetle are evaluated by determining if construction activities would remove riparian vegetation that could include elderberry shrubs or would be conducted in areas where elderberry shrubs often occur (e.g., along agricultural drains). It is not anticipated that elderberry shrubs would be removed during construction of the canal linings; though if removed, this action would constitute a significant impact and consultation with the Service, and mitigation would be required. (See Mitigation Measure BR-6.)

Potential impacts to California red-legged frog are evaluated by determining if construction activities would remove habitat that supports the species. A site assessment for the California red-legged frog may need to be conducted in accordance with guidelines provided by the Service to determine if suitable habitat for the species exists within the project area. If this habitat or the frog is found within the project area, it would be constituted as a significant impact, and consultation with the Service, and mitigation would be required (See Mitigation Measure BR-6).

Bald eagles are not known to nest near the proposed canal linings but may forage within the project vicinity. An osprey nest was sighted within a mile of the project area during the survey. Both species require perch sites such as trees near water bodies where they forage. In the project area, these species could use riparian trees as perch sites from which to forage for fish in nearby water bodies and ponds. The western yellow-billed cuckoo is not known to nest in the project area, though it may nest and forage within the project vicinity. Although this alternative would remove some riparian habitat, suitable nesting habitat does occur, and large trees would remain available in riparian areas not affected by construction. Considering the lack of known bald eagle, western yellow-billed cuckoo, and osprey nesting sites within this area, the small reduction in riparian habitat during construction would not significantly impact these species within the project area.

The tricolored blackbird has been found to nest in the groundwater well study area, in blackberry thickets in a wetland area (CNDDB, 2006). In the project area, these birds could forage and nest within wetland areas, on the ground, or in riparian vegetation. They could be found within pasture land in the project vicinity. The tricolored blackbird could be encountered within the proposed work areas, and preconstruction surveys should be conducted for this species. By limiting the size of the project footprint and staging areas, potential impacts would be kept to a minimum; therefore, these impacts would be less than significant.

The northwestern pond turtle could be encountered in the proposed work areas, and preconstruction surveys should be conducted for this species. By limiting the size of the project footprint and staging areas, potential impacts would be kept to a minimum; therefore, would be less than significant.

Impact BR-7: Construction of system improvements could result in the loss of special-status plants. Construction of system improvements would require the removal of riparian and wetland vegetation. Several special-status plant species are found in these types of environments in the Sacramento Valley and could be present in the areas that would be impacted by system improvements. The potential loss of individual special-status plant species associated with riparian and wetland habitat is a potentially significant impact.

Riparian and wetland habitats have been substantially reduced in the Central Valley, and many special-status species are of concern because of reductions in these habitats. Lost riparian and wetland habitat from the system improvement projects would reduce habitat availability for riparian and wetland-associated special-status species. This habitat reduction would be a significant impact; mitigation would be required and would reduce impacts to less-than-significant levels. (See Mitigation Measures BR-1 and BR-7.)

3.2.2.13 Operational Impacts

Facility-related Impacts. Canal linings would need to be inspected and maintenance activities conducted periodically. These activities would be infrequent and limited to the concrete lining and levee roads. Because of the low frequency and intensity of maintenance activities, these activities are expected to present a less-than-significant impact.

3.2.2.14 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Construction impacts associated with the combined use alternative would be identical to those addressed in Alternatives 1 and 2.

Operational Impacts. Operational impacts associated with the combined use alternative would be identical to those addressed in Alternatives 1 and 2.

3.2.3 Mitigation Measures

Mitigation BR-1: During the planning phase of the water management projects, when alternative locations for new wells are being evaluated, areas under consideration would be visited by a qualified biologist to determine the occurrence of native habitats (particularly wetlands, vernal pools, and riparian vegetation) at the proposed well sites. If native or sensitive habitats are found at a particular location, the location would be dropped from further consideration as a new well site or the specific configuration of the new well facilities would be adjusted to provide a buffer between the new facilities, construction-related disturbance areas, and the habitat in accordance with Table 3.2-3.

TABLE 3.2.3
Avoidance Distances by Habitat Type
Redding Basin Water Resources Management Plan EIR

Habitat	Buffer Distance
Vernal pools	250 feet
Wetlands	250 feet
Riparian Forest and Scrub	100 feet from dripline
Oak Woodlands	100 feet from dripline

If native habitats (vernal pools, wetlands, riparian vegetation, native grasslands, and oak woodlands) are found at the well sites, the project location would be changed or the specific configuration of the project components adjusted to avoid removal of native habitats, to the extent possible. Where feasible, all new facilities and construction support areas (e.g., new temporary access roads, new staging areas, and new stockpile areas) would be situated the specified distance from the outer edge or drip line of habitat listed in Table 3.2.3 If new facilities construction support areas could not be located in accordance with the distances listed in Table 3.2.3, they would be situated as far as possible from native vegetation, to avoid removal to the extent possible. Where impacts to native habitats could not be avoided, mitigation to offset the lost habitat values would be implemented.

Similarly, if special-status species are observed at a project site and would be at risk of direct injury from construction activities, the location of the project would be changed, if possible, the specific configuration of the project components adjusted to minimize the potential for direct injury of special-status species, or the individuals removed from the project site in a manner approved by Service or CDFG. In most cases, implementation of avoidance measures for native habitats would be sufficient to avoid significant impacts to special-status species. Exceptions are species that breed, roost, or hibernate in non-native habitats such as disturbed areas or agricultural fields. The appropriate avoidance requirements would depend on the species involved and would be coordinated with the appropriate resource agencies (CDFG and/or Service).

During construction of groundwater wells and associated pipelines, any open trenches would be checked at least twice daily (once in the morning and once in the evening) for wildlife that might have become trapped in the trench. Any wildlife found would be removed by qualified biologist and released in the nearest suitable habitat.

Mitigation BR-2: Prior to construction of groundwater wells that would impact the osprey and bald eagle, a qualified biologist would survey construction areas for special-status wildlife. If osprey and bald eagle nests are found, the location of project facilities and construction areas would be adjusted, if possible, to avoid impacting these special-status species. Regular monitoring of open trenches for trapped wildlife is recommended.

Mitigation BR-5: Prior to construction, canal lining sections would be visited to verify and refine the acreage of riparian and wetland habitat that would be impacted and to characterize the composition and quality of the impacted habitat. The loss of riparian and wetland habitat would be mitigated by enhancing, restoring, or creating riparian and wetland habitat at a 3:1 ratio for every acre of habitat permanently impacted. Mitigation may be accomplished through the following means:

- Restoration, enhancement, or creation of habitat onsite
- Restoration, enhancement, or creation of habitat at an offsite location
- Purchase of mitigation credits in an approved mitigation bank

For temporarily impacted areas of riparian vegetation where vegetation would need to be removed to accommodate construction, the disturbed areas would be replanted with native riparian vegetation.

To minimize the potential for temporary impacts to wetland habitat during preconstruction activities, wetland areas would be fenced and flagged. Construction workers would be instructed to avoid operating equipment in fenced areas. Standard best management practices (BMPs) would be used to minimize the potential for sediment input to the wetlands.

With implementation of these measures, impacts to riparian and wetland habitat would be less than significant.

Mitigation BR-6: Prior to construction of canal linings that would impact special-status wildlife, a qualified biologist would survey construction areas for special-status wildlife. If special-status wildlife are found, the location of project facilities and construction areas would be adjusted, if possible, to avoid the wildlife.

The Basin would follow the Service Conservation Guidelines for the valley elderberry longhorn beetle to avoid, minimize, and mitigate impacts to the beetle (U.S. Department of the Interior, 1999). Construction activities would attempt to avoid elderberry shrubs in locating staging areas and other construction areas. Shrubs that can be avoided would be fenced and posted, and workers would be educated about the beetle in accordance with the Conservation Guidelines. If elderberry shrubs cannot be avoided, they would be transplanted, and additional seedlings would be planted at a secure mitigation site in accordance with the Conservation Guidelines. With this mitigation, impacts to the beetle would be less than significant.

The Basin would follow the Service guidance (Service, 2005) to determine the presence or lack of suitable breeding habitat for the California red-legged frog within the project vicinity. If habitat is determined to exist, the Service may require protocol surveys for the frog. If surveys identify the occurrence of the California red-legged frog within the proposed project area, and there is the potential for "take," an incidental take authorization would be obtained from the Service. With this mitigation, impacts to the frog would be less than significant.

Mitigation BR-7: Prior to construction of projects that would impact riparian or wetland habitats, a qualified biologist would conduct a rare plant survey of the construction areas. If special-status plants are found, the location of project facilities and construction areas would be adjusted, if possible, to avoid the plants. CDFG would be consulted to determine appropriate methods and locations for transplanting. Implementation of this mitigation measure would reduce potential impacts to special-status plant species to a less-than-significant level.

3.2.4 References

Caicco, S., M. Swanson, and M. Macoubrie. 1993. Truckee River Riparian Vegetation and Fluvial Geomorphology Study. Prepared for the U.S. Fish and Wildlife Service. Reno, NV.

California Department of Fish and Game (CDFG). 2006. Wildlife and Habitats Data Analysis Branch. California Natural Diversity Database (CNDDB). September 1, 2006, to March 1, 2007. Accessed November 7.

Cowardin, L.M., V. Cater, F. Golet, and E. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service. 103 pp.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. State of California, The Resources Agency. Nongame Heritage Program, Department of Fish and Game. Sacramento.

Hughes, J. M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*). The Birds of North America, No. 418 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Mayer, K.E., and W.F. Laudinslayer Jr. (editors). 1988. A Guide to Wildlife Habitats of California. California Department of Forestry and Fire Protection, Sacramento, California.

NatureServe, 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: November 13, 2006).

Stromberg, J.C., R. Tiller, and B. Richter. 1996. Effects of groundwater decline on riparian vegetation of semiarid regions: The San Pedro, Arizona. Ecological Applications 6: 113-131.

University of California Davis, Information Center for the Environment. Accessed July, 2005. Icemaps 2. http://icemaps.des.ucdavis.edu/icemaps2/ICEMapInit.html.

U.S. Department of the Interior, U.S. Fish and Wildlife Service (Service). 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. July 9.

U.S. Fish and Wildlife Service (Service). 2006a. National Wetlands Inventory, Wetlands Mapper, wetlands.fws.gov. Accessed November 9.

U.S. Fish and Wildlife Service (Service). 2006b. Federal Endangered and Threatened Species List (by quad). Updated as of October 27. Accessed November 9.

U.S. Fish and Wildlife Service (Service). 2006c. Threatened and Endangered Species System. http://ecos.fws.gov/tess_public/SpeciesReport.do?groups=I&listingType=L. Accessed November 22.

U.S. Fish and Wildlife Service (Service). 2005. Revised Guidance on Site Assessment and Field Surveys for the California Red-legged Frog. August.

3.3 Cultural Resources

This section presents an overview of the Basin's prehistoric, ethnographic, and historic background and evaluates the potential consequences of implementation of the Plan for identified cultural resources of concern.

3.3.1 Affected Environment/Existing Conditions

The following description of existing cultural resources focuses on areas potentially affected by implementation of the action alternatives. Potential adverse impacts resulting from construction of conjunctive use management and water use efficiency projects could disturb known and unknown cultural resources in specific project areas.

3.3.1.1 Area of Analysis

The cultural resources analysis focuses on the Basin located in the northernmost portion of the Sacramento Valley. The Basin encompasses the south central region of Shasta County bounded at the north by Shasta Lake and extends south about 5 miles from Cottonwood Creek into northern Tehama County. Proposed project locations cluster east of Interstate 5 and north of the Shasta-Tehama county line, and at various points along the ACID Main Canal.

3.3.1.2 Regulatory Setting

Preserving the culture and history of the nation's past are the goals of regulations that include the Antiquities Act of 1906, Historic Sites Act of 1935, the National Historic Preservation Act (NHPA) of 1966, and the Archaeological Resource Protection Act of 1979. The NHPA, Section 106 regulations (36 CFR 800) require that federal agencies identify, evaluate, and assess impacts to historical properties (cultural resources determined eligible for inclusion in the National Register of Historic Places [NRHP]) and mitigate adverse impacts to historical properties. The State Historic Preservation Officer, the Advisory Council on Historic Preservation, Indian tribes, and other individuals and organizations can participate in the Section 106 process.

Similar state regulations protect archaeological and historical sites, and specifically provide for identification and protection of traditional Native American gathering and ceremonial sites on state land. These regulations include CEQA and various provisions within Public Resources Code Division 5 (Parks and Monuments).

3.3.1.3 Prehistory/Archaeology

Archaeological evidence of human occupation in the northern Sacramento Valley and nearby areas extends back several thousand years. Tribal oral histories would place Native American occupation back to "time immemorial."

In the span between about 10,000 B.C. and A.D. 1774, prehistoric societies occupying the greater Sacramento Valley and surrounding areas underwent a series of slow but important changes in subsistence and economic orientation, population densities and distribution, and social organization. The evidence for these changes is found within the known archaeological record (Jensen and Reed, 1979). Several models of prehistoric culture history are available for the region and are summarized by Moratto (1984), Jensen and Reed (1979), Basgall and Hildebrandt (1989), and Johnson and Theodoratus (1984a and 1984b).

3.3.1.4 Ethnology/Ethnohistory

The Basin includes a broad geographic area that encompassed both environmental and cultural diversity in prehistoric times and during the contact period when Native Americans encountered Spanish and Euro-American explorers and settlers. The Basin was home to three different California Native American groups, including the following, as described below:

- The Wintu territory covered parts of what are now Trinity, Shasta, Siskiyou, and Tehama Counties, including the area north of Cottonwood Creek and west of Little Cow Creek and the Sacramento River (LaPena, 1978). Detailed ethnographic information on the Wintu is available in DuBois (1935), LaPena (1978), and Kroeber (1925).
- The Yana traditionally occupied the upper Sacramento River Valley and foothills east of Little Cow Creek and the Sacramento River (generally east of Redding, Bloody Island, Red Bluff, and Tehama [Johnson, 1978]). Detailed ethnographic information on the Yana is available in Johnson (1978) and Kroeber (1925).
- The Nomlaki consisted of two groups. The River Nomlaki lived in the Sacramento River Valley in present Tehama County, south of Cottonwood Creek, and the Hill Nomlaki lived in the foothills to the west, extending to the summit of the Coast Range in what is now Tehama and Glenn Counties (Goldschmidt, 1978). Detailed ethnographic information on the Nomlaki is available in Du Bois (1939), Goldschmidt (1951 and 1978), and Kroeber (1925).

3.3.1.5 Euro-American History

The United States seized control of California from Mexico in 1846, at the start of the United States-Mexican War. In 1848, John Marshall, an employee of John Sutter, discovered gold on the American River. Many areas in the northern Sacramento Valley saw the first major wave of Euro-American colonization following the California Gold Rush. By the time the local Indians had been forcibly taken to reservations, many small towns and settlements had already been established. Euro-American colonization was further stimulated by the 1862 Homestead Act and the arrival of the railroad. Colonization included establishment of farms, ranches, gold mines, and lumber and other extractive industries.

In 1897, gold was replaced by copper as the main mineral produced in Shasta County. Smoke and fumes from Shasta County smelters killed vegetation, fish, and fruit trees as far south as Anderson and Cottonwood. All of the smelters were closed by court order in 1919.

Through the late nineteenth and early twentieth centuries, the spread of riverboat and ferry transportation and later railroad and highway transportation infrastructure increased access to more distant markets. The northern end of the Sacramento Valley developed a growing population sustained by a mix of mineral and timber extraction industries and farm and ranch operations. Large-scale irrigation of farms and ranches was made possible in the mid-twentieth century by completion of Shasta Dam and other large water reservoirs and aqueduct projects. Today, the area enjoys a diversified economy that is fully integrated with the rest of California and nearby states. In recent decades, recreation and tourism have emerged as important components of the local economy.

3.3.2 Environmental Consequences/Environmental Impacts

3.3.2.1 Methodology

Actions that physically disturb historical properties, alter its setting, or introduce elements out of character with the site could constitute an adverse effect. The cultural resource impact assessment relies on the type of site, the type of impact, and the extent of the disturbance on historical properties or unique archaeological resources. Potentially significant adverse impacts also occur indirectly through alteration of the setting's character and introduction of visual, audible, or atmospheric elements that change the character of a site or its setting and might affect the eligibility of the site for inclusion in the NRHP or the California Register of Historic Resources. The alternatives were reviewed for their potential to cause these types of impacts. Detailed review of individual historic properties would be required during the implementation of individual proposed project (see Mitigation Measures later in this section).

3.3.2.2 Significance Criteria

For this EIR, the determination of the significance of a project's impact and the requirement for mitigation follows the criteria described in federal (36 Code of Federal Regulations [CFR] 60) and state (California Code of Regulations [CCR] 15064.5, 15126.4) regulations. For Basin projects that are federal undertakings, cultural resource significance is evaluated in terms of eligibility for listing in the NRHP. NRHP criteria for eligibility (36 CFR 60.4) are as follows:

> The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association, and that:
>
> (a) are associated with events that have made a contribution to the broad pattern of our history;
>
> (b) are associated with the lives of people significant in our past;
>
> (c) embody the distinct characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) have yielded, or are likely to yield, information important in prehistory or history.

The impact assessment focuses on historic properties, or sites designated as either historic resources or unique archeological resources. Under state law, the evaluation of impacts on historic resources parallels federal law. Properties protected under CEQA include those eligible for listing or listed in the California Register of Historical Resources. CEQA Guidelines state that if a project follows the Secretary of Interior's Standards for the

Treatment of Historic Properties, the impacts are considered "mitigated to a level of less than a significant impact" (CEQA 15064.5[b][3]).

3.3.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under the No Project Alternative, surface water facilities would continue to operate in the same manner as under current conditions. Seasonal changes in river flows (e.g., flood flows that preclude access, and droughts that diminish stream bank vegetation) could interfere with Native American cultural resources at the same frequency as today and the No Project Alternative would have no impact on cultural resources or Native American traditional resources. No mitigation measures would be necessary.

3.3.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, the common pool and the TRF would pose no impacts during the baseline year, which was a normal water year. No mitigation measures would be necessary.

3.3.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 2, operational impacts would be the same as under Alternative 1.

3.3.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, construction-related impacts would be the same as those described under Alternatives 1 and 2.

Operational Impacts. Under Alternative 3, operation-related impacts would be the same as those described under Alternatives 1 and 2.

3.3.2.7 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, no construction would occur; therefore, no impacts to cultural resources would result from construction activities.

Operational Impacts. Under the No Action Alternative, surface water facilities would continue to operate in the same trend as under current conditions. Seasonal changes in river flows (e.g., flood flows that preclude access, and droughts that diminish stream bank vegetation) could interfere with Native American cultural resources at the same frequency as today and the No Action Alternative would have no impact on cultural resources or Native American traditional resources.

3.3.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. **Impact CR-1, Discovery of unknown cultural resources during construction.** Under Alternative 1, the installation of new wells, construction of conveyance systems, and utility and maintenance rights-of-way could impact existing cultural resources. Well construction would occur in areas of active agricultural production, typically with low archeological or historical sensitivity. However, depending on the location of new well projects, existing archeological and historic sites (both known and unknown) could be disturbed. Although such an impact is not likely given the range of sites considered, improper well siting or disturbance of subsurface resources could result in a significant impact. Implementation of Mitigation Measure CR-1 would reduce any impacts to less-than-significant levels.

Operational Impacts. Under Alternative 1, there are no anticipated impacts on cultural resources associated with operation of the proposed wells. No mitigation measures would be necessary.

Under Alternative 1, operating conditions could change. During drought conditions, the common pool and the TRF would be implemented; however, water transfers would not impact cultural resources. No mitigation measures would be necessary.

3.3.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Impact CR-1 as described for Alternative 1 could result in significant impacts, which would be reduced to less-than-significant levels with implementation of Mitigation Measure 1.

Impact CR-2, Construction would render ACID canals ineligible for listing on the National Register of Historic Places and/or the California Register of Historical Resources. Under Alternative 2, construction for canal lining could impact cultural resources as it could result in ground disturbance to archaeological and historic sites. Some of the water delivery canals that would be affected by the system improvement projects (e.g., ACID Main Canal) were constructed in the early 1900s, and contributed extensively to economic development in their local areas. Alterations to these canals could affect their eligibility for listing on the NRHP and/or the California Register of Historical Resources. This would be a potentially significant impact. Implementation of Mitigation Measure CR-2 would reduce potential impacts to less-than-significant levels.

Operational Impacts. Under Alternative 2, no anticipated impacts would be on cultural resources associated with operation of newly lined canal sections.

Under Alternative 2, operating conditions could change. During drought conditions, the common pool and the TRF would be implemented; however, the water transfers would not impact cultural resources.

3.3.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Under Alternative 3, the combined water projects would have the same construction impacts as identified in Alternatives 1 and 2.

Operational Impacts. Under Alternative 3, the combined water use projects would have the same operational impacts as identified in Alternatives 1 and 2.

3.3.3 Mitigation Measures

Mitigation Measure CR-1. Unknown cultural resources discovered during construction, or inadvertently disturbed by construction, would require review by a qualified archaeologist, or in the event of human remains, a coroner. Appropriate measures would be implemented to preserve cultural resources, should they be discovered. Measures could include, but are not limited to, the following: emergency data recovery (archaeological salvage excavations), project re-design or facilities relocation (if feasible), recordation of discovered sites (with construction proceeding), removal and relocation of the cultural resource objects/ structures/buildings to a safe location (if feasible), and preparation of research documents and records that capture consequential information about the encountered resources.

Mitigation Measure CR-2. If Reclamation resumes its role as lead agency, the project would be subject to its guidelines and practices regarding cultural resources. Prior to construction of water management projects with the potential to affect cultural resources, each undertaking's area of potential effect (APE) would be subject to a cultural resource assessment conducted by a cultural resource management professional in consultation with the Reclamation as follows:

- Review existing information within the study area (records search) to identify whether there are previously recorded cultural resources present within the Plan APE.
- Conduct a field investigation (surface inventory) of the project's APE to identify, record, and evaluate any cultural resources found. In consultation with Reclamation for undertakings with a potential to affect cultural and Indian tribe resources, if not previously inventoried.
- Determine the effect to significant cultural resources (historic properties).
- Develop and implement measures to mitigate the undertaking's impacts on significant cultural resources through a Memorandum of Agreement if an adverse effect to significant cultural resources is found, in consultation with Reclamation, California State Historic Preservation Officer, Advisory Council on Historic Preservation, affected Indian Tribes, and interested parties. Appropriate mitigation measures would be consistent with federal and state laws and regulations. Mitigation measures could include the following:
  - Avoidance or protection of the affected cultural resources through redesign or new design
  - Data recovery and recordation
  - Onsite monitoring during construction

  The consultation process described in this measure would identify appropriate project-specific mitigation measures that would reduce impacts on cultural resources to a less-than-significant level.

3.3.4 References

Basgall, M. E. and W. R. Hildebrandt. 1989. *Prehistory of the Sacramento River Canon, Shasta County, California*. Center for Archaeological Research at Davis, Publication No. 9, University of California, Davis.

Chartkoff, J. L. and K. K. Chartkoff. 1984. *The Archaeology of California*. Stanford University Press, Stanford, California.

Du Bois, C. A. 1939. *The 1870 Ghost Dance*. University of California Anthropological Records 3(1):1-151, Berkeley.

Du Bois, C. A. 1935. "Wintu Ethnography." *University of California Publications in American Archaeology and Ethnology* 36(1):1-148, Berkeley.

Goldschmidt, W. R. 1978. "Nomlaki." In R. F. Heizer (ed.). *Volume 8, Handbook of North American Indians*. Smithsonian Institution Press, Washington, D.C. pp. 341-349.

Goldschmidt, W. R. 1951. "Nomlaki Ethnography." *University of California Publications in American Archaeology and Ethnology* 42(4): 303-443, Berkeley.

Jensen, P. M. and P. R. Reed. 1979. *An Anthropological Overview and Cultural Resources Inventory of the Northern Sacramento Valley and Southern Cascade Range*. Bureau of Land Management, Redding District Office.

Johnson, J. J. 1978. "Yana." In R. F. Heizer (ed.). *Volume 8, Handbook of North American Indians*. Smithsonian Institution Press, Washington, D.C. pp. 361-369.

Johnson, J. J. and D. J. Theodoratus. 1984a. *Dutch Gulch Lake Intensive Cultural Resources Survey, Cottonwood Creek Project, Shasta and Tehama Counties, California*. U.S. Army Corps of Engineers, Sacramento District.

Johnson, J. J. and D. J. Theodoratus. 1984b. *Tehama Lake Intensive Cultural Resources Survey, Cottonwood Creek Project, Shasta and Tehama Counties, California*. U.S. Army Corps of Engineers, Sacramento District.

Kroeber, A. L. 1925. *Handbook of the Indians of California*. Bureau of American Ethnology Bulletin 78, Washington, D.C.

LaPena, Frank. 1978. "Wintu." In R. F. Heizer (ed.). *Volume 8, Handbook of North American Indians*. Smithsonian Institution Press, Washington, D.C. pp. 324-340.

Moratto, M. J. 1984. *California Archaeology*. Academic Press, Inc., San Francisco.

Riddell, F. A. 1978. "Maidu and Konkow." In R. F. Heizer (ed.). *Volume 8, Handbook of North American Indians*. Smithsonian Institution Press, Washington, D.C. pp. 370-386.

Riddell, F. A. 1960 through 1974. [Ethnogeographic Notes from Intermittent Fieldwork among the Maidu, Konkow and Nisenan. (Manuscripts in Riddell's possession).

Wilson, N. L. and A. H. Towne. 1978. "Nisenan." In R. F. Heizer (ed.). *Volume 8: California, Handbook of North American Indians*. Smithsonian Institution, Washington, D.C. pp: 387-397.

3.4 Aesthetic Resources

The aesthetic resources encompasses the project areas in relation to both the proposed groundwater wells and surface-water system improvement projects (i.e., ACID canal lining). For this analysis, aesthetic resources are those resources in which a sensitive viewer would experience the landscape adversely affected by construction or operation of the project, either by physical features or activities.

3.4.1 Affected Environment/Existing Conditions

The proposed project is located in rural portions of Shasta County characterized by scattered, single-family residential development, and agricultural, industrial, and gravel mining development. The terrain is generally flat with views to the west influenced by the grasslands and rolling foothills typical of the northern portion of the Sacramento Valley. To the north, south, and east, views include grasslands, rolling hills, agricultural development, and industrial and residential use. Residential and commercial/industrial development is restricted to the Cities of Redding and Anderson and unincorporated areas of Shasta County. Vegetation within the project area is dominated by oak woodland and grasslands, and urban vegetation associated with the residential use.

The northernmost portion of the canal in the project area is devoid of much vegetation and heavily disturbed because of gravel mining. Along certain reaches of the canal, oak trees and other riparian vegetation are located within or directly adjacent to portions of the canal (see Figure 3.4-1) and provide habitat for various wildlife. Rural residences as well as some industrial and commercial sites are located adjacent to the proposed canal lining sites.

While the exact well sites have not yet been determined, they would be situated on ACID-owned land and would likely be developed adjacent to large grain fields or non-native annual grasslands with live oak (see Figure 3.4-2). Rural residences, small industrial developments, mining operations as well as some high-traffic roadways would also be located in the vicinity of the proposed well sites. The typical proposed well site would be located in an irrigated pasture adjacent to the Main Canal or a lateral.

The Shasta County General Plan was reviewed for policies pertaining to aesthetic resource planning. No specific elements for aesthetic resource planning were identified in the General Plan. The Open Space and Recreation Element identified examples of adverse visual impacts of structures that have not been designed to blend with their surrounding landscape. In addition, it states that the purpose of the N-R (Natural Resource) classification is to mitigate any visual impacts that might result from the use of the lands. Specific reference of construction impacts to aesthetic resources was not made.

The City of Redding General Plan was reviewed for policies pertaining to aesthetic resources. No specific policies for aesthetic resource planning were identified. The Recreation Element of the General Plan addresses visual resources in reference to Private Neighborhood Parks and Improved Open Space areas. It states that facilities such as parks, playgrounds, picnic facilities, open play areas, and/or streets and other landscaped areas are designated for passive recreational use and visual enhancement (City of Redding, 2000).

FIGURE 3.4-1
TYPICAL VIEWS OF PROPOSED LINING SECTIONS ALONG ACID CANAL
REDDING BASINWIDE WATER RESOURCES MANAGEMENT PLAN EIR

CH2MHILL

FIGURE 3.4-2
TYPICAL VIEWS FROM PROPOSED WELL SITES
REDDING BASINWIDE WATER RESOURCES MANAGEMENT PLAN EIR

CH2MHILL

WB012007005RDD_06 (1/17/07)

The City of Anderson General Plan addresses aesthetic resources in the Natural Resource Section under the Plant and Animal Habitats. This section identifies the main branch of the ACID canal as an area of significant habitat. Although this area has been altered from it natural state by agricultural and urban development, this area contains lands along the waterway with trees and riparian vegetation that provide food and cover for wildlife. The canal is currently under quasi-public ownership and has a 100-foot right-of-way. The retention of this vegetation provides natural green space to the city's landscape and aesthetically enhances the built-up areas. At this time, the City of Anderson does not have any conservation polices for the ACID canal to assure or protect it from development that could significantly alter the natural habitat of this waterway (City of Anderson, 1989).

Tehama County addresses aesthetic resources in the Wildlife Resources and the Natural Resource Lands and Recreation Section of the General Plan. The purpose of these two sections is to promote the protection and maintenance of county wildlife resources to prevent their wasteful destruction or neglect, and to recognize their ecological, recreational, and aesthetic values. The Natural Resource Section provides an objective promoting the protection of resources which states: "NRR-1 Protection of resource lands for the continued benefit of agriculture, timber, grazing, recreation, wildlife habitat, and quality of life" (Tehama County, 1983).

3.4.2 Environmental Consequences/Environmental Impacts

3.4.2.1 Methodology

The interpretation and evaluation of scenic and aesthetic qualities is influenced by the viewpoint, the surrounding viewshed, and the particular viewer's sensitivity to the surroundings and existing resources. The visual impact assessment provided later in this section is based on a qualitative evaluation of the changes to the existing resources that would result from construction and operation of measures included in each alternative. Because construction would be of a relatively short duration, the emphasis of the analysis is on long-term changes to the landscape within the project area.

To evaluate impacts to aesthetic resources from the proposed canal improvements and well installation areas, the following methods were used:

- Conducted a site reconnaissance survey
- Identified surrounding sensitive receptors (i.e., residential homes)
- Reviewed the aesthetic resources policies in City and County General Plans

A site reconnaissance was performed on August 4, 2005, to visually assess the character of the existing site and surrounding area, locate sensitive receptors, and photograph the site and area.

3.4.2.2 Significance Criteria

Standards of significance represent the thresholds that were used to identify whether an impact would be potentially significant. Impacts on aesthetics would be significant if they resulted in any of the following:

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway.
- Substantially degrade the existing visual character or quality of the site and its surroundings.
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

3.4.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under the No Project Alternative, surface-water and groundwater facilities would continue to operate in the same manner as under current conditions. Seasonal changes in river flows (e.g., flood flows, droughts that diminish stream bank vegetation) could affect aesthetic resources along the ACID Main Canal at the same frequency as today. Implementation of the No Project Alternative would have no impact on aesthetic resources.

3.4.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF, as needed, to ameliorate drought conditions. Impacts to aesthetic resources would be within the range of current operating conditions; therefore, would be less than significant. Because the baseline year is a normal water year, management actions would not need to be implemented and aesthetic resources would not be affected.

3.4.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 2, operating conditions regarding the common pool and the TRF would be the same as Alternative 1.

3.4.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, construction impacts affecting aesthetic resources would be the same as under Alternatives 1 and 2.

Operational Impacts. Under Alternative 3, operational impacts affecting aesthetic resources would be the same as under Alternatives 1 and 2.

3.4.2.7 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Project Alternative, no construction would occur; therefore, no aesthetic impacts would result from construction activities. No mitigation measures would be necessary.

Operational Impacts. Under the No Action Alternative, surface-water and groundwater facilities would operate within current baseline trends. Seasonal changes in river flows (e.g., flood flows, droughts that diminish stream bank vegetation) could affect aesthetic resources along the ACID Main Canal at the same frequency as today. Implementation of the No Action Alternative would have no impact on aesthetic resources.

3.4.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Under Alternative 1, construction activities would have permanent and temporary affects on aesthetic resources. Permanent impacts would occur with the installation of new wells and the construction of new aboveground conveyance structures and utility systems as well as maintenance rights-of-way. Because the structures would have small footprints and be low to the ground, their presence would have less-than-significant impacts on aesthetic resources.

Temporary impacts (e.g., fugitive dust, stormwater runoff, and noise) would occur during construction activities. These impacts would be minimized or eliminated by implementing BMPs (as described in Section 3.9, Air Quality); therefore, potential impacts resulting from implementation of this alternative would be less than significant. No mitigation measures other than implementing BMPs would be necessary.

Operational Impacts. Under Alternative 1, the common pool and the TRF would be implemented during drought conditions. Impacts on aesthetic resources resulting from operation of agricultural wells and transfer of water to other purveyors would not impact aesthetic resources.

3.4.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Under Alternative 2, canal lining could have permanent impacts on aesthetic resources if riparian or wetland vegetation were removed and not replaced. Any permanent loss of vegetation would be minimized by modifying the project design in response to preconstruction surveys. Mitigation measures for impacts to biological resources are described in Section 3.2, Biological Resources, and would mitigate impacts to aesthetic resources to less than significant. Any remaining permanent impacts would be less than significant and no mitigation measures would be necessary.

Temporary impacts (e.g., fugitive dust, stormwater runoff, and noise) would occur during construction activities. These impacts would be minimized or eliminated by implementing BMPs (as described in Section 3.9 Air Quality); therefore, potential impacts resulting from implementation of this alternative would be less than significant.

Operational Impacts. Under Alternative 2, no operational impacts would result from the newly lined canal sections. The common pool and the TRF would be implemented during drought conditions. Impacts to aesthetic resources resulting from operation of agricultural wells and transfer of water to other purveyors would not occur.

3.4.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Potential impacts resulting from construction associated with implementing of Alternative 3 would be the same as those described for Alternatives 1 and 2.

Operational Impacts. Potential impacts resulting from operations associated with implementation of Alternative 3 would be the same as those described for Alternatives 1 and 2.

3.4.3 Mitigation Measures

No significant impacts have been identified; therefore, no mitigation is required.

3.4.4 References

City of Anderson. 1989. *General Plan.*

City of Redding. 2000. *General Plan*.

Shasta County. 2004. *General Plan.*

Tehama County. 1983. *General Plan.*

3.5 Water Resources

The Plan would be implemented throughout the Basin but could affect operations outside of the Basin through changes to the operation of the CVP. However, implementation of the Plan is expected to result in minimal operational changes to the CVP; therefore, impacts would be less than significant.

3.5.1 Affected Environment/Existing Conditions

The Basin is bisected by the Sacramento River, the largest river in California. At its terminus, the Sacramento River discharges approximately 21.6 million ac-ft annually into the Sacramento/San Joaquin Delta. In the Basin, average annual discharge is approximately 7.1 million ac-ft. The Basin includes CVP facilities that have a major effect on water resources in California. These CVP facilities would be important components of water transfers in the Basin. Following is a description of the overall CVP, with special emphasis on the components directly related to the Basin.

3.5.1.1 Central Valley Project

The CVP is the largest surface-water storage and delivery system in California, covering 35 of the state's 58 counties. The project includes 20 reservoirs, with a combined storage capacity of approximately 11 million ac-ft; and 9 power plants and 2 pump-generating plants, with a combined generation capacity of approximately 2 million kilowatts. Operations of the CVP are quite complex given the multiple demands that must be met. Key facilities for the Basin include the Trinity River Division (TRD) and the Shasta Division.

The TRD was authorized in 1955, and began operating in 1964. The TRD consists of a series of dams, tunnels, and powerplants that export water from the Trinity River Basin into the Sacramento River Basin. With a capacity of 2,448 million ac-ft, Trinity Reservoir is the centerpiece of the TRD. Releases from Trinity Reservoir are re-regulated in Lewiston Reservoir prior to release downstream into the Trinity River. Lewiston Reservoir also acts as a forebay for the trans-basin export of water into Whiskeytown Reservoir via the Clear Creek Tunnel.

TRD operations are integrated with operations of the Shasta Division of the CVP (Figure 3.5-1). For example, TRD exports have been made in consideration of minimum flow requirements in the Trinity and Sacramento Rivers, storage levels in Trinity and Shasta Reservoirs, and other CVP operating requirements (e.g., CVP deliveries, water quality requirements, the Winter-run Biological Opinion. Trinity Reservoir is also operated to maximize power production during the summer and fall, in coordination with the Shasta Division.

The winter-run Biological Opinion mandates temperature requirements in the Sacramento River below Keswick Dam. Compliance with the Biological Opinion is a major influence on Shasta Division operations. The TRD exports are used in conjunction with releases from Shasta Reservoir to meet temperature requirements and manage the coldwater pool in Shasta Reservoir. The majority of TRD exports occur in the spring and summer. At the same time, temperature objectives to protect Trinity River salmon must also be met. Addressing the temperature needs of the two systems is only one of the factors driving operations.

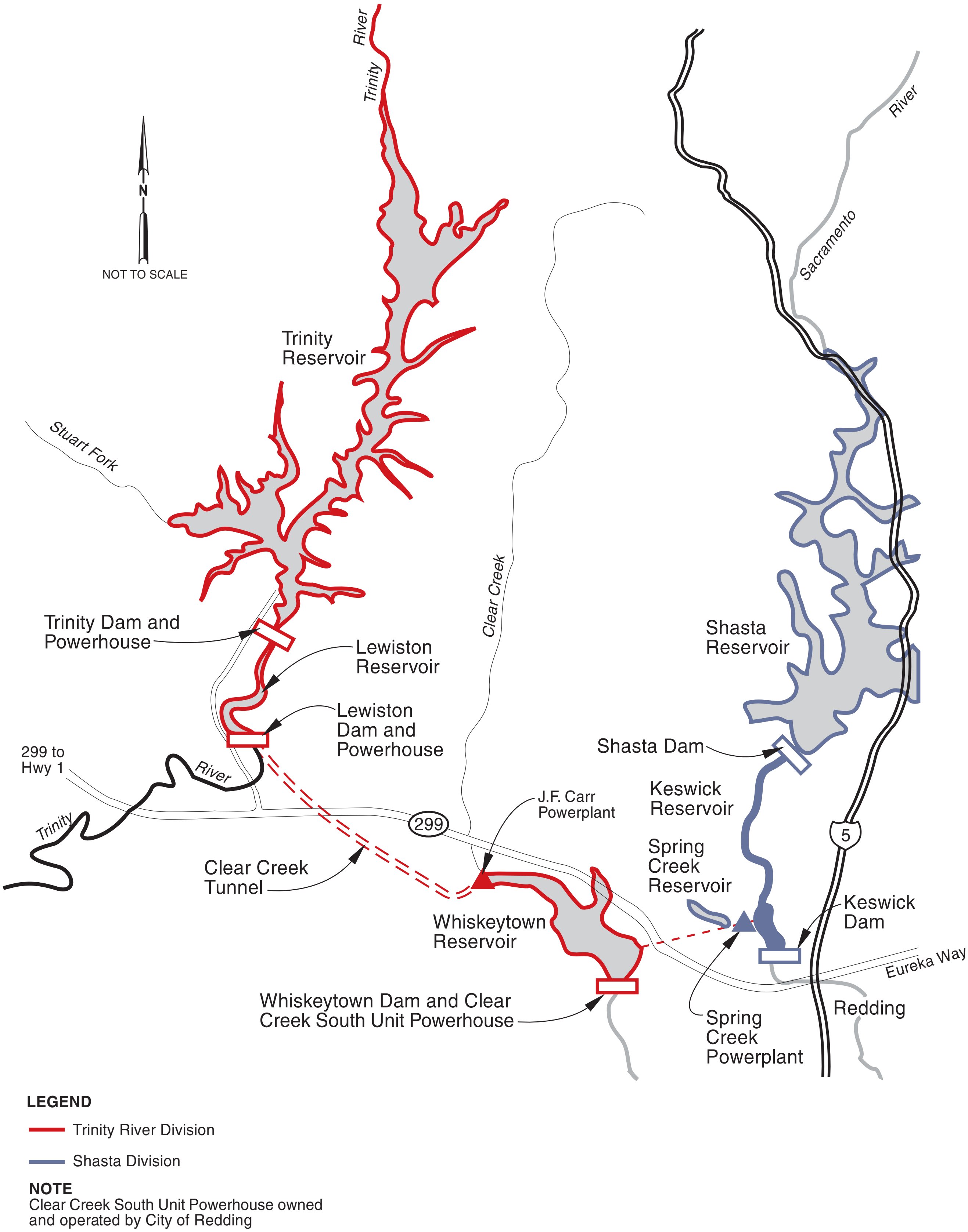


FIGURE 3.5-1
TRINITY RIVER DIVISION AND NEIGHBORING SHASTA DIVISION

REDDING BASINWIDE WATER RESOURCES MANAGEMENT PLAN EIR

WB012007005RDD_07 (1/17/07)

CH2MHILL

Flows in the upper Sacramento River are primarily regulated by Shasta Dam and are re-regulated 15 miles downstream at Keswick Dam. The watershed above Shasta Dam drains approximately 6,650 square miles with an average annual runoff of 5.7 million ac-ft. With a capacity of 4.6 million ac-ft, Shasta Dam has the largest capacity of any reservoir in the state. Annual releases range from 9 million ac-ft in wet years to 3 million ac-ft in dry years. From 1964 to 1996, Keswick releases averaged 7.3 million ac-ft annually. In more recent years (1986 to 1996), Keswick annual releases averaged 5.9 million ac-ft.

Key Shasta Division operational issues include the following:

- Flood control
- Storage and release of water for agricultural, M&I, fish and wildlife, refuges, and other needs
- Navigation flows
- Temperature control as specified by the 1993 Biological Opinion for Sacramento Winter-run Chinook Salmon
- Bay-Delta water requirements
- Generation of hydroelectric energy

Historically, the vast majority of CVP water has been delivered to agricultural users. However, continued urban growth is resulting in greater demand from CVP M&I customers.

The CVP operations are guided by a series of documents, including the 2005 CVP-OCAP, various Biological Opinions for endangered species, the Coordinated Operating Agreement (COA) between the CVP and State Water Project (SWP), and Regional Board water quality plans.

The 1993 winter-run Biological Opinion is one of the most influential factors governing Shasta Dam releases, both in terms of quantity and timing. The Biological Opinion sets temperature requirements below Keswick Dam for April through October, and establishes an end-of-September minimum carryover storage for Shasta Lake of 1.9 million ac-ft. In years when CVP facilities cannot be operated to meet required temperature and storage objectives, Reclamation re-initiates consultation with NOAA Fisheries.

Aside from making water available for downstream uses, exports for the remainder of the water year are managed to maximize the following:

- Movement of water through Whiskeytown Reservoir to minimize warming
- Conservation of Shasta Lake coldwater reserves
- Production of high-value summer and early fall power generation

Agricultural contractors account for the vast majority of consumptive uses of water along the Sacramento River. Of the total amount that is diverted for agricultural use, the portion of the water that is applied to fields but not actually used by crops is assumed to return to the Sacramento River either through surface water or groundwater. This water is then available for other downstream uses, including CVP contractors within the Bay Area (e.g., Contra

Costa Water District) or those served through Delta exports (e.g., the San Joaquin Exchange contractors, or agricultural and M&I water service contractors south of the Delta).

The CVP annually supplies up to approximately 6.2 million ac-ft to water contractors in the Central and Santa Clara Valleys and Contra Costa County. The CVP is required by contracts to make deliveries up to the contract amount, if requested, except in periods of water shortage. During periods of reduced supply, water deliveries are decreased according to terms in the contracts. Contractors are grouped into the following three general categories:

1. **Sacramento River Water Rights Settlement Contractors.** These contractors claimed water rights in the Sacramento River Basin prior to construction of Shasta Dam. Contract provisions allow for reductions of up to 25 percent of contracted amounts during dry conditions (as determined by the Shasta Inflow Index).

2. **San Joaquin River Exchange Contractors.** These contractors claimed water rights in the San Joaquin River and agreed to forgo these rights in exchange for CVP water diverted from the Bay-Delta and delivered to the Mendota Pool. Contract provisions allow for reductions of up to 25 percent of contracted amounts under dry conditions (as determined by the Shasta Inflow Index).

3. **CVP Water Service Contractors.** These agricultural and M&I water service contractors entered into agreements with Reclamation for delivery of CVP water as a supplemental supply. Water deliveries to agricultural water service contractors can be reduced up to 100 percent in particularly dry years. Maximum curtailment levels are not specified for most M&I water service contractors. Historically, Reclamation has limited maximum curtailments to M&I contractors to 25 percent; future system demands are assumed to potentially require curtailments of up to 50 percent. Water availability for delivery to CVP water service contractors during periods of insufficient supply is determined using a combination of operational objectives, hydrologic conditions, and reservoir storage conditions.

The Basin includes Settlement Contractors and Water Service Contractors and water supply reliability varies according to the type of contract and the use of the water.

3.5.1.2 Voluntary Water Transfers

Reclamation maintains approval authority for water transfers involving CVP water. Reclamation is bound by the following policies when evaluating water transfers:

A. **Authorized Project Purposes.** A change in the type of use of project water may be made only if the new use is an authorized project purpose or otherwise authorized by statute.

B. **Reclamation Approval Requirements.** Transfers of project water will require Reclamation's approval, unless already provided for by statute, judicial decision, or a water service, repayment, or other form of contract in existence. Regardless of Reclamation's approval authority, either the transferror or transferee, or sometimes both, depending upon the relevant circumstances, must have a contract with Reclamation for the delivery of project water.

C. **Protection of Project Purposes and Project Contractors.** Reclamation will approve proposals for the transfer of project water as long as project purposes and operations and Reclamation's contractual obligations to others are protected. Reclamation consults with, and takes into account the views of the other project contractors which receive project water

D. **Compliance With Federal Law.** Transfers of project water are subject to all other applicable Federal laws, including, but not limited to the National Environmental Policy Act and the Endangered Species Act.

E. **Compliance With State and Other Laws.** Transfers of project water must comply with all applicable State, Tribal, and local laws, including, but not limited to, those concerning the appropriation, diversion, storage, and use of water and changes of water rights.

F. **Pricing of Project Water by Sellers and Lessors.** To the extent permitted by law, the seller of project water is allowed to establish price.

G. **Charges Payable to Reclamation for Transferred Project Water.** The seller of contract water will be responsible for paying appropriate charges to Reclamation for the transferred project water. At a minimum, the charges fixed by Reclamation for transferred project water will ensure that the Federal Government will be in no lesser financial position than it would have been had a transfer not occurred. When a transfer of project water involves a change in the type of use from irrigation to a different beneficial use, and the capital costs allocable to a project's irrigation purpose have not been repaid, subsidies associated with the provision of project water for irrigation purposes will not follow the transferred project water. Charges payable to Reclamation for transferred project water will be consistent with the new use to which the transferred water is put.

H. **Disposition of Revenues Received by Reclamation.** Revenues received by Reclamation from the charges established above will be credited in accordance with the provisions of the authority under which the contract for the transfer of project water is made and the applicable policies in effect at the time.

I. **Reallocation of Construction Costs.** It is not necessary to consider reallocation of project construction costs for short-term or temporary transfers of project water. Cost reallocation should only be considered if the transfer is permanent and then only on a case-by-case basis and in consultation with the Solicitor's Office and the Office of Policy.

J. **Term of Contracts.** The duration of contracts or assignments for the transfer of project water should not exceed the remaining term of the repayment, water service, or other form of contract which is the source of the project water being transferred.

3.5.2 Environmental Consequences/Environmental Impacts

3.5.2.1 Methodology

Project-related activities with the potential to affect water resources include the diversion of water to purveyors and the transfer of water among purveyors. This analysis focuses on potential changes to operations that could result from implementation of the Plan.

3.5.2.2 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction.

Operational Impacts. Under the No Project Alternative, the Basin would continue to be managed by individual purveyors, without a comprehensive management plan. Current conditions would not change under the No Project Alternative.

3.5.2.3 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, water transfers among Basin purveyors would be accomplished through the use of the common pool and purveyors would voluntarily implement TRFs during drought conditions. Overall, the Basin would operate with moderate surpluses in both normal (23 thousand ac-ft) and drought (10 thousand ac-ft) years, thus facilitating water transfers as needed. Common pool transfers would occur on a case-by-case basis, allowing any purveyor with temporary or systematic shortages to supplement water supplies. These transfers would require moderate re-operations of CVP facilities. However, overall supplies in the Basin would remain the same although place of use might change because of a water transfer. Also, downstream operational requirements of the CVP would continue to be met, assuring that any water transfers in the Basin would not affect downstream use. For these reasons, implementation of the Plan would result in less-than-significant impacts.

3.5.2.4 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 2, operational impacts would be the same as under Alternative 1.

3.5.2.5 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 3, operational impacts would be the same as under Alternative 1.

3.5.2.6 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, there would be no construction; therefore, there would be no construction impacts.

Operational Impacts. Under the No Action Alternative, the Basin would continue to be managed by individual purveyors, without a comprehensive management plan. At the 2030 level of development individual purveyors would be subject to lower levels of water supply reliability as water demands throughout the state continue to use CVP water.

3.5.2.7 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Construction activities associated with the conjunctive use project would not have an effect on Water Resources. No impacts would occur.

Operational Impacts. Under Alternative 1, water transfers among Basin purveyors would be accomplished through the use of the common pool and purveyors would voluntarily implement TRFs during drought conditions. Overall, the Basin would exactly match water demand through the use of groundwater facilities and common pool transfers in a normal year. The Basin would operate with moderate surpluses in a drought year (15 thousand ac-ft) as a result of TRFs. Common pool transfers would occur on a case-by-case basis, allowing any purveyor with temporary or systematic shortages to supplement water supplies. These transfers would require moderate re-operations of CVP facilities. The amount of water transferred would increase as the conjunctive use project was developed, effectively reducing the amount of surface water diverted by ACID and increasing the amount of water diverted by other purveyors. However, total releases from Whiskeytown and Shasta would remain the same because, downstream operational requirements of the CVP would continue. Therefore, water transfers in the Basin would not affect downstream use. Implementation of the Plan would result in less-than-significant impacts.

3.5.2.8 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Construction activities associated with the lining canals or laterals would not have an effect on Water Resources. No impacts would occur.

Operational Impacts. Under Alternative 2, water transfers among Basin purveyors would be accomplished through the use of the common pool and purveyors would voluntarily implement TRFs during drought conditions. Overall, the Basin would operate with a moderate surplus in a normal year (4 thousand ac-ft). However, because this alternative does not adequately increase the amount of water available in drought years, a deficit of 4 thousand ac-ft would occur. It is unclear how this deficit would be addressed. Common pool transfers would occur on a case-by-case basis, allowing any purveyor with temporary or systematic shortages to supplement water supplies. These transfers would require moderate re-operations of CVP facilities. Surface-water savings in the ACID system would be available for diversion by other purveyors. However, total releases from Whiskeytown and Shasta Reservoirs would remain the same because downstream operational requirements of the CVP would continue. Therefore, water transfers in the Basin would not affect downstream use. Implementation of the Plan would result in less-than-significant impacts.

3.5.2.9 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Construction activities associated with the conjunctive use project, lining canals or laterals would not have an effect on water resources. No impacts would occur.

Operational Impacts. Operation impacts associated with the combined use alternative would be identical to those addressed in Alternatives 1 and 2.

3.5.3 Mitigation Measures

No significant impacts would occur; therefore, no mitigation measures would be required.

3.6 Groundwater Resources

This section presents an overview of groundwater conditions in the Basin, a detailed description of the Redding Basin Groundwater model, and the means for conducting the assessment. Implementation of the Basin Plan is not expected to result in significant groundwater impacts in the Redding Basin.

3.6.1 Affected Environment/Existing Conditions

The Redding Groundwater Basin is in the northernmost portion of the Sacramento Valley. Underlying parts of Tehama and Shasta Counties, it is bordered by the Klamath Mountains to the north, the Coast Range to the west, and the Cascade Mountains to the east. The Red Bluff Arch, between Cottonwood and Red Bluff, separates the Redding Groundwater Basin from the Sacramento Valley Groundwater Basin to the south. Department Bulletin 118 subdivides the Redding Groundwater Basin into six sub-basins: Anderson, Enterprise, Millville, Rosewood, Bowman, and South Battle Creek (Department, 2003a). Figure 3.6-1 shows the areal extent of the Redding Groundwater Basin.

3.6.1.1 Geology, Hydrogeology, and Hydrology

The Redding Groundwater Basin consists of a sediment-filled, southward-plunging symmetrical trough (Pierce, 1983). In most places, the bottom of the usable groundwater Basin is formed by the Chico Formation, which is comprised of sandstone and shale of marine origin. Because of its marine origin, the Chico Formation still contains salt water in many areas of the Redding Groundwater Basin. In other areas around the northern fringe of the Basin, there are some low-yield bedrock aquifers. Although these bedrock aquifers cannot yield large quantities of groundwater to wells, they still provide adequate groundwater supply to some rural residences in the Basin.

The principal aquifers of the Basin are formed by simultaneous deposition of material from the Coast Range and the Cascade Range. This deposition resulted in two different formations, which are the principal freshwater-bearing formations in the Basin. The Tuscan Formation in the east is derived from Cascade Range volcanic sediments, and the Tehama Formation in the western and northwest portion of the Basin is derived from Coast Range sediments. These formations are up to 2,000 feet thick near the confluence of the Sacramento River and Cottonwood Creek, and the Tuscan Formation is generally more permeable and productive than the Tehama Formation (Department, 1968). Groundwater recharge occurs in the higher elevations by stream seepage and direct infiltration of precipitation. Rivers and streams transition to gaining streams at lower elevations and receive direct groundwater discharge. Areas of riparian vegetation occur along surface water features throughout the Basin.

The water budget of the Redding Groundwater Basin is dominated by a large annual influx of water falling as precipitation on the surrounding mountains and valley floor. A large portion of recharge to the Redding Groundwater Basin is from precipitation and snowmelt from higher elevations. Average annual precipitation in the Redding Groundwater Basin ranges from 22 to as much as 60 inches in the higher elevations. As is typical throughout the Central Valley, 80 to 90 percent of the area’s precipitation occurs from November to April.

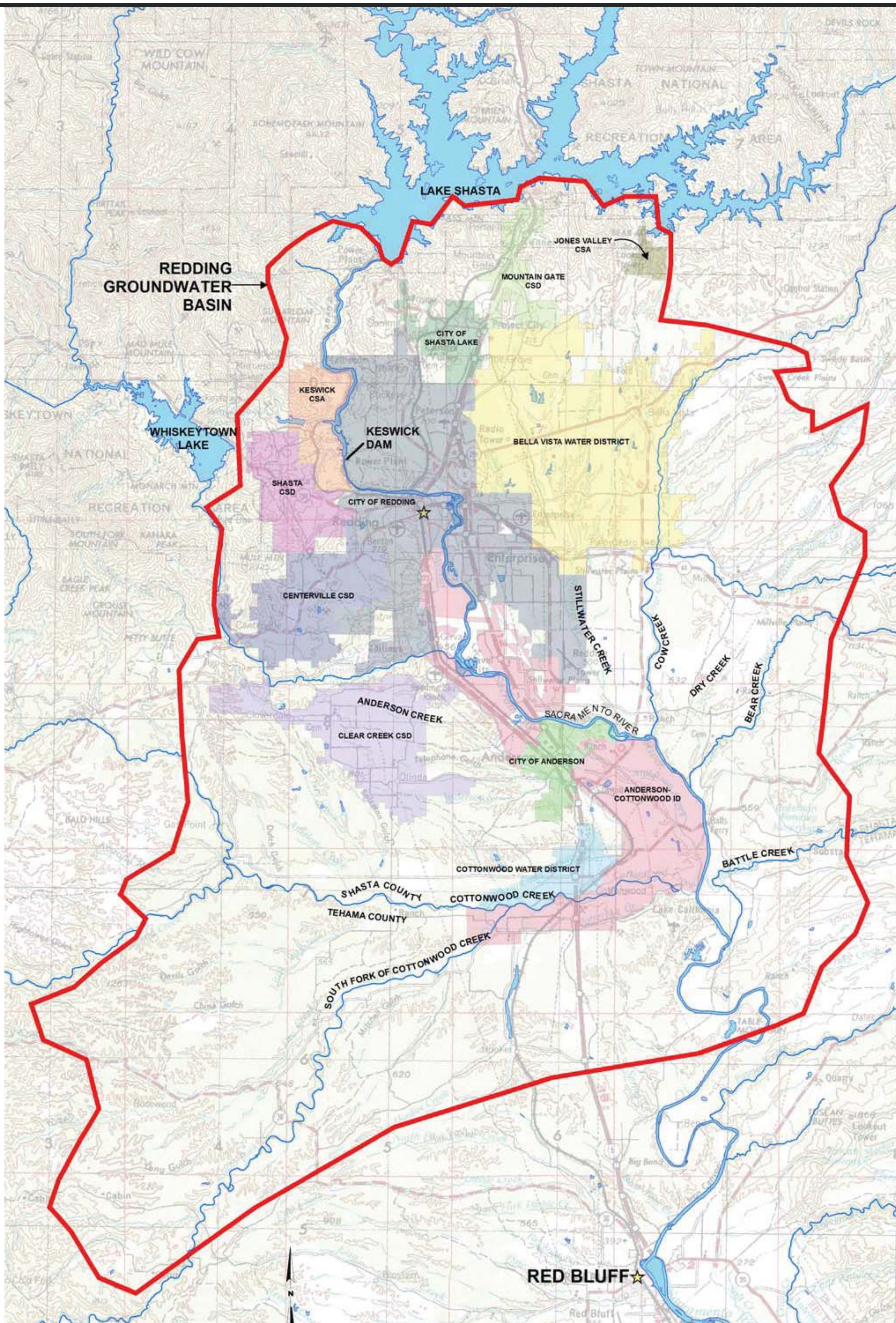


FIGURE 3.6-1
AREAL EXTENT OF THE REDDING GROUNDWATER BASIN
REDDING BASINWIDE WATER RESOURCES MANAGEMENT PLAN EIR

WB012007005RDD_08 (1/17/07)

CH2MHILL

In the surrounding mountain ranges, precipitation ranges from 40 to 75 inches, much of it in the form of snow. A portion of this water is consumed by evapotranspiration, and the remainder occurs as runoff and groundwater recharge.

It has been estimated that the Redding Groundwater Basin yields an average of 850,000 ac-ft of annual runoff (CH2M HILL, 2003). Much of this water is potentially available to recharge the Redding Groundwater Basin and replenish water levels that have been depressed because of groundwater pumping. Applied water totals approximately 270,000 ac-ft in the Redding Groundwater Basin (CH2M HILL, 1997). The exact quantity of groundwater that is pumped from the Basin is not known. It has been estimated that approximately 55,000 ac-ft of water is pumped annually from M&I and agricultural production wells (CH2M HILL, 2003). This magnitude of pumping represents approximately 6 percent of the average annual runoff into the Basin.

To further evaluate the nature of groundwater production from the Redding Groundwater Basin, Table 3.6-1 summarizes information contained in Department records. These data suggest that the approximately 55,000 ac-ft of groundwater production from the Redding Groundwater Basin occur from a combination of about 170 irrigation and municipal wells and approximately 6,000 domestic wells. Municipal and irrigation wells appear to be screened slightly deeper within the aquifer (200 to 300 feet bgs) than the domestic wells in the Basin (screened 140 to 250 feet bgs).

Seasonal groundwater fluctuations range from 2 to 3 feet in shallow unconfined aquifers and 2 to 5 feet in semi-confined to confined aquifers in normal years. During drought years, unconfined aquifer levels could fluctuate by as much as 10 feet, and semi-confined and confined aquifer levels could fluctuate as much as 16 feet. Wells drilled in lower permeability bedrock aquifers that fringe the Basin could fluctuate even more during droughts. The principal surface water features in the Redding Groundwater Basin are the Sacramento River and its tributaries Battle, Churn, Stillwater, Cow, Little Cow, Clear, Dry, and Cottonwood Creeks. Surface water and groundwater interact in many areas in the Redding Groundwater Basin.

In general, groundwater flows southeasterly on the west side of the Basin and southwesterly on the east side, toward the Sacramento River. The Sacramento River is the main drain for the Basin (Pierce, 1983).

TABLE 3.6-1
Typical Well Construction in the Redding Groundwater Basin
Redding Basin Water Resources Management Plan EIR

Sub-basin	Number of Domestic Wells	Average Depth[a] (feet bgs)	Number of Municipal and Irrigation Wells	Average Depth[a] (feet bgs)
Anderson	2,239	140	48	302
Bowman	804	257	27	312
Enterprise	1,970	139	65	180
Millville	487	156	8	265
Rosewood	447	181	15	311
South Battle Creek	18	189	5	227
Totals	5,965		168	

[a]Based on well completion reports (Department, 2003b).

3.6.1.2 Groundwater Production, Levels, and Storage

Total annual groundwater pumping for the Redding Groundwater Basin is approximately 40,000 ac-ft (CH2M HILL, 2003). This quantity represents less than 10 percent of the Basin's average (during years of normal precipitation) groundwater discharge to surface water, estimated at approximately 670,000 ac-ft (CH2M HILL, 2003). The majority of the groundwater discharge to surface water in the Basin occurs to the Sacramento River in the lower portions of the Basin.

Groundwater levels typically range from greater than 700 feet above mean sea level (msl) around the fringes of the Basin, to less than 390 feet msl near the confluence of Cottonwood Creek and the Sacramento River. Historically, groundwater levels have remained stable, with no long-term trend of declining or increasing. However, groundwater levels are affected by changes in precipitation, falling during droughts but rising quickly when normal or above-normal precipitation occurs. For example, some short-term declines were noticeable during the droughts of 1976 through 1977 and in 1987 through 1992. These declines were followed by recovery to predrought levels after several successive normal or above-normal precipitation events occurred.

3.6.2 Environmental Consequences/Environmental Impacts

3.6.2.1 Methodology

Impacts associated with changes to the current conditions are simulated by the Redding Groundwater model. Model output provides estimates of impacts on surrounding groundwater levels and changes in stream flow due to changes in groundwater pumping in the Basin. Simulations were performed to evaluate potential impacts projected over an annual average condition. Recharge to and pumping from the groundwater Basin was computed by using a land-use-based tool for computing the timing and areal distribution of water supply and demand. The impacts that may result from the alternatives were evaluated by comparing the changes that would occur under the alternatives versus conditions of the No Project and No Action Alternatives. It was assumed that decreases in surface water deliveries could be replaced by groundwater pumping for purveyors with access to groundwater. The estimated percentages of surface water and groundwater that would be delivered under each alternative are shown in Tables 3.6-2 and 3.6-3. The characteristics of groundwater pumping remain unchanged between alternatives under the 2005 Level of Development. Using this information, it was possible to compare the difference in surface water deliveries predicted under No Action and No Project conditions, and under each of the proposed alternatives. The impacts of this additional pumping on groundwater levels and stream flow could then be determined by comparing the changes in groundwater characteristics between alternatives.

TABLE 3.6-2
Relative Percentages of Supply from Surface Water and Groundwater under the Alternatives – 2005 Level of Development

Year 2005	No Project (2005)		Alternative 1 Conjunctive Use		Alternative 2 Water Use Efficiency		Alternative 3 Combined	
	SW	**GW**	**SW**	**GW**	**SW**	**GW**	**SW**	**GW**
Normal Year								
All Purveyors	93%	7%	93%	7%	93%	7%	93%	7%
Redding	76%	24%	76%	24%	76%	24%	76%	24%
ACID	100%	0%	100%	0%	100%	0%	100%	0%
Drought Year								
All Purveyors	86%	14%	86%	14%	86%	14%	86%	14%
Redding	55%	45%	55%	45%	55%	45%	55%	45%
ACID	100%	0%	100%	0%	100%	0%	100%	0%

Note:

SW = surface water
GW = groundwater

TABLE 3.6-3
Relative Percentages of Supply from Surface Water and Groundwater under the Alternatives – 2030 Level of Development

Year: 2030	No Action (2030)		Alternative 1 Conjunctive Use		Alternative 2 Water Use Efficiency		Alternative 3 Water Use Efficiency and Conjunctive Use	
	SW	**GW**	**SW**	**GW**	**SW**	**GW**	**SW**	**GW**
Normal Year								
All Purveyors	82%	18%	86%	14%	88%	12%	88%	12%
Redding	44%	56%	55%	45%	60%	40%	60%	40%
ACID	100%	0%	100%	0%	100%	0%	100%	0%
Drought Year								
All Purveyors	72%	28%	64%	36%	73%	27%	65%	35%
Redding	31%	69%	46%	54%	34%	66%	51%	49%
ACID	100%	0%	68%	32%	100%	0%	68%	32%

Several major assumptions were made in preparing the groundwater modeling simulations. These assumptions are summarized as follows:

- The quantity of contracted surface water deliveries versus projected demand was used as a basis for setting the additional groundwater pumping rates to the model.
- Groundwater pumping was assumed to occur in known locations of existing well fields.

- Groundwater pumping was assumed to occur from the regional aquifer. The regional aquifer is defined as the aquifer from which the majority of existing wells draw water in a given area.
- Groundwater production rates are assumed to be constant throughout the year with groundwater production occurring 24 hours per day, 7 days a week.
- The effects of a drought with a 10-year recurrence interval were simulated by assuming that this 10-year drought occurred during three simultaneous years. This is an unlikely event that illustrates a worst-case impact on groundwater levels.

3.6.2.2 Redding Groundwater Basin Modeling Tool

Total aquifer thickness in the Redding Basin was estimated by subtracting the depth to bedrock (primarily the Chico Formation) (Department, 1968) from average groundwater levels. The total aquifer thickness was subdivided into four model layers based on typical screened intervals of wells in the Redding Groundwater Basin. A no-flow boundary was used along the margins of the model domain to simulate the lateral extent of freshwater-bearing sediments in the Basin. A head-dependent boundary condition was used to simulate 31 individual streams throughout the model domain. The distribution of aquifer properties that resulted from the calibration process, such as transmissivity, was originally derived from specific capacity data obtained from M&I and, where available, domestic water supply wells. An additional head-dependent boundary was applied to the surface of the Redding Basin groundwater model to simulate the direct discharge of groundwater to the surface and the consumption of shallow groundwater by vegetation through evapotranspiration.

Increased groundwater pumping would result in additional drawdown of groundwater levels in the aquifer system underlying the Redding Groundwater Basin. Modeled draw-down was evaluated in both the shallow and regional aquifers. The shallow aquifer is defined as the unconfined aquifer that exists in the upper 50 feet of saturated sediments. The regional aquifer is defined as the deeper portions of the aquifer that are typically tapped by irrigation and municipal supply wells in the Basin. Drawdown in the shallow aquifer could influence streams and riparian vegetation. Drawdown in the deeper aquifer could affect pumping water levels in nearby wells and potentially induce subsidence. The degree of anti-cipated impact and relative potential for significance is discussed for each alternative below.

Implementation of any reduction of surface-water supply, and resultant increase in groundwater pumping, would result in a reduction in local stream flow by: (1) increasing infiltration of surface water through the streambed, (2) intercepting groundwater that would have discharged to surface streams or vegetation, or (3) a combination of 1 and 2.

3.6.2.3 Significance Criteria

Implementing the Plan would significantly affect land use if an action would substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or uses for which permits have been granted).

3.6.2.4 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, the proposed project would not be constructed.

Operational Impacts. Under the No Project Alternative, there would be no changes in operating conditions. Groundwater pumping by purveyors is estimated to be 17 thousand ac-ft in normal years and 24 thousand ac-ft in critical dry years. Model results indicate that groundwater discharge to surface water decreases by approximately 392 thousand ac-ft in the drought condition, compared to the modeled normal water year.

3.6.2.5 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction in 2005; therefore, there would be no impacts from new construction activities.

Operational Impacts. Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions. Groundwater pumping by purveyors is estimated to be 17 thousand ac-ft in normal years and 24 thousand ac-ft in critical dry years, same as under the No Project Alternative. Compared to the No Project Alternative, discharge to surface water would remain approximately the same under both normal and drought conditions.

3.6.2.6 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction in 2005; therefore, there would be no impacts from new construction activities.

Operational Impacts. Under Alternative 2, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions. Groundwater pumping by purveyors is estimated to be 17 thousand ac-ft in normal years and 24 thousand ac-ft in critical dry years, same as under the No Project Alternative. Compared to the No Project Alternative, discharge to surface water would remain approximately the same under both normal and drought conditions.

3.6.2.7 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no new construction in 2005; therefore, there would be no impacts from new construction activities.

Operational Impacts. Under Alternative 3, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions. Groundwater pumping by purveyors is estimated to be 17 thousand ac-ft in normal years and 24 thousand ac-ft in critical dry years, same as under the No Project Alternative. Compared to the No Project Alternative, discharge to surface water would remain approximately the same under both normal and drought conditions.

3.6.2.8 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, the Plan would not be implemented and, therefore, no impacts would result from construction activities.

Operational Impacts. Under a normal water year at the 2030 level of development, implementation of the No Action Alternative would result in a slight surplus of available water resources and sufficient supplies could be delivered to M&I and agricultural users. Groundwater pumping would be approximately 46 thousand ac-ft, with the majority of pumping occurring in the Redding service area.

Under a drought water year at the 2030 level of development, implementation of the No Action Alternative would result in a deficit of water delivered to M&I and agricultural users. The majority of increased pumping would occur in the City of Redding's Enterprise well fields. Total purveyor pumping is anticipated to be 53 thousand ac-ft. Effects from that level of pumping are anticipated to be temporary, lasting only until normal water deliveries resume. Model results indicate that groundwater discharge to surface water decreases by approximately 399 thousand ac-ft in the drought condition, compared to the modeled normal water year.

3.6.2.9 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Construction of agricultural wells and conveyance structures would occur under this alternative. These construction activities are not anticipated to affect groundwater, therefore no impacts would occur.

Operational Impacts. Operation of agricultural wells and subsequent transfer of water to other purveyors in the Basin would affect groundwater resources.

Model results indicate that during normal years, use of the common pool would be sufficient to meet water demands in the purveyor's service areas. This would result in a slight decrease in pumping in Redding's Enterprise well field as Redding uses proportionately more surface water than groundwater compared to the No Action condition. This effect is illustrated on Figure 3.6-2, showing a groundwater rise of 1 to 4 feet in the Enterprise region.

During the drought condition, model results suggest that drawdown of groundwater levels in the ACID service area would range from 1 to 8 feet near the proposed conjunctive use wells. However, an increase of 1 to 15 feet in groundwater levels would occur in Redding's Enterprise well field compared to the No Action condition. Relative groundwater levels are illustrated on Figure 3.6-3. Because the changes in groundwater levels are not anticipated to affect overlying land use, impacts would be less than significant.

Slight changes to Sacramento River flows are anticipated to result from changes to groundwater pumping patterns, which change groundwater discharge to surface water. Under this alternative, discharge to surface water would increase by approximately 7,000 ac-ft/yr during normal years and decrease by approximately 900 ac-ft/yr under the drought condition when compared to the No Action alternative. This change is less than significant.

3.6.2.10 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Construction of the canal lining would not affect groundwater resources.

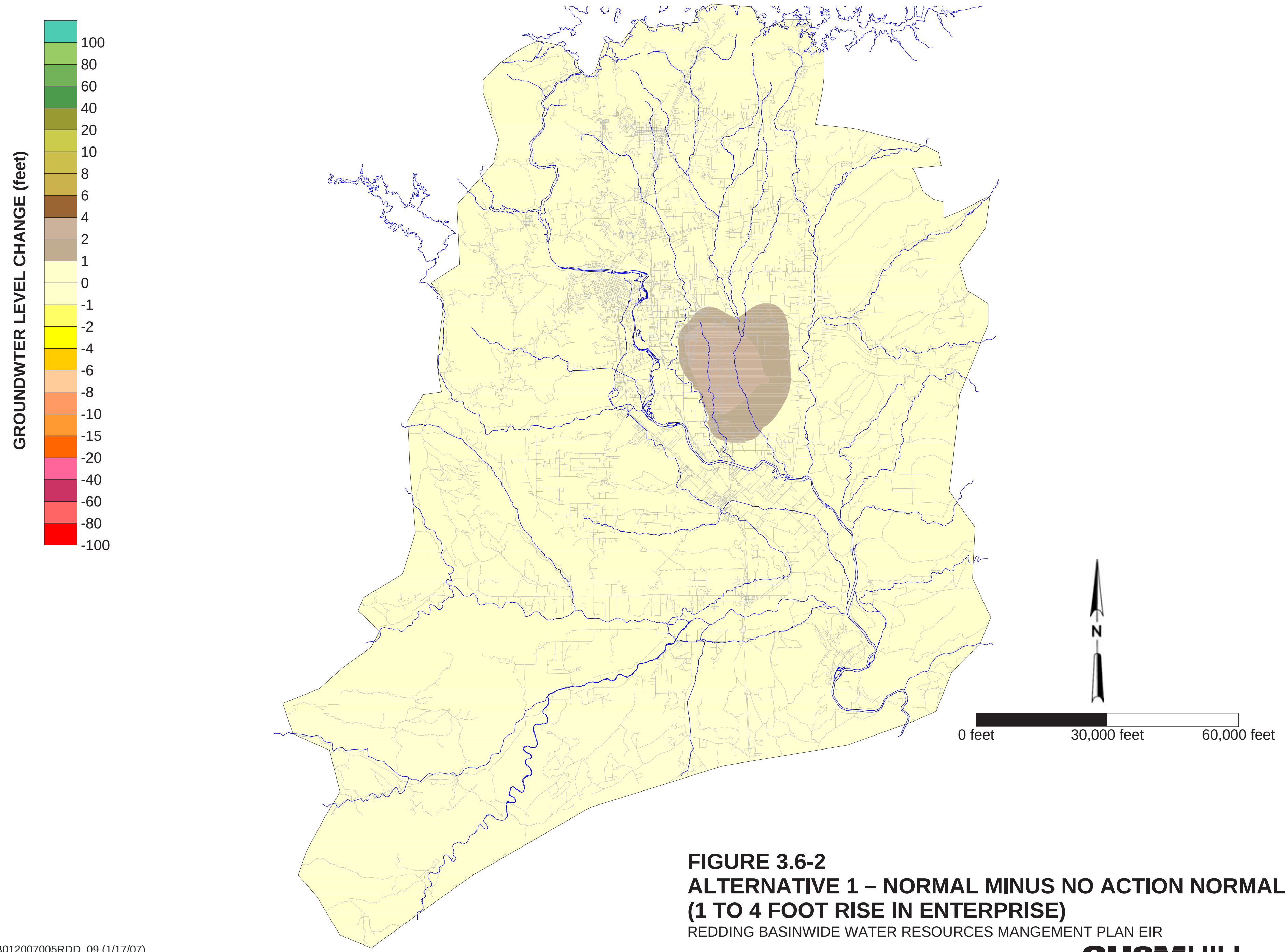


FIGURE 3.6-2
ALTERNATIVE 1 – NORMAL MINUS NO ACTION NORMAL
(1 TO 4 FOOT RISE IN ENTERPRISE)
REDDING BASINWIDE WATER RESOURCES MANGEMENT PLAN EIR

WB012007005RDD_09 (1/17/07)

CH2MHILL

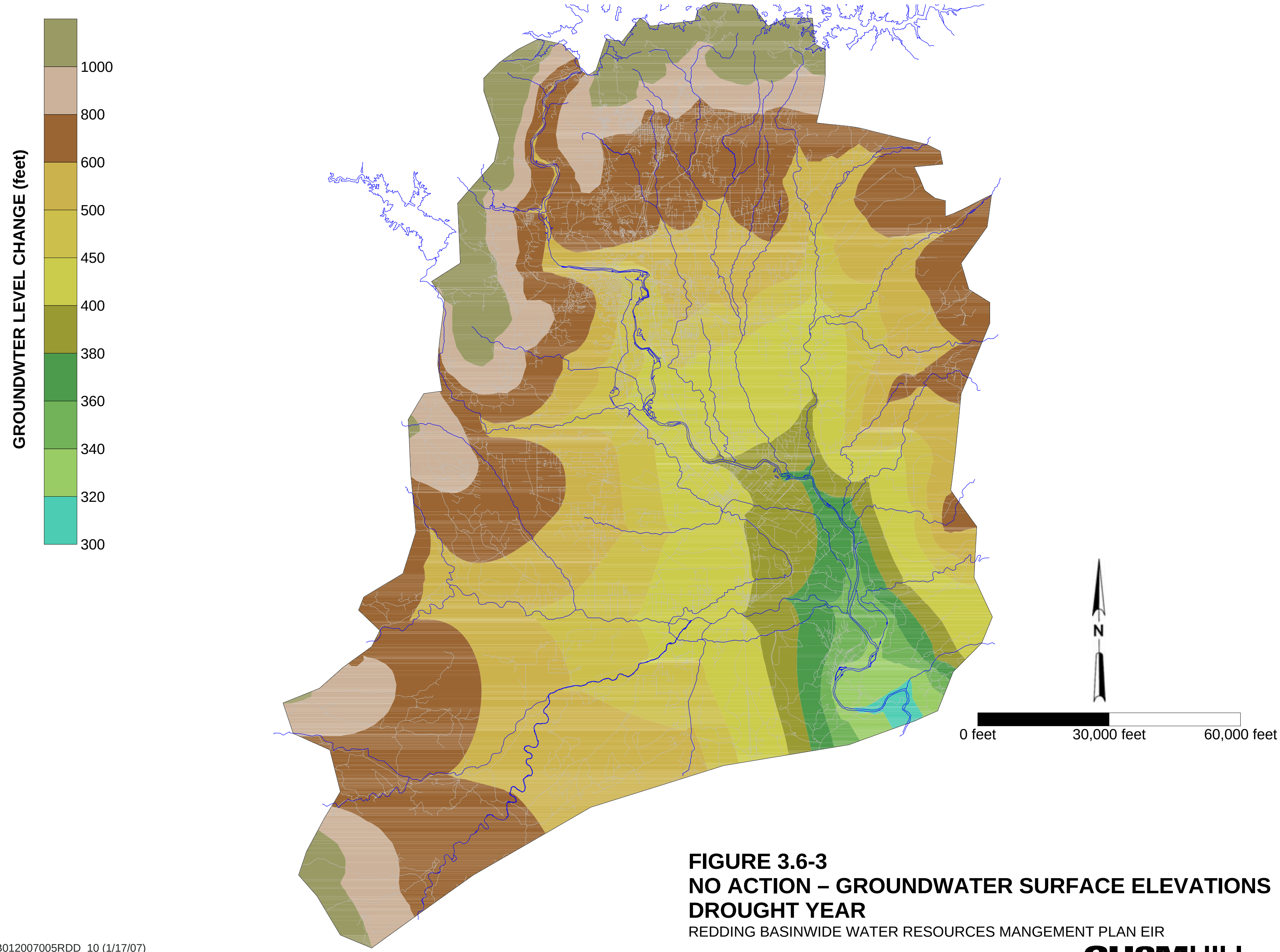


FIGURE 3.6-3
NO ACTION – GROUNDWATER SURFACE ELEVATIONS
DROUGHT YEAR
REDDING BASINWIDE WATER RESOURCES MANGEMENT PLAN EIR

WB012007005RDD_10 (1/17/07)

CH2MHILL

Operational Impacts. Lining of canals would decrease groundwater recharge in these areas.

Model results indicate that during normal years, use of the common pool will be sufficient to meet water demands in the purveyor's service areas. This will result in a slight decrease in pumping in Redding's Enterprise well field as Redding uses proportionately more surface water than groundwater compared to the No Action condition. This effect is illustrated on Figure 3.6-4, showing a groundwater rise of 1 to 6 feet in the Enterprise region.

During the drought condition, model results suggest that drawdown of groundwater levels in the ACID service area would range from 1 to 8 feet near the proposed canal lining projects. However, an increase of 1 to 8 feet in groundwater levels would occur in Redding's Enterprise well field compared to the No Action condition. Relative groundwater levels are illustrated on Figure 3.6-5. Because the changes in groundwater levels are not anticipated to affect overlying land use, impacts would be less than significant.

Slight changes to Sacramento River flows are anticipated to result from changes to groundwater pumping patterns, which change groundwater discharge to surface water. Under this alternative, discharge to surface water would increase by approximately 6,000 ac-ft/yr during normal years and increase by approximately 4,000 ac-ft/yr under the drought condition when compared to the No Action alternative. This change is less than significant.

3.6.2.11 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Potential impacts resulting from construction associated with implementation of Alternative 3 would be as those described for Alternatives 1 and 2.

Operational Impacts. Model results indicate that during normal years, use of the common pool will be sufficient to meet water demands in the purveyor's service areas. This would result in a slight decrease in pumping in Redding's Enterprise well field because Redding uses proportionately more surface water than groundwater compared to the No Action condition, resulting in a groundwater rise of 1 to 6 feet in the Enterprise region. Additionally, groundwater recharge along the ACID Main Canal would be slightly reduced, which would result in a decrease in groundwater levels of 1 to 8 feet. These effects are illustrated on Figure 3.6-6.

During the drought condition, model results suggest that drawdown of groundwater levels in the ACID service area would range from 1 to 8 feet near the proposed canal lining projects. However, an increase of 1 to 15 feet in groundwater levels would occur in Redding's Enterprise well field compared to the No Action condition. Relative groundwater levels are illustrated on Figure 3.6-7. Because the changes in groundwater levels are not anticipated to affect overlying land use, impacts would be less than significant.

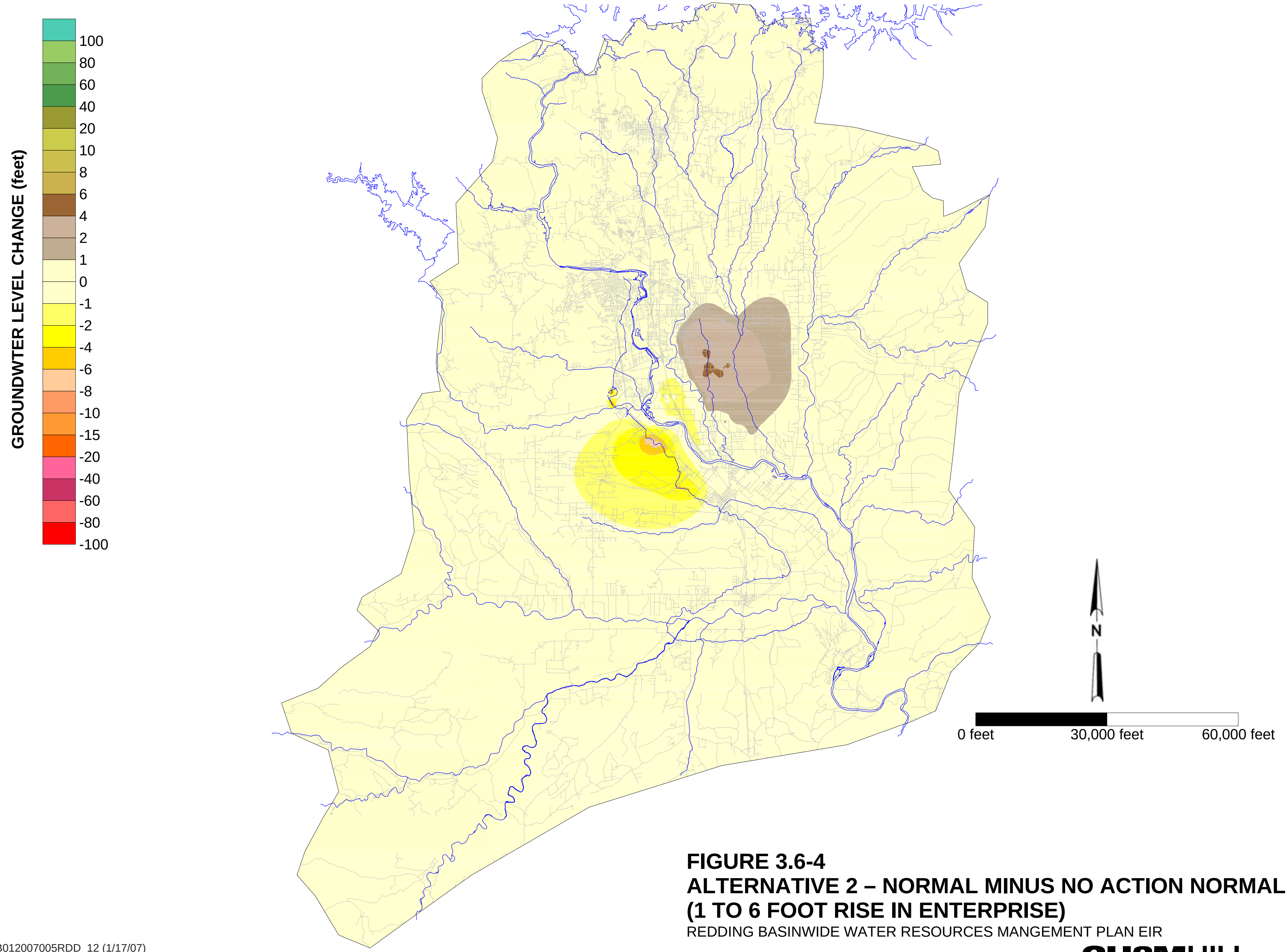


FIGURE 3.6-4
ALTERNATIVE 2 – NORMAL MINUS NO ACTION NORMAL
(1 TO 6 FOOT RISE IN ENTERPRISE)
REDDING BASINWIDE WATER RESOURCES MANGEMENT PLAN EIR

WB012007005RDD_12 (1/17/07)

CH2MHILL

Slight changes to Sacramento River flows are anticipated to result from changes to groundwater pumping patterns, which change groundwater discharge to surface water. Under this alternative, discharge to surface water would increase by approximately 6,000 ac-ft/yr during normal years and decrease by approximately 4,000 ac-ft/yr under the drought condition when compared to the No Action alternative. This change is less than significant.

3.6.3 Mitigation Measures

No significant impacts have been identified; therefore, no mitigation is required.

3.6.4 References

California Department of Water Resources (Department). 2003. *Bulletin 118 Update 2003*. October.

California Department of Water Resources (Department). 1968. *Bulletin No. 74-8 Water Well Standards, Shasta County*. August.

Pierce, Michael J. 1983. *U.S. Geological Survey Water-Resources Investigations Report 83-4052.* Prepared in cooperation with the California Department of Water Resources.

CH2M HILL. 2003. *Final Report Redding Basin Water Resources Management Plan Phase 2C Report*. Prepared for Redding Area Water Council. August.

CH2M HILL. 1997. *Final Report Shasta County Water Resources Management Plan Phase 1 Report Current and Future Water Needs.* Prepared for Redding Area Water Council and Other Shasta County Water Users. October.

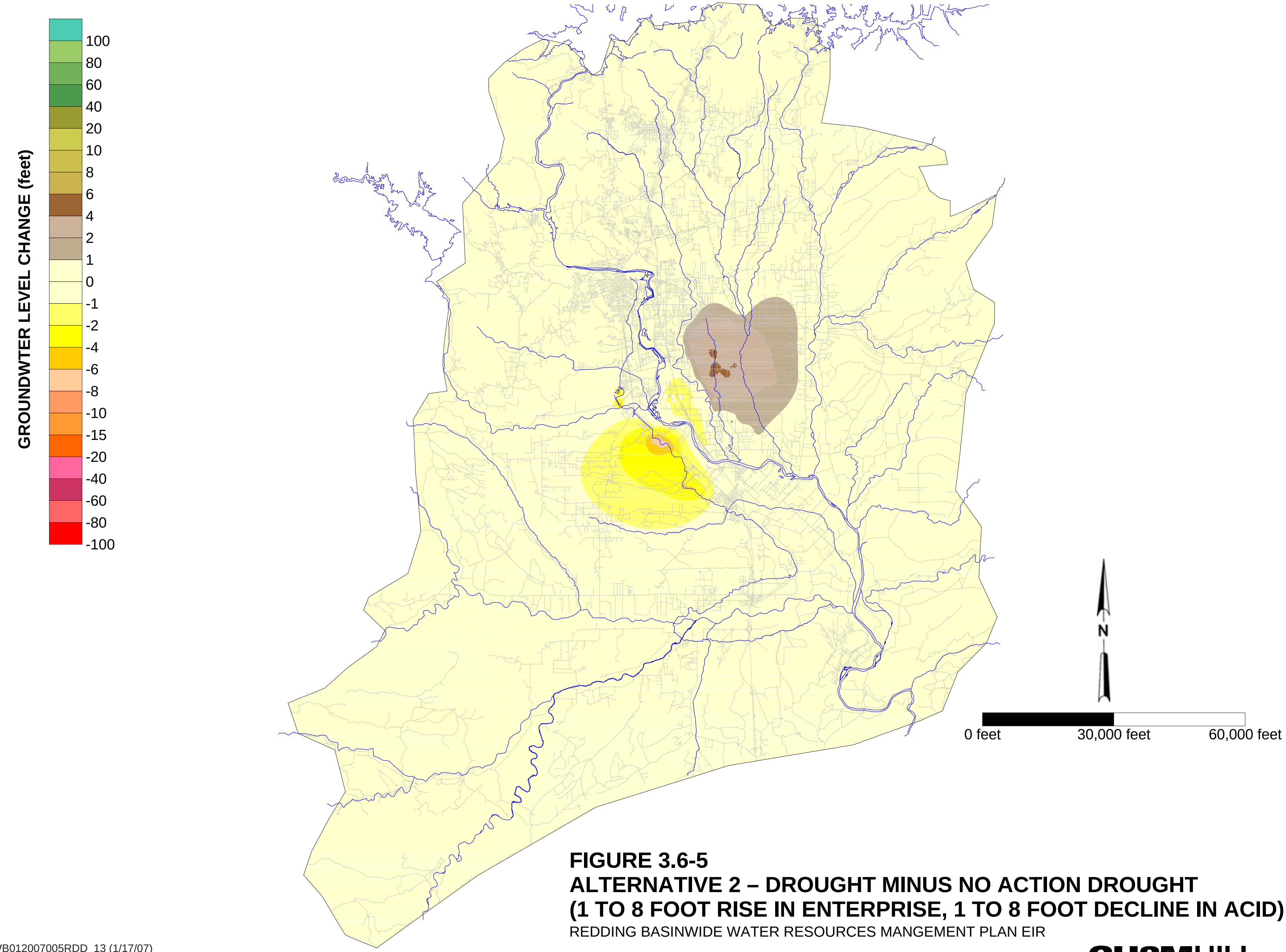


FIGURE 3.6-5
ALTERNATIVE 2 – DROUGHT MINUS NO ACTION DROUGHT
(1 TO 8 FOOT RISE IN ENTERPRISE, 1 TO 8 FOOT DECLINE IN ACID)
REDDING BASINWIDE WATER RESOURCES MANGEMENT PLAN EIR

WB012007005RDD_13 (1/17/07)

CH2MHILL

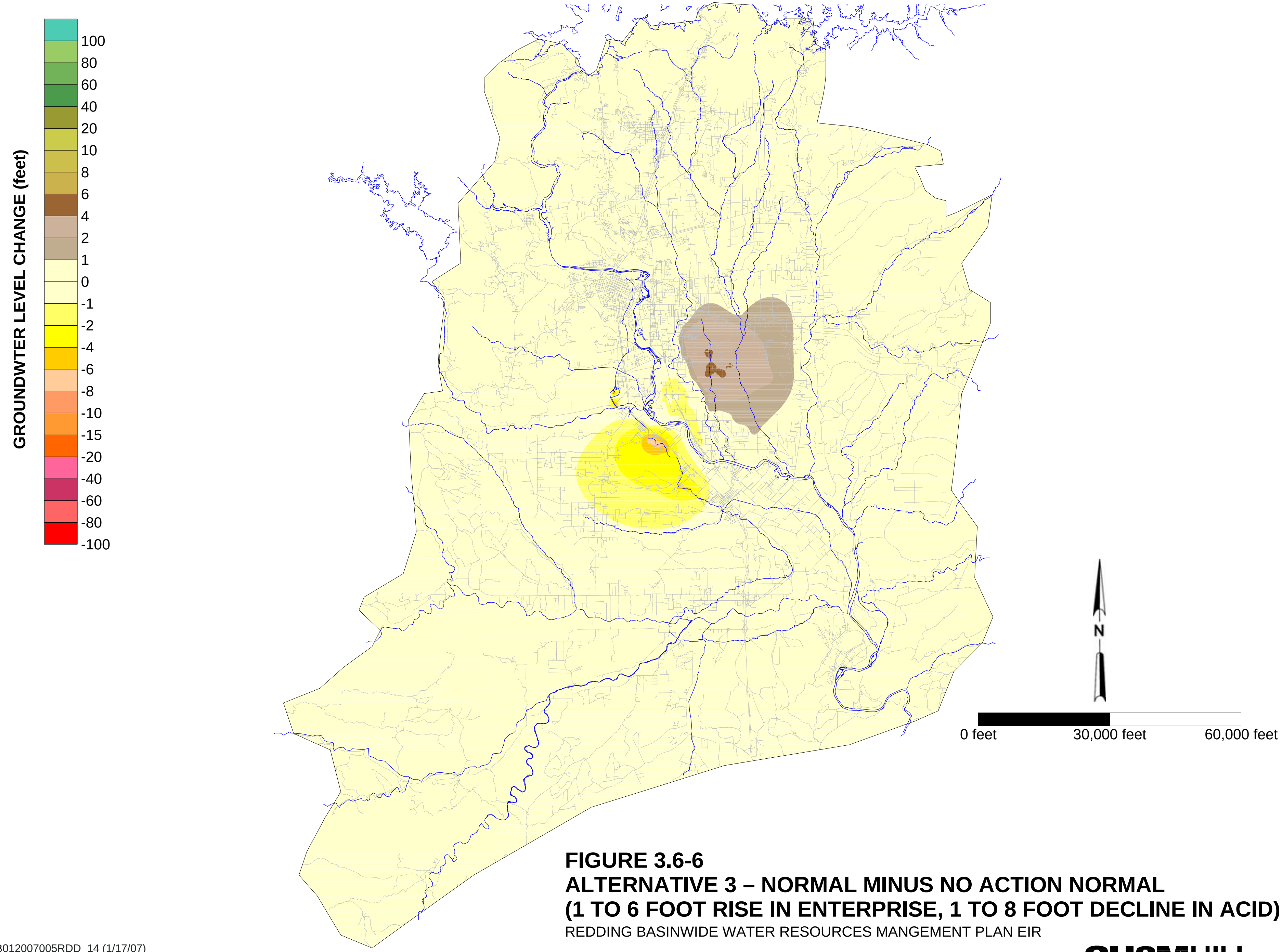


FIGURE 3.6-6
ALTERNATIVE 3 – NORMAL MINUS NO ACTION NORMAL
(1 TO 6 FOOT RISE IN ENTERPRISE, 1 TO 8 FOOT DECLINE IN ACID)
REDDING BASINWIDE WATER RESOURCES MANGEMENT PLAN EIR

WB012007005RDD_14 (1/17/07)

CH2MHILL

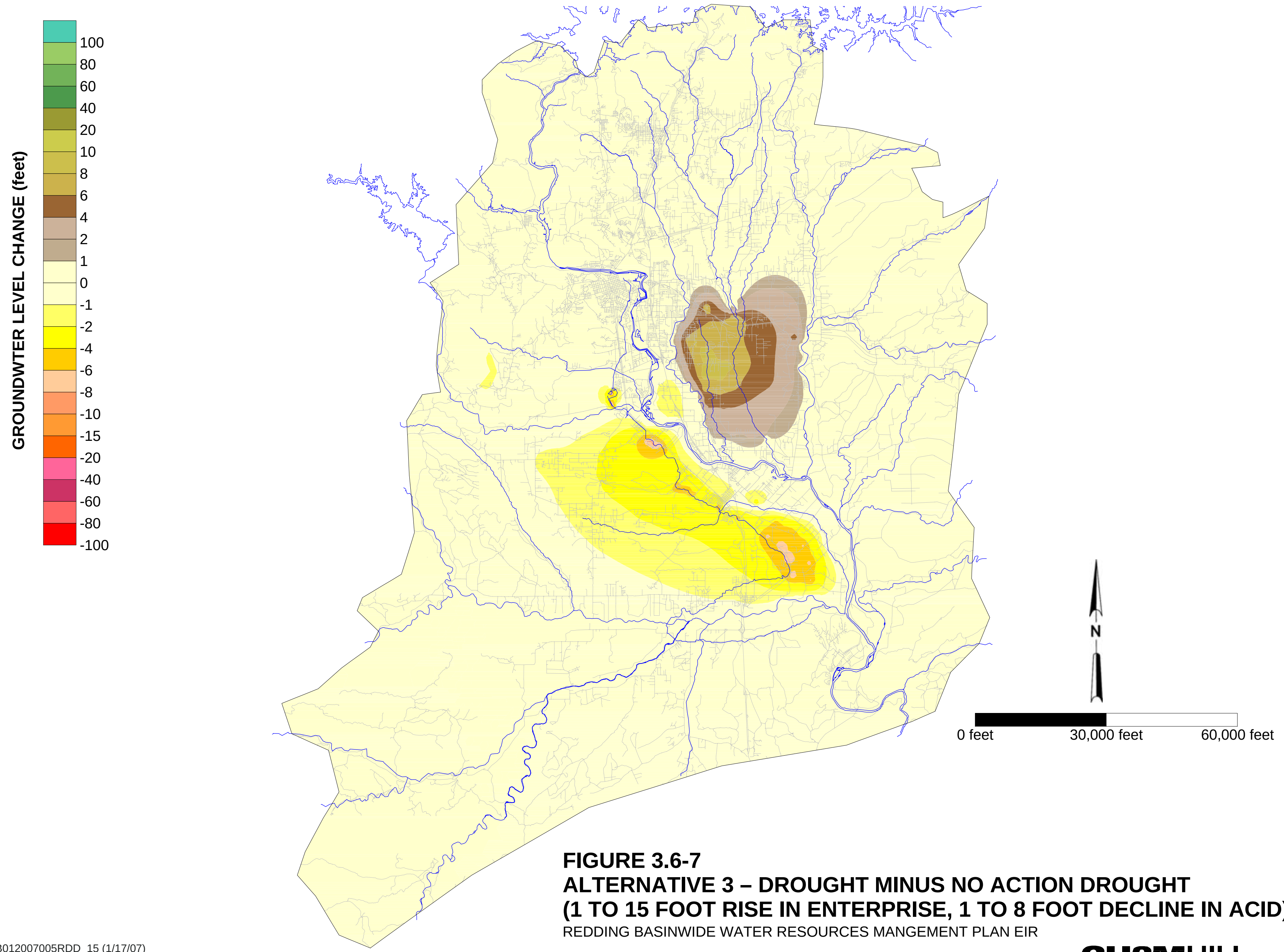


FIGURE 3.6-7
ALTERNATIVE 3 – DROUGHT MINUS NO ACTION DROUGHT
(1 TO 15 FOOT RISE IN ENTERPRISE, 1 TO 8 FOOT DECLINE IN ACID)
REDDING BASINWIDE WATER RESOURCES MANGEMENT PLAN EIR

WB012007005RDD_15 (1/17/07)

CH2MHILL

3.7 Power Resources

The Plan could affect power resources through increased demand for electricity at groundwater wells or through a reduction in generation at hydropower facilities through use of the common pool. CVP hydroelectric generation is expected to be relatively unaffected; however, because overall, federal facilities would continue to be operated to meet water requirements in the Sacramento Valley, and the transfer of water within the Basin would be very small in relation to overall CVP operations.

3.7.1 Affected Environment/Existing Conditions

The Basin includes CVP facilities that generate a large amount of hydroelectric power. Following is a description of hydroelectric management of the CVP, with special emphasis on the components directly related to the Basin.

The Western Area Power Administration (Western) is the marketing agency for power generated at Reclamation's CVP facilities. Created in 1977 under the Department of Energy Organization Act, Western markets and transmits electric power throughout 15 western states. Western's Sierra Nevada Customer Service Region annually markets approximately 8,000,000 kilowatt hours (kWh), including 3,000,000 kWh generated by CVP and 5,000,000 kWh produced by other sources.

Western's mission is to sell and deliver electricity that is excess to power required for CVP operations. Western's power marketing responsibility includes managing the federal transmission system and, as a federal agency, ensuring that operations of the hydropower facilities are consistent with regulatory responsibilities. CVP hydroelectric generation facilities are operated by Reclamation. Reclamation manages and releases water in accordance with the various acts authorizing its specific projects and in accordance with other laws and enabling legislation. Hydropower operations at each facility must comply with minimum and maximum flows and other constraints set by Reclamation, Service, or other regulatory agencies, acting in accordance with law or policy.

Western operates, maintains, and upgrades the transmission grid that was constructed by the CVP. Hydroelectric generation facilities were constructed as part of 11 CVP water supply facilities. Hydroelectric generation facilities include the turbines, generators, and powerplant substations and switchyards used to generate electricity and deliver it to a transmission system. CVP hydroelectric facilities have an installed generation capability of approximately 2,000 megawatts (MW) (Table 3.7-1).

Western dispatches and markets CVP power to preference power customers. Preference power customers are entities such as municipalities and irrigation districts that are specifically entitled to preference under Reclamation law. Western is also responsible for meeting all project use load, which is the power required to operate CVP facilities. Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water supply. Although the generation of power is not the primary operational objective, it is nonetheless a major economic benefit of CVP operations and, accordingly, affects project operations.

TABLE 3.7-1
Hydroelectric Generation Facilities
Redding Basin Water Resources Management Plan EIR

CVP Division	Powerplant	Location	Generating Units	Capability (kW)
Trinity River	Trinity	Trinity Dam/Trinity River	2	139,650
	Lewiston	Lewiston Dam/Trinity River	1	350
	J.F. Carr	Whiskeytown Dam	2	157,000
	Spring Creek	Spring Creek Power Conduit	2	200,000
Shasta	Shasta	Shasta Dam/Sacramento River	7[a]	625,000[b]
	Keswick	Keswick Dam/Sacramento River	3	105,000
American River	Folsom	Folsom Dam/American River	3	215,000
	Nimbus	Nimbus Dam/American River	2	14,900
Delta	San Luis	San Luis Reservoir	8 (total)	202,000 (CVP share)
				(424,000 total)
	O'Neill	San Luis Canal	6	29,000
East Side	New Melones	New Melones Dam/Stanislaus River	2	383,000
Total Capability				**2,070,900**

[a]Includes two station service units.
[b]Installed capacity after all rewinds were completed in year 2000.

Note:

kW = kilowatt

3.7.1.1 Power Generation and Purchase

Power generation from CVP facilities fluctuates with reservoir releases and storage levels. Climatic conditions such as drought or wet conditions are the primary factors affecting releases and storage, and the associated ability to generate power. For example, dry periods reduced the water level in the New Melones Reservoir to below the minimum power-pool levels, resulting in no power being generated at the facility from August through January 1991 and August through January 1992. Reservoir releases are also affected by mandated minimum stream flow requirements, flow-fluctuation restrictions, water delivery contracts, and water quality requirements. For example, prior to construction of the Shasta Dam temperature control device, the Biological Opinion on Sacramento River Winter-run Chinook Salmon required Reclamation to release cold water from Shasta Dam outlets that bypass the powerplants. The Biological Opinion has also increased winter and spring water releases into the Sacramento River, resulting in less water being available for release in the summer when power needs are highest (the installation of the temperature control device in 1997 essentially eliminated the need to bypass the powerplants at Shasta Dam). These factors have resulted in actual generation typically being less than full capability.

Peak power loads typically occur in summer months when water conveyance, groundwater pumping, industrial loads, and air conditioning loads are greatest. In the past, CVP generation has been integrated with other power generation resources operated by Pacific Gas and

Electric Company (PG&E) to meet project use load and CVP preference power customer loads. Future project power operations will be based on project use loads and CVP preference power customer loads. Currently, project use loads account for about 30 percent of the energy generated by CVP. During droughts and other times of low CVP generation, Western has exchanged or banked power with PG&E and purchased power from other entities (particularly those in the Pacific northwest) to meet demands.

Reclamation and Western work together daily, comparing hydropower availability, total loads, and availability of resources and transmission capabilities. Daily operations are scheduled 1 day prior to actual use when the Reclamation dispatch center determines the necessary releases from Keswick, Lewiston, Tulloch, and Nimbus Reservoirs to meet hourly stream flows, water demands, water quality requirements, and power generation needs. Reclamation communicates the dam releases to Western's Folsom dispatch office. The two entities confirm and, if necessary, adjust the schedule.

3.7.1.2 Current Power Marketing

Western sets prices for CVP hydropower according to its costs for delivering power to customers. The value of the electricity that Western sells to customers is set by the external markets and can fluctuate according to supply and demand. Although the value and annual project output can fluctuate, Western's costs remain essentially unchanged. This causes Western's per-unit cost of electricity to vary. When long-term average generation decreases, Western's customers receive less electricity and are required to pay a higher per-unit cost. If Western's rates are relatively low, Western customers are likely to continue to purchase power from Western as part of their long-term resource mix. For planning purposes, power customers evaluate capacity resources according to dry conditions to ensure reliability.

Western has wide discretion within its statutory guidelines regarding with whom and on what terms it will contract for the sale of federal power. The sale of excess power is conducted so as not to impair the efficiency of CVP irrigation deliveries.

3.7.1.3 Value of Electricity Production

Hydroelectric power generated from existing facilities is one of the lowest-cost sources available and represents about 10 to 20 percent of California's electricity generation, depending on weather. It is often generated during peak demand periods with the ability to rapidly vary output levels, making it a valuable resource. New sources of electrical generation are being developed in California and other western states that will include gas-fired combustion and combined-cycle plants, co-generation plants, and renewable sources such as windmills. The cost of these new sources is expected to be substantially greater than the cost of producing power with existing hydroelectric facilities.

3.7.1.4 Power Requirements for Groundwater Pumping

One of the main alternative sources of water when CVP cutbacks are in effect is groundwater. Electric or diesel-driven pumps are used by many CVP water customers to pump groundwater to supplement CVP water during years of delivery cutbacks. Table 3.7-2 summarizes the amount of electricity needed to pump groundwater under different cutback scenarios. These estimates assume that the pumps are driven by electric motors – energy required by diesel-driven pumps would be roughly equivalent. To illustrate potential impacts, total average pumping lift is assumed to be 60 feet and well pumping efficiency is assumed to be 70 percent. Actual lifts and efficiencies will vary by location.

TABLE 3.7-2
Power Required to Pump Groundwater in Sacramento Valley
Redding Basin Water Resources Management Plan EIR

Water Year Type	Water Pumped (ac-ft)	Energy Used (MWh)[a]
Below normal	212,745	18,600
Dry	425,490	37,200
Critically dry	531,863	46,500

[a]Assumes 60-foot average total lift and 70 percent pumping efficiency.

3.7.1.5 Redding Basin

The three electric service providers in the Redding Basin are PG&E, City of Shasta Lake, and Redding Electric Utility. Redding Electric Utility and Shasta Lake provide service to customers within their city limits while PG&E provides service to customers outside of Shasta Lake and Redding. The three service providers maintain hydroelectric power as part of their overall resource mix. Shasta Lake and Redding are both Western Preference Customers. Shasta Lake purchased approximately 61,000 MWh of electricity from Western in fiscal year 2004. Redding purchased almost 600,000 MWh of electricity from Western in fiscal year 2004.

3.7.2 Environmental Consequences/Environmental Impacts

Implementation of the Plan could change the pattern of power operations at CVP facilities through increased use of water transfers. Alternatives could also increase demand for regional energy use through increased local groundwater pumping.

3.7.2.1 Methodology

The amount of foregone generation caused by use of the common pool was qualitatively assessed by comparing the relative magnitude of water operations (and subsequent hydroelectric generation) for the CVP and Basin purveyor operations. The approximate power requirement for the conjunctive use project was estimated quantitatively.

3.7.2.2 Significance Criteria

Implementing the Plan would significantly affect power resources if an action resulted in:

- A reduction in generation that reduces the ability to market power for CVP hydrogeneration
- An increase in electric consumption that negatively affects the reliability of electric supplies in the Basin

3.7.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under the No Project Alternative, no changes in operating conditions would occur. Therefore no operational impacts to power resources would be expected.

3.7.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions. resulting in a slight surplus of water supply, which could be used for additional power generation. However, scheduling and management of any surplus water in the Basin would be the purview of Reclamation, subject to the constraints and operating requirements of the CVP. During the baseline year, which was a normal water year, management actions would not need to be implemented and power resources would not be affected.

3.7.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 2, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions resulting in a slight surplus of water supply, which could be used for additional power generation. However, scheduling and management of any surplus water in the Basin would be the purview of Reclamation, subject to the constraints and operating requirements of the CVP. During the baseline year, which was a normal water year, management actions would not need to be implemented and power resources would not be affected.

3.7.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 3, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions resulting in a slight surplus of water supply, which could be used for additional power generation. However, scheduling and management of any surplus water in the Basin would be the purview of Reclamation, subject to the constraints and operating requirements of the CVP. During the baseline year, which was a normal water year, management actions would not need to be implemented and power resources would not be affected.

3.7.2.7 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Project Alternative, the proposed project would not be constructed; therefore, no impacts would result from construction activities.

Operational Impacts. Under a normal water year at the 2030 level of development, implementation of the No Action Alternative would result in a slight surplus of available water resources. Under the No Action Alternative, groundwater pumping by purveyors in the

Basin would be approximately 46 thousand ac-ft, requiring approximately 4,000 MWh of electricity.

Under a drought water year at the 2030 level of development, implementation of the No Action Alternative would result in a deficit of available water resources and supplies delivered to M&I and agricultural users. Groundwater pumping by purveyors in the Basin would be approximately 53 thousand ac-ft, requiring approximately 4,600 MWh of electricity.

3.7.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Construction of agricultural wells and conveyance structures would require some use of electricity during installation of the wells and appurtenant structures. However, construction would be temporary and relatively small in comparison with normal construction efforts in the Basin. Therefore, the potential impacts resulting from implementation of this alternative would be less than significant.

Operational Impacts. Operation of agricultural wells and subsequent transfer of water to other purveyors in the Basin would constitute a small change in system operations. Impacts to power resources could occur through lost generation caused by transfer of water that would have otherwise flowed through generators. The entire demand of Basin purveyors would vary under this alternative from 196 thousand ac-ft to 241 thousand ac-ft. Total transfers through the common pool under this alternative would likely be in the range of 10 to 50 thousand ac-ft, with largest likely share moving to the City of Redding, a location below the major generators in the Shasta Division and TRD. By comparison, total water management through the Shasta Division of the CVP is approximately 5,700 thousand ac-ft. Accordingly, any lost generation associated with implementation of this alternative is less than significant.

Additional impacts to power resources are possible through the operation of the agricultural wells associated with this alternative. Assuming maximum build-out of the conjunctive use facilities, 44 thousand ac-ft, maximum power consumption would be approximately 3,800 MWh, less than the anticipated power consumption anticipated from operation of groundwater wells under the No Action Alternative. Any associated impact to power resources from additional pumping under this alternative is therefore less than significant.

3.7.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Construction of canal lining and pipeline structures would require some use of electricity during installation of the structures. However, construction would be temporary and relatively small in comparison with normal construction efforts in the Basin. Therefore, the potential impacts resulting from implementation of this alternative would be less than significant.

Operational Impacts. Operation of canal and lateral improvements and subsequent transfer of water to other purveyors in the Basin would constitute a small change in system operations. Impacts to power resources could occur through lost generation caused by transfer of water that would have otherwise flowed through generators. The entire demand of Basin purveyors would vary under this alternative from 184 thousand ac-ft to 237 thousand ac-ft. Total transfers through the common pool under this alternative would likely be in the range of 10 to 50 thousand ac-ft, with largest likely share moving to the City of Redding, a location below the major generators in the Shasta Division and TRD. As a comparison, total water management through the Shasta Division of the CVP is approximately 5,700 thousand ac-ft. Accordingly, any lost generation associated with implementation of this alternative is less than significant.

Additional impacts to power resources are possible through the operation of the municipal wells needed to meet Basin needs under this alternative. Maximum groundwater pumping under this alternative is anticipated to be 49 thousand ac-ft, with an associated power consumption of approximately 4,300 MWh, less than the anticipated power consumption anticipated from operation of groundwater wells under the No Action Alternative. An associated impact to power resources from additional pumping under this alternative is, therefore, less than significant.

3.7.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Potential impacts resulting from construction associated with implementation of Alternative 3 would be the same as those described for Alternatives 1 and 2.

Operational Impacts. Potential impacts resulting from operation under implementation of Alternative 3 would be the same as those described for Alternatives 1 and 2.

3.7.3 Mitigation Measures

No significant impacts have been identified; therefore, no mitigation is required.

3.7.4 References

Pacific Gas and Electric (PG&E).

3.8 Health and Safety

This section addresses the use of hazardous materials, including the management of hazardous waste, and occupational health and fire safety.

3.8.1 Affected Environment/Existing Conditions

The proposed project is located in rural portions of southern Shasta County characterized by scattered, single-family residential houses; and agricultural, industrial, and gravel mining development. The terrain is generally flat with views to the west of the grasslands and rolling foothills typical of the northern portion of the Sacramento Valley. To the north, south, and east, the area includes grasslands, rolling hills, agricultural development, and industrial and residential use. Residential and commercial/industrial development is restricted to the Cities of Redding and Anderson and unincorporated areas of Shasta County.

3.8.2 Environmental Consequences/Environmental Impacts

3.8.2.1 Methodology

The use of hazardous materials would be associated primarily with construction. Hazardous materials are defined by their characteristics as toxic, combustible, corrosive, or radioactive substances and include hazardous wastes.

3.8.2.2 Significance Criteria

Standards of significance represent the thresholds that were used to identify whether an impact would be potentially significant. Impacts on public health and safety would be significant if they would result in any of the following:

- Increase risk of accidental explosion or release of hazardous materials including fuels
- Interfere with an emergency response plan or emergency evacuation plan
- Create any health hazard or potential health hazard
- Expose people to existing sources of potential health hazards
- Increase fire hazard in areas with flammable brush, grass, or trees

3.8.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under the No Project Alternative, current operations of the Basin would not change; therefore, no impacts would result.

3.8.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under the Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Operating conditions during the baseline year, which was normal water year, would not change because the common pool and the TRF would not be implemented. Therefore, operations would not change and impacts would not result.

3.8.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under the Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Operating conditions during the baseline year, which was a normal water year, would not change because the common pool and the TRF would not be implemented. Therefore, operations would not change and impacts would not result.

3.8.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under the Alternative 3, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Operating conditions during the baseline year, which was a normal water year, would not change because the common pool and the TRF would not be implemented. Therefore, operations would not change and impacts would not result.

3.8.2.7 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, construction would not take place; therefore, no impacts would result from construction activities.

Operational Impacts. Under the No Action Alternative, current operations of the Basin would not change; therefore, no impacts would result.

3.8.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. If contaminated materials were encountered during construction, protective measures would be implemented based on direction from the Shasta County Offices of Emergency Services and Public Works, and potential impacts to human health and the environment from the contamination would be less than significant.

Impact HS-1: Hazardous Materials Spills could adversely affect human health or the environment. Under Alternative 1, hazardous materials (e.g., gasoline, oil, and lubricants) could inadvertently be spilled during construction, potentially affecting human health or the environment. Such impacts could be significant. Preparation and implementation of a site safety and spill prevention plan outlining BMPs would reduce the potential for spills and their effects to less-than-significant levels.

Impact HS-2: Fires could be accidentally ignited. During construction, smoking or sparks created when using construction equipment could accidentally ignite fires. Fire danger in the Basin is high during the dry season of the year and fires can result in potentially significant impacts. Preparation and implementation of a site safety and spill prevention plan outlining BMPs would reduce potential for fires and their effects to less-than-significant levels.

Operational Impacts. No hazardous materials would be associated with the operation of the new wells, conveyances, and utility and maintenance rights-of-way; therefore, no impacts would result. Operating conditions would change with implementation of the common pool and the TRF; implementation would not necessitate use of any hazardous materials; therefore, no impacts would result.

3.8.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Potential impacts resulting from implementation of Alternative 2 would be identical to those described for Alternative 1.

Operational Impacts. No hazardous materials would be associated with the operation of the newly lined ACID canal; therefore, no impacts would result. Operating conditions would change with implementation of the common pool and the TRF; implementation would not necessitate use of any hazardous materials; therefore, no impacts would result.

3.8.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Potential construction impacts under Alternative 3 would be the same as those described for Alternatives 1 and 2.

Operational Impacts. Potential operational impacts under Alternative 3 would be the same as those described for Alternatives 1 and 2.

3.8.3 Mitigation Measures

Mitigation Measure HS-1. The site safety and spill prevention plan would include the following BMPs:

- Onsite fuel and toxic materials would be stored and handled in designated areas at a minimum distance of 50 feet from any surface water and downslope from the surface water to avoid accidental spills from reaching the water.
- Vehicles would be inspected and maintained to reduce the potential for leaks and spills of oil, grease, or hydraulic fluid.
- Absorbent materials would be available at the construction site to clean up any potential spills.
- Onsite refueling would be conducted in designated places and using tarps to collect potential drips or spills.
- The potential for igniting fires is reduce by using tools equipped with spark arresters and by permitting smoking only in designated areas (e.g., on gravel pads).
- Fire fighting equipment would be available at the construction site and ready for use in the event that small fires erupted so that any flames could be extinguished immediately.

3.8.4 References

City of Anderson. 1989. *General Plan.*

City of Redding. 2000. *General Plan*.

Shasta County. 2004. *General Plan.*

Tehama County. 1983. *General Plan.*

3.9 Air Quality Resources

3.9.1 Affected Environment/Existing Conditions

The concentration of a pollutant in the atmosphere is dependent on the amount of pollutant released, the nature of the source and the ability of the atmosphere to transport and disperse the pollutant. The main determinants of transport and dispersion are wind, atmospheric stability or turbulence, topography, and the existence of inversion layers. Under the right meteorological and topographic conditions, certain photochemically active pollutants such as nitrogen oxide (NO_x) and reactive organic gases (ROG) can react under the presence of sunlight and form secondary pollutants. Elevated levels of ground-level ozone and fine particulate matter are examples of secondary pollutants. Warm temperatures accelerate the creation of secondary pollutants and can exacerbate conditions of poor air quality.

Air pollutants from stationary emission sources such as industrial facilities, mobile sources such as vehicles, and natural sources from some plants are emitted into the atmosphere, disperse, and chemically react depending on the meteorological and geographic factors present at the time.

Air quality in California is regulated by EPA and the California Air Resources Board (CARB), and locally by Air Pollution Control Districts (APCD) or Air Quality Management Districts (AQMD). The Basin is located in the Sacramento Valley Air Basin. The proposed project area falls within the Shasta County Air Quality Management District, which regulates air quality in Shasta County. The southern portion of the canal is located in Tehama County; however, there will be no improvements or construction associated with the proposed project occurring in that county, therefore, the remainder of this discussion focuses on Shasta County.

3.9.1.1 Federal Clean Air Act

The federal Clean Air Act (CAA) requires EPA to establish and maintain national ambient air quality standards (NAAQS), to monitor and manage air quality across the country. California has adopted its own ambient air quality standards (CAAQS), and generally, CAAQS are more stringent than NAAQS. Pollutants for which standards have been established are termed criteria pollutants, because the standards are based on criteria that show a relationship between pollutant concentrations and impacts on health and welfare. From this relationship, EPA and the state establish acceptable pollutant concentration levels to serve as ambient air quality standards. Table 3.9-1 lists the California and national ambient air quality standards for the criteria pollutants of primary concern (ozone, carbon monoxide [CO], nitrogen dioxide [NO_2], and sulfur dioxide [SO_2].

If ambient concentrations of any of the criteria pollutants in an area exceed state or federal standards established for those pollutants, the area is designated as a nonattainment area. For some pollutants, an area can be designated as a basic, moderate, serious, severe, or extreme nonattainment, depending on the level of concentrations. Likewise, if standards for pollutants are met in a particular area, the area is designated as an attainment area. Where standards might not have been established, or monitoring data do not exist for certain criteria pollutants, the areas are unclassified.

TABLE 3.9-1
Ambient Air Quality Standards
Redding Basin Water Resources Management Plan EIR

Pollutant	Averaging Time	California Standards[a]	National Standards[b]	
			Primary[c]	Secondary[d]
Ozone	8 hours 1 hour	-- 0.09 ppm	0.08 ppm 0.12 ppm	0.08 ppm 0.12 ppm
CO	8 hours 1 hour	9.0 ppm 20 ppm	9 ppm 35 ppm	-- --
NO_2	Annual arithmetic mean 1 hour	-- 0.25 ppm	0.053 ppm --	0.053 ppm --
SO_2	Annual arithmetic mean 24 hours 3 hours 1 hour	-- 0.04 ppm -- 0.25 ppm	0.030 ppm 0.14 ppm -- --	-- -- 0.5 ppm --
PM_{10}	Annual arithmetic mean 24 hours	20 $\mu g/m^3$ 50 $\mu g/m^3$	50 $\mu g/m^3$ 150 $\mu g/m^3$	50 $\mu g/m^3$ 150 $\mu g/m^3$
$PM_{2.5}$	Annual arithmetic mean 24 hours	12 $\mu g/m^3$ --	15 $\mu g/m^3$ 65 $\mu g/m^3$	15 $\mu g/m^3$ 65 $\mu g/m^3$
Sulfates	24 hours	25 $\mu g/m^3$	--	--
Lead	30-day average Calendar quarter	1.5 $\mu g/m^3$ --	-- 1.5 $\mu g/m^3$	-- 1.5 $\mu g/m^3$
Hydrogen Sulfide	1 hour	0.03 ppm	--	--
Vinyl Chloride	24 hours	0.01 ppm	--	--
Visibility-reducing Particles	8 hours	[e]	--	--

[a]California standards for ozone, CO, SO_2 (1 hour and 24 hour), NO_2, and suspended particulate matter less than 10 and 2.5 microns in aerodynamic diameter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded.

[b]National standards, other than ozone, particulate matter, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once per year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, is equal to or less than the standard.

[c]National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[d]National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse impacts of a pollutant.

[e]Insufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles, when the relative humidity is less than 70 percent.

Source: CARB, 2003a.

Notes:

ppm = parts per million (by volume)
$\mu g/m^3$ = microgram per cubic meter
-- = no established standard

The federal CAA requires states with nonattainment areas to develop plans, known as State Implementation Plan (SIP), describing the measures the state will take to attain national ambient air quality standards. Local air districts and other agencies prepare SIP elements for the areas under their regulatory jurisdiction and submit these elements to CARB for review and approval. CARB incorporates the individual air district elements into a statewide SIP and the plan is then submitted to EPA for approval and publication in the Federal Register.

General Conformity. Under the conformity provisions of the federal CAA, no federal agency can approve a project unless the project has been demonstrated conformance with the applicable SIP. These conformity provisions were put in place to ensure that federal agencies would contribute to the efforts of attaining the NAAQS. EPA has issued two types of conformity guidelines: transportation conformity rules that apply to transportation plans and projects, and general conformity rules that apply to all other federal actions. A conformity determination[1] is only required for the alternative that is ultimately selected and approved.

The general conformity determination is submitted in the form of a written finding, issued after a minimum 30-day public comment period on the draft determination. A project is exempt from the conformity rule (presumed to conform) if the total net project-related emissions (construction and operation) meet the following requirements:

1. They are less than the de minimis thresholds established by the conformity rule
2. They are not regionally significant (emissions are regionally significant if they exceed 10 percent of the total regional emissions inventory)

A project that produces emissions that exceed conformity thresholds is required to demonstrate conformity with the SIP through mitigation or other accepted practices.

Prevention of Significant Deterioration. The CAA includes provisions for prevention of significant deterioration (PSD) of air quality in areas designated as in attainment or unclassifiable. The basic goals of EPA's PSD rules, as published at 40 CFR 52.21, are the following:

- To ensure that clean air resources are preserved during economic growth
- To protect human health and welfare from adverse impacts of air pollution
- To preserve, protect, and enhance air quality in especially sensitive areas, such as national parks or wilderness

The PSD rules distinguish between two thresholds used to define a major source: (1) 28 listed source categories that emit, or have the potential to emit, 100 tons per year of any attainment pollutant, and (2) remaining stationary sources that emit, or have the potential to emit, 250 tons per year of any attainment pollutant. PSD permits are required for new sources that meet or exceed these major source thresholds, and for modifications to major sources with net emissions increases above PSD significance thresholds.

[1] A conformity determination is a process that demonstrates how an action would conform to the applicable implementation plan. If emissions cannot be reduced sufficiently, and if air dispersion modeling cannot demonstrate conformity, then either a plan for mitigating or a plan for offsetting the emissions would need to be pursued.

3.9.1.2 Shasta County

The two main contributors to air quality in Shasta County include ozone pollution during the summer, caused by vehicle and industrial emissions, and particulate matter in the winter, caused by a cold-weather inversion layer that traps airborne particles from open burning practices, fireplaces, and wood stoves (Shasta County, 1998).

As Table 3.9-2 shows, Shasta County is currently not in attainment with the state standards for ozone and PM_{10}. The current status for the federal 1-hour and 8-hour ozone standard and PM_{10} is unclassified/attainment.

TABLE 3.9-2
Ambient Air Quality Standards Attainment Status for Shasta County
Redding Basin Water Resources Management Plan EIR

Pollutant	Shasta County
State	
Ozone	Nonattainment
PM_{10}	Nonattainment
CO	Unclassified
Federal	
Ozone (1-hour standard)	Unclassified/Attainment
Ozone (8-hour standard)	Unclassified/Attainment
PM_{10}	Unclassified/Attainment
CO	Unclassified

Source: CARB, 2002

3.9.2 Environmental Consequences/Environmental Impacts

3.9.2.1 Assessment Methodology

Project-related activities with the potential to contribute to air quality impacts include emissions from fuel combustion in construction equipment and fugitive dust from construction activities. Newly constructed wells would be powered by electricity. This analysis focuses on an estimate of the total mass emissions related to construction and operation of the proposed project.

Construction Activities. To estimate emissions from construction of the proposed project, lists of the types of construction equipment and estimates of the length of time the equipment would need to operate were developed based on experience with construction of similar facilities at other locations.

The following types of construction activities were evaluated:

- New well installation
- Facility improvements
- Electrical power distribution infrastructure development

Emission factors from CARB's URBEMIS 2002 model (Version 7.4.1; Jones & Stokes Associates, 2003), the South Coast Air Quality Management District *California Environmental Quality Act Air Quality Handbook (*1993), and the SMAQMD *Roadway Construction Emissions Model, Revised Version 5.1* (SMAQMD, 2003) were used to estimate fugitive dust and exhaust emissions associated with operation of the construction equipment.

Construction equipment use was estimated from a schedule of tasks for each type of construction activity. Specific construction information used to calculate average daily emissions, in pounds per day (lb/day), included the following:

- The fuel type, and the number and type of construction equipment to be used
- Equipment use rates (hours per day, days per construction activity)
- The number of workers on site during a typical peak construction day
- The maximum acreage under construction or disturbed on a typical peak day
- Vehicle miles traveled by dump trucks, tractor trailers, water trucks, and workers

In addition, fugitive dust sources were evaluated, including grading and excavation, entrained dust from travel on paved and unpaved roads, trenching operations, and other types of soil disturbance.

Construction emissions were estimated in terms of average lb/day for each of the three types of construction activities. Average daily emissions were multiplied by the activity duration (in days) to evaluate emissions per construction activity. To calculate annual emissions for each county, assumptions were made about the number of construction activities, by type, which could reasonably occur per year in a given county. Emissions for these activities were summed and converted to annual emissions in tons per year.

General Conformity Applicability. The proposed project might involve federal funding, and as a result, is subject to general conformity requirements. Applicable only in areas designated as nonattainment or maintenance for NAAQS, the general conformity rule prohibits any federal action that does not conform to the applicable air quality attainment plan or State Implementation Plan for Clean Air Act nonattainment areas. General conformity applicability analysis requires quantification of construction and operation emissions for the federal action or project, and comparison of these emission levels to baseline emission levels. If the differences in emissions (i.e., the net emissions associated with the proposed project) exceed the general conformity de minimis levels for the peak year or any milestone year for attainment of standards, additional general conformity determination is required. As indicated previously, a federal action or project is exempt from the general conformity rule (presumed to conform) if the project-related emissions (construction and operation) are less than the de minimis thresholds established by the conformity rule, and are not regionally significant (greater than 10 percent of the regional emissions inventory).

Estimated net annual emissions for construction and operation of the proposed project have been summed and compared to the applicable de minimis thresholds and the nonattainment area emissions inventory.

3.9.2.2 Significance Criteria

Air quality impacts would be significant if implementation of the Plan would cause substantial adverse changes to the baseline (ambient) air quality conditions in the affected area.

Under CEQA, the significance of a project with respect to air quality is typically determined by whether total direct and indirect emissions from the project would do any of the following:

- Cause or contribute to any new violation of an ambient air quality standard
- Increase the frequency or severity of any existing violation of an ambient air quality standard
- Delay timely attainment of any standard, required interim emissions reductions, or other milestones, including emission levels specified in an applicable State Implementation Plan or Air Quality Management Plan
- Cause a net increase in pollutant emissions that exceeds CAA general conformity de minimis thresholds
- Foster development of or establish land uses that interfere with the provisions in an applicable SIP or air quality management plan
- Emit toxic air contaminants in quantities that could cause a significant health risk
- Create objectionable odors affecting a substantial number of people

Shasta County has established significance criteria for operational impacts; however, there are no significance thresholds for construction impacts. Table 3.9-3 presents the operational significance criteria. Table 3.9-4 presents CAA general conformity de minimis thresholds.

TABLE 3.9-3
Shasta County Environmental Review Thresholds
Redding Basin Water Resources Management Plan EIR

	Environmental Review Guidelines	
Pollutant	**Level A[a] lb/day**	**Level B[a] lb/day**
ROG	80	137
NO_x	80	137
CO	N/A[b]	N/A[b]
PM_{10}	25	137
So_x	N/A[b]	N/A[b]
Pb	N/A[b]	N/A[b]

[a] If the project's indirect and areawide emissions are greater than Level A thresholds but less than Level B thresholds, appropriate Level A mitigation, as listed in the jurisdiction's Air Quality Element to the General Plan, should be implemented. If the emissions remain above Level B after applying all feasible mitigation measures, the project is considered to have a significant impact, and is thus subject to CEQA review under an EIR.

[b] Thresholds for these pollutants are not identified in the EIR.

Notes:

Pb = lead
lb/day = pounds per day

TABLE 3.9-4
General Conformity de Minimis Levels
Redding Basin Water Resources Management Plan EIR

Designation	de Minimis Level (tons per year)
Nonattainment Areas	
Ozone (volatile organic compound or NO_x)	
Serious nonattainment areas	50
Severe nonattainment areas (e.g. Yolo, Solano, South Sutter and Sacramento Counties)[a]	25
Extreme nonattainment areas	10
Other ozone nonattainment areas outside ozone transport region (e.g. Butte, Northern Sutter, and Yuba Counties) [a]	100
Marginal and moderate nonattainment areas inside an ozone transport region	
ROG	50
No_x	100
CO, all nonattainment areas	100
SO_2 or NO_2, all nonattainment areas	100
PM_{10}	
Moderate nonattainment areas (e.g., Sacramento County) [a]	100
Serious nonattainment areas	70
Maintenance Areas	
Ozone (NO_x), SO_2, or NO_2, all maintenance areas	100
Ozone (volatile organic compound)	
Maintenance areas inside an ozone transport region	50
Maintenance areas outside an ozone transport region	100
CO, all maintenance areas	100
PM_{10}, all maintenance areas	100

Source: 40 CFR 93.153(b)(1) and (2)
[a] Applicable to the Short-Term Program area.

3.9.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under the No Project Alternative, the Basin would continue to implement its current water management program. Current conditions would not change under the No Project Alternative, therefore, there would be no impacts.

3.9.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

3.9.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 2, there would be no operational impacts during the baseline year. Operational impacts would be the same as baseline conditions (No Project Alternative).

3.9.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no construction in 2005; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 3, there would be no operational impacts in 2005. Operational impacts would be the same as baseline conditions (No Project Alternative).

3.9.2.7 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, there would be no construction; therefore, there would be no construction impacts.

Operational Impacts. Under the No Project Alternative, the Basin would continue to implement its current water management program. Water measurement, operational spills, groundwater use, and reuse occurring each year and the resulting impact to air quality would remain the same as existing conditions and would vary by year type.

3.9.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. The following discussion focuses on the specific impacts of implementing groundwater wells. The discussion relates exclusively to impacts occurring in Shasta County (project area).

Table 3.9-5 lists annual emissions estimates for construction activities associated with this alternative within SCAQMD. Construction impacts resulting from implementation of the alternative could result in an increase in PM_{10} emissions. The majority of the emissions would be fugitive dust resulting from ground disturbance associated with construction.

TABLE 3.9-5
Construction Emissions Estimates – Alternative 1
Redding Basin Water Resources Management Plan EIR

	Project – Unmitigated							
	NO_x		PM_{10}		CO		ROG	
Project Type	**lb/day**	**ton/yr**	**lb/day**	**ton/yr**	**lb/day**	**ton/yr**	**lb/day**	**ton/yr**
Well Installation Emissions	44.1	2.6	45.4	2.7	49.3	3.0	6.1	0.4
Power Distribution Infrastructure Development (1/4 mile of Trenching and Line Installation)	6.2	0.1	15.3	0.3	7.5	0.1	0.8	0
Total	50.3	2.7	60.7	3	56.8	3.1	6.9	0.4

Emission sources would include vehicles and construction equipment traveling over dirt surfaces, site clearing, and windblown dust. Phased well installation over a wide geographic area would result in temporary, localized impacts at less-than-significant levels.

Exhaust from diesel and gasoline-powered vehicles contains CO, ROG, NO_x, SO, and PM_{10}. Vehicle emissions from onsite construction equipment could temporarily increase emissions within the project area, however, the impact would be less than significant.

Operational Impacts. The wells associated with this alternative would be newly installed wells. The newly installed wells would be electrically powered and would not generate associated emissions in the project area; therefore, operation of the proposed action would not be considered to have impact on air quality.

Project related emissions (construction and operational emissions) would not exceed General Conformity de minimus levels and are therefore less than significant.

3.9.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. The following discussion focuses on the specific impacts of implementing surface water system improvements. The discussion relates exclusively to impacts occurring in Shasta County.

Table 3.9-6 lists annual emissions estimates for construction activities within SCAQMD. Construction impacts resulting from implementation of the alternative could result in an increase in PM_{10} emissions. The majority of the emissions would be fugitive dust resulting from ground disturbance during construction. Emission sources would include vehicles and construction equipment traveling over dirt surfaces, site clearing, and windblown dust. Phased well installation over a wide geographic area would result in temporary, localized impacts at less-than-significant levels.

TABLE 3.9-6
Construction Emissions Estimates – Alternative 2
Redding Basin Water Resources Management Plan EIR

	Project – Unmitigated							
	NO_x		PM_{10}		CO		ROG	
Project Type	**lb/day**	**ton/yr**	**lb/day**	**ton/yr**	**lb/day**	**ton/yr**	**lb/day**	**ton/yr**
System Improvement Emissions	173.3	72.4	59.8	25.0	167.0	69.8	21.7	9.1

Exhaust from diesel and gasoline-powered vehicles contains CO, ROG, NO_x, SO, and PM_{10}. Vehicle emissions from onsite construction equipment could temporarily increase emissions within the project area, however, the impact would be less than significant.

Operational Impacts. There would be no operational impacts associated with Alternative 2.

Project-related emissions (construction and operational emissions) would not exceed General Conformity de minimis levels and are, therefore, less than significant.

3.9.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Annual emissions estimates for construction activities associated with Alternative 3 would be the total emissions associated with Alternatives 1 and 2 and are presented in Table 3.9-7.

TABLE 3.9-7
Construction Emissions Estimates – Alternative 3
Redding Basin Water Resources Management Plan EIR

	Project – Unmitigated							
	NO_x		PM_{10}		CO		ROG	
Project Type	**lb/day**	**ton/yr**	**lb/day**	**Ton/yr**	**lb/day**	**ton/yr**	**lb/day**	**ton/yr**
Total	223.6	75.1	120.5	28	223.8	72.9	28.6	9.5

Temporary construction impacts from this alternative could cause an increase in PM_{10} emissions. The majority of the emissions would be fugitive dust resulting from ground disturbance associated with construction. Emission sources would include vehicles and construction equipment traveling over dirt surfaces, site clearing, grading, cut and fill operations, and windblown dust.

Exhaust from diesel and gasoline-powered vehicles contains CO, ROG, NO_x, SO, and PM_{10}. Vehicle emissions from onsite construction equipment could temporarily increase emissions within the project area, however, the impact would be less than significant.

Project related emissions (construction and operational emissions) would not exceed General Conformity de minimus levels and are therefore less than significant.

3.9.2.11 Operational Impacts on Air Quality

Operation impacts associated with the combined use alternative would be identical to those addressed in Alternatives 1 and 2.

3.9.3 Mitigation Measures

Although impacts associated with construction activities would be less than significant, implementation of the following BMPs would reduce nuisance dust emissions resulting from construction activities:

- Active construction areas would be watered daily, as necessary.
- Dust-producing activities would be suspended when high winds create substantial construction-induced visible dust plumes moving beyond the site in spite of dust control measures.
- Trucks hauling soil and other loose material would be covered, as necessary.
- Soil stabilizers, such as paving, watering, or gravel, would be applied to unpaved roads and staging areas at construction sites.
- Roads would be swept, as necessary, if visible soil material is carried onto adjacent public streets near construction areas.

- Stockpiles would be covered or applied with a soil stabilizer when necessary.
- Traffic speeds would be limited to 15 miles per hour on unpaved roads.
- Vehicle and equipment idling would be limited to the greatest extent practicable.
- Construction activities and the delivery and/or hauling of project-related materials would be organized to maximize productivity and reduce truck and vehicle trips to the fullest extent practicable.

3.9.4 References

California Air Resources Board (CARB). 2003a. Ambient Air Quality Standards Chart (California and Federal). http://www.arb.ca.gov/aqs/aqs.htm. July.

Jones & Stokes Associates. 2003. California Air Resources Board (CARB). 2003. URBEMIS 2002, Version 7.4.1. Jones & Stokes Associates.

Shasta County Department of Resource Management, Planning Division. Shasta County General Plan. October 1998.

Shasta County. 2003. Environmental Review Guidelines, Procedures from Implementing the California Environmental Quality Act, Air Quality Management District. November.

State of California Air Resources Board, online information http://www.arb.ca.gov/homepage.htm, 2002.

U.S. Environmental Protection Agency (EPA). 1970. Clean Air Act. Amended 1990.

3.10 Noise

The affected environment for noise encompasses the proposed project areas in relation to the Plan's proposed groundwater wells and surface-water system improvement projects. For this analysis, the area of potential effect is generally defined by the number and nature of sensitive receptors that could be affected by noise generated from project implementation. Sensitive receptors for noise can be defined as people at locations or participating in activities for whom low noise levels are important (e.g., residences, hospitals, school libraries, and places of religious worship).

3.10.1 Affected Environment/Existing Conditions

3.10.1.1 Fundamentals of Acoustics

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Noise can be measured in several ways depending on the source of the noise, the receiver, and the reason for the noise measurement.

In this subsection, some statistical noise levels are stated in terms of decibels on the A-weighted scale (dBA). Noise levels stated in terms of dBA reflect the response of the human ear by filtering out some of the noise in the low- and high-frequency ranges that the ear does not detect well. The A-weighted scale is used in most ordinances and standards. The equivalent sound pressure level (L_{eq}) is defined as the average noise level, on an energy basis, for a stated time (such as hourly).

In practice, the level of a sound source is conveniently measured using a sound-level meter that includes an electrical filter corresponding to the A-weighted curve. The sound-level meter also performs the calculations required to determine the L_{eq} for the measurement period. The following measurements relate to the noise level distribution during the measurement period: The L_{90} is a measurement that represents the noise level exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

3.10.1.2 Effects of Noise

The effects of noise on people fall into the following three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with such activities as speech, sleep, and learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial settings or at construction sites might experience noise effects in the third category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily a result of the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to a new noise is by comparing it with the existing or "ambient" environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual (California Energy Commission, 2001).

Table 3.10-1 lists noise levels typical of construction equipment. Topography, vegetation, and atmospheric conditions may reduce noise levels. These noise reductions were not included in the analysis; therefore, the noise-level estimates provided in Table 3.10-1 should be viewed as conservative.

TABLE 3.10-1
Typical Industrial Facility Construction Equipment Noise Levels (dBA-L_{eq})
Redding Basin Water Resources Management Plan EIR

		Noise Level for Specified Equipment Type			
Construction Phase	**Noisiest Equipment Type**	**100 feet**	**250 feet**	**500 feet**	**1,000 feet**
Ground Clearing	Truck	85	77	71	65
	Scraper	82	74	68	62
Excavation	Truck	85	77	71	65
	Backhoe	79	71	65	59
Foundation	Truck	85	77	71	65
	Concrete Mixer	79	71	65	59
Building Erection	Truck	85	77	71	65
	Crane	82	74	68	62
Pipeline	Truck	85	77	71	65
	Crane	82	74	68	62

Source: EPA, 1971.

3.10.1.3 Noise Standards

The proposed project is primarily located in rural portions of Shasta County, with some portions of the project area extending into the Cities of Redding and Anderson. The vicinity of the proposed project is generally characterized by scattered, single-family residences, and agricultural, industrial, and gravel mining development. Relevant noise standards are contained within the Noise Elements of the Shasta County. These standards were used to determine whether the project would result in significant noise impacts and whether noise mitigation measures would be required.

Shasta County. The primary purpose of the Noise Element included in the Shasta County General Plan (Shasta County, 2004) is to serve as a directive along with the land use element in developing a noise-compatible land use pattern for Shasta County. The General Plan identifies potential noise conflicts between various land uses and noise sources. Standards for determining potential noise conflicts are based on a 24-hour average L_{eq} descriptor.

The Noise Element identifies fixed noise sources, or stationary noise, as being a result of industrial processes and can produce noise that affects adjacent sensitive land uses. These noise sources might contain tonal components that might affect individuals who live nearby. Fixed noise sources might vary depending on existing ambient noise levels, climatic conditions, or the time of day. Examples of fixed noise sources include pump stations, generators, transformers, and conveyor systems. According to the General Plan, fixed noise control issues focus on the following goals:

- To prevent the introduction of new noise-producing uses in noise-sensitive areas
- To prevent encroachment of noise-sensitive uses on existing noise-producing facilities

These goals can be achieved by applying noise-level standards and requiring that new noise-sensitive uses, near noise-producing facilities, include mitigation measures to comply with noise performance standards. A noise level of 50 dB is the base criterion for examining fixed noise sources. This criterion reflects an interior noise environment of 35 dB. The typical noise reduction inside a residence with the windows partially open is 15 dB.

The General Plan lists noise-level performance standards for new projects affected by or including non-transportation sources at 55 dB during the daytime (7:00 a.m. to 10:00 p.m.) and 50 dB during the nighttime (10:00 p.m. to 7:00 a.m.). According to the General Plan, Shasta County could impose more restrictive noise-level standards by determining existing ambient noise levels. The exterior noise-level standard, in a rural area where large lots exist, would be applied 100 feet away from any residence (Shasta County, 2004).

The most consistent sources of noise affecting the area surrounding the proposed project sites would be traffic, and industrial and agriculture equipment. Highway 273 runs from approximately 375 to 4,500 feet east of the proposed canal lining locations. The well study area overlies portions of both Highway 273 and Interstate 5 within the City of Anderson (see Figure 2-1).

During a site study conducted July 5, 2005, the noise affecting the proposed project sites was consistently that of traffic in the more incorporated areas of the proposed project. This included proposed canal lining A, located adjacent to Clear Creek Road. Clear Creek Road carries a moderate amount of traffic, which is primarily industrial because of gravel mining operations to the west of the proposed canal lining. Proposed canal lining B (north section) is within a residential area, with few noise-generating sources. Proposed canal lining B (south section) receives noise from Highway 273 to the east of the canal and Wards Concrete to the west of the canal. The southernmost proposed canal lining C is within a residential area with few noise sources noted during the time of the survey.

A proposed well location within the City of Anderson lies adjacent to Ferry Street, which appears to receive a moderate amount of noise from residential and industrial traffic. A second proposed well location, approximately 100 feet from Interstate 5, receives the highest level of noise noted during the site study. The majority of the remaining proposed well sites are located south of the City of Anderson within rural portions of Shasta County. Although no trains were noted during the hours of the site survey, a railroad track runs adjacent to Locust Street, along which several of the proposed well sites are located.

ACID owns a 50-foot right-of-way on either side of the Main Canal, for the entire length of the Main Canal. ACID owns a 30- to 40-foot right-of-way on the laterals off of the Main Canal, depending on the location of the lateral. ACID also owns a 30- to 50-foot right-of-way on either side of the Churn Creek Lateral. During the site survey, the nearest noise-sensitive receivers observed were residences located at various distances from the project sites. Several proposed canal lining locations and lateral improvements revealed residences directly adjacent to the 50-foot Main Canal. These residences would likely be the most sensitive receptors to construction or operational noise resulting from implementation of the proposed project.

3.10.2 Environmental Consequences/Environmental Impacts

3.10.2.1 Methodology

Noise is defined as unwanted sound. Airborne sound is rapid fluctuation of air pressure above and below atmospheric pressure. Noise is measured in different ways depending on the source of the noise, the receiver, and the reason for the noise measurement. Noise levels stated in terms of dBA reflect the response of the human ear by filtering out some of the noise in the low and high-frequency ranges that the ear does not detect well. The A-weighted scale is used in most ordinances and standards.

3.10.2.2 Significance Criteria

Standard of significance were not identified for long-term project-related noise sources because noise levels associated with project operation are anticipated to be minimal.

Standards of significance were identified for short-term noise level increase caused by project construction. While the Shasta County General Plan Shasta County does not specifically regulate construction noise, it was used as the standard of significance because the construction sites would be located in the unincorporated areas of Shasta County. The following policy statements are applicable to development of the project:

- New development of noise sensitive uses shall not be allowed where the noise level due to non-transportation noise sources will exceed the noise level standards of; Daytime 7 a.m. to 10 p.m. 55 L_{eq} dB Nighttime 10 p.m. to 7 a.m. 45 L_{eq} dB, as measured immediately within the property line or within a designated outdoor activity area (at the discretion of the Planning Director) of the new development unless effective noise mitigation measures have been incorporated into the development design to achieve the standards specified above.
- Noise generated from agricultural operations conducted in accordance with accepted standards and practices is not required to be mitigated.
- Generally acceptable noise levels for agriculture and utilities ranges from 55 day-night average sound level or community noise equivalent level, dB to 70 day-night average sound level or community noise equivalent level, dB.

3.10.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under the No Project Alternative, surface-water and groundwater facilities would continue to operate in the same manner as under current conditions.

3.10.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, operating conditions could change. In normal water years, the common pool and the TRF would not be implemented. During drought conditions, the common pool and the TRF would be implemented; however, this would not create new noise-related impacts.

3.10.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 2, operating conditions and impacts would be the same as under Alternative 1.

3.10.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 3, the combined water projects would have the same operational impacts as identified in Alternatives 1 and 2.

3.10.2.7 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, no construction would occur.

Operational Impacts. Under the No Project Alternative, surface water and groundwater facilities operate in the same manner as under current conditions.

3.10.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Under Alternative 1, well construction near sensitive receptors (e.g., hospitals, nursing homes, and schools) would be avoided through siting of wells. Vehicle traffic and construction equipment associated with construction of new wells, conveyance structures, and utility and maintenance rights-of-way might temporarily increase ambient noise levels near residences within the proposed project area. The primary source of construction noise would be from drilling rigs associated with well installation. The noise impacts from construction would be temporary, localized, and occur only during daytime hours; therefore, noise impacts would be less than significant.

Operational Impacts. The proposed wells would be electrically powered; therefore, the only audible noise would be the well motor. The level of noise associated with the proposed wells would be less than Shasta County daytime and nighttime standards. The proposed wells would be operated mostly during the dry years and only during the summer. Impacts from operation of the wells would be less than significant.

Under Alternative 1, the new wells, conveyance structures, utilities, and access roads would require periodic inspection, maintenance, and possibly repair. Inspections and repairs would occur during the hours of 7 a.m. to 7 p.m., and would not exceed the noise performance standards; the impact on noise levels is to be less than significant.

Under Alternative 1, operating conditions could change. During drought conditions, the common pool and the TRF would be implemented. Noise impacts would not be associated with the common pool and TRF.

3.10.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Under Alternative 2, construction noise impacts associated with lining of the canal sections would be similar to those described for Alternative 1, with the primary difference being the types of construction equipment used and the larger number of construction vehicles used for installation. The noise impacts from construction would be temporary, localized, and occur only during daytime hours; therefore, noise impacts would be less than significant.

Operational Impacts. Under Alternative 2, no significant noise-related impacts are anticipated from operation of the lined portions of the ACID canal.

Under Alternative 2, canal improvements would require periodic inspection, maintenance, and possibly repair. Inspections and repairs would occur during the hours of 7 a.m. to 7 p.m., and would not exceed the noise performance standards; the impact on noise levels would be less than significant.

Under Alternative 2, operating conditions could change. During drought conditions, the common pool and the TRF would be implemented. Noise impacts would not be associated with the common pool and TRF.

3.10.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Under Alternative 3, the combined water projects would have identical construction impacts as identified in Alternatives 1 and 2.

Operational Impacts. Under Alternative 3, the combined water projects would have identical operational impacts as identified in Alternatives 1 and 2.

3.10.3 Mitigation Measures

No significant impacts have been identified; therefore, no mitigation is required.

3.10.4 References

Beranek, L.L. 1988. *Noise and Vibration Control*. Institute of Noise Control Engineering. McGraw Hill.

California Department of Health Services. 1976.

California Energy Commission. 2001. Presiding Members Proposed Decision – Metcalf Energy Center.

Kryter, Karl D. 1970. *The Effects of Noise on Man.* NY: Academic Press.

Peterson, Arnold P.G. and Ervin E. Gross, Jr. 1974. *Handbook of Noise Measurement*, Seventh edition. Concord, MA: GenRad.

Shasta County. 2004. *General Plan, Noise Element*. Amended through September.

U.S. Environmental Protection Agency (EPA). 1971. *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*

3.11 Indian Trust Assets

Potential impacts to Indian Trust Assets (ITA) stem from actions or activities that would affect Indian Trust land and federally reserved hunting, fishing, gathering, water, or other rights. ITAs could be indirectly affected by a change in water operations that affect Indian Trust lands. No potentially significant impacts are anticipated to result from implementing any system improvements.

3.11.1 Affected Environment/Existing Conditions

3.11.1.1 Area of Analysis

The Basin was evaluated for ITA resources. The northernmost indigenous California people in the Plan area were primarily Wintu, with a small portion of Yana. However, Yanas are dispersed throughout the various tribes within the Sacramento Valley. Descendants of these tribes live on the Redding and Roaring Creek Rancherias in Shasta County. Shasta County also has 15 public-domain allotments that are lands held in trust of individual Indians.

3.11.1.2 Regulatory Setting

ITAs are legal interests in property held in trust by the United States for federally recognized Indian tribes or individual Indians. Land assets held in trust for individual Indians are more specifically referred to as allotted land. An Indian trust has three components: (1) the trustee, (2) the beneficiary, and (3) the trust asset. ITAs can include lands; minerals; federally reserved hunting and fishing rights; federally reserved water rights; and in-stream flows associated with a reservation, rancheria, or individual allotment. Beneficiaries of the Indian trust relationship are federally recognized Indian tribes and individual Indians with trust land; the United States is the trustee.

By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval from the United States government or one of its executive agencies. The definition and application of the United States trust relationship has been defined by case law that supports congressional acts, executive orders, and historical treaty provisions. Cultural resources are not generally considered ITAs.

Consistent with President Clinton's April 29, 1994 memorandum, agencies assess the impact of programs on tribal trust resources and tribal governmental rights and concerns. Agencies must actively engage federally recognized tribal governments and consult with such tribes on a government-to-government level before taking actions that affect those governments. The Department of the Interior's Department Manual, Part 512, Chapter 2 (Departmental Responsibilities for Indian Trust Resources) ascribes the responsibility for ensuring protection and preservation of ITAs from loss, damage, and unlawful alienation, waste, and depletion to the heads of Interior Bureaus and Offices.

The Department of Interior's policy is to carry out activities in a manner that protects ITAs and avoids adverse impacts whenever possible (Reclamation ITA Policy, July 2, 1993).

3.11.2 Environmental Consequences/Environmental Impacts

3.11.2.1 Methodology

Sources from Reclamation's Office of Native American Affairs were used to determine the presence of Federally Recognized Tribes near the Basin or tribes that might be interested in the Plan. ITAs present on tribal lands were then evaluated in terms of the potential impacts on those resources from construction or operation of the project alternatives. The distances to trust lands were measured on maps from potential construction sites.

3.11.2.2 Significance Criteria

An impact is potentially significant if implementation of the Plan would adversely affect ITA. Direct impacts are those that result from the pumping of groundwater. The following impacts would be significant:

- Substantially interfere with the exercise of a federally reserved water right
- Degrade water quality on trust land, or where there is a federally reserved water right
- Adversely affect the health of a tribe by decreasing tribal water supplies on trust lands
- Substantially interfere with the use, occupancy, or character of Indian Trust lands by decreasing groundwater tables
- Adversely affect fish, vegetation, and wildlife on trust lands or where there is a federally reserved hunting, gathering, or fishing rights

3.11.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under the No Project Alternative, the ongoing water management actions would not change and would continue to respect the integrity of ITA.

3.11.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF. Land use, biological resources, and water resources would not be impacted; therefore, potential ITA assets in the project vicinity would not be impacted.

3.11.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 2, operating conditions would change with implementation of the common pool and the TRF. Land use, biological resources, and water resources would not be impacted; therefore potential ITA assets in the project vicinity would not be impacted.

3.11.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 3, operating conditions would change with implementation of the common pool and the TRF. Land use, biological resources, and water resources would not be impacted; therefore, potential ITA assets in the project vicinity would not be impacted.

3.11.2.7 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, the proposed project would not be constructed; therefore, there would be no construction-related impacts to ITA.

Operational Impacts. Under the No Action Alternative, the ongoing water management actions would not change and would continue to respect the ITA resources.

3.11.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Under Alternative 1, ITA resources could be affected if construction occurred on Indian Trust lands. However, no ITA resources were identified on proposed well sites, therefore no impacts would occur.

Operational Impacts. Implementation of Alternative 1 could result in increased depth to groundwater near the proposed wells. The proposed wells would be located approximately 12 miles south of the nearest Trust Resource, the Redding Rancheria. At this distance, there would not be a measurable effect from well operation; therefore, any impact to ITA is less than significant.

Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF, as needed to respond to drought conditions. These operations would not affect ITA resources.

3.11.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Under Alternative 2, ITA resources could be affected if construction occurred on Indian Trust lands. However, no ITA resources were identified on proposed lining or pipeline sites; therefore, no impacts would occur.

Operational Impacts. Implementation of Alternative 2 could result in increased depth to groundwater in the vicinity of the canal and lateral improvements. One section of Main Canal lining is proposed for a location approximately 1 mile from the nearest Trust Resource, the Redding Rancheria. At this distance, there would not be a measurable effect on Redding Rancheria operations; therefore, any impact to ITA is less than significant.

The common pool and the TRF would be implemented during drought conditions. Implementation would not impact ITA, and no mitigation measures would be required.

3.11.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. The ITA impacts associated with Alternative 1 and 2 would be identical to those under Alternative 3.

Operational Impacts. The ITA impacts associated with Alternative 1 and 2 would be identical to those under Alternative 3.

3.11.3 Mitigation Measures

No significant impacts have been identified; therefore, no mitigation is required.

3.11.4 References

Clinton, William. 1994. "Government-to-Government Relations with Native American Tribal Governments." Presidential Memorandum issued on April 29. *Federal Register* 59, No. 85. May.

U.S. Department of the Interior, Bureau of Reclamation. 2000. Public Review Draft National Environmental Policy Act Handbook, Indian Trust Policy. 2 July 1993, Washington, D.C.: U.S. Department of Interior.

U.S. Department of the Interior. 1995. "Departmental Responsibilities for Indian Trust Resources." Departmental Manual, Part 512, Chapter 2. http://elips.doi.gov/app_DM/index.cfm?fuseaction=home. Accessed March 2005.

3.12 Environmental Justice

The concept of environmental justice embraces the following two principles:

1. Fair treatment of all people regardless of race, color, nation of origin, or income
2. Meaningful involvement of people in communities potentially affected by program actions

Executive Order 12898, Section 2-2, signed by President Clinton in 1994, requires all federal agencies to conduct "programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color or national origin." Section 1-101 requires federal agencies to identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects" of programs on minority and low-income populations (Executive Order No. 12898, 1994).

California government code Section 65040.12 (c) defines environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws and policies."

The Plan includes water management through surface-water and groundwater planning projects. Construction of some projects could temporarily result in beneficial impacts on local labor employment and economy (including construction supply companies, equipment operators, and related businesses). The construction industry employs wage earners of all income levels and of all ethnic compositions.

Eighty-one percent of all California farm workers 1997 through 1998 were foreign-born; 95 percent were born in Mexico. In the 1990s, approximately 52 percent of all California farm workers were married; however, the majority of these families had incomes below the poverty level. The individual median annual income is less than $7,500, with real income having declined more than 11 percent in the last decade. Average wages for California farm workers are almost 50 percent less than average hourly wages for non-farm, private sector workers. The median level of educational achievement for these farm workers is sixth grade (U.S. Department of Labor, 2000). These farm workers typically were employed on large production farms. The Basin's major agricultural lands include pastureland with some orchard, and fruit and vegetable hobby farms; therefore, Basin's agricultural lands would not include a large portion of California farm workers.

These identifying factors place these workers into a low-income, minority group that is considered to represent the environmental justice community, a community that can potentially bear the greatest burden (or share in the benefits) of a given project's impacts.

3.12.1 Affected Environment/Existing Conditions

The proposed project area consists of the Basin, which sustains a variety of lifestyles. The proposed projects would include minor construction in Shasta County; therefore, discussion will focus on Shasta County. The City of Redding is the closest major urban area located in the proposed project area.

Table 3.12-1 provides a general description of the ethnic compositions, unemployment, and poverty rates occurring in Shasta and Tehama Counties and the City of Redding as compared to California.

TABLE 3.12-1
Percentages of Ethnicities in Shasta and Tehama Counties and the City of Redding, 2000
Redding Basin Water Resources Management Plan EIR

Study Composition	White Persons	Black or African American Persons	American Indian and Alaskan Native Persons	Asian Persons	Native Hawaiians and Other Pacific Islanders	Persons of Hispanic or Latino Origin
Shasta County	89.3	0.8	2.8	1.9	0.1	5.5
Tehama County	84.8	0.6	2.1	0.8	0.1	15.8
City of Redding	88.7	1.1	2.2	3.0	0.1	5.4
California	59.5	6.7	1.0	10.9	0.3	32.4

Source: U.S. Census Bureau, 2003.

Note: Values do not equal 100 percent because of multi-race reporting.

Table 3.12-2 lists the median household income and percentage of people living below poverty level, for Shasta and Tehama Counties and the City of Redding as compared to California.

TABLE 3.12-2
Income and Poverty Rates for Shasta and Tehama Counties and the City of Redding, 1999
Redding Basin Water Resources Management Plan EIR

Study Composition	Median Household Income	Percentage of Persons Living below Poverty Level[a]
Shasta County	$34,335	15.4%
Tehama County	$31,206	17.3%
City of Redding	$34,194	15.6%
California	$47,493	14.2%

[a]Families and persons are classified as below poverty if their total family income or unrelated individual income was less than the poverty threshold specified for the applicable family size, age of householder, and number of related children under 18 present.

Source: U.S. Census Bureau, 2003.,

3.12.2 Environment Consequences/Environmental Impacts

3.12.2.1 Methodology

The analysis of environmental justice impacts examines the extent to which each alternative would adversely impact or benefit a local economy and how these adverse impacts and benefits might affect different socioeconomic groups.

3.12.2.2 Significance Criteria

The following factors were considered in evaluating the environmental justice impacts of implementing the Plan:

- Whether there is or would be a direct or cumulative impact on the natural or physical environment that would result in a proportionately high or adverse impact on a minority or low-income population
- Whether that impact on the natural or physical environment would result in an impact on minority or low-income population that is disproportionately high, considering the population levels or income levels of all affected groups

3.12.2.3 No Project Alternative (CEQA Baseline for 2005)

Construction Impacts. Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under No Project Alternative current operations would continue and would, therefore, have no bearing on current farm labor employment trends or other worker or population groups in Shasta and Tehama counties. No mitigation measures would be required.

3.12.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, operating conditions could change. In normal water years, the common pool and the TRF would not be implemented and changes to current conditions would not result. During drought conditions, the common pool and the TRF would be implemented and depending on how M&I and agricultural water users would manage their operations to reduce water consumption to meet the TRF. For example, farm workers could be affected by becoming unemployed if fields were fallowed or if crops were switched to those that could be grown with less water and less labor. However, effects are anticipated to be temporary, lasting only until normal water deliveries resume; therefore, impacts to farm workers and environmental justice are less than significant.

3.12.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 2, operational impacts affecting environmental justice considerations would be the same as under Alternative 1.

3.12.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 3, operational impacts affecting environmental justice considerations would be the same as under Alternatives 1 and 2.

3.12.2.7 No Action Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Action Alternative, construction activities would not be conducted and environmental justice impacts would not result.

Operational Impacts. The No Action Alternative potentially could affect future farm labor employment trends in Shasta and Tehama counties. A reliable agricultural water supply is necessary to sustain or increase agricultural production. Depending on how M&I and agricultural water users would manage their operations to reduce water consumption in drought years, low income workers could be affected. For example, farm workers could be affected by becoming unemployed if fields were fallowed or if crops were switched to those that could be grown with less water and less labor. Effects, however, are anticipated to be temporary, lasting only until normal water deliveries resume; therefore, impacts to farm workers and environmental justice are less than significant.

Reduced liability in water deliveries could encourage farmer to sell their land to developers. The conversion of farm land to industrial or residential developments would reduce the need for farm workers and potentially add them permanently to the pool of unemployed, a potentially significant impact.

3.12.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Alternative 1 could result in temporary construction employment opportunities for workers, resulting in a beneficial impact. Small amounts of land would be permanently or temporarily removed from agricultural production (see Section 3.1 Land Use and Planning). The impact of the loss of agricultural land on farm labor is negligible. The impacts on environmental justice considerations resulting from construction-related activities are expected to be positive.

Potentially, there could be temporary, indirect environmental justice impacts during construction activities (e.g. fugitive dust, noise, and stormwater runoff) that affect rural homes. These impacts would be minimized or eliminated by implementing BMPs (as discussed in Sections 3.5 Water Resources, 3.9 Air Quality Resources, and 3.10 Noise) and reduced to less-than-significant levels.

Operational Impacts. Alternative 1 would result in increased well maintenance, and potentially additional maintenance requirements could create new job opportunities which is a beneficial impact.

No adverse impacts on agricultural-related employment is anticipated as the alternative is designed to maintain current M&I and agricultural practices. Implementation of the common pool and TRF would have impacts as described for implementation of Alternative 1 in 2005.

3.12.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Alternative 2 could result in temporary construction employment opportunities for workers, resulting in a beneficial impact. The impacts on environmental justice considerations resulting from construction-related activities are expected to be positive.

Temporary impacts to environmental justice, e.g., to rural homes, is as described for construction activities under Alternative 1 - 2030.

Operational Impacts. Operation of the lined canals would not create or eliminate jobs. No adverse impacts to agricultural employment are anticipated as the alternative is designed to maintain current M&I and agricultural practices.

Implementation of the common pool and TRF would have impacts as described for implementation of Alternative 1 in 2005.

3.12.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Under Alternative 3, construction impacts affecting environmental justice considerations would be the same as under Alternative 1.

Operational Impacts. Under Alternative 3, operational impacts affecting environmental justice considerations would be the same as under Alternatives 1.

3.12.3 Mitigation Measures

No significant impacts have been identified; therefore, no mitigation is required.

3.12.4 References

U.S. Census Bureau. 2003. State and County QuickFacts. Data derived from Population Estimates, 2000 Census of Population and Housing, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates, County Business Patterns, 1997 Economic Census, Minority- and Women-Owned Business, Building Permits, Consolidated Federal Funds Report, 1997 Census of Governments. http://quickfacts.census.gov/qfd/states/06000.html

U.S. Department of Labor. 2005. Findings from the National Agricultural Workers Survey (NAWS) 2001 – 2002: A Demographic Employment Profile of United States Farm Workers. March.

3.13 Growth-inducing Impacts

The Plan would be implemented throughout the Basin study area and would provide reliable water supplies to serve M&I and agricultural uses through the year 2030. Local governments for the Counties of Shasta and Tehama and various incorporated cities such as the Cities of Redding, Anderson, and Shasta Lake regulate land use within the Basin. Implementation of the Plan is not expected to result in growth-inducing impacts in the Basin.

3.13.1 Affected Environment/Existing Conditions

The Basin includes the south-central portions of Shasta County and a small portion of northern Tehama County. Land uses in the Basin vary and range from urban Redding to rural communities such as the Town of Cottonwood. The entire Basin is generally rural in character, with an economic base of service industry and agriculture.

3.13.2 Environmental Consequences/Environmental Impacts

3.13.2.1 Methodology

Section 15126.2(d) of CEQA Guidelines requires the following from an environmental document:

- Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth...

Furthermore, the section states that, "It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment." In other words, growth inducement should not automatically be considered adverse. Impacts on environmental resources resulting from growth might be too far removed from the actions of the lead agency or ultimate retail water delivery agency to require mitigation. The goal of the EIR in this regard is disclosure.

NEPA, in 40 CFR Section 1508.8(b), requires environmental documents to analyze indirect growth-inducing impacts, defined in the following way:

- Indirect effects shall include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

In general, an action would be growth inducing if it caused or contributed directly or indirectly to economic growth, population growth, or increase in population density, and includes indirect impacts such as changes in land use and related impacts on the environment beyond that which would have occurred otherwise from other factors. Thus, a growth-inducing action would promote or encourage growth beyond that which could be attributed to other factors known to have a relationship to economic or population growth. For operational impacts, this analysis looks at increases in water availability created by the Plan and discusses whether they would have a determinative impact on decisions related to permitting of land use changes; that is, whether new reliable supply created by the Plan would remove an impediment to growth.

Except where supply limitations have been identified as an impediment to development approvals, water supply reliability alone is not the determinative factor inducing growth in any region of California. Water supply reliability for urban population growth and development is taken into account to varying degrees by local planning agencies, in general plans of land use jurisdictions, and water supply master plans of water-serving organizations (water districts, irrigation districts, private utilities, and cities). The sophistication and complexity of this process has increased in the past decade as better predictive models for assessing demands and supply, and data available to these models have surfaced. Public attention has also focused on the recognition that water supply is one of the key factors to consider when planning new developments. Community planners, developers, industries, and others seeking to implement or realize urban growth in California are required to demonstrate that a reliable water supply exists under specified conditions.

Senate Bill 221 (Kuehl) and Senate Bill 610 (Costa), require local governments to prepare water supply assessments that look very closely at long-term water supply reliability, when approving land development projects consisting of more than 500 housing units (or their equivalent in demands for commercial and industrial projects). These requirements do not apply to infill housing. For small jurisdictions, projects representing a 10 percent increase in demand for water trigger the need for water supply assessments. Senate Bill 221 defines "sufficient water supply" as the "total water supplies available during normal, single-dry, and multiple-dry years within a 20-year projection that would meet the projected demand." The law does not speak, however, to levels of service, allowing local jurisdictions to define sufficiency in terms of how often and severe water shortages from droughts and other events can be. Therefore, one jurisdiction might conclude from its own perspective that a sufficient supply exists, while another, under exactly the same hydrologic conditions, might conclude otherwise.

The ultimate decision on water supply sufficiency in the context of land development approval rests with the land use jurisdiction and not the water supply entity, unless they are the same entity. Therefore, unless a local agency has imposed growth restrictions because of a water supply constraint, has specified a standard of reliability, and a new supply can be assessed against that standard, determining a specific growth-inducing impact because of the added supply is difficult without knowledge of facts surrounding specific development situations. There are areas within the state, such as the Monterey Peninsula, located along California's central coast and some within the SWP service areas, notably the Santa Clarita Valley in Southern California, where water supply is acting as a constraint in the development approval process. Where this occurs and where it could be determined that a new supply would relieve that constraint, growth inducement would occur.

The benchmark for analysis of the No Action/No Project and the Proposed Action/Proposed Project Alternatives, in terms of the impact of water supply on growth, is current conditions. Current conditions include meeting all current RAWC water quality objectives. The No Action/No Project benchmark, or baseline, assumes RAWC water quality objectives would continue to be maintained solely by the individual water purveyors and Reclamation.

3.13.2.2 Significance Criteria

Implementing the Plan could indirectly induce growth and could cause growth-related impacts if the new reliable water supply removed an impediment where water supply has been identified by a land use jurisdiction as an impediment to approval of urban or agricultural development.

3.13.2.3 No Project Alternative (CEQA Baseline for 2005)

Under the No Project Alternative, there would be no construction during the baseline year; therefore, there would be no construction impacts.

3.13.2.4 Alternative 1 – Conjunctive Use Alternative (2005)

Construction Impacts. Under Alternative 1, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions and to maintain current M&I and agricultural practices, thus not inducing growth.

3.13.2.5 Alternative 2 – Water Use Efficiency Alternative (2005)

Construction Impacts. Under Alternative 2, there would be no construction during the baseline year; therefore, there would be no construction impacts.

Operational Impacts. Under Alternative 1, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions and to maintain current M&I and agricultural practices, thus not inducing growth.

3.13.2.6 Alternative 3 – Combination Alternative (2005)

Construction Impacts. Under Alternative 3, there would be no construction in 2005; therefore, no environmental justice impacts would result from construction activities.

Operational Impacts. Under Alternative 3, operating conditions would change with implementation of the common pool and the TRF, as needed to ameliorate drought conditions, resulting in no change to land use.

3.13.2.7 No Project Alternative (NEPA Baseline for 2030)

Construction Impacts. Under the No Project Alternative, the proposed project would not be constructed; therefore, no impacts would result from construction activities. Under the No Project Alternative, projected growth in the Basin would be governed by the general plans for the following municipalities and counties:

- City of Shasta Lake
- City of Redding
- City of Anderson
- Shasta County
- Tehama County

Operational Impacts. Under normal water years, implementation of the No Project Alternative would result in a slight surplus of available water resources, and sufficient supplies could be delivered to M&I and agricultural users. Therefore, changes to growth-inducing effects are not anticipated to occur.

Under drought water years, implementation of the No Project Alternative would results in a deficit of available water resources, and supplies delivered to M&I and agricultural users might be insufficient. However, effects are anticipated to be temporary, lasting only until normal water deliveries resume; therefore, changes to growth-inducing effects are not anticipated to occur.

Growth is an issue addressed in applicable general plans consistent with projections from the DOF. It is anticipated that in the absence of a Plan, individual purveyors would be forced to respond to growth on an event by event basis. That is, each new connection would need to be assessed for its incremental effect on the overall water supply reliability for each purveyor. Theoretically, purveyors could develop new water supplies as needed, depending on available fund and approvals. However, many purveyors have limited access to water supplies and will likely focus on water transfers using existing facilities. Another consideration is the separation of land use planning and permitting approvals from the water supply function of purveyors. For example, some Bella Vista customers are located within the City of Redding political boundary, so a new subdivision could be approved by the City of Redding, but receive water from Bella Vista. Thus, it is possible that the orderly, planned growth anticipated in the general plans would be disrupted according to which purveyors have the most reliable water supplies, or by purveyors who do not adequately plan for growth and add connections at the risk of lower water supply reliability. Implementation of the Plan would provide water supply reliability for the Basin during drought years and concentrate land use responsibility in the designated planning agencies. No impacts would result from implementation of the Plan.

3.13.2.8 Alternative 1 – Conjunctive Use Alternative (2030)

Construction Impacts. Construction of the wells would provide job opportunities to workers and businesses in the region. However, installation of the wells would cost approximately $500,000, representing a small portion of the local economy, and would occur intermittently. Therefore, construction of the wells would not provide sufficient economic incentive to attract workers to the region and induce growth.

Operational Impacts. Implementation of the Plan would increase water supply reliability in response to projected growth, as noted in the general plans and based on DOF estimates. The Plan was developed in response to growth projections identified in the general plans and is anticipated to be implemented on an incremental basis, thus incrementally increasing the availability of water supplies over time to meet the needs of planned growth. Voluntary water use reduction measures (in response to the TRF) would be adopted by individual purveyors and water users to meet water demands. Implementation of the Plan would also allow for the planned and orderly growth anticipated in the general plans, rather than the potentially haphazard growth resulting from a lack of water supply planning. Because implementation of the project would meet the needs of planned growth only, it would not induce growth beyond levels anticipated in the general plans.

3.13.2.9 Alternative 2 – Water Use Efficiency Alternative (2030)

Construction Impacts. Lining canals would provide job opportunities to workers and businesses in the region. However, canal lining would cost approximately $500,000, representing a small portion of the local economy; therefore, would not provide sufficient economic incentive to attract workers to the region and induce growth.

Operational Impacts. Impacts potentially resulting from implementation of Alternative 2 would be identical to those described for Alternative 1.

3.13.2.10 Alternative 3 – Combination Alternative (2030)

Construction Impacts. Potential impacts resulting from construction associated with implementation of Alternative 3 would be as those described for Alternatives 1 and 2.

Operational Impacts. Potential impacts resulting from operation under implementation of Alternative 3 would be as those described for Alternatives 1 and 2.

3.13.3 Mitigation Measures

No significant impacts have been identified; therefore, no mitigation is required.

3.14 Irreversible and Irretrievable Commitments of Resources

NEPA Section 102(C)(v) (CEQ Regulations Part 1502.16) requires federal agencies to consider to the fullest extent possible any irreversible and irretrievable commitments of resources that would be involved in the proposed action, should it be implemented. CEQA Guidelines Section 15126.2(c) requires the same type of consideration. Non-renewable resources committed during project initiation might be irreversible, because commitments of such resources might permanently remove the resources from further use. CEQA requires evaluation of irretrievable resources to assure that consumption is justified. For example, cultural resources are non-renewable; any destruction or loss is irreplaceable.

The Plan focuses primarily on water acquisition and transfers within the Basin. The water management projects involve minimal construction for installation of newly proposed wells and pumps. The main uses of irretrievable resources for this element of the proposed project is the consumption of fuel required to power equipment and vehicles during construction and the consumption of electricity to power pumps for groundwater extraction (e.g., use of natural gas at power plants to generate the electricity required to operate the wells).

The system improvement element of the proposed project involves more extensive construction. Construction activities for the system improvement projects would result in use of materials that could not be restored (e.g., metal materials; excavation and/or import of soil and rocks; and energy used to manufacture, transport, or construct the facilities), as well as the use of nonrenewable resources (e.g., fuel) to operate construction equipment. There is no other commitment of nonrenewable resources, and the terms of the Plan do not commit future generations to permanent use of natural resources.

SECTION 4.0

Cumulative Impacts

4.1 Introduction

This section assesses the cumulative impacts of implementing the Preferred Alternative when combined with other projects that could result in impacts to the same environmental resources as the Preferred Alternative, as required for NEPA analysis. This analysis would be relevant in the event that this document is adapted as a NEPA document by a lead agency in the future. NEPA provides the following guidelines for assessing cumulative impacts.

The CEQ regulations implementing NEPA (40 CFR Section 1508.7) define a "cumulative impact" for purposes of NEPA as follows:

> Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

4.2 Cumulative Impacts Analysis

The No Action Alternative for this EIR is a projection of conditions that would occur in the Basin without coordinated actions by the purveyors. In making these projections, the purveyors incorporated projections of growth and made assumptions about how individual purveyors would respond to periodic drought.

It is recognized that the provisions of the reasonably foreseeable actions may be implemented in an interactive manner with other concurrent and subsequent projects. It is impossible to predict the timing of many of these actions or the precise effect on the greater California system, but these actions are included here as relevant projects that will impact the CVP generally, and will therefore affect CVP contractors, including contractors in the Redding Basin.

Actions that might contribute to cumulative effects include, but are not limited to, the following:

- Implementation of the Bay-Delta Plan Accord
- Conformed Place-of-use EIR for CVP Water Supplies
- Implementation of the Sacramento and San Joaquin River Basins Comprehensive Study
- Implementation of the CALFED EIS/EIR
- Implementation of the Sacramento Area Water Forum Proposal (American River)
- Implementation of the Environmental Water Account (EWA) (long term)
- Implementation of the Dry-year Water Purchase Program

- Implementation of the Drought Risk Reduction Program
- Implementation of the Environmental Water Program
- Changes in non-CVPIA water transfer actions
- Changes in federal farm programs
- Changes in demand for agricultural products
- Changes to the commercial and recreational harvest actions for commercial fishing
- Implementation of Yield Increase Plan
- Implementation of the Water Acquisition Program
- Creation of additional wetlands
- Additional listings of special-status species

The CVPIA PEIS includes an in-depth cumulative impact analysis of the effect of the CVPIA Preferred Alternative in combination with the projects listed above and other related projects. That analysis indicated that future projects could potentially improve CVP water supply reliability. These types of programs would modify water supply reliability but not change long-term CVP contract quantities or deliveries from within the historical ranges.

In addition, the PEIS cumulative analysis addressed potential impacts from CVPIA projects that might have occurred during preparation of or following the completion of the PEIS. The potential effects of these actions and how they might influence the effects of implementing the alternatives are considered in Chapter V of the PEIS. In addition to these projects, additional recent programs that are being coordinated between Reclamation and the DWR or are being wholly managed by the DWR are summarized below.

4.2.1 Environmental Water Account (Long Term)

The EWA is a CALFED implementation action, the primary focus of which is to provide environmental benefits while ensuring CVP/SWP operations are not adversely affected. The EWA program makes environmentally beneficial changes in the operations of SWP and CVP, at no uncompensated water loss to the CVP and SWP water users. Protective actions for at-risk native fish species would range from reducing Delta export pumping to augmenting in-stream flows and Delta outflows. Beneficial changes in SWP and CVP operations could include changing the timing of some flow releases from storage and the timing of water exports from the Delta pumping plants to coincide with periods of greater or lesser vulnerability of various fish species to environmental conditions in the Delta. The CALFED Record of Decision states that an EWA program would replace any regular water supply interrupted by the environmentally beneficial changes to SWP and CVP operations. The timing of the protective actions and operational changes would vary from year to year, depending on many factors such as hydrology and real-time monitoring that indicates fish presence at the pumps.

4.2.2 Dry-year Water Purchase Program and Drought Risk Reduction Investment Program

The Dry-year and Drought Programs would assists water users in dry conditions and compensate willing sellers in coordination with Reclamation and the DWR. In mid-January 2001, several SWP and CVP contractors requested that Reclamation and the DWR initiate planning for a dry-year water acquisition program, based on the dry-year hydrology to date. The DWR announced the 2001 Dry-year Water Purchase Program (Dry-year Program) in March 2001. This program represented the first dry-year acquisition program by the DWR since the 1991, 1992, and 1994 Drought Bank programs. The Dry-year Program was implemented again in 2002 and 2003, and may be activated in the future to help public agencies throughout California supplement their water supplies in dry years. During dry years, the DWR and Reclamation would likely initiate water acquisitions first from reservoirs upstream from the Delta, followed sequentially by groundwater substitution, crop substitution, and crop idling in areas upstream from the Delta. In addition, as part of the implementation of the CALFED Plan, Governor Gray Davis convened a panel to develop plans for California to respond to a future drought. In December 2000, the panel published its report, titled the Critical Water Shortage Contingency Plan, which is now referred to as the Drought Risk Reduction Investment Program. The plan recommended a multi-pronged set of preparations and responses to future water shortages. The water acquisition element of the plan is the Critical Water Shortage Reduction Marketing Program, which is an as-needed water purchasing and allocation program and is activated whenever parts of the state are suffering from critical water shortages.

4.2.3 Environmental Water Program

CALFED agencies created the EWP to carry out flow-related goals of the Ecological Restoration Program Plan. The EWP will acquire water from sources throughout the Bay-Delta watershed and provide flows to facilitate the following:

- Improvement in habitat conditions for fishery protection and recovery
- Restoration of critical in-stream and channel-forming flows in Bay-Delta tributaries
- Improvement in Delta outflow during critical periods
- Improvement of salmon spawning and juvenile survival in upstream tributaries by purchasing up to 100,000 ac-ft of water per year by the end of Stage 1

The EWP focuses on enhancing in-stream conditions, but program managers would also consider potential benefits to offstream resources. The EWP intends to purchase water from willing sellers in its effort to meet program objectives. CALFED agencies intend to first try the program with pilot water acquisitions. CALFED agencies will then evaluate the results to determine the program effectiveness and to refine the EWP framework (CALFED, 2002). Once the CALFED agencies gather sufficient information, they will prepare an environmental document that covers full implementation of the EWP.

4.2.4 South Delta Improvements Program

The DWR and Reclamation are currently evaluating the potential benefits and impacts associated with implementing CALFED’s South Delta Improvements Program (SDIP). Actions contemplated as part of the SDIP include providing for more reliable long-term export capability by the state and federal water projects, protection of local diversions, and reducing impacts on San Joaquin River salmon. Specifically, the CALFED actions in the South Delta Improvements Program include considering placement of a fish barrier at the head of Old River, up to three hydraulic barriers in south Delta channels, dredging and extending some agricultural diversions, and increasing diversion capability of Clifton Court Forebay to 8,500 cfs.

4.3 Potential for Significant Cumulative Impacts

As previously discussed, the CVPIA PEIS Cumulative Impact Analysis is incorporated into this EIR by reference. The potential cumulative effects of future and proposed projects are summarized in Table 4-1 of the cumulative effects chapter of the PEIS and is duplicated below for convenience. None of the additional four projects described above would adversely affect the cumulative condition described and evaluated in the PEIS or change the conclusions in that document regarding cumulative impacts of the Preferred Alternative.

TABLE 4-1
Summary of Cumulative Effects
Redding Basin Water Resources Management Plan EIR

Action	Potential Results	Effects of Cumulative Actions on Results of Impacts of EIR Alternatives
Implementation of the Bay-Delta Plan Accord	Changes in Delta inflow and associated instream releases. Restoration of habitat in streams and actions to improve water quality. Development of new storage and/or Delta conveyance facilities. Unknown cumulative effects on CPVIA water requirements.	Changes in instream and Delta flows may influence methodology for reoperation, (b)(2) water, or water acquisition for instream or Delta flows. Programs that could lead to partnerships with CVPIA actions or eliminate need for specific Anadromous Fish Restoration Program (AFRP) actions to be implemented under CVPIA. Water delivery shortages may not be as severe as identified in PEIS. May lead to partnerships with CVPIA actions or eliminate the need for specific AFRP actions to be implemented under CVPIA.
Place of Use EIR for CVP Water Supplies	Permitting or cessation of CVP water service areas currently served with CVP water but outside authorized Place of Use.	No anticipated change.
Trinity River Studies	Changes in instream flow requirements for Trinity River.	Could change (b)(2) water management and CVP water reliability.
Sacramento and San Joaquin River Basins Comprehensive Study	Develop a program to provide offstream storage, channel modifications, and other actions to reduce flood potential and improve habitat.	Could change channel cross-sections; instream flows; and offstream storage. Habitat improvements could be integrated with CVPIA actions.
Sacramento Water Forum Proposal	Changes in water demands and flow requirements on American River.	Could change (b)(2) and (b)(3) water management and CVP water reliability.
Changes in Water Transfer Actions	More extensive non-CVPIA water transfers than assumed in Base Transfer Scenario for alternatives with CVPIA transfers.	Competition for water from water rights holders would reduce available water supplies for transfers under CVPIA water acquisition programs or increase cost of water beyond assumptions for PEIS. Both of these impacts could reduce the amount of water acquired by Interior or increase the price of water purchased by Interior.
Changes in Federal Farm Programs	If lands fallowed or retired due to CVPIA actions continue to accumulate support payments, the net revenue to	Farmers may decide to increase participation in water transfer programs, including water acquisition programs by

TABLE 4-1
Summary of Cumulative Effects
Redding Basin Water Resources Management Plan EIR

Action	Potential Results	Effects of Cumulative Actions on Results of Impacts of EIR Alternatives
Implementation of the Bay-Delta Plan Accord	Changes in Delta inflow and associated instream releases. Restoration of habitat in streams and actions to improve water quality. Development of new storage and/or Delta conveyance facilities. Unknown cumulative effects on CPVIA water requirements.	Changes in instream and Delta flows may influence methodology for reoperation, (b)(2) water, or water acquisition for instream or Delta flows. Programs that could lead to partnerships with CVPIA actions or eliminate need for specific Anadromous Fish Restoration Program (AFRP) actions to be implemented under CVPIA. Water delivery shortages may not be as severe as identified in PEIS. May lead to partnerships with CVPIA actions or eliminate the need for specific AFRP actions to be implemented under CVPIA.
	farmers may increase and the revenue to the Federal Treasury may not increase.	Interior. The price of water also may be reduced, which could lead to an opportunity for higher purchases by Interior.
Changes in Demand for Agricultural Products	If changes in demand increase crop value, the price of water would increase and/or farmers would be less willing to sell water. If changes in demand decrease crop value, the price of water could decrease and/or farmers would be more willing to sell water. Changes in demand may cause farmers to change cropping patterns.	Increases in price or reduction in willing sellers would improve the ability of Interior to acquire water. Decreases in price or an increase in willing sellers would improve the ability of Interior to acquire water. Changes in cropping patterns could change the impacts of water shortages, especially if the ratio of permanent to annual crops changes.
Changes in Future Use of Hatcheries	Changes in use of hatcheries could occur based upon future studies. Changes in harvest limitations could occur in the future.	Whether changes in hatchery operations increase fish populations may depend Changes in harvest limitations may increase fish population. However, the upon habitat, hatchery practices, and other factors such as predation. Use of hatcheries also could reduce natural stock and the overall population through competition or reduction in genetic diversity. impact of domestic harvest may not be noticeable if larger numbers of fish are lost to international harvest, ocean conditions, or predation.
Yield Increase Plan	Development of facilities and programs to increase CVP water supplies could reduce impact of shortages from CVPIA actions.	Associated programs may increase the amount of water available for use by Interior for fish and wildlife purposes or may result in adverse impacts to fish and wildlife habitat due to new storage or conveyance facilities. The programs also may compete for the same sources of water that the PEIS identified as sources for the water acquisition program.

TABLE 4-1
Summary of Cumulative Effects
Redding Basin Water Resources Management Plan EIR

Action	Potential Results	Effects of Cumulative Actions on Results of Impacts of EIR Alternatives
Implementation of the Bay-Delta Plan Accord	Changes in Delta inflow and associated instream releases. Restoration of habitat in streams and actions to improve water quality. Development of new storage and/or Delta conveyance facilities. Unknown cumulative effects on CPVIA water requirements.	Changes in instream and Delta flows may influence methodology for reoperation, (b)(2) water, or water acquisition for instream or Delta flows. Programs that could lead to partnerships with CVPIA actions or eliminate need for specific Anadromous Fish Restoration Program (AFRP) actions to be implemented under CVPIA. Water delivery shortages may not be as severe as identified in PEIS. May lead to partnerships with CVPIA actions or eliminate the need for specific AFRP actions to be implemented under CVPIA.
Additional Wetlands	Improve reliability of water supplies to private wetlands and develop new wetlands. A portion of the new wetlands proposal is considered in the PEIS alternatives.	For the new wetlands, water supplies would probably be obtained with the land. Water obtained from other sources could be acquired for multiple purposes or water available for transfers may be reduced.
Future Listings under ESA of Special-status Species	Initiation of consultation with the Service and NOAA Fisheries.	Possible additional measures (flow and nonflow) to avoid a jeopardy determination. However, measures being taken under the AFRP, (b)(1) “other” program, and the Conservation Program may suffice to avoid substantial additional requirements.

4.3.1 Conclusion

The potential for cumulative impacts addressed in the PEIS would be slightly reduced by adopting the alternatives considered to reduce water demand in drought years. Implementing TRFs and increasing Basin flexibility by implementing physical projects would lessen strain on the system during drought years. Accordingly, implementation of any of the action alternatives would not result in additional significant cumulative impacts beyond those described in the PEIS.

SECTION 5.0

List of Preparers and Coordination

This section identifies the preparers associated with this document and the coordination efforts undertaken during its production.

5.1 List of Preparers

5.1.1 Purveyors

Stan Wangberg – Anderson-Cottonwood Irrigation District

David Coxey – Bella Vista Water District

Phil Browning – Centerville Community Services District

Rich Barchus – City of Anderson

Greg Norby – City of Redding

Chuck Robinson – City of Shasta Lake

Skip Born – Clear Creek Community Services District

Kris Hollmer – Cottonwood Water District

Ken Mariette – Mountain Gate Community Services District

J. R. Kaufman – Shasta Community Services District

Pat Minturn – Shasta County Water Agency

Eric Wedemeyer – Shasta County Water Agency

5.1.2 CH2M HILL

Ed Christofferson/CH2M HILL – Project Manager

Mike Urkov/CH2M HILL – Environmental Documentation Lead

Fritz Carlson/CH2M HILL – Environmental Support

Marjorie Eisert/CH2M HILL – Environmental Support

Karin Lilienbecker/CH2M HILL – Environmental Support

Kristen Maze/CH2M HILL – Environmental Support

Suzanne Moreland/CH2M HILL – Environmental Support

Harold Robertson/CH2M HILL – Environmental Support

Julie Rochlitz/CH2M HILL – Environmental Support

John Schoonover/CH2M HILL – Environmental Support

Heather Waldrop/CH2M HILL – Environmental Support

5.2 Coordination

5.2.1 Public Involvement

Prior to preparation of this EIR, input was solicited and incorporated from a broad range of cooperating and consulting agencies and the public. This chapter summarizes the public involvement program and key issues raised by the public and interest groups.

SCWA started the preparation of this EIR with scoping meetings. Discussions also were held with the purveyors and their representatives during the preparation of this document. Comments received during this period are summarized below.

5.2.2 Scoping Process

Scoping served as a fact-finding process to identify public concerns and recommendations about the proposed actions that would be addressed in this EIR; and the scope and level of detail for analyses. Scoping activities began in April 11, 2005, after a Notice of Preparation for environmental documentation was filed with the State clearinghouse. The scoping period formally ended May 31, 2005.

At a public scoping meeting held on May 16, 2005, SCWA provided information about the project and solicited public comments, questions, and concerns. At these meetings, participants had comments and questions about how important issues would be considered in the EIR. The majority of the comments received during the scoping process addressed the process of developing alternatives, the environmental document, and the public involvement process.

5.2.3 National Environmental Policy Act

As noted previously, this EIR was prepared pursuant to regulations implementing NEPA (42 USC 4321 et seq.) in the event that a federal lead agency uses this document in the future for NEPA compliance. NEPA provides a commitment that federal agencies will consider the environmental effects of their actions. This EIR provides information regarding the No Action Alternative and alternatives, environmental impacts of the alternatives, potential mitigation measures, and adverse environmental impacts that cannot be avoided.

5.2.4 Indian Trust Assets

The United States Government's trust responsibility for Indian resources requires Reclamation and other agencies to take measures to protect and maintain trust resources. These responsibilities include taking reasonable actions to preserve and restore tribal resources. ITAs are legal interests in property and rights held in trust by the United States for Indian tribes or individuals. Indian reservations, rancherias, and allotments are common ITAs.

To comply with 36 CFR 800.4(a) (4), a federal agency would need to send letters to Indian tribes requesting their input regarding the identification of any properties to which they might attach religious and cultural significance within the area of potential effect. To date, no comments or formal response have been received from the tribes.

ITAs exist on trust lands of the following entities:

- Redding Rancharia in Shasta County
- Paskenta Band of Nomlaki Indians in Tehama County
- Grindstone Rancheria in Glenn County
- Cachil Dehe Band of Wintun Indians of the Colusa Indian Community in Colusa County
- Cortina Band of Wintu Indians of the Cortina Rancheria in Colusa County
- Rumsey Indian Rancheria of Wintun Indians in Yolo County

However, the lead agency concludes that future action alternatives in this EIR would not adversely affect the use, quality, character, or nature of the six tribes' trust assets located in the Sacramento Valley study area. Therefore, the lead agency concludes there are no impacts to the ITAs of the Tribes in the Redding area as a result of project implementation. This conclusion should be verified by a federal review.

5.2.5 Indian Sacred Sites on Federal Land

Executive Order 13007 provides that in managing federal lands, each federal agency with statutory or administrative responsibility for management of federal lands shall, to the extent practicable and as permitted by law, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of such sacred sites. No sacred sites were identified during the scoping or planning process and, therefore, were not included in the impact assessment of this EIR.

5.2.6 Environmental Justice

Executive Order 12898 requires each federal agency to achieve environmental justice as part of its mission, by identifying and addressing disproportionately high and adverse human health or environmental effects, including social or economic effects, of programs, policies, and activities on minority populations and low-income populations of the United States. This EIR has evaluated the environmental, social, and economic impacts on minority and low-income populations in the impact assessment of alternatives.

5.2.7 State, Areawide, and Local Plan and Program Consistency

Agencies must consider the consistency of a preferred alternative with approved state and local plans and laws. This EIR was prepared with extensive information from local planning agencies.