RECLAMATION

Managing Water in the West

Draft
Environmental Assessment

Community Water Company of Green Valley
Central Arizona Project Water Delivery System
Pima County, Arizona

U. S. Department of the Interior
Bureau of Reclamation
Phoenix Area Office
Glendale, Arizona

March 2009

DRAFT ENVIRONMENTAL ASSESSMENT

COMMUNITY WATER COMPANY OF GREEN VALLEY
CENTRAL ARIZONA PROJECT WATER DELIVERY SYSTEM
PIMA COUNTY, ARIZONA

PREPARED FOR

U.S. BUREAU OF RECLAMATION

ON BEHALF OF

COMMUNITY WATER COMPANY OF GREEN VALLEY

PREPARED BY

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Interior and Reclamation Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

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The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

ABBREVIATIONS AND ACRONYMS

AAC	Arizona Administrative Code
ACC	Arizona Corporation Commission
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AF	acre-feet
AFY	acre-feet/year
AGFD	Arizona Game and Fish Department
AL	Action Level
ANC	American Nevada Company
ARS	Arizona Revised Statutes
ASLD	Arizona State Land Department
ASM	Arizona State Museum
AZPDES	Arizona Pollutant Discharge Elimination System
BA	Biological Assessment
CAGRD	Central Arizona Groundwater Replenishment District
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District
CC&N	Certificate of Convenience & Necessity
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNF	Coronado National Forest
CWA	Clean Water Act
CWC	Community Water Company of Green Valley
Corps	U.S. Army Corps of Engineers
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERO	ERO Resources Corporation
ESA	Endangered Species Act of 1973, as amended
FICO	Farmers Investment Company
FONSI	Finding of No Significant Impact
FR	Federal Register
FWCA	Fish and Wildlife Coordination Act
FWS	U.S. Fish and Wildlife Service
GSF	Groundwater Savings Facility
GVDWID	Green Valley Domestic Water Improvement District
ITA	Indian Trust Asset
Listed species	species listed as federally threatened or endangered under the ESA
LLNB	lesser long-nosed bat
LOI	Letter of Intent between CWC and Augusta Resource Corporation
mg/l	milligrams per liter
M&I	municipal and industrial
MCL	Maximum Contaminant Level
MPO	mine plan of operation

NAAQS	National Ambient Air Quality Standards
ND	Not Detected
NHPA	National Historic Preservation Act
NEPA	National Environmental Policy Act
NH	Nogales Highway
NPDES	National Pollutant Discharge Elimination System
NR	Not Reported
NRHP	National Register of Historic Places
ONH	Old Nogales Highway
pCi/l	picocuries per liter
PAG	Pima Association of Governments
PDEQ	Pima County Department of Environmental Quality
P.L.	Public Law
PMR	Pima Mine Road
PM2.5	particulate matter less than or equal to 2.5 microns in diameter
PM10	particulate matter less than or equal to 10 microns in diameter
PPC	Pima pineapple cactus
Proposed Project	CWC CAP water delivery system
R	Range
Reclamation	Bureau of Reclamation
RH	Rural Homestead
RPA	Rillito Planning Area
ROD	Record of Decision
Rosemont	Rosemont Copper Company
ROW	right-of-way
Section 7	Section 7 of the ESA
SMCL	Secondary MCL
SDCP	Sonoran Desert Conservation Plan
SHPO	State Historic Preservation Office
Stantec	Stantec Consulting, Inc.
STD	Standard
STU	Standard Testing Units
SCADA	Supervisory Control and Data Acquisition
T	Township
TAMA	Tucson Active Management Area
TAPA	Tucson Air Planning Area
TDS	total dissolved solids
µg/l	micrograms per liter
USC	Upper Santa Cruz
USC/PUG	Upper Santa Cruz Providers and Users Group
USFS	U.S. Forest Service
WWTP	wastewater treatment plant

Unit Conversion Guide

For the reader's convenience, the following table has been included to serve as a guide in converting measurements found in this document between U.S. measurements and metric.

CONVERSION OF U.S. TO METRIC MEASUREMENTS	
U.S. Measurement	**Metric Measurement**
Distance	
1 inch	2.54 centimeters
1 foot	0.31 meter
1 mile	1.61 kilometers
Area	
1 square foot	0.09 square meter
1 acre	0.41 hectare
CONVERSION OF METRIC TO U.S. MEASUREMENTS	
Metric Measurement	**U.S. Measurement**
Distance	
1 centimeter	0.39 inch
1 meter	3.28 feet
1 kilometer	0.62 mile
Area	
1 square meter	10.76 square feet
1 hectare	2.47 acres

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PIMA COUNTY, ARIZONA

1.0 Purpose and Need

1.1 Introduction and Background

The Community Water Company of Green Valley (CWC) has submitted its final plans to the Bureau of Reclamation (Reclamation), for taking and using its Central Arizona Project (CAP) entitlement. Reclamation's proposed action is to approve CWC's plans. This Environmental Assessment (EA) has been prepared to describe and assess the environmental consequences that may result from construction and operation of CWC's proposed CAP water delivery system, which consists of a pipeline, recharge site, and related facilities (Proposed Project) to convey and store CAP water from the existing pipeline that delivers water to the Pima Mine Road Recharge Project to a location near the northern edge of the CWC service area.

The EA has been prepared in compliance with the National Environmental Policy Act of 1969, as amended (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA, Reclamation's Draft NEPA Handbook (Reclamation 2000), and recent amendments of the Department of Interior's regulations for implementing NEPA (73 Federal Register [FR] 61292; October 15, 2008). Reclamation is the lead agency responsible for preparation of the EA. Cooperating agencies in the preparation of the EA are the Arizona State Land Department (ASLD), the Arizona Department of Water Resources (ADWR), and the Central Arizona Water Conservation District (CAWCD). ASLD is a cooperating agency due to its expertise in and responsibility for state land and associated resources in the vicinity of the Proposed Project. ADWR is also a cooperating agency due to its expertise in and responsibility for water resources throughout Arizona. CAWCD is a cooperating agency due to its role as contractor for the CAP water service subcontracts and operator of the CAP system.

CAP was authorized as part of the Colorado River Basin Project Act of 1968 (Public Law [P.L.] 90-537). CAP's principal purpose is to furnish water for irrigation and municipal and industrial (M&I) use in central and southern Arizona through the importation of Colorado River water, thereby reducing the use of ground water[1] in the CAP service area. CAP delivers Colorado River water to Arizona water users through a system of pumping plants, aqueducts, dams, and reservoirs.

In 1982, Reclamation prepared an Environmental Impact Statement (EIS) to address the potential environmental impacts associated with the allocation of CAP water to M&I

[1] In this EA, "ground water" is used to refer to underground water in a technical context, "groundwater" is used in a legal sense, as in Central Arizona Groundwater Replenishment District (CAGRD).

water users, non-Indian agricultural users, and Indian Tribes (Reclamation 1982). If known at the time, the EIS included a description of each water user's preliminary plans for the delivery and use of CAP water, and a general description of the resulting environmental impacts. On May 17, 1985, CWC entered into a CAP water service subcontract for 1,100 acre-feet/year (AFY) of CAP water annually, with Reclamation and the CAWCD. This CAP water service subcontract was later amended in 1997 when New Pueblo Water Company transferred 237 AFY to CWC. CWC also received 1,521 AFY as a result of the Arizona Water Settlements Act in 2005, making CWC's total CAP water entitlement equal to 2,858 AFY.

To contract for CAP water, each water user given a CAP entitlement is required to enter into a three-party water service subcontract with both Reclamation and CAWCD. As part of its procedures for approving these water service subcontracts, Reclamation includes a second level of environmental review for each CAP water user. For this second level environmental review, Reclamation requires each water user to provide specific plans for taking and using its CAP water entitlement. These plans are compared against the scenarios described in the 1982 EIS to determine whether the plans are consistent with the original plans, or whether additional environmental review and documentation are needed.

1.2 Purpose and Need

Reclamation

The purpose of the Proposed Project is to enable CWC to deliver CAP entitlement to its water service area. The Proposed Project is needed to provide a renewable source of M&I water to CWC, to help relieve ground water overdraft in this region consistent with the purpose of the CAP's authorizing legislation, and to provide an alternative source of water should CWC's ground water wells become unusable due to sulfate contamination.

Prior to entering into the initial subcontract in 1985, Reclamation reviewed CWC's conceptual plan for taking and using its CAP water entitlement through treatment and direct use, and determined that plan would not result in significant impacts. Because CWC did not anticipate implementing that plan in the reasonably foreseeable future, Reclamation indicated that once CWC finalized its plan for taking and using its CAP water allocation, the plan would need to be submitted for review and possible final environmental clearances prior to commencement of construction.

In April 2008, CWC provided Reclamation with a final plan for taking and using its CAP water allocation. The final plan indicates CAP water would be recharged near the CWC service area to help offset the declining water table and provide an alternative water supply if needed due to CWC well contamination. Reclamation determined an EA was required because:

- The final plan includes the construction and operation of a recharge facility
- A substantial amount of time has elapsed since Reclamation's original review of the conceptual plan

- The areas to be impacted and environmental conditions have changed since the 1985 subcontract

Reclamation must approve CWC's plans for taking and using its CAP entitlement, and identify environmental mitigation measures if appropriate, pursuant to the requirements of the CAP water service subcontract. Based upon this EA, Reclamation will determine whether a Finding of No Significant Impact (FONSI) is appropriate, or whether an EIS must be prepared prior to approving CWC's plans.

Community Water Company

Ground water levels within the Green Valley area have declined significantly over the past 50 years (ADWR 2006a; p. 34[2]). Between 1940 and 1995, ground water elevations directly west of the Farmers Investment Company (FICO) facilities declined 100 to 150 feet (Id.; p.3). The continued lowering of the water table is also confirmed in a 2007 report by Pima County that states "the water table in Green Valley has been declining in past years, and is expected to continue to decline even faster as water demands, through population growth and other factors, continue in the Green Valley area" (Pima County 2007a; p.1). CWC currently supplies all of its demand by pumping ground water, which is treated by chlorination and reduction of arsenic. CWC anticipates the population of its service area, and thus its water demand, to more than double by about 2020. The continued reduction of the water level in the area has raised concerns regarding the quantity of available ground water in the future. The limited water supply in the Green Valley area and the continuous lowering of the ground water table are prime reasons that CWC subcontracted for a CAP water allocation. CWC has maintained and paid for a CAP water entitlement since 1985 to assure water availability for its members (CWC 2007b). However, CWC has not taken delivery of any CAP water to date due to the lack of a water delivery system.

Water quality in the Green Valley area, particularly for CWC wells, is also a concern due to a sulfate plume from the Sierrita Mine tailings impoundment (HGC 2008; pp. 1-8). The tailings cover approximately 3,600 acres just west of Green Valley. Freeport-McMoRan Sierrita, Inc. is the current owner of the mine and tailings impoundment. Elevated concentrations of sulfate were first discovered in the vicinity of the tailings impoundment during the 1970s. In the 1980s, the origin of the sulfate was determined to be seepage from the various mine tailings impoundments in the area. The mining company installed interceptor wells along the southeastern and eastern boundaries of its tailings impoundment to intercept the seepage and return it for use at the mine. However, the seepage has continued and the sulfate plume is moving down-gradient to the east and northeast (HGC 2007; pp. 35, 36). Freeport-McMoRan Sierrita, Inc. is developing a mitigation plan for the sulfate plume under a Mitigation Order from the Arizona Department of Environmental Quality (ADEQ) (ADEQ 2008). Use of several CWC production wells has been discontinued due to sulfate contamination of the ground water

[2] Page numbers are included with the citation only where specific data or analysis are referenced and where the information would be otherwise difficult to locate in a large document.

aquifer in the vicinity of the Sierrita Mine. CWC is concerned about the possibility of future contamination of additional potable water wells.

Another consequence of the declining water level in the local aquifer has been the subsidence of the ground surface in areas of heavy pumping. Ground subsidence occurs when aquifer layers are dewatered due to cyclical or continuous lowering of the water table. When the water level in the aquifer declines, the aquifer materials compress and are no longer able to store as much water. The resulting compression of the aquifer layers lowers the ground surface and may cause changes to floodplain boundaries or lead to the creation of soil fissures. Ground subsidence has been a serious problem in parts of central Arizona such as Stanfield and Eloy where agriculture withdrew significant ground water. During the period February 2007 to March 2008, ADWR recorded net ground surface subsidence of almost 1.5 inches in some areas near Green Valley (see Section 3.6.1.1).

The Proposed Project would deliver CWC's CAP entitlement to the vicinity of the CWC service area. The delivery of the CAP water is needed to help offset the overdraft of the ground water aquifer in the Green Valley area by providing a renewable supply of water. The recharge of the water in the vicinity of the CWC service area would help maintain the aquifer levels near the point of use. Delivery of CAP water to the CWC service area also is needed to provide an alternative water source in the event that additional CWC wells are contaminated with sulfate. In addition, the concentrated withdrawal of water has created subsidence of the ground surface in the areas of the heaviest pumping. Delivering CAP water to the Green Valley area for recharge in the vicinity of the pumping would help offset the decline of the water table and would help reduce the potential for ground subsidence.

1.3 Project Location

The CWC service area is located in Pima County, Arizona, approximately 20 miles south of Tucson (Figure 1). CWC's service area is approximately 8 square miles, extending roughly between Anamax Road on the north, the Santa Cruz River on the east, the Sierrita Mine on the west, and Mission Twin Buttes Road on the south.

The location of the pipeline, recharge site, and related facilities are described in detail in Section 2.3. Most of the Proposed Project facilities would be on previously disturbed land within existing rights-of-way (ROWs).

The Proposed Project is located in the Santa Cruz Valley on the edge of the Sonoran Desert. Elevations along the pipeline and recharge facilities range from about 2,800 to 3,000 feet. Several copper mines are located west of the Proposed Project on the flanks of the Sierrita Mountains. Southeast of the Proposed Project is the Santa Rita Experimental Range, where research on the Sonoran Desert ecosystem has been conducted since 1903 by the U.S. Forest Service (USFS) and University of Arizona. The Experimental Range is

bounded to the east by the Coronado National Forest (CNF) and the Santa Rita Mountains (Figure 1).[3]

CWC supplies water to the northern portion of the unincorporated retirement community of Green Valley. Municipal water supplies for the adjoining areas are provided by the Las Quintas Serenas Water Company to the north, Farmers Water Company to the east, and Green Valley Domestic Water Improvement District (GVDWID) to the south. The incorporated Town of Sahuarita adjoins CWC to the north and northeast.

1.4 Public Involvement and Scoping

CWC developed an extensive public involvement program to notify its members and customers about the plans for taking and using its CAP entitlement. CWC issued a press release on its plan for the Proposed Project on July 19, 2007, and held a public meeting to describe the Proposed Project in more detail on July 25, 2007. The August 2007 Newsletter, distributed to all CWC members and customers, described the various issues and recharge alternatives being considered. CWC held a series of meetings with its members and customers to describe and discuss the Proposed Project on August 24, September 11, and October 30, 2007. On November 28, 2007, CWC published a Newsletter summarizing issues regarding the Proposed Project and urged attendance at the upcoming meeting with the Arizona Corporation Commission (ACC). The ACC invited public comment on the proposed pipeline during a Green Valley Town Hall meeting on December 5, 2007. Answers to frequently asked questions, comments, and replies have been posted and updated since August 2007 on the CWC website at: http://www.communitywater.com/.

The CEQ defines scoping as "…an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a proposed action" (40 Code of Federal Regulations [CFR] 1501.7). Scoping is an important part of the NEPA process that helps to identify public and agency concerns, and focuses the environmental impact analysis on relevant issues.

On August 11, 2008, Reclamation sent out a scoping memorandum to about 70 interested agencies, organizations, and individuals requesting input regarding issues or concerns that should be addressed in the EA (Appendix A). Reclamation also issued a press release to nine news media outlets and posted the scoping memorandum on its website on August 11, 2008. A public scoping meeting was held in Green Valley on August 26, 2008, which was attended by approximately 70 people. Following an open house with informational displays on the Proposed Project and a presentation by Reclamation on the Proposed Project and the NEPA process, public comments were invited. Nine people provided oral comments, which were transcribed by a court reporter. The comment period was open through September 12, 2008, and 28 written comments were received.

[3] All figures follow the text of Section 6, Literature Cited.

As discussed in more detail along with Reclamation's responses in the Scoping Report in Appendix B, the relevant issues and concerns identified during scoping that are addressed in the EA include:

- The NEPA process is premature and should not be initiated at this time
- An EIS is required rather than an EA
- The scoping process was inadequate
- The EA needs to consider more alternatives than just the proposed action or no action
- Alternatives that directly address mine-related water use and needs for Rosemont Copper Company's (Rosemont) proposed mine need to be included in the EA
- Statutory or regulatory conflicts exist with use of CWC's CAP entitlement by Rosemont
- Effects of the Proposed Project on the following topics should be evaluated: invasive species; climate change; potential for growth inducement; Santa Cruz River; quality of life and effects to tourism and real estate from declining water table; impacts to the existing ground water, including any effects of recharge on the existing sulfate plume contamination; and permits required to construct and operate the Proposed Project

1.5 Relationship to Proposed Rosemont Mine

Two of the most common comments submitted during scoping were: 1) the Proposed Project is connected to the proposed Rosemont Mine and as a connected project, the impacts would be significant; and 2) the Proposed Project, together with the Rosemont Mine, would result in significant cumulative impacts.

Reclamation recognizes that construction of the Proposed Project is proposed to be funded by Rosemont and that CWC plans to give Rosemont priority for use of CWC's CAP water and available recharge storage capacity for the first 15 to 20 years of the system's operation unless it is needed by CWC. However, as discussed further in the Scoping Report in Appendix B and below, Reclamation has determined the Proposed Project and the proposed Rosemont Mine are not connected actions under NEPA.

To evaluate whether the Proposed Project and the proposed Rosemont Mine are connected, Reclamation applied the three criteria in the NEPA regulations regarding connected actions (40 CFR 1508.25):

1. Approval of the CWC water delivery system does not automatically trigger the Rosemont Mine. Since 1985, CWC has pursued opportunities to develop a means for taking and using its CAP entitlement. Presently, use of the CWC water delivery system is not identified in Rosemont's mine plan of operation (MPO) (Rosemont 2007) under consideration by the CNF. Reclamation's approval of the CWC water delivery system is not contingent upon CNF's approval of Rosemont's MPO, nor the operation of the mine itself.

2. As indicated in the Letter of Intent (LOI) and Rosemont's letter to CWC dated January 20, 2009 (Appendix D), Rosemont's commitment to pay for construction of the Proposed Project[4] is not contingent on CNF's approval of the MPO. Rosemont's MPO does not include the CWC water delivery system and therefore Reclamation does not consider CWC's water delivery system to be a prerequisite for the mine's operation.

3. The CWC water delivery system has separate utility from the proposed Rosemont Mine. Because Rosemont's commitment to fund the construction of the CWC water delivery system is not contingent on mine approval by the CNF, the Proposed Project does not depend upon the proposed mine to justify its construction and operation. Neither does Rosemont depend upon the construction of the Proposed Project to proceed with its mine proposal. Rosemont can meet its stated commitment to replenish water within the Santa Cruz basin using other sources of CAP water and other ground water storage facilities, as has been occurring since 2007. Therefore, Reclamation believes these two actions are not interdependent parts of a larger action, nor do they depend on a larger action for their justification.

Additional discussion of the relationship of the Proposed Project with the proposed Rosemont Mine is provided in Appendix B. Further discussion of the potential impacts of the proposed Rosemont Mine is provided in Sections 3.1 and 3.6.

[4] As noted in the Letter of Intent, Rosemont's agreement to fund all capital and project development for the Proposed Project includes, but is not limited to, engineering, legal, public relations, easements, direct project management, construction, permitting and similar costs. This includes costs associated with preparation of this document and Reclamation's costs associated with complying with all applicable environmental rules and regulations.

2.0 Description of Alternatives

Section 2.0 describes the formulation and evaluation of alternatives. Information on the four alternatives evaluated in detail is provided. Reasons for excluding a number of other alternatives from further consideration are summarized.

This EA focuses on analyzing the No Action Alternative; Reclamation's proposed action to approve the Preferred Alternative, which would authorize construction of CWC's Proposed Project involving a CAP water delivery system; and two action alternatives having smaller main pipeline sizes—the CAP Entitlements and CWC-Only alternatives.

2.1 Formulation and Evaluation of Alternatives

A number of alternatives were considered during development of the Proposed Project and preparation of this EA. The primary factors used during formulation, screening, and evaluation of alternatives were:

- Purpose and need for the Proposed Project
- Public input
- Availability of land access and ROW
- Impacts on other resources

A primary consideration in evaluating alternatives was the purpose and need for the Proposed Project. As discussed in Section 1.2, declining water levels, subsidence, and potential future water quality issues result in a need to deliver the CAP entitlement to the vicinity of the CWC service area for beneficial use.

Section 1.4 summarizes public input during scoping, which suggested that additional alternatives be examined. In particular, an alternative developed by FICO and American Nevada Company (ANC) (the FICO-ANC Alternative) was identified as a potential alternative to the Proposed Project and is discussed further below.

Availability of land access and existing ROWs was a major consideration in evaluating alternative pipeline alignments and recharge locations. Alternatives requiring new ROWs or having land access constraints were eliminated due to greater environmental impacts (see next paragraph), higher costs, or infeasibility.

Minimizing impacts on other resources – e.g., native vegetation and water resources for existing water users – was also an important consideration in evaluating alternatives. Use of a previously disturbed ROW was preferred to reduce environmental impacts and costs to obtain a new ROW or mitigate environmental impacts. Similarly, recharge sites located away from existing wells and recharge facilities were preferred to minimize or avoid impacts to existing water users.

2.2 No Action Alternative

The No Action Alternative means that Reclamation would not approve of CWC's Proposed Project to deliver CAP water for recharge near its service area. Without Reclamation approval, it is not likely that a pipeline would be constructed in the foreseeable future for the conveyance and recharge of the CWC CAP water. CWC would continue to rely solely on pumped ground water for delivery to its customers. Without the delivery and use of its CAP water entitlement, either directly or by recharge and recovery, CWC would not have an alternative potable water supply should its existing wells become contaminated by the sulfate plume from the Sierrita Mine tailing impoundment. In addition, without introducing a renewable water supply to the area, ground water level decline and subsidence would occur at a rate faster than with one of the action alternatives.

Currently, the majority of the ground water supply delivered by CWC is grandfathered under the Arizona Groundwater Management Act.[5] Under the No Action Alternative, developers within the CWC service area would continue to be able to join the CAGRD, enroll their lands as member lands of CAGRD, and then pay CAGRD to replenish excess ground water delivered within the member lands.[6] CWC could supply those future developments' member lands through its ground water delivery system. In the long-term, assuming a CAP water delivery pipeline to the CWC service area could be financed, CWC would likely apply for a Designation of Assured Water Supply based on direct use or recharge of its CAP entitlement at that time.

2.3 Proposed Action (Preferred Alternative or Proposed Project)

Reclamation's proposed action is approval of CWC's Proposed Project, referred to in this document as the Preferred Alternative or Proposed Project. Under the Preferred Alternative, CWC would construct a water delivery system to deliver its CAP entitlement to the Green Valley area, consisting of a mainstem pipeline, two smaller pipelines, a booster station, and a recharge facility (Figure 2). Under the Preferred Alternative, the recharge site capacity would be able to recharge the annual CAP entitlements of both CWC and the GVDWID. These entities currently are the only water service providers in the Green Valley area with permanent CAP entitlements. If GVDWID does not elect to participate in the Proposed Project, alternative CAP supplies or other renewable sources could be recharged at the site, with appropriate state approvals.

[5] Grandfathered ground water rights are based upon historic use of ground water for 5 years prior to the establishment of the Active Management Area (BLM 2001).

[6] "Excess groundwater" is that amount of groundwater pumped by a member service area or member land that exceeds the amount allowed to be pumped under the Assured Water Supply rules. CAGRD would then be responsible for replenishing (recharging), with renewable water supplies (as defined in ARS 48-3771.C.), this volume of excess groundwater within the TAMA (as well as volumes of excess ground water pumped that are reported for all other CAGRD members within the TAMA). This must be accomplished by CAGRD within 3 years.

As noted above, CWC has agreed to give Rosemont priority for use of CWC's 2,858 AFY of CAP water for the first 15 to 20 years of the system's operation unless it is needed by CWC. Under the Preferred Alternative, this water would be recharged at the proposed recharge site, along with additional water supplies Rosemont may obtain to utilize the maximum recharge capacity of 5,000 AFY at the site. In the long term (following the first 15 to 20 years), it is expected that CWC would continue to recharge its CAP water at the site, along with other CAP water supplies from potential participants such as GVDWID. For analysis purposes, this EA assumes the full recharge capacity of the site of 5,000 AFY would be utilized.

Following is a brief description of the major project components of the Preferred Alternative.

Pipelines

A proposed 36-inch diameter main delivery pipeline would connect to an existing pipeline that delivers CAP water to the Pima Mine Road Recharge Project as it enters that recharge facility. The Pima Mine Road Recharge Project, which came into full scale operation in December 2001, was developed by CAWCD in cooperation with the City of Tucson. The proposed connection would occur on the north side of Pima Mine Road (PMR) in the southeast quarter of the southeast quarter of Section 30 T16S, R14E, approximately 2 miles east of the CAP terminus. From the connection with the existing CAP pipeline (PMR Lateral), the pipeline would extend eastward on the north side of PMR approximately 0.4 mile to the Nogales Highway (NH). The alignment turns south along the western NH ROW for approximately 5 miles to the intersection with the Old Nogales Highway (ONH) and continues south approximately 0.9 mile along the western ROW of ONH. The 36-inch diameter main delivery pipeline would require disturbing approximately 60 feet of existing utility ROWs, resulting in a total disturbance of up to 47 acres.

Near the intersection of the ONH and the potential El Corto Road alignment (north section line of Section 36 T17S, R13E and Section 31 T17S, R14E), the pipeline alignment would turn east. The pipeline diameter would be reduced to 20 inches, continuing east 1.6 miles to the proposed 20-acre recharge site. Another 20-inch diameter pipeline would be constructed some time in the future along the same alignment from the recharge facility approximately 2.5 miles west to the existing Well #11 treatment facility operated by CWC (Figure 2). The timing of this future pipeline would depend on when CWC needs to recover recharged water, which will be affected by future water demands and water quality considerations.

The design capacity of the 36-inch main pipeline was established after consultation with the Upper Santa Cruz Providers and Users Group (USC/PUG), of which CWC and GVDWID are participants. The USC/PUG is a group of water companies and major water users that are seeking to bring CAP water and other renewable sources to the Green Valley-Sahuarita area to recharge the aquifer. CWC requested the group's input to assure that the pipeline capacity would meet the potential needs of the USC/PUG members,

which is estimated to be approximately 30,000 AFY, including CWC (USC/PUG 2008). Thus, the maximum capacity for the 36-inch mainstem pipeline was established at 30,000 AFY, with up to 5,000 AFY to be delivered to the proposed CWC recharge site.

The proposed route of the main pipeline is consistent with the alignment recommended in the "Sahuarita – Green Valley Area Central Arizona Project Water Use Feasibility Analysis and Delivery System Optimization Study" (Malcolm Pirnie 1998; Figure ES-3). The selected main pipeline route and size are also consistent with the recommendations in Pima County's "Evaluation of Sustainable Water Supply Options in Green Valley," which adopted the Malcolm Pirnie preferred alignment (Pima County 2007a; Attachment A, p. 6).

The new buried ductile iron pipelines would be constructed using conventional construction methods of open cut trenching and backfill for the majority of the route. Materials excavated from the trench would be temporarily stockpiled adjacent to the trench line and used for backfill of the trench after installation of the new pipe. Excess excavated material would be spread within the limits of the ROW in a manner that blends with the adjacent contours, and then would be stabilized and re-seeded with an appropriate native seed mix.

The pipeline alignment includes three railroad crossings, and road crossings at PMR, NH, and ONH. The railroad and road crossings would be completed by jacking and boring a casing pipe beneath the existing rail bed or pavement. The locations of the proposed jacking and boring operations are shown on Figure 3.

The future water delivery pipeline from the proposed recharge basin to CWC's existing Well #11 site would cross the Santa Cruz River. The river crossing would be completed by jacking and boring a casing pipe beneath the calculated scour depth of the flow channel at the maximum channel flow rate. This type of crossing would eliminate any disturbance of the river bed, and would comply with U.S. Army Corps of Engineers (Corps) requirements under a Clean Water Act (CWA) nationwide Section 404 permit, if applicable. Several additional minor drainage ways also would be crossed along the NH section of the pipeline. The crossing of these small drainages would be completed by conventional open trench construction and would comply with CWA Section 404, if applicable. The new pipeline would be installed below the calculated scour depth of the channels. The completed pipeline would be pressure tested to assure that there would be no significant leaks during the operation of the new delivery system.

CAP Connection

The CWC water delivery system would connect to the existing CAP pipeline leading to the Pima Mine Road Recharge Project, and would be designed and installed pursuant to an agreement between CWC and CAWCD. It would consist of a new control valve, flow meter, and associated appurtenances. The control valve, flow meter, and all of the associated equipment would be owned and maintained by CAWCD.

Rights-of-Way

The pipeline route would occupy existing ROWs along PMR, NH, and ONH (Figure 2). The 20-inch pipeline along the potential El Corto Road alignment would be installed 20 feet south of the north section line of Section 36 of T17S, R13E, and Sections 31 and 32 of T17S, R14E, within easements from the ASLD and a private sand and gravel company, Staker & Parson Companies (Staker & Parson).

The new ROWs along the 20-inch pipeline alignments would be approximately 30 feet wide. The same ROW would be used for the sections of both pipelines between the booster station and the recharge facility. The existing ROWs along the alignment are used for roadways as well as numerous other utilities including gas, telephone, cable television, fiber optic lines, electrical power lines, and two existing water lines.

Construction Access and Staging

The Proposed Project would require ground access to deliver equipment, materials, and labor crews to complete the construction of the pipeline and the recharge facility. Access for the construction of the 36-inch diameter pipeline is readily available from the existing public roadways adjacent to the alignment. Road closures or traffic restrictions are not anticipated. Pipe and other materials can be temporarily placed within the ROWs as the construction progresses. Areas where the installation of the pipeline has been completed would be backfilled and re-graded as a continuous part of the construction. Access roads for the construction and future maintenance of the 20-inch lines would be completed as part of the construction sequence. Pipe and other materials would be delivered and temporarily stored within the new easements as well as temporary construction easements located on previously disturbed areas. The access roads completed for the construction of the 20-inch diameter pipeline also would be used to bring equipment and materials for the construction of the recharge basins.

Construction staging areas, temporary offices, and areas for storing construction materials would require 2 to 3 acres of land. There are several privately owned large, open, previously disturbed areas adjacent to the Proposed Project pipeline that could serve as staging areas. Figure 3 shows two possible locations that would be suitable for staging and storage of materials. Equipment and material storage areas are normally secured by the contractor as a part of the construction services. The selected contractor would negotiate with local property owners to secure a site for staging operations and storage of materials. The use of these areas would be negotiated by the contactor as part of his/her bid package. Use of any other areas by the contractor not already identified in Figure 3 would require prior approval by Reclamation.

Booster Station Construction

Because the elevation at the proposed recharge site is higher than at the alignment's tie-in to the Pima Mine Road Recharge Project, a pump booster station would be required to deliver the water to the recharge basin. This booster station would be located near the northwest corner of the Staker & Parson gravel pit property (Figure 2). The Staker & Parson booster station would be constructed on previously disturbed land within a 300-

foot by 165-foot footprint. The entire booster station would be enclosed within a concrete masonry unit wall that would be a minimum of 8 feet in height. The booster station would be installed with a Supervisory Control and Data Acquisition (SCADA) system to control the operation and send data to remote locations. The new SCADA system would be compatible with the operating systems utilized by the CAP operators.

While the existing pressure within the CAP pipeline is sufficient to deliver the recharge facility's capacity of 5,000 AFY to the proposed Staker & Parson booster station, there would be insufficient pressure to deliver a flow of 30,000 AFY to this point. If it becomes necessary to deliver a flow of 30,000 AFY, another booster station would be required. Booster stations that are required to deliver additional water would be constructed by the entities requesting water service using the CWC water delivery system.

Recharge Basin Construction

The new recharge facility would be located in the west half of the southeast quarter of the southeast quarter of Section 29 T17S, R14E (Figure 2). The outer footprint of the two recharge basins to be constructed within the 20-acre site recharge facility is shown on Figure 4. Recharge basin construction would require clearing approximately 13.5 acres of the 20-acre site. The site design would include a 30-foot-wide undisturbed buffer zone around the north, east, and west sides of the basin. This buffer zone would serve as a visual screen for the recharge facility and as a location for transplanting some of the cacti removed from the recharge site. Approximately 6.5 acres located in the southern portion of the site would not be needed for the recharge basin facilities. This area would not be cleared and also would be used for transplanting salvaged plants from cleared areas. In the future, a recovery well may be located within this 6.5-acre area.

Several monitoring wells may need to be installed as required by ADWR to construct and operate an underground storage facility. Existing wells in the vicinity of the Proposed Project would be considered first for monitoring wells. The impact, including access to new wells, if any, is estimated to be 0.5 acres or less. Disturbance to cultural resources and native vegetation would be avoided to the degree practicable.

Alluvium suitable for recharge of the CAP water has been located on the site at an average depth of approximately 58 feet. The alluvial layers below 58 feet contain coarse-textured material from 50 to 70 feet in thickness which overlays a 20-foot-thick fine-grained layer. The coarse-grained layer has a capacity to recharge up to 5 feet of water per day; however, the fine-grained soil layer would create a mounding effect under the granular layer, which may limit the long-term recharge potential to approximately 2 feet per day.

The contracted CAP water entitlements for the Green Valley area include 2,858 AFY for CWC and 1,900 AFY for GVDWID, totaling 4,758 AFY. The design capacity of the recharge basins has been rounded up to 5,000 AFY. The recharge basins would be operated about 300 days per year or possibly more depending on the maintenance requirements of the CAP system. The required daily recharge volume to accommodate

the design volume of 5,000 AFY would be 16.28 acre-feet (AF) per day. Recharging 2 feet of water per acre per day would require a total of 8.14 acres of infiltration surface at the bottom of the recharge basins.

The overburden to be removed for the construction of the recharge basins would average approximately 58 feet in depth. The total volume of material to be removed for the construction of the recharge basins is estimated to be approximately 950,000 cubic yards. The material would be moved from the recharge site to the Staker & Parson property using the same 30-foot-wide ROW acquired from ASLD for the 20-inch pipeline. This ROW would be cleared for the pipeline installation and would be wide enough to accommodate hauling the material to the storage areas. The excavated material would be stored on previously disturbed areas of the Staker & Parson gravel mining operation, which is located approximately 1.5 miles west of the recharge basin site, as shown on Figure 5. The storage areas have been previously stripped and excavated as part of the mining operation. Material removed from the proposed recharge site and stored at the gravel mine may ultimately be sold for fill or utilized to help restore the gravel mine site after closure. There are also several future projects planned in the area that would require substantial amounts of fill materials. One proposed future project would extend Quail Crossing Boulevard to Duval Mine Road, which would require a large volume of fill to raise the road surface above the floodplain.

The recharge basins would be constructed with 1:1 side slopes. The slopes would be stabilized to prevent the erosion of fine materials into the basins using anchored plastic geocell (honeycomb) material filled with coarse sand or gravel. Additional sediment control would be provided by constructing a collection trench with fiber roll filters around the perimeter of the basins.

CAP water would be delivered to the south side of the parcel and would be channeled to the inlets of the recharge basins by pipes and open channels. Concrete distribution boxes would be constructed at grade to reduce the velocity of the inflow and control the flow to the recharge basins through irrigation gates. The basins would be operated on a continuous basis; however, they would be allowed to dry for up to 60 days every year in coordination with the operation of the CAP system. The drying cycles would be used to inspect the basin surfaces and complete any necessary maintenance including scarifying or ripping the basin surfaces with equipment to reduce clogging. Small amounts of accumulated fine material and algae that could affect recharge efficiency would be removed periodically from the surface of the recharge basins using a small front-end loader or similar equipment and transported to Staker & Parson for disposal.

The recharge basins would be fenced with site-appropriate materials; signs would notify individuals that the property is private and no trespassing is allowed. The perimeter fencing would not restrict passage of small mammals. Chain link fencing would be used around the control structures and other points that require restricted access.

Project Financing

CWC is a private water company as defined in Arizona Revised Statutes (ARS) § 45-402 (30), and a public service corporation as defined by Arizona Constitution Article 15, § 2. As such, CWC is subject to the regulatory jurisdiction of both ADWR and the ACC in providing water utility service. CWC is in the business of producing water for delivery and sale to customers within its service area and has authority to withdraw and distribute ground water from within the Tucson Active Management Area (TAMA) ground water basin (ARS § 45-491). CWC's public service corporation service area is defined by a Certificate of Convenience & Necessity (CC&N) approved by the ACC.

Under the Letter of Intent dated July 12, 2007, between CWC and Augusta Resource Corporation, the parent company of Rosemont, it was anticipated that Rosemont would fund the construction of the Proposed Project (Appendix D). This proposed arrangement was confirmed in a letter from Rosemont to CWC on January 20, 2009 (Appendix D). The CWC water delivery system would be owned and operated by CWC. CWC would deliver its CAP water to the recharge basin, and Rosemont would have priority over use of CWC's CAP water, the system, and recharge capacity for the first 15 to 20 years, unless they are needed by CWC.

Negotiations between CWC and Rosemont (Parties) are ongoing to finalize an agreement (Agreement) through which the details of the arrangement would be memorialized. The Parties anticipate that the Agreement will require approval by the ACC under Arizona Administrative Code (AAC) R14-2-406. Currently, the Parties envision Rosemont would become a customer of CWC, subject to ACC and other approvals, and would provide an advance or contribution in aid of construction to CWC so the necessary infrastructure can be built to move water from the existing CAP system to a recharge site (underground storage facility) or other location where the water is of use to the customer, without financial burden on CWC's existing customers (Appendix D). The Parties also envision that Rosemont would pay the full cost of the infrastructure, a portion of which may be eventually refunded to Rosemont by CWC, depending on the nature of the transaction as finally approved. Once the infrastructure is in place, Rosemont anticipates purchasing non-potable CAP water from CWC under an approved tariff by the ACC [AAC R14-2-401(30); R14-2-409(D)].

As envisioned by the Parties, CWC proposes to incorporate this facility into its ACC CC&N and it would become an extension of CWC's operating distribution system and therefore a part of CWC's water service area under ARS § 45-493(A)(2). The underground storage facility would need to be permitted by ADWR under ARS § 45-811.01. Once the facility is permitted, CWC would perform water storage services. Rosemont, as a customer of CWC, would be required to obtain a water storage permit from the ADWR under ARS § 45-831.01 to store CAP water at this facility [ARS § 45-831.01(B) (2); ARS § 49-243(H)].

The Agreement between CWC and Rosemont has not been finalized, and thus Reclamation and CAWCD have not been able to review any portion of the Agreement.

The specific contractual and legal requirements related to the arrangements, under which CWC would request delivery of its CAP entitlement under such an Agreement, may involve additional discussion between Reclamation and CAWCD, in coordination with ADWR; however, the outcome of these discussions would not alter the range of environmental impacts that are described in this document. If CWC's CAP water is not utilized as envisioned in the Letter of Intent or Agreement, the use of other supplies likely would be increased, such as CAP excess pool water or CAP tribal leases. Thus, the Preferred Alternative would still recharge up to 5,000 AFY at the recharge site and the impacts would be as described in Chapter 3. If recharge averages less than 5,000 AFY, ground water replenishment and other impacts would be less than described in Section 3.6.

As discussed above, GVDWID also holds a CAP M&I priority subcontract in the vicinity of the proposed infrastructure. Currently, there are no agreements or tentative agreements in place concerning the delivery or use of this CAP water within the proposed CWC water delivery system, but there is available capacity to transmit this water to locations near the GVDWID service area. If the Agreement and related tariffs are approved by the ACC, this capacity would be available to GVDWID to transport its CAP water entitlement upon payment of the applicable tariffs. The water may be stored in underground storage facilities (if properly permitted as described for the Proposed Project) or delivered for direct use to or storage by, a GVDWID customer, at the discretion of GVDWID.

2.4 CAP Entitlements Alternative

The CAP Entitlements Alternative is identical to the Preferred Alternative, except that the entire length of the new pipeline would be 18-inch diameter rather than a combination of 36-inch and 20-inch pipe diameters. The ROWs, size, and location of the booster station and recharge facility would be the same as the Preferred Alternative. This alternative would be limited to the capacity to deliver the entitlements of the existing CAP water subcontractors in the Green Valley area, which are CWC (2,858 AFY) and GVDWID (1,900 AFY).

2.5 CWC-Only Alternative

The CWC-Only Alternative is similar to the Preferred Alternative but the size of the facilities would be reduced to solely have the capacity to deliver the CWC CAP entitlement of 2,858 AFY. The entire length of new pipeline would be 14-inch diameter rather than 36-inch and 20-inch diameters. The ROWs needed for this alternative, as well as the location and exterior dimensions of the booster station, would be the same as the Proposed Project. The size of the recharge facility would be reduced by approximately 40 percent because a maximum of approximately 3,000 AFY would be recharged rather than 5,000 AFY. The footprint of the recharge facility would be approximately 8.1 acres.

2.6 Alternatives Considered But Eliminated From Detailed Study

The following alternatives were considered but were eliminated from further consideration in the EA for the reasons summarized below.

2.6.1 Direct Use of CAP Water

Direct delivery and treatment of CWC's CAP water entitlement was evaluated as an alternative. Direct use would require more extensive treatment of the water to reduce turbidity, total dissolved solids (TDS), and other constituents. The cost of constructing and operating a treatment facility and the resultant waste stream disposal would exceed CWC's current ability to finance a CAP water delivery system. However, it is anticipated that this alternative would be investigated again in the future as the CWC service area approaches build-out.

2.6.2 Alternative Pipeline Routes

Alternative pipeline routes were considered as possible alignments including: La Canada, Sahuarita Road, El Toro Road, and combinations of other existing and new ROWs. Most of these potential routes would have greater impacts on residential and commercial areas than the proposed alignment while offering little opportunity for access to possible recharge sites. Some of these routes were also studied in the 1998 Malcolm Pirnie report and were not recommended for consideration in that study (Malcolm Pirnie 1998; pp. ES-13 to ES-15).

2.6.3 Alternative Recharge Locations

A variety of alternative recharge sites were evaluated as discussed below.

Recharge to the Santa Cruz River or Tributaries

The delivery of water to the Santa Cruz River or its tributaries in the Green Valley area for a managed recharge facility was considered, and an initial feasibility investigation was completed. This alternative was eliminated from consideration after comments received from Pima County staff (Julia Fonseca, Pima County Flood Control District) indicated that the option would pose a threat to the riparian habitat of the river. The possible introduction of nonnative species to the habitat was considered to be an unacceptable risk. Also, recharge in the bed of the Santa Cruz River or its tributaries could adversely impact other existing recharge sites by raising the water table in their vicinity. Other issues related to the use of natural waterways for recharge include the cost of rebuilding portions of the recharge facilities if major flood events cause damage and a reduction in natural recharge from flood events due to an already wetted channel and higher water levels under the stream channel. Also, increased flood damage to property on or adjacent to the floodplain may occur due to the reduction in natural recharge capability.

Recharge on Arizona State Trust Land: Section 36 T17S, R13E

The possible recharge on property located within Section 36 was eliminated from consideration due to the upstream proximity of the Green Valley wastewater treatment plant (WWTP) and adjacent recharge basins. Recharge on this property could adversely impact the existing percolation basins operated at the wastewater facility by raising the water table in the area.

Recharge at Recharge Facilities in the Marana Area

Existing and proposed recharge facilities in the Marana area, approximately 40 miles north (down-gradient) of Green Valley, may be available for recharge of the CWC water allotment. Recharge at one or more of those facilities would allow the withdrawal of water from a recovery well near the CWC service area. This alternative was not considered further as it does not provide for recharge near the CWC service area. It would provide no benefit to the Green Valley/Sahuarita aquifer, and it would provide no opportunity for delivery and direct use by CWC if the existing sulfate plume spreads or contaminates additional CWC wells.

Recharge at Pima Mine Road CAP Recharge Facility

The Pima Mine Road Recharge Project, approximately 7 miles north of the CWC service area, may be available for recharge of the CWC water allotment. Recharge at the Pima Mine Road Recharge Project would allow withdrawal of water from a recovery well in or near the CWC service area. This alternative was not further considered as it does not provide for recharge near the CWC service area. It would provide only limited benefit to the Green Valley/Sahuarita aquifer, and it would provide no opportunity for CWC to deliver and directly use its CAP entitlement if the existing sulfate plume problem worsens.

Use of the FICO Groundwater Savings Facility

Use of the CAP water for irrigation within the existing FICO Groundwater Saving Facility (GSF) could be a cost-effective and environmentally benign alternative for delivery and indirect recharge of the CWC CAP water. It would reduce current ground water pumping in an area identified by ADWR as having the most significant subsidence problems in the Green Valley/Sahuarita area by substituting CAP water for irrigation pumping. As discussed in Section 1.2, subsidence can cause changes to floodplain boundaries, and uneven subsidence has been associated with surface fissuring elsewhere in Arizona. However, by itself, recharge at the FICO GSF does not meet the purpose and need of the Proposed Project for recharge and recovery of the CWC CAP entitlement near the CWC service area.

Initially, this alternative was eliminated from further consideration due to a request to Reclamation by Richard Walden, President of FICO, that it be removed from further consideration (B. Ellis, pers. comm. 2008). Because the owner of a GSF has the authority to control the use of the GSF, Reclamation agreed to Mr. Walden's request.

Subsequently, FICO and ANC developed a proposed CAP water delivery system, which would incorporate the use of FICO's GSF for recharge (FICO 2008a). The FICO-ANC system would consist of three phases (Figure 6):

1. Phase I would be construction of a 36-inch pipeline from the CAP terminus or existing CAP pipeline serving the Pima Mine Road Recharge Project along the same alignment as the Proposed Project to Sahuarita Road, where a turnout would interconnect with FICO's GSF (irrigation system) with a capacity of 5,000 AFY during the irrigation season.
2. Phase II would extend the 36-inch pipeline farther south to Continental Road, with several turnouts to interconnect with additional sections of FICO's GSF and potentially other recharge projects or water users.
3. Phase III would extend the pipeline further south to the Canoa recharge basins, about 4.7 miles south of the end of Phase II.

The FICO-ANC proposal anticipates various sources of water being delivered through the system including FICO's non-Indian agricultural pool CAP water (3,600 AFY but declining over time), CAGRD water supplies (1,500 AFY and likely to increase over time), CWC and GVDWID CAP entitlements, ASLD CAP entitlements, and other potential water sources (Id.). Funding for Phase I would be provided by FICO and an affiliate of ANC, and construction would occur between 2011 and 2016 subject to housing market conditions (FICO 2008b). The cost, funding, and timing of Phases II and III are not known at this time due to ongoing discussions with potential participants in those phases (Id.).

A portion of Phase II of the FICO-ANC alternative, plus construction of facilities to recharge the CWC CAP entitlement near the CWC service area would need to occur to meet the purpose and need of the Proposed Project. Because the cost, funding, and timing of Phase II are uncertain, this alternative was eliminated from further consideration.

3.0 Affected Environment and Environmental Consequences

In Section 3.0, the affected environment of the area potentially impacted by the Proposed Project (referred to as the "Project area" or "impact area," which varies by resource) and likely environmental consequences are described for each resource potentially impacted by the Preferred Alternative and the other action alternatives. The consequences of the No Action Alternative are also described for each of the resources as a basis for comparison. In addition, the cumulative impacts of the Preferred Alternative are identified. Section 3.8 summarizes the reasons that other resources such as surface water and recreation were considered for analysis but determined not likely to be affected.

3.1 Background for Cumulative Impacts

Potential impacts of the Proposed Project would occur in the context of other development actions that have occurred and will occur in the impact area. Cumulative impacts, or effects, are the impacts on the environment which result from the incremental impacts of the Proposed Project when added to the impacts of other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time.

For purposes of this analysis, the geographic impact area for analyzing cumulative effects for the Proposed Project was generally established as the area within which measurable ground water elevation changes are anticipated to occur as a result of recharging a maximum of 5,000 AFY for the 20-year project period. This is an oblong area extending from the recharge facility in a radius of approximately 5.5 miles to the east, south, and west, and 8.5 miles to the north (see Section 3.6.2). For ease of reference, this oblong area is referred to as the 8-mile radius surrounding the recharge facility. This geographic impact area contains the entire proposed pipeline alignment and the area within which all land-disturbing project construction impacts would occur, Although smaller areas might be more appropriate for land use, biological, and cultural resources, Reclamation chose to use this broader geographic area as a conservative approach for analyzing cumulative impacts.[7]

Cumulative effects to various resources are possible for each of the action alternatives under consideration. The description of the affected environment in each subsection below provides information on the existing conditions of resources within the Project area that are the result of past and present actions. Notable past and present actions in the impact area of the Proposed Project include construction of roads and utility corridors, mining, and the development of residential communities and associated facilities.

[7] Depending upon the resource, the impacts may also vary temporally. The geographic impact areas for air quality and socioeconomic resources, which also vary temporally, are identified in their respective sections.

"Reasonably foreseeable future actions" are defined as actions that are not speculative—they have been approved, are included in short- to medium-term planning and budget documents prepared by government agencies or other entities, or are likely to occur given trends (Environmental Protection Agency [EPA] 1999).

3.1.1 Reasonably Foreseeable Actions

Potential future actions were identified through public and agency scoping, input from cooperating agencies, and available information on known projects or actions under consideration. Actions that meet all of the following criteria were considered reasonably foreseeable and were included in the cumulative impacts analysis:

- The impacts of the future action would occur within the same geographic area (impact area) and same time frame as the impacts of the Proposed Project or alternatives.
- The future action would affect the same environmental resources as the Proposed Project or alternatives.
- There is a reasonable expectation the future action would occur; the future action is not speculative.
- There is sufficient information available to define the future action and assess cumulative impacts.

(EPA 1999; CEQ 1997)

Reasonably foreseeable future actions meeting all of the above criteria, located within this impact area, consist of road construction and housing projects. The following description of these reasonably foreseeable actions provides context for the discussion of cumulative impacts included in this chapter for each resource category, as appropriate. One major new road is planned in the Project area; Quail Crossing Boulevard would be connected to Duval Mine Road as shown on Figure 7 (Sahuarita 2009).

Quail Creek, a planned community east of Sahuarita and south of the recharge site (Figure 7) consists of two components. Quail Creek is planning to add homes for 5,000 families, which would be age-restricted. The Stone House portion of Quail Creek would add 222 non-age-restricted custom homes. The existing Quail Creek development has a new clubhouse and plans to add more commercial and retail businesses (Sahuarita 2008a).

Sahuarita's current Master Plan of Development includes several new housing sites within and adjacent to the town. Rancho Sahuarita would have both age-restricted and non-age-restricted components. The Rancho Sahuarita development is expected to add housing for about 11,000 families as well as commercial and recreational opportunities (Sahuarita 2008a).

Mission Peaks is a proposed master-planned community west of Sahuarita. Up to 15,000 homes would be built along with commercial areas and community facilities. The Mission Peaks development plans include a WWTP and using reclaimed water to irrigate drought tolerant landscaping (ANC 2008). This housing development has obtained a

General Plan Amendment from the Town of Sahuarita (Franchine 2008; Sahuarita 2008b). In addition, ADWR has issued a designation of assured water supply to the Rancho Sahuarita Water Company, which would provide water service to this development (ADWR 2008b).

A third planned community is Madera Highlands. It is located on the southernmost edge of the Sahuarita town limits. Madera Highlands would add homes for 617 families. The project plans include athletic fields, botanical gardens, an outdoor amphitheater, and various other recreational opportunities. This community would not be age-restricted (Sahuarita 2008a).

Reclamation is aware of the high level of public interest concerning the potential hydrologic impacts of Rosemont's production wells, which are located within the 6- to 8-mile radius surrounding the recharge basins. Reclamation's ground water modeling of the long-term operation of the recharge facility required making assumptions with regard to future potential pumping by others. Because of the level of public interest in the proposed Rosemont Mine's production well pumping, modeling for the Proposed Project considered the effect of the Preferred Alternative's proposed recharge under two different scenarios—with and without future pumping by Rosemont. These two scenarios are described in Section 3.6.3.

3.1.2 Actions Not Considered Reasonably Foreseeable for Cumulative Impact Analysis Purposes

Potential future actions considered but determined not to be reasonably foreseeable for purposes of the cumulative impact analysis are summarized below. Based on the best available information, these and similar actions did not meet the criteria for inclusion in the cumulative impact analysis as reasonably foreseeable actions because they occur outside of the impact area, are speculative, and/or do not have sufficient information available to conduct a meaningful analysis of cumulative impacts.

A number of housing projects are proposed to occur in the region outside of the impact area for the Preferred Alternative. For example, south of the impact area is the proposed Las Mesas de Santa Cruz development north of Tubac. ADWR recently approved a water rights transfer from irrigation to municipal use, which supports an assured water supply for this master-planned community with 2,630 residential units plus commercial and office development (Las Mesas 2008). In late 2008, however, the County Board of Supervisors' approval of this development was overturned by a citizen-generated referendum (Davis 2008).

3.1.3 Other Future Actions Not Considered for Cumulative Impact Analysis Purposes

Reclamation has concluded it is not appropriate to consider the proposed Rosemont Mine project for cumulative analysis purposes. The proposed Mine is approximately 10 to 12 miles from the Proposed Project and is located in a separate watershed. Because of its distance from the Project area, and the fact that construction of the Proposed Project

would be completed prior to any mine-related construction activity, there is no potential for impacts to common resources, with the exception of ground water. For example, impacts that need to occur coincidentally to result in a cumulative effect, such as windblown dust resulting from local construction projects or socioeconomic impacts related to construction work would not occur since the CWC project would be completed prior to a decision on the Rosemont Mine. In the case of proposed ground water pumping by Rosemont, it is considered in the cumulative impact discussion in Section 3.6.3, because Rosemont's proposed production wells are located in the CWC project area, and the timing of Rosemont's proposed withdrawals and CWC's recharge would overlap, thus creating the potential for cumulative impacts. Impacts related to implementation of the proposed Mine, including direct, indirect and cumulative impacts, will be addressed in the CNF's EIS on Rosemont's MPO. The cumulative impacts discussion in the CNF EIS would take into consideration any past actions from the Proposed Project, if appropriate.

3.2 Air Quality

The Project area for air quality impacts is Pima County and, in particular, the Tucson Air Planning Area (TAPA) because regional air quality might be affected by the Proposed Project. Pima County is divided into three designated air planning areas. Two are located in eastern Pima County and include the Rillito Planning Area (RPA) and the TAPA. The Proposed Project is located within the TAPA, which was established in the late 1980s to address nonattainment of carbon monoxide (RECON 2006; p. 3-43).

3.2.1 Affected Environment

National ambient air quality standards (NAAQS) resulted from the Clean Air Act of 1970, as amended in 1977 and 1990 (EPA 2008). The standards are designed to protect public health and indicate the maximum levels of pollution allowable, including a margin of error. The standards relate to six primary air pollutants: ozone (O_3); carbon monoxide (CO); particulate matter (PM10 and PM2.5); sulfur dioxide (SO_2); nitrogen dioxide (NO_2); and lead (Pb). The State of Arizona's air quality standards are the same as those developed by the federal government. Pima County is currently designated as a carbon monoxide attainment area with a maintenance plan. The County is also designated unclassifiable/attainment for the other five pollutants.

Pollutant levels for primary NAAQS standards (human health) and secondary standards (human welfare, e.g., visibility) have been established by EPA as shown in Table 1.

In 1996, a carbon monoxide limited maintenance plan was submitted to the EPA. The Plan was amended in 1999; in 2000, the area was re-designated as being in attainment for carbon monoxide (RECON 2006; p. 3-43). The Tucson area, including Sahuarita and Green Valley, is in attainment for all of the criteria pollutants.

The Pima County Comprehensive Land Use Plan (Pima County 2003) includes plans for maintaining air quality and ensuring that occurrences such as range and forest fires, land disturbance, unpaved roads, and other land uses do not compromise the existing levels of attainment for the six criteria pollutants.

Both meteorology and climate affect air quality. Pollution levels increase in the winter when temperature inversions can trap pollutants during calm weather. The layer of pollution trapped near the ground will eventually rise as the sun heats the ground, which allows dispersal of the trapped pollutants (RECON 2006; p. 3-45).

Projections regarding the future air quality for specific pollutants within Pima County are provided below.

Table 1. National Ambient Air Quality Standards.

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None	
	35 ppm (40 mg/m^3)	1-hour[1]		
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour[2]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual[3] (Arithmetic Mean)	Same as Primary	
	35 µg/m^3	24-hour[4]	Same as Primary	
Ozone	0.075 ppm (2008 STD)	8-hour[5]	Same as Primary	
	0.08 ppm (1997 STD)	8-hour[6]	Same as Primary	
	0.12 ppm	1-hour[7] (Applies only in limited areas)	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m^3)	3-hour[1]
	0.14 ppm	24-hour[1]		

[1] Not to be exceeded more than once per year.
[2] Not to be exceeded more than once per year on average over 3 years.
[3] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.
[4] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).

[5] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008)

[6] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard—and the implementation rules for that standard—would remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.

[7] The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1. As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

STD – Standard.

Source: EPA 2008.

Carbon Monoxide

As mentioned above, Pima County was previously in nonattainment for levels of carbon monoxide. It is a colorless and odorless gas produced by vehicle emissions. The area around Tucson has elevated readings of carbon monoxide during the winter months during temperature inversions. Carbon monoxide levels are predictably higher at busy intersections. As a result of advances in technology producing cleaner burning vehicles, carbon monoxide levels have decreased during the past 15 years. Projections for nonattainment of carbon monoxide levels are low for the predictable future, despite the projected population increase in the Tucson area.

Ground-Level Ozone

While no violations of ozone have occurred in Pima County since 1982, there is a possibility of exceedance in the future (RECON 2006; p. 3-46). Ozone levels tend to follow increases in carbon monoxide, which occur with increased vehicular activity. The photochemical reactions resulting from heat and sunshine raise levels of ozone during the summer. Recently, the County has been relatively close to exceeding NAAQS limits, so there is at least a moderate likelihood of exceedance in the future. The trend in ground-level ozone in Pima County from 2000-2007 was steady or slightly declining (Pima County 2008b).

Particulate Matter

There have been no exceedances of PM10 in Pima County since 1999. Problems related to PM10 are common in the arid Southwest because dirt roads, fallow agricultural fields and building sites often are sources of airborne dust. Studies have indicated a range of health effects resulting from PM10 and PM2.5 including asthma, bronchitis, and premature death. In the event of elevated PM10 levels, the Pima County Department of Environmental Quality (PDEQ) issues Particulate Matter Pollution Advisories. The trend in PM10 and PM2.5 in Pima County from 2000–2007 was a reduction of about one-third (Pima County 2008b).

Nitrogen Dioxide and Sulfur Dioxide

Levels of both SO_2 and NO_2 have been well below the NAAQS and the likelihood of future exceedance is low.

Lead

As a result of decreasing levels of lead in the late 1990s, the EPA discontinued the requirements for monitoring ambient levels of lead in most of the country, including Pima County (RECON 2006; p. 3-47).

PDEQ has 23 air quality monitoring stations throughout Pima County. One monitoring station is located adjacent to the Pima County Government Center in Green Valley. The station has been monitoring PM10 since 1989 and was established to monitor the particulates from the ASARCO (now Freeport McMoran) and Cypress Sierrita mines and tailings ponds. It is located approximately 4 miles southwest of the proposed recharge facility. A summary of 2007 air quality values from the Green Valley monitoring site is shown in Table 2.

As shown in Table 2, readings for ozone, PM10 and PM2.5 are below the NAAQS thresholds (Table 1) at the Green Valley monitoring station.

Table 2. Green Valley Air Quality Data.

Ozone One Hour Average Summary Values for 2007 (in parts per million [ppm])				
Monitor	**1st Max 8-Hour Value**	**2nd Max 8-Hour Value**	**3rd Max 8-Hour Value**	**4th Max 8-Hour Value**
Ozone (ppm) [1]	0.033	0.085	0.074	98

Particulate Matter (PM_{10} and $PM_{2.5}$) Summary Values for 2007 (in micrograms per cubic meter [µg/m³])			
Monitor	**Annual Average[2,3]**	**Max 24-Hour Value[4]**	**2nd Max 24-Hour Value**
Particulate Matter (PM_{10})	20.4	123	77
Particulate Matter ($PM_{2.5}$)	4.33	14.5	13.0

[1] NAAQS is the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008); 3 years of data following the new standard will not be available until May 2011.
[2] NAAQS annual average for PM_{10} was revoked in September 2006.
[3] NAAQS annual average for $PM_{2.5}$ is 15 µg/m³.
[4] NAAQS 24-hour average for PM_{10} is 150 µg/m³ and for $PM_{2.5}$ is 35 µg/m³.
Source: Pima County (2008a).

3.2.2 Environmental Consequences

3.2.2.1 No Action

The No Action Alternative would not alter the air quality in the Project area. Because the CWC water delivery system would not be constructed under this alternative, the ambient air quality conditions would remain unchanged.

3.2.2.2 Preferred Alternative

The Preferred Alternative would result in the emission of relatively minor amounts of pollutants caused by the operation of vehicles and construction equipment over the construction period of approximately 7 months. Based on the size, type, and number of vehicles and equipment expected to be used to build the Proposed Project, potential emissions during construction would be approximately 3.0 tons of hydrocarbons, 13.9 tons of carbon monoxide, 54.6 tons of nitrogen oxides, and 6.8 tons of sulfur dioxide (Welch 2008). While not quantified, ozone levels during the construction period could increase because they tend to follow carbon monoxide levels, as discussed above under Section 3.2.1, Affected Environment.

Construction activities may result in a slight localized increase of particulate matter from land disturbance, fugitive dust, and operation of construction equipment. Pima County Code (Title 17) requires dust control measures be implemented during construction. According to PDEQ, a Pima County Activity Permit is required prior to land disturbance associated with construction of the pipeline, booster station, and recharge basin (Pima County 2008c). CWC would obtain the necessary Pima County permit prior to construction and the construction firms would be required to implement dust control by adhering to requirements of the permit. Construction firms would also be required to maintain construction vehicles and equipment to minimize emissions. The use of dust suppression would limit PM_{10} emissions to approximately 8.5 tons during construction of the Proposed Project (Welch 2008).

Temporary emission of air pollutants during construction of the Proposed Project would result in a short-term minor increase in emissions. The contribution of project-related emissions during the 7-month construction period compared to the emissions county-wide for the same period of time would range from 0.01 percent (carbon monoxide) to just under 0.5 percent (sulfur dioxide). This contribution is not anticipated to result in exceedances of the air quality standards (Welch 2008). There also would be temporary emissions of air pollutants from periodic scarifying of the recharge basins to maintain infiltration rates. These activities are expected to occur over a period of one or two weeks each year; the emissions would be nominal and only a fraction of those created during construction of the Proposed Project. These activities also are not anticipated to result in exceedances of the air quality standard. No adverse air quality impacts would result from the operation of the pipeline or recharge facility following construction.

3.2.2.3 CAP Entitlements Alternative

The minor adverse air quality impacts of the CAP Entitlements Alternative would be nearly identical to the impacts of the Preferred Alternative because the amount of vehicle and equipment use would be about the same under either alternative.

3.2.2.4 CWC-Only Alternative

The minor adverse air quality impacts of the CWC-Only Alternative would be approximately one-third less than the impacts of the Preferred Alternative because excavating the smaller recharge facility would require approximately 40 percent less equipment use. The vehicle and equipment use for pipeline construction would be similar to the Preferred Alternative.

3.2.3 Cumulative Effects

As described in Section 3.1, anticipated projects in the impact area include several new housing developments and a new road. These actions would result in an increase of vehicle emissions and construction-related fugitive dust in the impact area. Construction of the Proposed Project would temporarily add minor emissions of air pollutants in the immediate vicinity of the Proposed Project; however, it has the potential to contribute only slightly to cumulative air quality impacts. Timing of construction of the Proposed Project in relation to these other anticipated projects is not known; if they do not occur at the same time, there would not be an additive, or cumulative, impact. The No Action Alternative would not contribute to cumulative effects.

3.3 Land Use

The Project area for land use impacts is the Town of Sahuarita because that is the area where Project construction effects would occur. The Project area for analysis of cumulative impacts to land use is the broader 8-mile radius surrounding the proposed recharge facility.

3.3.1 Affected Environment

In December 2002, the Town of Sahuarita adopted a General Plan (Sahuarita 2002). The Land Use Element consists of both maps and policies regarding land uses planned for specific areas. The Town was incorporated in 1994 and covers more than 29 square miles. To augment the planning process, the Town defined the “sphere of influence,” which increased the planning area to a total of 38.5 square miles. The pipeline portion of the Proposed Project is located either within the Sahuarita Town limits, or its “sphere of influence” (Id., p. 7). Table 3 lists the existing land use percentages in various categories under the Sahuarita General Plan.

Table 3. Sahuarita Land Use (2002).

Land Use Category	Percent of Area
Residential	6.5
Commercial	0.3
Industrial	1.4
Parks and Open Space	0.3
Golf Course	1.8
Public, State Trust, and Institutional	11.6
Rights-of-Way	1.7
Utilities and Mines	3.8
Vacant	20.5
Farm and Ranch	52.3

Source: Sahuarita 2002 (p. 6).

Of the total sphere of influence in the Sahuarita Land Use Plan, 16.8 percent is State Trust Land and 83.2 percent of the land is privately, institutionally, or municipally owned. There are no federal lands within the Plan area. Most of the future growth within the Town is anticipated to be within master planned communities (Sahuarita 2002; p. 9).

The Town has identified three specific areas within its corporate boundaries for future commercial growth. One area for developing commerce is near Duval Mine Road and I-19. The second is at the intersection of I-19 and Sahuarita Road. The third growth area is designated for mixed use adjacent to PMR and I-19 (Id.; p. 25). In addition, the town adopted a General Plan Amendment in October 2008, which categorizes as a "designated growth area" some State Trust Land directly to the east of the established sphere of influence along Sahuarita Road, effective upon annexation into the Town (Sahuarita 2008b).

Although the area of the 100-year floodplain near the Santa Cruz River is seen as future developable land, the likelihood of this occurring within the foreseeable future is low. The possibility of floods in this area creates a development constraint that is likely to slow growth in this area (Id.; p. 16).

The pipeline would be constructed primarily through existing ROWs on private land within the Town limits. The portion of the pipeline corridor extending from the PMR Lateral to ONH, then south to the Staker & Parson booster station would be on land currently designated within the 100-year floodplain. The area along both sides of the NH is the subject of a Special Planning Area designation by the Town of Sahuarita (Id.; Figure 1A). Future land use both east and west of the highway is projected as an Employment category for most of the distance north of Sahuarita Road. The land surrounding the intersection of Sahuarita Road and NH is designated as Commercial. The land south of this intersection to the Staker & Parson booster station is designated Medium or High Density Residential. A narrow linear parcel of land northwest of the intersection of the

potential El Corto Road alignment and the ONH is designated Resource Conservation due to its proximity to the Santa Cruz River (Id.; Figure 1A). The area surrounding Well #11 is designated a mixture of Commercial and Residential uses (Id.; Figure 1).

The Staker & Parson sand and gravel mine is southeast of the intersection of ONH and the potential El Corto Road alignment. The Town has designated this parcel in the Resource Industrial category. From this parcel east to the recharge site, the ROW is on land managed by the ASLD. The Town's Land Use Plan designates this area as Future Development Area (Id.; Figure 1).

Existing land uses along the pipeline route from the PMR Lateral to the Staker & Parson booster station include roadways and driveways, and surface and subsurface utilities including gas, telephone, cable television, fiber optic lines, electrical power lines and two existing water lines. The installation of the paved roads and utilities has previously disturbed the ground surface in these locations.

Approximately half of the new ROW west of the ONH along the potential alignment of El Corto Road includes natural desert and the Santa Cruz River. The remaining proposed ROW would cross areas that have been heavily disturbed by gravel mining and other clearing operations.

The majority of the pipeline route as well as the recharge site is currently zoned Rural Homestead (RH). According to the Official Zoning Map of the Town of Sahuarita, a thin strip of land along the NH north and south of Sahuarita Road is designated General Industrial (CI-2) (Sahuarita n.d.).

The Sahuarita General Plan contains a section on Recreation and Open Space (Sahuarita 2002; pp. 44-50). As provided in the General Plan, a draft Parks, Recreation, Trails and Open Space Plan was completed in 2007 (Sahuarita 2007). The General Plan describes the existing and proposed trail system within the Town of Sahuarita boundaries and sphere of influence (Sahuarita 2002; Figure 3). Several trails planned for the future by the National Park Service (NPS) would cross the pipeline corridor. The existing De Anza National Historic Trail connects early mission sites and Spanish settlements of the 1700s, primarily as an auto tour route with points of interest along the way (NPS 2008). It is administered by local governments and by the NPS in partnership with agencies, private landowners and nonprofit organizations. A portion of the De Anza Trail corridor falls within the Project area.

In the Sahuarita General Plan, two drainages along the proposed pipeline route following the potential El Corto Road alignment east of the Staker & Parson booster station are designated as Unprotected Riparian Habitat. Farther east along the potential El Corto Road alignment is designated Protected Riparian Habitat (Sahuarita 2002; Figure 4).

Other relevant plans in the region that would have an effect on land use in the future include the Pima County Comprehensive Plan (Pima County 2003) and the related

Sonoran Desert Conservation Plan (SDCP) (Pima County 2008d). The Pima County Comprehensive Plan indicates the site of the recharge basin to be within a proposed land use category of "Low Intensity Urban" development. In October 2008, the Town of Sahuarita adopted a General Plan Amendment for the site of the recharge basin with a proposed land use category of "Low-Medium Density Residential," effective upon annexation into the Town (Sahuarita 2008b). The area surrounding the recharge site is State Land. Whereas the ASLD attempts to coordinate with local jurisdictions concerning land use plans and zoning, the main determinant for use is highest value to the State. The SDCP identifies the area near the Santa Cruz River as a significant wildlife corridor and the region surrounding Sahuarita as important for archaeological site complexes (Pima County 2008d).

3.3.2 Environmental Consequences

3.3.2.1 No Action

The No Action Alternative would not change the land use patterns in the vicinity of the Proposed Project. Because this alternative would not result in the construction of facilities, land use conditions would remain unchanged.

3.3.2.2 Preferred Alternative

Construction of the proposed pipeline would occur primarily within existing ROWs that have been disturbed for other purposes. Land use would not change following pipeline installation. The proposed booster station would be located in an area zoned for a compatible land use, Resource Industrial. The booster station would be enclosed behind concrete masonry unit block walls of a type to coordinate with the adjacent walls in the area. Installation of the pipeline, booster station, and recharge site are compatible with existing Sahuarita land use plans and zoning. The segment of the future proposed pipeline extending from the recharge basin west to Well #11 would cross one of the trails associated with the De Anza National Historic Trail. There could be some minor temporary disruption to recreational use of the trail system during construction or repair of this proposed pipeline extension; however, such a disruption would be negligible, as hikers could merely skirt the construction or repair zone. Pipeline construction within portions of the Santa Cruz 100-year floodplain would have no long-term impact to the floodplain because the pipeline would be buried. The majority of the proposed recharge facility would be located below the original ground surface. In addition, the facility would be surrounded by a berm covered with native vegetation. From the surrounding area, much of the facility would not be visible.

3.3.2.3 CAP Entitlements Alternative

The effect to land use for the CAP Entitlements Alternative would be identical to the impacts of the Preferred Alternative because the new facilities and area of disturbance would be the same under both alternatives.

3.3.2.4 CWC-Only Alternative

The land use impacts of the CWC-Only Alternative would be slightly less than the impacts of the Preferred Alternative because the recharge facility would be reduced by approximately 40 percent to 8.1 acres. The pipeline and booster station construction impacts would be identical to the Preferred Alternative.

3.3.3 Cumulative Effects

As described in Section 3.1, a number of road and housing projects are expected to occur in the Project area. These actions would result in changes in existing land use in the vicinity of the Proposed Project. The Preferred Alternative and action alternatives would not change land use patterns where installation of new underground pipeline would be located within existing utility corridors. The remaining pipeline alignments and addition of a small booster station would be compatible with existing land use plans and zoning. The recharge facility would be compatible with development on the adjacent State Trust Land because the facility would not be visible from the surrounding land; any maintenance activities at the recharge facility would be similar to existing operations at the Staker & Parson facility but at much less intensity and would only occur for one or two weeks per year. The No Action Alternative would not contribute to cumulative effects.

3.4 Biological Resources

The Project area for biological resource impacts is the pipeline corridors, the proposed recharge facility, and the CWC service area because that is the area where the Proposed Project construction, recharge, and water use effects would occur. For analysis of cumulative impacts to biological resources, the Project area is the broader 8-mile radius surrounding the proposed recharge facility.

3.4.1 Affected Environment

3.4.1.1 Vegetation

The Project area encompasses three primary habitat types: semidesert grasslands, Sonoran desertscrub, and riparian habitats. Descriptions of the vegetation communities in the Project area are provided below and follow Brown (1994). Note: Pima County utilizes a variation of Brown's (1994) biotic communities where some of the names are different and the vegetation mapping is more refined. A list of flora that may occur in the Project area is located in Appendix C.

Semidesert Grasslands

The Semidesert Grassland community is a perennial grass-scrub dominated landscape between Sonoran Desertscrub at lower elevations and Evergreen Woodland, Chaparral, or Plains Grassland at higher elevations (Brown 1994; p. 123). Most Semidesert Grasslands receive average annual precipitation between 9.5 to 17.5 inches, of which about 50 percent occurs between April and September. Perennial grass production is dependent primarily on the predictability and amount of precipitation during this period (Id., p. 123).

Many Semidesert Grasslands have been invaded by woody plants, leaf succulents, and cacti. This is believed to be caused by livestock grazing and increased aridity from decreased rains and increasing temperatures (Turner 1974; map).

Species typical of the Semidesert Grassland habitat includes catclaw acacia (*Acacia greggii*), foothill palo verde (*Parkensonia microphylla*), mesquite (*Prosopis velutina*), and columnar cacti such as the saguaro (*Cereus giganteus*). Additional species typical of the Semidesert Grassland habitat are fishhook barrel cactus (*Ferocactus wislizenii*), cholla (*Opuntia* spp.), prickly pear (*Opuntia* spp.), pincushion cacti (*Mammillaria* spp.), hedgehog (*Echinocereus engelmannii*) and burroweed (*Isocoma tenuisecta*). Typical grass species include needle grama (*Bouteloua aristidoides*), bush muhly (*Muhlenbergia porteri*), and three awn (*Aristida* spp.).

Within the proposed Project area, the primary locations of Semidesert Grassland habitat occur on the recharge site and on part of the ASLD portion of the pipeline alignment, which extends between the recharge site and Staker & Parson property. The recharge site has medium density of vegetation including approximately 94 small saguaro, 105 fishhook barrel cactus, numerous mesquite, cholla, and prickly pear, as well as annual forbs such as silverleaf nightshade (*Solanum elaeagnifolium*).

Arizona Upland Subdivision of the Sonoran Desertscrub

The Arizona Upland Subdivision of the Sonoran Desertscrub is also known as the Arizona Desert or Paloverde Cacti Desert. Approximately 90 percent of the Arizona Uplands Subdivision is on slopes, broken ground, and multi-dissected sloping planes (Brown 1994; p. 200). Average annual precipitation ranges between 7 inches to 16 inches. Summer rainfall accounts for 30 to 60 percent of the annual total. Winter precipitation ranges from 10 to 40 percent of the annual total.

The vegetation most often takes on the appearance of a scrubland or low woodland of leguminous trees with intervening spaces held by one to several open layers of shrubs and perennial succulents and columnar cacti (Brown 1994; p. 194). Vegetation within the subdivision includes its characteristic trees: foothill palo verde, blue palo verde (*Parkensonia florida*), mesquite, and catclaw acacia. Cacti in this subdivision include several species of cholla, saguaro, and pincushion cacti (*Mammillaria* spp.), to name a few.

The pipeline alignment from the PMR Lateral to Sahuarita Road consists of Sonoran Desertscrub habitat that has been disturbed by construction of various utilities and access roads. Vegetation in the area is sparse and includes mesquite, catclaw acacia, blue palo verde, fishhook barrel cactus, annual grasses, and forbs.

Riparian Communities

The Project area includes two types of riparian habitat according to Pima County habitat maps: Xeroriparian B and Important Riparian areas (Stantec Consulting, Inc. [Stantec] 2008; p. 5.3; Pima County 2005; p. 3). Xeroriparian B is moderately dense

riparian habitat generally associated with ephemeral drainages. These communities typically contain plant species found in adjacent upland habitats, but the plants are larger and/or occur at higher densities than the adjacent uplands. Small patches of Xeroriparian B habitat are located between the Staker & Parson property and the recharge site. Important Riparian habitat occurs along major river systems and provides critical watershed and water resource management functions as well as a framework for landscape lineages and biological corridors. Important Riparian habitat is valued for its water availability, vegetation density, and biological productivity compared to adjacent uplands. According to Pima County riparian maps, Important Riparian habitat is located along the Santa Cruz River near the pipeline crossing to Well #11.

Disturbed Habitats

The pipeline alignment along PMR, NH, ONH, ONH west to Well #11 and the booster station all occur within previously disturbed areas and/or dedicated ROWs. Vegetation cover is minimal with sparse mesquite, acacia (*Acacia* spp.), foothill palo verde, annual grasses, Russian thistle (*Salsola iberica*) and forbs. The type of disturbed vegetation varies along the 20-inch pipeline east of ONH. The first one-half mile east of the proposed Staker & Parson booster station contains a cover of annual grasses and forbs resulting from previous excavations and clearing. The remaining portion of the pipeline east to the recharge basin has been previously disturbed by the construction of power lines, but still contains mature mesquite trees and two small saguaros.

CWC Service Area

The vegetative communities within the CWC service area were not field verified. However, according to the Brown and Lowe (1994) map, the service area falls within the habitat types previously described. According to the Sahuarita General Plan (Sahuarita 2002), approximately 73% of the CWC service area is described as vacant, farm or ranch lands. The actual percentage of native habitat within this grouping is unknown. Likewise, the exact breakdown of habitat types within the vacant, farm or ranch lands is unknown, although the Arizona Upland Subdivision appears to be the predominate vegetative community.

3.4.1.2 Wildlife

Common bird species that may occur in the Project area include: curve-billed thrasher (*Toxostoma curvirostre*), mourning dove (*Zenaida macroura*), Say's Phoebe (*Sayornis saya*), Gila woodpecker (*Melanerpes uropygialis*), verdin (*Auriparus flaviceps*), rufous-winged sparrow (*Aimophila carpalis*), and black-throated sparrow (*Amphispiza bilineata*). In addition to resident species, the Sonoran Desert provides wintering and migratory habitat for various bird species including the white-crowned sparrow (*Zonotrichia leucophris*) and Brewer's sparrow (*Spizella breweri*), as well as raptors such as the northern harrier (*Circus cyaneus*), which descends into the Sonoran Desert for the winter.

The Sonoran Desert also exhibits a wide diversity of mammal species. Three rabbit species occur throughout this region, the desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), and the antelope jackrabbit (*Lepus alleni*). Other

typical desert mammals include the highly desert-adapted Merriam's kangaroo rat (*Dipodomy merriami*), the ubiquitous white-throated woodrat (*Neotoma albigula*), coyote (*Canis latrans*), and the collared peccary (*Pecari tajacu*).

Common lizards in the Project area include the tiger whiptail (*Aspidoscelis tigris*), side-blotched lizard (*Uta stansburiana*), and the poisonous Gila monster (*Heloderma suspectum*). The variety of small mammals provides an abundant prey source for the red racer (*Masticophis flagellum picues*), western diamondback (*Crotalus atrox*), and gophersnake (*Pituophis catenifer*).

Wildlife species (or sign) observed in the Project area include collared peccary, jackrabbit, red tail hawk (*Buteo jamaicensis*), and coyote. A list of additional fauna expected to occur in the Project area is provided in Appendix C.

3.4.1.3 Threatened and Endangered Species

Table 4 summarizes the federally listed species (listed species) and designated and proposed critical habitat identified by the U.S. Fish and Wildlife Service (FWS) as potentially occurring in Pima County (FWS 2008).

Impacts to federally listed aquatic species associated with importation of nonnative fish species into the Santa Cruz basin via the CAP were considered under the "Reinitiated Biological Opinion on the Transportation and Delivery of CAP Water to the Gila River Basin in Arizona and New Mexico and its Potential to Introduce and Spread Non-indigenous Aquatic Species" dated May 15, 2008. Impacts to listed aquatic species are not further discussed herein. Two listed species have suitable habitat in the Project area, and may be affected by the Preferred Alternative. They are discussed below.

Table 4. Federally Listed, Proposed, and Candidate Species, and Designated or Proposed Critical Habitats.

Common Name	Scientific Name	Federal Status	Habitat	Determination of Presence of Suitable Habitat in Project Area
MAMMALS				
Jaguar	*Panthera onca*	Endangered	Found in Sonoran desertscrub up through subalpine conifer forest	Arizona population extirpated. Possible Mexican transients
Lesser Long-nosed Bat	*Leptonycteris curasoae verbabuenae*	Endangered	Desert scrub habitat with agave and columnar cacti present as food plants	Suitable habitat within the Project area
Ocelot	*Leopardus (Felis) pardalis*	Endangered	Humid tropical and sub-tropical forests, savannahs, and semi-arid thornscrub	Vegetation lacks density to support species

Common Name	Scientific Name	Federal Status	Habitat	Determination of Presence of Suitable Habitat in Project Area
Sonoran Pronghorn	*Antilocapra americana sonoriensis*	Endangered	Broad intermountain alluvial valleys with creosote-bursage and palo verde-mixed cacti associations	Outside of known range
BIRDS				
Masked Bobwhite	*Colinus virginianus ridgewayi*	Endangered	Desert grasslands with diversity of dense native grasses, forbs, and brush	Outside of current population range
Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened	Nests in canyons and dense forests with multi-layered foliage structure	Outside of current elevation range
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Endangered	Cottonwood/willow and tamarisk vegetation communities along rivers and streams	No suitable habitat present
Yellow-billed Cuckoo	*Coccyzus americanus*	Candidate	Nests in relatively dense riparian habitat, willow, cottonwood and salt cedar	No suitable habitat present
FISH				
Desert Pupfish	*Cyprinodon macularius macularius*	Endangered	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	Perennial flows absent in this reach of the river.
Gila Chub	*Gila intermedia*	Endangered	Pools, springs, cienegas, and streams	Perennial flows absent in this reach of the river
Gila Topminnow	*Poeciliopsis occidentalis*	Endangered	Small streams, springs, and cienegas vegetated shallows	Perennial flows absent in this reach of the river
AMPHIBIANS AND REPTILES				
Chiricahua Leopard Frog	*Lithobates (Rana) chicahuensis*	Threatened	Streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish and bullfrogs	No permanent water source on or near site
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	Candidate	Ponds and streams	No permanent water source on or near site
PLANTS				
Huachuca Water Umble	*Lilaeopsis schaffneriana* ssp. *recurva*	Endangered	Cienegas, perennial low gradient streams, wetlands	Outside of current range

Common Name	Scientific Name	Federal Status	Habitat	Determination of Presence of Suitable Habitat in Project Area
Kearney Blue Star	*Amsonia kearneyana*	Endangered	West-facing drainages in the Baboquivari Mountains	Outside of current range
Nichol Turk's Head Cactus	*Echinocactus horizonthalonius* var. *nicholii*	Endangered	Sonoran Desertscrub	Outside of current range
Acuna Cactus	*Echinomasatus erectocentrus* var. *acunensis*	Candidate	Well drained knolls and ridges in Sonoran Desertscrub	No suitable habitat present
Pima Pineapple Cactus	*Corypantha scheeri* var. *robustispina*	Endangered	Sonoran Desertscrub or Semidesert Grassland communities	Suitable habitat present in the Project area

Lesser Long-Nosed Bat

The lesser long-nosed bat (LLNB) was listed as endangered on September 30, 1988 (53 FR 38456). It is a medium sized bat, yellowish brown or pale gray on top with cinnamon brown lower parts (FWS 2001). The LLNB has an elongated nose and a small triangular leaf on the end of its snout and a minute tail. The LLNB migrates north to Arizona in the summer to give birth and raise young; it returns to Mexico to breed during winter months. The LLNB cannot withstand prolonged exposure to cold temperatures (Dalton 1996).

The current range of the LLNB includes central Arizona to southwest New Mexico, extending to El Salvador (AFGD 2003). Its habitat is described as desertscrub with agaves, saguaros, and organ pipe cactus. The LLNB is a seasonal resident of southeastern Arizona in Cochise, Pima, Pinal, Maricopa, Santa Cruz, and Graham counties. Daytime and maternity roosts are located in caves and abandoned mines.

Known threats to the LLNB include urban development, loss of food resources through bootleg harvesting of agaves, catastrophic fire, and a new threat of illegal border crossings associated with enforcement actions, and possibly new wind farms (FWS 2007a; p. 9).

The LLNB feeds on nectar from agaves and columnar cacti, such as saguaros. There is a mutualistic relationship between the LLNB and its forage species (FWS 2007a; p. 13). Reports show that the LLNB will repeatedly travel long distances to forage when resources are scarce (Bogan 2007). However, foraging studies have also shown that the LLNB will fly long distances to forage even when forage resources are available closer to the roosting site (FWS 1994; p. 15). Because Leptonycteris bats forage over such a wide area, large roosts require extensive stands of cacti or agaves for food (FWS 2007a; p. 14). This emphasizes the importance of maintaining food resources in close proximity of roost sites.

There are LLNB roosts in the Santa Rita and Rincon Mountains. The nearest recorded maternity roost to the Project area is located 21 miles to the northeast. A colony is located 13 miles to the southeast (S. Schwartz, Arizona Game and Fish Department (AGFD), pers. comm. 2008). Both of these sites are within the 40-mile foraging radius of LLNB as determined by FWS (S. Richardson, FWS, pers. comm. 2008).

Foraging habitat within the proposed recharge site is limited to one mature saguaro located in the recharge site. However, immature saguaros also are found on site that would provide future foraging resources. Two small saguaros occur on the pipeline alignments.

Pima Pineapple Cactus

The Pima pineapple cactus (PPC) was listed endangered on September 23, 1993 (58 FR 49875). The range of PPC is limited to Pima and Santa Cruz counties of Arizona and northern Sonora, Mexico. The current range extends from the Baboquivari Mountains east to the western foothills of the Santa Rita Mountains (FWS 2000). The northern limit of the range is near Tucson (FWS 2000). The PPC is described as a 4- to 18-inch dome shaped cactus with yellow silky flowers that blooms in early July, when summer rains begin, and continues flowering through August. Clusters of 6 to 15 spines, with a central usually hooked spine, appear on finger-like projections called tubercles. PPC prefer open areas on flat ridge tops of the Semidesert Grassland or the Sonoran Desertscrub habitat dominated by white-thorn acacia (*Acacia constricta*), mesquite, thread snakeweed (*Gutierrezia microcephala*), triangle bursage (*Ambrosia deltoidea*), various cacti and grasses (AGFD 2001). The PPC also can be found in alluvial basins or on hillsides. This species seems to prefer deep alluvial soils (silty to rocky) of granitic origin (Ecosphere 1992; p. 11). It is most often found on south- or east-facing slopes between 2,500 feet to 3,800 feet in elevation (Ecosphere 1992; p. 11).

Known threats to this species include habitat loss associated with off road vehicle use, road construction, agriculture, mining, habitat degradation due to livestock grazing, alteration of habitat due to aggressive nonnative grasses, and illegal collection (AGFD 2001). It is believed that residential and commercial development and its infrastructure are the greatest threat to PPC (FWS 2007b; p. 10). Continued growth in Green Valley and Sahuarita has resulted in increased developmental pressure on PPC habitat.

Invasive species have the potential to alter the ecosystem of the plant community by forming monotypic stands that do not allow for regeneration of native species and create a much heavier fuel load with higher fire intensities. This change in plant composition can lead to a permanent change in the plant community by allowing fires to burn hotter and more frequently than would occur in the natural vegetation. Certain species such as the PPC that are not fire-adapted can be lost as a result of such fire.

The Proposed Project occurs within suitable PPC habitat. A PPC survey was completed on all proposed pipeline alignments and the entire recharge site in accordance

with the FWS recommended survey protocol. A total of five PPC were found within the proposed recharge site (Stantec 2008; p. 9.22).

3.4.2 Environmental Consequences

3.4.2.1 No Action

The No Action Alternative would not alter the vegetation patterns, wildlife populations, or threatened and endangered species in the vicinity of the Proposed Project. Because the No Action Alternative would not result in construction, the biological resources would remain unchanged.

3.4.2.2 Preferred Alternative

3.4.2.2.1 Vegetation

Construction of the pipeline would occur primarily in Semidesert Grasslands and Sonoran Desert Scrub habitat. Impacts to these vegetation communities would be minimized by locating the pipeline within existing easements with limited native species present. Approximately 52 acres of previously disturbed habitat would be affected by pipeline construction. Construction of the recharge site would disturb about 13.5 acres of Semidesert Grassland. All saguaro and PPC within the portions of the recharge site to be disturbed would be relocated to suitable habitat in the buffer area surrounding the recharge site. Semi-Desert Grassland and Sonoran Desert Scrub habitats remain abundant habitats in southeastern Arizona, despite increased losses due to development. Loss of a total of about 66 acres of these two types of habitat would not be considered adverse based upon the acreage still remaining in the region. Nevertheless, this loss will be offset through acquisition and preservation of 20 acres of PPC habitat from the Conservation Bank (see Section 3.4.2.2.3).

Important Riparian habitat along the Santa Cruz River would be avoided by boring the proposed future pipeline underneath the river and riparian area. The pipeline alignment has been located in areas with limited riparian vegetation in order to reduce impacts; however, approximately 0.7 acre of Xeroriparian B habitat found between the Staker & Parson property and the recharge site would be disturbed by pipeline construction. This vegetation is patchy in distribution. Widening the existing road would result in habitat loss that would be spread out over a linear strip along the existing road. This minor habitat loss would result in a negligible impact to the existing habitat values of the area. No wetlands would be impacted by the Preferred Alternative.

All disturbed areas not required for permanent facilities would be revegetated with an appropriate native seed mix following construction. Revegetation of the ROW on ASLD land would be negotiated with that agency according to its standard practices. Best management practices would be used during construction to minimize the introduction and spread of noxious weeds. Ongoing weed control would be used during and after the construction to minimize the colonization of disturbed areas by nonnative grasses that may degrade potential PPC habitat (see Section 3.4.2.2.3).

3.4.2.2.2 Wildlife

Mammal, bird, and reptile species common to the region would be temporarily displaced during pipeline construction, and there would be loss of some individuals; however, wildlife use of this habitat is limited because of the proximity to major roads along most of the pipeline route. Revegetation following construction, of disturbed areas not needed for permanent facilities, would restore vegetative cover along the pipeline. Construction of the recharge site would result in a long-term loss of 13.5 acres of wildlife habitat for reptiles, small mammals, and birds as well as large mammals such as mule deer (*Odocoileus hemionus*) and collared peccary. Individual species would be forced to move into adjacent suitable habitat, and there would be a loss of individuals during construction; however, this type of habitat remains abundant in the region. It is anticipated that populations would adjust and stabilize within the region after a period of time. Transplanting saguaro cacti from the recharge site to surrounding lands would maintain the potential for future use of this habitat by foraging LLNBs. Similar benefits would accrue for primary (woodpeckers) and secondary (owls) cavity nesters. Impacts to migratory birds would be avoided by performing construction work outside the breeding season or conducting clearance surveys prior to construction. If an active nest is found during clearance surveys, the nest would be avoided until after the breeding season. A barbed wire fence would be installed to restrict public access, but permit wildlife movement. Protection of PPC habitat (as described below) would also afford protection to general wildlife species.

3.4.2.2.3 Threatened and Endangered Species

Lesser Long-Nosed Bat

No saguaro cacti or suitable LLNB habitat would be impacted along the pipeline route, booster station location, proposed contractor use areas, or fill storage areas. Approximately 13.5 acres of the 20-acre recharge site would be cleared of all vegetation including an unknown number of the 94 saguaro cacti. Only one saguaro has reached maturity and is capable of producing flowers. The remaining 93 saguaros have not developed arms and are generally less than 6 feet tall. Removal of one mature saguaro cacti would have no discernable effect on LLNB foraging in this area.

To minimize the effects on the LLNB, all saguaro cacti removed from the recharge site would be transplanted to the buffer area or undisturbed area south of the recharge basins within the 20-acre site. Relocation of the saguaro cacti would be completed by a qualified contractor familiar with the requirements for moving cacti. The survival rate for saguaros is greater if they are less than 6 feet in height (Harris et al. 2004), transplanted with care, properly oriented and maintained after transplanting. The transplanted saguaro cacti would maintain future foraging resources for local bat populations.

There would be no effect to the LLNB from increased noise due to construction activities at the recharge site or along the pipeline alignments during construction. Construction work would occur primarily during daylight hours and cease prior to normal bat foraging times.

Infrequent travel on the road to the recharge site would have no discernible effect on bat foraging activities. Staker & Parson limits entry to its property, making access difficult for the public. Periodic use of large equipment during the day to clean and maintain the recharge ponds, and maintain the pumps, equipment, and pipes would have no effect on bat activity.

Reclamation submitted a Biological Assessment (BA) to the FWS on November 25, 2008. The BA concluded the Preferred Alternative may affect but is not likely to adversely affect the LLNB. This conclusion is based on the following: 1) there are no roost sites in the Project area; 2) the Project area covers only a minor portion of the total range of the LLNB; 3) the Preferred Alternative would not affect the ability to recover the LLNB; and 4) there would be no associated reduction in roost site occupancy or loss of existing forage resources (Stantec 2008; p. 8.19). In addition, relocation of the saguaros from the recharge basins to undisturbed land within the 20-acre site should provide future forage sources for the LLNB.

Pima Pineapple Cactus

Reclamation submitted a BA to the FWS on November 25, 2008 which concluded the Preferred Alternative may affect, and is likely to adversely affect the PPC. The Proposed Project would result in the loss of five PPC and approximately 13.5 acres of suitable habitat at the recharge site. Although CWC intends to relocate the five PPC into the buffer area, transplanting PPC is generally unsuccessful. Therefore, CWC proposes to offset these adverse impacts through the purchase of 20 acres of credits from an approved conservation bank for the PPC. Conservation banks protect existing PPC communities from disturbance to ensure viability of regional populations.

The introduction and spread of invasive plant species within PPC habitat have the potential to alter the plant community by crowding out native species and replacing them with species which provide a heavier fuel load and higher fire potential. These changes in vegetative composition permit fires to burn hotter and more frequently than what naturally occurs with the native vegetation. As a result, the potential for fire-related mortality of PPC is increased.

Several weed control measures would be utilized to minimize potential adverse effects to PPC habitat that may be present on lands bordering the recharge site and other areas of the Proposed Project. Construction equipment would be washed with high-pressure cleaning instruments, to remove a potential source of weeds before moving into a construction area. Additionally, active construction sites would be closed to vehicles that are not involved with construction, and public access to the recharge site would be restricted. Construction areas would be monitored for noxious weeds during construction and would be treated as needed during and for 2 years following construction. Noxious weeds would be treated with glyphosate herbicide. Disturbed areas would be revegetated with salvaged native species. Additionally, a native seed mix appropriate for the area would be applied to disturbed areas after construction to help prevent weed invasion.

3.4.2.3 CAP Entitlements Alternative

The same amount of previously disturbed habitat would be impacted by this alternative as the Preferred Alternative. Due to the lack of vegetation and wildlife habitat along the pipeline route, the impacts to these resources would be essentially the same as for the proposed alternative. The impacts to the federally endangered LLNB and PPC would be the same as the Preferred Alternative because the new facilities and area of disturbance would be the same under both alternatives. The CAP Entitlement alternative would implement the same mitigation measures at the Preferred Alternative. No additional threatened or endangered species would be affected.

3.4.2.4 CWC-Only Alternative

The same amount of previously disturbed habitat would be impacted by this alternative as the Preferred Alternative. Due to the lack of vegetation and wildlife habitat along the pipeline route the impacts to these resources would be essentially the same as for the proposed alternative. The CWC-Only Alternative would have slightly less impact on LLNB and PPC than the Preferred Alternative because the recharge basin would be about 40 percent smaller, with a disturbance area of about 8.1 acres. The smaller disturbance area would reduce the number of saguaro cacti that would require transplanting. It is likely that three PPC would be lost under this alternative. Mitigation measures would be the same as the Preferred Alternative, although the purchase of mitigation credits for the PPC would be reduced proportionally because of the reduced impacts.

3.4.3 Cumulative Effects

As described in Section 3.1, a number of road and housing projects are expected to occur within the impact area of the Proposed Project. These actions may result in future loss or degradation of vegetation, wildlife habitat, and LLNB foraging habitat. The Preferred Alternative's contribution to cumulative impacts to vegetation, wildlife and LLNB foraging habitat, taking into consideration the planned mitigation measures, would be small, especially with respect to planned developments expected to occur. Reasonably foreseeable actions by non-federal entities are expected to result in continued loss and further fragmentation of PPC habitat. The Preferred Alternative's contribution to the cumulative loss of PPC would be offset by purchasing replacement habitat from a conservation bank.

Consideration of cumulative effects and future federal actions under the Endangered Species Act (ESA) is specifically dictated by that Act. Pursuant to the ESA, consideration of cumulative effects does not include any future federal action. The CNF will be required to prepare a BA to determine whether or not the proposed Rosemont Mine would affect any federally listed or proposed species, or designated or proposed critical habitat. The CNF's BA will be required to include this Proposed Project as part of the baseline for determining the Mine's potential effect to any federally protected species or critical habitat as part of the CNF's compliance with the ESA.

3.4.4 Mitigation Commitments

1. All disturbed areas resulting from construction that are not needed for permanent facilities would be revegetated with an appropriate native seed mix.
2. All saguaro cacti impacted by construction would be relocated to the buffer area or the area south of the recharge basins within the 20-acre site.
3. Impacts to migratory bird species would be avoided by constructing outside the breeding season, or conducting clearance surveys prior to construction. If an active nest is found during clearance surveys, the nest would be avoided until after the breeding season.
4. If any previously unidentified listed species are identified, construction activities would stop in the immediate area and Reclamation personnel would be notified.
5. All equipment would be power-washed to remove invasive weed seeds prior to being brought into the construction area.
6. Growth of noxious weeds would be monitored during construction and treated as needed during and for 2 years following construction.
7. Public access into the construction zone would be restricted.
8. The buffer area would be protected with a barbed wire fence.

3.5 Cultural Resources

The Project area for cultural resource impacts is the corridor within ½ mile of the Proposed Project facilities. The Project area for analysis of cumulative impacts to cultural resources is the broader 8-mile radius surrounding the proposed recharge facility.

3.5.1 Affected Environment

3.5.1.1 Area Context

The Project area is located within the Santa Cruz River valley, which has a long prehistory and history. The general region has seen human activity for more than 10,000 years, evidenced by the discovery of mammoth remains and Paleoindian projectile points in the Santa Cruz watershed. Between Tucson and Green Valley, many areas of moderate to high cultural resource density are found. Site types range from sherd and lithic scatters to major prehistoric and historic villages and towns. At lower elevations near the river, prehistoric site density is high and includes numerous sites dated from the Archaic period to the present. Hohokam sites are common and range from small lithic and sherd scatters to large villages. At higher elevations away from the river, numerous prehistoric trails, campsites, petroglyphs, and other resource procurement sites are evident. Well known sites between Tucson and Green Valley include the Valencia site, Julian Wash, St. Mary's, Los Morteros, and Punta de Agua. O'odham sites from the protohistoric period are also common. The area also has a number of historic sites connected to Native American, Spanish, Mexican and Anglo occupations. Important sites such as the San

Xavier Mission, Agua Caliente Ranch and others contribute to the full range of sites representing every historic context including mining, commerce, farming, transportation, and ranching. Near the terraces and floodplain of the Santa Cruz River, the potential for buried cultural deposits is high.

3.5.1.2 Cultural History

Paleoindian Period (9500–6000 B.C.)

The earliest human occupation of the Americas is generally attributed to the Paleoindian period, which, in southern Arizona, is represented by the Clovis, Folsom, and San Dieguito traditions. Paleoindian groups are generally characterized as a pre-agricultural, highly mobile hunter-gatherer society that was well adapted to the Late Pleistocene environment (Cordell 1984; pp. 138–142; Martin and Plog 1973; p. 44). These groups, however, probably relied most heavily on small game and the gathering of wild plant resources.

Clovis people (ca. 9000-8000 B.C.) are thought to have used large territories to hunt megafauna, such as bison and mammoth, which became extinct at the end of the last Ice Age. This tradition is characterized by the diagnostic "Clovis" projectile point with their finely made fluted faces and ground distal end. Although some of the most famous Clovis sites are found in southern Arizona, they are rare. Only a few surface Clovis projectile points have been recovered in the Tucson Basin (Bronitsky and Merritt 1986: p. 95) representing the only Paleoindian remains found in the Tucson area. No remains have been identified as Folsom or San Dieguito in the Tucson Basin. This scarcity of Paleoindian remains in general may be due to the fact that late Pleistocene deposits are deeply buried by recent alluvium.

Archaic Period (7500 B.C.–A.D. 200)

Much like the previous Paleoindian tradition, the Archaic Period was originally described as a largely non-sedentary and widespread hunting-gathering culture. Relatively recent excavations at sites within the Santa Cruz River floodplain in Tucson show that the end of the Archaic Period is characterized by a shift to a more sedentary lifestyle with a gradual commitment to agriculture. High mobility and a subsistence strategy based on hunting and gathering characterize Early Archaic period groups. Middle Archaic groups had smaller territories, relied on large and small game, and used a range of wild plants. Many researchers now prefer the term "Early Agricultural" for the Late Archaic period to reflect the adoption of cultivation and increased sedentism at least along major waterways (Moses and Luchetta 2008; p.10).

Hohokam (A.D. 200–1450)

The Hohokam culture is present in southeastern Arizona beginning around A.D. 200, as evidenced by the large number of sites recorded in the Phoenix and Tucson basins. The Hohokam were sedentary agriculturalists who constructed pithouses, produced plain and decorated pottery, and created numerous other crafts of shell, stone, and clay. The Hohokam also constructed extensive irrigation canal systems along the major river

valleys. The Hohokam cultural sequence was established during the late 1930s using the various decorated pottery types excavated at Snaketown, a large village along the Gila River north of the Tucson basin. This chronology was modified for the Tucson Basin and was later refined to reflect newly collected data (Moses and Luchetta 2008; p. 11).

Early interpretations of the origins of the Hohokam were debated – whether they represented an intrusive migration from the south or an indigenous, in-situ development. Most archaeologists presently accept a model of indigenous origins for the Hohokam. This model is supported by recent excavations at Early Ceramic (AD 200-450) sites along the Santa Cruz River that include features common in Early Agricultural/Late Archaic occupations such as pithouses, storage pits, and ditch agriculture with those that are more characteristic of the later Hohokam occupation.

Pioneer Period (A.D. 450–750). Pioneer period Hohokam sites are not well represented in the region, although recent excavations at Valencia Vieja (Wallace 2003) have provided much information about this early period. Controversy still exists among archaeologists with regard to the nature of the early Pioneer period materials in the area. Recent excavations have documented an Early Ceramic period occupation characterized by small pithouse villages and plain ware pottery in the Tucson Basin by A.D. 200. Red ware pottery and more substantial architecture have been found at several sites dating to A.D. 450. However, more data are needed from Early Ceramic period sites to clarify the nature of their occupations and their relationship to Late Archaic/Early Agricultural period.

Colonial Period - Cañada del Oro (A.D. 750–850) and Rillito (A.D. 850–950) Phases. By the Colonial period, Hohokam populations were growing and the cultivation of maize, beans, squash, and cotton was widely practiced. Large village sites were established, primarily along major drainages. At least three communities in the Tucson Basin, including the Romero Ruin community in the Catalina State Park, are known to have had ballcourts during the Cañada del Oro phase. These features probably served as focal points for ceremonial or recreational activities and community integration. This period witnessed the emergence of the Tucson Basin red-on-brown decorated ceramics, which are distinct from the red-on-buff pottery found in the Phoenix area.

Sedentary Period - Rincon Phase (A.D. 950–1150). The Sedentary period witnessed the greatest expansion in settlement patterns with communities establishing villages along secondary drainages. Evidence of the practice of non-riverine agriculture is present in the form of rock pile fields, terraces, and check dams. Large "primary villages," such as portions of the Punta de Agua site, are present along the floodplain of the Santa Cruz and the Rillito Rivers during early Rincon times. The late Rincon period is characterized by a more dispersed pattern of small agricultural hamlets. Intrusive artifacts in the Sedentary period show evidence of increased trade with other cultural groups. Ceramics from the Sedentary period exhibit a change from the Colonial period. Vessel construction changed; the painted designs were often thicker and heavier (Moses and Luchetta 2008; p.11).

Classic Period - Tanque Verde A.D. 1150–1300) and Tucson (A.D. 1300–1450) Phases. Major changes took place in the Hohokam culture during the Classic period. Many large village sites that had been occupied since the Pioneer period were abandoned. New styles of architecture were developed, such as adobe-walled surface houses often arranged in walled compounds. Ballcourts were no longer used, and platform mounds emerged as the predominant form of public/ceremonial architecture. Interment was added to cremation as a mortuary practice. Extensive non-riverine agricultural features are found at Classic period sites throughout the basin.

Ceramic assemblages from this period show a shift from interior to exterior designs on bowls and a trend toward more rectilinear designs. Changing trade patterns are observed in the reduction of buff wares from the Phoenix Basin and an increase in polychrome pottery from the Tonto Basin.

Protohistoric Period (A.D. 1540–1700)

The Protohistoric refers to that time period which comprises the period between the first European influence and actual European presence in an area. In southern Arizona, Spanish influence increased as Spanish missionaries and communities moved into what is now northern Mexico and New Mexico, but the first recorded extended Spanish presence did not occur until the 1690s. Before this, Spanish influence was largely represented by the introduction of trade goods, such as glass beads, some domesticates, and some population movements. During times of initial contact, the Spanish encountered several established O'odham groups within the region, including the Akimel O'odham (Pima), the Tohono O'odham (Papago), the Hia Ced O'odham (Sand Papago) and, most importantly, the Sobaipuri. Although the Spanish recognized these as separate groups, they are now considered four specific groups within the O'odham culture. The sites dating from this period are characterized by a perceived reduction in cultural complexity, and areas that were villages in prehistoric times appear as small clusters of cobble-based oval huts. The larger clusters included house structures, food storage structures, ramadas and cooking windbreaks. Toward the end of the Protohistoric period, other site types included rock circles, corrals and Rancheria-type settlements. Pottery was thin-walled plainware, with some black-on-buff and stuccoed wares.

The first recorded European contact in the area occurred in the 1690s by a Jesuit missionary named Eusebio Francisco Kino and his military escort (Moses and Luchetta 2008; p. 12). Father Kino referred to the native O'Odham inhabitants as Sobaipuris. Sobaipuri settlements were located along the Santa Cruz and San Pedro Rivers, with the largest settlement found near the present-day San Xavier community. By the end of the century, Kino established a rudimentary church and the beginnings of a permanent mission at San Xavier and other Upper Santa Cruz (USC) villages.

Historical Period (A.D. 1700–Present)

After the initial Spanish contact in the 1690s, little European influence occurred until the mid–1700s. At this time, Spanish interests were concentrated south of the Project area in the USC Valley, where a Spanish presidio had been erected at Tubac in 1752, not far

from the mission at Tumacacori. In 1757 the first missionary settlement of San Agustin was established near present-day Tucson. Subsequent population growth along the Santa Cruz led to a concomitant increase in the level of Apache raiding in the area. In response to the Apache threat and increased Spanish interest, a fortified mission at San Agustin was built in the early 1770s (Harte 1980; p. 6).

In 1775, to further increase Spanish control in the Tucson area, the Tubac Presidio was abandoned and the garrison temporarily moved to the new San Xavier del Bac mission. A new presidio, named San Agustin de Tucson, was constructed and garrisoned in the area of present-day downtown Tucson. By 1783, the Presidio was fully developed. The Spanish retained a presence in Tucson until l821, when Mexico won its independence from Spain and claimed her territories (Moses and Luchetta 2008; pp. 12-13).

Near the Proposed Project is the San Ignacio de la Canoa land grant. This grant covered over 17,000 acres and was granted to Tomas and Ignacio Ortiz in 1821. Spanish rule ended that same year, but Mexican settlers lived throughout the area. Hostilities with local Indians ended the Ortiz's ranching operations and little was done with the ranch until it was purchased in the late 1800s for cattle ranching.

During the period of Mexican control, there was little economic growth in the area. In 1853, the area came under the control of the United States as a result of the Gadsden Purchase. Growth in the region continued to be slow until the start of the Civil War, when an increase in the demand for precious metals caused a mining boom in the newly organized Arizona territory (Id.; p. 12). The surge in economic activity again was accompanied by an increase in Apache raiding. The Southern Pacific Railroad reached Tucson in 1880 and brought people and resources to the area, stimulating ranching and mining activities. In the 1880s and early 1900s, several small ranches run by Mexican families were established in the eastern portion of the Tucson Basin, and shortly afterward, Anglo-American homesteaders moved into the area (Id.; p. 13). In the 1920s, the Great Depression limited economic growth. Recovery from the Great Depression was extremely rapid in the region, evident in the large population increase. Since the early part of the twentieth century, this region has been utilized for agricultural and mining purposes.

3.5.1.3 Project Research

Prior to conducting fieldwork in the Project area, a Class I records review was performed at the Arizona State Museum (ASM) in Tucson, the State Historic Preservation Office (SHPO) in Phoenix, and on the ASM's online database AZSite. This research was conducted to analyze the extent of archaeological work and to determine whether any previously recorded sites were present in or within ½ mile of the Proposed Project facilities. This records review identified 42 previous archaeological surveys have been completed (AZSite 2008), 15 of which covered areas within the limits of the Project construction corridor (Table 5). Three of these surveys covered most of the Project corridor; Archaeological Research Services (ARS) of Tempe surveyed the entire 6-mile long portion of the Project corridor between PMR to its intersection with the potential El

Corto Road alignment during the Tucson-Nogales Fiber Optics Right of Way Survey (ASM project number 1995-72.ASM, Adams and Hoffman 1995; AZSite 2008). ARS surveyed this same area again in 2000 during the Tucson Maintenance B-19 Survey (ASM project number 2000-823.ASM, Wright 2000; AZSite 2008). Finally, SWCA surveyed a portion of the ROW in 1997 (1997-257.ASM, Tucker 1995; AZSite 2008). Furthermore, Harris Environmental Group surveyed a portion of Sahuarita Road in 2007 (Luchetta and Shaw 2007; AZSite 2008). Although the results from this survey have not yet been updated in the AZSite or ASM records, several new sites were recorded and previously recorded sites were reassessed.

Table 5. Previous Surveys within the Project Corridor.

ASM Project Number	Recording Agency	Land Surveyed, Sites Recorded	Reference
1938-96	No information	No information	No information
1964-8	ASM	Tucson to Nogales, 17 sites	No reference
1980-106	ASM	300 acres, no sites	No reference
1988-177	ASM	3 acres surveyed, no sites	Euler 1988
1988-240	P.A.S.T.	810 acres, 2 sites	Stephen 1988
1992-77	SWCA	2.8 miles long, 1 site	Rea 1992
1995-72	Archaeological Research Services, Inc.	453 acres, no sites	Adams and Hoffman 1995
1995-82	P.A.S.T.	84 acres, 4 sites	Stephen 1995
1997-257	SWCA	832 acres, 11 sites	Tucker 1995
2000-650	Tierra Archaeological and Environmental Consultants	0.08 acre, no sites	Fratt and Olsson 2000
2000-823	Archaeological Research Services, Inc.	217 acres, 4 sites	Wright 2000
2003-188	Tierra Right-of-Way Services, Ltd.	400 acres, 2 sites	Thurtle 2002
2003-581	Desert Archaeology, Inc.	19 acres, no sites	Ruble 2003
2004-629	Tierra Right-of-Way Services, Ltd.	180 acres, no sites	Doak 2004
No Number assigned	Harris Environmental Group	28 acres, 1 site	Luchetta and Shaw 2007

Initially, the proposed recharge basin was investigated for cultural resources so that limited testing could occur to determine the site's suitability for recharging water to the aquifer. Field work for that survey was conducted on June 15, 2008 and a cultural resources report was completed on June 16, 2008 (Moses and Larkin 2008). No cultural sites were found on the proposed 20-acre recharge site. On September 17, 2008, fieldwork was conducted to survey the proposed pipeline corridor. No new cultural sites were found, but seven previously recorded sites were reassessed and a cultural resources

report was completed on September 24, 2008 (Moses and Luchetta 2008). The current survey results are consistent with the previous survey work that has taken place within the Project corridor.

The construction of the Proposed Project would have little impact within the CWC service area itself, estimated to be about 8 square miles between Anamax Road and Mission Twin Buttes Road to the south. Six previously recorded archaeological sites are located within the service area: five represent Hohokam era artifact scatters and one a possible Archaic artifact scatter with two fire pits. Many of these have been disturbed by road construction and erosion.

Records indicate that seven archaeological sites have been recorded within the Project corridor (Table 6).

Table 6. Previously Recorded Sites within the Project Corridor.

Site Number	Description and Cultural Affiliation	Size in Meters	NRHP Eligibility
AZ BB:13:407(ASM)	Historic artifact/trash scatter and features	46 by 55	Recommended not eligible by recorder
AZ EE:1:409(ASM)	Sahuarita Road/Twin Buttes Road	NA	Not considered eligible by recorder
AZ BB:13:679(ASM)	Tucson & Nogales R.R.	NA	Portions within Project corridor not considered eligible by recorder
AZ EE:1:78(ASM)	Original town limits of Sahuarita	NA	Recommended eligible by recorder
AZ EE:1:300(ASM)	Twin Buttes Railroad	NA	Not considered eligible by recorder
AZ EE:1:350(ASM)	Historic artifact/trash scatter and berms	NA	Not considered eligible by recorder
AZ I:3:10(ASM)	U.S. Highway 89	NA	Portions within Project corridor not considered eligible by recorder

No previously unknown sites were discovered within the Project corridor during the current surveys. The previously recorded sites include:

AZ BB: 13:407(ASM) - Historic-period artifact scatter with feature foundations. Site recording during the initial survey in August 1992 as well as during the current survey has effectively exhausted the research potential at this site. The Proposed Project design change to begin the proposed pipeline near the Pima Mine Road Recharge Project effectively removes this site from the project footprint. The site is recommended as not eligible to the National Register of Historic Places (NRHP).

AZ EE: 1:409(ASM)-Sahuarita Road. This historic-period road was originally recorded in 2007. The portion of the site near the Project corridor consists of Sahuarita

Road east of US 89. The site has been impacted by modern grading and construction and it is therefore considered not eligible to the NRHP.

AZ BB: 13:679(ASM)-Tucson & Nogales Railroad line. Sections of this property have been recommended eligible. Although this spur line was initially built in 1882, the portion within the current Project corridor is recommended not eligible as it has been repeatedly upgraded and no longer retains any of its original components.

AZ EE: 1:78(ASM)-Original Town Limits of Sahuarita. This site was re-evaluated in 2007 by Harris Environmental Group, Inc. of Tucson and recommended eligible under criteria A and C (AZSite 2008). The reassessment conducted for this Proposed Project concurred with this recommendation. Should the current undertaking impact any of the features, additional research should be conducted. Proposed Project plans indicate that known historic features would be avoided and impacts would be limited to the previously disturbed ROW.

AZ EE: 1:300(ASM)) - The Twin Buttes Railroad line. The original recording agency recommended this property, originally built around 1905, as not eligible as it has been upgraded and no longer retains any of its original components. The section of this property to be affected by the Proposed Project has been determined not to be an eligible property.

AZ EE: 1:350(ASM) - Historic-period artifact scatter. This site was recommended not eligible to the NRHP when it was originally recorded by Tierra Right-of-Way Services in August of 2002 (AZSite 2008). The reassessment conducted for this Proposed Project is in concurrence with this recommendation. The site lacks integrity; as such the recent survey recordation has effectively exhausted the research potential at this site.

AZ I: 3:10(ASM)-U.S. Highway 89 (Interstate 19). Various segments of the highway have been investigated over the years with both eligible and ineligible recommendations. The portion within the current Project corridor is recommended not eligible as it has been upgraded and maintained over the years and no longer retains any historic integrity.

3.5.1.4 Laws, Ordinances, Regulations, and Standards

Because the Proposed Project has a federal nexus, it is subject to compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), as implemented through 36 CFR 800. Section 106 is the most detailed and explicitly defined authority applicable to the Proposed Project with regard to cultural resources. It requires federal agencies to consider the effects of their actions, including approval, permitting, and technical assistance on properties that are eligible for, or included in, the NRHP. Historical sites, objects, districts, historic structures, and cultural landscapes that are eligible for listing in the NRHP are referred to as "historic properties." Section 106 also requires the federal agency to afford the Advisory Council on Historic Preservation an opportunity to comment on the agency's efforts to consider historic properties. The implementing regulations for Section 106 describe a process of inventory, evaluation, and

consultation that satisfies the federal agency's requirements. The criteria used for determining the eligibility of cultural resources are found at 36 CFR 60.4.

In November 2008, Reclamation initiated consultation with three tribes regarding the Proposed Project: the Hopi Tribe, Pascua Yaqui Tribe, and Tohono O'odham Nation. A summary of the Proposed Project and the findings of the Class I and Class III surveys were provided to each Tribe, along with a request to respond with any concerns the communities may have. To date, the Hopi Tribe has responded that no properties significant to the tribe would be affected.

3.5.1.5 Standards and Guidance

Federal and state governments offer guidance for the conduct of historic preservation activities. The Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (NPS 1983) establishes standards for the gathering and treatment of data related to cultural resources. Guidance is also offered for compliance with Section 106 through the Advisory Council on Historic Preservation, and Section 110 Guidelines are available through the office of the Secretary of the Interior.

Cultural resources identified as part of this effort were assessed in terms of a property's potential eligibility for inclusion on the NRHP. Three key elements for determining site eligibility for listing in the NRHP are that the property has integrity, that it possesses historical significance, and that significance be derived from an understanding of historic context. In order for a site to possess integrity and be historically significant, it must meet one of the National Register criteria listed below.

> "The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> (a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
> (b) That are associated with the lives of persons significant in our past; or
> (c) That embody the distinctive 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) That has yielded, or may be likely to yield, information important in prehistory or history.

In other words, a site's significance is dependent on its integrity—its retention of its essential form and construction, and its continued presence in the setting it was intended to occupy—and on its cultural significance, whether readily apparent or hidden in its potential to yield information" (NPS 1982; NPS 1986).

3.5.2 Environmental Consequences

3.5.2.1 No Action

The No Action Alternative would not alter the cultural resources of the Project area. There would be no effect on cultural resources because no construction would occur.

3.5.2.2 Preferred Alternative

All lands required for components of the Proposed Project, including pipeline construction, recharge facility construction, storage areas, and access roads have undergone cultural resource survey. The Proposed Project would be constructed primarily on land that has been previously disturbed. No previously unrecorded cultural resource sites were discovered during the survey conducted for this Proposed Project. All but one of the historic properties that may be impacted by the Proposed Project have been determined not eligible for the NRHP. The Proposed Project will pass through the boundaries of the historic Town of Sahuarita (AZ EE: 1:78(ASM)), which has been recommended eligible to the NRHP. However, construction activities would avoid known historic features and be limited to the previously disturbed ROW. This results in the Preferred Alternative having no adverse effect to historic properties as defined in the NHPA. No other cultural resources occur in the area of planned disturbance and none would be affected by the Proposed Project.

Because unknown cultural resources could be discovered during construction, the following measures would be employed upon the unforeseen discovery of cultural resources:

- If artifacts, archaeological soils, or unusual amounts of bone or shell are uncovered during the construction activities, all work in the area would be stopped and a qualified archeologist would be immediately contacted for onsite consultation.
- If a new cultural resources site is discovered during construction, and determined to be significant, a qualified archaeologist would prepare and implement a mitigation plan in accordance with state and federal regulations.
- If cultural resources are recovered during Project construction, a qualified archaeologist would arrange for the curation at a qualified curation facility of any archaeological materials collected.
- If any of the proposed work is redefined to impact standing structures, a qualified historic architect shall evaluate the structures for potential significance.

Should human remains and/or funerary objects, paleontological, or other artifacts that are at least 50 years old be uncovered during construction work on the property, ARS § 41-841 and § 41-844 require that all work be stopped in the area of the discovery and that the Director of the ASM be immediately notified. Action must then be taken to prevent further disturbance on such remains. The director of the ASM would have 10 working days to respond to any request to proceed with ground-disturbing activities.

3.5.2.3 CAP Entitlements Alternative

The Project facilities for this alternative would have the same "footprint" as the Preferred Alternative. Thus, the potential impacts and mitigation measures would be the same as those for the Preferred Alternative.

3.5.2.4 CWC-Only Alternative

The recharge basins for the CWC Alternative would be 40 percent smaller, so the potential for discovering unknown cultural resources would be slightly less than the Preferred Alternative. No known cultural resources would be impacted under this alternative; mitigation measures for the Preferred Alternative also would be applicable to this alternative.

3.5.3 Cumulative Effects

As described in Section 3.1, a number of road and housing projects are expected to occur in the Project area. These actions may result in cultural resource impacts within the impact area. However, the Proposed Project and action alternatives would not contribute to cumulative effects on cultural resources in the region, since the Proposed Project has no adverse effect on historic properties. The No Action Alternative would have no effect on cultural resources and would not contribute to regional cumulative effects.

3.6 Ground Water Resources

For purposes of the ground water discussion, the Project area is defined as the proposed artificial recharge site and the portion of the aquifer affected by the proposed recharge from the Preferred Alternative, which is an area within a radius of about 6 to 8 miles from the recharge site (see Section 3.6.2, Environmental Consequences). Construction and use of the pipeline and proposed booster sites are not anticipated to significantly impact the hydrogeologic environment.

3.6.1 Affected Environment

3.6.1.1 Regional Aquifer

The Project area is located within the southern portion of the approximate 4,000-square mile TAMA.[8] The statutory goal of the TAMA is to reduce ground water overdraft and attain safe yield of ground water supplies by 2025. Safe yield is defined by ADWR (ADWR 2006a) as "a ground water management goal which attempts to achieve, and therefore maintain, a long-term balance between the amount of ground water withdrawn in an active management area and the annual amount of natural and artificial recharge in the active management area." The amount of ground water stored within the TAMA is estimated at 12.7 million AF (ADWR 1999).

[8] The entire area on Figure 1 is located within the TAMA. A location map of the TAMA can be found on ADWR's website at: http://www.azwater.gov/dwr/WaterManagement/Content/AMAs/TucsonAMA/TAMA_documents/TAMA_map_large.pdf.

The Sahuarita-Green Valley area is located within the USC Sub-basin of the TAMA. The USC Sub-basin is a large alluvial valley that slopes to the north and northwest. Within the Sahuarita-Green Valley area of the USC Sub-basin, the Sierrita Mountain Range bounds the basin to the west and the Santa Rita Mountain Range bounds the basin to the east. The mountain ranges are generally composed of Precambrian through Tertiary age granitic, metamorphic, volcanic, and consolidated sedimentary rock. The basin fill deposits are composed of volcanic deposits and unconsolidated to consolidated sediments consisting of a complex sequence of alternating layers and lenses of gravel, sand, silt, and clay.

Previous investigations have divided the basin-fill sediments within the USC Sub-basin into the Upper Basin-Fill and Lower Basin-Fill units based on their general hydrogeologic characteristics. The saturated portions of the Upper and Lower Basin-Fill sediments form the Tucson Basin Aquifer. The Upper and Lower Basin-Fill sediments have been further subdivided into the following stratigraphic units from youngest to oldest: Younger Alluvium, Fort Lowell Formation, Upper, Middle and Lower Tinaja Beds, and the Pantano Formation. The saturated portions of the Younger Alluvium along with the Fort Lowell Formation and Upper Tinaja Beds form the most productive unit in the aquifer (ADWR 2006a). The thickness of the basin-fill deposits within the USC Sub-basin range forms a thin veneer along the mountain-fronts to as much as 11,200 feet (ADWR 2006a). The maximum thickness of the Younger Alluvium along the Santa Cruz River is about 80 feet (Malcolm Pirnie 1998).

Depth to ground water within the Sahuarita-Green Valley area ranges from 50 to 250 feet below ground surface (bgs) near the Santa Cruz River to more than 500 feet bgs in the Sierrita Mountain foothills (PAG 2002). The ground water flow direction within the Sahuarita-Green Valley area is away from the mountain ranges toward the axis of the basin. Along the axis of the basin, the ground water flow direction is parallel to the Santa Cruz River from south to north. The Tucson Basin Aquifer has experienced long-term water level declines and some related subsidence due to cumulative overdrafts associated with agricultural, industrial, mining, and public water supply usage. From 1940 to 1995, ground water level declines have ranged from 50 to 150 feet within the Sahuarita-Green Valley area (ADWR 2006a).

Declining ground water levels have led to compaction of the subsurface sediments resulting in land subsidence in many Arizona basins. As part of activities to better define and monitor subsidence, ADWR has begun to compile land subsidence data and develop land subsidence maps for the TAMA. Figure 1 displays the 2007-2008 subsidence in the Sahuarita-Green Valley area. Based on 1.1 years of monitoring from February 23, 2007 to March 14, 2008, parts of the Sahuarita-Green Valley area had up to approximately 1.4 inches of subsidence (ADWR 2008a).

The primary source of Tucson Basin Aquifer recharge consists of precipitation associated with mountain-front recharge and stream infiltration, with minor amounts associated with artificial recharge, infiltration of released effluent, ground water

underflow, and deep percolation of excess irrigation water. The primary source of ground water removal from the Tucson Basin Aquifer is pumping; minor amounts of ground water removal are associated with evapotranspiration and underflow.

3.6.1.2 Ground Water Quality

Ground water quality within the Sahuarita-Green Valley area is generally good with relatively few exceedances of primary drinking water standards (PAG 2002). Exceptions include elevated levels of nitrate and arsenic. Based on the PAG (2002) review of water quality data from 85 wells within the USC Basin sampled between February 1997 and February 2002, nitrate concentrations exceeding the primary drinking water standard of 10 milligrams per liter (mg/l) were noted in discontinuous areas mostly near and east of the Santa Cruz River. PAG (2002) noted no readily apparent pattern exists in the geographic distribution of arsenic concentrations exceeding the primary drinking water standard of 10 micrograms per liter (μg/l). A summary of the data reported by PAG (2002) is listed in Table 7.

Table 7. PAG (2002) Summary of Water Quality within the Upper Santa Cruz Basin.

Parameter	Standard	Units	Detected Range	Mean	Number of Wells Reviewed Exceeding Standard	Number of Wells Reviewed
Arsenic	10[1] (MCL)	μg/l	ND-46	NA[2]	10	49
Nitrate (as Nitrogen)[3]	10 (MCL)	mg/l	ND-20	4.4[4]	7	77[5]
Hardness	No STD	mg/l	27-1317	283	No STD	67
Sulfate	250 (SMCL)	mg/l	3.5-1100	230	13	72[6]
TDS	500 (SMCL)	mg/l	170-2000	580	30	65

[1] Prior to January 23, 2006, MCL for arsenic was 50 mg/l.
[2] Mean not calculated due to numerous non-detect values and varying minimum detection levels.
[3] Thirteen sample results reported as Nitrite plus Nitrate, but standard is the same as Nitrate (as Nitrogen).
[4] Calculation of mean included one non-detect treated as zero.
[5] Reported in summary table as 76 but according to Appendix C the total number of samples reviewed was 77.
[6] Reported in summary table as 70 but according to Appendix C the total number of samples reviewed was 72.
MCL – Maximum Contaminant Level (EPA Primary Standard).
ND – Not Detected.
SMCL – Secondary MCL.
STD – Standard.
TDS – Total Dissolved Solids.
μg/l – micrograms per liter equivalent to parts per billion.
mg/l – milligrams per liter equivalent to parts per million.

Secondary ground water standards are typically exceeded for TDS and sulfate in wells sampled near and down-gradient of the Sierrita Mine Tailings Pond. Possible mitigation options for the mine-related sulfate plume (see Section 1.2, Community Water Company) have been investigated and a selected remedy will be implemented under a Mitigation Order between Freeport-McMoRan Sierrita, Inc. and the ADEQ (ADEQ 2008). The Mitigation Order is discussed further under Section 3.6.3, Cumulative Effects.

CWC serves approximately 12,000 customers with treated ground water extracted from the Tucson Basin Aquifer. The ground water is made potable by chlorination and through treatment facilities designed to reduce the concentration of arsenic. Use of several CWC production wells has been discontinued due to sulfate contamination of the ground water aquifer in the vicinity of the Sierrita Mine. Table 8 summarizes the water quality monitoring reported by CWC between 2003 and 2007 for their water distribution system. The CWC wells are all located within its service area (Figure 1).

Under the Proposed Project, CAP water would be piped into the Sahuarita-Green Valley area and artificially recharged in a portion of the aquifer to help offset the ground water withdrawals associated with CWC's water supply activities. CAP water is a mixture of water from the Colorado, Bill Williams, and Agua Fria rivers with the Colorado River being the principal source. As part of the CAP, water quality is monitored on a monthly and quarterly basis at six sites along the CAP aqueduct by regularly scheduled collection of grab samples and real-time water quality data from installed sensors. The closest CAP monitoring location to the Proposed Project is the San Xavier Pumping Plant located near the terminus of the aqueduct. Table 9 provides a summary of the 2007 CAP water quality data reported for the San Xavier Pumping Plant. In general, CAP water contains a greater level of dissolved salts such as bicarbonate, calcium, chloride, magnesium, sodium, and sulfate, when compared to the ground water within the Sahuarita-Green Valley area.

Table 8. Summary of Water Quality Parameters Reported by CWC.

Parameter	Standard	Units	2007 Detected Range	2006 Detected Range	2005 Detected Range	2004 Detected Range	2003 Detected Range
Coliform	Presence	-	No	No	No	No	No
Lead	15 (AL)	µg/l	NR	NR	0-29	NR	NR
Copper	1.30 (AL)	mg/l	NR	NR	0.02-0.25	NR	NR
Arsenic	10[1] (MCL)	µg/l	4-10	<0.2-14	7-13	7-14	5-14
Barium	2 (MCL)	mg/l	<0.01-0.09	<0.01-0.04	<0.01-0.04	0.01-0.04	NR
Fluoride	4.0 (MCL)	mg/l	0.28-0.90	0.4-0.7	0.4-0.7	0.5-0.6	0.5
Cyanide	0.2 (MCL)	mg/l	NR	<0.01-0.02	<0.01-0.02	<0.01-0.02	NR
Nitrate (as Nitrogen)	10 (MCL)	mg/l	<1.00-1.94	0.57-2.05	0.4-2.0	0.50-2.00	0.5-1.6
Gross Alpha	15 (MCL)	pCi/l	5.1-8.1	NR	NR	NR	NR
Radium 226	5 (MCL)	pCi/l	<0.3	NR	NR	NR	NR
Aluminum	0.05 to 0.2 (SMCL)	mg/l	<20-.23	<.20-.23	<.20-.23	<0.02-0.23	NR
Molybdenum	No STD	mg/l	NR	NR	NR	<0.04	NR
pH	6.5 to 8.5 (SMCL)	STU	6.9-7.9	7.17-7.40	7.17-7.40	7.17-7.32	NR
Chloride	250 (SMCL)	mg/l	10.7-50.9	10.7-50.9	10.7-50.9	10.7-58.1	NR
Hardness	No STD	mg/l	75-347	75-460	75-460	104-532	NR
Iron	0.3 (SMCL)	mg/l	<0.02-0.23	<0.02-0.23	<0.02-0.23	<0.02-0.23	NR
Magnesium	No STD	mg/l	2-17	3-17	3-17	4-21	NR
Manganese	0.05 (SMCL)	mg/l	NR	NR	NR	<0.02	NR
Silver	0.1 (SMCL)	mg/l	NR	NR	NR	<0.04	NR
Sodium	No STD	mg/l	44-50	30-61	30-61	32-72	NR
Sulfate	250 (SMCL)	mg/l	45.9-52.6	32.7-132	25-470[2]	44-510	46.8-547
TDS	500 (SMCL)	mg/l	211-218	204-385	216-623[2]	209-771	NR
Zinc	5 (SMCL)	mg/l	NR	NR	NR	<0.02	NR

[1] Prior to January 23, 2006, MCL for arsenic was 50 µg/l.
[2] High reading from early 2005 for a well that is no longer in use.
AL – Action Level.
MCL – Maximum Contaminant Level (EPA Primary Standard).
NR – Not Reported.
SMCL – Secondary MCL.
STD – Standard.
STU – Standard Testing Units.
TDS – Total Dissolved Solids.
µg/l – micrograms per liter equivalent to parts per billion.
mg/l – milligrams per liter equivalent to parts per million.
pCi/l – picocuries per liter.
Sources: CWC 2004, 2005, 2006, 2007a, 2008b.

Table 9. Summary of CAP Water Quality Parameters, San Xavier Pumping Plant.

Parameter	Standard	Units	2007 Detected Range
pH	6.5 to 8.5 (SMCL)	STU	7.5-8.4
Dissolved Oxygen	No STD	mg/l	7.5-11.5
Specific Conductance	No STD	mS/cm	999-1100
Alkalinity (as $CaCO_3$)	No STD	mg/l	110-133
Arsenic	10[1] (MCL)	mg/l	1.9-3.0
Barium	2 (MCL)	mg/l	0.14-0.17
Calcium	No STD	mg/l	71-82
Chloride	250 (SMCL)	mg/l	88-100
Copper	1.30 (AL)	mg/l	ND-0.0031
Iron	0.3 (SMCL)	mg/l	0.03-0.25
Magnesium	No STD	mg/l	30-33
Manganese	0.05 (SMCL)	mg/l	2.9-11
Nitrate (as Nitrogen)	10 (MCL)	mg/l	ND
Perchlorate	No STD	µg/l	ND
Sodium	No STD	mg/l	90-120
Sulfate	250 (SMCL)	mg/l	250-280
TDS	500 (SMCL)	mg/l	624-710

[1] Prior to January 23, 2006, MCL for arsenic was 50 µg/l.
MCL – Maximum Contaminant Level (EPA Primary Standard).
ND – Not Detected.
SMCL – Secondary MCL.
STD – Standard.
STU – Standard Testing Units.
TDS – Total Dissolved Solids.
µg/l – micrograms per liter equivalent to parts per billion.
mg/l – milligrams per liter equivalent to parts per million.
Source: CAP 2008

Although not detected in the CAP quarterly samples collected at San Xavier Pumping Plant, low perchlorate concentrations of up to 9.7 mg/l in CAP water have been detected in June 1999 (CAP 2008). Based on ongoing remediation efforts in the Las Vegas Valley, Nevada, where perchlorate contamination of Colorado River water occurred, concentrations of perchlorate in CAP water are expected to gradually decrease over time (CAP 2008).

3.6.1.3 Water Use

In 2005, total water use in the TAMA was approximately 350,000 AF, of which 185,000 AF were for municipal purposes (55 percent), almost 110,000 AF were for agriculture (30 percent), about 35,000 AF were for metal mining (10 percent), and approximately 20,000 AF (5 percent) were for other industrial uses (ADWR 2006b). Within the USC Sub-basin, 2006 water usage was reported by the USC/PUG from data collected by ADWR (Hedden et al 2008). Table 10 provides the 2006 water usage results along with the projected water usage in 2010, 2020, and 2030 reported by USC/PUG.

Table 10. Summary of Upper Santa Cruz Sub-basin Water Usage.

Major Users and Providers	2006		2010		2020		2030	
FICO	29,800	39%	29,800	37%	26,800	30%	20,800	23%
Freeport-McMoRan	26,700	35%	28,000	35%	28,000	31%	28,000	31%
ASARCO	7,900	10%	8,000	10%	8,000	8.8%	8,000	8.9%
Golf courses	4,375	5.7%	4,375	5.5%	4,375	4.8%	4,375	4.9%
Water Providers	7,245	9.4%	8,975	11%	12,715	14%	14,095	16%
Sand/Gravel	475	0.6%	550	0.7%	750	0.8%	750	0.8%
Homeowner Wells	330	0.4%	365	0.5%	500	0.6%	660	0.7%
Potential Major Users		0.0%	200	0.2%	9,325	10%	13,515	15%
Total Usage	76,825		80,265		90,465		90,195	

All quantities in units of AF.
Source: Hedden et al. 2008.

CWC's service area is approximately 8 square miles, extending roughly between Anamax Road on the north, the Santa Cruz River on the east, Cyprus Sierrita Corp. mines on the west, and Continental Road on the south (Figure 1). In 2007, the CWC pumped 2,795 AF of water for its users; in 2006, CWC pumped 3,006 AF. There were 11,854 total users as of December 31, 2007, up 251 users from the same time in 2006. Residential uses account for 78 percent of the total water sales, commercial usage accounts for 19 percent, and the other 3 percent is used for water supply maintenance such as flush and cleaning the system (CWC 2008a). CWC anticipates its water demand to double to about 6,100 AFY by 2020 as a result of additional population growth, which would approximate full build-out of the existing service area (Stantec 2006).

3.6.1.4 Existing Recharge Projects

Currently 11 ground water recharge projects are operating within the TAMA. Of the 11 recharge projects, three recharge facilities occur within the Sahuarita-Green Valley area: Town of Sahuarita WWTP, Robson Ranch Quail Creek, and Pima Mine Road. The water source for the Town of Sahuarita WWTP recharge facility is treated effluent water and the facility is permitted to recharge up to 896 AFY. The water source for the Robson Ranch Quail Creek recharge facility is treated effluent water from the Green Valley WWTP and the facility is permitted to recharge up to 2,240 AFY. The water source for the Pima Mine Road Recharge Project is CAP water and the facility is permitted to

recharge up to 30,000 AFY. In 2005, the most recent year for which data are available, the Robson Ranch Quail Creek and Pima Mine Road facilities recharged a combined total of 23,716 AF; no data are available for the Town of Sahuarita WWTP recharge, which went into operation after 2005.[9]

3.6.2 Environmental Consequences

This Section describes the estimated ground water impact area, mounding, and potential water quality impacts from operation of the proposed CWC ground water recharge facility. As mentioned earlier in Section 1.5, Relationship to Proposed Rosemont Mine, concern regarding the Proposed Project's relationship to the proposed Rosemont Mine, if any, was raised during the public scoping process. To address this concern, ground water level changes for both the No Action and Preferred Alternatives were modeled for a 20-year analysis period using two assumptions—one in which proposed Rosemont Mine-related ground water pumping does not occur and one in which Rosemont Mine-related ground water pumping does occur. Ground water changes were modeled using a MODFLOW-2000 model modified by Montgomery and Associates (2008) from the calibrated TAMA flow model, a spreadsheet model based on the Hantush equation (1967), and a MODPATH model (GSA 2008b). The inclusion of the Proposed Project recharge facility and the proposed Rosemont Mine water wells were the only modifications made to the Montgomery and Associates (2008) model. The results of the modeled changes that assume Rosemont Mine-related ground water pumping occurs are discussed in Section 3.6.3, Cumulative Impacts.

The description of the ground water impacts included in the EA are summarized from a detailed evaluation of the hydrogeologic feasibility and impacts of the ground water recharge facility that was conducted as part of development of the Proposed Project design (GSA 2008a, 2008b). Additional details concerning the facility feasibility and modeling results will be provided to ADWR as part of the permit approval process for the proposed CWC recharge facility.

The descriptions of potential ground water impacts anticipated to occur under the No Action scenario and from the Preferred Alternative assume Rosemont Mine-related ground water pumping does not occur, and is based upon the following considerations.

No Action (Case 1): The Preferred Alternative is not constructed. CWC's CAP water is not recharged in the vicinity of the Sahuarita-Green Valley area. As discussed in Section 3.6.1.3, Water Use, ground water pumping in the Project area would continue to increase to serve new developments. The new developments would likely become member lands of CAGRD and would be served ground water by a water provider; CAGRD is responsible for replenishing this ground water use by recharging within the TAMA.

[9] Recharge data available at: http://www.azwater.gov/dwr/WaterManagement/Content/AMAs/TucsonAMA/TAMA_documents/TAMA_recharge_1993_2005.pdf.

Preferred Alternative (Case 2): The proposed pipeline and recharge facility are constructed. Upon obtaining the appropriate water storage permit(s), CWC would store up to 5,000 AFY at this facility for 15 to 20 years. In the long term, it is anticipated the water storage permit would be extended, and CWC would continue to recharge its 2,858 AFY of CAP water and use the storage credits to offset ground water pumping associated with delivery of water within its water service area. However, as noted in Section 2.6.1, CWC may in the future reinvestigate the option of treating and using CAP water directly, as the CWC service area approaches build-out.

It was not necessary to separately model the CAP Entitlements Alternative because the amount of water to be recharged would be the same as the Preferred Alternative. The CWC-Only Alternative was not modeled because the impacts simply would be proportionately smaller than the Preferred Alternative.

3.6.2.1 No Action

The No Action Alternative would not alter or offset the declining ground water table levels in the Sahuarita-Green Valley portion of the TAMA. CWC would continue to rely solely on pumping local ground water for delivery to its customers. Without the delivery and use of its CAP water, either directly or by recharge and recovery, CWC would not have an alternative potable water supply should its existing wells become contaminated by the sulfate plume from the Sierrita Mine tailing impoundment. In addition, if there are no actions to change the current conditions, ground water overdraft within the Project area would continue unabated and would result in increasingly greater ground surface subsidence and aquifer compaction, installation of deeper wells to replace dry wells, and additional costs for pumping ground water from lower elevations.

New developments within the CWC water service area would join CAGRD. It is anticipated that CWC would continue to pump ground water to serve these member lands, and CAGRD would replenish the ground water used by these member lands at existing recharge basins within the TAMA. However, because much of CAGRD's recharge is likely to occur in the lower Santa Cruz basin, there would not be a benefit to the local aquifer or an available alternative water supply source in the event of well contamination.

3.6.2.2 Preferred Alternative

3.6.2.2.1 Regional Aquifer

Under the Preferred Alternative, recharge of CAP water would begin following ADWR permit approval and construction of the CWC storage facility. After 20 years, the ground water mound within the impact area resulting from infiltration of CAP water is estimated to extend about 8.5 miles north, 5.25 miles south, 6 miles west, and 4 miles east of the CWC recharge facility (Figure 9). The maximum projected ground water level rise beneath the recharge facility relative to the No Action Alternative is estimated to be 135 feet at the end of year 2031. It is anticipated the minimum depth to ground water would be 60 feet below ground surface.

The Preferred Alternative would result in elevated ground water levels in an approximate radial pattern, slightly elongated down-gradient to the north and west in response to regional ground water flow direction. Ground water recharge from the Proposed Project would reduce the rate of regional ground water elevation decline and potentially reduce associated land subsidence within the northern portion of CWC's service area, southern portion of Sahuarita, and parts of the FICO land area.

The upsized main pipeline would have capacity to transport additional renewable water supplies to the USC basin, should water providers and users within the USC basin build the necessary infrastructure and obtain supplies. Transport and use of these additional renewable water supplies, either directly or through recharge, would further assist in reducing overdraft within the USC basin and ameliorating other negative effects resulting from ground water pumping.

3.6.2.2.2 Water Quality

As recharge occurs, ground water quality directly beneath and radiating out from the recharge facility would approximate that of CAP water. As local ground water is displaced with CAP water, there would be an increase in the concentration of sulfate and TDS and a general change from calcium-bicarbonate dominate water to calcium-sulfate dominate water. In 2007, sulfate and TDS concentrations in CAP water exceeded secondary water quality standards by 1.1 and 1.4 times, respectively, while local ground water quality near the facility for these parameters is typically 2.5 and 2 times less than the secondary standards, respectively.

As a result of mounding, displacement of ground water by CAP water beneath and in the vicinity of the recharge facility would result in an increased ground water gradient and velocity away from the facility. Based on modeling results, at the end of year 2031, the interface between CAP water and local ground water would extend about 2.5 miles north and 1.25 miles west of the recharge facility in a northwest flow direction (Figure 10). The Preferred Alternative is not predicted to alter ground water gradients and flow directions west of the Santa Cruz River in the vicinity of the Freeport-McMoRan Sierrita, Inc. ground water sulfate plume.

Under the Preferred Alternative, displacement of local ground water by CAP water is anticipated to only impact the upper portions of the aquifer and is not projected to substantially infiltrate into the lowest portion of the aquifer in the middle and lower Tinaja beds and Pantano Formation. For wells located within the modeled CAP water recharge interface, the concentration of sulfate and TDS in pumped ground water would be dependent on the screen length and depth of the wells. For wells screened within the middle and lower Tinaja beds and Pantano Formation, CAP water recharge is not predicted to substantially affect the quality of the ground water. Within the CAP water recharge interface depicted in Figure 10 and for wells screened within the Alluvium, Fort Lowell, and upper Tinaja Formations, the quality of extracted ground water is anticipated to approximate that of CAP water. Under the Preferred Alternative at the end of year 2031, CAP water is anticipated to infiltrate approximately 20 wells within the recharge

interface. According to the ADWR database (Montgomery and Associates 2008), 13 wells are listed for domestic water use and 7 are listed for irrigation use. Of the wells with depth information, 10 wells are listed with a casing depth in the shallower portion of the aquifer and 3 are listed with a casing depth in the deeper portion of the aquifer. The number of impacted wells is approximate based on modeling assumptions and well locations provided in the database. The number of impacted wells would likely increase with time as CAP water continues to move in a north-northwest flow direction.

As CAP water replaces ground water beneath the impact area, the quality of the water pumped would approximate that of CAP water. CAP water is typically higher in sulfate and TDS concentrations than the ground water served by CWC; however, the data indicate the CAP concentrations are below historically high values reported by CWC. Both CAP and CWC water have exceeded the SMCLs (related to taste and aesthetics) for TDS and sulfate. CAP water also exceeded the SMCL for manganese, whereas CWC ground water results were either not reported or negligible. Other constituents that are generally higher for CAP water than for CWC pumped ground water include magnesium (no standard), chloride, pH, and barium; however, the CAP water complies with the applicable standards. CAP water is typically lower than CWC water in copper, arsenic, and nitrate (as nitrogen). CAP water quality is acceptable for municipal use as evidenced by the large amounts used by municipalities within all three counties in central Arizona served with CAP water (Maricopa, Pinal, and Pima).[10] Elevated ground water levels that result from recharging also assist in small reductions in pumping costs.

3.6.2.2.3 Water Use

The Preferred Alternative is not expected to increase projected water usage within the USC Sub-basin over usage anticipated to occur under the No Action alternative. Areas within the CWC water service area are developing, and would continue to develop, by joining CAGRD as a means of obtaining an assured water supply in the absence of the Proposed Project, which would allow CWC to take and use its CAP entitlement. As discussed in Section 2.6.1, direct use of CAP water by CWC has been eliminated as an alternative at the present time.

3.6.2.3 CAP Entitlements Alternative

Impacts to the regional aquifer, water quality, and water use under the CAP Entitlements Alternative would be similar to the Preferred Alternative. Because the capacity of the main pipeline would be limited to approximately 5,000 AFY, the total amount allocated to CAP water subcontractors in the Green Valley area, there would not be any future opportunity for USC/PUG participants without existing CAP entitlements to connect to the Proposed Project. Thus, under this alternative, there would be no opportunity to partially offset existing ground water pumping along the USC River by conveying renewable water supplies further south.

[10] See CAP deliveries for 2008 at: http://www.cap-az.com/deliveries/index.cfm.

3.6.2.4 CWC-Only Alternative

Impacts to the regional aquifer and water quality due to the decreased CAP water conveyance and recharge capacity of this alternative, from 5,000 AFY to 3,000 AFY, would be similar to the Preferred Alternative except the magnitude of the impacts would be reduced by approximately 40 percent. Water use would be the same as the Preferred Alternative. Because the main pipeline would only have the capacity to deliver CWC's CAP entitlement, there would not be any future opportunity for GVDWID or other USC/PUG participants to connect to the Proposed Project and convey renewable water supplies to offset existing ground water pumping.

3.6.3 Cumulative Effects

A number of road and housing projects are expected to occur in the Project area (see Section 3.1), which will result in increasing water usage and the addition of ground water supply wells to meet the demand. As discussed in Section 3.6.1.3, Ground Water Resources, Affected Environment-Water Use, total water usage is predicted to increase from 76,825 AF used in 2006 to 90,195 AF in 2030 with Water Providers accounting for 14,095 AF (15.6 percent) of the total use in 2030 compared to 7,245 AF (9.4 percent) used in 2006. Because of uncertainty as to future well locations and quantities, specific locations and amounts of pumping by many of these new developments were not incorporated into the recharge facility modeling. However, future pumping of about 15,000 AFY beginning in 2010 for general development areas in the Sahuarita area is included in the projected demands in the model (Montgomery and Associates 2008). Also, with the continued advance of the Freeport-McMoRan Sierrita, Inc. sulfate plume, available well locations capable of withdrawing potable water may be limited within the CWC service area to the northern and eastern extents, if mitigation measures proposed by Freeport-McMoRan Sierrita, Inc. are unsuccessful in remediating the current plume in a timely manner. As a result, future pumping for reasonably foreseeable demands is likely to result in a greater withdrawal of ground water in the Project area, and some of the pumping may be in closer proximity to the recharge facility than modeled. Additional ground water pumping in the impact area would confine the impact of CAP water recharge at the proposed facility to a smaller area in terms of mound height and radius of the CAP water interface (compare Figure 9 and Figure 11, and Figure 10 and Figure 12, as discussed below in this section), but would result in a greater vertical depth of infiltration.

Another reasonably foreseeable activity in the impact area would be ground water withdrawal associated with a Mitigation Order between Freeport McMoRan and ADEQ. Presently, the Sierrita Mine preferred sulfate remediation action (Sierrita Mine Alternative 5), discussed in the Freeport McMoRan feasibility study for addressing the sulfate plume, consists of an aggressive ground water pumping program using plume stabilization pumping and mass removal pumping within the plume to reduce the extent and sulfate mass of the down-gradient plume (HGC 2008). The objective of Sierrita Mine Alternative 5 is to pump all of the water that can be used at the Sierrita Mine from the down-gradient plume in order to accelerate the removal of sulfate mass from the plume during the lifetime of the mine (HGC 2008). Implementation of the Sierrita Mine Alternative 5

would begin following approval by ADEQ, with increased ground water pumping for plume remediation beginning 24 to 36 months later (HGC 2008). The Sierrita Mine Alternative 5 assumes a total ground water pumping rate of 17,236 gallons per minute (gpm) from 2010 to 2035, a pumping rate of 16,021 gpm from 2036 to 2042, and a pumping rate of 2,555 gpm from 2043 to 2060 (HGC 2008). Based on the modeling results performed for the Freeport McMoran feasibility study, the Sierrita Mine Alternative 5 would result in a predicted ground water elevation decline directly below the Preferred Alternative's recharge facility of about 10 feet at year 2020, about 20 feet at year 2040, and about 8 feet at year 2060 (HGC 2008).[11] This cumulative impact would result in a smaller impact area where long-term impacts from recharge would occur. CAP water recharged by the Proposed Project would help to alleviate potential land surface subsidence within the Project area during the lifetime of the Proposed Project; however, long-term ground water withdrawals associated with Sierrita Mine Alternative 5 could result in potential subsidence issues if CWC would ever choose to terminate the recharge and instead treat and directly deliver its CAP water in the future.

Recharge of CAP water by the Proposed Project would be an incremental addition to other sites recharging CAP water and treated effluent within the Sahuarita-Green Valley area, which are discussed in Section 3.6.1.4. The combined effect of recharge by the Proposed Project and other facilities would reduce ground water overdraft, ground surface subsidence, aquifer compaction, and the need to deepen wells or incur greater pumping costs. The additional recharge from the Preferred Alternative would cause a small amount of additional ground water mounding beneath those recharge facilities. Those recharge facilities were incorporated into the model based on the total quantity permitted and the permitted life of the facility to ensure there are no adverse impacts from the proposed recharge facility in anticipation of the ADWR permit application process. Based on the model results, the cumulative impact of the Preferred Alternative does not substantially alter the ground water mounding beneath these facilities.[12]

As explained at the beginning of Section 3.6.2, Environmental Consequences, concern was raised during the public scoping process regarding the Preferred Alternative's relationship to the proposed Rosemont Mine. The outcome and timing of Rosemont Mine project will not be known for at least another 1.5 to 2 years;[13] however, to address this concern, ground water level changes for both the No Action and Preferred Alternatives were modeled for a 20-year analysis period using two assumptions regarding Rosemont Mine-related ground water pumping—one in which the proposed Mine pumping occurs

[11] Ground water withdrawal associated with the Freeport McMoran preferred sulfate remediation action was not incorporated into the Proposed Project modeling because it was not available at the time of the modeling, and has yet to be approved by ADEQ.

[12] Ground water mounding from the Proposed Project recharge would not be significantly impact the proposed Arroyos Recharge Project on the San Xavier District of the Tohono O'odham Indian Reservation, which is located approximately 4 miles northwest of the Pima Mine Road Recharge Project.

[13] See the CNF schedule at: http://www.fs.fed.us/r3/coronado/rosemont/index.shtml .

without the Preferred Alternative recharge (Case 3), and one in which both the proposed Mine pumping and the Preferred Alternative recharge occur (Case 4).

Figure 11 displays the difference between Case 3 (No Action with Rosemont Mine-related pumping) and Case 4 (Preferred Alternative recharge and Rosemont Mine-related pumping), which is the ground water mound formed by the proposed recharge assuming that Rosemont Mine-related pumping is occurring. As described for Case 2 (see Section 3.6.2.2.1, Environmental Consequences-Preferred Alternative), the Preferred Alternative recharge would result in elevated ground water levels in an approximate radial pattern, slightly elongated down-gradient to the north and west in response to regional ground water flow direction. Assuming Rosemont mine-related ground water pumping occurs as described in Rosemont Mine's water balance plan (M3 2007), only small differences are noted in the projected ground water level rise between the two scenarios (compare Figure 9 and Figure 11). With Rosemont pumping, the ground water mound from recharge would be slightly smaller than under the Preferred Alternative (Case 2), and would extend about ½ mile less to the north, but an additional ¼ mile east of the CWC recharge facility (Figure 11). The maximum projected ground water level rise under Case 4 relative to Case 3 (Mine pumping but no Proposed Project recharge) is estimated to be 149 feet at the end of year 2031.[14] It is anticipated the minimum depth to ground water would be 70 feet below ground surface.

Ground water quality impacts as a result of displacement by CAP water beneath and in the vicinity of the recharge facility, assuming ground water pumping associated with the proposed Rosemont Mine occurs, would be as described for Case 2 except the interface between CAP water and local ground water would extend about 2.25 miles, or a ¼ mile less, to the north at the end of year 2031 (Figure 12). In addition, it is anticipated CAP water would infiltrate into the lower portion of the aquifer in the middle and lower Tinaja beds and Pantano Formation beneath the recharge facility due to the lowered ground water elevation. Under Case 4, 6 wells are located within the modeled CAP water recharge impact area. According to the ADWR database, all 6 wells are listed for irrigation use, of which two are listed with casing depths in the lower portion of the aquifer and one is listed with a casing depth in the shallower portion of the aquifer; the rest of the wells do not have depth information. As with the Preferred Alternative, the number of impacted wells is approximate and is based on modeling assumptions and well locations in the database. The number of impacted wells would likely increase with time as CAP water continues to move in a north-northwest flow direction. As discussed in Section 3.6.2.2.2, the difference in water quality between CAP supplies and existing CWC ground water is not substantial and the CAP water is being used by many municipalities in central Arizona.

[14] The maximum projected ground water level rise is actually higher than without Mine-related pumping because Rosemont pumping would lower the baseline water table and create more vertical space in the aquifer for recharge water to be stored. Although the ground water level rise from baseline would be greater, the top of the ground water mound under the recharge facility in Case 4 would actually be slightly lower than under Case 2 due to the difference in baseline conditions.

With ground water pumping associated with the proposed Rosemont Mine, the ground water withdrawals associated with Sierrita Mine Alternative 5 (which are expected to be about 723,000 AF from 2010 to 2035, and about 974,000 AF from 2010 to 2060), would likely reduce the aerial extent of the CAP water interface from what is described above for Case 4 and depicted in Figure 11 and Figure 12. This would be due to the overall lowering of the water table, which would increase the vertical extent of CAP water infiltration.

3.7 Socioeconomic Resources

The analysis of social and economic conditions addresses the relationships between the Proposed Project and the communities it may affect. The Project area for socioeconomic impacts is Pima County because the Proposed Project use would occur in the south-central portion of the county. Direct and indirect socioeconomic effects of construction would occur primarily in Green Valley, Sahuarita, and nearby communities. Some direct and indirect socioeconomic impacts are likely to occur in the Tucson metropolitan area as the result of construction activities. The CWC service area and nearby water users relying on the same portion of the ground water aquifer would experience some socioeconomic effects associated with water recharge and pumping.

3.7.1 Affected Environment

3.7.1.1 Data Sources

Information from local, state, and federal sources was used to characterize the overall baseline and future economic and demographic conditions in the Project area. Data were collected for population, employment, household and per capita incomes, wage rates, and other economic and demographic variables. Specific sources of data include:

- Regional, county, municipal, and water company reports and information
- Arizona Department of Commerce
- U.S. Department of Commerce, Census Bureau

3.7.1.2 Population

The population of Pima County has grown rapidly over the past 10 years and is projected to grow steadily over the next 40 years at a declining rate (Table 11).

Table 11. Pima County Historical, Current, and Projected Population.

Year	Total Population	Change	Percent Change
1990	666,880	--	--
2000	846,746	102,742	15%
2010	1,070,723	223,977	26%
2020	1,271,921	201,198	16%
2030	1,442,420	170,499	13%
2040	1,585,983	143,563	10%
2050	1,709,026	123,043	8%

Source: ADOC 2007.

The Town of Sahuarita has experienced exponential population growth in the past 20 years. However, the growth rate is expected to significantly taper off after 2020. Table 12 shows Sahuarita's population growth, which has been much more rapid than Pima County's as a whole (compare Table 11 with Table 12).

Table 12. Town of Sahuarita Historical, Current, and Projected Population and Percent of Change vs. Pima County.

Year	Total Population	Change	Percent Change
1990	1,622	--	--
2000	3,242	1,053	65%
2010	37,965	34,723	1071%
2020	71,479	33,514	88%
2030	84,714	13,235	19%
2040	92,230	7,516	9%
2050	101,274	9,044	10%

Sources: Sahuarita 2008a; Tucson 2006; ADOC 2007.

Green Valley's population has risen steadily in the last 10 years, but at a slower rate than that of Sahuarita (Chamber 2008). Population projections for Green Valley are not available for comparison to Sahuarita and Pima County. However, CWC anticipates the population of its service area to more than double to about 43,000 by 2020 (Stantec 2006).

3.7.1.3 Employment and Income Patterns

Primary components of the Pima County economy are government, business, industry, and technology. Government (local, state, and federal) is a major employer providing opportunities in management, public administration, and education. Major business enterprises include Raytheon in manufacturing; Wal-Mart Stores in retail trade; and

Freeport McMoRan in mining. A reflection of Pima County's growth, construction is a major component of the Pima County economy. In 2006, the value of permitted construction decreased to slightly under $2 billion from a recent high of over $2.5 billion in 2005. Construction and extraction jobs in 2006 accounted for 6.7 percent of the total working population putting it fourth in the list of employees by occupation for Pima County (2007b).

The Pima County civilian labor force is estimated to be approximately 457,000 employees (ADOC 2007). Based on the 2000 census, unemployment in the County was slightly higher than for the entire State of Arizona. Table 13 shows that 1999 median household and per capita incomes in the County were slightly lower than similar levels in Arizona. Similarly, the percentage of families living below the poverty level in Pima County was slightly higher than the State of Arizona.

Table 13. Economic Attributes for the Pima County.

Attribute	Pima County	Arizona
Population	843,746	5,130,632
Employment, Civilian (2007)	457,101	3,029,090
Unemployment rate (2007)	3.7%	3.8%
Median household income (2004)	$38,687	$43,696
Per capita income (1999)	$19,785	$20,275
Families below poverty level (2004)	15.6%	14.6%

Sources: Census 2000; ADOC 2007, 2008.

The average entry level wage earned by employees in Pima County was $7.56 per hour in 2007. This falls in the 10th percentile for the United States. The average wage for experienced employees was $21.93 per hour, which is in the 75th percentile for the United States (ADOC 2008).

Because Sahuarita is only 15 miles from Tucson, over half of its employed residents commute to the city to work. The main source on employment in Sahuarita is education and health services. The unemployment rate for the town in 2000 was 2.9 percent, well below the Pima County and state average (Census 2000).

Green Valley is primarily a retirement community with over 70 percent of its residents age 65 or older (Census 2000). Only 14.2 percent of Green Valley residents age 16 or older are employed (ADOC 2008).

3.7.2 Environmental Consequences

The socioeconomic impacts from the No Action and Preferred alternatives related to the construction and operation of the Proposed Project are discussed in this section. The impact area for socioeconomic resources extends to the Tucson metropolitan area, due to the likelihood that the employment base for construction workers needed for the Proposed Project would come from the Tucson area.

3.7.2.1 No Action

No substantial adverse impact on socioeconomic resources in the impact area is anticipated under the No Action Alternative because existing conditions would continue for the foreseeable future. It is assumed that any additional water treatment costs due to contamination of wells would be paid by the parties responsible for the contamination.

3.7.2.2 Preferred Alternative

The estimated construction cost of the Proposed Project is $20,800,000. The components of the total cost are:

- Materials = $11,440,000
- Labor = $4,368,000
- Equipment = $1,664,000
- Overhead and Profit = $3,328,000

Pipeline construction would require approximately 33 persons working for 6 to 8 months. Concrete, horizontal boring, and mechanical-electrical crews would employ approximately 27 persons. To meet desired completion dates, earth moving for the construction of the recharge basin would require 10 machines moving material to finish the work in the time frame required for the expected completion, which would require an additional 10 workers. It is estimated that about 70 construction workers would be required to complete the Proposed Project in a 6- to 8-month time frame.

Minor short-term benefits would occur with implementation of the Preferred Alternative, resulting from construction expenditures of $21 million, which would be approximately 0.01 percent of the annual Pima County total construction expenditures in 2006. Similarly, the employment of up to 70 persons during peak construction would provide a minor short-term benefit in jobs. Indirectly, there would be a minor, short-term economic benefit for local businesses due to construction workers' expenditures on lodging and food, although most of the work force would likely commute from their homes in the Tucson area. Given the relatively small scale and short term of construction activity, there would not be a discernable impact on services or government tax receipts. Ongoing operation and maintenance requirements of the pipeline and recharge facility would provide a minor economic benefit to the impact area through employment and expenditures. The Preferred Alternative is not anticipated to have any long-term adverse impact on socioeconomic resources in the impact area. There would be a benefit to CWC and its customers by securing a reliable source of water, in the event additional water supply wells become contaminated by the sulfate plume. There also would be benefits to landowners and water users within the Project impact area due to reduced ground water overdraft, reduced ground surface subsidence, and reduced costs for deepening wells or pumping from deeper water levels.

3.7.2.3 CAP Entitlements Alternative

The estimated cost of the CAP Entitlements Alternative is $16.2 million, about 22 percent less than the Preferred Alternative because of the smaller pipe size. The minor beneficial socioeconomic impacts to the regional economy of the CAP Entitlements Alternative would be similar to those of the Preferred Alternative because the expenditures for labor and equipment would be the same under either alternative. The reduction in construction cost would be primarily for pipe, which would likely be purchased from outside the region. Like the Preferred Alternative, there also would be benefits to landowners and water users within the Project impact area due to reduced ground water overdraft, reduced ground surface subsidence, and reduced costs for deepening wells or pumping from deeper water levels.

3.7.2.4 CWC-Only Alternative

The estimated cost of the CAP Entitlements Alternative is $12.3 million or about 60 percent of the Preferred Alternative because of the smaller pipe size and smaller recharge facility. The maximum number of employees would be about 60. The minor beneficial socioeconomic impacts to the regional economy of the CWC-Only Alternative would be smaller than those of the Preferred Alternative because the expenditures for labor and equipment would be reduced by approximately 40 percent because the recharge facility would be smaller. The other reduction in construction cost would be primarily for pipe, which would likely be purchased from outside the region. Compared to the Preferred Alternative, the CWC-Only Alternative would result in fewer benefits to landowners and water users within the Project impact area due to reduced ground water overdraft, reduced ground surface subsidence, and reduced costs for deepening wells or pumping from deeper water levels.

3.7.3 Cumulative Effects

As described in Section 3.1, a number of road and housing projects are expected to occur within the impact area of the Proposed Project. The Preferred Alternative and other action alternatives, when added to the past, present and reasonably foreseeable future construction activity in the Project area would provide minor short-term socioeconomic benefits from construction expenditures. Long-term beneficial cumulative impacts from the Project would occur as the result of recharge, which would reduce ground water overdraft, ground surface subsidence, and costs for deepening wells or pumping from deeper water levels. The No Action Alternative would not contribute to cumulative socioeconomic effects.

3.8 Resources Considered But Not Affected

3.8.1 Surface Water

The Santa Cruz River and its tributaries in the Project area are ephemeral, meaning they flow only in response to storm events (see stream gage characteristics for Demetrie Wash, Ocotillo Wash, Flato Wash, and the Santa Cruz River near Continental, AZ in Pope et al. 1998). The only perennial reaches of the Santa Cruz River in the vicinity are

effluent-dependent reaches located approximately 18 miles upstream and 25 miles downstream of Green Valley (ADWR 2008b). The ground water level is currently estimated to be approximately 200 feet under the Santa Cruz River and is declining (Section 3.6.1). There would be no impact on surface water resources because the Proposed Project or its alternatives would not cause a substantial increase in ground water levels; the minimum depth to ground water resulting from the proposed recharge would be 60 feet, which would occur directly beneath the recharge site (Section 3.6.2).

3.8.2 Recreation

Construction, operation, and maintenance of the Proposed Project would primarily occur within existing disturbed ROWs and on private land. Thus, existing recreation resources would not be affected. The minor potential adverse impact on future recreational trails is discussed in Section 3.3.2.

3.8.3 Climate Change

As discussed in Section 3.2.2, the action alternatives would result in relatively minor amounts of emissions over a period of up to 7 months. Thus, potential adverse impacts on climate change are likely to be negligible and were not considered further.

4.0 Environmental Laws and Directives Considered

The following is a summary of selected federal laws, regulations, and Executive Orders considered in preparation of this EA.

National Environmental Policy Act of 1969, as amended (P.L. 91-190)

This law requires federal agencies to evaluate the potential environmental consequences of major federal actions. NEPA also requires full public disclosure about the proposed action, accompanying alternatives, impacts, and mitigation.

Public scoping was initiated on August 11, 2008. A total of 28 written comments were received. In addition, a public scoping meeting was held on August 26, 2008, which was attended by approximately 70 people. This EA was prepared in accordance with the requirements of NEPA. The draft EA is being circulated for a 30-day public review and comment period.

Fish and Wildlife Coordination Act (FWCA) (P.L. 85-624)

The FWCA provides a procedural framework for the consideration of fish and wildlife conservation measures in federal water resource development projects. Coordination with the FWS and state wildlife management agencies is required on all federal water development projects. The effects of the CAP were originally addressed in an amended FWCA report prepared by the FWS in 1989. The proposed action does not constitute a federal water resource project that impounds, diverts, or otherwise modifies a stream or other natural body of water. No further coordination pursuant to the FWCA is required.

Endangered Species Act of 1973 (P.L. 93-205)

The ESA provides protection for plants and animals that are currently in danger of extinction (endangered), and those that may become extinct in the foreseeable future (threatened). Section 7 of this law requires federal agencies to ensure that all federally associated activities do not have adverse impacts on the continued existence of threatened or endangered species or designated areas (critical habitat) that are important in conserving those species.

Reclamation submitted a BA (prepared by Stantec) on November 25, 2008. We concluded that the Proposed Project may affect, but is not likely to adversely affect the LLNB. We also concluded that the Proposed Project may affect, and is likely to adversely affect the PPC. Reclamation requested the initiation of formal consultation pursuant to Section 7(b) of the ESA. A December 24, 2008 letter from FWS indicated that additional information was required prior to initiating formal consultation. An Informal Consultation meeting was held on January 12, 2009, with representatives from Reclamation, CWC and FWS, to provide the requested project information.

Wild and Scenic Rivers Act of 1968 (P.L. 90-542)

This law designated the initial components of the National Wild and Scenic River System, and established procedures for including other rivers or reaches of rivers that

possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values and preserving them in a free-flowing condition. No recommended or designated wild and scenic rivers are located within or near the Project area.

Clean Water Act (P.L. 92-500, as amended) (CWA)

This law establishes the basic structure for regulating discharges of pollutants into the nation's rivers, lakes, estuaries, and coastal waters. Section 404 of the CWA regulates the discharge of dredged and fill material into, and out of, jurisdictional waters. No jurisdictional waters would be impacted by the proposed action. Authorization under Section 402 of the CWA, the National Pollutant Discharge Elimination System (NPDES), has been delegated to ADEQ. An Arizona Pollutant Discharge Elimination System (AZPDES) general permit for construction activities, and other required discharge permits, would be obtained from ADEQ by CWC prior to construction.

National Historic Preservation Act (P.L. 89-665) (NHPA)

This law provides for the protection of historic and prehistoric sites that are eligible for listing on the NRHP. The NHPA requires federal agencies to identify potential impacts to cultural resources and conduct mitigation to protect or record resources as determined appropriate in consultation with the SHPO or Tribal Historic Preservation Office prior to initiating a federal project.

Cultural resource investigations of the Project area were performed by Stantec and its subcontractors. Section 3.5 of this EA describes the cultural resources present in the Project area and mitigation of possible impacts. Reclamation has consulted with the SHPO and received concurrence on a finding of no adverse effect for the project as a whole. Several Native American Tribes also were consulted as part of Section 106 compliance, including the Hopi Tribe, Tohono O'odham Nation, and Pascua Yaqui Tribe.

Farmland Protection Policy Act (P.L. 97-98)

This law requires identification of proposed actions that would adversely affect any lands classified as prime and unique farmlands to minimize the unnecessary and irreversible conversion of farmland to nonagricultural uses. The U.S. Department of Agriculture's Natural Resources and Conservation Service administers this law. The proposed pipeline transects an area of prime irrigated farmland but would be constructed in existing ROW that has already been permanently taken out of farming. Thus, the proposed action would not impact any lands classified as prime or unique farmland.

Executive Order 11988 (Floodplain Management)

This Presidential directive encourages federal agencies to avoid, where practicable alternatives exist, the short- and long-term adverse impacts associated with floodplain development. Federal agencies are required to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibility. The proposed action would not affect floodplain development or management.

Executive Order 12898 (Environmental Justice)

Executive Order 12898 requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of federal actions on minority populations and low-income populations. Low-income populations include communities or individuals living in close geographic proximity to one another, identified by U.S. Census Bureau statistical thresholds for poverty. Minority populations are identified where the percentage of minorities in the affected area exceeds 50 percent, or where the minority population percentage of the affected area is meaningfully greater than the minority population percentage of a much broader area. Neither of these conditions exists within the affected area or Pima County as a whole. No disproportionately high or adverse human health or environmental effects on minority populations and low-income populations would result from the Proposed Project.

Executive Order 11990 (Wetlands)

Executive Order 11990 requires federal agencies, in carrying out their land management responsibilities, to take action that would minimize the destruction, loss, or degradation of wetlands; and take action to preserve and enhance the natural and beneficial values of wetlands. No wetlands would be affected by the Proposed Project.

Department of Interior, Secretarial Order, Indian Trust Assets (ITAs)

ITAs are legal interests in assets held in trust by the U.S. Government for Indian tribes or individual Indians. These assets can be real property or intangible rights, including lands, minerals, water rights, hunting rights, money, and other natural resources. The trust responsibility requires that all federal agencies take actions reasonably necessary to protect ITAs. The primary ITAs in the area involve the San Xavier District of the Tohono O'Odham Nation (Figure 1). The starting point for the proposed pipeline is located near the southeast corner of the San Xavier District boundary. The Proposed Project would be located within existing road ROWs. Construction impacts would be temporary and would not likely affect ITAs. The proposed recharge site is located approximately 5.4 miles southeast of the San Xavier District and would not likely have an effect on reservation ground water resources (see Section 3.6.2, Ground Water Resources – Environmental Consequences). No ITAs are currently known to be present within the Project area or that could be affected by implementation of the proposed action. Consultation with appropriate tribes and the Bureau of Indian Affairs would be undertaken if it is determined there could be ITAs affected by the proposed action.

5.0 Agencies and Persons Consulted

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Stantec
- Alice Templeton, Project Manager
- Robert Welch, Senior Associate

CWC
- Pat Carlstad, Assistant to the President
- Virgil Davis, Secretary
- Arturo Gabaldón, President
- Ken Taylor, Chairman of the Board
- Norris West, Operations Manager

Cooperating Agencies

Arizona Department of Water Resources
Arizona State Land Department
Central Arizona Water Conservation District

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Figures

Appendix A

Scoping Memorandum

United States Department of the Interior

BUREAU OF RECLAMATION
Phoenix Area Office
6150 West Thunderbird Road
Glendale, Arizona 85306-4001

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
PXAO-1500
ENV-6.00

AUG 11 2008

MEMORANDUM

To: All Interested Parties, Organizations, and Agencies

From: Acting for Carol Lynn Erwin
Area Manager

Subject: Notice of Public Scoping for Preparation of an Environmental Assessment (EA) on the Proposed Community Water Company of Green Valley (CWC) Central Arizona Project (CAP) Water Distribution System and Recharge Facility (Action by September 12, 2008)

The Bureau of Reclamation has received CWC's final plans for taking and using its CAP water allocation. Pursuant to the National Environmental Policy Act, Reclamation is requiring preparation of an EA to describe the existing environment and anticipated environmental impacts from construction and operation of CWC's proposed CAP water system. Reclamation is inviting the public to provide input regarding issues and concerns that should be included in the EA.

BACKGROUND

On May 17, 1985, CWC entered into a CAP water service subcontract for 1,100 acre-feet (AF) of CAP water annually, with Reclamation and the Central Arizona Water Conservation District, which operates the CAP. This CAP water service subcontract was later amended in 1997 when New Pueblo Water Company transferred 337 AF annually to CWC. CWC also was allocated 1,521 AF annually as a result of the 2005 Arizona Water Settlements Act, making CWC's total CAP water allocation 2,858 AF annually.

Prior to entering into its initial subcontract, Reclamation reviewed CWC's conceptual plans for taking and using its CAP water allocation and determined they would not result in significant impacts. Because CWC did not plan to implement those plans in the reasonably foreseeable future, Reclamation indicated that CWC would need to submit final plans for taking and using its CAP water allocation to Reclamation for review and final environmental clearances prior to commencement of construction.

Recently, CWC provided Reclamation with final plans for taking and using its CAP water allocation. The prior conceptual plans indicated CWC would treat and directly use its CAP water. The final plans indicate CAP water would be recharged and CWC would continue to pump and serve ground water. Reclamation has determined an EA is needed due to the following: The final plans include construction and operation of a recharge facility; there has been a substantial amount of time that has gone by since Reclamation's original review; and,

the areas to be impacted and environmental conditions have changed. Based upon the EA, Reclamation will determine whether a Finding of No Significant Impact is appropriate, or an environmental impact statement must be prepared prior to approving CWC's plans.

COMMENTS AND PUBLIC SCOPING MEETING

The purpose of the EA is to describe the proposed project and environmental impacts that are anticipated to result from its implementation. Brief descriptions of the proposed action and the No Action alternative to be included in the EA are provided in the attachment to this memorandum. The impacts we currently anticipate addressing in the EA include, but are not limited to, biological resources, cultural resources, land ownership and use, water quality and quantity, air quality, and socioeconomic resources.

Reclamation is interested in receiving your input regarding potential impacts of the proposed action, alternatives that should be considered, and/or other concerns and issues that should be addressed in the EA. We will be holding a public scoping meeting to solicit your comments. At this meeting you will have an opportunity to view our exhibits, listen to a short presentation regarding the proposed project, and provide verbal and/or written comments:

Date and Time:	August 26, 2008 at 5:00 p.m.
Location:	Green Valley Recreation West Center, 520-625-0288
Address:	1111 South Villa Arco Iris, Green Valley, Arizona 85614

Hearing impaired, visually impaired, and/or mobility impaired persons planning to attend this meeting may arrange for necessary accommodation by calling CWC at 520-625-8409, by August 15, 2008.

Comments may also be sent by mail to Reclamation's Phoenix Area Office at the above address, Attention: PXAO-1500 (Ms. Sandra Eto). To be most helpful, comments should be as specific as possible and sent to Reclamation by September 12, 2008. Comments may also be submitted by faxogram to 623-773-6486. Before including your name, address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment--including your personal identifying information--may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

We anticipate a draft EA will be available for a 30-day review and comment period in late 2008, at which time we will notify the public of its availability. Copies will be made available at that time; it also will be posted on PXAO's website, http://www.usbr.gov/lc/phoenix/.

If you have any questions, please call Ms. Eto at Reclamation's Phoenix Area Office, 623-773-6254, or write to her at the above address, Attention: PXAO-1500. Thank you for your interest in this project.

Attachment

ATTACHMENT TO SCOPING NOTICE

Brief Description of the Proposed Community Water Company of Green Valley
Central Arizona Project Water Delivery System Project

BACKGROUND

On May 17, 1985, Community Water Company of Green Valley (CWC) entered into a Central Arizona Project (CAP) water service subcontract for 1,100 acre-feet (AF) of CAP water annually, with Reclamation and the Central Arizona Water Conservation District, which operates the CAP. This CAP water service subcontract was later amended in 1997 when New Pueblo Water Company transferred 337 AF annually to CWC. CWC also was allocated 1,521 AF annually as a result of the 2005 Arizona Water Settlements Act, making CWC's total CAP water allocation 2,858 AF annually.

Reclamation must comply with the requirements of the National Environmental Policy Act prior to approving CWC's plans for taking and using its CAP water allocation. Reclamation has determined an environmental assessment (EA) is necessary. Based upon the EA, Reclamation will determine whether a Finding of No Significant Impact is appropriate, or an environmental impact statement must be prepared prior to approving CWC's plans. The impacts currently anticipated to be addressed in the EA include, but are not limited to, biological resources, cultural resources, land ownership and use, water quality and quantity,[1] air quality, and socioeconomic resources.

Proposed Action - Pipeline and New Recharge Site

CWC has been working for a number of years to ensure the future water supply for residents of the Green Valley area. The service area of CWC covers approximately eight square miles (Figure 1). A 2007 report completed by Pima County states "the water table in Green Valley has been declining in past years and expected to continue to decline as water demands increase." Drawdown of the local aquifer has caused concerns regarding quantity of available water in the future. Despite the current slowdown in the economy, future residential development is likely to occur, as evidenced by the interest in large master planned communities in this region in recent years. In addition, CWC is concerned about the presence of a sulfate plume from the Phelps Dodge Sierrita tailing impoundment (now owned by Freeport McMoRan Sierrita, Inc.) and its potential impact to CWC's operating wells, underscoring the need for an alternative water source.

CWC plans to construct and operate a raw water delivery pipeline and underground storage facility (recharge site) to deliver and recharge Central Arizona Project (CAP) water in the Green Valley area (Figure 2). Under the proposed project, the pipeline would be sized to provide additional flow capacity, should other water users make arrangements with CWC to utilize the system for delivery of CAP water.

[1] Although the recharge location is distant from most existing wells and other development, the potential effects, if any, of underground mounding of the water to be recharged in this area will be evaluated.

A proposed 36-inch, raw water pipeline would begin at the existing CAP pipeline terminus, which is located at the southwest corner of the intersection of Interstate 19 and Pima Mine Road (Figure 2). It would proceed east along Pima Mine Road until turning south along Nogales Highway. At the intersection of the Nogales and Old Nogales Highways, the pipeline alignment would continue south along Old Nogales Highway approximately 0.9 miles. At this point, the pipeline size would be reduced to 20-inch pipe and would proceed easterly along the section line of Sections 31 and 32 of Township 17S, Range 14E (the extended alignment for El Corto Road) to a proposed 20-acre recharge site located in Section 29, T17S, R14E. Along this same alignment, a second 20-inch transmission pipeline from the recharge site would be constructed heading in a westerly direction along the section line to CWC's existing Well #11. Two booster stations would be constructed. The new pipeline would deliver up to 7,000 AF of CAP water per year to the recharge site for the first 15 years of operation (a total of 105,000 AF). After that, the rate of recharge may be reduced. Recovery wells would be constructed at the recharge site to recover CAP water after the first 15 years of operation, or sooner if the existing CWC wells become unusable due to sulfate contamination.

An agreement between CWC and Rosemont Copper Company (RCC) would provide the funding mechanism for the pipeline construction. The agreement would allow RCC to recharge CWC's CAP water allocation for a period of 15 years. RCC has made a commitment to the Green Valley community to recharge a total of 105% of any ground water withdrawn for the operation of its facilities. It is anticipated that this commitment, supplemented by additional sources, could result in a recharge volume of as much as 7,000 AF per year. Utilization of the CAP water supply for this recharge would help maintain the local aquifer and utilize renewable water sources.

No Action Alternative

The No Action Alternative would mean that no pipeline would be constructed in the near future for water conveyance and recharge of the aquifer. CWC is a member of a regional water planning group, the Upper Santa Cruz/Providers and Users Group. This group, formed in October 2007, has been studying ways to bring CAP and other renewable water resources to the greater Green Valley/Sahuarita region to address long-term water supply needs. It is anticipated CWC would continue to investigate ways to deliver its CAP water allocation for use within its water service area, either as part of a regional system, or as a discrete system. In the foreseeable future, however, CWC would continue to rely solely on pumped ground water for delivery to its customers. CWC's annual CAP water allocation of 2,858 AF would continue to be available for purchase as excess CAP water.

Without the delivery and use of its CAP water allocation–either directly or by recharge and recovery–CWC would not have an alternative potable water supply should its existing wells become contaminated by the sulfate plume from the mine tailing impoundment. In addition, without introducing a renewable water supply to the area, ground-water levels would continue to decline.

Appendix B

Scoping Report

SCOPING SUMMARY REPORT – January 2009
Community Water Company of Green Valley Environmental Assessment

This report has been prepared to provide a summary of the scoping process conducted for Community Water Company of Green Valley's (CWC) plans for taking and using its Central Arizona Project (CAP) entitlement to Colorado River water. An environmental assessment (EA) will be prepared to describe the anticipated impacts resulting from CWC's plans to construct and operate a water delivery system that would transport CWC's CAP entitlement of 2,858 acre-feet per year (AFY) through a buried pipeline to a 20-acre recharge facility located east of CWC's current water service area.

The report provides a summary of the following:

- efforts made to notify interested agencies, organizations, and individuals about the proposed project;

- the major points made in public comments received during the scoping process, both written in response to Reclamation's request for scoping comments, and verbally at a public scoping meeting held August 26, 2008, in Green Valley, Arizona; and

- the relevant issues and concerns identified during scoping that will be addressed in the EA.

The report also briefly addresses comments that were considered to be beyond the scope of, or not applicable to, this proposed action.

BACKGROUND

On May 17, 1985, CWC entered into a CAP water service subcontract for 1,100 AFY of CAP water with the Central Arizona Water Conservation District (CAWCD), which operates the CAP, and Reclamation. This CAP water service subcontract was later amended in 1997 when New Pueblo Water Company transferred 237 AFY of CAP entitlement to CWC. CWC also was allocated an additional 1,521 AFY of CAP entitlement as a result of the 2005 Arizona Water Settlements Act, making CWC's total CAP entitlement equal to 2,858 AFY.

Prior to entering into the 1985 water service subcontract, Reclamation received and conditionally approved CWC's conceptual plans for taking and using its CAP entitlement. Reclamation indicated that once CWC finalized its plans, the plans would need to be submitted for review and final environmental clearances prior to commencement of construction.

In April 2007, CWC provided Reclamation with final plans for taking and using its CAP water entitlement. The prior conceptual plan indicated CWC would treat and directly use its CAP water. The final plan indicates CAP water would be recharged and CWC would continue to pump and deliver groundwater to its customers. Specifically, CWC plans to enter into an agreement with Rosemont Copper Company (Rosemont) through which CWC would construct

and operate a raw water delivery pipeline and underground storage facility (USF) to deliver and store CAP water in the Green Valley area, that would be paid for by Rosemont. Under the preferred alternative, the pipeline would be sized to provide additional flow capacity, should other water users in the Upper Santa Cruz sub-basin make arrangements with CWC to utilize the system for delivery of CAP water.

Because the final plan includes construction and operation of the USF, the amount of time that has gone by since Reclamation's original review, and changes in the environmental conditions within the project area, Reclamation concluded an EA is needed to comply with the National Environmental Policy Act (NEPA). Based upon the EA, Reclamation will determine whether a Finding of No Significant Impact is appropriate, or an environmental impact statement (EIS) must be prepared prior to delivering CAP water to CWC.

Rosemont intends to develop a mine in the Santa Rita Mountains, located approximately 10 to 12 miles southeast of the proposed USF in Green Valley. Because a portion of the mine is located on the Coronado National Forest (CNF), the CNF must approve Rosemont's proposed Mine Plan of Operation (MPO). CNF issued a Notice of Intent to prepare an EIS on March 13, 2008 (*Federal Register:* 73 [13527]), and is in the process of evaluating the scoping comments received during the scoping period. According to Rosemont's proposed MPO, the total life-of-mine water usage is estimated to be 100,000 acre-feet. The mine extraction well is located within the Upper Santa Cruz sub-basin. Rosemont has made a commitment to the Green Valley community to replenish 105 percent of its mine water usage within the Santa Cruz basin using available CAP water. There are 11 existing underground storage facilities located within the Santa Cruz basin. Rosemont has been recharging excess CAP water at three of these facilities since 2007. This commitment would result in a replenishment volume of as much as 7,000 acre-feet per year within the Santa Cruz basin. Rosemont's proposed MPO indicates its preference to recharge available CAP water close to its production wells to lessen impacts of its groundwater withdrawals on local water users.

CWC and Rosemont signed a Letter of Intent in July 2007, indicating their intention to enter into an agreement under which Rosemont would fund the construction of the CWC water delivery system, and Rosemont would have first priority of using CWC's CAP water and the recharge facility's capacity for 15 years upon completion of the system unless CWC needs to utilize the system to deliver water to its customers. Although use of CWC's USF could assist Rosemont in meeting its commitment to recharge CAP water close to its production wells, the Letter of Intent does not indicate the agreement is contingent upon the approval of the MPO by CNF. In a subsequent memorandum from Rosemont to CWC dated January 20, 2009, Rosemont reiterated its intent that construction of the CWC water delivery pipeline proceed on a schedule that is independent of, and not contingent upon, CNF's approval of the proposed MPO pursuant to NEPA.

CWC carried out an extensive public involvement program to notify its members and customers about the plans for taking and using its CAP entitlement. CWC publicly announced its plan for the proposed project in a press release on July 19, 2007, and held a public meeting on July 25, 2007, to describe the project in more detail. The August 2007 newsletter distributed to all CWC members and customers described the various issues and recharge alternatives being considered.

CWC held a series of meetings with its members and customers to describe and discuss the proposed project on August 24, September 11, and October 30, 2007. The Arizona Corporation Commission (ACC) invited public comment on the proposed pipeline at a Green Valley Town Hall Meeting on December 5, 2007. Comments, frequently asked questions and CWC's responses and replies have been posted and updated since August 2007 on the CWC website at http://www.communitywater.com/ .

PUBLIC SCOPING

"Scoping" is an integral part of the NEPA process. It provides "*an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action*." (40 CFR § 1501.7).

The objectives of scoping for this Federal action include the following:

- Determine the range of alternatives to be evaluated;
- Identify environmental review and consultation requirements;
- Identify relevant issues related to CWC's plans for taking and using its CAP entitlement that should be addressed in the EA;
- Define the environmental analysis process and technical studies necessary to adequately address the impacts of the project;
- Indicate any public EAs or other EISs which are being or will be prepared that are related to but are not part of the scope of the NEPA document under consideration;
- Identify the interested and affected public; and
- Provide information to the public regarding the proposed project.

Reclamation sent out a scoping memorandum on August 11, 2008, to about 70 interested agencies, organizations, and individuals requesting input regarding issues or concerns that should be addressed in the EA. Reclamation also issued a press release and posted the scoping memorandum on its website on August 11, 2008. A public scoping meeting was held on August 26, 2008, in Green Valley, Arizona, which was attended by approximately 70 persons. Following an open house with informational displays on the proposed project and a presentation by Reclamation on the NEPA process, public comments were invited. Nine persons provided oral comments, which were transcribed by a court reporter. The comment period was open through September 12, 2008; 28 comment letters were received.

ISSUES RAISED THROUGH SCOPING and RECLAMATION'S RESPONSES

A complete set of written comments that have been received and transcript of oral comments presented at the August 26th meeting are available for review at Reclamation's Phoenix Area Office and Tucson Field Office. Reclamation has reviewed and considered all the comments that have been received. The comments fell into four major categories: the NEPA process; action alternatives; statutory and/or regulatory conflicts; and impacts/issues/concerns. These comments are briefly described below, along with how they have been addressed by Reclamation.

I. The NEPA process

A. The NEPA process is premature and should not be initiated at this time. Several people commented there was insufficient information to prepare an EA, or that the lack of a commitment of funding or contractual document made the preparation of an EA premature. Others felt that Reclamation should wait until Pima County completed updating a previous study to determine the best areas to develop recharge facilities within the Upper Santa Cruz sub-basin, in order to include an alternative recharge basin location that would result in the best environmental benefits for the region.

Reclamation's response. The Federal action for which the EA is being prepared is to enable CWC to take and use its CAP entitlement. CWC has provided sufficiently detailed design plans to initiate the NEPA process. Reclamation believes a contractual document is not required to initiate the NEPA process. CWC's consultant has conducted investigations to determine the most appropriate location for an underground storage facility to meet CWC's need. The EA will summarize the investigations that were undertaken and their results.

B. An EIS is required. The majority of the comments received indicated an EIS should be prepared for any or all of the following reasons: the impacts from the project itself would be significant; the project is connected to the Rosemont mine project and as a connected project the impacts would be significant; and/or this project, together with the Rosemont mine, would result in significant cumulative impacts.

Reclamation's response. Section 1508.9(a)(1) of the NEPA regulations states an environmental assessment serves to: "Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact." We initiated preparation of the environmental assessment to determine whether a Finding of No Significant Impact is appropriate or an EIS should be prepared.

As stated in Section 1508.25(a)(1) of the NEPA regulations, actions are connected and should be discussed in the same NEPA document if the actions meet any of the following:

(i) Automatically trigger other actions which may require environmental impact statements.

(ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.

(iii) Are interdependent parts of a larger action and depend on the larger action for their justification.

40 CFR §1508.25(a)(1)

Reclamation recognizes construction of the CWC CAP water delivery system is proposed to be funded by Rosemont and that CWC plans to give Rosemont priority for use of CWC's CAP water for the first 15 years of the system's operation unless it is needed by CWC. Nevertheless, Reclamation must determine whether or not the proposed action and Rosemont mine are "connected" as defined in the NEPA regulations, by applying the three criteria above.

(i) Approval of the CWC water delivery system does not automatically trigger the Rosemont mine operation. CWC has, since 1985, pursued opportunities to develop a means for taking and using its CAP entitlement. Presently, use of CWC's proposed water delivery system is not identified in Rosemont's proposed MPO under consideration by CNF. Reclamation's approval of the CWC water delivery system is not contingent upon CNF's approval of Rosemont's MPO, nor the operation of the mine itself.

(ii) As indicated in a memorandum to CWC from Rosemont dated January 20, 2009 (Attachment D of the Draft EA), Rosemont has made a commitment to pay for construction of the CWC water delivery system regardless of the outcome of CNF's EIS on Rosemont's proposed MPO. Rosemont's MPO does not include the CWC water delivery system and therefore currently CWC's water delivery system is not considered to be a prerequisite for the mine's operation.

(iii) The CWC water delivery system has separate utility from the Rosemont mine. Based upon Rosemont's commitment to fund the construction of the water delivery system regardless of the subsequent outcome of the CNF EIS process, the proposed project does not depend upon the mine to justify its construction and operation. Neither does Rosemont depend upon the construction of the pipeline to proceed with its mine proposal. It can meet its commitment to replenish water within the Santa Cruz basin using other sources of CAP water and other groundwater storage facilities, as has been occurring since 2007. Therefore, Reclamation believes these two actions are not interdependent parts of a larger action, nor do they depend on the larger action for their justification.

Although Reclamation has determined the proposed project and the Rosemont mine proposal are not connected actions, the potential effect of future mine-related pumping was an issue that was raised in many of the comments received. To be responsive to this concern, Reclamation has requested that modeling conducted to evaluate the proposed project's impact on ground water include both a scenario in which there is no mine-related pumping in the future, and one in which there is mine-related pumping in the future. The results will be included in the EA's discussion of ground water impacts, and potential cumulative impacts where appropriate.

C. The scoping process was inadequate. Several individuals complained about the lack of advance notice about the public scoping meeting. One individual complained about the time of day and time of year of the meeting, and felt more than one scoping meeting should be held.

Reclamation response. As noted above, Reclamation sent out about 70 scoping notices, and notified the local news media about both the scoping period and the scheduled public meeting. The comment period was open for over 30 days. Reclamation believes the public was given sufficient opportunity to provide scoping comments during this process. Although we believe it is not reasonable to delay initiation of the NEPA process until winter residents return to the area, we would be happy to send notices to part-time residents regarding the project if their out-of-town addresses are provided to us. In addition, we will attempt to schedule the time of our next meeting to reduce conflicts with other community activities.

II. Action Alternatives.

A. The EA needs to consider more than just "do it" or "don't do it." Several action alternatives were suggested, including identifying alternate funding for the proposed action, considering alternate pipeline and/or recharge basin locations, and considering an alternative that addresses the entire region's existing and future water needs.

Reclamation's response. As indicated in the Council of Environmental Quality's memorandum, "Scoping Guidance" dated April 30, 1981, one of the purposes of scoping is to "…define the issues and alternatives that will be examined in detail...." Based upon the comments received, Reclamation and the project proponent have agreed the following will also be described and evaluated in the EA, to consider a reasonable range of action alternatives along with the preferred alternative:

- An alternative that is identical to the preferred alternative except that the delivery pipeline is sized to accommodate the CAP entitlements of CWC and the other CAP water service subcontractor, Green Valley Domestic Water Improvement District (about 5,000 AFY).

- An alternative that has a recharge facility and delivery pipeline similar to that of the preferred alternative except that the pipeline and recharge basins are sized to only accommodate CWC's CAP entitlement of 2,858 AFY.

The EA will also briefly discuss alternatives that were investigated but eliminated from further consideration, including other pipeline alignments and recharge facility locations. No proposals using alternate funding have been considered as Rosemont is the only entity that has offered to contribute to the funding of a CAP water delivery system. Reclamation initially intended to include an action alternative in its scoping notice which would utilize the existing Farmers Investment Company (FICO) groundwater savings facility as an alternate recharge site; however, due to the objections of FICO's president, that alternative was omitted from the scoping notice. The day before the public meeting,

FICO announced its intention, with American Nevada Corporation (ANC), to construct a CAP water deliver system of its own, that would initially deliver water to the FICO groundwater savings facility. Reclamation requested information from FICO regarding its proposed FICO/ANC water delivery system, and will review it to determine whether or not this proposal also should be included as a reasonable alternative in the EA.

The purpose of the proposed project is to deliver CWC's CAP entitlement to the vicinity of the CWC service area. The delivery of CWC's CAP water would help offset the overdraft of the ground water aquifer in the Green Valley area by providing a renewable supply of water. The recharge of the water in the vicinity of the CWC service area would help maintain the aquifer levels near the point of use. Delivery of CAP water to the CWC service area also is needed to provide an alternative water source in the event that additional CWC wells are contaminated with sulfate. The concentrated withdrawal of water has created subsidence of the ground surface in the areas of the heaviest pumping. Delivering CAP water to the Green Valley area for recharge in the vicinity of the pumping would help offset the decline of the water table and reduce the potential for ground subsidence. While the proposed action and one of the action alternatives to be considered in the EA would provide an opportunity to deliver CAP water to others in the region, Reclamation is not required by NEPA to insist that the project proponent consider alternatives that satisfy regional needs that are beyond its own purpose and need.

B. Alternatives that directly address the mine's water needs and/or uses need to be included in the EA. Comments were received indicating Reclamation should include an action alternative that reflects a range of water use scenarios for Rosemont mine, and one that would deliver water directly to the mine. Several comments also questioned Rosemont's estimated mine water usage, stating it was too low and based upon questionable assumptions.

Reclamation's response. An alternative which directly delivers water to the mine, or alternatives that would reflect a range of water use scenarios by the mine, are outside the scope of Reclamation's EA, and would not meet the purpose and need for the proposed project. Alternative sources of water for the proposed mine, and questions regarding the estimated mine water usage would be appropriately addressed in the CNF EIS on the MPO.

Reclamation's evaluation, regarding amounts of water needed for mine use over the life of the project, is based upon Rosemont's published MPO. Use of any other estimate is beyond the scope of the analysis in this EA.

III. Statutory and/or regulatory conflicts. Use of CWC's CAP entitlement by Rosemont for a number of years would violate the terms of the CAP water service subcontract (Subcontract) and/or would require approval by CAWCD and Reclamation.

Reclamation's response. CWC's delivery and use of its CAP entitlement must be consistent with the provisions of its Subcontract, including Section 4.3, Conditions Relating to Delivery and Use. The agreement between CWC and Rosemont regarding delivery of CWC's CAP

water has not been finalized; therefore, Reclamation and CAWCD, the Contracting Officer and Contractor of the Subcontract, respectively, have not reviewed it for conformity with the Subcontract provisions. Once Reclamation and CAWCD have received a copy of the finalized agreement, Reclamation and CAWCD will determine if it is consistent with the Subcontract requirements. It is envisioned impacts from use of the pipeline and recharge facilities would not change significantly if the details of the finalized agreement are modified. If CWC's CAP water is not used as envisioned in CWC and Rosemont's Letter of Intent or a subsequent agreement, use of other sources of CAP water, such as CAP excess pool water or CAP tribal leases, could be delivered and recharged.

IV. Impacts/issues/concerns need to be addressed.

A. Scoping comments included specific issues and concerns that should be addressed in the EA.

Reclamation's response. The scoping notice indicated the following resource areas would be addressed in the EA: biological resources, cultural resources, land ownership and use, water quality and quantity, air quality, and socioeconomic resources. While the following impacts fall within the resource areas identified above, they were specifically mentioned through the scoping process to be evaluated: invasive species; climate change; potential for growth inducement; Santa Cruz River; quality of life and effects to tourism and real estate from declining water table; impacts to the existing groundwater, including any effects of recharge on the existing sulfate plume contamination; and permits required to construct and operate the project.

B. Rosemont's estimate of water use over the life of mine is grossly underestimated. Several comments indicated Reclamation's analysis of impacts to water quality and quantity needed to utilize a much higher estimate of water withdrawal by the mine, spread over a longer period of time.

Reclamation's response. As indicated in II.B. above, Reclamation's evaluation regarding amounts of water needed for mine use over the life of the project are based upon Rosemont's published MPO. Use of any other estimate is beyond the scope of the analysis in this EA. The analysis of groundwater impacts will provide the magnitude of change among the alternatives, with and without Rosemont's proposed pumping. While ultimately Rosemont's water use may differ in both quantity and timing, as will future water use by other entities, the relative magnitude of the cumulative impacts over time among the alternatives will still be valid.

Appendix C

Common Plant and Animal Species in the Project Area

Table A. Plant Species That May Occur in the Project Area

Black Grama	*Bouteloua eriopoda*
Blue Grama	*Bouteloua gracilis*
Wright Sacaton	*Sporobolus wrightii*
Porter's Muhly	*Muhlenbergia porteri*
Catclaw Acacia	*Acacia greggii*
Burroweed	*Isocoma tenuisecta*
Triangle-leaf Bursage	*Ambrosia deltoidea*
Creosote Bush	*Larrea tridentata*
White-thorn Acacia	*Acacia constricta*
Chain-fruit Cholla	*Opuntia fulgida*
Barrel Cactus	*Ferocactus acanthodes*
Pincushion Cactus	*Mammillaria* spp.
Ocotillo	*Fouquieria splendens*
Brittlebush	*Encelia farinosa*
Wolfberry	*Lycium* sp.
Velvet Mesquite	*Prosopis velutina*
Foothill Paloverde	*Parkinsonia microphylla*
Blue Paloverde	*Parkinsonia florida*
Desert Ironwood	*Olneya tesota*
Saguaro	*Cereus giganteus*
Four-wing Saltbush	*Atriplex canescens*
Wild Buckwheat	*Eriogonum* sp.
Strawberry Hedgehog	*Echinocereus engelmannii*
Burrobrush	*Hymenoclea monogyra*
Canyon Ragweed	*Ambrosia ambrosioides*
Fairy Duster	*Calliandra eriophylla*

Table B. Wildlife Species That May Occur in the Project Area

Reptiles and Amphibians

Sonoran Toad	*Bufo alvarius*
Couch's Spadefoot Toad	*Scaphiopus couchi*
Great Plains Toad	*Bufo cognatus*
Tiger Whiptail	*Apidoscelis tigris*
Desert Grassland Whiptail	*Apidoscelis uniparens*
Side-blotched Lizard	*Uta stansburiana*
Zebra-tailed Lizard	*Callisaurus draconoides*
Desert Iguana	*Dipsosaurus dorsalis*
Western Patch-nosed Snake	*Salvadora hexalepis*
Western Diamondback Rattlesnake	*Crotalus atrox*
Mojave Rattlesnake	*Crotalus scutulatus*
Common Kingsnake	*Lampropeltis getula*
Gophersnake	*Pituophis catenifer*
Red Racer	*Masticophis flagellum piceus*
Western Banded Gecko	*Coleonyx variegatus*
Regal Horned Lizard	*Phrynosoma solare*
Desert Spiny Lizard	*Sceloporus magister*

Table B (cont.) Wildlife Species That May Occur in the Project Area

Avian

Red-tailed Hawk	*Buteo jamaicensis*
American Kestrel	*Falco sparverius*
Northern Harrier	*Circus cyaneus*
Harris Hawk	*Parabuteo unicinctus*
Poor-will	*Phalaenoptilus nuttallii*
Mourning Dove	*Zenaida macroura*
Curve-billed Thrasher	*Toxostoma curvirostre*
Black-tailed Gnatcatcher	*Polioptila melanura*
Ladder-backed Woodpecker	*Dendrocopos scalaris*
Northern Flicker	*Colaptes auratus*
Scaled Quail	*Callipepla squamata*
Gambel's Quail	*Callipepla gambelii*
Western Kingbird	*Tyrannus verticalis*
Common Raven	*Corvus corax*
Verdin	*Auriparus flaviceps*
Cactus Wren	*Campylorhynchus brunneicapillus*
Greater Roadrunner	*Geococcyx californianus*
Northern Mockingbird	*Mimus polyglottos*
Loggerhead Shrike	*Lanius ludovicianus*
Phainopepla	*Phainopepla nitens*
Brown-headed Cowbird	*Molothrus ater*
House Finch	*Carpodacus mexicanus*
Lark Sparrow	*Chondestes grammacus*
White-crowned Sparrow	*Zonotrichia leucophrys*
Black-throated Sparrow	*Aimophila bilineata*

Mammals

Coyote	*Canis latrans*
Mule Deer	*Odocoileus hemionus*
Collared Peccary	*Pecari tajaca*
Kit Fox	*Vulpes macrotis*
Striped Skunk	*Mephitis mephitis*
Desert Cottontail	*Sylvilagus audubonii*
Black-tailed Jackrabbit	*Lepus californicus*
Antelope Jackrabbit	*Lepus alleni*
Harris' Antelope Squirrel	*Ammospermophilus harrissi*
Round-tailed Ground Squirrel	*Spermophilus tereticaudus*
Cactus Mouse	*Peromyscus eremicus*
Deer Mouse	*Peromyscus maniculatus*
Merriam's Kangaroo Rat	*Dipodomys merriami*
Ord's Kangaroo Rat	*Dipodomys ordi*
White-throated Woodrat	*Neotoma albigula*
Desert Woodrat	*Neotoma lepida*
Desert Pocket Mouse	*Chaetodipus penicillatus*
Bailey's Pocket Mouse	*Chaetodipus baileyi*
Arizona Pocket Mouse	*Perognathus amplus*
Southern Grasshopper Mouse	*Onychomys torridus*

Appendix D

Community Water Company – Rosemont Copper Memoranda

Explanatory Memorandum and Letter of Intent between Community Water Company of Green Valley and Augusta Resource Corporation; 2007

Memorandum from Rosemont Copper to Community Water Company of Green Valley; January 20, 2009

EXPLANATORY MEMORANDUM

The attached July 12, 2007 Letter of Intent between Community Water Company of Green Valley and Augusta Resource (Arizona) Corporation, together with its Appendix A, reflect preliminary concepts and alternatives being discussed by the parties at that time. The fact that an alternative is discussed or potential third party participant identified is not intended to imply that any determination has been made concerning any given alternative or that any understanding has been reached with any identified potential participant.

The documents were designed and intended to identify an array of options and possible participants that warranted further inquiry and discussion. Efforts to date have determined that some identified options are not feasible and others require further investigation and refinement. An example of the former is that instream recharge has been eliminated for technical reasons. Examples of the latter include the possible use of State Lands, the method by which CAP water may be used by and among the participants, and the form of final agreements to construct and operate the project and the regulatory role of the Arizona Corporation Commission concerning those matters. All these issues, among others, remain the subject of ongoing discussion, investigation and review.

Accordingly, it must be recognized while reviewing the Letter and the Appendix that they reflect only the initial step in an ongoing process. That process continues to narrow available options and to clarify and specify relationships and regulatory frameworks that may be incorporated into any final project.

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To: Augusta Resource Arizona Corporation
ATTN.: Gil Clausen

Subject: Community Water Company Central Arizona Project Water Delivery System

Dear Gil:

Community Water Company of Green Valley (CWCGV) has a long range plan to construct and operate a Water Delivery System (WDS) to transport and recharge CAP water in the service area of CWCGV. The availability of suitable financial arrangements is critical to the eventual implementation of this long range plan.

Augusta Resource Corporation (ARC) plans to procure and recharge CAP water in the vicinity of its Rosemont Mine well site, a 53 acre parcel of land located on Davis Road, Sahuarita, AZ (ARC 53 Acre Parcel). The availability of a suitable pipeline and recharge facility is critical to the eventual implementation of this plan.

CWCGV wishes to construct and operate the CWCGV WDS with planned construction to be initiated in November 2007 and ARC wishes to finance the CWCGV WDS at this time and procure water for delivery and recharge in the CWCGV WDS in June 2009.

This Letter of Intent (LOI) presents the due diligence required to complete an agreement between Community Water Company of Green Valley (CWCGV) and Augusta Resource Corporation (ARC) for the above identified financing, construction and operation of a Central Arizona Project Water Delivery System (WDS) consisting of a new pipeline and associated water recharge facilities.

The pipeline is to be constructed from the current terminus of the Central Arizona Project (CAP) canal at Pima Mine Road in Pima County, AZ and extend to the CWCGV service area in Green Valley, Arizona, generally in

the vicinity of CWCGV Well No: 11 with the provision of a valve to provide for future extension of a line by ARC to the ARC 53 Acre Parcel.

The associated water recharge facilities include (a) a newly constructed in-stream recharge storage facility, in the vicinity of Well 11 that is acceptable to CWCGV to store CAP water or (b) a newly constructed artificial recharge facility on a parcel made available to CWCGV by the State Land Department of Arizona; and possibly (c) the use of a Ground Water Savings facility in the vicinity of Well 11.

The parties have established a CAP Water Delivery System (WDS) Plan as presented in a briefing dated June 18, 2007, and that Plan is incorporated as Appendix A to this Letter of Intent.

The terms of this LOI will be memorialized in an "Agreement Relating to Extension of Water Distribution Facilities" (the "Agreement") that will be subject to the approval of the Arizona Corporation Commission.

The parties agree that the following activities shall be undertaken by the respective party in furtherance of implementation of the CWCGV WDS:

- Complete the Design Studies;
- Elect Design Options;
- Define the Participants to the Agreement;
- Finalize the terms of the Agreement.

The Agreement shall generally contain within it the following terms and conditions.

WDS Financing

- The Agreement may be structured as a "Contribution in Aid of Construction" contract (without repayment to ARC) or as an "Advance in Aid of Construction" contract (with repayment to ARC, but based on a tariff schedule designed to generate the revenue necessary for the repayment), as may be determined by the parties.

- Upon approval of a budget with scheduled capital funding terms, ARC will deposit full payment for the funding of all capital and project development (including, but not limited to engineering, legal, public relations, easements, direct project management, construction, permitting and similar) costs required to construct and implement the WDS, at a financial institution mutually acceptable to ARC and CWCGV.

- CWCGV will own the WDS as constructed and described in the WDS Project Plan.

WDS Design & Construction

- CWCGV will implement the WDS Project Plan with a minimum Design Capacity of 700 acre-feet of CAP water delivery and recharge per month before any capacity increases identified in the following paragraphs.

- ARC and CWCGV will form a WDS Project Team comprised of two members each and an alternate from each. The WDS Project Team will report directly to the appropriate management of ARC and CWCGV. The WDS Project Team will have specific construction milestone and operation milestone responsibilities.

- CWCGV will obtain the necessary approvals for construction and operation of the WDS as required in the WDS Project Plan.

- CWCGV will manage construction of the WDS as described in the WDS Project Plan.

- CWCGV and ARC may oversize beyond the Design Capacity any aspect of the infrastructure to accommodate additional capacity for their individual needs, provided such capacity changes and funding obligations are committed to no later than 120 days from the signing of this Letter of Intent and the party requesting the oversize pay any incremental cost.

- CWCGV and ARC will communicate and cooperate on discussions with possible third party participants to increase the design capacity of the entire WDS Project to accommodate that third party's capacity requirements, provided that such capacity changes and funding obligations are committed to no later than 120 days from the signing

of this Letter of intent and the third party pay a pro-rated share of all appropriate project costs. Any third party participant must be approved by both CWCGV and ARC.

WDS Infrastructure Capacity Use

- ARC agrees to become a member of the CWCGV cooperative, and CWCGV agrees to appoint ARC as a member in the CWCGV cooperative.

- ARC will enter a customer agreement with CWCGV for delivery and recharge of ARC CAP water.

- ARC will recharge the full amount of planned water usage for the Rosemont Mine as specified in the approved Rosemont Mine Plan of Operation. This water will be stored at the ARC 53 Acre Parcel or the WDS recharge facilities, provided that any water from CWCGV (and/or GVDWID) CAP allocations shall be stored only at the WDS recharge facilities. In the event that the WDS facilities are not completed by January 1, 2011, ARC may store water at the existing Pima Mine Road recharge facility and any water stored at that facility between January 1, 2011 and the completion of the WDS will be counted towards ARC's obligation under this paragraph.

- ARC will recharge additional water usage above the planned water usage by the Rosemont Mine at the ARC 53 Acre Parcel, the WDS recharge facilities, or the Pima Mine Road Recharge facility.

- ARC will have first priority for the utilization of the WDS delivery and recharge Design Capacity for 15 years from initial operation of the WDS.

- After the initial 15 year term, the Design Capacity of the WDS shall belong to CWCGVS. The right to utilize additional capacity beyond the Design Capacity shall be retained by such party that paid to oversize the WDS. If a third party participant fails to utilize its additional capacity, or pay the capacity tariff established by the ACC, the third party participant' capacity will revert to CWCGV on terms to be set forth in the third party participation Agreement.

- The right to use additional delivery capacity through increased pressure or velocity shall be retained as a "right of first refusal" by ARC for thirty years from the initial operation of the WDS. In the case of additional capacity by increased operating velocity, ARC shall be responsible for any incremental increases in operating costs, including power, maintenance and other items as may be associated with the increased capacity.

- ARC may use its rights to capacity and water under this agreement for any lawful purpose. ARC may also subcontract its rights to capacity and water without the approval of CWCGV. ARC may **not** assign its rights under this agreement.

CAP Water Supply for the WDS

- ARC's CAP water supply for WDS transport and recharge shall consist of ARC's CAP Excess Water Subcontracts, CWCGV's CAP M&I Subcontract (to the extent permissible, for a maximum of 15 years from initial operation of the WDS), ARC Acquired CAP water (e.g. Indian lease) and possibly GVDWID's CAP M&I Subcontract (for a maximum of 15 years from initial operation of the WDS).

- The availability to ARC of CWCGV's CAP allocation and associated WDS capacity for the 15-year period shall be subject to cancellation in the event of a government agency requirement or court order outside of the control of CWCGV requires CWCGV to be able to treat and deliver CAP water to its customers.

- ARC will pay all costs required to purchase the water that ARC will transport and recharge through the WDS.

- All ARC or third party water within the WDS must originate in the CAP unless the Board of Directors of both parties consent in writing.

WDS Operational Costs

- CWCGV will obtain a mutually acceptable ACC approved Tariff Schedule for water transport and recharge services and maintenance fees, and for the sale of water from CWCGV's CAP allocation to ARC at CWCGV's cost if used for recharge under this agreement. [Alternative:

To the extent that such tariff is exclusively for this project, the cost will be considered a project cost.]

- ARC will pay the prevailing Tariff Schedule fees for WDS transport and recharge of ARC's CAP water supply.

- ARC will pay a maintenance component of the Tariff Schedule fees for those years when there is no CAP water transport and/or recharge.

- ARC and CWCGV will negotiate an appropriate performance guaranty to insure payment of the WDS transport and recharge fees.

WDS Long Term Storage Credits

- Long term storage credits earned by storage of CAP water within the WDS recharge and storage facilities shall belong exclusively to the party purchasing the CAP water and paying the cost of transport, delivery and storage. Separate accounts shall be established with the Arizona Department of Water Resources to account for such credits. Once created, the long term storage credits shall be the personal property of the entity holding the account, and such party may extinguish, sell or otherwise dispose of the credits in its sole discretion, except for the right of refusal granted in this agreement.

- CWCGV shall have the right to purchase, at ARC's actual cost, ARC long term storage credits remaining after completion of the Rosemont Mine operation and reclamation activities, that were earned by ARC's delivery and storage of CAP water from CWCGV's CAP M&I Subcontract.

Additional Matters

- Upon execution of this LOI, ARC shall make a contribution in aid of construction in the amount of Fifty Thousand Dollars (U.S.) to CWCGV to assist CWCGV with its evaluation of the recharge facility. ARC will undertake to prepare all documents necessary to produce the final agreement envisioned by this letter of intent.

- Although the Parties shall endeavor in good faith to complete the Agreement within one hundred twenty (120) days, if prior to executing the Agreement ARC elects to terminate this LOI, it shall pay to CWCGV

all of CWCGV's reasonable costs and expenses incurred subsequent to executing the LOI less the $50,000 contribution in aid of construction noted above. In the event CWCGV shall terminate this LOI, it shall assist ARC in identifying and implementing an alternate recharge facility.

- CWCGV and ARC will jointly develop and abide by a Community Communications Plan to keep the Sahuarita/Green Valley citizens informed of the CAP WDS plans and implementation status.

- This LOI and any resulting "Agreement(s)" shall be binding on successors in interest.

DATED as of the 12th day of July, 2007.

COMMUNITY WATER COMPANY OF GREEN VALLEY

By: _____
Its: Chairman

By: _____
Its: President

ACCEPTED AND APPROVED:

AUGUSTA RESOURCE CORPORATION

By: _____
Its: PRESIDENT & CEO

CWC CAP WDS
Appendix A
CAP Water Deliver System (WDS) Plan
dated _____, 2007

COMMUNITY WATER COMPANY of GREEN VALLEY

CAP WATER DELIVERY SYSTEM (WDS) PLAN

PLAN BRIEFING

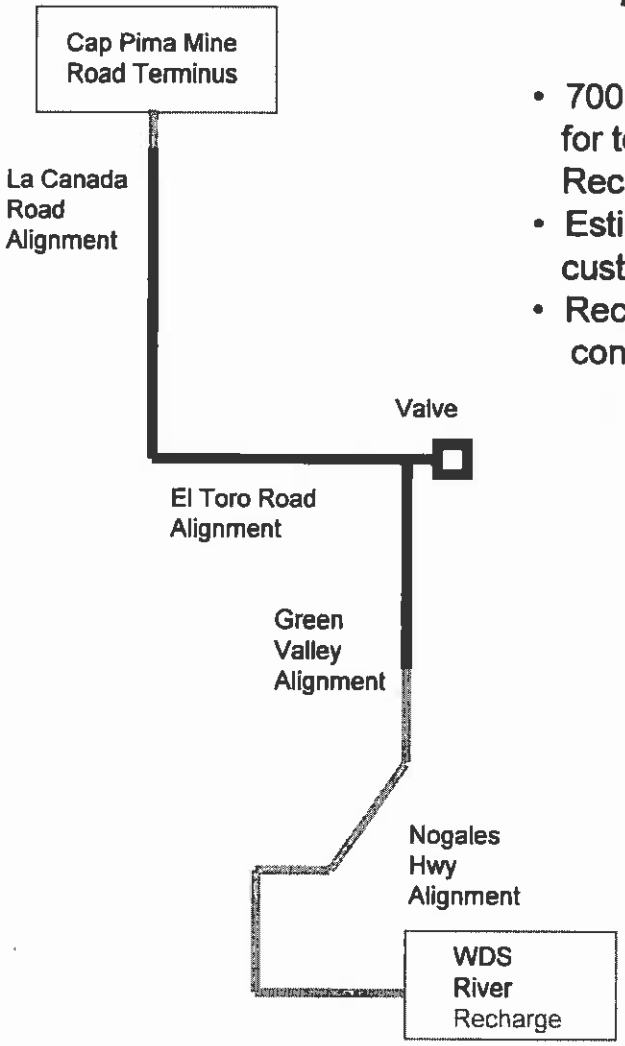
June 18, 2007

CWC CAP WATER DELIVERY SYSTEM
PLAN OUTLINE

- CWC CAP WDS
- WDS Project Team
- Schedule
- Plan Benefits
- Potential Players
- Potential Agreements
- Scope of Agreements
- Overview of Agreements
- Plan
  - CWC CAP WDS Project Plan
  - Funding Agreement
  - Customer Agreement
  - CAP Allocation Agreements
- Action Items

CWC CAP WATER DELIVERY SYSTEM

TARGET SYSTEM



- 700 acre-feet per month for ten months to WDS Recharge
- Estimate established customer for 15 years
- Recharge at Pima if construction is delayed

Item	Cost ($000)
Pipeline: 20 Inch from CAP Terminus to WDS Recharge Facilities.	[redacted]
Recharge Land: 2 acres for river access.	[redacted]
Recharge Construction:	[redacted]
Engineering Overhead	[redacted]
Legal & Management OH	[redacted]
Construction Contingency at 15%	[redacted]
Total Opinion of Cost (Stantec)	8,779

200706124192f

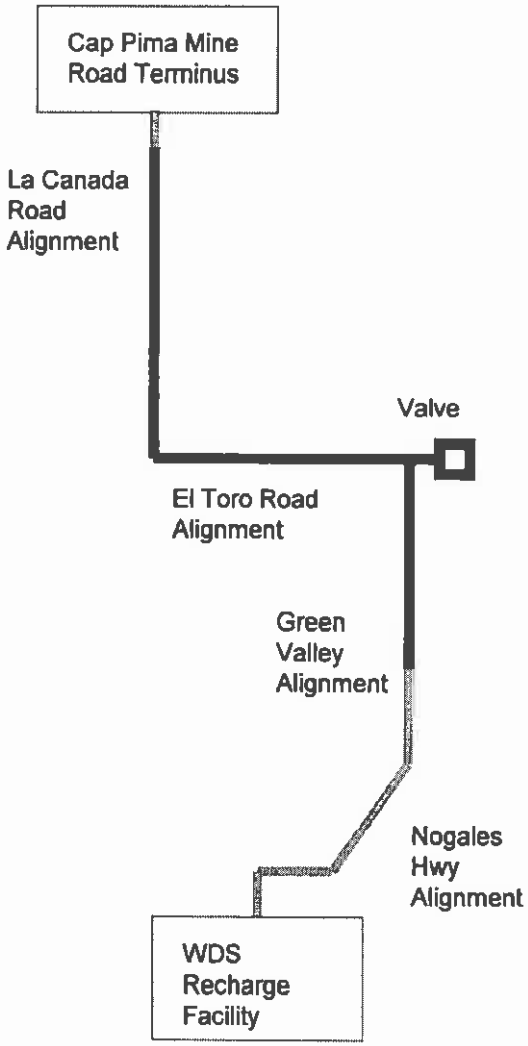
Confidential Information

CWC CAP WATER DELIVERY SYSTEM
WDS CONCEPT NOTES

- Pipeline from Pima Mine Road CAP Terminus to CWC Well No: 11, with planned extension to Santa Cruz river for recharge. Sized for 700 acre-feet of water per month.
- Install branch valve at El Toro Road alignment and intersection with FICO property. (Pipeline turns south at this point).
- Oversize pipeline from Pima Mine Road CAP Terminus to El Toro Road branch valve per anticipated future additional capacity requirements.
- Tariff schedule reflects optional water capacity available to serve branch pipeline.
  - First 15 years—optional water capacity dedicated to ARC.
  - Beyond 15 years—ARC has priority choice on optional water capacity. If not used, CWC able to sell capacity to other customer(s).

CWC CAP WATER DELIVERY SYSTEM

SAFE HARBOR



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- 700 acre-feet per month for ten months to WDS Recharge
- Estimate established customer for 15 years
- Recharge at Marana if construction is delayed

Item	Cost ($000)
Pipeline: 20 Inch from CAP Terminus to WDS Recharge Facilities.	[redacted]
Recharge Land: 15 acres for basins, 13 acres for buffer.	[redacted]
Recharge Construction:	[redacted]
Engineering Overhead	[redacted]
Legal & Management OH	[redacted]
Construction Contingency at 15%	[redacted]
Total Opinion of Cost (Stantec)	14,893

Confidential Information

CWC CAP WATER DELIVERY SYSTEM
CONSTRUCTION COST ELEMENTS

Element	Engineering	Support	Contingency
Land and Right of Ways	[redacted]	[redacted] *Identify owners, purchase or lease agreements for Recharge Facilities*	*See Construction Cost*
Pipeline	[redacted] *Engineering, permitting, easements*	[redacted] *Legal, contractor agreements, project management*	*See Construction Cost*
Recharge Facility	[redacted] *Engineering, permitting, easements*	[redacted] *Legal, contractor agreements, project management*	*See Construction Cost*
Construction Cost *(Land & Right of Ways, Pipeline, and Recharge Facility)*	[redacted]	[redacted]	[redacted]

CWC CAP WATER DELIVERY SYSTEM
WDS PROJECT TEAM

- Team Structure
  - Two from Community Water Company (plus one designated alternate)
  - Two from Augusta Resource Company (plus one designated alternate)
  - Responsible to senior management of both Companies
- Responsible for specific construction milestones
  - Identify customer(s) for recharge facility overburden sale
  - Plan and implementation for use of the FICO GWSF
  - Santa Cruz Recharge
    - Other than active stream bed recharge
    - Managed recharge
    - Constructive element recharge
  - Recharge facility specification
    - One location versus two locations
  - Oversight of construction
- Responsible for specific operation milestones
  - Purchase option for annual water delivery contract
  - Annual review of the CWC contract price for water transport and recharge, and recommendation of any change required to meet all cost obligations
  - Oversight of continuing operations

CWC CAP WATER DELIVERY SYSTEM
PLANNING SCHEDULE

• Conceptual Agreement	• May 2007
• WDS Project Team	• May 2007
• Safe Harbor	• June 12, 2007
• Draft Funding Agreement	• July 2007
• Detailed Planning	• June 2007 through Nov 2007
• Pre-Construction Review	• Oct 2007
• Funding Agreement	• Nov 2007
• Design, Construction, Operation and Management Agreements	• Nov 2007
• Construction	• Dec 2007 through July 2009
• Operation	• June 2009

CWC CAP WATER DELIVERY SYSTEM

PLAN BENEFITS

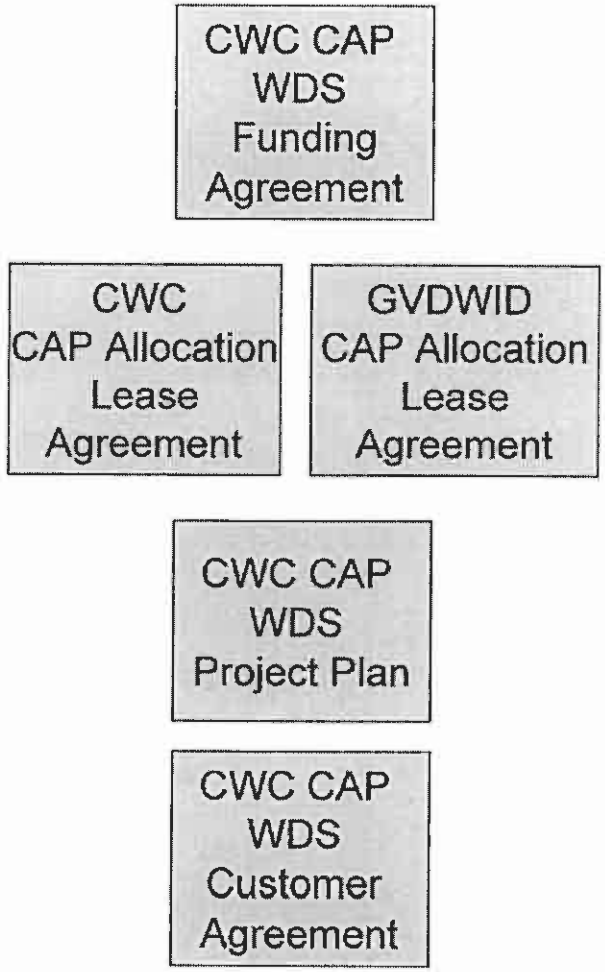
	Pros	Cons	Constraints
Community Water Company of Green Valley (CWC), Green Valley, AZ	• Water recharge area is local to water supply wells • 30,000 owners see the benefit of local recharge • Increased political strength for the recharge project • Project developed and managed by an experienced water company • Existing CAP water allocations • Does not depend on FICO participation • Plan not subject to NEPA review and approval	• Requires land purchase for water recharge facility	• Subject to ACC Water Utility regulation • CWC actions must benefit members • Requires full recharge of water into the CWC service area

CWC CAP WATER DELIVERY SYSTEM
POTENTIAL PLAYERS

- Governmental Agencies
  - Arizona Department of Water Resources (ADWR)
  - Arizona State Land Department (ASLD)
  - Arizona Department of Transportation (ADOT)
  - Arizona Corporation Commission (ACC)
  - Arizona State Game and Fish
  - Central Arizona Project (CAP)
  - US Army Corp of Engineers
  - US Fish and Wildlife Service
  - Federal Bureau of Reclamation (USBR)
  - Pima County
  - Town of Sahuarita
  - Green Valley Water Improvement District (GVDWID)
- Farmers Investment Company (FICO)
- Consumers
  - Elected Representatives (Federal, State, County, Local)
  - Green Valley Community Coordinating Council (GVCCC)
  - Green Valley-Sahuarita Chamber of Commerce (GV-SCoC)
  - Developers (*example: Mission Peaks*)

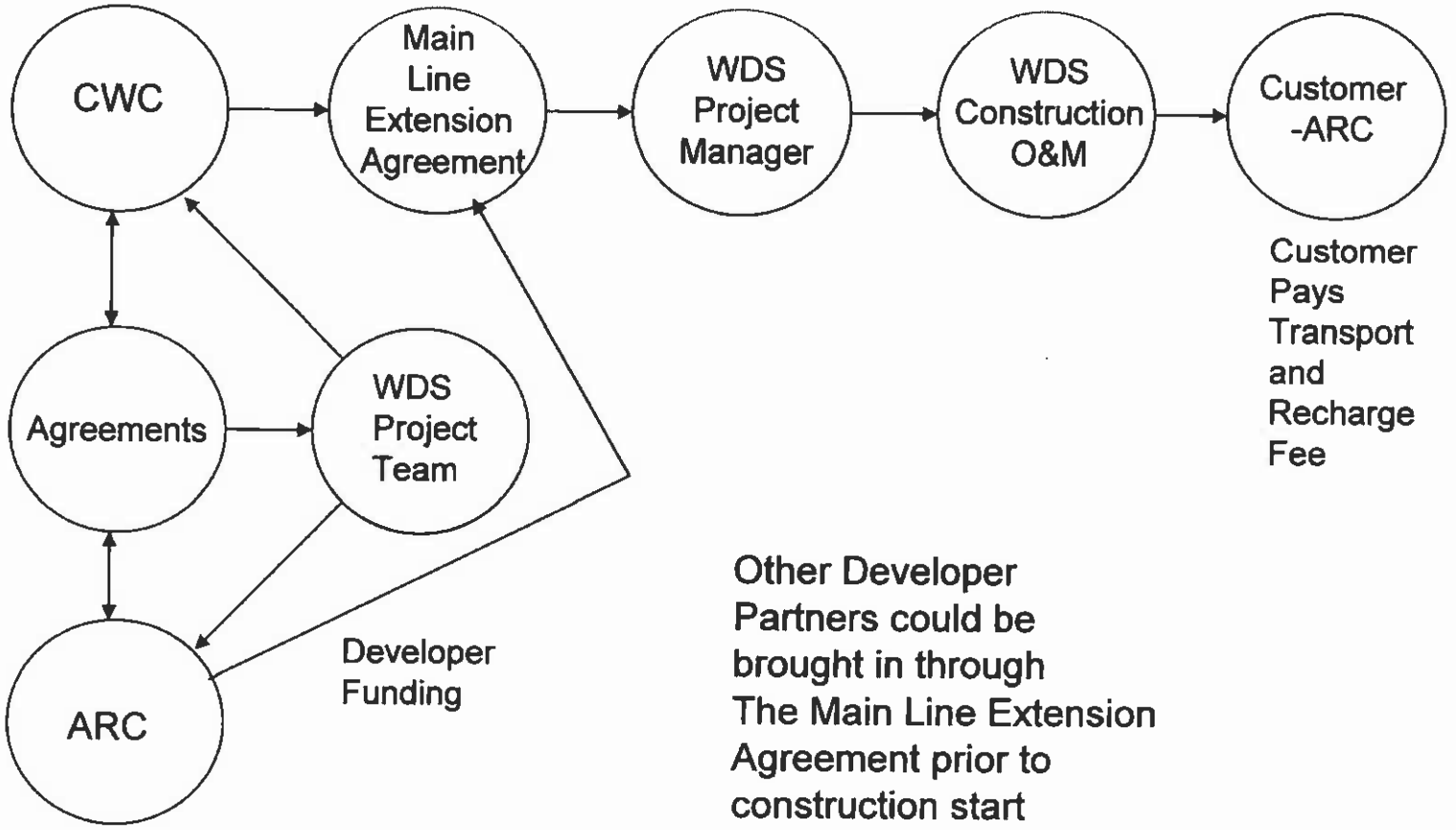
CWC CAP WATER DELIVERY SYSTEM
POTENTIAL AGREEMENTS

- Funding Agreement
  - Loans
  - Payment Guarantees
  - Regulatory Review
  - Cash Flow
  - Ownership
  - CAP Allocations
- Design, Construction, Operation and Management
  - Feasibility
  - Project Plan
  - Schedule
  - Customers



CWC CAP WATER DELIVERY SYSTEM

OVERVIEW OF AGREEMENTS



CWC CAP WATER DELIVERY SYSTEM
SCOPE OF AGREEMENTS

- The ARC is obligated to recharge the full amount of planned water usage for the Rosemont Mine as specified in the approved Mine Plan of Operation.
  - The current draft Mine Plan of Operations presents the water usage to be 100,000 acre-feet of water plus a 5% additional amount, known as the "cut to the aquifer". This results in a planned total water recharge of 105,000 acre-feet of water at the WDS recharge facilities.
  - WDS Project Team will make best efforts to obtain sufficient water to meet the ARC Recharge Commitment, including purchase of excess CAP water, lease of CWC and GVDWID CAP allocations, Indian rights water, and other. The maximum water purchase price that ARC would be required to pay under this agreement is [redacted] per acre-foot.
  - Cumulative ARC water usage recharge in the WDS Recharge Facilities will equal or exceed cumulative Mine water usage at the end of each calendar year.
  - Annual recharge will be subject to availability, as determined by the WDS Project Team. The Team will accrue any accumulative water deficiencies and investigate the potential opportunities required to fulfill the water recharge obligation by 2025.
- Additional water usage, above the planned water usage, by the Mine will be recharged at any combination of the following recharge facilities:
  - WDS Recharge Facilities
  - Pima Mine Road CAP Recharge Facility
  - ARC Recharge Facility located adjacent to the ARC water supply wells
- Additional Partner(s) to contract for water transport and recharge, and share in the construction cost of an enlarged system, are sought by the WDS Project Team.

CWC CAP WATER DELIVERY SYSTEM
PROJECT PLAN

- Prepared by Stantec Consulting, Inc.
  - CWC has final decision authority for WDS design
- WDS
  - General Specifications and Description
    - Water Capacity
    - Design Constraints
    - Location of Source and Terminal
  - Pipeline from Pima Mine Road Terminus to WDS Recharge Facility
    - Design Criteria
    - Preferred Route
    - Alternate Route(s)
    - Pipeline specifications
      - Diameter
      - Materials
      - Coatings
  - WDS Recharge Facility
    - Design Criteria
    - Preferred Design
    - Recharge Facility Specification
      - Size
      - Operation Requirements
  - Easements, Approvals, and Costs for Construction, Operation, and Maintenance

CWC CAP WATER DELIVERY SYSTEM
FUNDING AGREEMENT, PART I

- Prepared by Appropriate Attorneys
- Basic Elements Incorporated into Agreement:
  - ARC will execute a CWC main line extension agreement approved by the ACC that requires full funding of all capital and project development (engineering, legal, public relations, easements, direct project management, construction and similar) costs required to construct and implement the WDS.
  - ARC will demonstrate that it has obtained a third party guarantee to its creditors for all debts incurred for the funding of the WDS.
  - ARC will provide upfront funding to facilitate plan implementation for WDS positive cash flow.
  - ARC will pay all the costs required to acquire ownership of the water that ARC will transport and recharge through the WDS.
  - ARC agrees to transport and recharge the planned usage of 105,000 acre-feet of water as presented in the current ARC Plan of Operations.
  - ARC will provide third party guarantee for the WDS transport and recharge fees. A maintenance component of the transport and recharge fees will be charged for those years when there is no water transport and/or recharge.
  - ARC agrees to transfer to CWC, at a t.b.d charge, water credits arising from the transport and recharge of CWC and GVDWID leased CAP water through the WDS, remaining at the end of 25 years.

CWC CAP WATER DELIVERY SYSTEM
FUNDING AGREEMENT, PART 2

- Prepared by Appropriate Attorneys
- Basic Elements Incorporated into Agreement:
  - CWC will accept the modified WDS Project Plan to accommodate the ARC capacity requirements.
  - CWC will refund to the initial funding partners any WDS capital reimbursements from future WDS customers over the initial 15 year period.
  - CWC will obtain the necessary approvals for construction and operation of the WDS as required in the WDS Project Plan.
  - CWC will manage construction of the WDS as described in the WDS Project Plan.
  - CWC will operate and maintain the WDS as described in the WDS Project Plan.
  - CWC will own the WDS as constructed and described in the WDS Project Plan.
  - CWC will make available its CAP water allocation for lease by ARC. The mechanism to implement this water source over a ten to fifteen year period needs to be identified.
  - CWC will negotiate with GVDWID to make available its CAP water allocation for lease by ARC. If successful, the mechanism to implement this water source over a ten or fifteen year period needs to be identified.

CWC CAP WATER DELIVERY SYSTEM
CUSTOMER AGREEMENT

- Prepared by Appropriate Attorneys
- Basic Elements Incorporated into Agreement:
  - Identifies the WDS activity.
  - A "tariff schedule" for water transport and recharge services and maintenance fees.
  - Third party guarantee of ARC annual payments.

CWC CAP WATER DELIVERY SYSTEM
CWC CAP ALLOCATION AVAILABLILITY

- Prepared by Appropriate Attorneys
- Basic Elements Incorporated into Agreement:
  - CWC will make available its CAP water allocation for lease by ARC.
  - The mechanism to implement this water source over a ten to fifteen year period needs to be identified.
  - Agreement will reflect mechanism identified above.
  - Agreement terminates if governmental agencies intervene with use of CAP water allocation.
  - CWC allocations will be used in full each year to maximize credit generation.

CWC CAP WATER DELIVERY SYSTEM
ACTION ITEMS

- Establish WDS Project Team
- Define elements of contractual relationship to accommodate WDS Safe Harbor System.
- Define elements of contractual relationship to accommodate WDS Optimized System.
- Request Stantec Consulting, Inc. to initiate development of easements along the Preferred Route.
- Initiate Public Relations.
- Attorney to attorney conferences.

AUGUSTA
RESOURCE CORPORATION

ROSEMONT COPPER
Resourceful

January 20, 2009

To: Virgil Davis
Community Water Company of Green Valley

Augusta Resource Corporation, parent company of Rosemont Copper Company, an Arizona corporation ("Rosemont"), signed a letter of intent on July 12, 2007 regarding the proposed construction of a pipeline from the terminus of the present Central Arizona Project ("CAP") delivery system to the service area of CWCGV. The contemplated pipeline was intended to cover a distance of approximately seven miles and deliver a minimum of 2,856 acre feet of CAP water per year, with a contemplated maximum flow rate of 700 acre feet per month.

Subsequent to the 2007 agreement, Rosemont and CWCGV have explored, and agreed in principle, to the concept of increasing the pipeline diameter from a nominal 20 inches diameter to as much as a 36 inch diameter pipeline, to allow other parties in the area to achieve regional water delivery from the extended CAP system. The need for this additional capacity depends upon engineering, upstream capacity factors, and upon voluntary participation by others. It does not affect the basic concept approved in the July 12, 2007 Letter of Intent.

Augusta Resource Corporation, through Rosemont Copper Company, has stated frequently in the past, and reiterates today, that the intent of the company is to enter into final main extension agreements and construction contracts to build the pipeline under a schedule that is independent of, and not contingent upon, the permits and approvals of the Rosemont Mine Plan of Operations currently being reviewed by the United States Forest Service under the National Environmental Policy Act. Construction of the pipeline can move forward solely upon mutual approval of the necessary agreements between Rosemont and CWCGV, and the necessary state, federal and local approvals for the pipeline project. Rosemont expects that the design, construction bidding, funding, and actual construction of the pipeline will be completed prior to the finalization of Rosemont Mine Plan of Operation review process, and will move forward completely independent thereof.

Sincerely,

Jamie Sturgess
Vice President Sustainable Development

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CORPORATE OFFICE: 4500 Cherry Creek South Drive – Suite 1040, Denver, Colorado 80246
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