

DRAFT  
ENVIRONMENTAL IMPACT STATEMENT  
JUNE 2000

VOLUME I

ALLOCATION  
OF  
WATER SUPPLY  
AND  
LONG-TERM  
CONTRACT  
EXECUTION

CENTRAL ARIZONA PROJECT

U.S. Department of the Interior  
Bureau of Reclamation

## **CHAPTER I**

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### **PURPOSE AND NEED FOR THE PROPOSED ACTION**

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# **I PURPOSE AND NEED FOR THE PROPOSED ACTION**

## **I.A. INTRODUCTION**

This draft Environmental Impact Statement (EIS) describes the environmental effects of proposed modifications to previous Central Arizona Project (CAP) water allocation decisions and associated long-term contract execution. The draft EIS has been prepared in compliance with the requirements of the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), which require the evaluation of potential environmental impacts resulting from Federal actions.

Four alternative proposals for modifying previous CAP water allocation decisions are described herein. Each action alternative proposes a different allocation of CAP water. The draft EIS describes the anticipated impacts resulting from the allocation of CAP water for each of the identified action alternatives. A No Action Alternative is also identified which describes the impacts that result from taking no Federal action.

In order to better understand the currently proposed modifications, an overview is provided below regarding the history of the CAP. This overview includes a brief explanation of how CAP water allocations and water delivery contracts were originally made and executed, and additional CAP water transfers that have occurred in subsequent years up to the present.

## **I.B. BACKGROUND**

### **I.B.1. Overview of the CAP**

The rights to use Colorado River water are shared by seven Colorado River basin states and Mexico, through a multitude of water rights legislation and court decisions, international treaty and administrative decisions known as the "Law of the River." The Colorado River basin is divided into the Upper Basin, which has an entitlement to 7.5 million acre-feet<sup>1</sup> annually (mafa), and the Lower Basin, which is entitled to 7.5 mafa. The dividing line between the basins is located at Lee's Ferry on the Colorado River, about 18 miles downstream of Glen Canyon Dam. By treaty, Mexico is also entitled to 1.5 mafa<sup>2</sup>. The Secretary of the Interior (Secretary or SOI), through the Bureau of Reclamation (Reclamation), operates facilities on the river and is responsible for administering a complex system of water deliveries.

The Boulder Canyon Project Act of 1928 (Public Law [PL] 70-642) allotted Arizona 2.8 mafa out of the 7.5 mafa of Colorado River water allotted to the Lower Basin<sup>3</sup>. The Supreme Court confirmed this entitlement in 1963 (*Arizona v. California*). The Colorado River Basin Project Act of 1968 (PL 90-537) (CRBPA) authorized the Secretary to build, operate and maintain the CAP.<sup>4</sup> The CRBPA also provided the Secretary<sup>5</sup> with the authority to execute contracts for CAP water.

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<sup>1</sup>An acre-foot (af) is a measure of volume equal to 325,851 gallons; it is approximately the amount of water required by an average family of five in one year (Arizona Department of Water Resources [ADWR] 2000).

<sup>2</sup>Since the estimated average annual yield of the Colorado River is less than 16.5 mafa there would be shortages if all the Colorado River water rights holders were utilizing their full entitlements.

<sup>3</sup>California is allotted 4.4 mafa and Nevada 300,000 afa.

<sup>4</sup>The CAP provides a delivery mechanism to utilize a significant portion of Arizona's 2.8 mafa entitlement within central Arizona.

<sup>5</sup>For purposes of this draft EIS, Reclamation serves as the delegated authority responsible for executing the Secretary's duties.

CAP water suppliers are a relatively low priority among other Lower Basin users. When less than 7.5 mafa is available, California receives its full 4.4 mafa entitlement, while Arizona and Nevada take reduced quantities. CAP also has a priority junior to most users in Arizona along the Colorado River. Based upon current trends regarding Arizona's use of Colorado River water along the mainstem, it is estimated that the long-term consumptive use along the mainstem in Arizona would be 1.3 mafa, leaving 1.5 mafa available for diversion by CAP in a normal year (ADWR 1993).

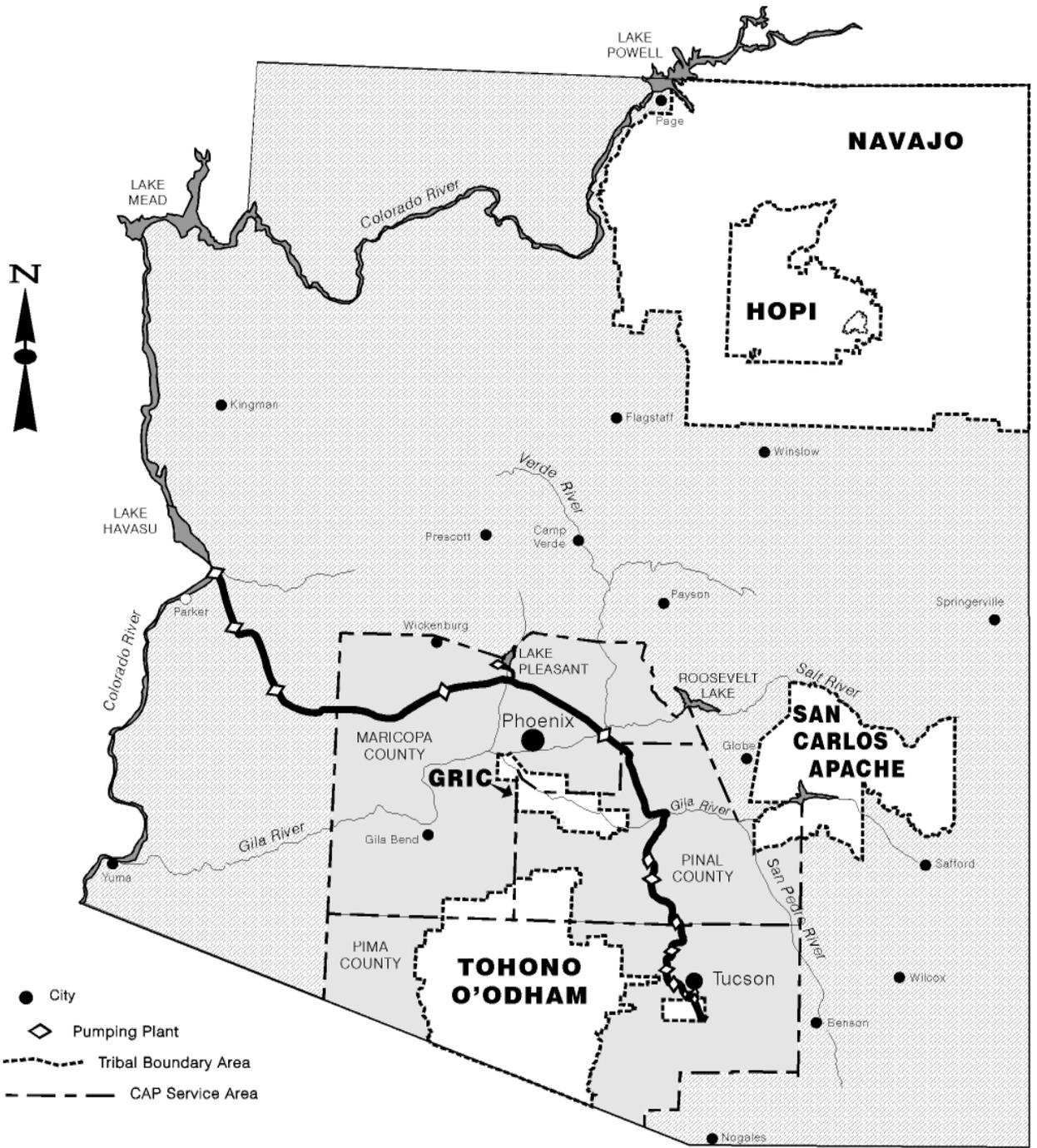
CAP, which began limited deliveries of water in 1985, consists of a system of pumping plants, aqueducts, dams, and reservoirs, which extend approximately 336 miles into central Arizona, as shown on Figure I-1. The CAP system has the physical capacity to deliver up to 2.2 maf of Colorado River water annually, although operational limitations may reduce the actual amount that can be delivered to a range of between 1.6 maf to 1.8 maf. The CAP system is operated and maintained by the Central Arizona Water Conservation District (CAWCD) under a 1987 Operation and Maintenance (O&M) transfer contract with Reclamation. A 1988 repayment contract between the Secretary and CAWCD establishes the mechanism by which CAWCD and the system's users are to repay the United States for reimbursable costs associated with construction of the CAP system. The distribution of the CAP water supply among the project beneficiaries can impact the distribution of the project costs attributable to the various project purposes. A more detailed discussion of the allocation of costs to the various project purposes and subsequent impacts to the beneficiaries is found in Appendix K.

Consistent with Federal reclamation laws, uses of CAP water are divided into three major sectors: municipal and industrial (M&I), non-Indian agriculture (NIA), and Indian. Originally conceived in the early part of last century as essentially an irrigation project, the CAP evolved to reflect the rapid urban growth in central Arizona and increased awareness of Indian water rights and needs. CAP now has a greater emphasis on water uses for M&I and Indian purposes.

### **I.B.2. Previous CAP Allocations and Current Contract Status**

Following authorization of the CAP in 1968, Secretary Stewart Udall requested assistance from the State of Arizona in planning for the distribution of the CAP water. The allocation of CAP water for Indian use is a Federal responsibility reserved for the Secretary. The ADWR, and its predecessor agency, have the task of making recommendations to the Secretary for allocation of CAP water to non-Indian water users in Arizona.

The first proposed allocation of CAP water for Indian irrigation use, by Secretary Thomas Kleppe, was issued in April 1975 (40 Federal Register (FR) 17297). In October 1976, following preparation of an environmental assessment (EA) and a "Negative Determination of Environmental Impact," Secretary Kleppe made an allocation of CAP water for Indian irrigation use (41 FR 45883). This allocation was followed by recommendations from the State of Arizona for M&I allocations (in June 1977) and for NIA allocations (in August 1979). Studies were initiated to analyze the environmental impacts associated with the State's recommended non-Indian allocations. Before any action was taken on these allocations, however, Secretary Cecil Andrus proposed to modify and increase the CAP Indian allocations, due in part to an increased awareness of Tribal water needs and the possibility of using CAP water as a partial answer to litigation over Reservation water rights (45 FR 2938). In December 1980, following preparation of another EA on the proposed modified Indian allocations and a "Finding of No Significant Impact," Secretary Andrus made final allocations to 10



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Tribes, which were identified to receive a total of 309,828 af of CAP water annually (45 FR 81270). Nine out of the 10 Tribes signed CAP water service contracts in December 1980. In that same month, the State of Arizona and others filed suit in U. S. District Court to prevent implementation of the water allocations claiming inadequate NEPA compliance. The lawsuit was dismissed when Secretary Andrus agreed to prepare an EIS on CAP water allocations, due in large part to the potential length of the litigation process.

In early 1982, the State recommended a revised allocation for non-Indian supplies. Following preparation of a final EIS in 1982 (Reclamation 1982), Secretary James Watt published a Record of Decision (ROD) in the FR on March 24, 1983 (48 FR 12446) pursuant to the CRBPA. In that ROD, Secretary Watt identified the total amounts of CAP water to be allocated to each of the three major sectors, as well as the specific amounts or percentages to be allocated to each individual entity within those sectors, and the method by which priorities would be applied for delivery of CAP water during times when there were shortages of Colorado River water.

The 1983 ROD identified fixed volume allocations totaling 309,828 af annually (afa) for 10 Indian Tribes and communities. The ROD also identified fixed volume allocations totaling 638,823 afa for 85 non-Indian M&I entities. The CAP water supply remaining after Indian users' and M&I entities' allocations were made was divided among 23 NIA districts; their allocations were expressed as percentages that would be applied to the supply remaining after the other two sectors had ordered CAP water in any given year. The percentages were based upon each district's CAP-eligible acres after adjustment to reflect any available surface water supplies. The actual amount available to the NIA districts in a given year would depend upon the amount of water ordered and delivered to the other two sectors during that year. This remaining supply is often referred to as the "Ag Pool."

Before CAP water can be taken and used, an entity that receives a CAP water allocation from the Secretary is required to contract for the right to purchase and use the CAP water. In the case of non-Indian CAP allottees, these contracts are a three-party subcontract among the user, the Secretary, and CAWCD. In the case of Indian users, they are two-party contracts with the Secretary. Whether a three-party subcontract or a two-party contract, each contracting mechanism identifies the specific terms and conditions for delivery of CAP water.

The subcontracts and contracts include provisions regarding priority of delivery when there are shortages of Colorado River water. Essentially, both Indian users and M&I entities have priority over other water users. That means NIA CAP water use is to be reduced until exhausted before Indian and M&I water uses are reduced.

Following the 1983 ROD, the Secretary entered into contracts and subcontracts for the delivery and use of CAP water. All 309,828 afa of CAP water allocated to Indian Tribes and communities were put under contract with the 10 Indian Tribes and communities who signed contracts with the United States. The Secretary and CAWCD offered subcontracts to M&I allottees, and 63 M&I entities signed for 558,511 afa of the 638,823 afa allocated for M&I use. A total of 12 M&I entities either have declined or terminated CAP water subcontracts, resulting in 80,312 afa of M&I priority water remaining uncontracted. Of this amount, 14,665 afa allocated to the Phelps Dodge Corporation and 3,480 afa allocated to the City of Globe was assigned to the San Carlos (SC) Apache Tribe pursuant to the SC Apache Tribe Water Rights Settlement Act of 1992, resulting in 65,647 afa of other M&I priority water remaining uncontracted and available for reallocation. Of 23 NIA districts allocated percentages of the remaining CAP water supply, 10 districts signed CAP

subcontracts; 11 districts declined their allocations; and two districts have not yet entered into contracts (representing 70.7, 23.8 and 5.5 percent of the CAP NIA priority water supply, respectively).

These NIA contracts include a "take or pay" provision, which requires the NIA users to pay for their annual share of CAP water, whether or not it is used. At the time NIA users agreed to this provision, it was envisioned CAP water would be available at prices competitive with pumped groundwater, and NIA users anticipated there would be a demand for CAP water in excess of the available supply. The NIA subcontracts also included a provision that allowed a conversion right from agricultural to M&I supply (at one afa per acre, minus available surface supplies), to provide a supply of M&I priority water to those acres that were urbanized. The NIA priority water would be converted to M&I priority, and would be transferred to whatever water company or municipal water provider served the area in question.

Several actions have been taken since the Secretary's 1983 decision that changed the amounts of CAP water available to both the M&I and Indian water use sectors. The amount of water allocated for Tribal use has increased as a result of Indian water rights settlements<sup>6</sup>. These settlements are enumerated in Appendix B. As a result, 143,396 afa of CAP water have been made available to the Tribes resulting in a total of 453,224 afa of CAP water currently allocated for Indian use. In addition, with final implementation of the SC Apache Tribe Water Rights Settlement Act, the amount of water originally allocated for M&I use would be reduced by 18,145 afa. The 18,145 afa, which were allocated but not contracted to the City of Globe and the Phelps Dodge Corporation, would be allocated to the SC Apache Tribe. The amount of uncontracted M&I priority water, 65,647 afa, remains unchanged. Additional information is included in Appendix B.

As mentioned above, 10 NIA districts entered into subcontracts for a percentage of the CAP NIA priority water supply, leaving 29.3 percent of the Ag Pool uncontracted. In 1991, pursuant to the Salt River Pima-Maricopa Indian Community (SRPMIC) Water Rights Settlement Act of 1988 (PL 100-512), Reclamation prepared an EA on a proposed reallocation of this uncontracted NIA CAP water (Reclamation 1991). The Secretary published a Final Reallocation Decision on February 5, 1992 (57 FR 4470) that identified the process by which Reclamation would reallocate this remaining 29.3 percent of the NIA priority water supply.

The "take or pay" provision in the NIA subcontracts became effective when Reclamation declared the CAP nearly complete on October 1, 1993. This provision contributed substantially to the financial burden felt by NIA subcontractors. Commodity prices were also falling at this same time. In addition, the amount of water being used by the M&I and Indian sectors was a small percentage of the total CAP water supply available, thus resulting in a very large water supply for which the NIA districts were financially responsible. Two NIA subcontractors declared bankruptcy, one re-structured, and two relinquished their entitlements as part of Indian water rights settlements. Because of this situation, CAWCD entered into two-party letter agreements with all the NIA subcontractors in late 1993. In those letter agreements, each NIA district and CAWCD "mutually agreed to waive certain rights and obligations under the Water Service Subcontract." The letter agreements waived the "take-or-pay" provision of the three-party NIA CAP subcontracts and

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<sup>6</sup>These settlements provide for resolution of Tribal claims to reserved water rights pursuant to the Winter's Doctrine. Under the Winter's Doctrine, upon creation of a Federal Reservation, there is an implicit reservation of the amount of water necessary to fulfill the purpose of the Reservation.

facilitated establishment of three "pools" of NIA water at subsidized prices, which would allow NIA districts to take CAP water rather than pump groundwater. (The United States is challenging provisions of these agreements for consistency with Reclamation law in ongoing litigation regarding operation and repayment of the CAP, and does not recognize the validity of the provisions of the two-party agreements<sup>7,8</sup>. Nevertheless, these NIA districts are receiving CAP water from the Ag Pool pursuant to these excess water contracts on an annual basis and at a reduced cost from the original contract requirements.) The 1992 NIA reallocation process, which had already been initiated when these two-party letter agreements were signed, was put on indefinite hold.

Figure I-2 summarizes the changes that have occurred since the Secretary's original 1983 allocation.

### **I.C. PURPOSE AND NEED FOR THE PROPOSED ACTION**

Reclamation is proposing modifications to previous CAP water allocation decisions. The purpose and need for the Federal action is to allocate remaining available CAP water in a manner that would facilitate the resolution of outstanding Indian water rights claims in the State of Arizona. Authority for this action is pursuant to the CRBPA.

The proposed allocation is taking place in the context of settlement negotiations concerning operation and repayment of the CAP and Indian water rights settlement negotiations. These negotiations are being conducted by the U. S. Department of the Interior and Department of Justice, with representatives of CAWCD, several Indian Tribes, ADWR, NIA districts, and several municipalities. The proposed action (or Settlement Alternative) identified in the draft EIS is an allocation of CAP water consistent with terms of the negotiated settlements currently under discussion with these entities. These settlements are discussed in more detail in Section I.E. of this Chapter, below. The draft EIS also analyzes three alternative allocations of remaining available CAP water. The Secretary could implement any one of these four action alternatives to achieve the purpose and need for the proposed action.

A final allocation of remaining available CAP water, and contract executions with the United States for delivery of that water, would provide a level of certainty to all entities regarding available future water supplies. This, in turn, would enable Arizona water users, Indian and non-Indian alike, to develop and implement the systems and infrastructure necessary to utilize those water supplies to meet future water demands and serve Tribal and community needs.

This EIS, when final, will serve as NEPA compliance to allow the Secretary to make a final overall allocation and enter into water service contracts and subcontracts. It is anticipated that at the conclusion of the NEPA process, the Secretary will prepare a ROD and offer and execute contracts pursuant to that ROD.

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<sup>7</sup>When a user elects not to contract to receive all the water available to him/her under the allocation, or when a user breaches a contract that provides for delivery of water, his/her right to contract for that water devolves upon the Secretary. The Secretary may choose to terminate the contracts of those entities that have breached the provisions of existing water delivery subcontracts. In the event of such a termination, any CAP water allocation reverts to the Secretary for discretionary use and reallocation.

<sup>8</sup> However, these issues have been addressed in the settlement stipulation, discussed in Chapter I.E.1. (see also Appendix O).



**FIGURE I-2**  
**CAP Allocation Draft EIS**  
**HISTORY OF CURRENT CAP WATER SUPPLIES**  
**(1983 Record of Decision to Present)**

1983 SOI - ROD

**Indian Allocation**  
**309,828 af**

**Non-Indian Ag. Allocation**  
**(remaining CAP supply**  
**after Indian + M&I)<sup>1</sup>**

**M&I Allocation**  
**638,823 af**

**+18,145 af from M&I**  
**+56,851 af from NIA**  
**+68,400 af from Col. R.<sup>5</sup>**  
**+143,396 af**

**- 13,933 af (HVID to FMIC)<sup>3</sup>**  
**-19,318 af (HVID to Fed)<sup>3</sup>**  
**-5,000 af (RWCD assignment)<sup>4</sup>**  
**-18,600 af (RWCD for GRIC)<sup>4</sup>**  
**-56,851 af to Indian/Fed Supply**

**-14,665 af (PD to SC)<sup>2</sup>**  
**-3,480 af (Globe to SC)<sup>2</sup>**  
**-18,145 af to Indian/Fed**

2000 Status

**Indian/Federal Water Supply**  
**453,224 af**  
**(19,318 af HVID for future settlements)**  
**(18,600 af RWCD for GRIC)**

**NIA Water Supply**  
**341,098 af**  
**(184,449 af letter agreements)**  
**(71,815 af uncontracted)**  
**(38,999 af relinq./declined)**  
**(45,835 af cities' option)**

**M&I Water Supply**  
**620,678 af**  
**(538,031 af contracted)**  
**(65,647 af uncontracted)**  
**(17,000 af ASARCO for GRIC)<sup>6</sup>**

<sup>1</sup>NIA allocations were defined as percentages of CAP supply remaining after Indian and M&I use. It is assumed that the NIA supply is approximately 341,098 af in 1999.

<sup>2</sup>Subject to implementation of the San Carlos Apache Tribe Water Rights Settlement Act of 1992.

<sup>3</sup>Pursuant to Fort McDowell Indian Community Water Rights Settlement Act of 1990.

<sup>4</sup>Assigned pursuant to 1988 SRPMIC settlement agreement and relinquished in the 1992 GRIC/RWCD agreement.

<sup>5</sup>Colorado River sources provided from Yuma Mesa Division in the 1984 Ak Chin Indian Community Settlement Act and from Wellton-Mohawk IDD in the 1988 SRPMIC Settlement Act.

<sup>6</sup>Agreement to assign 17,000 af from ASARCO to GRIC subject to SOI consent.

## **I.D. PROJECT LOCATION**

The geographic area that would be affected by the proposed allocation generally includes the three-county area consisting of Maricopa, Pinal, and Pima Counties. Specific geographical areas that are outside the three-County area which may be affected by a particular action alternative are also included and described in Chapter III of this draft EIS. Figure I-1 shows the entire CAP service area.

## **I.E. RELATIONSHIP OF THIS PROPOSED ALLOCATION TO OTHER ACTIVITIES**

Currently, negotiations are ongoing among several entities to resolve various water-related issues within the State of Arizona. The goal of these negotiations is to achieve a “global” settlement of Arizona water issues. These include, but are not limited to, settlement of Gila River Indian Community (GRIC) water rights, amendment of the Southern Arizona Water Rights Settlement Act of 1982 (Pub. L. 97-293) (SAWRSA), final settlement of San Carlos Apache Tribe (SC Apache Tribe) water rights, and reallocation of remaining available CAP water.

There are three principal settlements currently being negotiated that involve the proposed allocation of CAP water. Litigation is ongoing between the Secretary and CAWCD regarding operation and repayment of the CAP system (see I.E.1. below). There are also active settlement negotiations among several parties, including the Secretary, GRIC and several non-Indian water users, to develop a comprehensive settlement of GRIC's water rights claims in the General Adjudication of the Gila River. In addition, there is a potential for the Tohono O'odham Nation (TON) to receive additional CAP water, which would provide a designated source for water required to be delivered to TON by the Secretary pursuant to the SAWRSA. These settlement negotiations contemplate actions or decisions related to the proposed allocation of CAP water and contract execution. Where appropriate, those related actions or decisions have been incorporated into the draft EIS and included in the applicable analyses.

### **I.E.1. CAWCD**

Negotiations toward settlement of issues related to a lawsuit between the Secretary and CAWCD (*CAWCD v. United States*) regarding operation and repayment of the CAP have continued over the past several years. Among other things, the issues include the status of the three-party CAP subcontracts with NIA districts and the amount of CAWCD's repayment obligation. Settlement of these issues involves the reallocation of a block of CAP water from the NIA sector to the Federal ledger for Indian use, thereby reducing the repayment obligation of CAWCD to the United States. This would also resolve the issue of the status of the NIA subcontracts, while providing a source of water for Indian water rights settlements. On May 9, 2000, the United States and CAWCD reached agreement on a stipulated settlement agreement which would both resolve and “stay” or suspend the active litigation of the lawsuit (Appendix O). The stipulation is contingent upon (i.e., will become final and effective) the global negotiated settlement of Arizona water issues mentioned above. According to the stipulation, various contingencies must be accomplished, in a manner acceptable to the Attorney General, the Secretary of the Interior, CAWCD and ADWR, by May 2003. Congressional action will be needed for some of the contingencies to be accomplished.

The Settlement Alternative would provide for an allocation of CAP water consistent with the stipulation, including its contingencies. In the absence of the global negotiated settlement, the United States would still be able to move forward with any one of the four action alternatives to achieve the purpose and need for the project.

### **I.E.2. Gila River Indian Community Water Rights Settlement**

The GRIC and the United States on behalf of GRIC have claimed Federal reserved water rights of about 1.56 mafa in the Gila River General Stream Adjudication, filed by the United States on behalf of GRIC. Negotiations to resolve GRIC's water rights claims have occurred periodically over the past 20 years. The goal of the negotiations is a comprehensive settlement of GRIC's water rights claims in the General Adjudication of the Gila River. Current negotiations have been active for more than five years. Thus far, the parties to the negotiations have agreed to an average annual water budget of 653,500 af. Negotiations have focused on establishing surface, imported, and ground water supplies that would be available to GRIC, protecting these supplies, and providing a means to put these supplies to use. A substantial amount of this water would be CAP water.

Under settlement, the GRIC and the United States, on behalf of GRIC, would waive and release all water rights claims in the General Adjudication of the Gila River except those claims specifically reserved (i.e., potential claims against parties for excessive groundwater pumping) in return for the water supplies and other benefits secured through the settlement. In addition to providing GRIC with a total water budget of 653,500 afa the settlement is envisioned to also provide GRIC with a significant financial contribution to facilitate its ability to use the water.

Under the Settlement Alternative of this draft EIS, GRIC would receive an additional 102,000 afa of CAP water, which would greatly assist in satisfying GRIC's total water budget. Under the Non-Settlement Alternatives, additional allocations of CAP water would also be made to GRIC, ranging from 35,600 afa to 170,200 afa. These allocations would not be made in the context of a final water rights settlement, although they would be credited toward any future settlements or adjudicated water supply. If no settlement occurs, the GRIC, and the United States on its behalf, would be free to pursue resolution of its water rights claims to the Gila River through the Courts. The current uncertainty regarding available future water supplies affected by the General Adjudication of the Gila River would remain.

### **I.E.3. SAWRSA**

SAWRSA authorized the settlement of water rights claims of the TON for the San Xavier and Schuk Toak Districts. The settlement provided 37,800 afa of CAP water to the two districts. In addition, the settlement authorized delivery of 23,000 afa of additional water supplies suitable for agricultural use in the San Xavier District, and 5,200 afa to the Schuk Toak District; however, the source of this additional 28,200 afa was not identified in SAWRSA. The source of this 28,200 afa is identified and made available as CAP water in all but one of the action alternatives included in this draft EIS.

## **I.F. NEPA CONSIDERATIONS**

As previously discussed above, the 1982 EIS addressed potential environmental impacts associated with the Secretary's proposed allocation of CAP water to M&I users, NIA users and Indian Tribes

and communities (Reclamation 1982). In order to identify the potential environmental impacts, that EIS contained many assumptions related to, among other things, the availability of Colorado River water supplies for CAP, groundwater use, urban development and population growth, and users' plans for taking and using their CAP water allocations. The 1982 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 anticipated resulting environmental impacts.

Following this approach for the current proposed allocation, it was again necessary to develop a detailed set of assumptions in order to describe and address potential environmental impacts associated with the currently proposed modification to previous CAP water allocations. For example, in order to analyze impacts to the NIA sector from a reallocation of CAP water from NIA to Indian use, assumptions had to be made regarding how much water would be available in the future for NIA use, and at what price. This involved additional assumptions regarding future M&I demand, Indian build-out schedules, demand from Central Arizona Groundwater Replenishment District (CAGRDR)<sup>9</sup> and the Arizona Water Banking Authority (AWBA)<sup>10</sup>. CAWCD pricing policies, and so on. Assumptions developed for this draft EIS that apply to all analyses are presented in Appendix A. Other assumptions specific to a particular analysis are explained where appropriate. The purpose of using these assumptions is to make an informed analysis of those future actions and impacts that are reasonably foreseeable at the time of this analysis. In developing the assumptions, an effort was made to predict what policy makers would do given a certain set of circumstances (that would exist under each alternative included in this draft EIS) based upon a thorough analysis of currently available information. Sensitivity was also given to avoid skewing the impacts in any of the three major water user sectors through the background assumptions. In particular, great care was taken in developing the assumptions for the No Action Alternative in an effort to provide a fair baseline against which the impacts of the other alternatives were evaluated.

The future may likely diverge from the assumptions made in this draft EIS, and it is entirely possible other actions will occur. While it is likely the future will not look exactly like any of the projections made in this document, the analyses conducted utilizing these assumptions are based on best available information and provide a reasonable basis upon which a relative comparison of environmental consequences among the alternatives can be made.

## **I.G. PUBLIC INVOLVEMENT/SCOPING PROCESS**

One of the steps in preparing a draft EIS is "scoping." Scoping 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 scoping process provides the general public, local agencies, and affected Federal and state agencies the opportunity to provide input on key issues and concerns they believe should be evaluated in the EIS.

The objectives of scoping for the proposed allocation of CAP water included:

- ◆ Identify significant issues related to the allocation of CAP water;

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<sup>9</sup> The CAGRDR replenishes groundwater pumped by district members in excess of their ADWR groundwater allowance. The district replenishes through groundwater recharge of CAP or other available surface water.

<sup>10</sup> The AWBA recharges currently unused CAP water to protect M&I entities from shortage, to support Indian water rights settlements, and to protect Arizona communities that use Colorado River water outside of CAP, from shortage.

- ◆ Determine the range of alternatives to be evaluated;
- ◆ Identify environmental review and consultation requirements;
- ◆ Define environmental analysis process and technical studies necessary to adequately address the impacts of the project;
- ◆ Identify the interested and affected public; and
- ◆ Provide information to the public regarding the project.

To achieve the scoping objectives identified above, two notices were published in the FR regarding the proposed allocation of CAP water. The first notice was published on July 30, 1999 (64 FR 41456) and indicated Reclamation's intent to initiate the NEPA process to assist in developing proposed modifications to previous CAP water allocations. The second notice, a Notice of Intent (NOI) to prepare a draft EIS, was published in the FR on August 26, 1999 (64 FR 46720). The NOI also announced that three scoping meetings would be conducted in September 1999 to receive public input on issues to be addressed in the draft EIS.

A memorandum regarding the public scoping meetings and information on the proposed action was mailed to 190 Federal, state and local agencies, organizations and/or interested individuals. Reclamation also issued a press release on August 26, 1999, regarding the scoping meetings. This release was made available through mailings to over 400 agencies, media contacts and interested organizations. The scoping meetings were held on September 14, 15, and 16, 1999, at the time and locations listed below. In addition to the announcements contained in the FR, advertisements were placed in 16 local newspapers statewide.

- ◆ September 14, 1999: 1:00 p.m. National Young Women's Christian Association Leadership Development Center, Phoenix, Arizona;
- ◆ September 15, 1999: 6:30 p.m. Francisco Grande Resort Ballroom, Casa Grande, Arizona; and
- ◆ September 16, 1999: 1:00 p.m. Tucson Community Center, Tucson, Arizona.

Approximately 47 people attended the Phoenix area meeting, 185 people attended the Casa Grande area meeting, and 29 people attended the Tucson area meeting. A total of 42 oral comments were received during the scoping meetings. Transcripts of the meetings were made part of the public record of this NEPA process for the proposed action. Interested or affected individuals, organizations, and agencies were also encouraged to submit written comments to Reclamation by September 27, 1999. Reclamation received 56 letters during the comment periods (16 during the comment period for the first notice and the remaining 40 during the comment period for the second notice).

Reclamation has thoroughly reviewed and considered all of the comments received during the scoping period. A complete set of the written comments received as well as the meeting transcripts were made part of the public record for the project and are available for review at Reclamation's Phoenix Area Office and Tucson Field Office. The principal comments addressing environmental concerns that have been included in the impact analysis performed and which are described in the draft EIS, include the following:

- ◆ Impacts to groundwater levels and groundwater management in central Arizona, including the ability of entities to comply with Arizona's Groundwater Management Act;
- ◆ Impacts to agriculture and its viability, as a result of allocation of CAP water and the associated subsequent transition to groundwater pumping;
- ◆ Potential impacts from retirement of irrigated farmlands, such as air quality, weed control, and subsidence.
- ◆ Socioeconomic impacts in Pinal County resulting from the loss of agriculture and the loss of CAP M&I conversion rights, including impacts due to the loss of the County's tax base, impacts to associated businesses, and impacts from loss of a rural lifestyle;
- ◆ Impacts from developing additional irrigated acreage on Indian lands;
- ◆ Impacts on NIA districts under alternatives that lack debt and Reclamation Reform Act (RRA) relief;
- ◆ Impacts to central Arizona M&I users under alternatives where uncontracted M&I priority water is used for Federal purposes;
- ◆ Impacts to the Colorado River mainstem; and
- ◆ Changes regarding distribution of CAP water shortages and surpluses under the various alternatives and associated impacts on CAP water users.

As a result of the scoping process, the alternatives described in the initial scoping documents were revised and further refined. A scoping report was prepared that summarized the major comments received during the public scoping period and explained how the alternatives had been revised and further refined. In November 1999, notice of the availability of the scoping report (hard copy by request or on Reclamation's internet website) was sent out to the same entities who received the original scoping memorandum, and to interested parties who had requested to be added to the mailing list. The scoping report is included as Appendix F to this draft EIS.

A complete description of each alternative being considered is included in Chapter II.

## **CHAPTER II**

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### **DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES**

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## **II**

# **DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES**

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### **II.A. INTRODUCTION**

This chapter describes alternatives that have been investigated to satisfy the federal purpose and need for the project. The proposed action, referred to as the Settlement Alternative, and three non-settlement alternatives are described in detail. A No Action Alternative is also described. This chapter briefly discusses alternatives that were considered but eliminated from further evaluation and identifies criteria that were used in developing the alternatives.

### **II.B. CRITERIA USED IN FORMULATING ALTERNATIVES**

As noted in Chapter I, the primary purpose and need for this action is to allocate CAP water pursuant to the CRBPA, in such a manner that would facilitate the resolution of outstanding Indian water rights claims in the State of Arizona. It is anticipated that at the conclusion of the NEPA process, the Secretary would prepare a ROD and offer and execute contracts for water service consistent with that decision.

Three major considerations taken into account in developing the range of alternatives were as follows:

- ◆ Restrictions or conditions that apply to any CAP water made available for reallocation as a result of authorizing legislation and/or water settlement agreements. For example, federal law requires that use of CAP water occur within the lower Colorado River basin, and several relevant Indian water rights settlements specify reassignments of allocations and leases that are to be implemented.
- ◆ Amounts of water believed to be sufficient to facilitate resolution of water rights claims of Tribes being "actively" negotiated. These Tribes include GRIC, TON, SC Apache Tribe, Navajo Nation and Hopi Tribe (Navajo/Hopi).
- ◆ Water needs of the non-Indian sectors served by the CAP.

### **II.C. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS**

#### **II.C.1. CAP water allocated to the Tonto Apache and Yavapai Apache Tribes**

Non-settlement alternatives were considered throughout the scoping process that allocated water made available for federal purposes by the Fort McDowell Indian Community (FMIC) Water Settlement Act of 1990 (PL 101-628). After additional review, it was determined this water, formerly NIA priority water relinquished by the Harquahala Valley Irrigation District (HVID), could be used only in the final settlement of Indian water rights claims on the Salt and Verde River watershed. Consideration was then given to identifying the water as being "designated" for use in settling these Tribes' claims. Reclamation, however, decided to remain silent on the disposition of the water

for purposes of preparing the draft EIS, since negotiations regarding settlement of water rights claims for these entities are not sufficiently developed at the present time. Nonetheless, the water remains available for allocation consistent with the Congressional directive in PL 101-628.

### **II.C.2. CAP water allocated to other Indian Tribes**

Non-settlement alternatives were considered that allocated CAP water to Indian Tribes in addition to those evaluated in this EIS. For example, during the public scoping process, the Havasupai and Hualapai Tribes suggested including alternatives that provided allocations for their respective Tribes or that settled their water rights claims. Reclamation considered whether an alternative should be developed that provided CAP water allocations to these Tribes but decided not to do so because negotiations regarding settlement of water rights claims for these entities are not sufficiently developed at the present time. This decision does not, however, preclude future CAP allocations to Tribes not included as part of this round of CAP allocations.

### **II.C.3. CAP water allocated for environmental purposes on the Colorado River mainstem**

Non-settlement alternatives were considered that would allocate CAP water for environmental purposes on the Colorado River mainstem or for use in the Colorado River Delta in Mexico. After review and consideration of the scoping comments, Reclamation concluded that the inclusion of alternatives that would result in use of CAP water along the Colorado River mainstem would not be consistent with the stated purpose and need of this proposed federal action. Reclamation does, however, recognize that allocation and use of CAP water for environmentally beneficial purposes are consistent with CAP's authorization. Such an approach has been considered at various times in the recent past. For example, the 1993 Governor's Task Force Report specifically addressed recommendations for allocating CAP water for environmental purposes within the CAP service area (ADWR 1993). While not identified as a specific element of any of the action alternatives included in the draft EIS, use of CAP water for environmental purposes within Arizona is not precluded, and is contemplated at least to some degree in two of the action alternatives (see discussions under Settlement Alternative and Non-Settlement Alternative 3B). Any allocation for such use would require specific federal action which, in turn, would be accompanied by the appropriate environmental compliance documentation.

### **II.C.4. Pool of uncontracted water in non-settlement alternatives dedicated to State purposes**

Non-settlement alternatives were considered that would allocate NIA priority water for non-Indian purposes, which would be distributed to those users through a process to be determined later. A portion of the water included in this pool is currently uncontracted NIA priority water that was subject to the 1992 NIA reallocation process, described in Chapter I. After consideration of scoping comments and further analysis, it was determined that, absent settlement, the SRPMIC settlement dictated contracts for this water would have to first be offered to the NIA sector pursuant to the 1992 Final Reallocation Decision regarding uncontracted NIA priority CAP water (57 FR 4470).

## II.D. ALTERNATIVES EVALUATED IN THE EIS

This section describes the four action alternative allocations of CAP water that are considered in detail and the No Action Alternative. To better understand the effect of each allocation alternative, it is necessary to provide some background regarding the water supply that is being allocated. The background information which follows includes how various users' shares of the pool are calculated during a normal flow year and during years when there are surpluses or shortages of Colorado River water. For a more detailed explanation, see Appendix A.

For purposes of describing the environmental consequences of the proposed action and the alternatives, this document assumes the total amount of CAP water available in a normal year<sup>11</sup>, for diversion and use after deducting estimated system losses, is 1,415,000 afa<sup>12</sup>. Reclamation's longstanding analysis shows that in a normal year, this amount of water is available for delivery via the CAP system.

As noted in Chapter I, the NIA users' allocations are expressed as percentages of the CAP water supply that remains after the Indian and M&I sectors' allocations have been ordered and delivered. Solely for purposes of describing and comparing the alternatives in this document, the NIA allocations have been converted from percentages to fixed volumes for all the alternatives. The calculation of fixed volume amounts corresponding to percentages of the available CAP water supply may vary depending upon the order in which specific calculations, reductions and conversions are made. For purposes of this draft EIS, the total amount currently available for NIA use has been estimated to be 341,098 afa (1,415,000 afa less the sum of 620,678<sup>13</sup> plus 453,224 afa). For a detailed explanation of the method by which these conversions were made, see Appendix B. Also, using the methodology presented in Appendix B, each NIA subcontractor's CAP water allocation was converted to a fixed annual volume.

Use of specific numbers in the EIS is not meant to imply a degree of precision that does not exist, and it should be noted the various amounts of water attributed to the NIA sector are estimates for purposes of describing alternative allocation scenarios, with one exception--NIA priority water previously allocated and contracted to HVID. Pursuant to the FMIC Water Settlement Act of 1990 (PL 101-628), the HVID water was converted from an NIA percentage allocation to a fixed volume of 33,251 afa considered to be Indian priority. Of this amount, 13,933 afa were allocated and contracted to FMIC. The remaining "HVID water" (19,318 afa) is being reserved for Federal use in the settlement of Indian water rights claims to the Salt and Verde River watershed.

For the Settlement Alternative, all allocations of NIA-priority water would be converted to fixed volumes for ease of administration. Existing contracts based upon percentages would be

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<sup>11</sup> The Secretary, in his capacity as Water Master for the Colorado River, makes an annual determination of whether Colorado River water supplies are "normal," "surplus," or "shortage," based upon water storage levels and other factors. See Appendix A for details.

<sup>12</sup> Technically, some of the water included in this 1,415,000 afa CAP supply is higher priority Colorado River water that has been allocated to Indian Tribes also holding CAP water contracts. For example, the Ak-Chin Indian Community is entitled to divert 50,000 afa of Colorado River water from the Yuma Mesa Division (YMD) through the CAP. In order to simplify the discussion in the EIS, it is all referred to as "CAP water supply" although, in fact, a portion of the supply maintains a higher delivery priority than the actual CAP water supply.

<sup>13</sup> This 620,678 af consists of the 638,823 af of M&I priority water minus 18,145 af of M&I priority water currently allocated to the City of Globe and PD. The 18,145 af are considered to have been transferred to the SC Apache Tribe pursuant to the SC Apache Tribe Water Settlement Act of 1992 (PL 102-575) (see Appendix B).

voluntarily relinquished, and a new methodology for distribution would be established. In the absence of settlement, it is contemplated that contracts and subcontracts for NIA priority water would be offered on a percentage basis; however, as mentioned above, in this draft EIS, the NIA allocations for non-settlement alternatives have also been converted to volumes based upon a normal year CAP delivery of 1,415,000 afa (consistent with the volumes developed in the Settlement Alternative), for the purposes of providing a consistent method for describing and comparing all the alternatives (see Appendix B).

The treatment of NIA priority water during conditions when there is surplus water on the Colorado River (called “surplus conditions”) under the Settlement Alternative is the subject of ongoing settlement negotiations. For all alternatives except the Settlement Alternative, the method by which the NIA sector would receive surplus Colorado River water would be consistent with what is currently stated in the NIA subcontracts, regardless of what sector may eventually receive the NIA priority water<sup>14</sup>.

CAP water that is either not under contract or is under contract but not ordered is referred to as “excess water,” or the “excess water pool.” Under current practice, CAWCD sells this CAP water through excess water contracts for a term of not more than one year<sup>15</sup>. Excess water, however, should not be confused with surplus water, which is water available on the Colorado River system when the Secretary declares surplus conditions and more than 7.5 mafa are available for users from Lower Basin States. During declared surplus conditions, the Lower Basin may consumptively use more than the standard 7.5 mafa. Surplus water may be used with fewer restrictions and by more entities than CAP agricultural water.

A shortage year is one in which the Secretary has declared that the available Colorado River water supply is insufficient to meet normal contract deliveries. If the Secretary declares a shortage, a schedule of reduced deliveries would be implemented. For purposes of this draft EIS, a shortage is defined as diversion of 1,000,000 afa and, after system losses, delivery of 925,000 afa through the CAP system.

As discussed briefly in Chapter I, CAP water is assigned a priority of Indian, M&I, or NIA. NIA priority water is the lowest priority and is reduced to zero prior to any reductions to Indian or M&I priority water during shortage. For the 50-year study period of the draft EIS Reclamation studies show that an average rate of shortage occurrence is approximately 17 percent, with a range of zero to 44 percent. Beyond the 50-year study period in 2055, Reclamation studies predict the probability of shortage to increase to approximately 50 to 55 percent and to continue at that level thereafter.

Each alternative considered in detail in the draft EIS is summarized below. Each summary includes a listing of the major actions that would be taken under that alternative, followed by a description of the conditions that are expected to exist/occur within each of the three water user sectors (M&I, NIA, and Indian). Additional actions that have been proposed independent of the proposed repayment settlement or any of the Tribal water rights settlement negotiations, but would affect

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<sup>14</sup> The original percentage system included a mechanism whereby NIA subcontractors would schedule and take delivery of surplus Colorado River water, when available. When converting to a fixed allocation of 1,415,000 af under the Settlement Alternative, it is currently contemplated the CAP portion of any Colorado River surplus water would not be allocated to any specific water user, but would remain in the excess pool.

<sup>15</sup> Appendix A contains a detailed description of the assumed distribution of excess water, for purposes of this draft EIS.

CAP allocations and be implemented as part of any of the action alternatives, are included. These are identified in the alternative descriptions where appropriate.

For the Indian sector, these descriptions include a brief discussion of potential purposes the Tribes or communities might choose for using the CAP water that would be received through any of the action alternatives. These discussions are not intended to address quantification of water rights. They are intended only to provide examples of the types of uses for which these Tribes and communities could use the allocated water, in order to describe anticipated impacts in this document<sup>16</sup>. Each Tribe or community could subsequently decide to use its water in a different manner than that described in this document.

Nine entities are evaluated in the draft EIS. They include entities which have a letter agreement (Central Arizona Irrigation and Drainage District (CAIDD), Maricopa-Stanfield Irrigation & Drainage District (MSIDD), Chandler Heights Citrus Irrigation District (CHCID), Queen Creek Irrigation District (QCID), San Tan Irrigation District (STID), Tonopah Irrigation District (TID)), and entities which would be offered a CAP allocation under Non-Settlement Alternative 3; (MSIDD, CAIDD, New Magma Irrigation and Drainage District (NMIDD), CHCID, San Carlos Irrigation and Drainage District (SCIDD), and Roosevelt Irrigation District (RID)).

#### **II.D.1. Settlement Alternative (Proposed Action)**

The Settlement Alternative, referred to as the proposed action during the scoping process, would result in the allocation of CAP water consistent with both the settlement stipulation between the United States and CAWCD, and ongoing negotiations among the United States, the CAWCD, GRIC, the State of Arizona, and other affected parties, including other Indian Tribes. As such, it is important to remember that specific details of this alternative may evolve while the NEPA process is still in progress. Nonetheless, sufficient information is available regarding this alternative to adequately describe the environmental consequences that would result from its implementation.

In the event a final settlement contains modifications that are different from those analyzed in this process, Reclamation will evaluate them to determine what additional NEPA compliance is required prior to implementation.

Under the Settlement Alternative, defined blocks of CAP water would be voluntarily relinquished by some users and assigned to other users and/or reserved for future uses, as follows:

- ◆ A total of 65,647 afa of currently unallocated M&I priority water would be allocated and contracted to M&I entities consistent with State recommendations.
- ◆ A total of 17,000 afa of M&I priority water currently contracted to ASARCO would be voluntarily transferred to GRIC pursuant to an agreement between the two parties, and would be put under contract to GRIC.
- ◆ A total of 37,918 afa of CAP water currently held by the Secretary, as a result of the Roosevelt Water Conservation District (RWCD) and HVID CAP relinquishments, would be

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<sup>16</sup> For a more detailed explanation regarding how these plans were developed, see the introduction to Appendix L, especially the introduction to the Indian Sector.

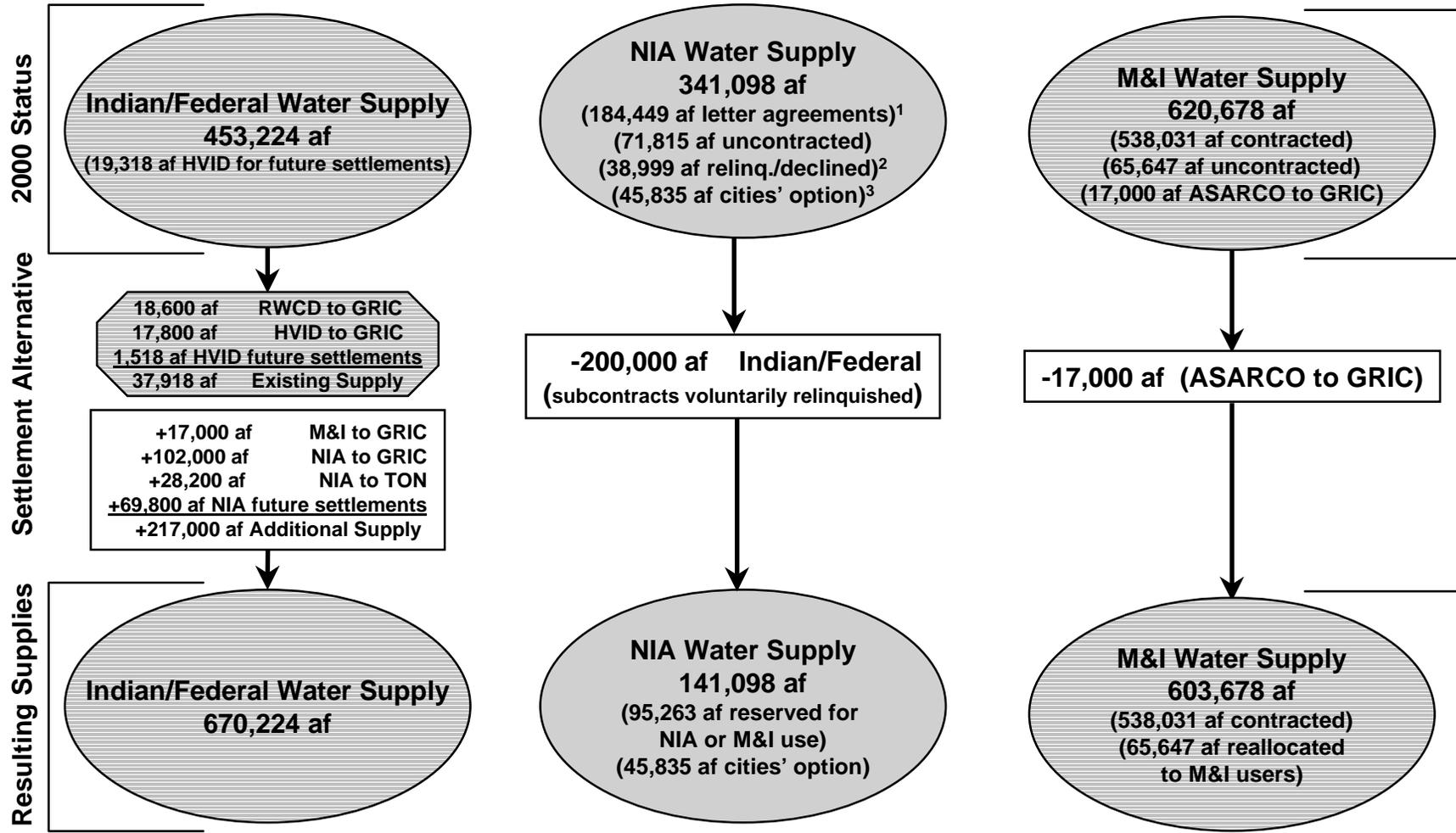
used to facilitate Indian water rights claims (36,400 afa would be allocated and contracted to GRIC; the remaining 1,518 afa would continue to be held for use in settling Indian water rights claims in the Salt and Verde River watershed).

- ◆ All allocations of NIA-priority water would be converted to fixed volumes based upon a total CAP water supply of 1,415,000 afa. It is assumed that CAP water allocated to NIA districts would be voluntarily relinquished (estimated to affect a maximum of 295,263 afa). To facilitate this relinquishment, some degree of federal debt relief and RRA relief would be provided for NIA users. It is further assumed that, consistent with past and current practice, CAWCD would continue to make NIA priority water available during the 2001 to 2030 period. Assuming the maximum amount would be relinquished, the following is envisioned to occur:
  - 102,000 afa would be reallocated to GRIC as part of a water rights settlement agreement; and 28,200 afa would be allocated to TON to satisfy federal obligations under SAWRSA.
  - 69,800 afa would be reserved for federal use, primarily to facilitate future Indian water rights settlements. (Current negotiations indicate this amount would be reduced by 2,500 afa; the final EIS will reflect the most current agreed upon amount.) Although allocations to Tribes would be made when appropriate, for purposes of identifying environmental consequences in this EIS, it is assumed this block of water would be made available as excess water for the remainder of the 50-year study period, continuing to be used by the NIA sector, and for groundwater recharge or other uses. This assumption is consistent with project operations since 1993 and represents a continuation of the ongoing administration and operation of the project by CAWCD.
  - Up to 95,263 afa would be distributed for M&I and/or NIA sector use by the State of Arizona, through a process to be established at a future date. For the purpose of the draft EIS, this water is treated as excess water during the period of analysis.
- ◆ The manner in which shortages are allocated within the CAP would be agreed upon as part of the Settlement Alternative. The modified schedule would operate such that when CAP water supply is less than the total Indian water plus the total M&I water, both M&I and Indian CAP water users would begin to take shortages based on the proportions contemplated (approximately 64 percent and 36 percent, respectively) in the 1980 and 1983 FR notice. The agreed-to schedule resolves differing interpretations of the 1980 and 1983 FR notices. NIA priority water is of lesser priority than Indian priority water or M&I priority water and would maintain its original priority similar to existing CAP operation schedules. Water that would be voluntarily relinquished and assigned to different user sectors would retain its original NIA priority. It should be noted that higher priority Colorado River water delivered by CAP would continue to retain its priority under the Settlement Alternative.

Figure II-1 summarizes the distribution of CAP water among the three water sectors that would occur under this alternative.



**FIGURE II-1**  
**CAP Allocation Draft EIS**  
**SETTLEMENT ALTERNATIVE**  
**Distribution of CAP Water Supplies**



<sup>1</sup>Six irrigation districts (Central Arizona IDD, Maricopa-Stanfield IDD, Queen Creek ID, Chandler Heights Citrus ID, San Tan ID, and Tonopah ID) are considered to have relinquished their allotments subject to SOI consent.

<sup>2</sup>NMIDD is considered to have relinquished its 1983 allocation. FICO, MVWCD, and ASLD are considered to have declined their rights to the 1992 NIA reallocation.

<sup>3</sup>Pursuant to 1993 HIDD Agreement.

**II.D.1.a. M&I Sector**

Under the Settlement Alternative, all water currently allocated to the M&I sector would remain in this sector, except for 17,000 afa that would be transferred from ASARCO to GRIC and potentially leased back to ASARCO (an arrangement already proposed and agreed to by the two parties). The 65,647 afa of currently unallocated M&I priority water would be allocated to M&I entities consistent with the recommendations received from the State in a letter to the Secretary dated December 2, 1999, and reaffirmed in a subsequent letter dated January 20, 2000 (see Appendix N). Water service subcontracts would be executed with those entities. Table II-1, at the end of this chapter, contains a summary of the allocations to the M&I entities as proposed under this alternative.

**II.D.1.b. NIA Sector**

As indicated above, it is assumed that under the Settlement Alternative, NIA users would voluntarily relinquish their CAP water allocations. It is unclear at this point in the preparation of the draft EIS, whether or not all NIA subcontracted water would be voluntarily relinquished; however, a vast majority of the NIA subcontracts are expected to be terminated through this process. Nevertheless, it is anticipated NIA users would continue to use excess water for at least the next 30 years. This is based upon the amount of water projected to be available as excess water during this period and CAWCD's stated goal of providing the NIA sector with affordably-priced water for 30 years. In addition, NIA entities that currently owe the Federal government for amounts borrowed to construct CAP water delivery facilities could receive some degree of debt relief. RRA requirements could also be limited or suspended for certain CAP NIA users. Depending upon ultimate legislative modifications, RRA relief could involve a revision to the restriction on the number of acres that could be farmed with CAP water in addition to elimination of groundwater commingling fees<sup>17</sup>.

**II.D.1.c. Indian Sector**

Under the Settlement Alternative, two Tribes, GRIC and TON, would receive additional CAP water allocations. In addition to the CAP water allocations to GRIC and TON, there would also be a total of 69,800 afa available to be allocated by the Secretary for use in facilitating resolution of Indian water rights claims. There would also be 1,518 afa that would remain reserved for use in settling Indian water rights claims to the Salt and Verde River watershed. This water was previously allocated for use by the HVID, converted to Indian priority water, and made available through the FMIC Water Rights Settlement Act of 1990 (PL 101-628). Table II-2, at the end of this section, contains a summary of the Indian allocations proposed under this alternative.

Hypothetical non-binding plans for the Tribes' uses of this water are briefly described below.

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<sup>17</sup> It is reasonably foreseeable to include debt relief and RRA modification in the analysis, based on the stated positions of the NIA sector, ADWR, and other public statements made, that indicate these considerations must be part of an overall restructuring of the CAP system.

**II.D.1.c.(1) GRIC**

Under the Settlement Alternative, GRIC would receive an additional 155,400 afa of CAP water, which would contribute to satisfying GRIC's total water budget of 653,500 afa<sup>18</sup>. GRIC's Gila River water rights claims would be settled.

Based upon current water rights settlement negotiations, it is anticipated that 41,000 afa of Indian priority water to be received as part of the Settlement Alternative would be leased by GRIC to seven municipalities within Maricopa County. The lease term would be for 100 years. In addition, it is anticipated GRIC would exchange 32,500 afa of CAP water with the cities of Mesa and Chandler for 40,600 afa of reclaimed water. This would result in a net addition of 8,100 afa of water to GRIC's total water budget. The specific plans for transporting and using this reclaimed water are unknown at this time.

Based upon previous agreements, it is anticipated that 17,000 afa of the 155,400 af of CAP water would be available to be leased to ASARCO and 12,000 afa might possibly be leased to PD. The details of the lease arrangements and specific uses of the leased water are not known at this time.

For purposes of evaluating the environmental consequences in the draft EIS, it is anticipated that all CAP water not leased or exchanged would be used for agricultural purposes. GRIC has developed a master agricultural development plan, called the Pima-Maricopa Irrigation Project (PMIP), which consists of rehabilitating existing agricultural lands and developing new lands for agriculture within the Reservation, up to a maximum of 146,330 acres. The additional net 93,500 afa of CAP water would support continued agricultural use/development of about 20,800 acres, consistent with the PMIP, for which a programmatic EIS was prepared (Reclamation 1997) and a ROD issued (Reclamation 1998). These potential uses are described in more detail in Appendix L.

**II.D.1.c.(2) TON**

Among its other provisions, the SAWRSA directed the Secretary to secure and deliver 28,200 afa of water to TON as a component of settlement of water rights claims of the TON. This water was identified to be of a quality suitable for agricultural use; however, the source of this water was not identified. Under the Settlement Alternative, the source of this water would be NIA priority CAP water. Of this total amount, San Xavier District would receive 23,000 afa and Schuk Toak District would receive 5,200 afa. These are specific amounts established by the SAWRSA.

For purposes of evaluating the environmental consequences in the draft EIS, it is envisioned that water received as a result of this allocation would be used by each district primarily for agriculture and/or recharge. These anticipated uses are based upon plans previously developed regarding use of CAP water allocated in the 1983 process, as well as discussions with Reclamation staff currently working with TON on water resource projects. For the San Xavier District, it is anticipated approximately 15,000 afa would be used for agricultural purposes. An estimated 3,000 acres could be farmed with that amount of water. It is anticipated the remaining 8,000 afa would be recharged (directly and/or indirectly) within the district. It is anticipated the Schuk Toak District would use

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<sup>18</sup> GRIC's total water budget for its water rights settlement includes the following sources: CAP water, obtained as an allocation as well as from other entities through water rights settlements; Globe Equity 59 Decree water from the Gila River; groundwater; Salt River Project (SRP) water and reclaimed water.

its 5,200 afa for agriculture, which could serve an estimated 1,000 acres. If this district chose to recharge the water, less acreage would be disturbed. These potential uses are described in more detail in Appendix L.

#### **II.D.1.d. Other Uses**

Under the Settlement Alternative, 69,800 afa of NIA priority water would be reserved for federal purposes. Unless and until specific amounts are allocated and contracted to facilitate the settlement of future water rights claims<sup>19</sup>, this water would be made available as excess water. As explained above, excess water is available on an annual basis through two-party contracts with CAWCD. For purposes of the EIS, it is assumed this water would remain in the excess water pool for the remainder of the 50-year study period, continuing to be used primarily by the NIA sector and for groundwater recharge<sup>20</sup>.

#### **II.D.2. Non-Settlement Alternatives**

Traditional Reclamation shortage schedules would be used for Non-Settlement Alternatives 1 through 3 and the No Action Alternative. In addition, water assigned, transferred, or relinquished to another use sector would retain its original priority, and be subject to the same risk of shortage as the original user.

##### **II.D.2.a. Non-Settlement Alternative 1**

Under Non-Settlement Alternative 1, blocks of CAP water would be allocated as follows:

- ◆ A total of 65,647 afa of currently uncontracted M&I priority water would be allocated and contracted to M&I entities consistent with State recommendations referenced above under the Settlement Alternative.
- ◆ A total of 17,000 afa of M&I priority water currently contracted to ASARCO would be voluntarily transferred to GRIC pursuant to an agreement between the two parties, and would be put under contract to GRIC.
- ◆ A total of 18,600 afa of NIA priority water, relinquished by RWCD for the Secretary to reserve for use by GRIC (pursuant to the Agreement among the United States, GRIC and RWCD of 1992), would be put under contract to GRIC.

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<sup>19</sup> When allocated and contracted, this water could be delivered via the CAP system, diverted from the Colorado River mainstem (as proposed for the Navajo/Hopi allocation under Non-Settlement Alternatives 2 and 3), or exchanged with a CAP partner (as proposed for the SC Apache under Non-Settlement Alternatives 2 and 3).

<sup>20</sup> It should be noted the water could also be used on an annual basis for other purposes, including environmental enhancement. Any such use is expected to occur within the State of Arizona. The draft EIS, however, does not speculate regarding these uses.

Figure II-2 summarizes the distribution of CAP water that would occur among the three sectors under this alternative.

#### **II.D.2.a.(1) M&I Sector**

As with the Settlement Alternative, under Non-Settlement Alternative 1 the 65,647 afa of currently uncontracted M&I priority water would be allocated to M&I entities consistent with the recommendations received from the State in its correspondence of December 1999 and January 2000. Water service subcontracts would be executed with those entities. Table II-1, at the end of this chapter, contains a summary of the allocations to the M&I entities as proposed under this alternative.

#### **II.D.2.a.(2) NIA Sector**

Under Non-Settlement Alternative 1, no change from the status quo would occur. The NIA districts would continue to obtain excess CAP water through two-party letter agreements and excess water contracts, and the status of their CAP water service subcontracts would remain unresolved<sup>21</sup>.

#### **II.D.2.a.(3) Indian Sector**

Under Non-Settlement Alternative 1, the GRIC would receive an additional CAP water allocation of 35,600 afa, resulting from bilateral settlements with ASARCO (17,000 afa of M&I priority water) and RWCD (18,600 afa of NIA priority water). This amount would be contracted to GRIC. It is assumed the entire 35,600 afa allocation would be used by GRIC for agricultural purposes in implementing the PMIP. It is estimated approximately 8,000 acres could be farmed with this allocation.

Out of an available 19,318 afa of CAP water relinquished by HVID, 17,800 afa would be designated for use in a final water rights settlement agreement with GRIC. The remaining 1,518 afa would be designated for use in a final settlement regarding Salt and Verde River watershed Indian water rights claims. Table II-2, at the end of this chapter, contains a summary of the allocation to the GRIC as proposed under this alternative.

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<sup>21</sup>As noted in Chapter I, the United States is challenging provisions of these agreements for consistency with Reclamation law in ongoing litigation regarding operation of the CAP. However, these issues have been addressed in the settlement stipulation, discussed in Chapter I.E.1. (see also Appendix O). For purposes of the EIS, it is assumed under Non-Settlement Alternatives 1 and 2, that current CAP operations allowing delivery of these water supplies would continue pending final resolution of the litigation.



**FIGURE II-2**  
**CAP Allocation Draft EIS**  
**NON-SETTLEMENT ALTERNATIVE 1**  
**Distribution of CAP Water Supplies**

2000 Status

**Indian/Federal Water Supply**  
**453,224 af**  
(19,318 af HVID for future settlements)

**NIA Water Supply**  
**341,098 af**  
(184,449 af letter agreements)<sup>1</sup>  
(71,815 af uncontracted)  
(38,999 af relinq./declined)<sup>2</sup>  
(45,835 af cities' option)<sup>3</sup>

**M&I Water Supply**  
**620,678 af**  
(538,031 af contracted)  
(65,647 af uncontracted)  
(17,000 af ASARCO to GRIC)

Alternative 1

**Existing Supply:**  
**18,600 af RWCD to GRIC**

**+17,000 af (M&I to GRIC)**  
**+17,000 af Additional Supply**

**-17,000 af (ASARCO to GRIC)**  
**-17,000 af to Indian/Federal**

Resulting Supply

**Indian/Federal Water Supply**  
**470,224 af**  
**Designated:**  
**17,800 af HVID to GRIC<sup>4</sup>**

**NIA Water Supply**  
**341,098 af**  
(184,449 af letter agreements)<sup>1</sup>  
(71,815 af uncontracted)  
(38,999 af relinq./declined)<sup>2</sup>  
(45,835 af cities' option)<sup>3</sup>

**M&I Water Supply**  
**603,678 af**  
(538,031 af contracted)  
(65,647 af reallocated  
to M&I users)

<sup>1</sup>Six irrigation districts (Central Arizona IDD, Maricopa-Stanfield IDD, Queen Creek ID, Chandler Heights Citrus ID, San Tan ID, and Tonopah ID) are considered to have relinquished their allotments subject to SOI consent.

<sup>2</sup>NMIDD is considered to have relinquished its 1983 allocation. FICO, MVWCD, and ASLD are considered to have declined their rights to the 1992 NIA reallocation.

<sup>3</sup>Pursuant to 1993 HIDD Agreement.

<sup>4</sup>Consistent with FMIC Water Rights Settlement Act provisions.

**II.D.2.b. Non-Settlement Alternative 2**

Under Non-Settlement Alternative 2, blocks of CAP water would be allocated as follows:

- ◆ A total of 65,647 afa of currently uncontracted M&I priority water would be allocated and contracted to Indian Tribes for use in facilitating settlement of Indian water rights.
- ◆ A total of 17,000 afa of M&I priority water currently contracted to ASARCO would be voluntarily transferred to GRIC pursuant to an agreement between the two parties, and would be put under contract to GRIC.
- ◆ A total of 18,600 afa of NIA priority water relinquished by RWCD for the Secretary to reserve for contracting to GRIC, pursuant to the Agreement among the United States, GRIC and RWCD of 1992, would be put under contract to GRIC.
- ◆ A total of 38,999 afa of currently relinquished and/or declined NIA priority water would be reallocated to Indian Tribes for use in facilitating settlement of Indian water rights claims.

Figure II-3 summarizes the distribution of CAP water that would occur among the three water sectors under this alternative.

**II.D.2.b.(1) M&I Sector**

Under Non-Settlement Alternative 2, a total of 82,647 afa of M&I priority water (65,647 afa currently uncontracted plus 17,000 afa currently contracted to ASARCO) would be allocated/reallocated to facilitate resolution of Indian water rights claims, as indicated above.

**II.D.2.b.(2) NIA Sector**

Under Non-Settlement Alternative 2, an estimated 38,999 afa would be reallocated for use in facilitating resolution of Indian water rights claims. This water consists of water originally allocated by the 1983 ROD and relinquished by NMIDD in its bankruptcy proceedings, and water declined by the Farmers Investment Company (FICO), McMullen Valley Water Conservation District (MVWCD) and the Arizona State Land Department (ASLD) following the initiation of the 1992 NIA reallocation process<sup>22</sup>.

It is anticipated that, while the status of the other NIA districts' subcontracts would remain unresolved, the districts would continue receiving CAP water as they do currently.

**II.D.2.b.(3) Indian Sector**

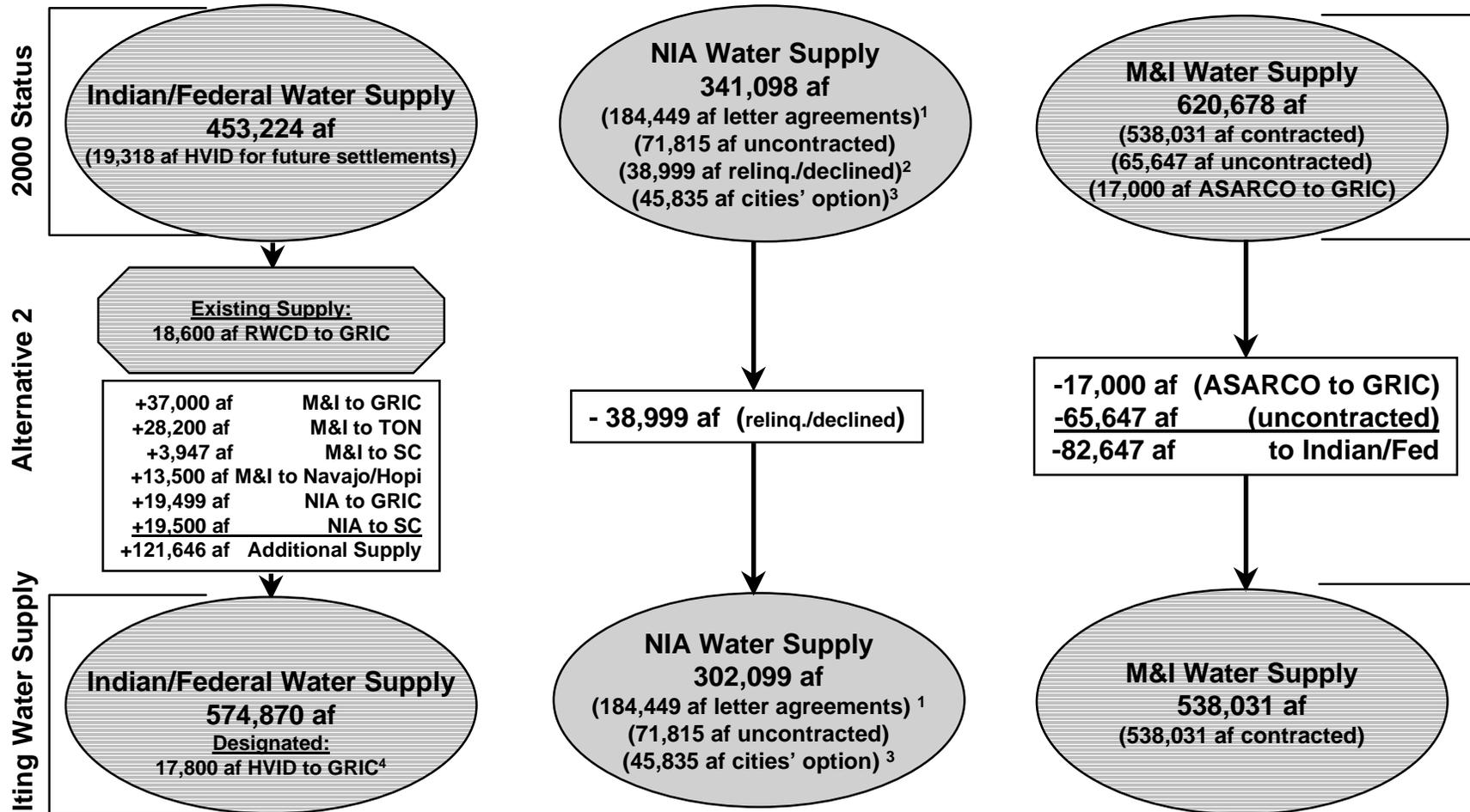
Under Non-Settlement Alternative 2, an additional 75,099 afa of CAP water would be allocated and contracted to GRIC. This additional amount would consist of 38,099 afa of NIA priority water (18,600 afa previously allocated and contracted to RWCD from a pre-existing arrangement, plus

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<sup>22</sup>See Chapter I.



**FIGURE II-3**  
**CAP Allocation Draft EIS**  
**NON-SETTLEMENT ALTERNATIVE 2**  
**Distribution of CAP Water Supplies**



<sup>1</sup>Six irrigation districts (CAIDD, MSIDD, Queen Creek ID, Chandler Heights Citrus ID, San Tan ID, and Tonopah ID) are considered to have relinquished their allotments subject to SOI consent.

<sup>2</sup>NMIDD is considered to have relinquished its 1983 allocation. FICO, MVWCD, and ASLD are considered to have declined their rights to the 1992 NIA reallocation.

<sup>3</sup>Pursuant to 1993 HIDD Agreement.

<sup>4</sup>Consistent with FMIC Water Rights Settlement Act provisions.

19,499 afa of relinquished and/or declined NIA), and 37,000 afa of M&I priority water (see Figure II-3). Similar to Non-Settlement Alternative 1, it is assumed that all the additional CAP water would be used by GRIC for agricultural purposes in implementing the PMIP. It is estimated approximately 16,700 acres could be farmed with this 75,099 afa.

Also under this alternative, the source of the 28,200 afa of water authorized to be provided to TON under SAWRSA (23,000 afa to San Xavier District and 5,200 afa to Schuk Toak District) would be previously uncontracted M&I priority CAP water.

Two additional Tribes would receive CAP water allocations under Non-Settlement Alternative 2. Under this alternative, the Navajo/Hopi would together receive a total of 13,500 afa of M&I priority water. For purposes of evaluating the environmental impacts in this draft EIS, it is anticipated the Navajo/Hopi would utilize this water for M&I purposes, based upon information provided by the Navajo/Hopi and discussion with Reclamation staff currently working with these communities on water resource projects. The water would be delivered via pipeline for use in the Lower Colorado River basin. These potential uses are described in more detail in Appendix L.

The SC Apache Tribe would receive a total of 23,447 afa (3,947 afa of M&I priority, and 19,500 afa of NIA priority water). It is anticipated that in order to use the CAP water, the SC Apache Tribe would need to enter into an exchange agreement with a downstream party that has both rights to use Gila River water and access to CAP water. Water would most likely be used for agriculture (up to 4,700 acres could be farmed), although the Tribe could decide to leave some water in San Carlos Reservoir to maintain a minimum pool in the reservoir. These plans are based upon discussion with Reclamation staff currently working with the SC Apache Tribe on developing water resource projects. These potential uses are described in more detail in Appendix L.

As under Non-Settlement Alternative 1, 17,800 afa of the 19,318 afa of HVID water (reserved for use in settling Indian water rights claims to the Salt and Verde River watershed pursuant to the FMIC Water Rights Settlement Act of 1990), would be designated for GRIC. This water is considered to be Indian priority. Table II-2, at the end of this chapter, contains a summary of the allocations to the GRIC, TON, SC Apache Tribe, and Navajo/Hopi proposed under this alternative.

### **II.D.2.c. Non-Settlement Alternative 3**

Under Non-Settlement Alternative 3, blocks of CAP water would be allocated as follows:

- ◆ A total of 65,647 afa of currently uncontracted M&I priority water would be reallocated to Indian Tribes for use in facilitating settlement of Indian water rights claims.
- ◆ A total of 17,000 afa of M&I priority water currently allocated to ASARCO would be voluntarily transferred to GRIC pursuant to an agreement between the two parties, and would be put under contract to GRIC.
- ◆ A total of 18,600 afa of NIA priority water, relinquished by RWCD for the Secretary to reserve for use by GRIC, (pursuant to the Agreement among the United States, GRIC and

RWCD of 1992), would be put under contract to GRIC.

- ◆ A total of 38,999 afa of currently relinquished and/or declined NIA priority water would be reallocated to Indian Tribes for use in facilitating settlement of Indian water rights claims.
- ◆ A total of 184,449 afa of NIA priority water which is considered to have reverted to the Secretary would be allocated and contracted to several Indian users, or would be reserved for use in facilitating settlements of Indian water rights claims<sup>23</sup>.
- ◆ NIA entities would be offered an estimated 71,815 afa consistent with the 1992 NIA reallocation process. For purposes of evaluating the environmental consequences of this alternative, it is anticipated one of two outcomes would result:
  - Option 3A - Under this option, it is anticipated the six affected districts<sup>24</sup> would satisfy the eligibility requirements for receiving the reallocated 1992 NIA priority water, and water service subcontracts would be executed for the amounts identified through that process.
  - Option 3B - Under this option, the six affected districts would not be able to meet the eligibility requirements for receiving, or would decline, the reallocated 1992 NIA priority water. The water would revert to the United States, consistent with the 1992 NIA reallocation process described in 57 FR 4470. The United States would make this estimated 71,815 afa of NIA priority water available for M&I purposes. It is assumed this water would be distributed pro rata among the M&I entities based upon the recommendations received from the State as described earlier. These contracts would be offered and executed.

Figure II-4 summarizes the distribution of CAP water that would occur among the three sectors under this alternative.

#### **II.D.2.c.(1) M&I Sector**

Under the Non-Settlement Alternative 3A option, the M&I sector would be affected in the same manner as under Non-Settlement Alternative 2. Specifically, the 538,031 afa of M&I priority water currently under contract would continue to be used by M&I entities within the CAP water service area. Under the Non-Settlement Alternative 3B option, an estimated additional 71,815 afa of NIA priority water would be allocated and contracted to M&I entities based upon the State's recommendations. Table II-1, at the end of this chapter, contains a summary of the allocations to the M&I entities, proposed under this alternative.

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<sup>23</sup> See Table 2 in Appendix F for the derivation of the NIA-priority water amounts.

<sup>24</sup> MSIDD, CAIDD, NMIDD, CHCID, SCIDD, RID.



**FIGURE II-4**  
**CAP Allocation Draft EIS**  
**NON-SETTLEMENT ALTERNATIVE 3**  
**Distribution of CAP Water Supplies**

2000 Status

**Indian/Federal Water Supply**  
**453,224 af**  
(19,318 af HVID for future settlements)

**NIA Water Supply**  
**341,098 af**  
(184,449 af letter agreements)<sup>1</sup>  
(71,815 af uncontracted)  
(38,999 af relinq./declined)<sup>2</sup>  
(45,835 af cities' option)<sup>3</sup>

**M&I Water Supply**  
**620,678 af**  
(538,031 af contracted)  
(65,647 af uncontracted)  
(17,000 af ASARCO to GRIC)

Alternative 3

**Existing Supply:**  
18,600 af RWCD to GRIC

+37,000 af	M&I to GRIC
+28,200 af	M&I to TON
+3,947 af	M&I to SC
+13,500 af	M&I to Navajo/Hopi
+114,600 af	NIA to GRIC
+36,053 af	NIA to SC
+72,795 af	NIA future settlements <sup>5</sup>
<b>+306,095 af</b>	<b>Additional Supply</b>

**-184,449 af** (letter agreements)  
**- 38,999 af** (relinq./declined)  
**-223,448 af to Indian/Federal**

**-17,000 af** (ASARCO to GRIC)  
**-65,647 af** (uncontracted)  
**-82,647 af to Indian/Federal**

Resulting Supply

**Indian/Federal Water Supply**  
**759,319 af**  
**Designated:**  
17,800 af HVID to GRIC<sup>4</sup>

**NIA Water Supply**  
**117,650 af**  
(71,815 af reallocated to NIA)<sup>6</sup>  
(45,835 af cities' option)

**M&I Water Supply**  
**538,031 af**  
(538,031 af contracted)

<sup>1</sup>Six irrigation districts (CAIDD, MSIDD, Queen Creek ID, Chandler Heights Citrus ID, San Tan ID, and Tonopah ID) are considered to have relinquished their allotments subject to SOI consent.

<sup>2</sup>NMIDD is considered to have relinquished its 1983 allocation. FICO, MVWCD, and ASLD are considered to have declined their rights to the 1992 NIA reallocation.

<sup>3</sup>Pursuant to 1993 HIDD Agreement.

<sup>4</sup>Consistent with FMIC Water Rights Settlement Act provisions.

<sup>5</sup>Includes possible environmental uses.

<sup>6</sup>Two outcomes of reallocation will be evaluated in the EIS: reallocation to NIA use, and reallocation to M&I uses.

**II.D.2.c.(2) NIA Sector**

Under Non-Settlement Alternative 3, an estimated 223,448 afa of NIA priority CAP water would be reallocated for use in facilitating resolution of Indian water rights claims.

Under Non-Settlement Alternative 3A, the remaining estimated 71,815 afa would be put under subcontract to and used by six NIA districts. Table II-3, at the end of this chapter, contains a summary of the allocations to the NIA users, proposed under this alternative. Additionally, substantial amounts of NIA priority water could be available for use by the NIA entities from the excess water pool.

Under Non-Settlement Alternative 3B, it is assumed the six affected NIA districts would either decline and/or be unable to enter into subcontracts for the estimated 71,815 afa. As described earlier, substantial amounts of NIA priority water could be available for use by the NIA entities from the excess water pool.

**II.D.2.c.(3) Indian Sector**

Under Non-Settlement Alternative 3, GRIC would receive an additional CAP water allocation of 170,200 afa (18,600 afa +114,600 afa of NIA priority water, and 37,000 afa of M&I priority water). Similar to the other Non-Settlement Alternatives, it is assumed this additional 170,200 afa would be used by GRIC for agricultural purposes in implementing the PMIP. It is estimated approximately 38,000 acres could be farmed with this allocation.

As in the Non-Settlement Alternative 2, under Non-Settlement Alternative 3, the source of the 28,200 afa of water authorized to be provided to TON under SAWRSA (23,000 afa to San Xavier District and 5,200 afa to Schuk Toak District) would be identified as unallocated M&I priority CAP water.

Similar to Non-Settlement Alternative 2, the Navajo/Hopi together would receive a total of 13,500 afa of M&I priority water. The SC Apache Tribe would receive a total of 40,000 afa (3,947 afa of M&I priority water, and 36,053 afa of NIA priority water). It is anticipated the uses by each Tribe would be as noted under Non-Settlement Alternative 2. For the SC Apache Tribe, if the entire amount was used for agriculture, up to 8,000 acres could be farmed.

As under the other Non-Settlement Alternatives, 17,800 afa of the 19,318 afa of HVID water reserved for use in settling Indian water rights claims to the Salt and Verde River watershed pursuant to the FMIC Water Rights Settlement Act of 1990, would be designated for GRIC. This water is considered to be Indian priority.

An additional estimated 74,313 afa would be reserved for future use by the United States (of which 1,518 afa could only be used for final settlement of Indian water rights claims along the Salt and Verde River watershed). Although it is anticipated this reserve would be used primarily for facilitating Indian water rights claims<sup>25</sup>, there would also be opportunities for using some of that

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<sup>25</sup> When allocated and contracted, this water could be delivered via the CAP system, diverted from the Colorado River mainstem (as proposed for the Navajo/Hopi allocation under Non-Settlement Alternatives 2 and 3), or exchanged with a CAP partner (as proposed

water for environmental purposes. Water for environmental purposes could be allocated and contracted or provided on an annual basis. In either case, such use is expected to occur within the State of Arizona. For analysis purposes, however, the draft EIS assumes this water would be made available as excess water for the remainder of the 50-year study period, continuing to be used primarily by the NIA sector and for groundwater recharge. Table II-2, at the end of this chapter, contains a summary of the Indian allocations proposed under this alternative.

### **II.D.3. No Action Alternative**

The No Action Alternative provides a baseline for comparing the impacts of the alternatives discussed in the draft EIS. For purposes of this document, “no action” is defined as no additional federal action being taken regarding allocation or contracting of CAP water. No blocks of water would move from one sector to another. No CAP water transfers would be approved by Reclamation. Even actions that have already been agreed upon, such as the transfer to GRIC of 17,000 afa of water previously allocated to ASARCO, would not occur, since Secretarial approval or federal action would be required. Figure II-5 summarizes the distribution of CAP water that would occur among the three sectors under this alternative.

It is assumed under the No Action Alternative that the status quo would continue for the 50-year study period<sup>26</sup>. There would be no additional water allocated or reallocated within the M&I sector<sup>27</sup>. The NIA districts would continue to use CAP water as they do currently under two-party excess water agreements, and the status of their CAP water service subcontracts would remain unresolved. No additional water would be provided to facilitate settlement of Indian water rights claims, and the uncertainty of the status of water rights would remain. Current water rights litigation would continue, as well as litigation over repayment of the CAP. No particular outcome of these lawsuits is assumed under the No Action Alternative.

An optional way to define the No Action Alternative would have been to identify reasonably foreseeable actions that might be expected to occur in the absence of the Settlement Alternative. The action alternatives considered in this EIS, however, already comprise various alternative futures that could result in the absence of a settlement. Moreover, in the absence of any reallocation at all, it is difficult to envision reasonably foreseeable actions that would be likely to occur, because so much would depend upon the outcome of litigation between CAWCD and the United States. In light of these considerations, Reclamation determined it was most reasonable to define the No Action Alternative as truly one in which no additional federal action occurs, without speculating on future possibilities.

#### **II.D.3.a. M&I Sector**

Under the No Action Alternative, the M&I sector would be affected in a similar manner as under Non-Settlement Alternatives 2 and 3A. Specifically, the 538,031 afa of M&I priority water currently

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for the SC Apache under Non-Settlement Alternatives 2 and 3).

<sup>26</sup> Current CAP allocations for each entity, if any are identified in Appendix L.

<sup>27</sup> Transfer of M&I allocations and/or amendments to the existing M&I subcontracts, already recommended by ADWR and being processed by Reclamation, would be completed.



**FIGURE II-5**  
**CAP Allocation Draft EIS**  
**NO ACTION ALTERNATIVE**  
**Distribution of CAP Water Supplies**

2000 Status

**Indian/Federal Water Supply**  
**453,224 af**  
 (19,318 af HVID for future settlements)

**NIA Water Supply**  
**341,098 af**  
 (184,449 af letter agreements)<sup>1</sup>  
 (71,815 af uncontracted)  
 (38,999 af relinq./declined)<sup>2</sup>  
 (45,835 af cities' option)<sup>3</sup>

**M&I Water Supply**  
**620,678 af**  
 (538,031 af contracted)  
 (65,647 af uncontracted)  
 (17,000 af ASARCO to GRIC)

No Action

Resulting Supply

**Indian/Federal Water Supply**  
**453,224 af**  
 (19,318 af HVID for future settlements)  
 (18,600 af RWCD for GRIC)

**NIA Water Supply**  
**341,098 af**  
 (184,449 af letter agreements)<sup>1</sup>  
 (71,815 af uncontracted)  
 (38,999 af relinq./declined)<sup>2</sup>  
 (45,835 af cities' option)<sup>3</sup>

**M&I Water Supply**  
**620,678 af**  
 (538,031 af contracted)  
 (65,647 af uncontracted)<sup>4</sup>  
 (17,000 af ASARCO to GRIC)<sup>5</sup>

<sup>1</sup>Six irrigation districts (CAIDD, MSIDD, Queen Creek ID, Chandler Heights Citrus ID, San Tan ID, and Tonopah ID) are considered to have relinquished their allotments subject to SOI consent.

<sup>2</sup>NMIDD is considered to have relinquished its 1983 allocation. FICO, MVWCD, and ASLD are considered to have declined their rights to the 1992 NIA reallocation.

<sup>3</sup>Pursuant to 1993 HIDD Agreement.

<sup>4</sup>Uncontracted and relinquished water is delivered under two-party "excess water" agreements. The U.S. is challenging these agreements.

<sup>5</sup>Agreement to assign 17,000 af from ASARCO to GRIC subject to SOI consent.

under contract by M&I entities would continue to be used by those entities within the CAP water service area.

Pursuant to an “Agreement among the United States, the CAWCD, the Hohokam Irrigation and Drainage District (HIDD) and the Arizona Cities of Chandler, Mesa, Scottsdale, and Phoenix of 1993 (HIDD Agreement),” HIDD relinquished its CAP allocation in exchange for debt relief. The four Arizona cities contributed money in exchange for HIDD’s CAP allocation and an option of contracting up to five percent of the NIA pool (provided the five percent is available as uncontracted water). This water would continue to be available to contract to the four cities. None of the four cities has exercised its option as of this writing; however, exercising this option has already been approved by Reclamation (including environmental clearances) and is considered to require no additional Federal action other than administrative processing. This water would retain its NIA priority. This also considered to be the case under all the action alternatives.

#### **II.D.3.b. NIA Sector**

As mentioned above, under the No Action Alternative, NIA districts would continue to use CAP water as they currently do under two-party excess water agreements. It is anticipated there would be substantial amounts within the excess water pool available for use by the NIA entities.

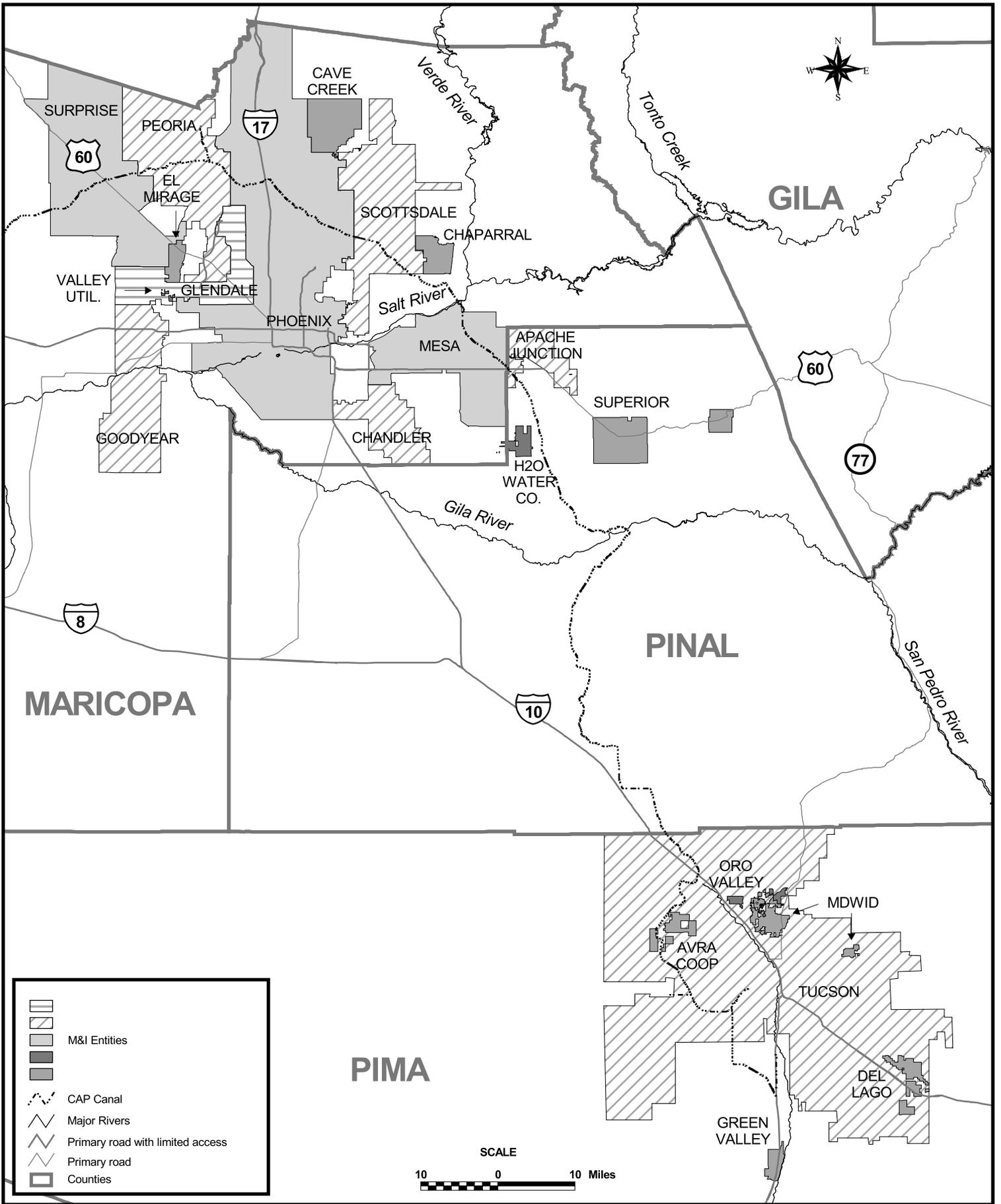
#### **II.D.3.c. Indian Sector**

Under the No Action Alternative, it is assumed no Indian water rights settlements are consummated within the 50-year study period. Even proposed transfers that have already been agreed to, such as the 17,000 afa transfer of ASARCO M&I priority water and 18,600 afa allocation of RWCD water to GRIC, would not occur. It is assumed the various parties would continue to pursue litigation; however, no particular outcome is anticipated to occur.

Table II-4 summarizes the CAP allocations made under each of the proposed alternatives. Figures II-6 through II-8 show the location of the entities that could receive CAP water under the action alternatives. Table II-4 also identifies various components that are addressed under each alternative.

### **II.E. EFFECTS OF ALTERNATIVES ON SELECTED RESOURCES**

Table II-5 summarizes the effects of the alternatives on selected resources.



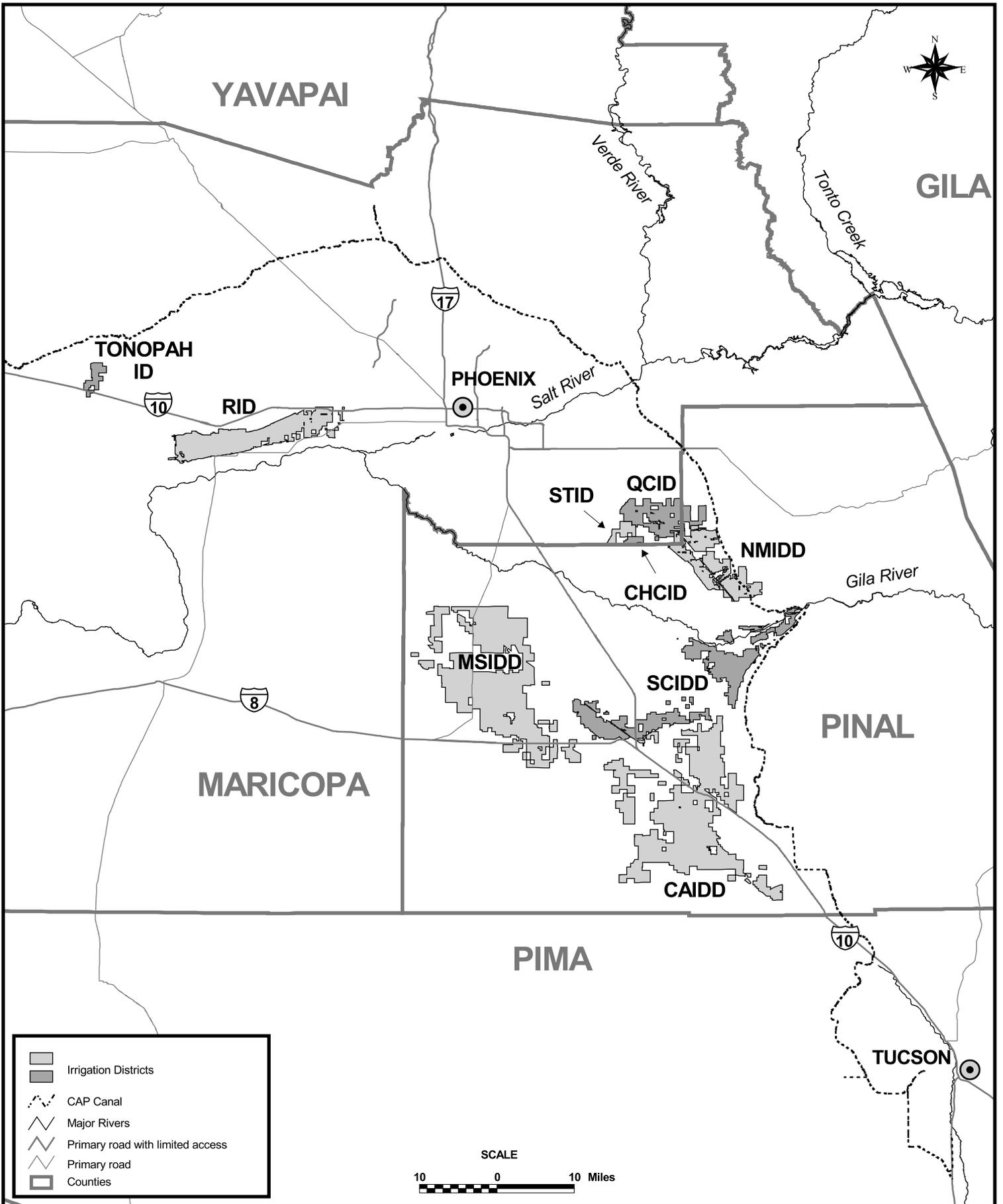
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**CAP Allocation EIS**  
**M&I Sector Location Map**

**Figure**  
**II-6**

June 2000



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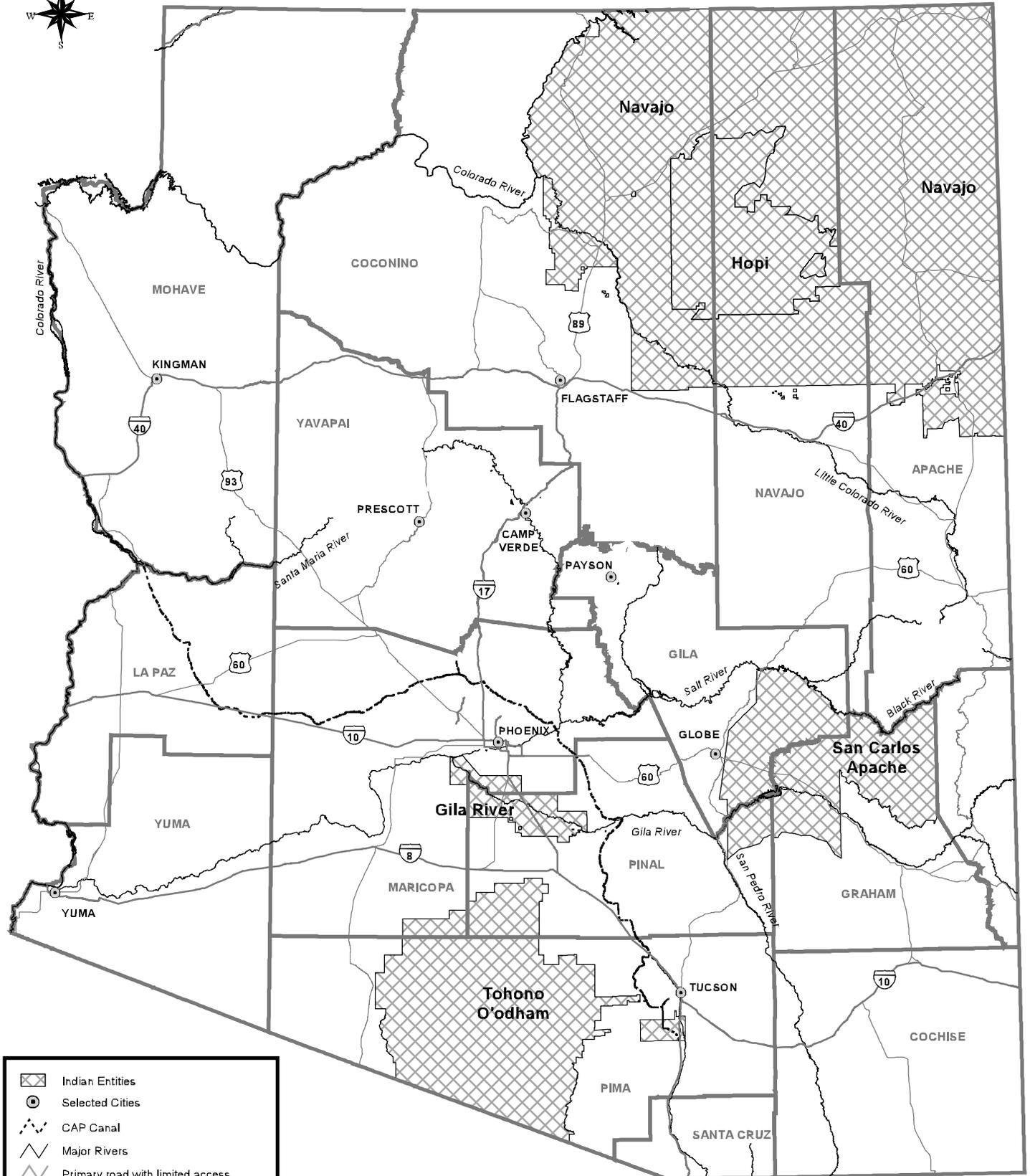


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**CAP Allocation EIS**  
**Irrigation District Sector Location Map**

**Figure**

**II-7**



	Indian Entities
	Selected Cities
	CAP Canal
	Major Rivers
	Primary road with limited access
	Primary road
	Counties



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June 2000

**CAP Allocation EIS  
Indian Sector Location Map**

**Figure  
II-8**

**Table 2-1**  
**CAP Allocation Draft EIS**  
**Summary Table of New Allocations – M&I**

Entity	Allocation Under Alternative (acre-feet per year)					
	Settlement Alternative	No Action	Non- Settlement Alternative 1	Non- Settlement Alternative 2	Non- Settlement Alternative 3A <sup>(d)</sup>	Non- Settlement Alternative 3B <sup>(d)</sup>
Arizona Water Company -Apache Junction <sup>(a)</sup>	285	0	285	0	0	312 <sup>(b)</sup>
AVRA Water Cooperative	808	0	808	0	0	884 <sup>(b)</sup>
Cave Creek Water Company	806	0	806	0	0	882 <sup>(b)</sup>
City of Chandler	4,986	0	4,986	0	0	5,454 <sup>(b)</sup>
Chaparral City Water Company	1,931	0	1,931	0	0	2,112 <sup>(b)</sup>
Community Water Company of Green Valley	1,521	0	1,521	0	0	1,664 <sup>(b)</sup>
City of El Mirage	508	0	508	0	0	556 <sup>(b)</sup>
City of Glendale	3,053	0	3,053	0	0	3,340 <sup>(b)</sup>
City of Goodyear	7,211	0	7,211	0	0	7,889 <sup>(b)</sup>
H2O Water Company	147	0	147	0	0	161 <sup>(b)</sup>
City of Mesa	7,115	0	7,115	0	0	7,784 <sup>(b)</sup>
Metropolitan Domestic Water Improvement District (MDWID)	4,602	0	4,602	0	0	5,034 <sup>(b)</sup>
Town of Oro Valley	3,557	0	3,557	0	0	3,891 <sup>(b)</sup>
City of Peoria	5,527	0	5,527	0	0	6,046 <sup>(b)</sup>
City of Phoenix	8,206	0	8,206	0	0	8,977 <sup>(b)</sup>
City of Scottsdale	2,981	0	2,981	0	0	3,261 <sup>(b)</sup>
Town of Superior/Arizona Water Company-Superior	285	0	285	0	0	312 <sup>(b)</sup>
City of Surprise	2,876	0	2,876	0	0	3,146 <sup>(b)</sup>
City of Tucson	8,206	0	8,206	0	0	8,977 <sup>(b)</sup>
Vail Water Company	1,071	0	1,071	0	0	1,172 <sup>(b)</sup>
Valley Utilities Water Company	250	0	250	0	0	273 <sup>(b)</sup>
<b>M&amp;I and/or NIA Reserved for Future Use<sup>(c)</sup></b>	95,263	0	0	0	0	0
<b>Total</b>	<b>65,647</b>	<b>0</b>	<b>65,647</b>	<b>0</b>	<b>0</b>	<b>71,815</b>

**Notes:**

- (a) If the allocation is not accepted, then the 285 acre-feet from Town of Superior would be recommended for the Arizona Water Company for use in its Superior or Apache Junction system.
- (b) NIA-priority water.
- (c) In a process to be developed later and not included in total.
- (d) Under Non-Settlement Alternative 3, allocations would be offered on a percentage basis and are shown here as fixed volumes for ease in describing and comparing all the alternatives.

**Table 2-2**  
**CAP Allocation Draft EIS**  
**Summary Table of New Allocations - NIA**

Entity	Allocation Under Alternative (acre-feet per year)					
	Settlement Alternative	No Action	Non- Settlement Alternative 1	Non- Settlement Alternative 2	Non- Settlement Alternative 3A <sup>(a)</sup>	Non- Settlement Alternative 3B <sup>(a)</sup>
CAIDD	0	0	0	0	27,342	0
Chandler Heights Citrus ID	0	0	0	0	173	0
Maricopa- Stanfield IDD	0	0	0	0	26,497	0
New Magma IDD	0	0	0	0	3,396	0
Queen Creek ID	0	0	0	0	0	0
Roosevelt ID	0	0	0	0	6,122	0
San Carlos IDD	0	0	0	0	8,284	0
San Tan ID	0	0	0	0	0	0
Tonopah ID	0	0	0	0	0	0
<b>M&amp;I and/or NIA Reserved for Future Use<sup>(b)</sup></b>	95,263	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>71,815</b>	<b>0</b>

Notes:

- (a) Under Non-Settlement Alternative 3, allocations would be offered on a percentage basis and are shown here as fixed volumes for ease in describing and comparing all alternatives.
- (b) In a process to be developed later and not included in total.

**Table 2-3**  
**CAP Allocation Draft EIS**  
**Summary Table of New CAP Allocations – Indian**

Entity	Allocation Under Alternative (acre-feet per year)					
	Settlement Alternative	No Action	Non- Settlement Alternative 1	Non- Settlement Alternative 2	Non- Settlement Alternative 3A	Non- Settlement Alternative 3B
<b>Gila River Indian Community</b>						
Allocated	155,400	0	35,600	75,099	170,200	170,200
Designated	0	0	17,800	17,800	17,800	17,800
<b>GRIC Total</b>	155,400	0	53,400	92,899	188,000	188,000
<b>Tohono O’odham Nation</b>						
San Xavier District	23,000	0	0	23,000	23,000	23,000
Schuk Toak District	5,200	0	0	5,200	5,200	5,200
<b>TON Total</b>	28,200 <sup>(a)</sup>	0	0	28,200 <sup>(a)</sup>	28,200 <sup>(a)</sup>	28,200 <sup>(a)</sup>
<b>SCAT</b>	0	0	0	23,447	40,000	40,000
<b>Navajo/Hopi</b>	0	0	0	13,500	13,500	13,500
<b>Reserved for Future Settlements</b>	33,400 <sup>(b)</sup>	0	0	0	34,877 <sup>(b)</sup>	34,877 <sup>(b)</sup>
<b>Totals</b>	217,000	0	53,400	158,046	304,577	304,577

Notes:

(a) Under the Settlement Alternative and Non-Settlement Alternatives 2 and 3, the 28,200 AF annually of additional water to the TON per SAWRSA are identified as a CAP allocation.

(b) Reserved for Federal use, primarily to facilitate future Indian water rights settlements. Water for environmental purposes within the State of Arizona could be available on an annual basis.

**Table 2-4  
CAP Allocation Draft EIS  
Summary of Alternatives**

		Settlement Alternative (SETTLEMENT)	Non-Settlement Alternative 1	Non-Settlement Alternative 2	Non-Settlement Alternative 3	No Action
		----- (NO SETTLEMENT) -----				
<b>Blocks of Water</b>						
<b>Users</b>						
M&I 65k Uncontracted	M&I	X	X			-
	Federal-Indians			X	X	
NIA 39k Relinq. or Declined	NIA	1	-			-
	Federal-Indians	1		X	X	
NIA 184k Letter Agreement	NIA	1	-	-		-
	Federal-Indians	1			X	
NIA 72k Uncontracted	NIA	1	-	-	X <sup>2</sup>	-
	M&I	1			X <sup>3</sup>	
<b>Other Components in Alternatives<sup>4</sup></b>						
Water for Environmental Purposes <sup>5</sup>		X <sup>6</sup>			X <sup>7</sup>	
Water to Indian Users		X	X	X	X	
Leases of Indian Water to M&I Users		X				
Final Indian Water Rights Settlement		X				
Reclamation 9d Debt Relief for NIA		X				
Firming of NIA to M&I Priority for Indian Users		X <sup>8</sup>				
RRA Relief for NIA		X				
Extended Availability of NIA Pool <sup>9</sup>		X				
Resolution of CAP Shortage Administration		X				
Conversion of NIA Percentage to Volume		X <sup>10</sup>				

**Notes**

- (1) Under the Settlement Alternative, all NIA water is voluntarily relinquished. Of the total 297k NIA water, 200k is reserved for federal purposes and 97k is reserved for non-indian use.
- (2) One scenario evaluated under Non-Settlement Alternative 3 is contracts offered to, accepted, and used by NIA.
- (3) The other scenario evaluated under Non-Settlement Alternative 3 is contracts offered to and declined by NIA, with subsequent offer to and use by M&I.
- (4) If marked, alternative includes a degree, but not necessarily all, of the component. For example, 9d debt and RRA relief are under negotiation.
- (5) Water for environmental purposes would be for in-state use only and would not be used on the Colorado River mainstem.
- (6) Under the Settlement Alternative, water for environmental purposes could be available on an annual basis as excess water.
- (7) Non-Settlement Alternative 3 contains a block of water reserved for federal purposes, primarily for Indian uses and possibly environmental purposes.
- (8) Firming of some NIA to M&I priority for Indian use.
- (9) NIA Pool is excess water, pool extension is based on availability and CAWCD extending the ag pool pricing program.
- (10) As a result, a new method for distributing surplus will be established.

**Table II-5  
CAP Allocation Draft EIS  
Effects of Alternatives on Selected Resources**

Resource	Change in Conditions from 2001 to 2051	Impacts (Impacts are Changes in the Action Alternatives Relative to the No Action Alternative)				
	No Action Alternative	Settlement Alternative	Non-Settlement Alternative 1	Non-Settlement Alternative 2	Non-Settlement Alternative 3A	Non-Settlement Alternative 3B
<b>Water Resources</b>						
<u>Water Resources</u> M&I Sector	Groundwater levels generally continue to decline, except in areas where CAP water is used for groundwater recharge or is used to offset substantial amounts of existing groundwater pumping	Groundwater levels reflect that additional CAP water is available for direct use, and less CAP water is available for recharge	Groundwater levels reflect that additional CAP water is available for direct use, and less CAP water is available for recharge	Groundwater levels reflect that less CAP water is available for direct use and groundwater recharge	Groundwater levels reflect that less CAP water is available for direct use and groundwater recharge	Groundwater levels reflect that additional CAP water is available for direct use, and less CAP water is available for recharge
	Declines in groundwater levels indicate safe yield would not be achieved by year 2025	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
	Physical and legal ability to recover groundwater not substantially limited	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
	Potential for subsidence in most areas with substantial groundwater level declines	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
	Potential for worsening of water quality as water levels drop in areas with poorer quality groundwater at depth	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
<u>Water Resources</u> NIA Sector	Higher groundwater levels in QCID, STID, CHCID, RID. No appreciable impacts to groundwater levels in NMIDD and TID. Lower groundwater levels in MSIDD, CAIDD, and SCIDD.	No appreciable impacts to groundwater levels in MSIDD, CAIDD, and RID. Higher groundwater levels in SCIDD. Lower groundwater levels in QCID, NMIDD, STID, CHCID, and TID.	No appreciable impacts to groundwater levels in TID, MSIDD, CAIDD, SCIDD, QCID, STID, CHCID, and RID. Lower groundwater levels in NMIDD.	No appreciable impacts to groundwater levels in TID, MSIDD, CAIDD, SCIDD, and RID. Lower groundwater levels in QCID, NMIDD, STID, and CHCID.	No appreciable impacts to groundwater levels in MSIDD, CAIDD, SCIDD, and RID. Lower groundwater levels in QCID, NMIDD, STID, CHCID, and TID.	No appreciable impacts to groundwater levels in MSIDD, CAIDD, SCIDD, and RID. Lower groundwater levels in QCID, NMIDD, STID, CHCID, and TID.
	Declines in groundwater levels indicate safe yield would not be achieved by year 2025	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative

**Table II-5  
CAP Allocation Draft EIS  
Effects of Alternatives on Selected Resources**

Resource	Change in Conditions from 2001 to 2051	Impacts (Impacts are Changes in the Action Alternatives Relative to the No Action Alternative)				
	No Action Alternative	Settlement Alternative	Non-Settlement Alternative 1	Non-Settlement Alternative 2	Non-Settlement Alternative 3A	Non-Settlement Alternative 3B
	Physical and legal ability to recover groundwater not substantially limited	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
	Potential for subsidence in most areas with substantial groundwater level declines	Increased subsidence potential in QCID, STID, CHCID, NMIDD, and TID. Reduced subsidence potential in SCIDD.	Increased subsidence potential in NMIDD.	Increased subsidence potential in QCIDD, NMIDD, STID, and CHCID.	Increased subsidence potential in QCID, NMIDD, STID, CHCID, and TID.	Increased subsidence potential in QCID, NMIDD, STID, CHCID, and TID.
	Potential for worsening of water quality as water levels drop in areas with poorer quality groundwater at depth	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
<u>Water Resources</u> Indian Sector	Groundwater levels on GRIC would generally decline	Additional decline would occur	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	Additional decline would occur	Additional decline would occur
	Groundwater levels on SC Apache Tribe lands would remain stable	Same as No Action Alternative	Same as No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
	Groundwater levels on TON, San Xavier District would rise	Additional groundwater level rise would occur	No appreciable difference from No Action Alternative	Additional groundwater level rise would occur	Additional groundwater level rise would occur	Additional groundwater level rise would occur
	Groundwater levels on TON, Schuck Toak District would decline	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
	Decline in groundwater levels for most areas indicate safe yield would not be achieved by year 2025. Safe yield would be achieved by SC Apache Tribe.	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative
	Physical and legal ability to recover groundwater not substantially limited	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative	No appreciable difference from No Action Alternative

**Table II-5  
CAP Allocation Draft EIS  
Effects of Alternatives on Selected Resources**

Resource	Change in Conditions from 2001 to 2051	Impacts (Impacts are Changes in the Action Alternatives Relative to the No Action Alternative)				
	No Action Alternative	Settlement Alternative	Non-Settlement Alternative 1	Non-Settlement Alternative 2	Non-Settlement Alternative 3A	Non-Settlement Alternative 3B
	Potential for subsidence in most areas with substantial groundwater level declines	Increased subsidence potential in GRIC and reduced potential in TON San Xavier	No appreciable difference from No Action Alternative	Reduced potential for subsidence in TON, San Xavier District	Reduced potential for subsidence in TON, San Xavier District	Reduced potential for subsidence in TON, San Xavier District
	Potential for substantial changes in groundwater quality not identified	No appreciable impacts	No appreciable impacts	No appreciable impacts	No appreciable impacts	No appreciable impacts
<b>Socioeconomic</b>						
<u>Socioeconomic</u> M&I Sector – Cost to deliver potable water	Costs of alternative water supplies (CAGR and reclaimed water) range from \$214 to \$301 per af. M&I entities would require approximately 95,000 afa, absent additional CAP water.  All entities able to meet projected water demands.	Cost to deliver CAP water is \$154 per af	Costs of alternative water supplies (CAGR and reclaimed water) range from \$214 to \$301 per af. M&I entities would require approximately 30,000 afa, absent additional CAP water.	Costs of alternative water supplies (CAGR and reclaimed water) range from \$214 to \$301 per af	Costs of alternative water supplies (CAGR and reclaimed water) range from \$214 to \$301 per af	Costs of alternative water supplies (CAGR and reclaimed water) range from \$214 to \$301 per af. M&I entities would require approximately 30,000 afa, absent additional CAP water. Additional cost to recharge 6,168 afa of NIA-priority water.

**Table II-5  
CAP Allocation Draft EIS  
Effects of Alternatives on Selected Resources**

Resource	Change in Conditions from 2001 to 2051	Impacts (Impacts are Changes in the Action Alternatives Relative to the No Action Alternative)				
	No Action Alternative	Settlement Alternative	Non-Settlement Alternative 1	Non-Settlement Alternative 2	Non-Settlement Alternative 3A	Non-Settlement Alternative 3B
<u>Socioeconomic</u> NIA Sector – Changes in agricultural output in year 2051 as compared to year 2001	-\$23.6 M Potential loss of land and/or agricultural lifestyle for those farmers no longer able to maintain their family farms.	-\$5.1 M (relative to No Action Alternative) Potential loss of land and/or agricultural lifestyle for those farmers no longer able to maintain their family farms.	+\$1.6 M (relative to No Action Alternative) Potential loss of land and/or agricultural lifestyle for those farmers no longer able to maintain their family farms.	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
<u>Socioeconomic</u> Indian Sector – Changes in agricultural output in year 2051 as compared to year 2001	+\$85.5 M Improved Tribal economy from revenue generated from agriculture.	+\$32.4 M (relative to No Action Alternative) Improved Tribal economy from revenue generated from agriculture and water leases.	+\$7.6 M (relative to No Action Alternative) Improved Tribal economy from revenue generated from agriculture.	+\$18.3 M (relative to No Action Alternative) Improved Tribal economy from revenue generated from agriculture.	+\$50.1 M (relative to No Action Alternative) Improved Tribal economy from revenue generated from agriculture.	+\$50.1 M (relative to No Action Alternative) Improved Tribal economy from revenue generated from agriculture.
<b>Land Use</b>						
<u>Land Use</u> M&I Sector	240,000 acres of desert urbanized	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
	68,150 acres of farmland urbanized	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
<u>Land Use</u> NIA Sector	40,926 acres fallowed due to economic reasons	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
	46,900 acres urbanized	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
<u>Land Use</u> Indian Sector	101,280 acres developed for agriculture	24,800 additional acres developed for agriculture	8,000 additional acres developed for agriculture	25,400 additional acres developed for agriculture	50,000 additional acres developed for agriculture	50,000 additional acres developed for agriculture
<b>Biological Resources</b>						
<u>Biological</u> M&I Sector	Loss of 240,000 acres of desert and wildlife habitat	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
	Potential loss of suitable habitat for Cactus Ferruginous Pygmy Owl, Pima Pineapple Cactus, Nichol's Turk's Head Cactus, Arizona Agave, and Arizona Cliffrose	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative

**Table II-5  
CAP Allocation Draft EIS  
Effects of Alternatives on Selected Resources**

Resource	Change in Conditions from 2001 to 2051	Impacts (Impacts are Changes in the Action Alternatives Relative to the No Action Alternative)				
	No Action Alternative	Settlement Alternative	Non-Settlement Alternative 1	Non-Settlement Alternative 2	Non-Settlement Alternative 3A	Non-Settlement Alternative 3B
<u>Biological</u> NIA Sector	Fallowed acres may provide suitable habitat for burrowing owls and other wildlife	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
<u>Biological</u> Indian Sector	Loss of up to 101,280 acres of wildlife habitat	Loss of 24,800 additional acres of wildlife habitat	Loss of 8,000 additional acres of wildlife habitat	Loss of 25,400 additional acres of wildlife habitat	Loss of 50,000 additional acres of wildlife habitat	Loss of 50,000 additional acres of wildlife habitat
<b>Cultural Resources</b>						
<u>Cultural</u> M&I Sector	Loss of cultural resources resulting from urbanization of 240,000 acres of desert and 68,150 acres of farmland	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
<u>Cultural</u> NIA Sector	Loss of cultural resources resulting from urbanization of 46,900 acres of farmland	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative	Same as No Action Alternative
<u>Cultural</u> Indian Sector	Loss of cultural resources resulting from agricultural development of 101,280 acres	Loss of cultural resources due to development of 24,800 additional acres	Loss of cultural resources due to development of 8,000 additional acres	Loss of cultural resources due to development of 25,400 additional acres	Loss of cultural resources due to development of 50,000 additional acres	Loss of cultural resources due to development of 50,000 additional acres
<b>Air Quality</b>						
<u>Air Quality</u> Maricopa County	State Implementation Plan (SIP) would control future increases of PM <sub>10</sub> , CO, and ozone precursor emissions	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions
<u>Air Quality</u> Pinal County	ROG, NO <sub>x</sub> , CO, and PM <sub>10</sub> will steadily increase by 1.5 percent per year through 2020	By 2043, PM <sub>10</sub> emissions could substantially exceed current thresholds	Same as No Action Alternative	By 2034, PM <sub>10</sub> emissions could exceed current thresholds	By 2043, PM <sub>10</sub> emissions could substantially exceed current thresholds	By 2043, PM <sub>10</sub> emissions could substantially exceed current thresholds
<u>Air Quality</u> Pima County	ROG, NO <sub>x</sub> , and PM <sub>10</sub> will increase by 1.5 percent per year through 2020. CO emissions will level off after 2010 per SIP.	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions.	Same as No Action Alternative	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions.	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions.	Same as No Action Alternative for M&I emissions. Similar to No Action Alternative for agricultural emissions.

## **CHAPTER III**

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### **AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

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# **AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

## **III**

### **III.A. INTRODUCTION**

#### **III.A.1. Purpose**

The purpose of this chapter is to describe the existing conditions in areas that could be affected by implementation of the proposed allocations, and the anticipated environmental consequences that would occur under each alternative. Environmental consequences of the No Action Alternative provide a baseline against which the impacts of the action alternatives are compared.

#### **III.A.2. Assumptions**

As mentioned in Chapter I, it was necessary to develop assumptions to establish inputs for the technical studies that were conducted as part of the preparation of this draft EIS. These technical studies, which are included as appendices to this draft EIS, became the basis for predicting the potential environmental impacts associated with each alternative described and addressed in this document. Development of the background assumptions common to all analyses is described in detail in Appendix A. Following is a brief explanation regarding these assumptions and their development, to aid in reading this chapter.

The background assumptions developed for this draft EIS that are common to all analyses are grouped into the following major categories: water availability and pricing; population projections; and land uses. Evaluation of the background assumptions resulted in quantification of water demands of, and water supplies available to, each individual entity for the 50-year study period.

The water availability and pricing assumptions were developed to assess not only the volume of CAP water available by priority class<sup>28</sup>, but also the possible price of CAP water. The water availability assumptions included: capacity of the CAP system as a whole; capacity within the CAP system; possible shortages in the Colorado River system; possible surplus Colorado River water available to CAP; and water demands by users of excess CAP water, including AWBA, CAGR, and NIA districts.

Projected water uses by the individual entities within each use sector (M&I, NIA, and Indian) were developed based upon interviews with Reclamation staff, available data, reports, and institutional constraints (e.g., compliance with the Groundwater Management Act [GMA]). The projected water uses for M&I entities were also based upon the State's regulatory program for water use, including Assured Water Supply (AWS) designations and ADWR management plans. In addition, population projections, entity interviews, and water use plans were analyzed where available (see Appendix C). NIA projected water uses were also based upon an economic analysis conducted by Reclamation (included as Appendix D), cropping patterns, entity interviews, and water supply analyses. As mentioned in Chapter II, Indian users' potential water uses were developed solely for purposes of this document, and are intended only to provide examples of the types of uses for

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<sup>28</sup> It is assumed that CAP water would be delivered by priority class. These priority classes are defined in Appendix A.

which these Tribes and communities could use the allocated water. The Tribes themselves will determine the actual uses of water; accordingly, these examples should not be considered binding on the part of any user with regard to developing plans, once water is allocated and contracted. These were prepared using existing water development plans, analysis of existing contracts and agreements, and data provided from Tribes and Reclamation staff. These hypothetical non-binding Tribal projects were developed merely to illustrate the manner in which the Tribes could use the water and to provide, at a programmatic level, a description of the potential impacts that could result from such use. Each entity's projected water use is included in Appendix L.

The projected water uses of each entity were then converted into water budgets<sup>29</sup>. These water budgets became the basis for conducting impact analyses for each affected entity and for evaluating the overall impacts by user sector (M&I, NIA, and Indian).

### **III.A.3. Resources Evaluated and Structure of Section**

The following resources are discussed in this chapter: water; socioeconomic; land; biological; cultural; and air quality.

#### **III.A.3.a. Methodology**

Each resource subsection begins with a brief explanation of the impact analysis methodology used to evaluate the impacts for that particular resource area. Specific factors considered to be of particular importance in the evaluation are also identified as appropriate.

#### **III.A.3.b. Affected Environment**

A description of the existing conditions within the general project area, for each particular resource, is provided. For all alternatives, this will include the three-County area consisting of Maricopa, Pinal and Pima counties. Specific geographical areas affected by a particular action alternative are also included and described as applicable. (For example, under Non-Settlement Alternatives 2 and 3, existing conditions of areas within the Navajo/Hopi Reservations that could be affected by these alternatives are also described.)

#### **III.A.3.c. Environmental Consequences**

Following the description of the affected environment for a given resource there is a summary of the impacts that are anticipated to result to that resource. Impacts occurring as a result of the proposed allocation of CAP water and execution of contracts for the delivery and use of that water can be characterized as either direct or indirect. Direct impacts would be those which are caused by the allocation of CAP water and occur as a direct result of that allocation and contract execution. Examples of these types of impacts include land-disturbing activities associated with construction

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<sup>29</sup> A water budget consists of a comparison of an entity's existing and expected water supplies over a given period of time as compared to its expected future water demands over that same period. In the budget, projections are made as to the amounts that will be used from each particular source of water to satisfy the water demands.

of facilities needed to take, treat and deliver CAP water received through this proposed allocation. Indirect impacts would be those that are caused by the allocation and contract execution, but occur later in time or are further removed in distance, but are still reasonably foreseeable. Examples of typical indirect impacts include changes in groundwater levels and cropping patterns due to availability or unavailability (and assumed use or non-use) of CAP water, or due to the varying amount of CAP water made available.

Direct impacts are summarized in this chapter, based upon the status of water user plans for taking and using CAP water that would be received. Most entities have only conceptual plans for taking and using CAP water. Therefore, construction-related activities are discussed at a "programmatic" level. Consistent with long-standing Reclamation practice and previous CAP contracting actions, Reclamation would require completion of specific on-the-ground environmental clearances for any new facilities that would need to be constructed to take delivery of CAP water. Language in the water service contract or subcontract would require that such clearances be completed prior to water delivery. At this time, it is anticipated most entities already using CAP water would not require additional facilities to take and use CAP water received as part of the proposed allocation. Similarly, GRIC and TON already have, or are constructing, facilities for delivery of CAP water, and environmental compliance documents have been, or are being prepared (Franzoy Corey 1988, Reclamation 1997, Reclamation 1999). In other situations, such as the SC Apache Tribe, which has not yet taken delivery of CAP water or constructed facilities, additional environmental compliance documentation would be required, once specific plans for taking and using CAP water are identified (see Chapter V). Once actual plans are received, they would be compared against what is described in Appendix L to determine what, if any, additional evaluation and documentation are needed to complete NEPA clearances. Reclamation is ultimately responsible for ensuring all environmental clearances have been completed satisfactorily, although the on-the-ground surveys and documentation can be prepared by others.

The vast majority of the environmental impacts described in this document are considered to be indirect impacts. Except for specific on-the-ground disturbances from construction of facilities to treat and deliver CAP water, most of the environmental impacts of the proposed allocation will become apparent only over time. These impacts will occur as a result of choices made by water users due to the availability or unavailability of CAP and other sources of water.

As explained in more detail in Appendix C, analysis of current and potential future water resources compared to projected future water demands concluded all M&I entities evaluated in the draft EIS could meet their projected demands without receiving additional CAP water through this proposed allocation (see Appendix C). In other words, urban growth would not be an indirect impact of the proposed allocation, because it would occur even in the absence of the proposed allocation.

Even though the analysis concludes allocation of CAP water would not have an effect on urban growth, the draft EIS identifies and describes land use changes associated with urban growth, and generally describes environmental effects to the various resources, as part of the environmental consequences under the No Action Alternative.

To support the impact analyses presented in this chapter, technical studies were completed for the following resources: water (groundwater); socioeconomic; biological; cultural; and air quality (Appendices I, D, E, G and H, respectively). These studies contain qualitative and/or quantitative

data on the affected environmental and analytical procedures used to determine and describe impacts. Due to the nature and extent of the assumptions needed to be made to conduct these studies, the analyses provide more value as a comparison of each action alternative to the others and to the No Action Alternative's baseline, rather than as a prediction of actual changes that would occur within a particular resource area.

A discussion of the regulatory setting that is applicable to the resource areas is included in Chapter IV.

#### **III.A.3.d. Other Resources**

Other resource areas, which are typically included in a NEPA analysis include: Geology and Soils; Recreation; Traffic and Transportation; Noise; Public Health and Safety; and Hazardous Materials. These resources areas would not be directly affected as a result of the CAP allocation. No further analysis of these resource areas is included in the draft EIS.

## **III.B. WATER RESOURCES**

### **III.B.1. Introduction**

The water resources affected environment considers both groundwater resources in aquifers which underlie CAP recipients and the effluent resources that may be impacted by alternative CAP allocations. Where appropriate, impacts to the Colorado River downstream of Glen Canyon Dam were considered. The groundwater conditions consider groundwater levels and quality. Also, because subsidence in the area of interest has been related to groundwater withdrawals, consideration of this element of the affected environment is considered together with the water resources. Figures 6, 7, and 8 of Chapter II show the location of the entities that may be impacted by the alternatives.

This section first summarizes the methodology for the water resources impact analysis. The existing conditions in the project area are then discussed. This is followed by discussion of conditions expected to occur under the No Action Alternative and the action alternatives. The discussion of conditions under the alternatives includes an introductory discussion of the primary aspects of the alternatives that result in relevant impacts. Additional detail on this analysis is presented in Appendix I, and the results of the analysis by entity are presented in Appendix L.

### **III.B.2. Impact Analysis Methodology**

Impacts for the alternatives are defined as the change from conditions under the No Action Alternative. Methodologies were developed to analyze impacts with respect to groundwater levels, groundwater quality, surface water levels, and subsidence. Those methodologies are briefly discussed in the following subsections, and are considered in additional detail in Appendix I.

#### **III.B.2.a. Groundwater Level Impact Analysis Methodology**

In this analysis, groundwater level impacts are defined as the difference between levels that would occur under the No Action Alternative and the levels that would occur under each of the other alternatives. Changes in groundwater levels may also result in impacts to other resource areas. For example, there may be impacts on economics and land use due to changes in groundwater pumping costs. These related impacts are addressed within discussion of these other resource areas.

The groundwater level impact analysis methodology includes the evaluation of the groundwater hydrologic inventory, and estimation of future water demands and supplies which serve as inputs to the hydrologic inventory. These two elements of the groundwater level impact analysis are discussed in the subsections that follow.

##### **III.B.2.a.(1) Groundwater Hydrologic Inventory**

The basic approach to evaluate groundwater level impacts is the consideration of the hydrologic inventory, which involves quantifying the components of recharge to and discharge from groundwater, to determine the change in groundwater storage. This change in groundwater storage can then be used to estimate the associated change in the groundwater level, based on the area under consideration and the storage characteristics of the aquifer. The hydrologic inventory analyses were checked by comparing historical groundwater levels estimated using the hydrologic inventories to observed historical groundwater levels.

### **III.B.2.a.(2) Estimation of Inputs to Groundwater Hydrologic Inventory**

Inputs for the hydrologic inventory models included projections of groundwater pumping and recharge in yearly increments for the 50-year study period. Estimation of inputs varied by use (M&I or agricultural) and geographic area. Inputs for the M&I dominated areas were based on their projected demands and the water supplies either currently available or estimated to be available. Appendices A and C include a more detailed discussion of M&I demand projections. Estimates were made regarding groundwater pumping and the incidental return to groundwater from all water uses. The volumes of direct groundwater recharge were also estimated on a facility-by-facility basis. Inputs for Indian agricultural areas were estimated based on their projected system build-out schedules (see Appendix A). In the NIA dominated areas, inputs were developed based on irrigated acreage. As acreage in the NIA sector would not increase, demands were modified based on decreases in acreage due to urbanization and land going fallow due to farming economics. A more thorough discussion of the inputs to the groundwater hydrologic inventory models is included in Appendix I.

### **III.B.2.b. Groundwater Quality Impact Analysis Methodology**

Groundwater quality impacts were evaluated on a qualitative basis. Factors considered in the qualitative evaluation were:

- ◆ Lowering of groundwater levels in areas where poorer quality water may occur at depth;
- ◆ Changes in the flow patterns and the potential lateral movement of bodies of poorer quality water; and
- ◆ Changes in aquifer salinity due to artificial recharge of CAP water. The concentration of total dissolved solids (TDS) was used as an indicator of the general quality of groundwater. Generally speaking the higher the TDS, the poorer the water quality.

The estimated groundwater level impacts for the alternatives provide the basis to identify the potential impacts due to lowering of groundwater levels into deeper pockets of poorer quality water, and potential changes in the lateral movement of bodies of poorer quality groundwater.

### **III.B.2.c. Subsidence Impact Analysis Methodology**

Subsidence in the areas of interest in this study has generally been due to the compaction of fine-grained materials in the underlying aquifers related to lowering of groundwater levels. A qualitative assessment of the potential for subsidence impacts was made by comparing areas with projected groundwater level declines to the historical occurrence of subsidence in those areas. The qualitative evaluation also considers the geology of the underlying deposits, and their potential for subsidence.

### **III.B.2.d. Effluent Impacts Analysis Methodology**

An analysis of the volume of treated effluent discharged to streams was conducted to determine if an M&I entity not receiving a proposed CAP allocation would cause a decrease (when compared to year 2001 levels) in effluent discharge to streams.

### **III.B.2.e. Mainstem Impacts Analysis Methodology**

The differences in Colorado River water surface elevation between Glen Canyon and Hoover Dams due to proposed CAP allocations and resultant diversion in this stretch was estimated using Manning's Equation and assumptions regarding channel characteristics and flow. Appendix J describes the analysis.

### **III.B.3. Affected Environment**

The existing conditions relevant to groundwater include the geology, the occurrence and movement of groundwater, and a conceptual-level presentation of the elements of the hydrologic inventory. These considerations are summarized in this section, and are presented in further detail in Appendix I. The discussion presented below has been organized into some larger geographic areas, which correspond to the geographic scope of various analyses prepared as shown on Figure III-1.

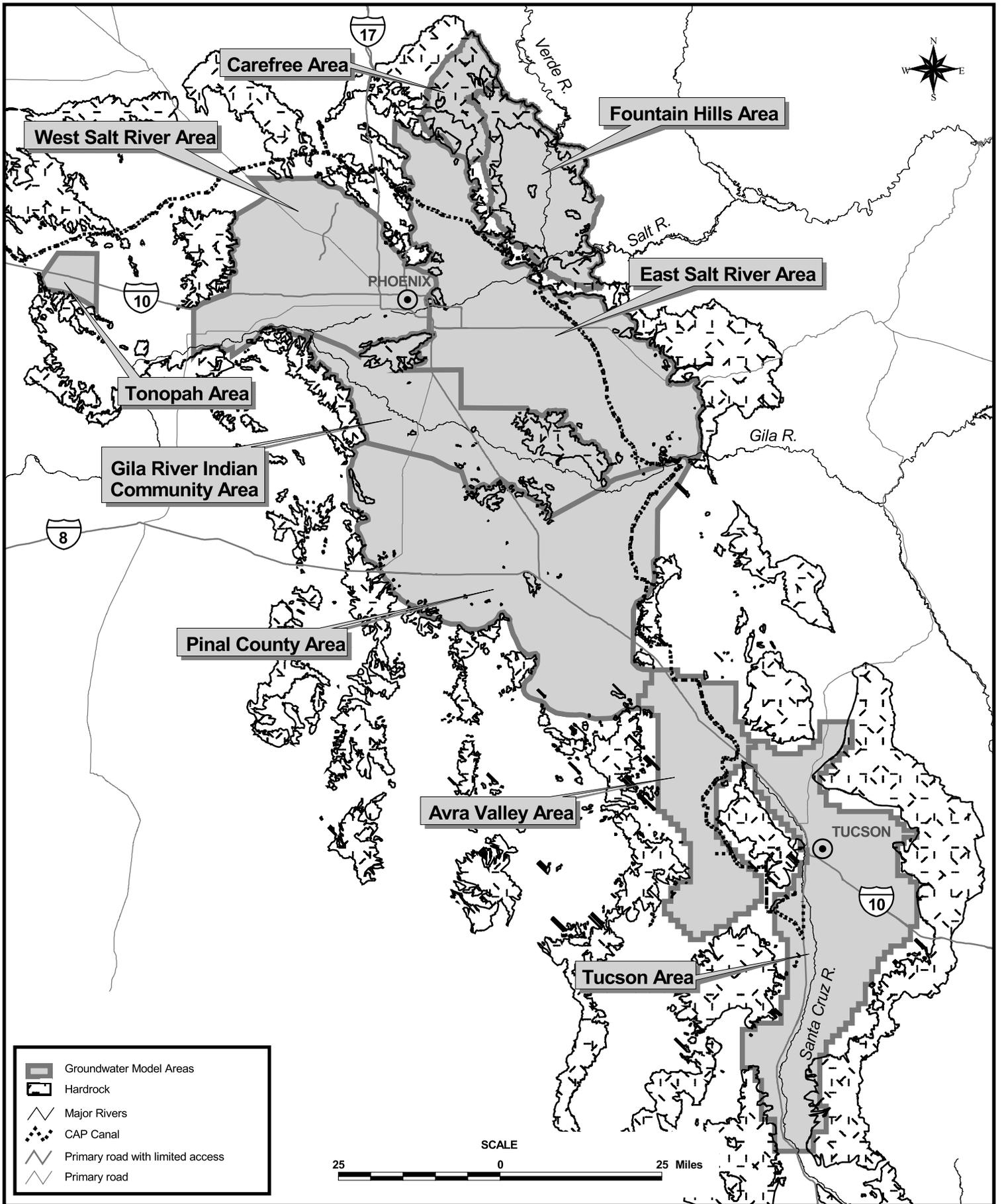
#### **III.B.3.a. Pinal/Salt River Valley**

This area includes the basin fill materials in the interconnected Maricopa-Stanfield and Eloy sub-basins of the Pinal Active Management Area (AMA), GRIC, and the East and West Salt River Valley. The valley fill materials fall into three general units. The lower conglomerate unit consists of conglomerate and gravel at the basin margins, and grades into finer deposits toward the center of the basins. The Middle Fine-Grained Unit consists of fine interbedded sands and silty clay in the upper portions, and evaporites with some clay and silt in the lower sections. The Upper Alluvial Unit is composed of alluvial materials that tend to become finer-grained toward the centers of the valleys and in the deeper portions of this unit. The lower conglomerate and Middle Fine-Grained Units tend to become thicker toward the valley axes, while the upper alluvium has a more constant thickness of about 200 to 400 feet throughout.

Groundwater occurs under unconfined to semiconfined conditions in the Upper Alluvial Unit, while the Middle Fine-Grained Unit will often provide confinement to the underlying lower conglomerate and to coarser deposits within the Middle Fine-Grained Unit. Consistent with the trend to fine-grained materials toward the center of the basins, confined conditions are less likely to occur at a given depth at the margins of the basins.

The current pattern of groundwater flow reflects the impacts of development, as a number of groundwater depressions have formed in response to groundwater pumping. These depressions include those which occur beneath the MSIDD, the southern portion of Scottsdale, at the southern end of the East Salt River Valley area against the San Tan Mountains, and in the Luke Cone area of the West Salt River Valley.

Present groundwater levels reflect lowering of groundwater levels over time in response to changes in groundwater use due to development, both for irrigated agriculture and for M&I demands.



**CAP Allocation Draft EIS**  
**General Location of**  
**Groundwater Model Areas**

**Figure**  
**III-1**



June 2000

Recharge to the aquifer includes mountain front recharge, seepage from the Salt and Gila Rivers, groundwater underflow from lands adjacent to the study area, and incidental recharge derived from water applications and use (including significant amounts of Salt, Gila, and Agua Fria water). The large direct recharge facilities in the East Salt River Valley, Granite Reef Underground Storage Project (GRUSP), and the West Salt River Valley (such as the Agua Fria recharge project) will in the future have substantial influence on groundwater levels. Discharge is primarily by groundwater pumping, with some groundwater outflow near Buckeye and some phreatophyte consumptive use.

In the Pinal County area, groundwater below a depth of 1,000 feet has been reserved for future M&I uses. In the Phoenix AMA, the stated goal of groundwater management is to achieve safe yield.

The concentration of TDS was used as an indicator of the general quality of groundwater. TDS concentrations in groundwater generally increase from the margins of the valleys to the central portions of the valleys, and from the upstream areas to the downstream areas along the major drainages. These concentrations range from less than 500 parts per million (ppm) to over 3,000 ppm of TDS. In addition to these area variations in groundwater quality, a body of relatively poor quality water (with a TDS concentration from 1,000 to over 3,000 ppm) also occurs at depths greater than about 500 to 700 feet in the West Salt River Valley northerly of the Gila River and westerly of the Agua Fria River.

Much of the Pinal and Salt River Valley areas have historically experienced subsidence and fissuring. The subsidence impacts tend to be greatest in areas with the most substantial lowering of groundwater levels.

### **III.B.3.b. Avra Valley**

This area includes the basin fill materials in the Avra Valley. These materials lie between the Tucson and Tortolita Mountains to the east and the Silverbell and Roskrige Mountains to the west. The basin fill includes an upper and lower unit. The upper unit consists of gravel, sand, and clayey silt, which ranges in thickness from 100 to 1000 feet. The lower unit can be thousands of feet thick in the central portions of the basin. It consists of gravel and conglomerate at basin margins and in the southern part of the basin. Evaporites, clayey silt, and mudstone occur in the north-central part of the basin. In general, these deposits are coarser along the edges of the basins, and finer-grained toward the central axis of the valley.

Groundwater in the upper 1,000 feet of the basin fill generally occurs under unconfined conditions. Groundwater flow is generally from south to north in the Avra Valley toward the Santa Cruz River. Groundwater flow beneath the River generally parallels the River channel. Present groundwater levels reflect lowering of groundwater levels over time in response to changes in groundwater use due to development, primarily of irrigated agriculture. Recharge to the aquifer includes mountain front recharge, seepage from the Santa Cruz River channel, groundwater underflow from the southern end of the analysis area, and incidental recharge derived from water applications and use. Discharge is primarily by groundwater pumping, with some groundwater outflow to the Avra Valley and some phreatophyte consumptive use.

Most groundwater in Avra Valley has TDS concentrations of less than 500 ppm. There are higher concentrations (in the range of 500 to 1,000 ppm beneath portions of the Santa Cruz River and in areas northeasterly of the Santa Cruz River.

Subsidence has historically occurred in the northern Avra Valley. In addition, the USGS identified the potential for subsidence in much of the northern Avra Valley.

### **III.B.3.c. Tucson Area**

This area includes the basin fill materials along the Santa Cruz River from Tubac in the south, up to the Avra Valley. These materials lie between the Santa Catalina and Santa Rita mountains to the east and the Tucson, Sierrita, and Tumacacori Mountains to the west. The basin fill includes an upper and lower unit. The upper unit consists of gravel, sand, and clayey silt, which ranges in thickness from 100 to 1000 feet. The lower unit consists of gravel, conglomerate, evaporites, clayey silt, and mudstone, and can be thousands of feet thick in the central portions of the valley. In general, these deposits are coarser along the edges of the basins, and finer-grained toward the central axis of the valley.

Groundwater generally occurs under unconfined to partially confined conditions to a depth of about 1,500 feet. Groundwater flow is generally from south to north under the Santa Cruz River, paralleling flow in the river. In the margins of the valley, groundwater generally flows from the mountain fronts toward the Santa Cruz River.

Present groundwater levels reflect lowering of groundwater levels over time in response to changes in groundwater use due to development. Recharge to the aquifer includes mountain front recharge, seepage from the Santa Cruz River channel, groundwater underflow from the southern end of the analysis area, and incidental recharge derived from water applications and use. Discharge is primarily by groundwater pumping, with some groundwater outflow to the Avra Valley and some phreatophyte consumptive use.

TDS concentrations are generally less than 500 ppm along the margins of the valley, and increase toward the center of the valley and the Santa Cruz River. The water beneath the Santa Cruz River generally has a TDS concentration of 500 to 1,000 ppm, and there are pockets of groundwater with TDS concentrations ranging from 1,000 to 3,000 ppm.

Subsidence has historically occurred in the Tucson area. Also, the USGS identified the potential for further future subsidence in the Tucson area, in the vicinity of Tucson and south of Tucson.

### **III.B.3.d. SC Apache Tribe**

Evaluation of groundwater for the SC Apache Tribe focused on the basin fill and stream alluvium associated with the San Carlos and Gila Rivers, and nearby washes. The upper few hundred feet of the basin fill consist of fine sand, silt, limestone, and clay, with interbedded volcanic tuff deposits. The total thickness of basin fill on SC Apache Tribe may be more than 3,200 feet. The stream alluvium, which overlies the basin fill, consists of poorly sorted sandy gravel and gravely muddy sand that occur as channel deposits associated with the rivers. These deposits are up to about 8,000 feet wide and up to about 85 feet thick.

Groundwater likely occurs under unconfined conditions in the alluvial fill. Groundwater in the basin fill tends to occur under unconfined conditions at the margins of the valleys, and the groundwater tends to become confined toward the centers of the valleys.

The likely pattern of groundwater flow is from the mountain fronts toward the Salt and Gila Rivers, and flow parallel to the San Carlos and Gila Rivers beneath the channels. This flow pattern is probably not impacted significantly by the limited amount of groundwater pumping under current conditions.

TDS concentrations of groundwater in the stream alluvium and upper portions of the basin fill beneath the San Carlos River is generally less than 500 ppm of TDS. Groundwater in the stream alluvium beneath the Gila River is generally greater than 500 ppm of TDS, and exceeds 4,000 ppm of TDS in some wells adjacent to the Gila River. In the basin fill near the Gila River, the TDS concentration of groundwater two miles or more from the Gila River is less than 500 ppm, while closer to the Gila River there are pockets with TDS concentrations of more than 2,500 ppm.

### **III.B.3.e. Navajo-Hopi Reservations**

Groundwater beneath the Navajo Nation and Hopi Reservation occurs in sandstone layers located between relatively impermeable siltstone and mudstone layers. Evaluation of groundwater for the Navajo Nation and Hopi Reservation focused on the Navajo/Lukachukai aquifer (N-Aquifer), which is a primary source of groundwater in the Black Mesa area. Groundwater occurs under both confined and unconfined conditions in the N-Aquifer, with unconfined conditions generally occurring in the western, northern, and eastern edges of the aquifer in the Black Mesa area.

Groundwater flow has generally been from the northern area (in the vicinity of Shonto) to the south, from there to the east (toward Chinle wash) and west (toward Tuba City). The flow pattern has been modified due to pumping, such as for the Black Mesa Coal Mine.

TDS concentrations of groundwater in the N-Aquifer range from about 100 to 700 ppm.

### **III.B.3.f. Tonopah Irrigation District (TID)**

This area includes basin fill materials in the “Tonopah Desert” portion of the Hassayampa sub-basin of the Phoenix AMA, south of the Belmont and Big Horn Mountains, and north of the Gila Bend Mountains. The basin fill includes the same three general units discussed in the earlier section for Pinal and Salt River Valley areas. However, the Upper Alluvial Unit is generally de-watered in the Tonopah Desert area, so that the Middle Fine-Grained Unit and the Lower Conglomerate Unit generally comprise the aquifer in the basin fill for this area. Groundwater also occurs in volcanic bedrock underlying the Tonopah Desert. The total thickness of the basin fill and water-bearing volcanic bedrock is more than 1,200 feet thick in the central part of the Tonopah Desert. Groundwater in the TID area occurs under unconfined conditions.

The current pattern of groundwater flow reflects the impact of historical pumping for irrigation. There is a groundwater depression generally located beneath TID. This depression results in inflows from adjacent areas. Components of the hydrologic inventory include groundwater inflow and incidental recharge from irrigation applications. The primary component of groundwater discharge is groundwater pumping.

Limited data were available on water quality and subsidence in the vicinity of TID. Available published data indicate that the TDS concentration in the TID area probably ranges from about 500 to 1,000 ppm. Documentation of historical subsidence for the TID area was not located in published

reports. However, groundwater in TID occurs in deposits which are similar to those in the Salt River Valley, where there has been substantial subsidence.

### **III.B.3.g. Carefree Basin**

The Carefree sub-basin is underlain by partially consolidated to consolidated sedimentary rocks, which are as much as about 2,000 feet thick. The primary aquifer consists of alluvial fan and playa deposits. These deposits are underlain by volcanic rocks (which do not yield significant water to wells) and weathered granite (in which well yields of as much as 600 gallons per minute [gpm] have been achieved).

Groundwater flows toward a depression that has developed in the vicinity of the Town of Cave Creek. Present groundwater levels reflect lowering of groundwater levels over time in response to changes in groundwater use due to development. Recharge to the aquifer includes mountain front recharge and percolation from ephemeral washes and the Cave Creek. Discharge is primarily from groundwater pumping and groundwater outflow to the south.

Groundwater in the Carefree sub-basin is generally suitable for most uses, including domestic use. Based on 1977 data, TDS concentrations typically range from about 200 to 700 ppm.

Documentation of historical subsidence for the Carefree sub-basin was not located in published reports. The occurrence of groundwater in the Carefree sub-basin in semi-consolidated to consolidated sediment does indicate that geologic conditions may not be conducive to subsidence.

### **III.B.3.h. Chaparral Area**

The Chaparral City Water Company obtains groundwater from the Fountain Hills sub-basin of the Phoenix AMA. Groundwater occurs primarily within unconsolidated alluvium associated with the Verde River and in the deeper basin fill materials. The unconsolidated alluvium, which consists of gravel, sand, and sandy silt, is generally about one mile wide along the Verde River and more than 90 feet thick. The thickness of the basin fill varies, with the depth to bedrock exceeding 1,200 feet in the center of the valley. The basin fill deposits include fanglomerate at basin margins and grade into interbedded fine sand, silt and clay toward the center of the basin. Near the center of the basin, the materials are predominantly clays, silts, and evaporites.

Groundwater is probably unconfined in the unconsolidated alluvium. There may be some confinement in the basin fill, particularly toward the center of the basin where the materials tend to be finer grained.

Groundwater generally flows from north to south (paralleling the flow in the Verde River) in the Fountain Hills sub-basin, and there is likely also lateral flow from the margins of the valley to the center of the valley. In the vicinity of Chaparral, flow is generally southwesterly, including a component of flow from the Verde River toward the Chaparral area.

Groundwater levels in the Fountain Hills sub-basin have not been highly impacted by groundwater development to date. For the Chaparral area, recharge includes incidental recharge and groundwater inflow from the east. Discharge is primarily from groundwater pumping.

Groundwater in the Fountain Hills sub-basin is generally suitable for most uses, including domestic. Based on data from the early 1980s, TDS concentrations typically range from about 300 to 850 ppm.

Documentation of historical subsidence for the Fountain Hills sub-basin was not located in published reports. Given the reported minimal changes in groundwater levels, subsidence has probably not occurred historically. However, the similarity of the deposits to those in the neighboring East Salt River Valley and the presence of fine-grained materials, indicate that subsidence impacts could occur in the Chaparral area.

#### **III.B.4. Environmental Consequences**

This section presents a discussion of the impacts that are anticipated to occur under each of the action alternatives as compared to the conditions anticipated to occur under the No Action Alternative. Impacts addressed include changes to groundwater levels, and potential water quality and subsidence impacts that would be associated with those groundwater level changes.

The discussion of impacts is organized by geographic area. Within the discussion of each geographic area, conditions expected to occur under the No Action Alternative are described first followed by discussion of impact resulting from the action alternatives (including the Settlement Alternative and Non-Settlement Alternatives 1, 2, 3A, and 3B). Most impacts are similar for each action alternative, so that the action alternatives are discussed together. Where there are significant differences among impacts associated with the action alternatives, they have been highlighted in the discussion.

The No Action Alternative reflects the continuation of current water supplies and operations into the future. Evaluation of the No Action Alternative focuses on the changes from 2001 to 2051. Evaluation of the action alternatives focuses on impacts computed as the incremental change in groundwater levels expected to occur under the action alternatives to groundwater levels expected to occur under the No Action Alternative. The estimated incremental changes are considered more reliable than the estimated “absolute” groundwater elevation for each alternative, as the effects of various assumptions with respect to future hydrology (except with regard to proposed CAP allocations) tend to cancel out in this comparison. Anticipated groundwater level impacts that are less than +/- 25 feet were not considered to be of any particular relevance, recognizing the 50-year length of the analysis period and the uncertainties involved in projecting conditions over that period of time. Therefore, discussion in this section concentrates on changes in groundwater level impacts greater than 25 feet over the groundwater levels expected to occur under the No Action Alternative.

A discussion of the relationship between the background assumptions and the groundwater level analysis is provided in Appendix I.

##### **III.B.4.a. Pinal County Area**

###### **III.B.4.a.(1) No Action Alternative**

Under the No Action Alternative, groundwater levels would decline throughout the Pinal Area from 2001 to 2051, with declines ranging from about 27 to 77 feet. The declines result from continued reliance on groundwater to meet irrigation requirements, and reductions in the availability of CAP water to NIA entities over the long-term. The groundwater level declines in

some areas would be moderated by reductions in the cropped acres and associated decreases in water demands. The lower groundwater levels would result in greater pumping costs under the No Action Alternative than under present conditions. While groundwater levels would continue to decline, the depth to groundwater would remain substantially above the 1,000 foot depth “floor” for irrigation use established in the Pinal AMA.

The changes in groundwater levels would not greatly change the flow pattern, and directions of flow would remain the same in year 2051 as in year 2001. Therefore, changes to groundwater quality would not be anticipated to result from changes in the groundwater flow pattern. However, the lowering of groundwater levels in the HIDD, San Carlos Irrigation and Drainage District (SCIDD) and northern CAIDD areas could cause or increase production from deeper zones having poorer quality water. Also, the lower groundwater levels throughout the Pinal County area could result in continued subsidence.

#### **III.B.4.a.(2) Settlement and Non-Settlement Alternatives**

Groundwater level impacts in Pinal County for all alternatives are relatively small, with the greatest impact in year 2051 being an increase of about 29 feet relative to the No Action Alternative in the HIDD/SCIDD area. The estimated groundwater level impacts reflect both changes in supplies, and changes in demands that result from reductions in cropped acres.

Figure III-2 shows estimated groundwater level impacts in various locations in the Pinal County area in year 2051. The groundwater level impacts in Pinal reflect changes in the availability of CAP water from the Ag Pool and from NIA allocations relative to the No Action Alternative. The availability of CAP water from the Recharge Pool has a more limited influence on the impacts, because in-lieu recharge water is only available to entities in Pinal County through year 2017.

The only area where the change as compared to the No Action Alternative groundwater level impact would exceed 25 feet is in the HIDD/SCIDD area under the Settlement Alternative. That positive impact (i.e., groundwater levels are higher in 2051 than under the No Action Alternative) results from the availability of Ag Pool water to SCIDD under the Settlement Alternative. The Settlement Alternative is the only alternative in which SCIDD would have access to any sizeable amount of CAP water.

For other areas, the groundwater level impacts generally reflect the change in availability of the total Ag Pool and NIA allocations over the 50-year period. This is illustrated in Figure III-2, which shows both the groundwater level impacts and the availability of CAP water for each alternative. The one exception to this correlation is the impacts for the Settlement Alternative, in which the impacts for some locations are not as favorable as would be expected with the relatively large Ag Pool. This reflects the difference between the distribution of Ag Pool water under the Settlement Alternative and the distribution for the other alternatives; districts in Pinal County would typically receive a smaller proportion of the total Ag Pool under the Settlement Alternative.

The pattern of groundwater flow in year 2051 for the Settlement and Non-Settlement Alternatives would remain similar to the No Action Alternative. Therefore, groundwater quality impacts are not anticipated to result from changes in flow patterns. The Settlement Alternative does result in a relatively large rise (29 feet) in groundwater levels in the vicinity of HIDD and SCIDD relative to the No Action Alternative, which could reduce any influence of poorer quality water at depth in these areas on groundwater produced from wells. That rise in HIDD and SCIDD would also tend to reduce potential subsidence impacts in that area.

### **III.B.4.b. Gila River Indian Community**

#### **III.B.4.b.(1) No Action Alternative**

Groundwater levels would generally decline in GRIC from 2001 to 2051 under the No Action Alternative. Groundwater levels would remain essentially unchanged from present levels in the western part of GRIC (i.e., in the vicinity of Komatke and Maricopa Village), while declines of as much as about 48 feet would occur in the eastern and central part of GRIC. The anticipated changes in groundwater levels under the No Action Alternative result from additional supplies available to GRIC relative to historical conditions, the development of additional lands for irrigated agriculture, and changes in groundwater flows between GRIC and adjacent areas. Absent consideration of groundwater underflows to adjacent areas, there would be net recharge to GRIC. Therefore, the declining levels can be attributed to groundwater outflow that would exceed the net recharge.

Changes in groundwater levels would not greatly change the groundwater flow pattern, which would remain essentially the same throughout the study period. There would be groundwater outflow from GRIC to essentially all the adjacent areas; however, groundwater quality would not be anticipated to change as a result of any groundwater level or flow changes. There would be some potential for subsidence due to lowering of groundwater levels in the eastern part of GRIC.

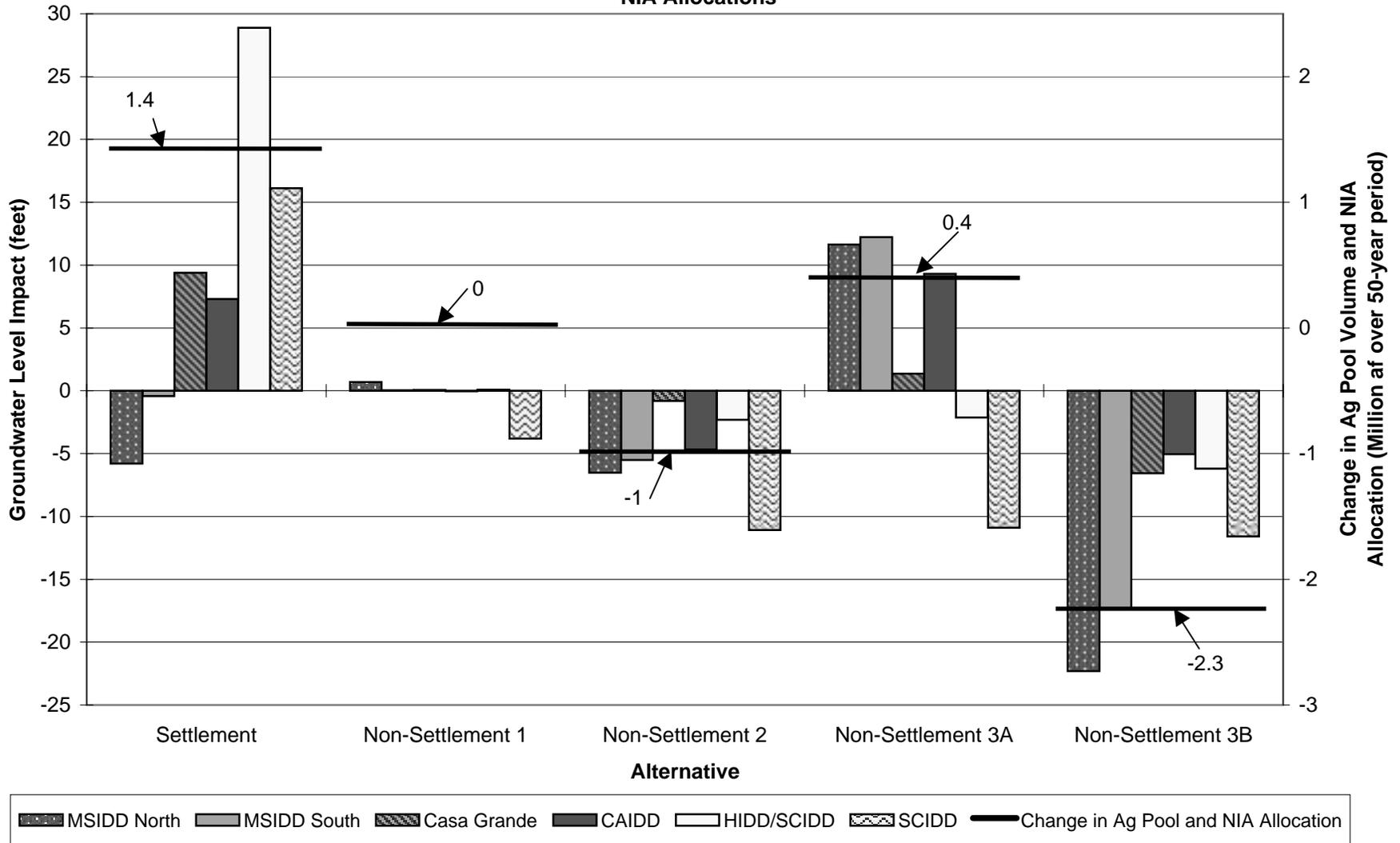
#### **III.B.4.b.(2) Settlement and Non-Settlement Alternatives**

Changes in groundwater levels in year 2051 relative to the No Action Alternative are generally small for all alternatives. The largest impact occurs under the Settlement Alternative, in which groundwater levels would be as much as about 26 feet deeper than the No Action Alternative in some locations. The groundwater level impacts in GRIC reflect a number of factors that vary under each alternative, including the amount of CAP water allocated to GRIC and the priority of that water, the total acres developed for irrigation, the build-out schedule, the amount of groundwater pumping, and changes in underflows between GRIC and adjacent areas.

Estimated groundwater level impacts in year 2051 for each alternative are shown in Figure III-3 for areas of GRIC that show the largest estimated impacts. Also shown is the estimated net pumping for each alternative (i.e., the incidental recharge less the groundwater pumping). The net pumping integrates many of the factors which vary among alternatives, except for changes in groundwater underflows between GRIC and adjacent areas. Figure III-3 illustrates that the magnitude of the changes in groundwater levels relative to the No Action Alternative generally relates to the net pumping for the Settlement and Non-Settlement Alternatives. Changes in groundwater underflows also influence these impacts. The occurrence of lower groundwater levels under GRIC relative to the No Action Alternative for the Non-Settlement Alternatives 3A and 3B (in which incidental recharge exceeds pumping) reflects that groundwater outflow from GRIC to adjacent areas increases from the No Action Alternative.

Unlike most of the areas evaluated in this analysis, the water demands on GRIC vary among the alternatives, as does the portfolio of water supplies used to meet those demands. This can result in groundwater level impacts that are at first glance counter-intuitive. For example, while surface water supplies available to GRIC are greatest under the Settlement Alternative, groundwater levels on GRIC generally drop under this alternative, and the lowest groundwater levels for most

**FIGURE III-2**  
**CAP Allocation Draft EIS**  
**Comparison of Groundwater Level Impacts in Year 2051 for Pinal Subareas to Changes in Ag Pool Volume and**  
**NIA Allocations**



locations generally occur under the Settlement Alternative. The lower groundwater levels primarily reflect that the Settlement Alternative has the greatest cropped acreage (and so the greatest irrigation demand), and the greatest groundwater pumping of any alternative. Groundwater levels on GRIC for all alternatives also reflect that: (1) there is a net groundwater outflow under all alternatives; and (2) improvements in the distribution facilities tend to reduce the incidental recharge under all alternatives.

The pattern of groundwater flow under all of the action alternatives would be similar to the pattern under the No Action Alternative. Therefore, groundwater quality impacts are not anticipated due to changes in groundwater levels or flow patterns. The lower groundwater levels (relative to the No Action Alternative) under the Settlement Alternative and Non-Settlement Alternatives 3A and 3B would have the potential for greater subsidence than under the No Action Alternative. This would particularly apply to the Settlement Alternative, which has the largest groundwater level impacts relative to the No Action Alternative.

### **III.B.4.c. East Salt River Valley**

#### **III.B.4.c.(1) No Action Alternative**

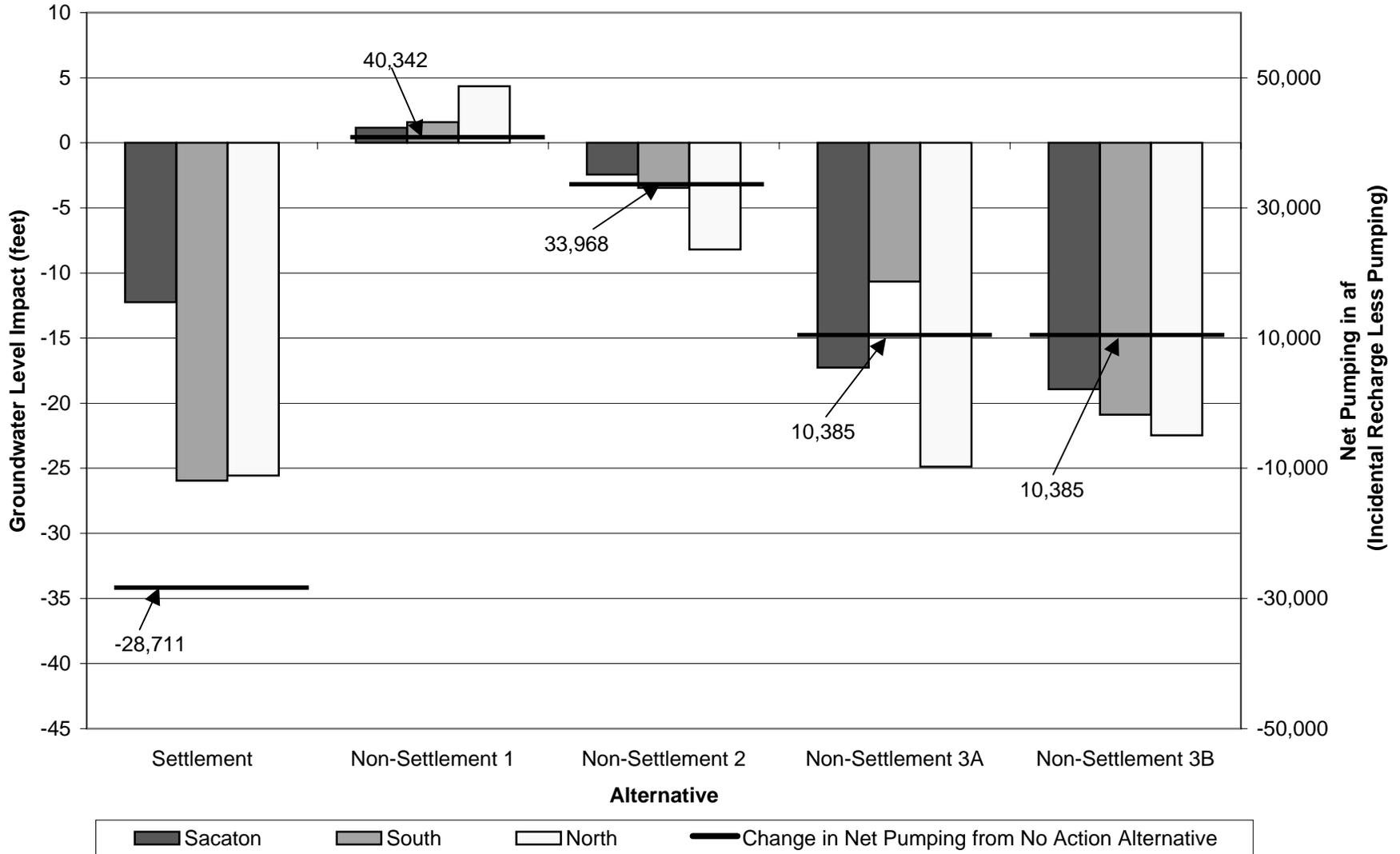
Changes in groundwater elevations from 2001 to 2051 in the East Salt River Valley would vary widely, including increases in groundwater levels in some areas and declines in others. One of the dominant factors influencing groundwater levels is recharge in GRUSP, located near the Salt River where it enters the East Salt River Valley. Groundwater levels would rise in the vicinity of GRUSP (estimated to be as much as about 128 feet). The influence of that recharge also extends beyond the GRUSP facility, resulting in rises in groundwater levels in some locations, and attenuation of declines in other areas. A hydrograph showing estimated groundwater levels occurring in the vicinity of GRUSP under the No Action Alternative (as well as for the action alternatives) is provided on Figure III-4. Groundwater levels rise through the year 2043, when it is assumed that a shortage condition would occur on the Colorado River. As shown, groundwater levels drop relatively rapidly during that shortage period.

The area between the Salt River and GRIC shows substantial declines in groundwater levels during the 2001 to 2051 period, as does the most northerly portion of the East Salt River Valley, and the Apache Junction area. These declines reflect continued reliance on groundwater to meet demands in these areas.

The agricultural lands located in the southeasterly portion of the East Salt River Valley (which include NMIDD, QCID, STID, and CHCID) experience relatively stable or rising groundwater levels over the 2001 to 2051 period under the No Action Alternative. These groundwater level changes reflect the interplay of a number of factors, including continued availability of CAP water from the Ag Pool and Recharge Pool (particularly during the early years), and changes in demands related to urbanization of these lands and reductions in cropped acres due to economic considerations.

There would be some changes in the groundwater flow pattern in the East Salt River Valley by year 2051. Rises in groundwater levels in the vicinity of QCID and the southern part of Scottsdale would eliminate the existing groundwater level depressions in these areas, while a new groundwater level depression would develop near the boundary with GRIC. Also, the recharge at GRUSP would result in radial flow away from that facility by year 2051. The changes in the groundwater flow pattern result in groundwater depressions adjacent to GRIC (where groundwater has relatively high

**FIGURE III-3**  
**CAP Allocation Draft EIS**  
**Comparison of Groundwater Level Impacts in Year 2051 for Selected Subareas in GRIC to Net Pumping on GRIC**



concentrations of TDS) rather than in the vicinity of QCID and the southern part of Scottsdale (where groundwater has relatively low concentrations of TDS). This change in flow pattern would tend to reduce the movement of groundwater from areas of high TDS to areas of low TDS. Recharge of CAP water in GRUSP facilities would not be anticipated to result in groundwater quality impacts, as the TDS concentration of the CAP water is similar to the TDS concentration of the underlying groundwater.

Groundwater levels would continue to decline in a number of areas in the East Salt River Valley under the No Action Alternative, and subsidence could occur in these areas. This includes the northern Scottsdale and Phoenix areas, lands lying between the Salt River and GRIC, and the Apache Junction area.

### **III.B.4.c.(2) Settlement and Non-Settlement Alternatives**

Groundwater level impacts of the Settlement and Non-Settlement Alternatives in the East Salt River Valley (relative to the No Action Alternative) reflect different influences for different locations in the analysis area. The largest influences on these impacts appear to be the amount of direct recharge that would occur at GRUSP, and factors affecting NIA entities.

Changes in year 2051 groundwater levels for each action alternative relative to the No Action Alternative for areas strongly influenced by direct recharge at GRUSP are shown on Figure III-5. Also shown is the change in the CAP water available from the Recharge Pool for each action alternative relative to the No Action Alternative. The decline in groundwater levels for each non-settlement alternative generally reflects the reduction in the CAP Recharge Pool for that alternative. The magnitude of these declines is also greatest close to GRUSP (i.e., on the Salt River Indian Reservation and the western part of Mesa); smaller impacts tend to occur with increasing distance from GRUSP.

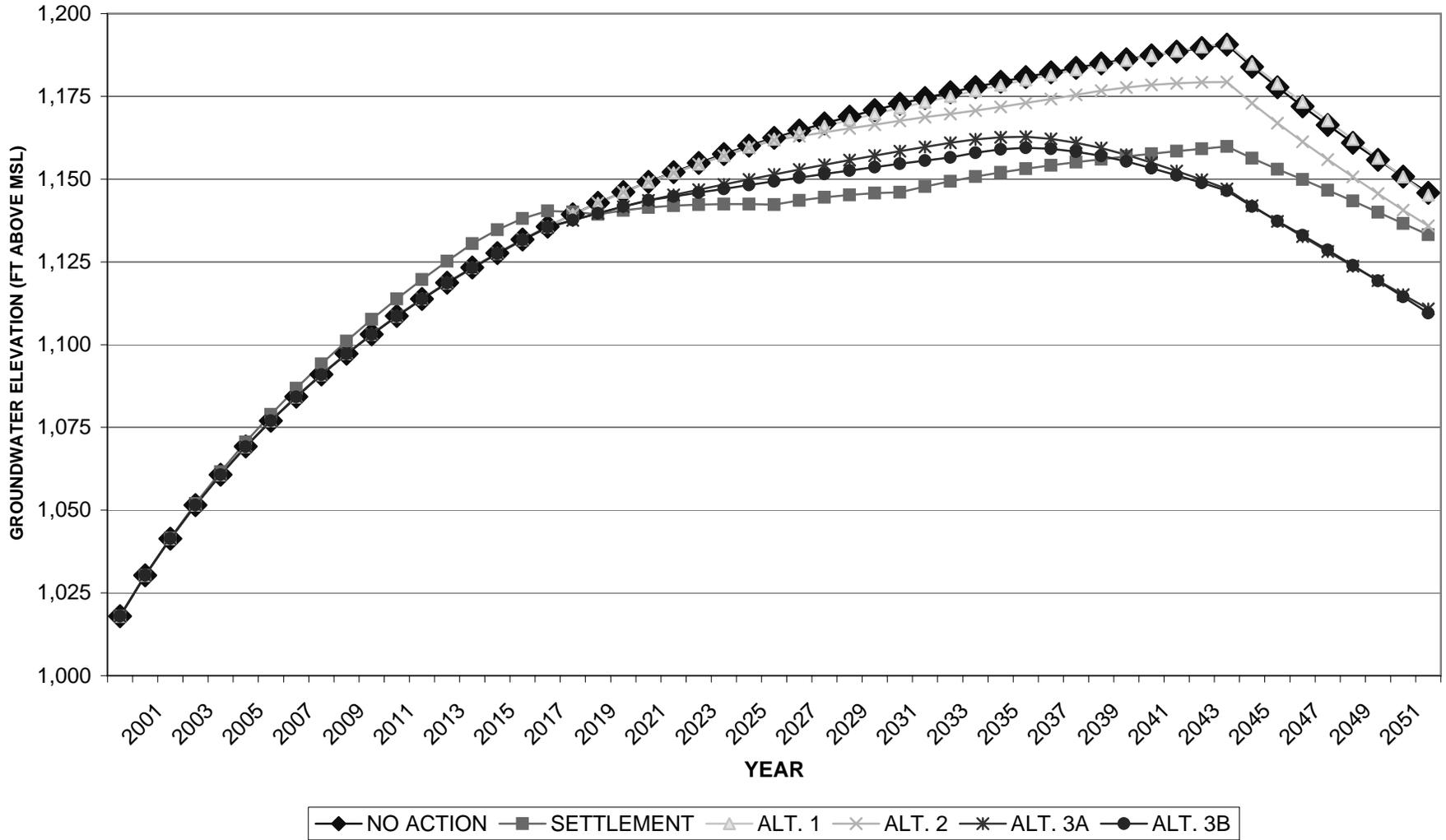
The groundwater levels for the Settlement Alternative are not as closely related to the reduction in the recharge pool. While the Settlement Alternative has the greatest reduction in the recharge pool, relatively small groundwater level impacts reflect that the cities of Mesa and Chandler would receive additional CAP water from GRIC in exchange for effluent that would otherwise be unused. Without that additional CAP supply, the largest negative groundwater level impacts would have been expected for the Settlement Alternative.

The differences in the groundwater level impacts over time can be seen on the groundwater level hydrograph shown on Figure III-5. The variations result from differences in the availability of groundwater to the Recharge Pool among the alternatives.

Relatively large groundwater level impacts would also occur in the vicinity of the NIA entities (NMIDD, QCID, STID, and CHCID). Changes in groundwater levels in 2051 for the action alternatives relative to the No Action Alternative are shown on Figure III-6 for NMIDD and QCID. Groundwater levels are typically about 65 to 80 feet deeper than under the No Action Alternative, except for Non-Settlement Alternative 1. There would be smaller changes in groundwater levels under that alternative, due to a lesser reduction in the amount of recharge water relative to the No Action Alternative, and earlier reductions in cropped acreage.

In general, the pattern of groundwater flow in 2051 for all action alternatives would be similar to the pattern for the No Action Alternative. However, there could be some differences (particularly

**FIGURE III-4**  
**CAP Allocation Draft EIS**  
**Hydrograph of Estimated Groundwater Levels Occurring in the Vicinity of GRUSP - All Alternatives**



for the Settlement Alternative and Non-Settlement Alternatives 3A and 3B) in the vicinity of GRUSP reflecting that there would be a less pronounced groundwater “mound” for those alternatives. Also, a groundwater level depression would remain in the vicinity of QCID under the Settlement Alternative. For all of the action alternatives, groundwater quality impacts associated with the small changes in the groundwater flow pattern relative to the No Action Alternative would not be anticipated. Also, direct recharge of CAP water at GRUSP would not be anticipated to result in groundwater quality impacts, as the TDS concentration of the CAP water is similar to the TDS concentration in the underlying groundwater.

Groundwater levels would be generally deeper under the action alternatives than under the No Action Alternative. These deeper levels indicate a greater potential for subsidence than under the No Action Alternative. One exception is that, while groundwater levels in the vicinity of GRUSP would be lower than under the No Action Alternative, they would remain above present levels, so that subsidence may not be anticipated at that location.

#### **III.B.4.d. West Salt River Valley**

##### **III.B.4.d.(1) No Action Alternative**

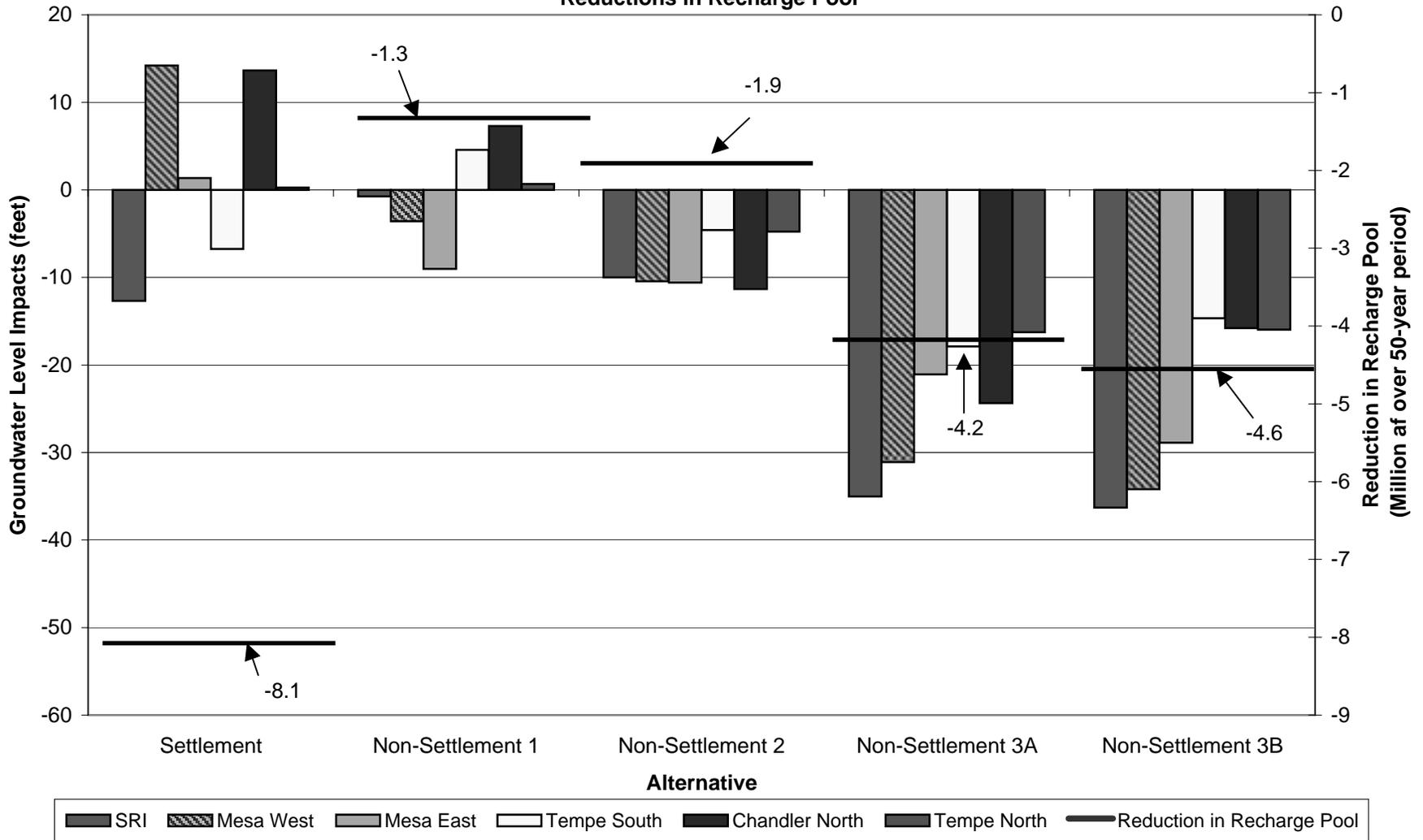
Changes in groundwater elevations from 2001 to 2051 in the West Salt River Valley would vary widely, including increases in groundwater levels in some areas and declines in others. Substantial declines are projected for the Phoenix area (as much as about 295 feet) and the west side area near the existing Luke Cone groundwater level depression (as much as about 150 feet). These impacts reflect continued reliance on groundwater to meet much of the demands in these areas.

Direct recharge at the planned Agua Fria facility and proposed future westside recharge facilities has a substantial influence on groundwater levels. A hydrograph showing estimated groundwater levels in the vicinity of the Agua Fria recharge facility under the No Action Alternative (as well as for the action alternatives) is provided on Figure III-7. Groundwater levels would rise through the year 2043, when it is assumed that a shortage condition on the Colorado River would occur. As shown, groundwater levels would drop relatively rapidly during that shortage period. There would also be direct recharge at proposed future westside facilities on the west side of the valley. Those facilities are not anticipated to come operational until year 2017. While groundwater levels are expected to decline in this area over the 2001 to 2051 period, these declines would be moderated by the direct recharge.

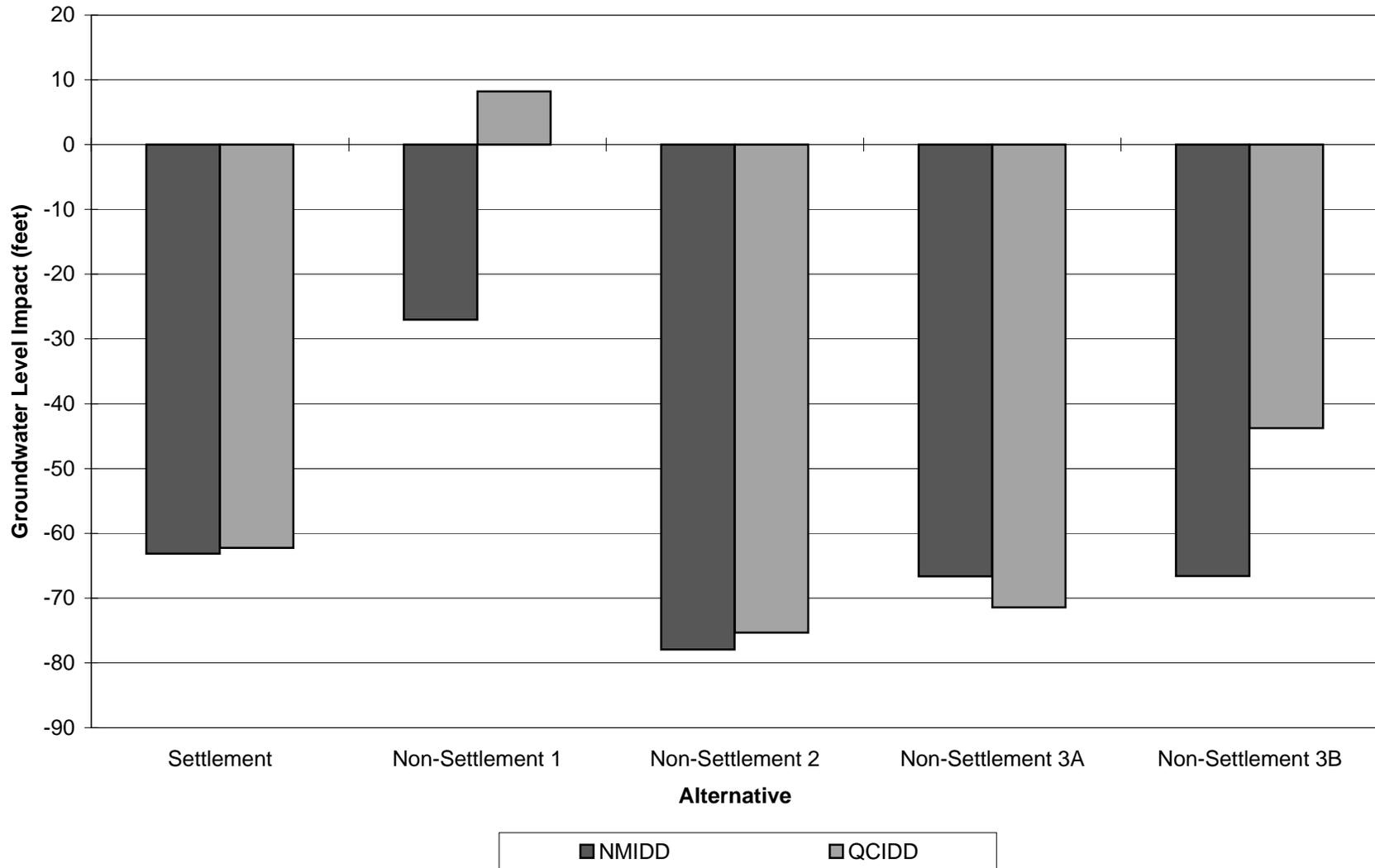
There would be changes in the groundwater flow pattern by year 2051. A groundwater depression would form beneath the northern portion of Phoenix in the West Salt River Valley. The existing Luke Cone groundwater level depression would remain. Under the No Action Alternative, groundwater flow would continue from areas with relatively poor quality water beneath the Gila River to northerly areas that presently have relatively good quality water. Also, lower groundwater levels in the vicinity of the “Luke salt dome” could result in lower quality water being produced from wells in that area. Recharge of CAP water in the Agua Fria and future westside recharge facilities could eventually result in higher TDS concentrations in the underlying groundwater, as the CAP water has a higher TDS concentration than the groundwater.

Subsidence would be anticipated under the No Action Alternative in the eastern and western areas of the West Salt River Valley, where relatively large declines in groundwater levels would occur.

**FIGURE III-5**  
**CAP Allocation Draft EIS**  
**Comparison of Groundwater Level Impacts in Year 2051 for Selected East Salt River Valley Subareas to**  
**Reductions in Recharge Pool**



**FIGURE III-6**  
**CAP Allocation Draft EIS**  
**Comparison of Groundwater Level Impacts in Year 2051 for QCIDD and NMIDD Sub-Areas**



### **III.B.4.d.(2) Settlement and Non-Settlement Alternatives**

Groundwater level impacts of the Settlement and non-settlement alternatives in year 2051 primarily reflect the influence of direct recharge at the Agua Fria and future westside recharge facilities in the West Salt River Valley. The largest impacts occur near these facilities. Estimated changes in groundwater levels for the action alternatives relative to the No Action Alternative are shown on Figure III-8 for selected areas. As shown on that Figure, CAP water available from the Recharge Pool for all of the action alternatives would be reduced relative to the No Action Alternative. The magnitude of the decline in groundwater levels from No Action groundwater levels for each alternative generally reflects the reduction in CAP water available from the Recharge Pool.

The differences in the groundwater level impacts over time can be seen on the groundwater level hydrograph shown on Figure III-7. The differences among the various alternatives are primarily a result of differences in the availability of CAP water from the Recharge Pool.

In general, the pattern of groundwater flow in 2051 for all action alternatives would be similar to the pattern for the No Action Alternative. For all of the action alternatives, the changes in the groundwater flow pattern relative to the No Action Alternative are relatively small, and groundwater quality impacts associated with these changes are not anticipated. However, the greater declines in groundwater levels relative to the No Action Alternative in the vicinity of the Luke salt dome, particularly for the Settlement Alternative and Non-Settlement Alternatives 3A and 3B, would have the potential to result in greater influence of the poor quality water at depth in groundwater produced by wells. The reduced direct recharge of CAP water could potentially result in lower TDS concentrations in groundwater near the Agua Fria and future westside recharge facilities than would occur under the No Action Alternative, in the later years.

There would be declines in groundwater levels relative to the No Action Alternative in the western part of the West Salt River Valley for all of the action alternatives. These declines would be relatively large under the Settlement Alternative and Alternatives 3A and 3B. These groundwater level declines could result in greater subsidence than would occur under the No Action Alternative.

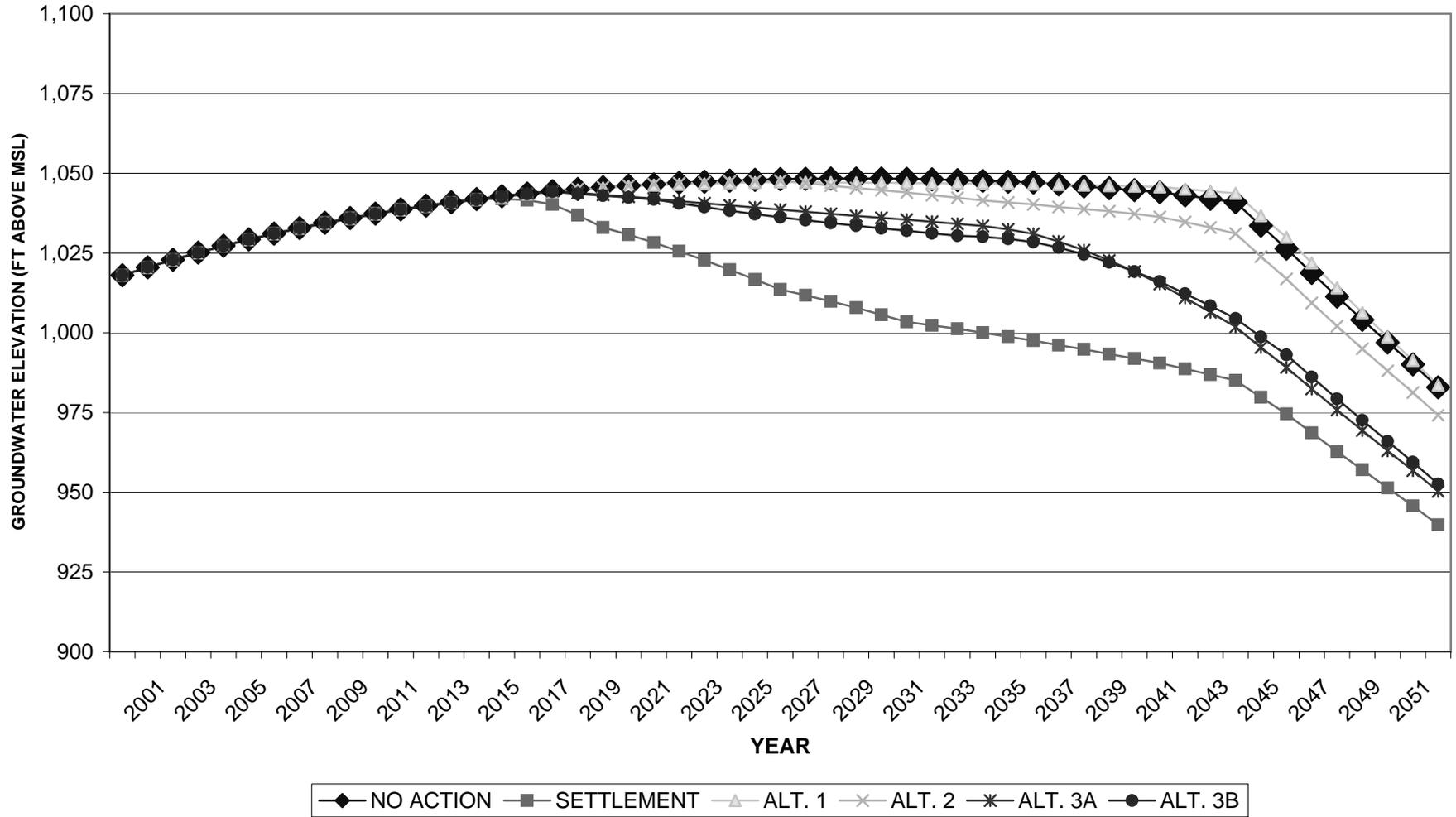
### **III.B.4.e. Avra Valley**

#### **III.B.4.e.(1) No Action Alternative**

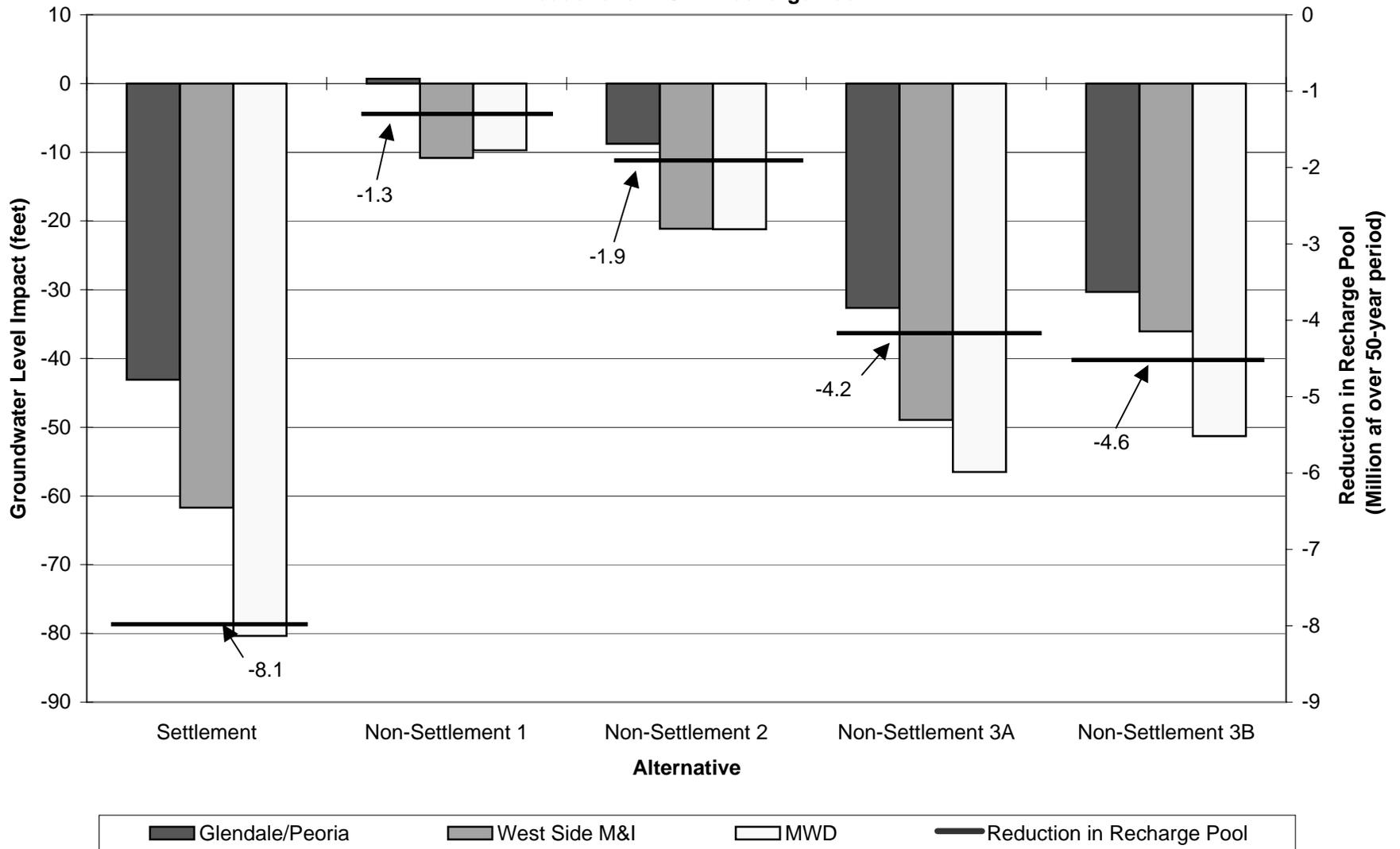
Changes in estimated groundwater levels during the 2001 to 2051 period in Avra Valley under the No Action Alternative would vary widely. The largest changes in groundwater levels occur in the southern part of Avra Valley. Groundwater levels would rise more than 300 feet in the vicinity of the Central Avra Valley Storage and Recovery Project (CAVSRP) direct recharge facility, in response to the recharge of CAP M&I allocations in that facility. Groundwater levels would decline more than 150 feet at the City of Tucson wellfield located southerly of CAVSRP. Smaller increases in groundwater levels occur in the vicinity of other direct and in-lieu recharge facilities located along the Santa Cruz River and in the North Avra Valley.

Significant changes in groundwater quality are not expected under the No Action Alternative. However, there would be the potential for subsidence in the southern part of Avra Valley due to the lower groundwater levels.

**FIGURE III-7**  
**CAP Allocation Draft EIS**  
**Hydrograph of Estimated Groundwater Levels Occurring in the Vicinity of the Agua Fria Recharge Facility - All Alternatives**



**FIGURE III-8**  
**CAP Allocation Draft EIS**  
**Comparison of Groundwater Level Impacts in Year 2051 for Selected Subareas in the West Salt River Valley to**  
**Reductions in CAP Recharge Pool**



### **III.B.4.e.(2) Settlement and Non-Settlement Alternatives**

Impacts would be very small throughout Avra Valley. While these impacts are small, they do reflect the changes in water supplies for each alternative. The magnitude of the impacts for the Avra Coop under each alternative reflect changes in CAP water available and changes in recharge amounts in nearby areas. The magnitude of impacts in the South Avra Valley sub-area reflect the Schuk Toak District's receipt of additional CAP water under the Settlement Alternative and Non-Settlement Alternatives 2, 3A, and 3B.

Because the groundwater level impacts would be very small, water quality and subsidence impacts (i.e. changes from No Action) would not be anticipated. Groundwater pumping costs would not differ significantly from the costs under the No Action Alternative.

### **III.B.4.f. Tucson Area**

#### **III.B.4.f.(1) No Action Alternative**

Changes in estimated groundwater levels under the No Action Alternative during the 2001 to 2051 period would range from a decline of 111 feet to a rise of 57 feet. Most of the Tucson area would experience groundwater level declines over the 2001 to 2051 period, reflecting continued reliance on groundwater to meet demands and increased demand associated with population growth. Lower groundwater levels would result in higher pumping costs in these areas.

Groundwater levels would rise in the eastern part of the San Xavier District and the Western part of Tucson. These rises reflect the impact to direct recharge of CAP water at most locations. Groundwater pumping costs would be reduced in these areas.

The groundwater flow pattern would generally be similar to the existing flow pattern, except that a groundwater mound would develop beneath the eastern part of the San Xavier District. This mound could result in the movement of poorer quality water beneath the Santa Cruz River to the east. However, the TDS concentration of the recharged CAP water would be lower than the poorer quality groundwater, and would tend to provide an offsetting improvement in groundwater quality. Substantial changes in groundwater quality would not be anticipated under the No Action Alternative under these conditions. The relatively large declines in groundwater levels (over 25 feet by year 2051) both north and south of the metropolitan Tucson area could result in continued subsidence.

#### **III.B.4.f.(2) Settlement and Non-Settlement Alternatives**

Groundwater levels throughout the Tucson area would be higher under all of the action alternatives than under the No Action Alternative. However, these impacts are generally relatively small (less than 25 feet). These higher groundwater levels would result in a reduced cost per af of pumping.

The largest impacts are shown for the eastern part of the San Xavier District of the Tohono O'odham Nation under the Settlement Alternative and Non-Settlement Alternatives 2, 3A, and 3B, in which groundwater levels would be about 70 to 80 feet higher than under the No Action Alternative as illustrated on Figure III-9, the higher groundwater levels relative to the No Action Alternative result from additional CAP supplies for the San Xavier District, which would be used for irrigation and

direct/indirect recharge. The relatively large groundwater rise beneath the eastern San Xavier District would also cause an increase in groundwater levels in the Green Valley area to the south.

As shown on Figure III-10, under the Settlement Alternative and Non-Settlement Alternatives 1 and 3B, groundwater levels in the eastern portion of the Cortaro-Marana area, MDWID, and the metropolitan Tucson area show increases in groundwater levels of about 20 to 40 feet relative to the No Action Alternative. The additional CAP water that would be available to M&I entities through CAP allocations are also shown on Figure III-10. The groundwater level impacts result from use of these additional supplies and the associated reduction in groundwater pumping.

The groundwater flow pattern for all of the action alternatives would be similar to the No Action Alternative and changes in groundwater quality would be similar to those under the No Action Alternative. One difference is that a ground level depression would develop in the Green Valley area. This could result in an adverse salt balance in that area.

Because groundwater levels are higher than under the No Action Alternative throughout the Tucson area under all of the action alternatives, these alternatives would tend to reduce the potential for continued subsidence.

#### **III.B.4.g. San Carlos Apache Tribe**

##### **III.B.4.g.(1) No Action Alternative**

Under the No Action Alternative, irrigation would be expanded using the existing CAP allocation for SC Apache Tribe. Use of surface water for irrigation would increase incidental recharge along the San Carlos and Gila Rivers, where the new irrigated lands are anticipated to be located. The result would be a rise in groundwater levels in the alluvium associated with the San Carlos and Gila Rivers, essentially filling presently unfilled storage space. Water quality and subsidence impacts would not be anticipated.

##### **III.B.4.g.(2) Settlement and Non-Settlement Alternatives**

For Non-Settlement Alternatives 2 and 3, additional lands would be irrigated along the San Carlos and Gila Rivers. As with the No Action Alternative, this could fill the presently unfilled storage in the alluvium, so that there would be no impact (i.e., the groundwater levels for Non-Settlement Alternatives 2 and 3 would be the same as the No Action Alternative). Subsidence and water quality impacts would not be anticipated.

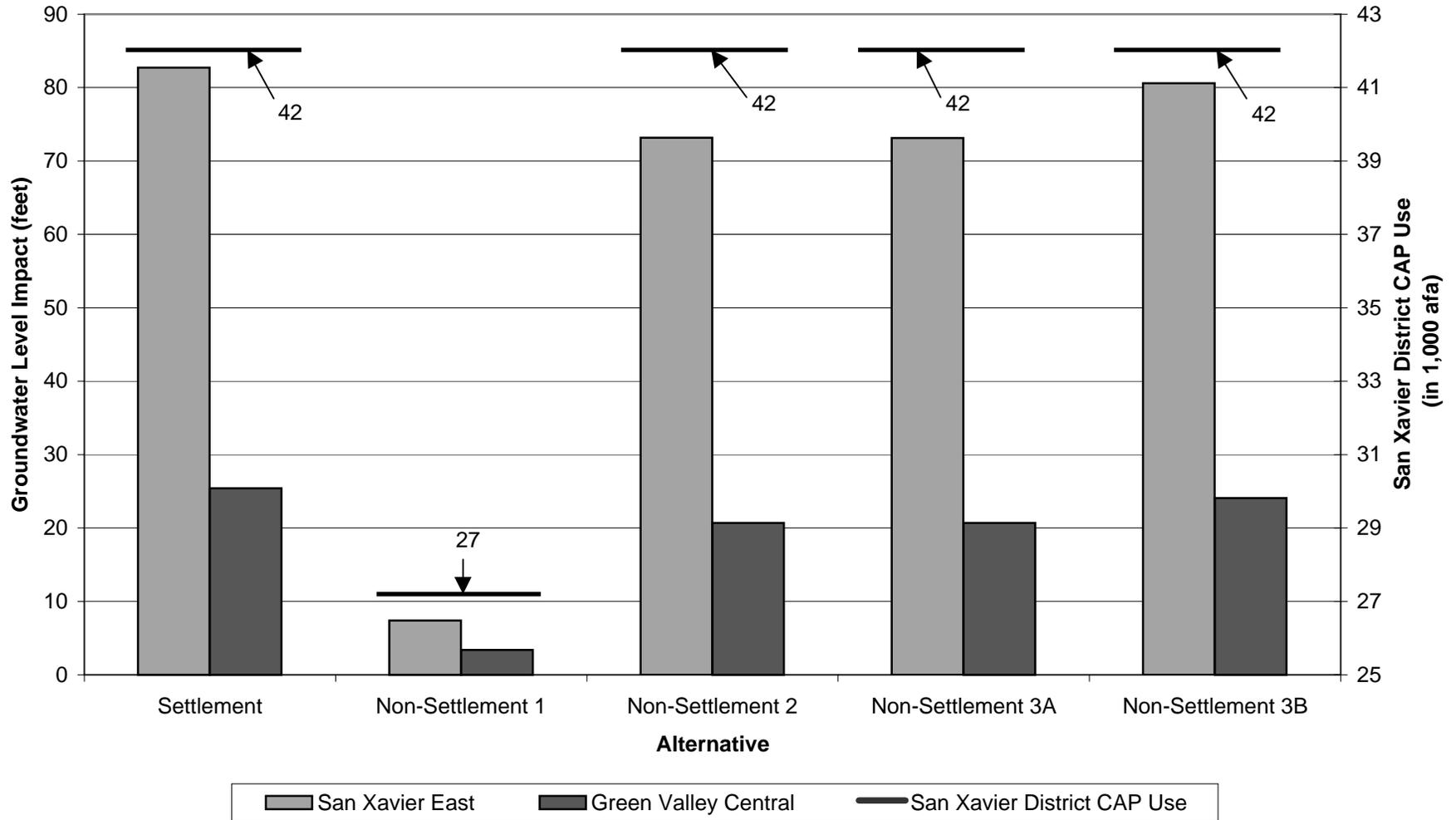
Impacts under the Settlement Alternative and Non- Settlement Alternative 1 would be the same as for the No Action Alternative.

#### **III.B.4.h. Hopi Tribe and Navajo Nation**

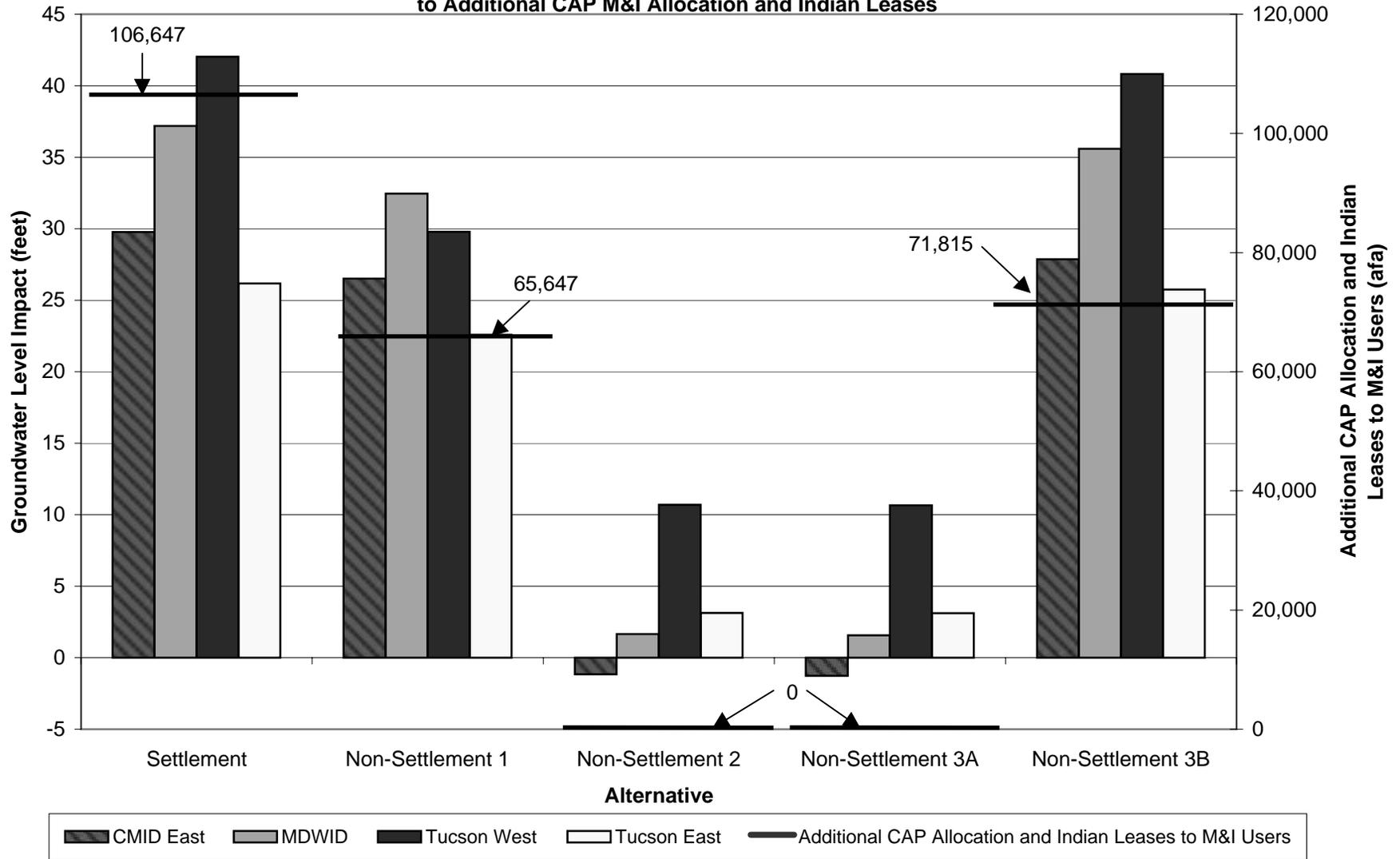
A qualitative rather than quantitative analysis was performed to estimate impacts of the alternatives on groundwater on the Navajo Nation and Hopi Tribes, reflecting that:

- ◆ The distribution of available CAP water between the Navajo and Hopi Tribes is not known, nor are the specific uses;

**Figure III-9**  
**CAP Allocation Draft EIS**  
**Comparison of Groundwater Level Impacts in San Xavier East and Green Valley Central**  
**Sub-Areas to San Xavier District CAP Use**



**FIGURE III-10**  
**CAP Allocation Draft EIS**  
**Comparison of Groundwater Level Impacts in Year 2051 for Selected Subareas in the Tucson Area**  
**to Additional CAP M&I Allocation and Indian Leases**



- ◆ Estimates of present and future population and water demands tend to vary widely among various sources; and
- ◆ There is not consensus of involved entities on the characteristics of the groundwater system.

For these reasons, the impact analysis is based on evaluation of the incremental change in CAP water supplies among alternatives. Available CAP supplies would be used to offset groundwater pumping, resulting in an incremental increase in groundwater storage.

#### **III.B.4.h.(1) No Action Alternative**

CAP water would not be available to the Navajo Nation and Hopi Tribe under the No Action Alternative.

#### **III.B.4.h.(2) Settlement and Non-Settlement Alternatives**

CAP water would not be available to the Navajo and Hopi Tribes from the re-allocation process under the Settlement Alternative and Non-Settlement Alternative 1. Therefore, there would not be an incremental change in groundwater storage for these alternatives relative to the No Action Alternative.

For Non-Settlement Alternatives 2, 3A, and 3B, a total of 675,000 acre-feet of CAP water would be available to the Navajo Nation and Hopi Tribe over the 50-year period of analysis. This would result in an incremental increase in groundwater storage of 675,000 acre-feet relative to storage under the No Action Alternative. This represents an increase of about two-tenths to four-tenths of a percent in the volume of groundwater storage in the N-aquifer. The increased groundwater storage would result in higher average groundwater levels in the N-aquifer for these alternatives relative to the No Action Alternative. However, information is not available to evaluate how levels might change in specific locations.

#### **III.B.4.i. Tonopah Irrigation District**

##### **III.B.4.i.(1) No Action Alternative**

Under the No Action Alternative, groundwater levels would rise by about 45 feet during the early years of the study period (from 2001 to 2017) and then decline through year 2051. From 2001 to 2051, the net groundwater level impact is a decline in groundwater levels of about 17 feet. These impacts occur due to reduced availability of CAP water to TID over time, and increased reliance on groundwater pumping to meet irrigation demands. Groundwater pumping costs would not be significantly different from present costs under this alternative.

Significant changes in the groundwater quality are not expected under the No Action Alternative. Also, the relatively small decline in groundwater levels in year 2051 (17 feet) would not be anticipated to result in significant potential for subsidence.

### **III.B.4.i.(2) Settlement and Non-Settlement Alternatives**

Groundwater levels in the TID area would be lower for all action alternatives than under the No Action Alternative. These negative groundwater level impacts range from about 17 to 41 feet in year 2051, as shown on Figure III-11. The magnitude of the groundwater level impact relates to the change in total excess CAP water available from the Ag Pool, the Recharge Pool, and NIA allocations under each alternative relative to the No Action Alternative, as illustrated on Figure III-11. The greater pumping lifts would result in greater pumping costs than under the No Action Alternative.

As the groundwater level impacts are very small, significant groundwater quality impacts would not be anticipated. Groundwater pumping costs would not differ significantly from the costs under the No Action Alternative.

### **III.B.4.j. Carefree Sub-Basin**

#### **III.B.4.j.(1) No Action Alternative**

Under the No Action Alternative, groundwater levels would rise during the early years of the study period due to full use of available CAP supplies. However, groundwater pumping would increase to meet growing demands, resulting in groundwater level declines in the later years.

From 2001 to 2051, the groundwater level would decline by about 13 feet. Groundwater pumping costs would not be significantly different from present costs under this alternative.

Significant changes in the groundwater quality are not expected under the No Action Alternative. Also, the relatively small decline in groundwater levels in year 2051 (13 feet) would not be anticipated to result in significant potential for subsidence in the consolidated sediments underlying the Cave Creek area.

#### **III.B.4.j.(2) Settlement and Non-Settlement Alternatives**

Non-Settlement Alternatives 2 and 3A have the same CAP supplies for this sub-basin as the No Action Alternative. Therefore, no impacts to groundwater level, groundwater quality, and subsidence relative to the No Action Alternative are anticipated for these alternatives.

Groundwater levels under the Settlement Alternative and Non-Settlement Alternatives 1 and 3B would be about 58 feet higher than under the No Action Alternative by year 2051. These positive groundwater level impacts reflect the availability of additional CAP water, and the corresponding reduction in groundwater pumping. Groundwater pumping costs under these alternatives would be lower than under the No Action Alternative, reflecting the higher groundwater levels. Significant groundwater quality impacts would not be anticipated.

### **III.B.4.k. Chaparral/Fountain Hills**

#### **III.B.4.k.(1) No Action Alternative**

Under the No Action Alternative, groundwater levels would rise during the early years of the study period due to full use of currently available CAP supplies. However, groundwater pumping would increase to meet growing demands, resulting in groundwater level declines in the later years. From 2001 to 2051, the groundwater level would decline by about 50 feet. The groundwater level decline would result in greater costs for groundwater pumping.

Significant changes in the groundwater quality are not expected under the No Action Alternative. However, the 50-foot decline in groundwater levels through the year 2051 indicates potential for subsidence under the No Action Alternative.

#### **III.B.4.k.(2) Settlement and Non-Settlement Alternatives**

Non-Settlement Alternatives 2 and 3A have the same CAP supplies for this sub-basin as the No Action Alternative. Therefore, impacts to groundwater level, groundwater quality, and subsidence relative to the No Action Alternative would not be anticipated to occur. Also, groundwater pumping costs would be the same as the No Action Alternative.

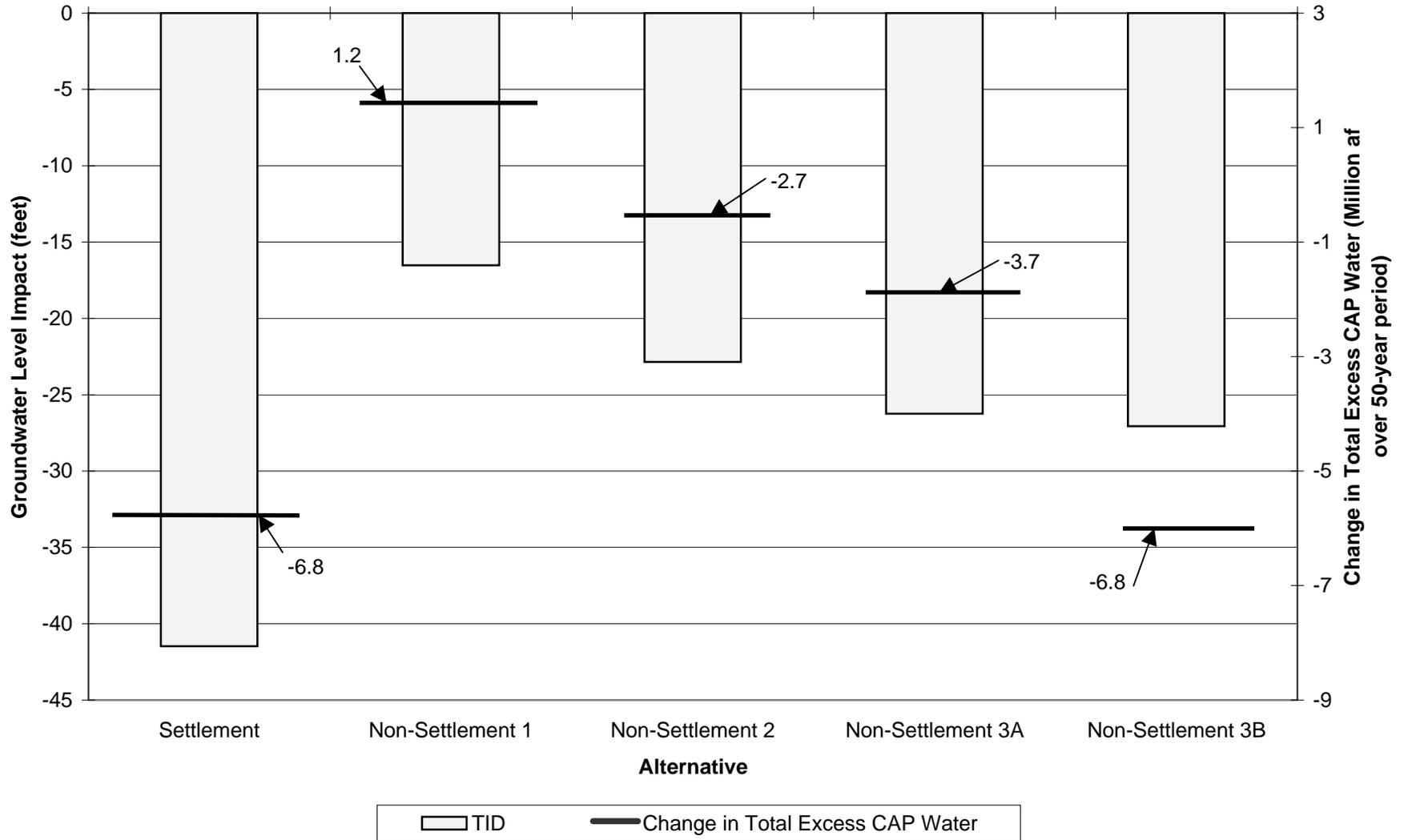
Groundwater levels under the Settlement Alternative and Non-Settlement Alternatives 1 and 3B would be about 20 feet higher than under the No Action Alternative by year 2051. These positive groundwater level impacts reflect the availability of additional CAP water, and the corresponding reduction in groundwater pumping. The higher groundwater levels would result in reduced costs for groundwater pumping.

As the groundwater level impacts are small, significant groundwater quality impacts would not be anticipated. The positive groundwater level impacts would tend to reduce subsidence impacts in the Chaparral area relative to the No Action Alternative.

#### **III.B.4.l. Effluent**

The level of effluent discharge from existing wastewater treatment plants is projected to continue at current or increased levels under the No Action and all action alternatives. As population increases, it is anticipated that effluent would not be sent to the regional wastewater treatment plants, such as Phoenix's 91<sup>st</sup> Avenue Wastewater Treatment Plant, but rather would be treated locally in smaller wastewater treatment plants, such as the one at the Anthem development north of Phoenix. These local wastewater treatment plants may use the reclaimed water for turf facilities, groundwater recharge, or discharge to streams. For the alternatives under which the M&I entities do not receive an additional CAP allocation (i.e., the No Action Alternative and Non-Settlement Alternatives 2 and 3A), it is estimated that more reclaimed water would be used for turf facilities than for the other alternatives (see tables of Summary of Projected Water Uses for Each Entity in Appendix C for estimated differences in effluent reuse by alternative).

**FIGURE III-11**  
**CAP Allocation Draft EIS**  
**Comparison of Groundwater Level Impacts in Year 2051 in TID to Change in Total Excess CAP Water**



### **III.B.4.m. Colorado River Mainstem**

Under the No Action, Settlement, and Non-Settlement Alternative 1, no change in the diversion pattern off of the Colorado River would occur from the current practice of full CAP diversion at Parker Dam. Therefore, no impacts to the Colorado River mainstem would occur.

Under Non-Settlement Alternatives 2 and 3, 13,500 afa for the Navajo Nation and Hopi Tribe would likely be diverted from Lake Powell. This diversion is estimated to lower the Colorado River water surface between Lake Powell and Lake Mead less than 0.02 inch and the impacts are considered *de minimis*.

### **III.B.5. Summary of Water Resources Impacts**

Groundwater level impacts for entities considered in this analysis are summarized in Table III-1. The values shown for the Settlement and Non-Settlement Alternatives are the differences in estimated groundwater levels in year 2051 for each alternative relative to the No Action Alternative.

The groundwater level impacts for many of the entities are less than 25 feet, and are not considered to be of any particular relevance, recognizing the 50-year length of the analysis period, and the uncertainties involved in projecting conditions over that period of time. Even the groundwater level impacts which exceed 25 feet (which are shaded in Table III-1) are of limited importance. In no sub-area under any alternative is the magnitude of groundwater level decline by year 2051 large enough to substantially limit the ability of any entity to physically recover groundwater. The relatively small groundwater level impacts also indicate that none of the alternatives would substantially impact the ability to achieve safe yield in the AMAs. The increased costs associated with pumping at greater depths are generally small in relation to the costs of developing alternative water supplies for M&I use.

Potential subsidence impacts would generally reflect the groundwater level impacts summarized in Table III-1. Positive groundwater level impacts (i.e., groundwater levels higher than under the No Action Alternative) would result in reduced potential for subsidence, while negative groundwater level impacts (groundwater levels lower than under the No Action Alternative) would result in increased potential for subsidence.

A significant factor in the relatively small groundwater level impacts experienced under all alternatives is the availability of substantial amounts of excess water during the early years of the analysis. This excess water availability means that many entities which do not get CAP allocations would have continued access to CAP through the Ag Pool or Recharge Pool. Larger groundwater level impacts would be anticipated if either the contracted CAP water were fully used (thus reducing the amount of excess water available), or if different assumptions were made as to the distribution of the excess water.

Table III-1  
CAP Allocation Draft EIS  
Groundwater Impacts<sup>1</sup> in Year 2051 for All Entities  
(in units of feet unless otherwise noted)

ENTITIES	SETTLEMENT ALTERNATIVE	NON-SETTLEMENT ALTERNATIVE 1	NON-SETTLEMENT ALTERNATIVE 2	NON-SETTLEMENT ALTERNATIVE 3A	NON-SETTLEMENT ALTERNATIVE 3B
<b>M&amp;I ENTITIES</b>					
Arizona Water Company – Apache Junction	3	4	-5	-8	-4
AVRA Water Cooperative	-6	-3	-5	-5	-6
Cave Creek Water Company	58	58	0	0	58
City of Chandler	14 to 38	7 to 18	-11 to -14	-24	-4 to -16
Chaparral City Water Company	20	20	0	0	20
Community Water Company of Green Valley	25	3	21	21	24
City of El Mirage	-62	-11	-21	-49	-36
City of Glendale	-43 to -80	1 to -11	-9 to -21	-33 to -57	-30 to -51
City of Goodyear	-1 to -81	5 to -11	-3 to -21	-4 to -57	0 to -51
H2O Water Company	-62	8	-75	-71	-44
City of Mesa	-8 to 14	-9 to 13	-10 to -33	-21 to -38	-19 to -34
Metropolitan Domestic Water Improvement District	30 to 37	27 to 32	-1 to 2	-1 to 2	28 to 36
Town of Oro Valley	14 to 30	12 to 27	0 to -1	0 to -1	13 to 28
City of Peoria	-4 to -43	1 to 11	-5 to -9	-13 to -14	2 to -30
City of Phoenix	6 to -43	2 to -11	0 to -9	-1 to -33	0 to -30
City of Scottsdale	6 to -21	2 to -18	0 to -8	-1 to -28	0 to -48
Town of Superior/Arizona Water Company-Superior	-44	-12	-47	-41	-39
City of Surprise	-4 to -80	-10 to 11	-5 to -21	-14 to -57	2 to -51
City of Tucson	4 to 42	0 to 30	3 to 11	3 to 11	3 to 41
Vail Water Company	13	4	8	8	12
Valley Utilities Water Company	-62	-11	-21	-49	-36
<b>NIA ENTITIES</b>					
Central Arizona Irrigation and Drainage District	7	0	-5	9	-5
Chandler Heights Citrus Irrigation District	-62	8	-75	-71	-44
Maricopa-Stanfield Irrigation & Drainage District	0 to -6	0 to 1	-6 to -7	12	-17 to -22
New Magma Irrigation and Drainage District	-63	-27	-78	-67	-67
Queen Creek Irrigation District	-62	8	-75	-71	-44
Roosevelt Irrigation District	0 to -6	0 to 5	0 to -3	0 to -9	0 to -3
San Carlos Irrigation and Drainage District	9 to 29	0 to -4	-1 to -11	-1 to 12	-12 to -6
San Tan Irrigation District	-62	8	-75	-71	-44
Tonopah Irrigation District	-41	-17	-23	-26	-27
<b>INDIAN ENTITIES</b>					
Gila River Indian Community	-26 to -8	-2 to 4	-8 to -2	-25 to -3	-22 to -4
Hopi Tribe and Navajo Nation (change in groundwater storage in af)	0	0	675,000	675,000	675,000
San Carlos Apache Tribe	0	0	0	0	0
Tohono O'odham Nation	4 to 83	0 to 7	3 to 73	3 to 73	3 to 81

(1) Impacts are computed as No Action groundwater level minus groundwater level for action alternative.

The largest groundwater level impacts were associated with areas that have significant direct recharge. These impacts reflect in part that there is a relatively large pool of water for recharge, and that the Recharge Pool has a relatively low priority. The different allocations under the various alternatives particularly affect the size of the Recharge Pool with its lower priority for CAP water. Another factor is that the direct recharge operations tend to result in a relatively intense impact, with large amounts of water being recharged within a limited area. These factors generally account for the substantial impacts in the vicinity of GRUSP in the East Salt River Valley, and the Agua Fria and future westside facilities in the West Salt River Valley. While not driven by the size of the CAP Recharge Pool, direct recharge of CAP water on the San Xavier District of the Tohono O'odham Nation and direct recharge of M&I allocations in direct recharge facilities in the Tucson and Avra Valley areas is also a reflection of the impact of concentrated recharge in a limited geographic area.

For many areas, the demands met are the same for all alternatives, so that the groundwater level impacts are a relatively direct measure of the total impacts of the alternative. However, there are some entities in which the demands differ among alternatives. For example, there are declines in cropped acres for NIA entities that can differ among the various alternatives, reflecting both changing land use (i.e., urbanization) and reductions in cropping due to economic considerations. Those changes in demand can influence the estimated groundwater level impacts. There is a similar situation for the estimated groundwater level impacts on GRIC. The demands can vary among the alternatives, and the assumed portfolio of supplies (in particular the amount of groundwater pumping) used to meet those demands can vary.

### **III.C. SOCIOECONOMIC RESOURCES**

#### **III.C.1. Introduction**

This section summarizes the socioeconomic impacts of the proposed CAP allocation on the NIA, Indian, M&I, and power generation sectors. These impacts include NIA lands going out of production and the consequent impacts on the regional economy, Indian lands coming into agricultural production, the cost to the M&I sector of obtaining alternative water supplies to meet the demand of expected population increases, and potential reduced power generation at Glen Canyon Dam.

This section also includes an analysis of CAP repayment and reviews the costs of Indian water rights settlement litigation. In addition, a review of the RRA of 1982 as it pertains to the proposed alternatives is presented in this section. The summary presented in this section focuses on the overall effects. More economic and geographic detail can be found in Appendix D.

#### **III.C.2. Impact Analysis Methodology**

##### **III.C.2.a. M&I Sector**

Every M&I entity receiving a CAP allocation under one or more of the proposed alternatives was analyzed to determine if the CAP allocation was likely to cause growth. Population projections combined with water use rates specific to each entity formed the basis of projected water demands. The populations projections used were developed by Arizona Department of Economic Security (ADES) independent of water supply availability. The projected water demands were compared to each entity's projected water supplies, as identified in their AWS applications and Water Resource Master Plans. An assessment was made as to whether the entities would be able to meet their projected demands in the absence of the proposed CAP allocation by using existing supplies or by developing alternative supplies. Appendix C provides more detail on the M&I water demand and supply analysis. The costs of developing other supplies to meet the projected demands absent any additional CAP water are estimated based on current costs of developing such supplies. The cost of using CAGR water as an alternative supply included the cost of pumping groundwater (energy, maintenance, and pump tax) and the cost of joining the CAGR (currently \$188 per af). The costs for the reuse of treated effluent incorporates the costs for building and operating a tertiary treatment facility as well as a secondary, non-potable, water distribution system. Where applicable, a discount rate of 6.875<sup>30</sup> percent was assumed and payments for municipal bonds were assumed over a 25-year period.

##### **III.C.2.b. NIA Sector**

There were six points in time considered in the analysis of the NIA sector impacts. These six points are as follows:

- ◆ 2001, the beginning of the 50-year study period;

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<sup>30</sup> 6.875 percent is the Federal discount rate for long term water projects.

- ◆ 2004, the beginning of the CAWCD's new agricultural water pricing and marketing program associated with the Settlement Alternative;
- ◆ 2017, the expected termination of the funding for the AWBA program and discontinuance of in-lieu water <sup>31</sup> available to irrigators;
- ◆ 2030, the end of CAWCD's current CAP agricultural water marketing and pricing program;
- ◆ 2043, the time when shortage conditions are assumed to exist on the Colorado River in which CAP deliveries decrease from 1.4 mafa under normal conditions on the Colorado River to 925,000 afa under shortage conditions; and
- ◆ 2051, at the end of the 50-year study period.

To project the magnitude and timing of potential changes to NIA production, the viability of representative crops was analyzed given water availability and costs under the proposed alternatives that were considered in this draft EIS. In this analysis, viability was determined by evaluating the difference between the revenues generated from specific crops and the variable costs of producing those crops, including water costs. When revenues are not sufficient to cover variable costs, it was assumed that the crop would no longer be produced.

This analysis highlights the effect of changes in water cost and availability on changes in irrigated agricultural land. The effects of changes in crop prices, non-water costs of agriculture, and other economic variables are muted by holding agricultural commodity prices and non-water costs constant. In particular, prices for crops were assumed to stay at recent levels in constant (inflation adjusted) dollars. Non-water production costs for crops were assumed to stay at levels estimated in University of Arizona crop budgets (in constant dollars<sup>32</sup>). Crop yields per acre were assumed to stay at recent (1993-1997) levels.

Groundwater pumping costs were based on historical pumping costs in each of the nine NIA districts that would be affected under one or more of the action alternatives, modified by the groundwater lifts estimated in the groundwater analysis (see Appendix I). Groundwater pumping costs vary greatly even within the NIA districts due to varying depths to the water table and due to variations in the use of gas and electricity to run the pumps. Groundwater pumping costs were estimated using the groundwater declines predicted by the groundwater model (see Appendix I). Pool One<sup>33</sup> CAP water prices were assumed to remain constant over the 50-year study period (in constant dollars) under all proposed alternatives. Pool Two and Pool Three prices are different than Pool One prices, but Pools Two and Three are available only in the early years of the 50-year study period. Details on water prices are provided in Appendix D.

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<sup>31</sup> As described in Chapter I, in-lieu water refers to surface water delivered to farmers, who use the surface water in-lieu of groundwater, which would otherwise be pumped.

<sup>32</sup> University of Arizona, College of Agriculture, Department of Agricultural and Resource Economics, *Arizona Field Crop Budgets 1999-2000* for various Counties, Extension Bulletins #AZ1121, #AZ1120, #AZ1118, #AZ1115; and *1998-99 Arizona Vegetable Crop Budgets* for various regions within the State, Extension Bulletins #AZ1103, #AZ1102.

<sup>33</sup> CAWCD currently has a structure of three Ag Pools (Pool One, Pool Two and Pool Three) with varying eligibility and pricing. More detail may be found in Appendix M.

Decreases in NIA production constitute the “first round regional economic impacts” of the alternatives. Over time these first round impacts would lead to subsequent rounds of regional economic impacts. For example, the first round impacts would lead to decreases in the purchase of farm inputs such as chemicals, machinery, and labor from within the three-County area (i.e. Maricopa, Pima and Pinal Counties). These decreases in turn would lead to decreases in purchases by suppliers of agricultural chemicals, sellers of agricultural machinery, manufacturers of agricultural machinery, and purchases by workers who otherwise would have earned income from farm work. These impacts on the three-County region were analyzed using IMPLAN, a regional economic impact model. Technical detail on the regional economic impact analysis and the IMPLAN model are found in Appendix D. The sum of the impacts over all rounds of regional economic repercussions is called the total regional economic impact in this draft EIS<sup>34</sup>.

### **III.C.2.c. Indian Sector**

In general, the economic analysis of impacts on the Indian sector was similar to the analyses completed for NIA users. Greater availability of CAP water supplies on some Indian Reservations is expected to lead to more land under cultivation. The impacts of bringing Indian lands into agricultural production were estimated assuming cropping patterns similar to those found in the NIA sector, as described in Appendix D. Crop yields and prices are assumed to be constant throughout the 50-year study period for all alternatives, as explained above. Regional economic impacts were also analyzed using the IMPLAN model. Crop yields and prices used in this analysis are from the same sources as used in NIA analysis.

### **III.C.2.d. Power Generation Sector**

The economic impact of reducing water through the turbines at Glen Canyon Dam was analyzed by estimating lost power production at Glen Canyon and assuming that the lost power would be replaced by more expensive spot market energy purchases and associated transmission service. It was assumed that water allocated to the Navajo Nation and Hopi Tribe under Non Settlement Alternatives 2 and 3 would be diverted from Lake Powell and would occur at a constant rate of 20 cubic feet per second (cfs). More detail on the methodology may be found in Appendix J.

### **III.C.2.e. CAP Repayment**

The allocation of CAP water to various users over the repayment period is an important determinant of the repayment obligation assigned to CAWCD for the CAP’s construction. In the draft EIS, the proposed alternatives represent varying allocations of CAP water to different uses. Different water allocations result in different financial obligations. Therefore, a cost allocation and repayment analysis was conducted for each scenario. The full cost allocation model was not

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<sup>34</sup> Regional economists usually call the first round regional economic impact the “direct impact.” Subsequent rounds of impacts are usually called “indirect and induced impacts.” The discussion in Appendix D uses these terms, but for clarity for the non-technical reader, and to maintain consistency with the definition of direct and indirect impacts presented in the Introduction to Chapter 3, this chapter uses the terms first round and subsequent round regional economic impacts.

employed; instead, a spreadsheet approximation on Excel software, known as the “mini-model,” closely approximates the results of the more detailed official model for cost allocations. This model is discussed in more detail in Appendix K.

### **III.C.2.f. RRA**

The analysis of the relationship between the RRA and the proposed alternatives was conducted by reviewing the relevant portions of the statute in light of the provisions of the Settlement Alternative.

### **III.C.2.g. Indian Water Rights Settlement Litigation Costs**

The costs of litigating water rights claims were taken from a Memorandum prepared by the Chairman of the Steering Committee for Gila River Adjudication dated October 22, 1993<sup>35</sup>. Although this Memorandum is an incomplete record of costs associated with the adjudication, which began about 20 years prior to the preparation of the Memorandum, it provides a rough guide as to the magnitude of resources put toward a litigation approach to resolving conflicting water rights claims.

### **III.C.3. Affected Environment**

#### **III.C.3.a. M&I Sector**

Current cost for CAP water treated to potable standards is estimated to be approximately \$154 per af, as shown in Appendix L.

#### **III.C.3.b. NIA Sector**

In 1997, farming and agricultural services accounted for \$1.934 billion of the State’s gross state product<sup>36</sup>. Also in 1997, farming and agricultural services accounted for \$881 million in compensation to employees<sup>37</sup>. However, Arizona is predominantly a non-agricultural state. Total gross state product in 1997 was \$121.2 billion and total compensation of employees was \$69.2 billion. Figure III-12 shows the distribution of gross state product by sector in 1997. Manufacturing, trade, services, and government are all large components of the Arizona economy. The sector labeled FIRE is the Finance, Insurance, and Real Estate sector. Additional discussion of agriculture is included in the Land Use section of this chapter.

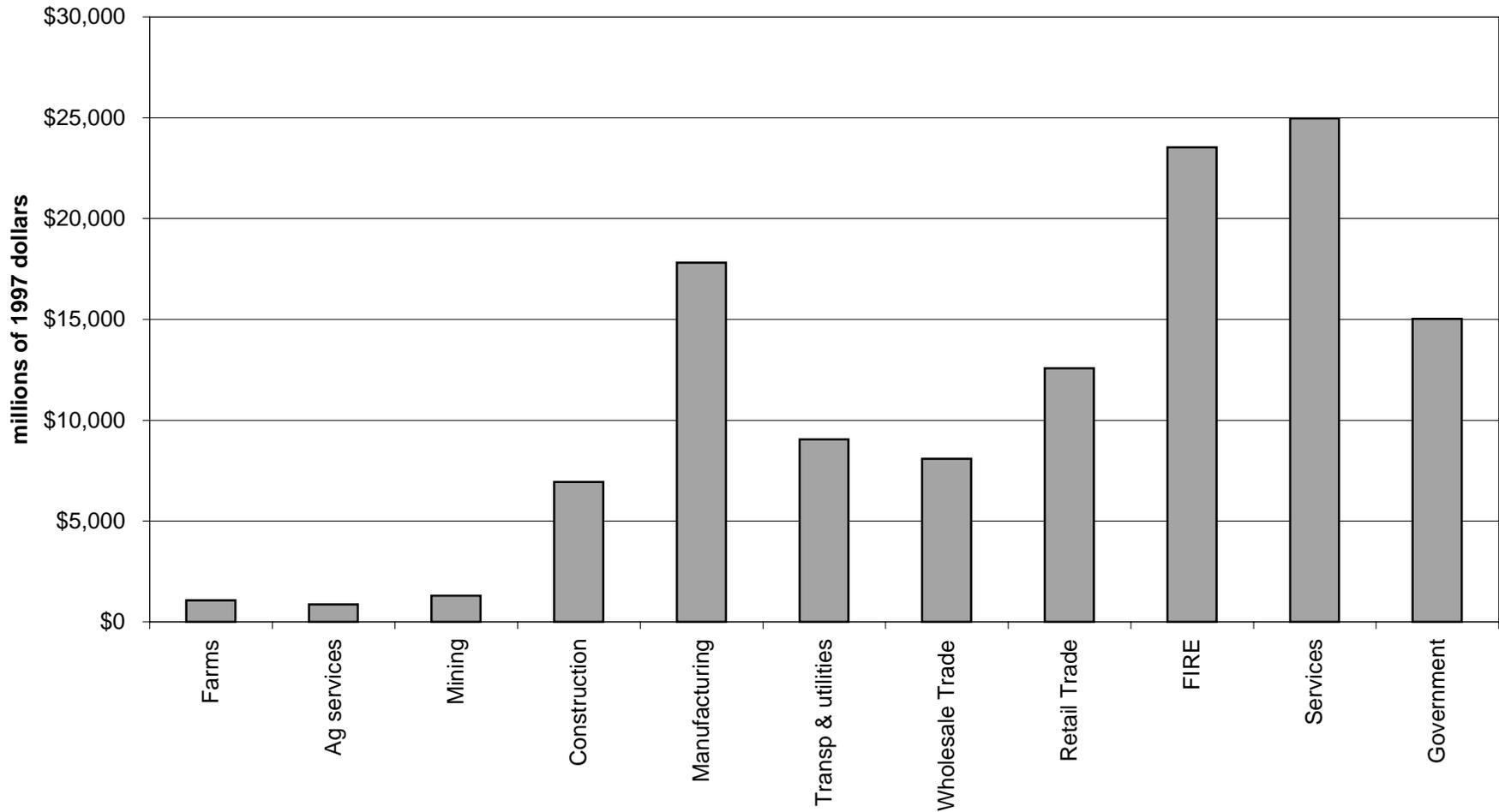
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<sup>35</sup> Memorandum to the Steering Committee, Gila River Adjudication.

<sup>36</sup> Data are from the Bureau of Economic Analysis. Gross state product is the sum value added originating in all industries in the state. Value added is gross output (sales or receipts and other operating income, commodity taxes, and inventory change) minus intermediate inputs (consumption of goods and services purchased from other U.S. industries or imported).

<sup>37</sup> Bureau of Economic Analysis.

**Figure III-12**  
**CAP Allocation Draft EIS**  
**1997 Arizona Gross State Product by Sector**  
**Total = \$121,239 million**



### **III.C.3.c. Indian Sector**

Additional Indian agricultural activity resulting from proposed allocations would increase incomes for a population that generally experiences low income<sup>38</sup> and high unemployment rates. For those Indian Tribes receiving priority CAP water for M&I use, i.e., the Navajo Nation and Hopi Tribe, water costs may decrease, thereby making economic development more attractive. Figure III-13 shows the 1999 average unemployment rates by Reservation according to data compiled for the Arizona DES. All the Reservations shown in the Figure had much higher unemployment rates than the state as a whole.

### **III.C.3.d. Power Generation**

Lake Powell is behind Glen Canyon Dam, and water from Lake Powell flows through turbines at Glen Canyon Dam to generate electricity. An allocation to the Navajo/Hopi Reservations could result in withdrawal of about 13,500 afa from Lake Powell. Water withdrawn from Lake Powell would not flow through the hydroelectric turbines and some electric generation would, therefore, be foregone.

### **III.C.3.e. CAP Repayment**

In 1998, Reclamation revised the Interim Final Cost Allocation for the CAP for Stages I and II, dated December 1996. The date of the revised cost allocation, also known as Revised CASII, is September 1998. Revised CASII is the latest official cost allocation of the CAP. Under Revised CASII, the estimated repayment obligation assigned to CAWCD is \$2,182,532,000.

### **III.C.3.f. RRA**

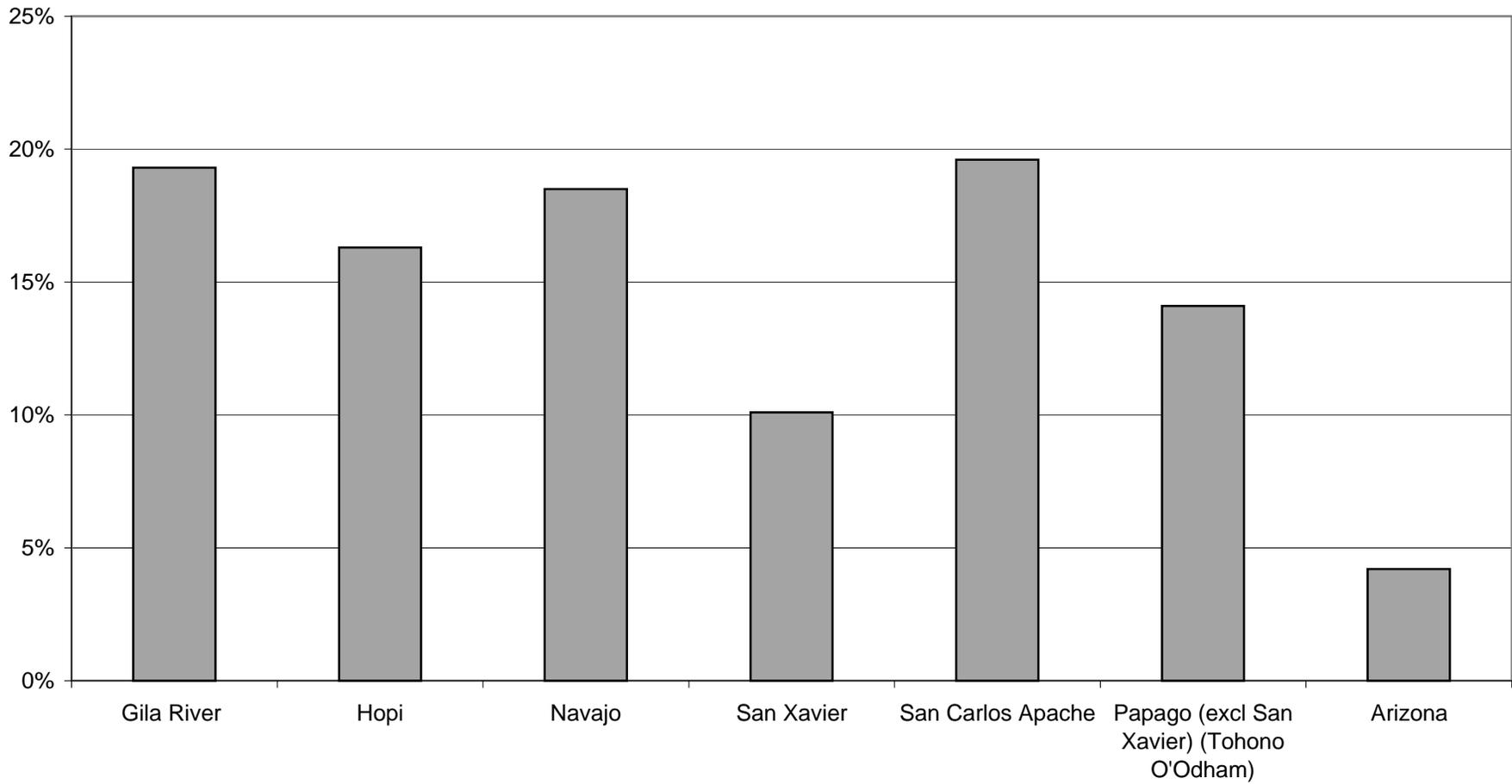
With the RRA (PL 97-293, 96 Stat. 1261, Title II, as amended), Congress broadened Reclamation's empowerment from building and managing waterworks on the supply side, to ensuring Federal water was being put to reasonable and beneficial use on the demand side<sup>39</sup>. The RRA addresses the ownership and leasing of land in Reclamation irrigation projects and the pricing of project irrigation water. It further establishes terms and conditions for the delivery of project irrigation water. The RRA imposes ownership and pricing limitations on districts that have a contract with Reclamation. Landholders are required to certify or report their landholdings as part of their compliance with the RRA. Each year, irrigation districts (IDs) must summarize these certifications and reporting forms and provide the information to Reclamation, which oversees the districts' implementation of the RRA rules and regulations. The RRA limits benefits from Reclamation projects to participants in those projects.

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<sup>38</sup> 1990 Census data for Indian Tribes clearly indicate lower incomes per capita, per household, and per family for Indians relative to the general population.

<sup>39</sup> This description is taken from Reclamation's web site 209.21.235/documents/index.htm.

**Figure III-13**  
**CAP Allocation Draft EIS**  
**1999 Unemployment Rates:**  
**Indian Reservations and State of Arizona**  
Source: Arizona DES



With regard to CAP water, the RRA imposes the following:

- ◆ Land that exceeds a landowner's maximum ownership entitlement (excess lands) cannot receive CAP irrigation water (except surplus water in certain circumstances) at any price;
- ◆ Lands ineligible for other reasons may not receive any CAP water at any price;
- ◆ Land leased over 960 acres or owned by limited recipients (entities benefiting more than 25 natural persons) under most circumstances may receive CAP water at the full cost rate;
- ◆ The full cost rate of CAP water is required for delivering CAP water to ineligible lands (this would make CAP water costs sufficiently high such that its use for agriculture on ineligible lands would be economically prohibitive).
- ◆ Groundwater delivered through the CAP distribution system requires a commingling contract and is subject to a commingling fee; MSIDD and CAIDD have commingling agreements.

Commingled water is groundwater delivered via a federally-funded distribution system and is not Reclamation irrigation water. Commingled water may be delivered to CAP ineligible lands. The commingling fee is equal to the Federal interest subsidy for the proportion of the irrigation distribution system facilities used to deliver commingled water. Otherwise, irrigation districts pay no interest on their federally-funded water distribution system loans. Over the period 1989 through 1997, the CAIDD took 140,230 af of commingled water at a cost of \$562,323<sup>40</sup>. Over the same period, the MSIDD took 398,222 af of commingled water at a cost of \$1,478,291.

Currently, in the CAP there are approximately 38,258 acres of excess land. Excess is defined as nonexempt land that is in excess of a landowner's maximum ownership entitlement under the applicable provisions of Federal reclamation law. Excess land by irrigation district is shown in Table III-2.

The majority of these lands could be made non-excess and eligible for project water under Reclamation's sale price approval process. If a landholder has purchased land that has been designated excess by the previous owner and these lands would fit in the new owner's 960-acre entitlement, they can be made eligible through this sales price approval process.

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<sup>40</sup> Represents commingling fee only. CAIDD had additional costs to pump the water that are not included in this cost.

<b>Irrigation District</b>	<b>Excess Land (acres)</b>
Chandler Heights Citrus ID	67
CAIDD	11,067
Harquahala ID	12,722
HIDD	1,049
MSIDD	10,200
New Magma IDD	2,439
Queen Creek ID	585
San Tan ID	78
Tonopah ID	51
Total	38,258

IDs and other parties contend that the RRA does not coincide with the goals of the CRBPA and the State of Arizona GMA of 1980, to use CAP water to decrease groundwater pumping. They contend that the RRA discourages the use of CAP water and, therefore, encourages the use of groundwater, which the CAP was meant to limit.

### **III.C.3.g. Indian Water Rights Settlement Litigation Costs**

On October 22, 1993, The Chairman of the Steering Committee for Gila River Adjudication assessed the costs of Indian water rights settlement litigation costs<sup>41</sup>. The 1993 review identified the following costs associated with the adjudication of Indian water rights:

- ◆ The United States had spent about \$16 million on the Gila River Adjudication since 1974.
- ◆ The ADWR and its predecessor agencies had spent between \$20 million and \$25 million.
- ◆ The Arizona State Lands Department (ASLD) had spent \$7 million.
- ◆ Four municipalities had spent about \$4 million.

The total costs through 1993 also included costs incurred by mines, utilities, IDs, water association, water companies and others, but cost data were not available.

The Chairman of the Steering Committee concluded that “Significant expenditures by all parties will continue into the future and can be expected to increase significantly as litigation begins in earnest.”

<sup>41</sup> Memorandum to the Steering Committee, Gila River Adjudication.

### **III.C.4. Environmental Consequences**

#### **III.C.4.a. M&I Sector**

All of the M&I entities potentially receiving a CAP allocation are estimated to be able to meet their projected demands, with or without the additional CAP allocation. (See Appendix C.)

##### **III.C.4.a.(1) No Action Alternative**

For all the M&I entities evaluated, the projected demands were estimated to be met through the development of alternative water supplies, including joining the CAGR and treating and using reclaimed water. These alternative supplies, however, would be more costly than using the proposed CAP allocations. For example, treated CAP water costs are approximately \$154 per af, joining the CAGR costs approximately \$214 to \$301 per af (depending on the depth to groundwater), and reclaiming effluent for use on turf facilities costs approximately \$237 per af (this cost includes a secondary distribution system). Within reason, M&I water demand is relatively insensitive to water rates and it is recognized that increased water costs would likely be passed on to consumers via rates, resulting in potentially decreased spending on household discretionary items such as recreation. These secondary impacts were not quantified. Specific M&I water-related construction projects were also not quantified for inclusion in the IMPLAN model. Entity specific details may be found in Appendix L.

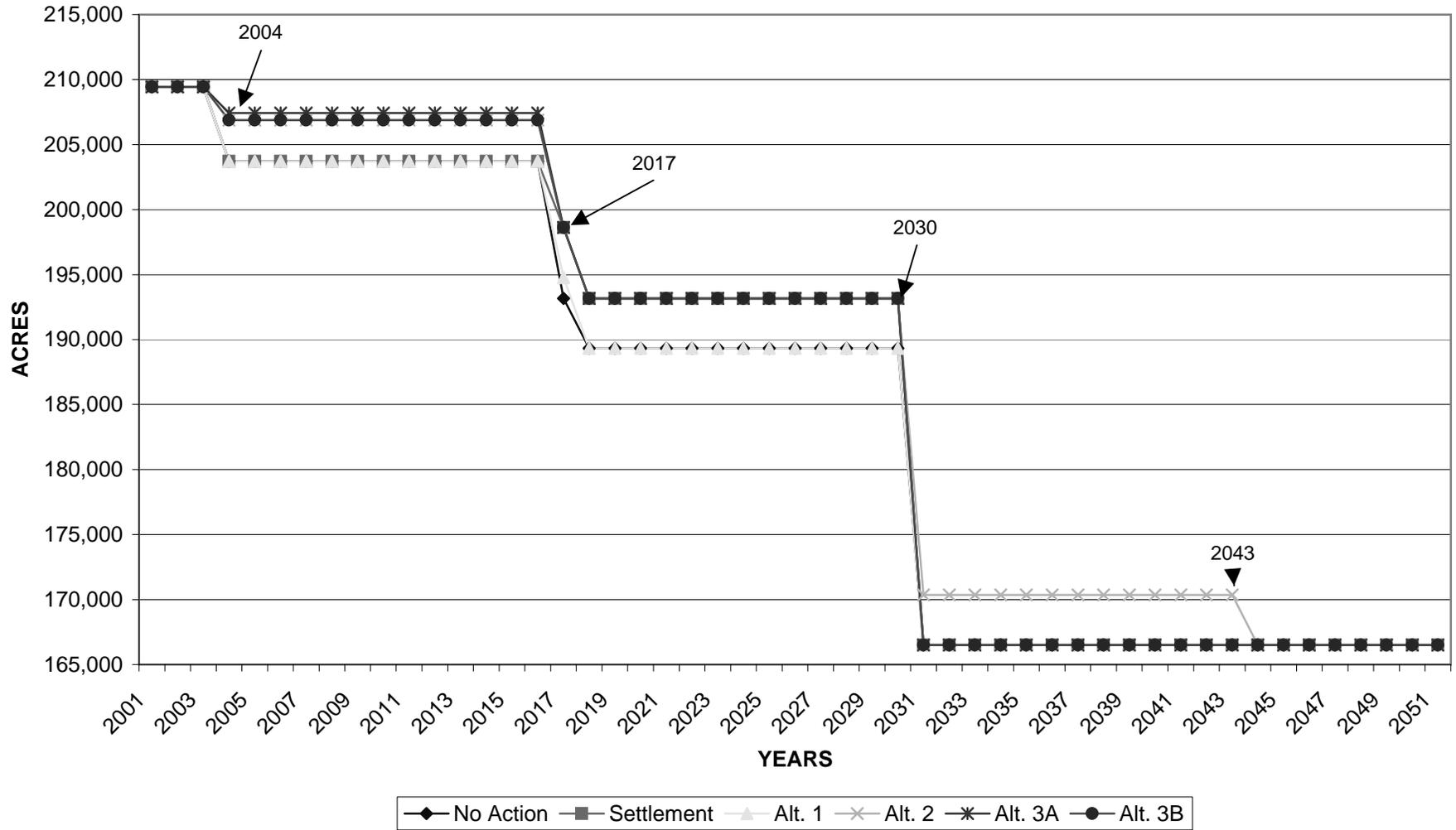
##### **III.C.4.a.(2) Settlement and Non-Settlement Alternatives**

Under the Settlement Alternative, Non-Settlement Alternative 1 and Non-Settlement Alternative 3B, the cost of water would be less than under the No Action Alternative, since the M&I entities would receive a CAP allocation and would have less of a need to develop alternative water supplies. Non-Settlement Alternative 2 and Non-Settlement Alternative 3A would be the same as under the No Action Alternative.

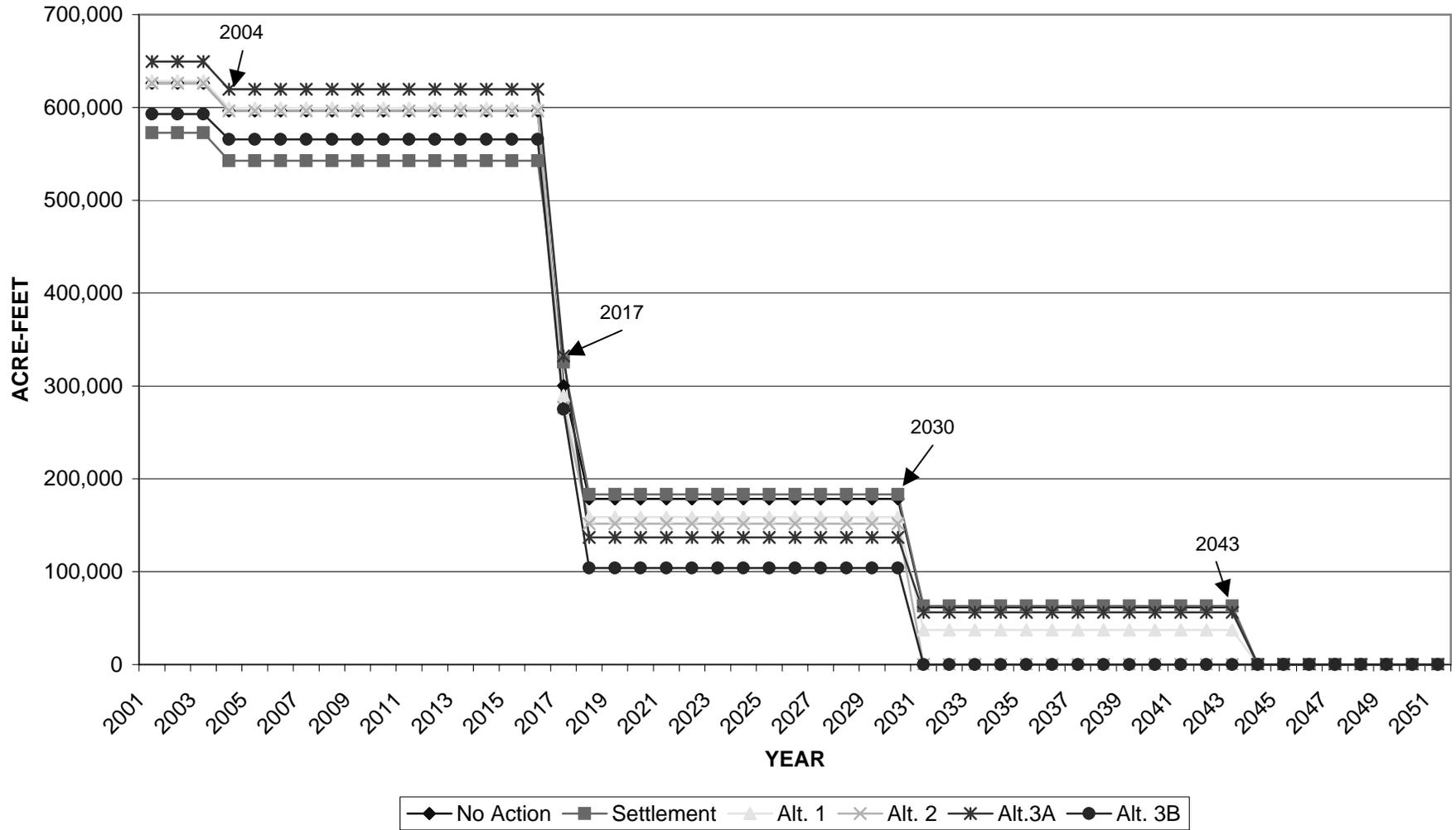
#### **III.C.4.b. NIA Sector**

Forecasts were made of NIA acreage changes over the 50-year study period, and the corresponding groundwater and CAP water usage for all of the alternatives, including the No Action Alternative. The results are shown in Figures III-14 through III-16. NIA CAP water use in Figure III-15 includes use of in-lieu water. Where acreage would diminish over time, the decrease pertains to those crops whose production is highly sensitive to water costs, such as forage and grains. The acreage of other crops, such as vegetables, melons, and citrus, which are not as sensitive to water prices, is not expected to decrease over the 50-year study period. The production of vegetables, fruit, or other high value crops is restricted by the size of the national market. Presently, farmers in central Arizona are producing high value crops to the maximum extent that markets will bear, based upon an evaluation of specialty crop acreages farmed in Arizona over the past 20 years. Therefore, there appears to be no opportunity to substantially increase specialty crops acres as more traditional field crop acres decrease.

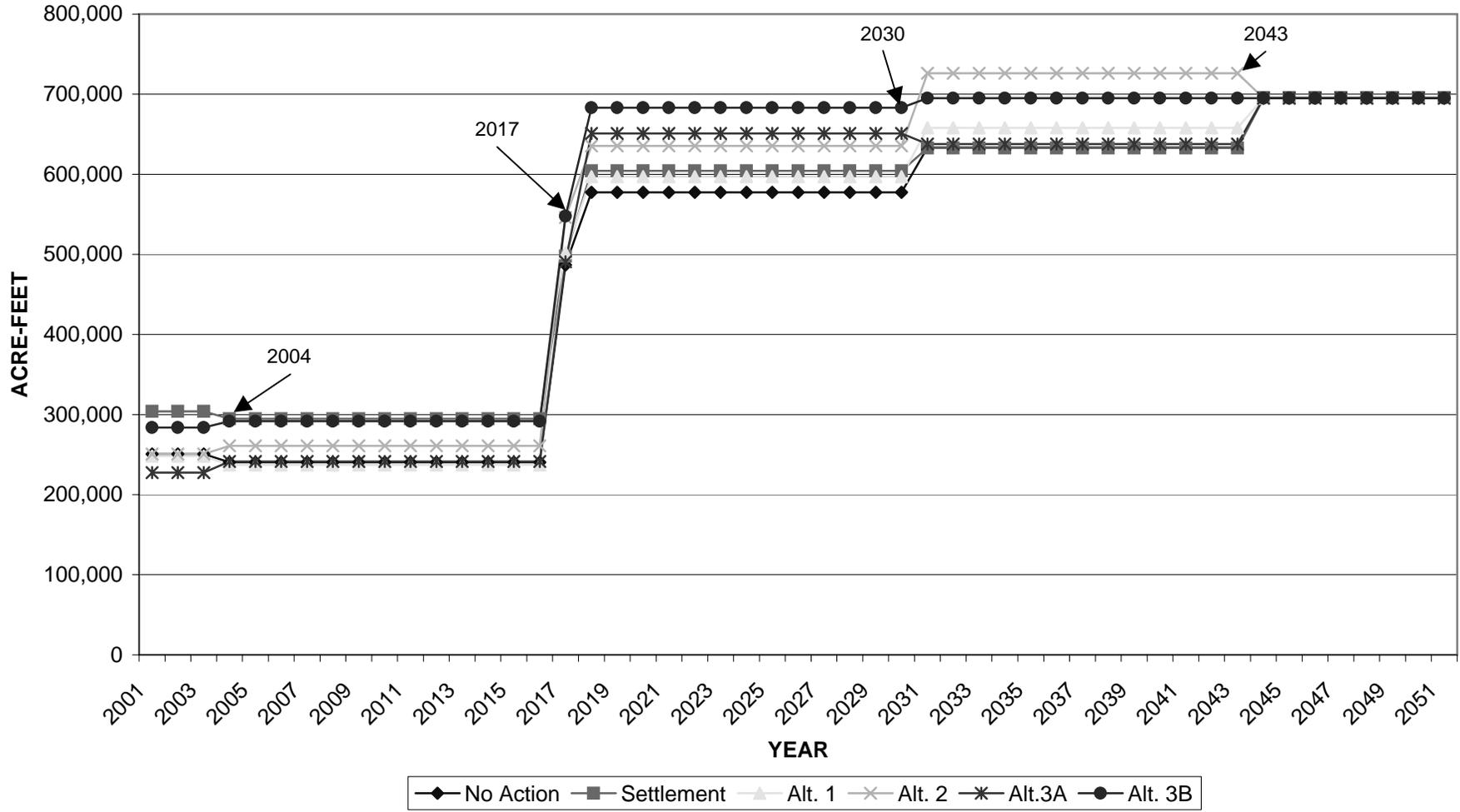
**Figure III-14  
CAP Allocation Draft EIS  
NIA Irrigated Acreage**



**Figure III-15  
CAP Allocation Draft EIS  
NIA CAP Water Use**



**Figure III-16**  
**CAP Allocation Draft EIS**  
**NIA Groundwater Use**



Agricultural acreage is expected to decline as CAP water diminishes over time, leaving farmers with a choice of using more groundwater or retiring the land. It is assumed groundwater would be used as long as its cost does not make farming a particular crop uneconomical. Rising groundwater costs in some districts would render some crops uneconomical and the analysis indicates that those crops would no longer be grown. As a result, NIA acreage would decline.

The acreage farmed, groundwater, and CAP water patterns are interrelated. Overtime, NIA acreage would decline due to decreasing availability of CAP water. The cost to use groundwater, a substitute for CAP water, would increase over time due to higher pumping costs. The higher water cost is expected to cause some crops to be taken out of production because the revenues from the sale of those crops would no longer cover the variable costs, including water costs, of producing those crops. Groundwater pumping costs vary from district to district so the effect of declining CAP water would not be spatially uniform. There would be no declines in agricultural acreage over time under any alternative in MSIDD, but there would be declines in acreage under all alternatives in the other districts. Details by district are presented in Appendix D.

For the nine NIA districts combined, the amount of farmed acreage and water use patterns would be similar under all alternatives. The underlying reason is the similarity in water availability under each action alternative. In every study year, the difference between the largest and smallest CAP NIA Ag Pool size across the alternatives is less than 80,000 af (including in-lieu water).

With regard to NIA acreage, the same amount of acreage would be farmed by all entities in 2001 under each action alternative. And, the amount of acreage that is farmed among the alternatives in 2051 would also be the same. In the intervening years, the No Action Alternative results in irrigated acreage as low as under any action alternative.

With regard to CAP water availability (including in-lieu water use), among all the alternatives, the Settlement Alternative would result in less CAP water availability for NIA uses in the early years. However, for the 50-year period, the Settlement Agreement would result in CAP water availability for NIA use that is the highest among the alternatives.

Finally, with regard to groundwater consumption, the Settlement Alternative would result in the highest groundwater use of any action alternative in 2001 and 2004. In 2017 and 2030, groundwater usage under the Settlement Alternative is expected to fall in the middle of the range of alternatives. In 2043, the Settlement Alternative would result in the lowest groundwater use of any alternative.

First round regional economic impacts of declining NIA production are displayed in Table III-3 in terms of changes in output. These impacts reflect only the decreases in agricultural output consistent with the decreases in NIA acreage described above. In general, NIA exhibits negative first round regional economic impacts because agricultural acreage is expected to decline. These first round regional economic impacts associated with the NIA sector are greatest under the Settlement Agreement and often (but not always) smallest under the No Action Alternative. Total regional economic impacts are discussed below in the section on the Indian sector.

<b>Table III-3</b>					
<b>CAP Allocation Draft EIS</b>					
<b>First Round Economic Impacts on Three-County Area</b>					
<b>NIA</b>					
<b>Millions of dollars worth of changes in output (2,000 dollars)</b>					
<b>Year</b>	<b>Settlement Alternative</b>	<b>Non-Settlement Alternative 1</b>	<b>Non-Settlement Alternative 2</b>	<b>Non-Settlement Alternative 3A</b>	<b>Non-Settlement Alternative 3B</b>
2001	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2004	-\$2.8	\$0.0	\$0.0	\$0.0	\$0.0
2017	-\$3.5	-\$0.5	-\$1.9	-\$1.9	-\$1.9
2030	-\$10.0	-\$4.3	-\$8.4	-\$10.0	-\$16.8
2043	-\$10.0	-\$8.4	-\$10.0	-\$10.0	-\$10.0
2050	-\$5.1	-\$1.6	\$0.0	\$0.0	\$0.0

### **III.C.4.b.(1) No Action Alternatives**

Under the No Action Alternative, the amount of land farmed in the NIA sector would decline about 43,000 acres over the period 2001 to 2051. The dollar value of the expected decline in NIA activities (first round impacts only, in 2000 dollars) would be \$23.6 million in the year 2051. In 1997, the value of all farm sales in Arizona was \$1.9 billion<sup>42</sup>, so the decline, while locally important, would be a small fraction of agricultural activity Statewide. Forecasts for individual NIA districts can be found in Appendix D.

### **III.C.4.b.(2) Settlement and Non-Settlement Alternatives**

Under the action alternatives, it is anticipated the decline in NIA acreage, comparing year 2001 and year 2051, would be the same as under the No Action Alternative. However, the rates of decline vary among the alternatives. (See Appendix D for district specific forecasts.)

### **III.C.4.c. Indian Sector**

#### **III.C.4.c.(1) No Action Alternative**

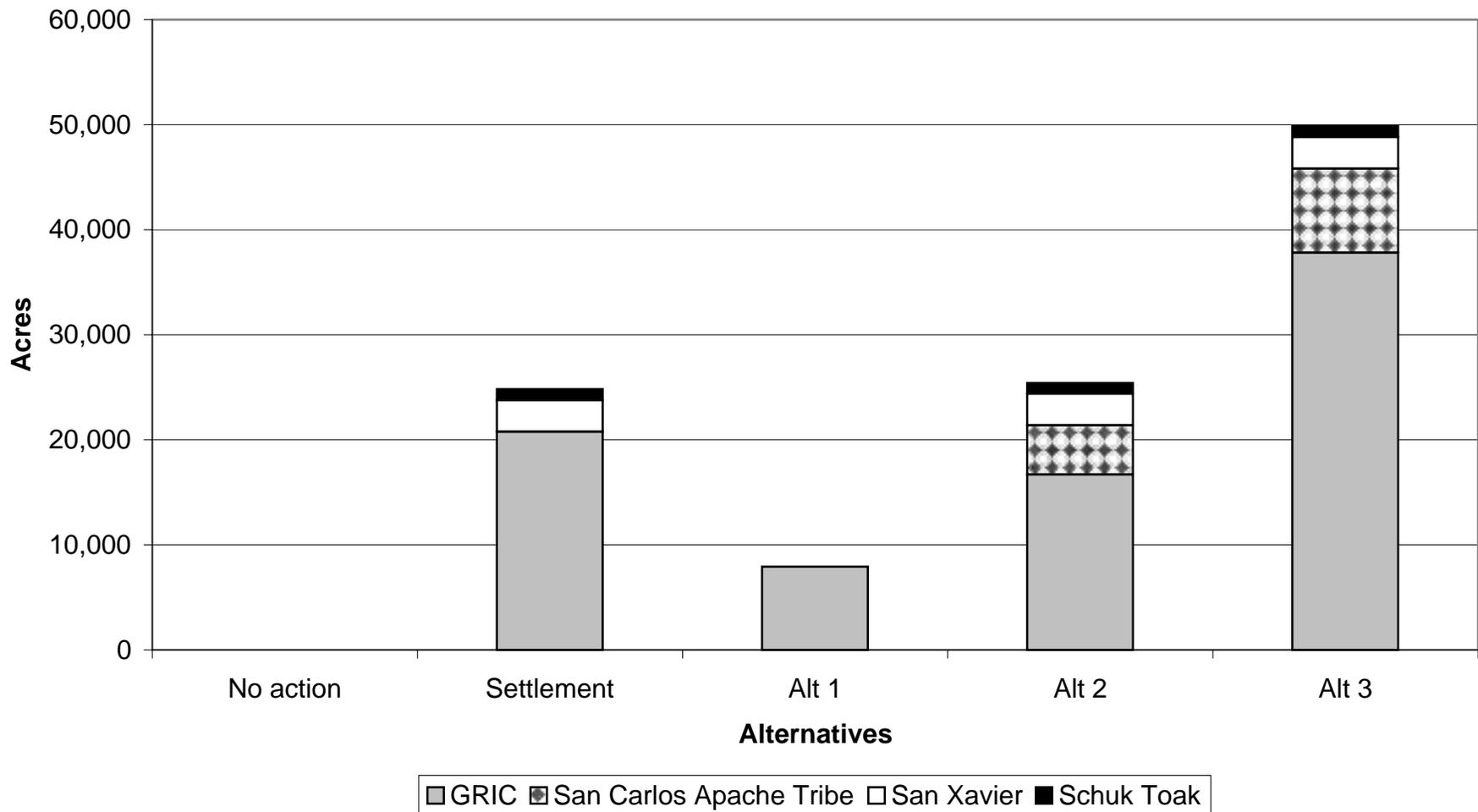
The No Action Alternative represents the baseline for the draft EIS. Detailed forecasts of the amounts of acreage farmed on Indian lands are provided in Appendix D. Under the No Action Alternative, allocation of CAP water to the Navajo/Hopi for M&I uses would not occur.

#### **III.C.4.c.(2) Settlement and Non-Settlement Alternatives**

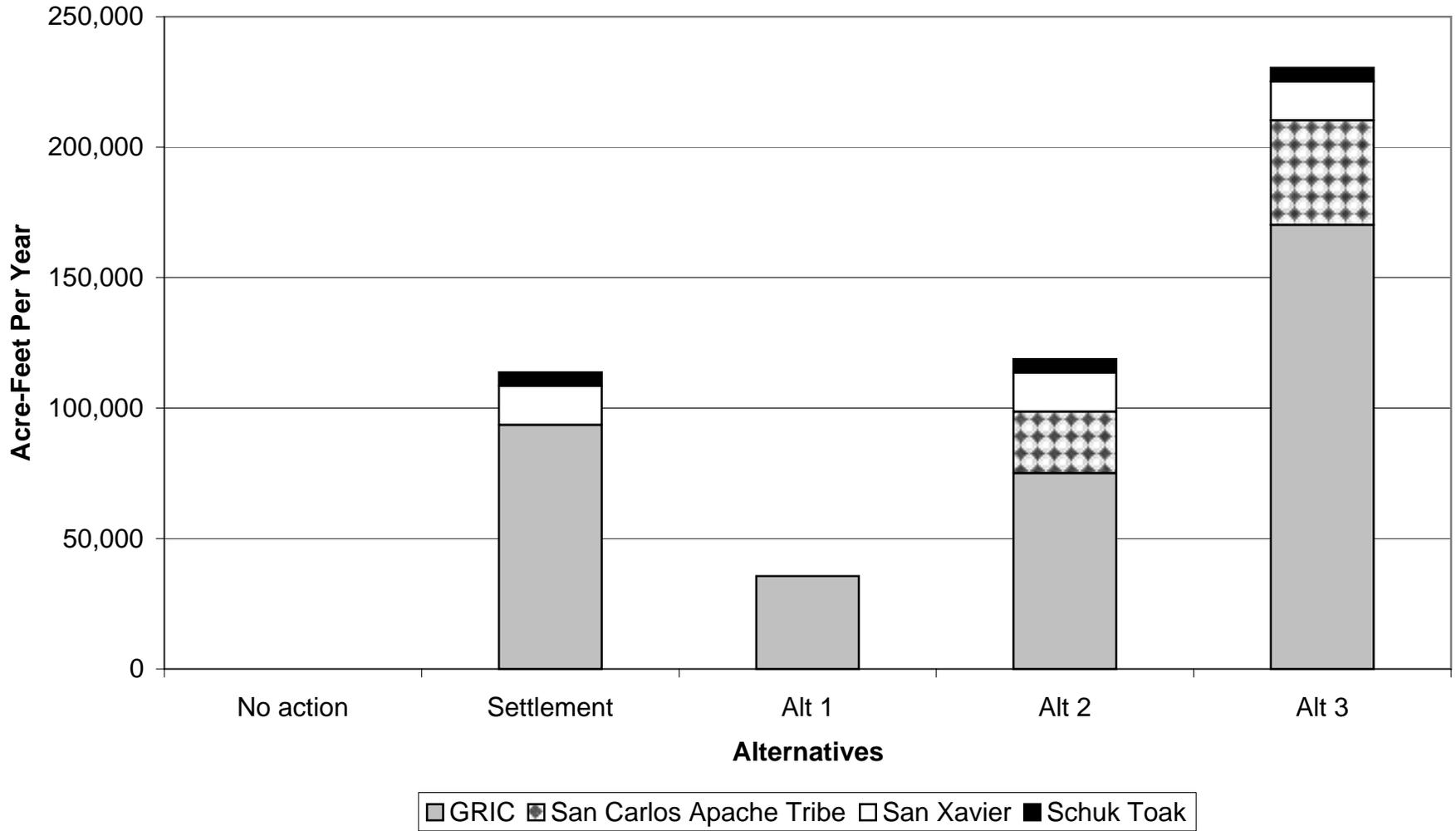
Figures III-17 and III-18 indicate incremental increase in Indian agriculture acreage and associated CAP water use at the time of build-out for Indian agricultural activities, relative to the No Action Alternative. As stated later in this section, the GRIC and TON would all be developed for agriculture by the year 2040. These figures report only the impacts attributable to changes in CAP allocations and do not include changes due to other water supply usage.

<sup>42</sup> 1997 Census of Agriculture, Arizona, Table 2.

**Figure III-17**  
**CAP Allocation Draft EIS**  
**Incremental Indian Agricultural Acreage at Build-Out Attributable to CAP Allocations**



**Figure III-18**  
**CAP Allocation Draft EIS**  
**CAP Water Usage for Indian Irrigation at Build-Out**



Under every action alternative, the largest impact is on the GRIC. Non-Settlement Alternative 1 results in the least amount of agriculture being developed of all the alternatives except the No Action Alternative. Non-Settlement Alternative 3 results in the greatest amount of land used for agriculture for the GRIC and the SC Apache Tribe.

In addition to the impacts on Indian agriculture shown in the figures, Non-Settlement Alternatives 2 and 3 provide for withdrawal of about 13,500 afa from Lake Powell for M&I use on the Navajo/Hopi as delivered via pipeline.

First round regional economic changes due to increasing agricultural production on the Indian lands are displayed in Table III-4 in terms of changes in output. More detail can be found in Appendix D. The first round impacts on the three-County area consist of the changes in the value of Indian agricultural output relative to current levels of output. Indian agriculture exhibits positive first round regional economic impacts on the region because agricultural acreage is expected to increase. First round regional economic impacts associated with the Indian sector are greatest under Alternative 3 and smallest under the No Action Alternative.

	<b>Settlement Alternative</b>	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3A</b>	<b>Alternative 3B</b>
2001	\$0	\$0	\$0	\$0	\$0
2004	\$0	\$0	\$0	\$0	\$0
2017	\$0	\$0	\$0	\$0	\$0
2030	\$32.4	\$7.6	\$18.3	\$50.1	\$50.1
2043	\$32.4	\$7.6	\$18.3	\$50.1	\$50.1
2050	\$32.4	\$7.6	\$18.3	\$50.1	\$50.1
Source: Reclamation calculations					

As Indian lands are converted to agricultural use, water distribution systems would need to be constructed. Table III-5 shows the impacts on output, employment and income of constructing Indian distribution systems for those study years during which construction is expected to occur. The Federal expenditures for Indian distribution systems are currently on-going and will continue through about 2012. The GRIC settlement currently contemplates an additional amount of \$200 million, disbursed at the rate of \$25 million annually for 2001 through 2008. This expenditure occurs only under the Settlement Alternative, and would be used for agricultural development on the Reservation.

	<b>Settlement Alternative</b>		<b>All Other Alternatives</b>	
	<b>First Round Impacts</b>	<b>Total Impacts</b>	<b>First Round Impacts</b>	<b>Total Impacts</b>
Construction Expenditures (million \$)				
◆ 2001	\$25.0	\$40.3	\$0	\$0
◆ 2004	\$25.0	\$40.3	\$0	\$0
Employment (jobs)				
◆ 2001	218	420	0	0
◆ 2004	219	421	0	0
Income (million \$)				
◆ 2001	\$8.8	\$17.1	\$0	\$0
◆ 2004	\$8.8	\$17.1	\$0	\$0
Source: Reclamation estimates				

#### **III.C.4.d. Power Generation Sector**

No water would be diverted from Lake Powell under the No Action Alternative, Settlement Alternative, and Non-Settlement Alternative 1, and no changes in power generation at the Glen Canyon Dam would occur.

Under Non-Settlement Alternative 2 and Non-Settlement Alternative 3A and 3B, there would be a withdrawal of 13,500 afa of water from Lake Powell for Navajo/Hopi M&I use. This withdrawal would reduce energy production at Glen Canyon Dam by about 7,148 megawatt hours (MWh) per year. (One MWh equals 1000 kilowatt hour (kWh)). Replacing this foregone energy production with spot market purchases and associated transmission services would cost about \$226,000 per year. This dollar amount is about 0.19 percent of the value of electric energy produced at Glen Canyon Dam annually. Over the 50-year study period, assuming the water diversions start in 2001, the present value of foregone energy production is \$7.8 million. Details on the analysis are presented in Appendix J.

#### **III.C.4.e. CAP Repayment**

CAP construction costs are costs allocated to non-Indian and Indian irrigation, commercial power, M&I water, fish and wildlife, recreation, and flood control. Changes in CAP water allocation do not significantly affect the allocation of costs to commercial power, fish and wildlife, recreation, and flood control. Changes in CAP water allocation do, however, impact the costs assigned to non-Indian and Indian irrigation and M&I water supply. The total project construction cost is just under \$5 billion and includes all expenditures by the United States in constructing the CAP plus interest during construction.

The CAWCD is the primary repayment entity for the CAP. Under the Settlement Alternative, CAWCD's repayment obligation is \$1.650 billion, a fixed, negotiated number. Under the No Action

Alternative, CAWCD's repayment obligation is calculated to be \$2.183 billion<sup>43</sup>, based on the CASII repayment analysis. The difference between total project costs and the portion which is to be repaid by local beneficiaries becomes construction costs that are not recovered by the United States through repayment. The difference in cost to the United States between the Settlement Alternative and the No Action Alternative, in terms of a reduction in the repayment amount, is about \$500 million. In addition, CAWCD would experience an approximate reduction of \$450 million in interest payments to the United States over the repayment period.

For Non-Settlement Alternatives 1, 2, 3A, and 3B, the repayment obligation is established to be \$2.183 billion, \$1.964 billion, \$1.833 billion, and \$1,897 billion, respectively.

#### **III.C.4.f. RRA**

Under the No Action Alternative, it is assumed that all provisions of the RRA would remain in effect. ID landowners would continue to file certification forms and be subject to the excess acreage and full cost pricing provisions of the RRA. Certain lands would continue to be ineligible for project water delivery and commingling fees would continue. Reclamation and the IDs would still need to maintain staff and would incur costs administering the RRA program.

Under the Settlement Alternative, it is expected that CAP irrigation districts would be provided some degree of relief from the acreage limitation and full cost pricing provisions of RRA. If full relief was provided by Congress, Reclamation irrigation water could be delivered to all CAP irrigation district lands without the ownership and leasing limitations and full cost charges. This exemption would render formerly excess lands and land owned by limited recipients eligible to take delivery of Reclamation irrigation water. No full cost charges would be assessed, removing the possibility of having to pay high full cost rates for delivery of Reclamation irrigation water to ineligible lands. In MSIDD and CAIDD, commingling fees for delivering non-project groundwater would be eliminated. All of these changes together may make farming more profitable, and potentially increase the use of CAP water and reduce groundwater pumping. Furthermore, agricultural irrigation districts, individual farmers, and the United States would no longer incur administrative costs associated with the implementation, fulfillment, and oversight of the RRA program. In addition, administrative costs related to implementing the RRA program would be eliminated. In particular, NIA districts, individual farmers and the United States would no longer incur RRA-related administrative costs. The Phoenix Area Office of Reclamation has three full-time positions that administer the RRA for CAP.

Under the non-settlement alternatives, the RRA would remain in effect, and conditions would be as described for the No Action Alternative.

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<sup>43</sup> It is noted that in *CAWCD vs. United States*, the Court ruled in its Phase One decision that the repayment ceiling is \$1.781 billion, absent an amendatory contract. In order to provide a basis of comparison, the repayment obligation shown for all Non-Settlement Alternatives is based solely on costs resulting from changes in water allocation.

### **III.C.4.g. Indian Water Rights Settlement Litigation Costs**

Under the No Action Alternative, it is assumed ongoing litigation would continue among numerous Indian Tribes, the United States on behalf of the Tribes, the State of Arizona, and municipalities, along with the attendant litigation costs.

The Settlement Alternative would avoid millions of dollars in future litigation expenditures. In particular, under the Settlement Alternative, the expense of continuing litigation would conclude. The potential savings, relative to the other alternatives, is millions of dollars, but the precise amount cannot be determined. The Chairman of the Steering Committee, Gila River Adjudication, stated that “The premise of [settlement approaches] is that if the principal Indian claims in the Gila River watershed can be settled, there is very little purpose in proceeding further with the litigation....”

Under Non-Settlement Alternatives 1, 2, 3A, and 3B, Indian water rights settlement litigation costs would continue as described under the No Action Alternative.

### **III.C.5. Summary of Socioeconomic Impacts**

In comparing the negative first round regional economic impacts on the NIA sector and the positive first round regional economic impacts on the Indian sector, it is important to keep in mind that these impacts would fall on different communities. Changes in first round economic impacts would affect different sectors of the population, but subsequent round regional impacts would affect the same sector primarily. Thus, even though the positive impacts would offset the negative impacts from an economic perspective, non-Indian farmers would bear the costs of declining agriculture under all alternatives. The analyses predict very little difference among alternatives in terms of NIA land going out of production and negatively impacting the Pinal County tax base. The reductions in acreage occur in the latter time periods. The county tax base is rooted in property taxes. Additional land fallowing is not expected to affect appraisal values of agricultural lands. Thus, no change is expected in county tax revenues. Any decreases in the agricultural tax base would probably be more than offset by increases from the M&I tax base, as the Pinal County economy continues to grow and diversify over the 50-year study period.

Agriculture has been the basis of economic growth in Pinal County. Families moved into Pinal County, developed farmland and formed communities. Businesses were created to provide goods and services to the farmers. Some families have farmed over multiple generations, non-Indian and Indians alike. According to the Census of Agriculture, the age of farmers is increasing. Many farmers have other jobs in addition to farming. There are many factors affecting the Pinal County agricultural way of life. The economy and social fabric are changing and diversifying.

The total regional economic impacts (covering all rounds of repercussions including the first round impacts) resulting from changes in NIA and Indian agriculture are shown in Tables III-6 through III-8. The tables present total regional economic impacts in terms of output, employment, and income. These total regional economic impacts incorporate the decreases associated with NIA and the increases associated with Indian agriculture.

The total economic impact on the three-County area caused by declines in NIA and increases in

Indian agriculture is smallest in the early years under all the alternatives and negative under the Settlement Alternative in 2004. The largest impacts occur in the later years.

<b>Table III-6</b>					
<b>CAP Allocation Draft EIS</b>					
<b>Total* Economic Impact on Three-County Area</b>					
<b>INDIAN AND NIA</b>					
<b>Millions of dollars worth of changes in output (2000 dollars)</b>					
	<b>Settlement Alternative</b>	<b>Non-Settlement Alternative 1</b>	<b>Non-Settlement Alternative 2</b>	<b>Non-Settlement Alternative 3A</b>	<b>Non-Settlement Alternative 3B</b>
2001	\$0	\$0	\$0	\$0	\$0
2004	-\$3.8	\$0	\$0	\$0	\$0
2017	-\$4.8	\$0.6	-\$2.6	-\$2.6	-\$2.6
2030	\$33.2	\$5.2	\$15.0	\$58.8	\$49.4
2043	\$33.2	-\$0.3	\$12.8	\$58.8	\$58.8
2050	\$39.0	\$13.2	\$26.3	\$72.3	\$72.3

\*Total impact includes first and subsequent rounds of regional economic impacts.  
Source: Data was generated by the IMPLAN model, as described in Appendix D.

<b>Table III-7</b>					
<b>CAP Allocation Draft EIS</b>					
<b>Total* Economic Impact on Three-County Area</b>					
<b>INDIAN AND NIA</b>					
<b>Employment: jobs</b>					
	<b>Settlement Alternative</b>	<b>Non-Settlement Alternative 1</b>	<b>Non-Settlement Alternative 2</b>	<b>Non-Settlement Alternative 3A</b>	<b>Non-Settlement Alternative 3B</b>
2001	0	0	0	0	0
2004	-124	0	0	0	0
2017	-80	62	-43	-43	-43
2030	221	-21	20	518	362
2043	221	-199	-17	519	519
2050	519	165	347	883	883

\*Total impact includes first and subsequent rounds of regional economic impacts.  
Source: Data was generated by the IMPLAN model, as described in Appendix D.

<b>Table III-8</b> <b>CAP Allocation Draft EIS</b> <b>Total* Economic Impact on Three-County Area</b> <b>INDIAN AND NIA</b> <b>Millions of dollars of changes in income (2000 dollars)</b>					
	<b>Settlement Alternative</b>	<b>Non-Settlement Alternative 1</b>	<b>Non-Settlement Alternative 2</b>	<b>Non-Settlement Alternative 3A</b>	<b>Non-Settlement Alternative 3B</b>
2001	\$0	\$0	\$0	\$0	\$0
2004	-\$2.6	\$0	\$0	\$0	\$0
2017	-\$2.9	\$0.6	-\$1.6	-\$1.6	-\$1.6
2030	\$19.4	\$2.9	\$8.5	\$34.7	\$29.1
2043	\$19.4	-\$0.8	\$7.1	\$34.7	\$34.7
2050	\$24.1	\$8.0	\$15.9	\$43.5	\$43.5
*Total impact includes first and subsequent rounds of regional economic impacts. Source: Data was generated by the IMPLAN model, as described in Appendix D.					

### **III.D. LAND USE**

#### **III.D.1. Introduction**

This section describes both the existing land uses that could be affected by the proposed allocation, and the anticipated land use changes that would occur as a result of alternative CAP water allocations and contract execution. Land use changes that are expected to occur in the absence of any additional CAP water allocations and subsequent contract execution are also described.

#### **III.D.2. Impact Analysis Methodology**

##### **III.D.2.a. M&I Sector**

The analysis regarding land use changes within the M&I sector focused primarily on projecting future population growth during the 50-year study period (2001 through 2051) and on identifying the likely areas within each M&I entity's municipal planning area (MPA) and/or service area that would likely be developed to accommodate this growth. The development would occur through the conversion of acres from agriculture and desert to urban. In most cases, the MPA of an entity is larger than the entity's existing water service area. Figures illustrating the MPA and/or service area of each of the affected 21 M&I entities are included in Appendix L.

Population projections for each entity over the study period were based upon ADES 1997 population projections for 2000 through 2050. Appendix C contains additional information on how the population projections were prepared. Population projections for each of the 21 entities are also included in Appendix L. The population projections were used to derive changes in population, the number of households and the corresponding reductions of acres of agricultural and desert lands. As mentioned earlier, these projections were developed by ADES independent of water supply availability.

The base for existing land use data for those M&I entities located in Maricopa County was the 1995 land use data obtained from Maricopa Association of Governments (MAG). The MAG land use categories include agriculture, developed, rural, vacant, and water. The "developed category" is comprised of a number of individual land use categories including various residential, commercial, industrial, and open space categories. For the purpose of converting the 1995 MAG data to current and future anticipated land usage, three land use categories were developed. The categories include agriculture, desert and urban. The agriculture category is the same as the 1995 MAG category. The desert category includes that area defined as vacant in the 1995 MAG data. The category of urban includes the 1995 MAG categories of developed, rural and water. In addition to redefining the land use categories, the 1995 data were then updated and adjusted based upon review of 1998 aerial photographs and the result of the field surveys and habitat mapping that were completed to assess biological resources for the entities (see Appendix L). Land use data for the other counties were based upon the review of 1998 aerial photographs and the result of the field surveys and habitat mapping.

The land use data and population projections were then used to calculate the number of acres of agriculture and desert lands that are anticipated to be urbanized for each of the M&I entities over the 50-year study. All of the M&I entities proposed to receive an allocation are located in Maricopa,

Pinal, and Pima Counties. For the Maricopa County entities, the MPA and/or service area boundaries were more finely defined into Regional Analysis Zones (RAZ). For the Pinal and Pima County entities, the MPA and/or service areas were more finely defined into County Census Divisions (CCDs). The RAZ and CCDs are smaller geographic areas within an MPA designated for the purpose of estimating and projecting populations. The following methodology was used to translate population projections for MPAs, RAZs, and CCDs into reductions in acres of farmland and natural desert by entity for the 50-year study period.

Each MPA, RAZ, and CCD was evaluated to determine what proportion of the projected population change would result in declines in agricultural and desert acreage. Aerial photographs and maps showing agricultural areas were reviewed to determine what proportion of the projected population change would result in declines in agricultural and desert acreage. Certain RAZs inside of MPA boundaries have already been built out and developed and were therefore removed from the analysis. Population growth in parts of Maricopa County that lie outside of the region of analysis was excluded from consideration. Also certain CCDs were removed from the analysis, if it was determined the population change would not affect agriculture acreages. The following steps were then taken:

- ◆ Determine from MPA, RAZ, and CCD boundaries, the proportion of a projected population change that would result in the reduction of farm acreage and natural desert. Allocate the proportions to the respective MPAs, and RAZs or CCDs.
- ◆ Determine the number of persons per household for each MPA. For Maricopa County, this was estimated using the published MAG projections. Using the 1997 MAG maps and projections, estimate the number of households per acre in each of the MPAs. Approximations of households per acre are used to determine absorption of farmland and natural desert. This was estimated by using the 1990 Census for Pinal County and 1990 Census Atlas for Pima County. For example, in Pinal County, an approximation of two households per acre is used to determine the absorption of agricultural land inside city boundaries and of one house per acre outside the city boundaries. The approximations of households per acre were then used to determine absorption of agricultural lands and natural desert.
- ◆ Given the allocations of a projected population to reduction in farm and natural desert acreage determined above, allocate that proportion of the population change in each RAZ and CCD to the appropriate M&I entity.
- ◆ Divide the projected population increase for a given area by the persons per acre (this number includes the person per household number built in) to yield the number of acres that may displace agriculture or desert lands.
- ◆ Add the acreage reductions to each of the groundwater basins to derive the total reduction in agricultural and desert acres by entity for the 50-year study period, to obtain a total for the M&I sector.

The results of this analysis are displayed later in this section, in Table III-12.

The methodology relies primarily on the 1997 MAG Socioeconomic Projections Interim Report and on population projections for Maricopa County published by the ADES Population Statistics Unit on August 1, 1997. The MAG and ADES population projections have been reviewed and approved by the Central Arizona Council of Governments and the State Population Technical Advisory Committee and signed by the ADES Director.

The number of persons per household is derived from the MAG 1997 publication. The number of households per acre was derived for each MPA from MAG maps and the 1997 publication from representative RAZs. The allocation of population between agriculture and non-agriculture acreage is based on maps showing irrigated acreage in Maricopa County. The allocation of reductions in agricultural and desert acreage to respective groundwater basins is based on the relation of the groundwater basin boundary lines on the maps displaying groundwater areas to census area boundaries.

An analysis was conducted of each entity's projected water demands (based on population projections and water use rates) and the supplies available to meet those demands. In all alternatives, including No Action, it was determined the M&I entities' demands could be met with alternative supplies that could be developed, with or without the proposed CAP allocation. Appendix C contains a more detailed discussion of M&I demands and supplies.

#### **III.D.2.b. NIA Sector**

The abandonment of farming in the NIA sector would be the primary land use change associated with the proposed allocations. This land use change is anticipated to occur over time due to increasing unavailability of CAP water, and the increased cost of groundwater supplies. The analysis methodology employed to assess these impacts to the NIA sector included estimating the number of acres that would go out of agricultural production as a result of increasing unavailability of CAP water to the NIA sector. This analysis methodology is described in more detail above in the socioeconomic resources section and also in Appendix D.

#### **III.D.2.c. Indian Sector**

The rehabilitation of existing, retired or fallowed farm lands, the development of new agricultural lands, and construction of distribution systems that would occur in the Indian sector would be the major land use changes resulting from the proposed allocations. For purposes of this draft EIS it was assumed that funds would be available to develop the infrastructure that is necessary to take and use CAP water for agriculture. As shown in Appendix A, it was also assumed that the delivery systems would be completed and functioning by the year 2040. This assumption was made to ensure impacts from using the allocated water would be evident and taken into account in the analysis. To provide a "worst" case analysis, the draft EIS assumes all agricultural development resulting from receipt of CAP water through any of the proposed allocation alternatives would be new development occurring on desert land.

### III.D.3. Affected Environment

#### III.D.3.a. General Land Use

As noted in Chapter I, the majority of the lands that would be affected by the proposed allocation are located within the three-county area that includes Maricopa, Pinal and Pima Counties. All 21 M&I entities and 9 NIA users, and two (GRIC and TON) of the five Indian Tribes potentially affected by the proposed allocation fall within this geographical three-county area. Additional areas within Gila and Graham Counties (associated with SC Apache Tribe) and within Coconino and Navajo Counties (associated with Navajo/Hopi) would also be affected under Non-Settlement Alternative 2 or 3.

The primary land ownership for Maricopa, Pinal and Pima Counties is shown in Tables III-9, III-10 and III-11, respectively.

<b>Table III-9</b>	
<b>CAP Allocation Draft EIS</b>	
<b>Land Ownership – Maricopa County</b>	
<b>Ownership</b>	<b>Percent</b>
Private Land	29
Public Lands:	
BLM/ U.S. Forest Service	39
Public Lands – State	11
Public Lands – Other	16
Tribal Lands	5
Total	100
Source: Arizona Department of Commerce, 1999 1998 County population: 2,800,000 (MAG 1999) Total County area = 9,222 square miles (mi <sup>2</sup> ).	

<b>Table III-10</b>	
<b>CAP Allocation Draft EIS</b>	
<b>Land Ownership – Pinal County</b>	
<b>Ownership</b>	<b>Percent</b>
	25.7
Public Lands:	
BLM/U.S. Forest Service	17.5
Public Lands – State	35.3
Public Lands – Other	1.2
Tribal Lands	20.3
Total	100
Source: Arizona Department of Commerce, 1999a 1998 County population: 157,675 (Arizona Department of Commerce, 1999c) Total County area = 5,371 mi <sup>2</sup> .	

<b>Table III-11 CAP Allocation Draft EIS Land Ownership – Pima County</b>	
<b>Ownership</b>	<b>Percent</b>
Private Land	13.8
Public Lands: BLM/ U.S. Forest Service	12.1
Public Lands – State	14.9
Public Lands – Other	17.1
Tribal Lands	42.1
Total	100
Source: Arizona Department of Commerce, 1999b 1998 County population: 824,900 (Arizona Department of Commerce, 1999c) Total County area = 9,184 mi <sup>2</sup>	

As described earlier in this section, the areas potentially affected by the proposed allocations would include agricultural, developed, rural, urban, and vacant land, as well as some bodies of water. For purposes of this draft EIS, these land uses (which were based on 1995 land use data) were then converted into the categories of agriculture, desert and urban. Tables identifying the current land use designations for each of the individual M&I, NIA and Indian users which would receive an allocation under any of the proposed alternatives are included in Appendix L.

### **III.D.3.b. M&I Land Use**

The 21 M&I entities proposed to receive a CAP allocation in three of the action alternatives have a combined planning area of approximately 2.1 million acres. Of this total, approximately 954,000 acres (or 45 percent) are currently developed, approximately 100,000 acres (or five percent) are farmed, and approximately 1.2 million acres (or 55 percent) are desert.

### **III.D.3.c. Agricultural Land Use**

In 1997, there were an estimated 26,866,722 acres of land in farms in the State of Arizona. Overall, the acres of land in farms in Arizona decreased by approximately 23 percent between 1992 and 1997. The average size of farms in the State decreased by approximately 15 percent and the number of full-time farms decreased by approximately 10 percent statewide during the same time period.

### **III.D.3.d. Indian Land Use**

#### **III.D.3.d.(1) GRIC**

The GRIC is located south of the Phoenix metropolitan area and encompasses 372,929 acres, of which 275, 537 acres are Tribal lands and 97,392 acres are allotted lands<sup>44</sup>. Reservation land use is

<sup>44</sup> The General Allotment Act of 1887, as amended, established the allotment system on reservations. Once executed, between 1916 and 1924, each Tribal member was allotted a certain number of acres. Today, due to inheritance, individual allotments are owned by anywhere from one to several dozen people. Land not allotted to individuals within a reservation are Tribally owned and managed.

predominantly rural with interspersed pockets of commercial, industrial and residential developments. The area within GRIC with the highest potential for commercial/industrial development is along the northern boundary, from Old Price Road to 51st Avenue, and along the Queen Creek and Riggs Roads alignments. There are approximately 294,000 acres of open rangelands used for grazing livestock. Livestock grazing units are primarily located along the Gila and Santa Cruz rivers, their tributaries and in upland areas. There are approximately 69,300 acres that have been historically developed for agricultural production within GRIC (Reclamation 1997); the number of acres actually farmed from year to year depends upon water availability.

#### **III.D.3.d.(2) TON**

The TON is located in southern central Arizona extending down to Mexico. It is composed of four non-contiguous segments totaling more than 2.8 million areas, which are divided into 11 political districts. The main body of the reservation contains nine of those districts, and is approximately 4,330 square miles in size. The Schuk Toak District is located along the eastern portion of this main body. The San Xavier District is geographically separate from the main body of the reservation. It encompasses 71,095 acres, and is comprised of approximately 28,800 acres of Tribal land and 42,295 acres of allotted land. The predominant land use on the areas of both districts that would be affected by the project is cattle grazing, with much of the other areas consisting of open space. Copper mining also occurs on San Xavier District lands leased to ASARCO. This lease encompasses approximately 2,554 acres along the southern San Xavier District boundary between Mission Road and I-19. Approximately 1,100 acres have historically been farmed on the San Xavier District. About 400 acres are currently under production (Reclamation 1999).

#### **III.D.3.d.(3) SC Apache Tribe**

The SC Apache Tribe, in southeastern Arizona, is located within Gila, Graham and Pinal counties, Arizona. It encompasses 1,834,781 acres, ranging from highland desert in the southernmost part of the reservation, to mountainous areas interspersed with grassland prairies in the central area, and abundant stands of ponderosa pine, blue spruce and aspen in the northern portion of the reservation. Over one-third of the reservation land consists of forested (175,000 acres) or wooded (665,000 acres) lands<sup>45</sup>. San Carlos Reservoir, formed by Coolidge Dam, is more than 16,600 surface acres at top of conservation (about 880,00 af). Primary land uses on the reservation include grazing, recreation (mostly water based), agriculture, mining and timber. Historically up to 3,000 acres were farmed; over the last three decades, SC Apache Tribe has irrigated an average of over 500 acres annually (ADWR 1999). These areas are generally located along the Gila River near Bylas, adjacent to the San Carlos River and along other major tributaries to the San Carlos River.

#### **III.D.3.d.(4) Hopi Tribe**

The Hopi Tribe's reservation is located in northeastern Arizona within Navajo and Coconino counties, Arizona. It encompasses over 1.5 million acres. Reservation lands are primarily high deserts dominated by three mesas ranging in elevation from 5,000 to 6,500 feet. Relatively dense populations and a cultural center are located on these three natural features, with most of the 34 clans living in

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<sup>45</sup> Intertribal Council website: [www.primenet.com/~itca/Tribes/sancarl.htm](http://www.primenet.com/~itca/Tribes/sancarl.htm)

12 villages on or near these mesas. The land is suitable for grazing with the potential for expanded agricultural development. The Hopi people have practiced agriculture for hundreds of years despite an arid landscape and an average of only 12 inches of rainfall a year.

#### **III.D.3.d.(5) Navajo Nation**

The Navajo Nation's reservation is the largest Indian reservation in the United States. It encompasses an area approximately 27,000 square miles, and falls within portions of Arizona, New Mexico and Utah. The Navajo Nation is divided into 110 chapters, which are areas of local government. The major existing land uses include livestock grazing, agriculture, mining, and oil and gas production. The Navajo Nation has the potential to expand many of these uses, including agricultural development. Vast expanses of open space exist within the reservation.

#### **III.D.3.e. Prime Farmland**

In 1997, the State of Arizona had approximately 876,600 acres of prime farmland. Some of this prime farmland exists in the area affected by the proposed allocation (NRCS 1997). The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, seed, forage, fiber and oilseed crops, which is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt or sodium content, and no rocks (NRCS Acres of Prime Agriculture 1997).

Currently, the NRCS has completed soil surveys for numerous areas in the State. Portions--but not the entire--area affected by the proposed allocations have been surveyed. In general, the Soils Surveys published by NRCS include a description of soil types, their suitability, limitations and management for specified used. As part of the soil classification, the surveys also indicate which soil types would be considered prime. Detailed maps indicating the soil classification and the area surveyed are also included.

#### **III.D.4. Environmental Consequences**

A summary of the land use impacts anticipated to occur by alternative, is provided in Table III-12.

<b>Table III-12 CAP Allocation Draft EIS Land Use Changes 2001 - 2051</b>						
	<b>No Action</b>	<b>Settlement Alternative</b>	<b>Non- Settlement Alternative 1</b>	<b>Non- Settlement Alternative 2</b>	<b>Non- Settlement Alternative 3A</b>	<b>Non- Settlement Alternative 3B</b>
Agriculture Acres Urbanized - M&I*	68,150	68,150	68,150	68,150	68,150	68,150
Desert Acres Urbanized - M&I*	240,000	240,000	240,000	240,000	240,000	240,000
Agriculture Acres Urbanized Within NIA Districts**	46,900	46,900	46,900	46,900	46,900	46,900
Agriculture Acres Left Fallowed Within the NIA Districts**	40,926	40,926	40,926	40,926	40,926	40,926
Desert Acres Developed for Agriculture	na	24,800	8,000	25,400	50,000	50,000
* Includes the MPA and/or service area for each of the 21-M&I entities						
**Some of the acreage in the above categories are overlapping. For the acres per entity, see Appendix L						

#### **III.D.4.a. Prime Farmland**

As urbanization increases, which would occur under all alternatives, including that of no action, prime farmland located adjacent to urban areas would be developed. Actively irrigated prime farmland within NIA districts could also be fallowed as a result of economic conditions under all alternatives; however, the rate at which lands would be fallowed varies depending upon the alternative. Because new lands would be developed and retired/fallowed farmlands would be rehabilitated for agriculture on Indian lands, there could be additional lands classified as prime farmland brought into production as well. The amount of net acreage of prime farmland adversely affected by any of the alternatives cannot be estimated.

#### **III.D.4.b. M&I Sector**

##### **III.D.4.b.(1) No Action Alternative**

Under the No Action Alternative, it is estimated that approximately 308,150 acres would become urbanized within the 21 M&I MPAs and/or service area. Table III-12 provides both the total number of agricultural acres urbanized and the total number of desert acres urbanized for this alternative.

**III.D.4.b.(2) Settlement and Non-Settlement Alternatives**

Under all action alternatives, the number of acres that would become urbanized within the M&I MPA's and/or service areas would be the same as under the No Action Alternative. As explained in detail in Appendix C, an analysis of the estimated water supplies and water demands for each M&I entity through the study period indicates sufficient water supplies would be available to meet projected water demands for the 50-year study period. Therefore, it is assumed the degree of urbanization that would occur under the No Action Alternative would also occur under any of the action alternatives.

**III.D.4.c. NIA Sector****III.D.4.c.(1) No Action**

Under the No Action Alternative, it is estimated that approximately 46,900 acres of agricultural land would become urbanized and 40,926 acres of agricultural land would be fallowed as a result of economic conditions. Table III-12 provides both the total number of agricultural acres urbanized and the total number of acres fallowed within the NIA sector. The total average urbanized is the same for all alternative as it was determined that M&I entities would meet their population projections under all alternatives (see Appendix C for more detail.) Although the total number of agricultural acres left follow within the NIA sector is the same for all alternatives, the timing of acres fallowed varies somewhat by alternative. Appendix D provides detail on acres fallowed by year by alternative.

**III.D.4.c.(2) Settlement and Non-Settlement Alternatives**

Under all alternatives, approximately 46,900 acres of farmland would be urbanized and 40,926 acres would be fallowed due to economic reasons. While the totals would be the same, the timing of the 40,926 acres being fallowed varies by alternative. Details are provided in Appendix D.

**III.D.4.d. Indian Sector**

Under the No Action Alternative, there would be an increase in the number in agricultural lands in Indian communities that would result from existing CAP water allocations being utilized for irrigation. Table III-12.

**III.D.4.d.(1) GRIC****III.D.4.d.(1)(a) No Action**

Under the No Action Alternative, it is anticipated GRIC would continue developing and farming up to 86,000 acres. For purposes of this draft EIS, it is assumed the acres developed would consist of a mix of existing and/or previously farmed acres that are rehabilitated, and native desert that are developed; however, it is unknown what the exact ratio would be of these 86,000 acres.

**III.D.4.d.(1)(b) Settlement and Non-Settlement Alternatives**

Under the action alternatives, it is anticipated GRIC would rehabilitate or develop additional acreage for agricultural production as a result of receiving varying amounts of additional CAP water as follows:

<b>GRIC</b>	<b>No Action</b>	<b>Settlement</b>	<b>NSA 1</b>	<b>NSA 2</b>	<b>NSA 3</b>
Incremental increase	---	+20,800	+8,000	+16,700	+38,000
Total acres developed	86,000	106,800	94,000	102,700	124,000

For purposes of analyzing impacts in this draft EIS, it is assumed development of these additional acres would all occur on areas that are currently native desert (although some of the acreage could actually be rehabilitated existing or retired agricultural lands). This change in land use was previously described and evaluated in the GRIC PMIP Programmatic EIS (PEIS) (Reclamation 1997). Briefly, the PEIS identified development of up to 77,000 new acres and rehabilitation of about 69,330 acres of previous or existing agricultural lands. There could be up to 35 percent reduction in the amount of existing rangeland. The PEIS indicates additional studies would be conducted during phased implementation of the PMIP, to identify the number of cattle and wild horses that would be affected as alignments and locations of facilities are finalized. The PEIS also indicated GRIC's intent to develop a process to evaluate future residential subdivision development versus potential agricultural areas to buffer concentrated residential development from agricultural activities. Other environmental documentation would address potential conflicts and site-specific mitigation measures for any future agricultural development proposed for areas in close proximity to existing residential areas (Reclamation 1997). No other substantive conflicts with existing land uses within the GRIC reservation were identified in the PEIS.

**III.D.4.d.(2) TON****III.D.4.d.(2)(a) No Action Alternative**

The San Xavier District is in the process of constructing a CAP Link pipeline to facilitate delivery and use of the District's existing CAP water allocation. If all 27,000 afa of San Xavier District's current CAP allocation were used for agriculture, approximately 5,400 acres could be developed and farmed. There are sufficient number of farmable acres located within the district to accommodate this additional agricultural development.

The Schuk Toak District is currently constructing facilities to take and use its existing CAP water allocation of 10,800 afa. The District is in the process of developing land within the southeastern portion of what is commonly referred to as the "Garcia Strip," where this water will be used to irrigate up to 2,580 acres. This area was formerly native desert used for grazing (Franzoy Corey 1988).

In the absence of identifying a source for the remaining 28,200 afa of water suitable for agriculture, which was authorized by SAWRSA, the United States would continue to have the responsibility of identifying a source and providing this water for the Districts' use.

#### **III.D.4.d.(2)(b) Settlement and Non- Settlement Alternatives**

Under the Settlement Alternative, Non-Settlement Alternative 2 and Non-Settlement Alternative 3, CAP water would be identified and allocated as the source of the additional 23,000 afa of water (suitable for agriculture) authorized by SAWRSA to be delivered to the San Xavier District. For purposes of this impact analysis, it was assumed that 15,000 afa would be used for irrigation and an additional estimated 3,000 acres would be developed for agriculture. The remaining 8,000 afa would be used for recharge, either through a direct or indirect recharge project. Assuming a direct recharge project is constructed (which would disturb the greatest amount of land), this would affect up to an additional 70 acres. It is anticipated the additional 3,070 acres that could be affected as a result of the proposed allocation would be located in areas that are currently undisturbed desert. The San Xavier District would receive no CAP water allocation under Non-Settlement Alternative 1; impacts would be as described for the No Action Alternative.

Under the Settlement Alternative, Non-Settlement Alternative 2 and Non-Settlement Alternative 3, CAP water would be identified and allocated as the source of the additional 5,200 af of water (suitable for agriculture) authorized by SAWRSA to be delivered to the Schuk Toak District. For purposes of this impact analysis, it was assumed that the entire amount would be used to develop up to an additional 1,000 acres for agriculture. The original design for the recently constructed CAP delivery system included consideration of future development utilizing the District's entire 16,000 afa entitlement under SAWRSA to develop a total of 3,700 acres. The land (1,000 to 3,700 acres depending upon which estimate is used) that would be developed with this additional 5,200 afa was identified as those lands lying directly north of the existing development (Franzoy Corey 1988). These lands consist of native desert that has been used for grazing. The Schuk Toak District would receive no CAP water allocation under Non-Settlement Alternative 1; impacts would be as described for the No Action Alternative.

#### **III.D.4.d.(3) SC Apache Tribe**

##### **III.D.4.d.(3)(a) No Action Alternative**

Under the No Action Alternative, it is anticipated SC Apache Tribe would continue to expand its current farming efforts to eventually develop 7,300 acres of agricultural land, utilizing its existing CAP water allocation. The 7,300 acres would likely be developed along the Gila and San Carlos Rivers, as they are closest to San Carlos Reservoir, the likely point of diversion.

##### **III.D.4.d.(3)(b) Settlement and Non-Settlement Alternatives**

SC Apache Tribe would receive an allocation for additional CAP water under Non-Settlement Alternative 2 (23,447 afa) and Non-Settlement Alternative 3 (40,000 afa). For purposes of the draft EIS analysis, it is assumed the water would be used to develop additional agricultural lands, resulting in an additional 4,700 acres farmed under Non-Settlement Alternative 2 and an additional 8,000 acres being developed under Non-Settlement Alternative 3. It is anticipated lands that would be targeted for development would be located along the Gila and San Carlos Rivers, and tributaries of the San

Carlos River. Additional evaluation would need to be conducted to determine what specific land use conflicts could exist, once lands targeted for agricultural production are identified.

#### **III.D.4.d(4) Navajo Nation and Hopi Tribe**

##### **III.D.4.d.(4)(a) No Action Alternative**

Neither the Navajo Nation nor the Hopi Tribe has an existing CAP water allocation. No CAP water would be allocated to either Tribe under the No Action Alternative; no change from current land use trends would be anticipated to occur.

##### **III.D.4.d.(4)(b) Settlement and Non-Settlement Alternatives**

Together the Navajo Nation and Hopi Tribe would receive an allocation of CAP water of 13,500 afa under Non-Settlement Alternative 2 and Non-Settlement Alternative 3. This water would be used for M&I purposes, most likely in conjunction with or complementary to water uses that are being considered as part of other ongoing settlement negotiations. These include providing a reliable potable water supply for areas within the Lower Colorado River basin that are currently without one, and providing a renewable surface water source for use by Peabody Western Coal Company's Black Mesa Mine coal slurryline operation<sup>46</sup>, thus reducing the amount of groundwater being pumped (about 4,000 afa). These uses would be consistent with current land uses and are not anticipated to conflict with future land use trends. Under the Settlement Alternative and Non-Settlement Alternative 1, the Navajo Nation and the Hopi Tribe would not receive a CAP water allocation; impacts would be as described under the No Action Alternative.

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<sup>46</sup> The mine and slurry operations are currently served by groundwater pumping under an agreement with the Hopi Tribe. If Peabody Western Coal Company elects to participate in the proposed Lake Powell Pipeline Project, it is envisioned approximately 4,000 afa would be used by the slurryline operation for the remainder of the life of Black Mesa Mine, estimated to close around the year 2032. After the mine closes, the water would shift to M&I use.

### **III.E. BIOLOGICAL RESOURCES**

#### **III.E.1. Introduction**

The study area for the proposed allocations is located primarily in central Arizona from north of Phoenix to south of Tucson. This area includes several ecological communities, but most of this region is within the Sonoran Desertscrub Biome (Brown 1982). Outside this region, the Tribal entities of Navajo/Hopi and San Carlos Apache occupy higher elevation plant communities such as semidesert grassland, pinyon-juniper woodlands and ponderosa pine conifer forests or are within the Great Basin Desertscrub Biome.

Biological resources would be impacted by the water allocations in two ways. First, varying amounts of new agricultural lands would be developed on Indian reservations with a resulting loss of wildlife habitat. Other uses of CAP water on the reservations are also possible (see Appendix L). Second, and less important from a biological perspective, varying amounts of NIA farmland would be fallowed under the different alternatives. Urban growth is expected to continue under all alternatives, including the No Action Alternative, with resulting conversions of native desert and agricultural lands to urban uses. Even though the draft EIS analysis concludes that the allocation of CAP water would not have an effect on urban growth (See Appendix C), the biological resources impacted by urban growth are described as part of the environmental consequences under the No Action Alternative. Details on the biological resources for each water user's planning area are contained in Appendix L.

#### **III.E.2. Methodology**

Habitat type was assessed for over 1,600 square miles (over one million acres) within the M&I MPAs and/or water service areas. Areas were field surveyed at the rate of 50 square miles per day during December 1999 and January 2000.

To aid in the determination of association types, and to ascertain an estimate of important ecological parameters, a total of 169 sampling sites were established in what appeared to be habitat typical for each specific area. At each sampling site, an initial point was identified by randomly obtained compass bearings and distance units. The number of samples taken was in direct relationship to the size of the total area to be sampled. To estimate foliar height density ([fhd]= horizontal and vertical density of vegetation), live plant material was identified and marked as present or absent within an imaginary vertical cylinder one decimeter in diameter at height intervals of 0-1.5 meter (m), 1.5-1m, 1-2m, 2-3m, 3-4m, and >4m. Secondly, all perennial species were identified within a radius of 3m, and then the distance (up to 500m) to the nearest tree (> 6 inches diameter breast height [dbh]) was estimated for each of four quadrants. Finally, any additional perennial species visible in the area were recorded. Saguaro density was calculated and ranked into the following categories: 1) None = none in sight of plot, 2) low = one saguaro per 50 acres or more, 3) moderate = one saguaro per 10-50 acres, and 4) High = one saguaro per 10 acres or less. The data were averaged within each sampling unit of each Planning Entity and a determination was done to establish which biotic association each site belonged.

Habitats were typed at broad association levels as described by Brown (1982) and, with the aid of aerial photographic enlargements (1 inch = 1,200 feet) or with comparable contact prints, were

delimited onto clear acetate overlays. Because of the broad area covered, closely-related associations were not distinguished. Where possible, vegetation polygons were mapped to an accuracy of approximately 40 acres. In some areas, lines were drawn using best judgment where associations intergraded imperceptibly.

The USFWS has issued specific guidance that can be used to identify potentially suitable habitat for the endangered cactus ferruginous pygmy-owl (64 FR 14999-15000). Suitable habitat for the pygmy-owl is defined as areas below 4,000 feet in elevation containing one or more of the following vegetation communities:

- ◆ **Riparian vegetation:** Broadleaf, riparian gallery forests of cottonwoods, willows, mesquite, ash, or other trees growing along watercourses and associated species.
- ◆ **Sonoran desertscrub:** Characterized by braided wash systems and vegetation which is dense and well structured. Key species include mesquite, foothill and blue paloverdes, ironwood, saguaro, organ pipe cactus, and various other shrubs and cacti.
- ◆ **Semidesert grasslands:** Containing wooded drainage with mesquite, hackberry, ash, and limited number of saguaros.

Vegetative communities listed above, containing saguaro cactus or other columnar cactus that are eight feet or taller, or ironwood, mesquites, paloverde or other large trees with a trunk diameter of six inches or greater measured 4.5 feet above the ground may provide nesting opportunities for pygmy-owls.

In addition, the Bureau of Land Management (BLM) (1999 Krueper, D. Pers.com) provided criteria for assessing the suitability of habitat for pygmy-owls. Both criteria were utilized to identify potentially suitable habitat for the cactus ferruginous pygmy-owl within each planning area.

Habitat descriptions for each listed T&E species were obtained from the FR, the USFWS T&E species county lists, and other applicable published literature sources. By integrating this information with the vegetational data, potentially suitable habitat for the listed species were delineated on aerial photographs within each MPA.

### **III.E.3. Affected Environment**

#### **III.E.3.a. Vegetation Associations**

Eight habitat types were identified using the Brown (1982) classification system. Scientific names for plant species identified below are provided in Appendix E, Table 3.

- ◆ **Blue Paloverde/Desert Ironwood Association** - When found along washes and drainages, the xeroriparian habitat created by this association can provide valuable wildlife habitat. Co-dominants in the survey area include foothill paloverde, desert-willow, desert-broom, ragweed, graythorn, white-thorn acacia, velvet mesquite, and catclaw acacia.

- ◆ **Bursage/Foothill Paloverde Association** - Bursage, which averages under 1.5 feet in height, is generally the most common element of this association. Creosote bush, which averages between three & five feet, is also very common and, of course, the most frequent tree is the foothill paloverde. Saguaros are nearly always present and sometimes densely distributed. Drainages are often densely vegetated with blue paloverde and desert ironwood and technically belong to their collective association but are generally too narrow to map within the resolution of this assessment. The study did not distinguish between the Bursage-Saguaro-Mixed Scrub and Brittlebush-Mixed Shrub Associations.
- ◆ **Creosote-Bush Association** - Although often composed of nearly pure stands of creosote-bush, this association can grade toward Bursage-Foothill Paloverde, Velvet Mesquite, and Snakeweed/ Velvet Mesquite Associations. Creosote-Bush Association is usually found in flat terrain at lower elevations. Larger drainages are often vegetated with stands of Blue Paloverde/Desert Ironwood Association. However, most are not within the mapping resolution of the present assessment. In general, this association has lower wildlife values than other associations identified in this draft EIS.
- ◆ **Creosote-Bush/Allthorn Association** - This association is mostly found on light textured soils, such as those high in gypsum or calcium. Several rare plant endemics, such as the Apache wild-buckwheat, Arizona cliffrose, Mearn sage, Arizona wild-buckwheat, and Ripley wild-buckwheat occur on white, chalky soils within this community. Of these, only the Arizona wild-buckwheat has been found within the study area. Co-dominants within the study area include staghorn cholla and little-leaved krameria. Other common species include tiqulia, foothill paloverde, ocotillo, jojoba, catclaw acacia, snakeweed, ephedra, bursage, fairy-duster, California wild-buckwheat, saguaro, fluffgrass, brittlebush, and hedgehog cactus.
- ◆ **Fremont Cottonwood/Goodding Willow Association** - Cottonwood and willow forests are largely restricted to the immediate flood plains of perennial streams and rivers. Depending on stand size and quality, these riparian habitats can support the highest plant and wildlife diversity within the study area. In the survey area, the third most common tree species within this community was saltcedar. Owing to the coarseness of the resolution, both Saltcedar Association and Saltcedar/Mixed Scrub Association are included here. Vegetation structure of the Fremont Cottonwood/ Goodding Willow Association is variable. As many strands and patches of this community were not within the study's resolution, they often are not indicated on the vegetation maps.
- ◆ **Jojoba/Mixed Scrub Association** - This is an association of generally east- to north-facing steep and/or rocky slopes between 2,500-foot and 4,500-foot elevation. Although some areas are covered by nearly pure stands of jojoba, most contain numerous co-dominant shrubs such as California wild-buckwheat, turpentine-bush, fairy-duster, Pima ratany, and catclaw acacia.
- ◆ **Snakeweed/Velvet Mesquite Association** - This represents a disclimax desert grassland where perennial grasses have been nearly extirpated. The association is variable with respect to the relative composition of several species, including snakeweed, velvet mesquite, goldenweed, desert-broom, creosote-bush, and paperflower. Other related associations, such as the Goldweed/Mixed Scrub Association were included here. This association occurs on lower bajadas and plains southeast of Tucson.

- ◆ **Velvet Mesquite Association** - The Velvet Mesquite Association ranges from sparse to very dense, nearly homogenous stands. It is a community of low-lying areas where water runoff collects or passes intermittently, and is often associated with the banks of drainages or abandoned agricultural fields. Species commonly associated with this community are creosote bush, tamarisk, desert-broom, snakeweed, goldenweed, Fremont wolfberry, and whitethorn acacia.

### **III.E.3.b. Fish and Wildlife**

No specific wildlife surveys were conducted. Birds, mammals, reptiles and amphibians that are typically associated with the Sonoran Desertscrub Biome are listed in Table 4, Appendix E. Only general wildlife observations were recorded during field surveys.

### **III.E.3.c. Colorado River Mainstem**

Lake Powell and the first 15.5 miles of the Colorado River downstream of Glen Canyon Dam are part of the Glen Canyon National Recreation Area. The river flows another 278 miles through Grand Canyon National Park into Lake Mead, part of the Lake Mead National Recreation Area. All of these areas are administered by the National Park Service (Reclamation 1995). Other lands adjacent to the river or National Park Service lands are administered by the Forest Service, Hualapai Tribe, Navajo Nation, and the Havasupai Tribe.

Between Glen Canyon Dam and Lake Mead, the Colorado River falls about 1,900 feet, or from approximately 3100 to 1200 feet above sea level. Major tributaries in this reach of the Colorado River mainstem include the Paria and Little Colorado Rivers, and Bright Angel, Kanab, Havasu, and Diamond creeks.

Prior to the completion of Glen Canyon Dam in 1963, flows in the Colorado River were characterized by large year to year and seasonal variability. Melting of mountain snowpack typically produced high runoff of long duration during the late spring and early summer. Annual maximum flows greater than 80,000 cfs were not uncommon. In late summer, fall, and winter, flows were typically below 3,000 cfs. Flow regulation by the dam has resulted in a slight increase in median flows and a large decrease in the magnitude and frequency of major floods in the Colorado River, although tributary floods continue to produce temporary uncontrolled peak flows in the river (Reclamation 1995).

Historically, the Colorado River and its tributaries were characterized by heavy sediment loads, variable water temperatures, large seasonal flow fluctuations, extreme turbulence, and a wide range of dissolved solids concentrations (Reclamation 1995). Water temperatures varied on a seasonal basis from highs around 80° Fahrenheit (F) to lows near freezing. Water released from Glen Canyon dam averages about 46°F year round. Lake Powell traps sediment that historically was transported downstream. The dam releases clear water and the river becomes muddy only when downstream tributaries contribute sediment.

Prior to the construction of Glen Canyon Dam, riparian vegetation developed only above a scour zone that was affected by the seasonally high river flows. This vegetation consisted mainly of acacia, mesquite, and hackberry. Following dam construction, protection from annual high flows allowed the riparian vegetation to develop below this scour zone. Today, this habitat is a mixture of native and non-native plant species that provides habitat for numerous species of mammals, birds, amphibians and reptiles, and terrestrial invertebrates.

Glen Canyon Dam stores and releases water from Lake Powell, which has an active capacity of about 24.3 maf. A collection of Federal and State statutes, interstate compacts, court decision and decrees, an international treaty with Mexico, and criteria and regulations set by the Secretary determine how Colorado River water will be operated, diverted, released, and delivered. These are collectively known as the "Law of the River."

More specific information on the natural resources before and after the construction of Glen Canyon Dam can be found in the Final Environmental Impact Statement (FEIS) on the operation of Glen Canyon Dam (Reclamation 1995).

The Federal endangered species that are found within this project area include the humpback chub (*Gila cypha*), razorback sucker (*Xyrauchen texanus*), bald eagle (*Haliaeetus leucocephalus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and the Kanab ambersnail (*Oxyloma haydeni kanabensis*). In March 1994, the USFWS designated critical habitat for the chub and sucker. Critical habitat for the humpback chub includes the lower eight miles of the Lower Colorado River and the Colorado River from River Mile 34 to 208. For the razorback sucker, critical habitat includes the Colorado River from the confluence with the Paria River to and including Lake Mead. Both species are endemic to the Colorado River Basin. While the razorback can be found near areas with strong currents, it is typically associated with backwaters, side channels, flooded bottom lands and other slower moving habitats. The chub is typically associated with canyon areas with fast current, deep pools, and boulder habitat.

No critical habitat has been designated for the threatened bald eagle. The Colorado River corridor through the Grand Canyon is used by migrating bald eagles in the winter. They were not often observed in the Grand Canyon until after the rainbow trout fishery below Glen Canyon Dam was established (Reclamation 1995).

The Kanab ambersnail is a small terrestrial landsnail found in semiaquatic vegetation watered by springs or seeps at the base of sandstone or limestone cliffs (FWS 1998). One population is found within the Grand Canyon but no critical habitat has been designated.

Breeding southwestern willow flycatchers are found along the mainstem downstream of Glen Canyon Dam to the Lake Mead delta. Critical habitat is designated between the confluences of Bright Angel Creek and Tanner Creek.

#### **III.E.3.d. Federally Listed Threatened and Endangered (T&E) Species**

All M&I and NIA, and two of the Tribal entities are located within a three county area: Maricopa, Pinal, and Pima. A total of 24 T&E species have been recognized for these counties. After reviewing the literature on each species, and conducting habitat assessments within each county, the list of

possible T&E species which might be affected by Tribal agricultural developments or urban growth within the 21 MPAs was reduced to 10 (Table III-14). These 10 species are briefly discussed below. The remaining Tribal entities are located in other counties and are discussed in more detail in Appendix L.

<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>	<b>Maricopa</b>	<b>Pinal</b>	<b>Pima</b>
Arizona agave	<i>Agave arizonica</i>	Endangered	P		
Arizona cliffrose	<i>Purshia subintegra</i>	Endangered	P		
Arizona hedgehog cactus	<i>Echinocereus triglochidiatus var.</i>	Endangered	P	P	
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	C P	P	
Cactus ferruginous pygmy	<i>Glaucidium brasilianum cactorum</i>	Endangered	P	P	C
Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuena</i>	Endangered	P	P	
Nichol's Turk's head cactus	<i>Echinocereus horizonthalonius var.</i>	Endangered		P	
Pima pineapple cactus	<i>Coryphantha scheeri var. robustispina</i>	Endangered			
Southwestern willow	<i>Empidonax traillii extimus</i>	Endangered	P	P	
Yuma clapper rail	<i>Rallus longirostris yumanensis</i>	Endangered	P	P	
		Total	8	7	1
*C=Critical habitat has been designated. P=Potential suitable habitat in the general area.					

### **III.E.3.d.(1) Arizona Agave**

The Arizona agave has rosettes of bright green leaves with dark reddish-brown margins. The flower is borne on a sub-umbellate inflorescence. This species is found in the transition zone between oak-juniper woodland and mountain mahogany-oak scrub habitat at an elevation range of 3,000-6,000 feet, usually on steep, rocky slopes. Scattered clones have been found in the New River and the Sierra Anches Mountains, and may possibly occur in the Mazatzal Mountains. Surveys should be conducted wherever the ranges of *Agave toumeyana var. bella* and *Agave chrysantha* overlap. Arizona agave may be found in Gila, Yavapai, and Maricopa Counties.

### **III.E.3.d.(2) Arizona Cliffrose**

The Arizona cliffrose is an evergreen shrub of the rose family, with pale, shredded bark. The young twigs have dense hairs. Leaves have one to five lobes with down-curved edges. The flowers have five white or yellow petals less than 0.5 inches long. The Arizona cliffrose is found on white soils of tertiary limestone lakebed deposits at elevations below 4,000 feet. All four localities of this species are in Central Arizona below the Mogollon Rim. These known sites include Burro Creek drainage (Mohave County), Horseshoe Lake area (Maricopa County), Verde Valley (Yavapai County), and San Carlos Indian Reservation (Graham County).

**III.E.3.d.(3) Arizona Hedgehog Cactus**

The Arizona hedgehog cactus is dark green, cylindroid, 2.5-12 inches tall, two to ten inches diameter, has one to three gray or pinkish central spines and five to eleven shorter radial spines. They grow singly or in clusters and have brilliant red flowers on the side of the stem in April-May. Plants are found on open slopes, in narrow cracks between boulders and in the understory of shrubs in the ecotone between Madrean Evergreen Woodland and Interior Chaparral. Arizona hedgehog may be found at elevations from 3,700-5,200 feet in Gila and Pinal counties, in the Superior-Globe area.

**III.E.3.d.(4) Bald Eagle**

The bald eagle is a large raptor with a wingspan of 66-96 inches and a height of 28-38 inches. Adults have a white head, neck, and tail, while birds four years old or less are dark with mottled brown plumage. Eagles feed primarily on fish, but waterfowl, small mammals, and carrion constitute a portion of the diet. Arizona's resident population of bald eagles (40 known breeding territories) breeds mostly along the lower elevations of the Salt and Verde Rivers. Nesting sites are usually in trees, on cliffs or pinnacles in close proximity of water. A significant number of wintering eagles can be found at most elevations and habitat types near water, especially along the Mogollon Rim and the White Mountains. On July 6, 1999, the USFWS published a proposed rule to remove the bald eagle from the list of T&E wildlife in the lower 48 States (64 FR 36453-36464). Bald eagles may be found in Yuma, La Paz, Mohave, Yavapai, Maricopa, Pinal, Coconino, Navajo, Apache, Santa Cruz, Pima, Gila, and Graham Counties.

**III.E.3.d.(5) Cactus Ferruginous Pygmy-Owl**

The cactus ferruginous pygmy-owl is a small (approximately seven inches tall) owl having reddish-brown feathers overall with a cream-colored belly streaked with reddish-brown, although some individuals are grayish-brown. Diet includes birds, lizards, insects and small mammals. It is non-migratory throughout its range. The western population of the subspecies spans from lowland Central Arizona south through western Mexico. Historically, the cactus ferruginous pygmy-owl was reported as occupying cottonwood-willow woodlands or mesquite bosques as far north as the confluence of the Salt and Verde Rivers (Arizona Game and Fish Department in prep.). Recent observations have been restricted to Sonoran Desertscrub habitats characterized by braided-wash systems and dense vegetation including ironwood, paloverde and mesquite. While historically they were documented in cavities of cottonwoods, willows, or mesquites, recent nest sites have been in saguaro cavities. The cactus ferruginous pygmy-owl is crepuscular/diurnal and can be heard calling in the early morning and in the early evening, particularly during breeding season, which lasts from approximately January through early June (Abbate et al. 1996, U.S. Fish and Wildlife Service 1999). Critical habitat has been designated by USFWS in Pima and Pinal counties.

Table III-15 is a summary of five criteria that were used in assessing the suitability of habitat among the M&I entities for the pygmy-owl. The greater the value for each of these five parameters, the better the habitat for the pygmy-owl.

M & I	Avg. fhd per site	% frequency bursage	% frequency creosote-bush	% frequency foothills paloverde	avg. tree density per acre
Peoria	70	72	65	20	4.5
Surprise	67	79	47	29	0.8
Goodyear	53	20	94	20	2.8
Cave Creek	70	53	19	31	0.3
Phoenix	54	82	54	09	1.0
Scottsdale	59	86	30	17	1.3
Apache Inct.	53	90	73	18	2.6
Superior	54	87	24	10	3.3
Oro Valley	87	35	23	25	2.2
Avra	110	20	90	20	2.6
Tucson	98	75	45	21	1.2

The USFWS announced the availability of its recommended guidance for private landowners concerning the cactus ferruginous pygmy-owl and the survey protocol in the FR on March 20, 2000 (65 FR 14999-15000). Depending on the location of the clearing or land disturbance activity, two consecutive years of surveys may be required.

#### **III.E.3.d.(6) Lesser Long-nosed Bat**

The lesser long-nosed bat is one of three leaf-nosed bats that occur in desertscrub habitat in central and southeastern Arizona below 6,000-foot elevation. Its wingspan averages approximately 14 inches and it has an elongated muzzle, small leaf nose, very short tail, and long tongue. The fur is yellowish-brown or gray above and cinnamon-brown below. This bat is migratory, being present in Arizona from approximately April to September, and roosting in caves and abandoned tunnels. This species is easily disturbed. Females mate in Mexico during the winter and are pregnant when they arrive in Arizona, where they congregate in maternity colonies. Agave and columnar cacti serve as food-source plants for this pollen and nectar eating species. Lesser long-nosed bats may occur in Pima, Santa Cruz, Graham, Pinal, and Maricopa Counties.

#### **III.E.3.d.(7) Nichol's Turk's Head Cactus**

The Nichol's Turk's head cactus is a blue-green to yellowish-green columnar cactus that is 18 inches tall and has an eight-inch diameter. The spine clusters have five radial and three central spines (with one downward short spine and two upward spines that are red or gray). The flowers are pink and the fruit is wooly white. This cactus can be found in unshaded microsites in Sonoran Desertscrub, on dissected alluvial fans, or at the foot and saddles on limestone mountains; at elevations from 2,400-4,100 feet in Pinal, Pima, or Yuma Counties.

**III.E.3.d.(8) Pima Pineapple Cactus**

The Pima pineapple cactus has hemispherical stems four to seven inches tall and three to four inches in diameter. The central spines are about one inch long, hooked at the end, and straw colored, with 10-15 radial spines in older plants. Stems are usually solitary but can occur in clusters. Flowers are yellow, salmon or rarely white. This cactus is found in the Sonoran Desertscrub or Semi-Desert Grassland communities at 2300-5000 feet in Pima County from Baboquivari Mountains east to the Santa Rita Mountains in Santa Cruz and Pima counties. Most known locations are associated with the Tucson basin.

**III.E.3.d.(9) Southwestern Willow Flycatcher**

The southwestern willow flycatcher is a small, neotropical migratory bird, approximately six-inches long, with grayish-green back and wings, a whitish throat, light olive-gray breast, and a pale yellowish belly. It has two wingbars and the eye ring may be faint or absent. The flycatcher arrives in Arizona from late April to early May and usually leaves in September. In general, southwestern willow flycatchers nest in areas near surface water or saturated soil in dense, closed-canopy stands of riparian vegetation. Critical habitat is designated on portions of the 100-year floodplain on the San Pedro and Verde Rivers, the Colorado River, and the Little Colorado River in the higher elevations near Greer.

**III.E.3.d.(10) Yuma Clapper Rail**

The Yuma clapper rail is found at elevations below 4,500 feet in brackish and freshwater marshes with emergent vegetation that usually includes cattails or bulrushes. The Yuma clapper rail has long legs, a short tail, and a long slender decurved bill. Its plumage is mottled brown on gray on its rump, with dark gray with vertical streaking that produces a barred look on its flanks and undersides (U.S. Fish and Wildlife Service 1999). Calling activities peak in February and most eggs hatch in early June. Dense, herbaceous vegetation is needed for its nesting and foraging. Crayfish are its main food source in Arizona. Yuma clapper rails have been found on the Gila River just downstream of the confluence of the Salt and Gila rivers, and in isolated areas on the Verde River in the Verde Valley.

**III.E.4. Environmental Consequences**

Impacts to biological resources would include direct impacts from construction of CAP delivery facilities, and development of new irrigated lands on the Indian Reservations. Direct impacts for each entity, based upon available plans, are described in Appendix L. Since final construction plans are not available, Reclamation will carry out supplemental environmental review, pursuant to NEPA and ESA for these construction impacts when final plans are available (see Chapter V). Indirect impacts from retirement of irrigated lands due to economic conditions vary only in timing among alternatives. Under the No Action Alternative and all action alternatives, loss of habitat associated with land use changes in the M&I and NIA service areas would also occur. Land use changes due to continued urban growth are identical under all alternatives. A general description of the types of impacts to biological resources follows. Table III-12 in Chapter III-D.4- Land Use, quantifies the acreage of land use changes for each of these types of impacts.

**III.E.4.a. Development of desertlands for agriculture**

Development of agriculture would occur only on Indian Reservations, and would vary in the amount of acreage, depending upon the action alternative. For purposes of evaluating a worst-case scenario, it has been assumed all agricultural development resulting from any of the proposed allocations would occur on native desert. As many as 50,000 acres of new irrigated farmland could be developed as a result of water allocated to Indian Tribes (see Table III-12). Associated infrastructure would likely include pipelines, irrigation and drainage canals, lateral canals and field ditches. This would result in direct loss of Sonoran Desertscrub Biome and associated habitat types. The impacts to wildlife would depend on the condition and quality of the habitat at the time of development. Indirect impacts from the fragmentation and isolation of the remaining natural habitat and loss of wildlife movement corridors may also occur. Degradation may occur in undeveloped habitat adjacent to the developed areas. Some of the possible impacts to wildlife and/or their habitat include increased road kills, exposure to human disturbance such as off-road vehicle (ORV) activities, hiking, free-roaming pets, and the possible introduction of non-native species.

**III.E.4.b. Conversion of desert to urban uses**

Urbanization will continue in each of the 21 M&I entities' MPAs and/or water service areas. The rate of growth would be identical under all of the alternative allocations, so the acres urbanized would be the same under all alternatives, including No Action. This would result in direct loss of Sonoran Desertscrub Biome and associated habitat types. The impacts to wildlife would depend on the condition and quality of the habitat at the time of development. Indirect impacts from the fragmentation and isolation of the remaining natural habitat and loss of wildlife movement corridors may also occur. Degradation may occur in undeveloped habitat adjacent to the developed areas. Some of the possible impacts to wildlife and/or their habitat include increased road kills, exposure to human disturbance such as ORV activities, hiking, free-roaming pets, and the possible introduction of non-native species. Appendix L provides additional details on each M&I planning area.

**III.E.4.c. Conversion of agricultural lands to urban uses**

Agricultural lands, within the M&I MPAs and/or water service areas and within the IDs, will continue to be urbanized over the 50-year study period. The rate of urbanization is identical under all the alternatives. Natural habitat and wildlife impacts should be minimal. However, some species, such as burrowing owls that often utilize fallow fields for nesting, would be adversely affected.

**III.E.4.d. Conversion of agricultural lands to fallow fields**

Under the different alternatives, varying amounts of irrigated farmland would be fallowed due to economic conditions resulting from changes in the availability and cost of CAP water for the NIA sector. Through natural revegetation processes, these fallow fields can provide fair wildlife habitat in the long term. Restoration or revegetation with native species would enhance this process if these fields are not developed in the future. Growth of noxious weeds could create a nuisance that would need to be managed.

**III.E.4.e. Impact to riparian areas from reductions in effluent discharge**

Under Non-Settlement Alternatives 2 and 3, 65,647 afa of M&I priority water would be reallocated from M&I users to Indian Tribes and communities. An evaluation was made to determine if the cities would likely utilize effluent as a substitute for this water supply, with potential adverse impacts to the riparian communities that depend on effluent discharges (e.g., the Salt River below 91<sup>st</sup> Avenue WWTP or the Santa Cruz River downstream of the Roger Road WWTP). Appendix L provides a water budget for each municipality, which estimates future effluent use under each alternative. In total, the increased reuse of effluent under Alternatives 2 and 3 is 27,500 afa in year 2051. This reuse of effluent would not require any reduction in effluent discharge to streams over current levels, since it represents increases from future population growth. Therefore, the allocations would not impact any existing riparian habitats which depend on effluent discharge.

**III.E.4.f. Impacts to Colorado River mainstem**

All CAP water diversions currently occur at Parker Dam. Under Non-Settlement Alternatives 2 and 3, a total of 13,500 af of CAP water would be allocated and contracted to the Navajo Nation and Hopi Tribe. This water would most likely be delivered from a diversion from Lake Powell. Based upon the anticipated use for M&I purposes, it is estimated this would result in a constant diversion of less than 20 cfs.

The estimated change in depth in the river's water surface between Lake Powell and Lake Mead, associated with this 20 cfs diversion, was calculated to range between 0.004 and 0.01 inches (see Appendix J). Based upon the incremental change in water surface elevation, the impacts to aquatic and other wildlife would be inconsequential.

**III.E.5. Impacts to T&E species**

Reclamation has determined that the allocation alternatives considered in this draft EIS would have no effect on T&E species. This determination is based on the following:

- ◆ The alternative reallocations of CAP water would have no effect on urban population growth (see Appendix C). Accordingly, there would be no effect on T&E species from the water allocations to the M&I entities. This is not meant to imply that continued urban growth would have no effect on T&E species -- only that such urban growth would be the same under any of the allocation alternatives, including no action. Each municipality would need to comply with the relevant provisions of the Endangered Species Act for urban growth related issues. Appendix L identifies those M&I entities that have potentially suitable habitat for T&E species within their planning areas.
- ◆ The retirement of agricultural lands which may result from the alternative allocations would have no effect on T&E species.
- ◆ It is premature to consult on potential impacts to T&E species that could result from the

development of agricultural lands or other CAP related developments on Indian reservations. It is not possible to identify the areas of potential impact at this time, since the specific locations of Indian agricultural and other developments are not known. Reclamation will carry out specific Section 7 evaluations for future Federal actions (Tribal water service contracts, federally funded construction) once specific development plans are identified. Appendix L provides available information on potential T&E species impacts for each Tribe.

- ◆ It is premature to consult on potential impacts to T&E species that could result from construction of new CAP water delivery facilities to M&I allottees. The specific areas that may be affected by such facilities cannot be identified at this time. Reclamation will carry out specific Section 7 consultations for each M&I subcontract (or subcontract amendment) for any new delivery facilities which may affect T&E species. Appendix L provides currently available information on necessary water delivery facilities for each M&I entity.

## **III.F. CULTURAL RESOURCES**

### **III.F.1. Introduction**

A cultural resources overview was completed for the 35 CAP entities including 21 M&I entities, nine NIA users, and five Indian Tribes that could receive CAP water under the proposed allocation. The overview provides an initial summary assessment of known and/or projected cultural resources located in the areas of these entities that might be affected by the proposed allocation.

### **III.F.2. Impact Analysis Methodology**

A summary culture history of the project areas was prepared to provide a historic context for the cultural resource data (see Appendix G). Site and project maps on file at Archaeological Consulting Services, Ltd. (ACS), the State Historic Preservation Office (SHPO), and the Arizona State Museum (ASM) were checked to determine the extent of archaeological survey coverage and the location of known cultural resources for each individual entity, including the presence of archaeological and/or historic districts that are listed on the National and/or State Register of Historic Places. It should be noted that other repositories throughout Arizona (e.g., the BLM, the Forest Service, Northern Arizona University [NAU]) maintain their own site and project records, not all of this documentation is duplicated at ASM and SHPO. The cultural sensitivity designations derived from the map check must be understood as merely a starting point for estimating the magnitude of potential effects at this stage of the planning process.

The map check focused on non-urban areas, as defined by Reclamation. Information on specific site types and specific surveys were not desired at this stage of the planning process, nor did the limited time frame available to complete this overview allow for assembling data at such level of detail. Site locations were marked on USGS 7.5 minute topographic quadrangles (quad). The classification system initially sought to identify areas of low (<2 sites per mi<sup>2</sup>), moderate (3 to 5 sites per mi<sup>2</sup>), or high (>6 sites per mi<sup>2</sup>) cultural resource density. However, the nature of human occupation in the area affected by the proposed allocation is such that a single "site" might extend over an entire section; in such cases, the area was classified as having high or moderate cultural resource sensitivity based on the preparer's judgment. The cultural sensitivity data were then marked on individual entity maps, that are included in Appendix L.

Because of the highly sensitive nature of the information and confidentiality issues involving the various Tribes, no attempt was made to obtain locational data regarding cultural resources or traditional cultural places on Tribal lands. It should be noted that some USGS 7.5' minute quad maps on file at SHPO are classified as restricted at the request of various Indian Tribes whose lands extend onto map boundaries; these quad maps were not reviewed. Additionally, some maps were not on file at either ASM or SHPO; others were available only at one agency. Data for the relevant portions of entities that could not be found at either ASM or SHPO were derived solely from site and project information on file at ACS.

Surveyed areas were noted to estimate the current level of coverage for each entity. However, a comprehensive evaluation of the adequacy of survey coverage for each entity was not addressed. Representative examples of the types of archaeological work done in each entity were cited whenever possible. It should be noted that the presence of cultural resources in an area does not necessarily

reflect the extent of survey coverage; many sites that were mapped and recorded during the late 1800s and early 1900s are in areas that have not been systematically examined.

Planning department officials for each of the 21 M&I entities were contacted to ascertain the existence of local laws or regulations pertaining to the preservation of cultural resources. Some municipalities (e.g., Scottsdale, Mesa, Glendale, and Tempe) have rules currently in place; others (e.g., Phoenix) are in the process of compiling written historic preservation plans to be implemented in cultural resource compliance projects. When available, this information was included in the individual entity descriptions. Individual entity descriptions are contained in both Appendix G and Appendix L.

Impacts were assessed based on known cultural resource density, extent of survey coverage, potential for buried deposits, and information regarding projected uses for the CAP water under each of the proposed alternatives. It was assumed that any change in land use (e.g., urbanization of farmland), ground-disturbing activities (e.g., well-drilling), and activities that might alter the landscape (e.g., flooding), would potentially affect cultural resources.

Many archaeological sites are also traditional cultural places (TCPs) or sacred sites associated with present-day Native American ceremonial activities. There are other areas such as certain landscapes or areas where traditional plants have been and continue to be collected that may also qualify as TCPs. Locational information about these places is often confidential (for example, refer to the American Indian Religious Freedom Act of 1979 and Executive Order 13007 that addresses Federal compliance with sacred sites), and permission to conduct a records check at Tribal historic preservation offices to identify these areas must be requested from each Tribal historic preservation office. Not all Tribes have a historic preservation office, however. In these cases, consultation regarding TCPs and sacred places must be conducted with designated Tribal elders. Regardless, adequate time must be allowed for these consultations, particularly when consulting with Tribal elders.

Identification of TCPs and sacred places for all affected project sectors was beyond the scope of the present study. No attempt was made to discover site density or degree of survey coverage within Tribal sectors. Because site record access was relatively easy, basic survey coverage was obtained for many of the non-Tribal entities, but no information on TCPs was obtained. Tribal consultation regarding the location of sites, TCPs sacred places and other areas that may need to be avoided will be implemented as soon as possible pending decisions regarding implementation of a given alternative. It should also be noted that TCPs are applicable to other ethnic groups and not only to Native Americans. TCP consultation must try to identify and consult with as many potentially affected groups as possible.

Indian Trust Assets (ITAs) must also be considered, but like TCPs and sacred sites, until a ROD is made, current project information is too general to aid in assessing ITAs.

All relevant information for each of the 35 entities is summarized in Appendix G. Potential cultural impacts under each alternative are also summarized in Appendix G.

### **III.F.3. Affected Environment**

#### **III.F.3.a. M&I Sector**

The MPAs and/or service areas of the 21 M&I entities contain a variety of landscapes from highly urbanized to native desert. Prior to the arrival of non-Indians, these lands were essentially identical to those discussed below in the Indian Sector. Many could have been considered areas of high cultural resource sensitivity; some remain so today. Development and urban growth over the last 100 years have eliminated the native desert landscapes of some of the M&I areas, covering over, if not completely removing, many of the cultural resources once present in these areas. Reports by archaeologists from the late nineteenth and early twentieth centuries--prior to intensive agricultural and the beginning of urban development-- reveal that entities such as Phoenix, Glendale, Scottsdale, Mesa, Chandler, and Tucson contained significant, sometimes extensive, cultural resources. Initially, these were mostly plowed over as agriculture rapidly expanded. Eventually, the fields began to be built over, paved over, and ultimately re-landscaped to meet the needs of growing metropolitan and urban development. Other M&I entities located in more rural areas of central and southern Arizona retain varying amounts of native desert landscapes and their associated cultural resources. As is true of central and southern Arizona in general, areas adjacent to reliable sources of water usually contain (or contained) high densities of cultural resources. These areas, favored by prehistoric and protohistoric Indian farmers for building their villages and farms, were, not surprisingly, also the first choice of non-Indian farmers and developers upon entering these areas.

In spite of more than 100 years of often intensive development, intact cultural resources are present in portions of some of the M&I entities beneath the veneer of twentieth century urbanization. In downtown Phoenix, as one example, recent construction projects revealed not only the remains of late nineteenth century downtown Phoenix, but underneath these, considerable evidence of much earlier prehistoric Hohokam occupation. In rural areas where development has been less intensive and perhaps more localized, the chances for finding intact, relatively undisturbed cultural resources are obviously greater.

It should be noted that with the influx of Euro-Americans from a variety of cultural backgrounds and the subsequent development of new communities, traditional cultural places and new cultural landscapes associated with some of these newcomers may be present in the areas of some of the M&I entities. Conversely, places that may have once held significance to Native Americans are likely to have been destroyed by development, particularly in the metropolitan and urban entities. In rural areas, where there has been considerably less development, as well as more restricted spatial development, there is a greater likelihood for identifying traditional cultural places associated with specific Native American groups.

Specific cultural resource information for each of the 21 M&I entities is available in Appendices G and L. Maps showing areas within each entity with greater cultural resource sensitivity are included in Appendix L.

### **III.F.3.b. NIA Sector**

Much of the NIA land is located away from major metropolitan and urban areas. Some of this land is located on or near areas that were used by Hohokam farmers and that today are being supplied water from canals that follow their prehistoric predecessors. As canals and laterals were extended, wells drilled, or both, additional agricultural lands were developed in desert areas that were previously sparsely populated or unoccupied in prehistoric times. Nonetheless, cultural resources can be found in many of the NIA sectors in spite of decades of plowing and irrigation. Beneath the plowzone, intact prehistoric villages can often be found in excellent condition with varying degrees of damage depending on how deeply the remains are buried. This situation is similar to that in some of the downtown metropolitan areas where intact cultural resources are found beneath streets and buildings.

Some of the NIA sectors are located in areas that were not intensively occupied by the Hohokam or later Native American groups, primarily because of the absence of reliable water sources. Consequently, these areas are less likely to contain the large, complex cultural resource sites that occurred along the Salt and Gila Rivers where extensive canal systems supported large prehistoric populations and delivered water to Hohokam fields. Other NIA sectors are adjacent to areas known to contain extensive prehistoric villages, and it is likely that remnants of these or other villages may be located in these sectors.

Lands in the NIA sectors that for one reason or another were never developed for agriculture, obviously offer more potential for undisturbed cultural resources, including TCPs. Additional information on the NIA sector is presented in Appendices G and L. Maps of the affected NIA sector lands, indicating known or potential areas of cultural resource sensitivity, can be found in Appendix L.

### **III.F.3.c. Indian Sector**

For this overview, all Indian lands are considered areas of high cultural resource sensitivity. In general, the spatial boundaries of archaeological sites are defined by surface feature and artifact distribution. However, to Native American groups the land itself can be an important symbol of their shared heritage. The natural environment of specific geological landmarks, as well as larger landscapes, is an integral part of Native American lifeways. Many of these are traditional cultural places used for ceremonial as well as secular activities, and are still in use today. Some are tied to origin or creation myths, kinship, and clan affiliations. Others might serve as physical reference points associated with stories and songs used to convey traditional history and detail proper behavior. Thus, not only the preservation of cultural resources, but also the preservation of the natural landscape, plays a vital part in the preservation of traditional historical knowledge (36 CFR 60.4/National Register Bulletin 38).

Because many archaeological sites also are TCPs associated with present-day Native American ceremonial activities, locational data regarding these properties are often confidential (see American Indian Religious Freedom Act of 1978). Permission to conduct a Tribal records check for purposes of compiling such information must be requested from the individual tribes, and sufficient time must be allowed for Tribal response. Given the limited time frame involved, this was beyond the scope of

the present study. Therefore, no attempt was made to discover site density or degree of survey coverage within the Tribal entities. Tribal consultation regarding location of sites, TCPs, and other areas to be avoided should be implemented at a sufficiently early future stage of the planning process to allow adequate opportunity for the Tribes to respond and ensure the undertaking meets cultural resource compliance guidelines within these entities.

Because of the complex nature of past aboriginal settlement in the Southwest (see Appendix G), various Tribes claim cultural affinity with areas outside their currently designated reservation boundaries. To assist the compliance process, maps showing the areas of cultural affinity claimed by the various Arizona Tribes are included as part of Appendix G. It should be noted that these maps, prepared by ASM, do not include information for all Tribes. The maps, and the accompanying list of Tribal leadership and cultural resource division contacts (prepared by SHPO) (see Appendix G, Attachment A) should be considered a starting point for identifying all potential consulting parties in this undertaking.

Both Appendix G and Appendix L include information on the Indian Tribes that could receive water under the proposed allocation. Figures identifying the cultural resources sensitivity areas for each Indian Tribe also are included in Appendix L.

#### **III.F.4. Environmental Consequences**

At this stage of the planning process, only general information exists regarding the portions of each entity that might be affected by the proposed allocation and contract execution. Therefore, no entity-specific recommendations can be made. The following assessment of potential impacts to the cultural resources is by necessity expressed in general terms and might be applied to all entities.

Impacts to the cultural resources within the areas of individual entities are expected to be similar under all proposed alternatives, although the acreage of new agricultural lands on Indian Reservations varies among the alternatives. Since any ground-disturbing activities have the potential to impact known and/or as yet undiscovered cultural resources, cultural impacts can be anticipated in any undertaking involving 1) urbanization of farmland, an action which has the potential to adversely impact intact cultural deposits that might still exist below the plowzone; 2) subjugation of natural desert for agriculture, an action which has the potential to adversely impact intact cultural deposits presently on the surface and within the plowzone; and 3) any related ground-disturbing activity that might result from implementation of the proposed allocation.

As stated in the introduction to this chapter, direct impacts would be those impacts that would occur as a direct result of the proposed allocation and contract execution, an example being land-disturbing activities associated with the construction of facilities needed to take, treat, and deliver CAP water. Construction-associated impacts to archaeological resources would result from such anticipated activities as excavation, temporary stockpiling, and disposal of earthen materials; manufacture or delivery of concrete; construction of concrete-lined canals, turnouts, siphons, flood protection berms, dikes, reservoirs, pipelines, water-treatment plants, wells, and pumping stations; and modifications to existing canals and equipment. These impacts would be quantified once specific plans are known. Compliance with the NHPA would be completed at that time.

No additional adverse effect is anticipated to cultural resources located in currently agricultural acreage that is to remain under cultivation or allowed to go fallow and abandoned. An exception would involve the construction of new field irrigation features like laterals or sprinklers that would

require excavation beneath the existing plowzone. Subjugation of previously undisturbed (desert) land for agriculture would directly impact surface cultural remains and might impact buried deposits within the plowzone. Likewise, urbanization of land presently used for farming could potentially impact any intact cultural deposits currently preserved below the plowzone.

Adverse effects are also expected to occur from activities that have the potential to alter the landscape, such as mineral extraction and the construction of permanent features such as recharge basins. Direct impacts to archaeological sites resulting from any of these activities would be long-term and permanent.

### **III.F.5. M&I Sector**

#### **III.F.5.a. No Action Alternative**

Under the No Action Alternative, urban growth is expected to continue. An estimated 240,000 acres would be converted from desert to urban uses and 68,150 acres from agricultural to urban uses within the 21 M&I planning areas over the 50-year study period. Such growth would have impacts on the cultural resources, as outlined above. Avoidance or mitigation of cultural resource impacts would be the responsibility of the local jurisdictions. Information on local ordinances with respect to the cultural resources is outlined in Appendix L.

#### **III.F.5.b. Settlement and Non-Settlement Alternatives**

The level of urban growth would be as described under the No Action Alternative. Reclamation would consult under NHPA Section 106 only for those actions that are directly related to taking CAP water deliveries (i.e., facilities necessary to tie into the CAP canal and take and treat the water). Impacts to the cultural resources resulting from urban growth are not a consequence of the proposed allocation. They would occur regardless of the allocation decision.

### **III.F.6. NIA Sector**

#### **III.F.6.a. No Action Alternative**

Under the No Action Alternative, an estimated 46,900 acres of farmland are expected to be urbanized within the nine NIA districts over the 50-year study period. An additional 40,926 acres are expected to be fallowed and left undeveloped as a result of economic conditions.

#### **III.F.6.b. Settlement and Non-Settlement Alternatives**

The level of urbanization would be as described under the No Action Alternative. Avoidance or mitigation of cultural resource impacts associated with urbanization would be the responsibility of the local jurisdictions. Information on local ordinances with respect to the cultural resources is outlined in Appendix L.

### **III.F.7. Indian Sector**

#### **III.F.7.a. No Action Alternative**

No additional CAP water would be provided to the Tribal entities under the No Action Alternative. No additional impacts to the cultural resources would result.

#### **III.F.7.b. Settlement and Non-Settlement Alternatives**

The potential for delivery facilities and agricultural development on the reservations that could occur as a result of proposed allocations is summarized by Indian Tribe as follows (see Appendices G and L for additional detail).

##### **III.F.7.b.(1) GRIC**

Under the Settlement Alternative, Non-Settlement Alternative 2, and Non-Settlement Alternative 3, the GRIC would receive additional CAP water. Under the Settlement Alternative, an estimated additional 20,800 acres would be subjugated for agriculture. Under Non-Settlement Alternative 2, an estimated additional 16,700 acres would be subjugated for agriculture. Under Non-Settlement Alternative 3, an estimated additional 38,000 acres would be subjugated for agriculture. The lands to be developed, and the appurtenant facilities to be constructed, are identified in the PMIP PEIS (Reclamation). Under Non-Settlement Alternative 1, the GRIC is the only Tribe to receive an allocation, and would receive an additional 17,000 af of water, which would be used for irrigation as part of PMIP PEIS. Under Non-Settlement Alternative 1, an estimated additional 8,000 acres would be subjugated for agriculture. National Historic Preservation Act (NHPA) Section 106 compliance is being carried out as part of the PMIP, in which Reclamation is directly involved.

##### **III.F.7.b.(2) TON**

Under the Settlement Alternative, Non-Settlement Alternative 2 and Non-Settlement Alternative 3, the TON would receive additional CAP water (23,000 afa to San Xavier District and 5,200 afa to Schuk Toak District). Under each of these three Alternatives, an estimated 4,000 acres would be developed for agriculture. It is also anticipated that some of this CAP water would be made available for recharge on-reservation; facilities associated with this use include infiltration basins, pipelines, and pumps. Other possible uses include growing mesquite, habitat enhancement, river restoration, recreation, and mining. Because Reclamation is directly involved in implementing the CAP distribution facilities (through funding) for both districts, NHPA Section 106 consultations would be carried out, and mitigation plans developed.

##### **III.F.5.b.(3) SC Apache Tribe**

The SC Apache Tribe would receive additional CAP allocation only under Non-Settlement Alternatives 2 and 3. Under Non-Settlement Alternative 2, an estimated 4,700 acres would be developed for agriculture. Under Non-Settlement Alternative 3, an estimated 8,000 acres would be developed for agriculture. Additionally, some of the allocated water could be used for aquaculture, fish hatchery, livestock grazing, mining of peridot and gypsum, and maintenance of a minimum pool

within the San Carlos Reservoir; these uses would reduce the amount of agricultural acreage accordingly. Facilities would include construction of pump stations and pipelines, disturbing approximately 750 acres.

#### **III.F.7.b.(4) Navajo/Hopi**

The Navajo/Hopi would receive additional CAP water only under Non-Settlement Alternatives 2 and Non-Settlement Alternative 3. It is anticipated CAP water would be diverted to users via the Western Pipeline or the Lake Powell Pipeline. It is estimated that construction of the necessary distribution lines to supply the water would impact an estimated 3,100 acres if both pipelines are constructed (1,100 acres for the Western Pipeline and 2,000 acres for the Lake Powell Pipeline).

### III.G. AIR QUALITY

The proposed allocation would result in minor short-term increases in air emissions associated with construction of water conveyance and associated support facilities. Those short-term air emissions are addressed qualitatively because specific information regarding the type, number, and location of additional water transfer conveyance facilities is currently unknown. The long term direct effects of water transfer are expected to be negligible. The long term indirect air quality effects associated with water allocation-induced economic activity could be substantial; however, due to the timeframe in which they would occur (year 2043 and beyond) and the uncertainty of conditions and standards that may apply at that time, these impacts are discussed at a programmatic level.

#### III.G.1. Impact Analysis Methodology

The air quality analysis focuses on estimating criteria pollutant emissions associated with economic development resulting from each of the alternatives, including the No Action Alternative. The objective is to evaluate whether each action alternative would significantly increase emissions when compared to the No Action Alternative, which is the baseline for assessing project impacts. Appendix H contains a detailed description of the methodology used for this analysis.

Air emissions were estimated for ozone (O<sub>3</sub>) precursors (reactive organic gases [ROG] and oxides of nitrogen [NO<sub>x</sub>]), for carbon monoxide (CO), and for respirable particulates (particulate matter less than 10 microns in diameter or PM<sub>10</sub>). O<sub>3</sub> (and its precursors), CO, and PM<sub>10</sub> constitute the pollutants of most concern in Arizona and are the pollutants that would be generated by water-allocation-induced economic development.

Changes in air emissions would potentially result from changes in agricultural production by Indian Tribes and NIA users. For changes in agricultural water use, emissions were calculated based on changes in crop acreage using agricultural emission inventories and emission factors for agricultural activities. The socioeconomic study (Appendix D) provided agricultural production estimates that were used for this analysis. Because none of the action alternatives are expected to either stimulate or reduce growth rates for the M&I entities, future air emissions associated with these entities would not change beyond what is currently projected to occur under No Action.

The factors that were considered in evaluating potential impacts included identifying whether or not an alternative would result in a net increase in emissions that exceed certain levels. For each alternative, emissions are subdivided by location based on whether emissions are within an attainment versus a non-attainment area. Non-attainment areas are those that violate the Federal and Arizona ambient air quality standards.

Significance thresholds were developed for use in this analysis as benchmarks for assessing the magnitude of air pollution emissions associated with each alternative. These thresholds were developed based on the county in which the emissions would occur, the type of pollutant, and the attainment status for each affected county. If the affected county is currently in a nonattainment status for a specific criteria pollutant, the general conformity threshold for that pollutant was used. If the affected county is in an attainment status for a pollutant, new source review (NSR) thresholds were used. NSR requirements apply to new stationary sources of pollution, such as power plants or factories, that generate new emissions from a specific location. For this project, NSR

requirements would not be applicable because the sources of emissions would be classified as area sources. NSR thresholds are only being used in this analysis to provide perspective on the magnitude of air impacts in attainment areas.

### III.G.2. Existing Conditions

Air quality is evaluated by measurement of ambient concentrations of pollutants that are known to have deleterious effects. The U.S. Environmental Protection Agency (EPA) has promulgated primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: CO, nitrogen dioxide (NO<sub>2</sub>), PM<sub>10</sub>, O<sub>3</sub>, sulfur dioxide (SO<sub>2</sub>), and lead. Primary standards are adopted to protect public health, while secondary standards are adopted to protect public welfare (Arizona Department of Environmental Quality [ADEQ] 1998). States are required to adopt ambient air quality standards that are at least as stringent as the Federal NAAQS. The ADEQ is responsible for regulating air quality in the State and has adopted the Federal NAAQS as State standards.

As of July 1, 1997, EPA had revised the standards for O<sub>3</sub> and particulate matter to ensure a more effective and efficient protection of public health and the environment. These revised standards are an eight-hour O<sub>3</sub> standard of 0.08 ppm, a 24-hour standard for PM<sub>2.5</sub> (particulate matter with a diameter of 2.5 microns or smaller) of 65 micrograms per cubic meter (µg/m<sup>3</sup>) and an annual PM<sub>2.5</sub> standard of 15 µg/m<sup>3</sup> (ADEQ 1998). However, the revised O<sub>3</sub> and particulate matter standards are currently on hold pending resolution of ongoing litigation.

Portions of the study area are located in areas designated as non-attainment for Federal O<sub>3</sub>, CO, and PM<sub>10</sub> standards. The applicable *de minimis* thresholds are 25 tons per year (tpy) of reactive organic gases and nitrogen oxides, 100 tpy of CO, and 70 tpy of PM<sub>10</sub>. If implementation of an alternative would result in total direct and indirect emissions in non-attainment areas in excess of the *de minimis* emission rates, it must be demonstrated that the emissions conform to the applicable State Implementation Plan (SIP) for each affected pollutant. If emissions would not exceed the *de minimis* levels, and are not regionally significant, then the project is presumed to conform, and no further analysis or determination is required.

Maricopa County is designated by EPA as a non-attainment area for CO, O<sub>3</sub>, and PM<sub>10</sub> (see Table H-1 in Appendix H) (ADEQ 1998). Maricopa County was reclassified as a “serious” CO non-attainment area in August 1996, and serious PM<sub>10</sub> non-attainment area in June 1996, and was classified as a “serious” non-attainment area for O<sub>3</sub> in February 1998 (ADEQ 1998). The required CO SIP was submitted to EPA on July 8, 1999. A PM<sub>10</sub> SIP for the 24-hour standard was submitted to EPA in May 1997. The MAG submitted a complete serious area PM<sub>10</sub> SIP to EPA on July 8, 1999, which addressed both the 24-hour and annual standards. The Plan included an extension request for attainment for no longer than December 21, 2006. On August 3, 1998, EPA published in the FR a final rule promulgating a Federal implementation plan (FIP) to address the moderate area PM<sub>10</sub> requirements for the Phoenix PM<sub>10</sub> non-attainment area because the area does not have an EPA-approved PM<sub>10</sub> moderate area plan.

Pinal County is designated as an attainment area for all criteria pollutants except PM<sub>10</sub>. The county is in attainment of PM<sub>10</sub> standards for all areas except the Hayden-Miami area, which is classified as moderate non-attainment.

Pima County is designated as an unclassifiable area for CO. The last violation of the CO NAAQS occurred in 1984. A CO maintenance plan was submitted to EPA on April 21, 1996. The Plan has been deemed complete and is undergoing EPA review. Once approved, the area would be re-designated to attainment.

The remainder of Arizona is generally in attainment of NAAQS with the exception of several small areas that are classified as moderate nonattainment for PM<sub>10</sub>. These areas include the Nogales nonattainment area in Santa Cruz County, the Hayden-Miami and Payson nonattainment areas in Gila County, the Paul Spur-Douglas nonattainment area in Cochise County, the Yuma nonattainment area in Yuma County, and the Bullhead City nonattainment area in Mohave County.

### **III.G.3. Impacts**

#### **III.G.3.a. No Action Alternative**

Under the No-Action Alternative, activities within the three sectors would continue into the future consistent with current projections. The M&I entities would continue to grow in size and area as currently projected by the planning agencies for those entities. Non-Indian and Indian agricultural production would continue to decline or grow as dictated by projected water availability and economic conditions. Air quality conditions for current and future years under this alternative are described below for Maricopa, Pinal and Pima counties<sup>47</sup>. The portion of Gila County that would be affected by this project is not within a non-attainment area; therefore, no further discussion is provided for this county.

Maricopa County is currently classified as non-attainment for the Federal O<sub>3</sub>, CO, and PM<sub>10</sub> ambient standards. SIPs have been prepared that are designed to bring the County into attainment with those standards. Within Maricopa County PM<sub>10</sub> SIP control measures would be implemented to control emissions from agriculture and other fugitive dust sources. Those control measures are expected to result in no net increase in PM<sub>10</sub> emissions from those emission categories beyond 2010. Similarly, increases in CO and O<sub>3</sub> precursor emissions would be limited by the respective O<sub>3</sub> and CO SIPs. The CO, O<sub>3</sub>, and PM<sub>10</sub> SIPs have been prepared using assumptions similar to those under the No Action Alternative. Therefore, the No Action Alternative would either not result in emission increases or would limit those increases to within emission budgets developed to bring Maricopa County into compliance with the national ambient air quality standards.

Table III-16 shows mobile source emissions in Maricopa County estimated as part of the most recent transportation conformity analysis (Maricopa Association of Governments 1999). The emission estimates show that Maricopa County's projected transportation improvements, which are consistent with the No Action Alternative, would not cause or contribute to violations of the Federal ambient air quality standards because emissions would be within the County's transportation emissions budgets.

Table III-17 shows agricultural and fugitive dust emissions in Maricopa County. The emissions from these two sectors are relatively small compared to mobile source emissions and, due to proposed SIPs, are not expected to increase substantially beyond 2010.

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<sup>47</sup> Estimated air emissions data that are presented in Tables Air 8 through Air-11 were calculated to the year 2020.

<b>Year</b>	<b>ROG</b>	<b>NOx</b>	<b>CO</b>	<b>PM<sub>10</sub></b>
2000	75.6	103.2	436.0	206.0
2010	69.4	94.7	420.0	260.0
2020	77.5	105.8	462.0	309.0
Budget	84.5	Not Applicable	565.0	Not Applicable

Notes: Emission estimates for ROG, CO, and PM<sub>10</sub> based on the Maricopa Association of Governments 1999. Emission estimates for NOx based on EPA's 1996 emission inventory for Maricopa County (U.S. EPA. undated). The ratio of NOx to ROG mobile source emissions for Maricopa County in 1996 was used to estimate mobile source NOx emissions in 2000.

	<b>ROG</b>	<b>Nox</b>	<b>CO</b>	<b>PM<sub>10</sub></b>
1996 – Agriculture	0.4	2.5	1.6	24.8
1996 - Fugitive Dust Sources				68.8
2000 – Agriculture	0.4	2.7	1.7	26.3
2000 - Fugitive Dust				79.8
2010 – Agriculture	0.4	3.1	2.0	30.5
2010 - Fugitive Dust				92.6
2020 – Agriculture	0.4	3.1	2.0	30.5
2020 - Fugitive Dust				92.6

Notes: Emission estimates for ROG, CO, and PM<sub>10</sub> based on EPA's 1996 emission inventory for Maricopa County (U.S. EPA. Undated). Emissions in 2000 and 2010 assume 1.5% increase in emissions per year. Emissions in 2020 are assumed to remain unchanged from 2010 due to implementation of Maricopa County's PM<sub>10</sub> SIP and FIP.

Table III-18 shows emissions in Pinal County under the No Action Alternative. This alternative assumes that ROG, NOx, CO, and PM<sub>10</sub> would steadily increase by 1.5 percent per year through 2020.

	<b>ROG</b>	<b>Nox</b>	<b>CO</b>	<b>PM<sub>10</sub></b>
1996 - Agriculture	0.3	2.0	1.3	17.7
1996 - Fugitive Dust				29.2
1996 - Mobile Sources	10.5	19.5	105.0	0.2
2000 - Agriculture	0.3	2.1	1.4	18.8
2000 - Fugitive Dust				31.0
2000 - Mobile Sources	11.1	20.7	111.4	0.2
2010 - Agriculture	0.3	2.5	1.6	21.8
2010 - Fugitive Dust				36.0
2010 - Mobile Sources	12.9	24.0	129.3	0.3
2020 - Agriculture	0.4	2.9	1.9	25.3
2020 - Fugitive Dust				41.7
2020 - Mobile Sources	15.0	27.9	150.0	0.3

Notes: Emission estimates for ROG, NO<sub>x</sub>, CO, and PM<sub>10</sub> based on EPA's 1996 emission inventory for Pinal County (U.S. EPA. Undated). Emissions in 2000, 2010, and 2020 assume 1.5% increase in emissions per year.

Table III-19 shows emissions in Pima County under the No Action Alternative. This alternative assumes that ROG, NO<sub>x</sub>, and PM<sub>10</sub> would increase by 1.5 percent per year which is the annual increase assumed by EPA for this county (E.P.A. undated). CO emissions are assumed to level off after 2010 due to implementation of the Pima County CO SIP and because of the expected turnover in the vehicle fleet, which results in newer, cleaner vehicles being replaced by older, higher-emitting vehicles.

	<b>ROG</b>	<b>Nox</b>	<b>CO</b>	<b>PM<sub>10</sub></b>
1996 - Agriculture	0.03	0.2	0.2	3.3
1996 - Fugitive Dust				35.5
1996 - Mobile Sources	41.1	52.7	382.8	0.9
2000 - Agriculture	0.0	0.2	0.2	3.5
2000 - Fugitive Dust				37.7
2000 - Mobile Sources	43.6	55.9	406.3	1.0
2010 - Agriculture	0.04	0.3	0.2	4.1
2010 - Fugitive Dust				43.7
2010 - Mobile Sources	50.6	64.9	471.3	1.1
2020 - Agriculture	0.05	0.3	0.2	4.7
2020 - Fugitive Dust				50.7
2020 - Mobile Sources	58.7	75.3	471.3	1.3

Notes: Emission estimates for ROG, NO<sub>x</sub>, CO, and PM<sub>10</sub> based on EPA's 1996 emission inventory for Pima County (U.S. EPA. Undated). ROG, NO<sub>x</sub>, and PM<sub>10</sub> emissions through 2020 assume 1.5% increase in emissions per year compared to 1996. CO emissions beyond 2010 assumed to remain unchanged due to implementation of Pima County's CO SIP.

### **III.G.3.b. Settlement Alternative and Non-Settlement Alternatives**

Under each of the action alternatives, emissions of PM<sub>10</sub>, CO, NO<sub>x</sub>, and ROG were estimated where appropriate for current and future years and compared to analysis thresholds described previously.

No emissions estimates were prepared for the M&I sector because changes in the amount of water allocated to these entities would not affect growth rates projected for the individual entities. New M&I sector emissions would be limited to those associated with construction of new water conveyance structures and would be short-term in duration. Therefore, the air quality analysis focuses primarily on changes to agricultural production within the NIA and Indian sectors, both of which would experience changes in the amount of agricultural land that is in production during the 50-year study period. A discussion of construction impacts related to the M&I and Indian sectors is also provided.

#### **III.G.3.b.(1) Settlement Alternative**

Changes in agricultural production were estimated as part of the socioeconomic analysis for this project (Appendix D). This analysis estimated changes to the amount of land under production for each sector by crop type and for several specific milestone years between the present time and 2051.

Changes in emissions were calculated for both agricultural activities and for fallow lands that would no longer be in production. The calculations were organized by the counties where the changes would occur. Table III-20 summarizes the air emissions that would occur under this alternative. The numbers shown in the table indicate the net change in emissions resulting from a comparison of changes associated with the Settlement Alternative and expected changes in agricultural production under the No Action Alternative.

<b>Table III-20</b>							
<b>CAP Allocation Draft EIS</b>							
<b>Net Agricultural Air Emissions under the Settlement Alternative (tpy)</b>							
<b>County</b>	<b>Year</b>					<b>Analysis Thresholds</b>	
	<b>2004</b>	<b>2016</b>	<b>2030</b>	<b>2043</b>	<b>2050</b>	<b>Pre-2010</b>	<b>Post-2010</b>
<b>Maricopa County</b>							
PM <sub>10</sub>	0	2	2	-11	-33	15	250
CO	0	0	0	0	-1	50	250
NO <sub>x</sub>	0	0	0	-1	-3	25	250
ROG	0	0	0	0	0	25	250
<b>Pinal County</b>							
PM <sub>10</sub>	0	20	329*	656*	996*	250	250
CO	0	1	12	23	36	250	250
NO <sub>x</sub>	0	2	33	66	100	250	250
ROG	0	0	6	11	17	250	250
<b>Pima County</b>							
PM <sub>10</sub>	0	-37	-17	4	24	250	250
CO	0	-1	-3	-2	-1	100	250
NO <sub>x</sub>	0	-4	-2	0	2	250	250
ROG	0	-1	0	0	0	250	250
<b>Gila County</b>							
PM <sub>10</sub>	0	0	0	0	0	-	-
CO	0	0	0	0	0	-	-
NO <sub>x</sub>	0	0	0	0	0	-	-
ROG	0	0	0	0	0	-	-
Note: * indicate that significance thresholds would be exceeded.							

As indicated in Table III-20 above, the changes in emissions due to changes in agricultural production are relatively small in magnitude and would generally not exceed significance thresholds. The exception is Pinal County during the latter part of the 50-year study period. By 2043, PM<sub>10</sub> emissions from new agricultural activities could substantially exceed current threshold standards. Follow-on NEPA documentation conducted for Indian development projects would evaluate potential air quality impacts using conditions and standards that exist and are applicable at those future points in time, including regulations related to conformity and new source review standards for sources of air emissions. That NEPA documentation will indicate that projects involving Federal funds or requiring Federal approval must comply with applicable Federal, State, and local air pollution and dust control laws, regulations and ordinances. Mitigation measures will be identified to ensure compliance with those laws. This is consistent with past and current Reclamation practice.

As mentioned previously, some construction activities associated with construction of water conveyance facilities would take place within the M&I and Indian sectors. Although the magnitude of construction associated with other projects is unknown, construction activities typically result in the generation of fugitive dust and O<sub>3</sub> precursors, PM<sub>10</sub> and CO from construction vehicle exhaust. These pollutants are a potential concern especially since the projects would primarily be constructed in Maricopa, Pinal, and Pima Counties. Although the magnitude of construction associated with these projects is unknown, construction projects would be required to comply with Federal, State and local laws and ordinances regarding air pollution and dust control.

**III.G.3.b.(1) Non- Settlement Alternative 1**

Non-Settlement Alternative 1 would have similar air quality impacts compared to the Settlement Alternative although the magnitude of these impacts would be somewhat less. Increases in PM<sub>10</sub> emissions would be smaller in the later years as the incremental increase in agricultural development over the No Action Alternative would be less. Changes in air emissions would be generated by both construction activities in the M&I and Indian Sectors and from changes in agricultural production in the NIA and Indian sectors. Table III-21 summarizes the net changes in emissions associated with agricultural activities.

<b>Table III-21 CAP Allocation Draft EIS Net Agricultural Air Emissions under Non-Settlement Alternative 1 (tpy)</b>							
<b>County</b>	<b>Year</b>					<b>Analysis Thresholds</b>	
	<b>2004</b>	<b>2016</b>	<b>2030</b>	<b>2043</b>	<b>2050</b>	<b>Pre-2010</b>	<b>Post-2010</b>
<b>Maricopa County</b>							
PM <sub>10</sub>	0	2	2	2	-20	15	250
CO	0	0	0	0	0	50	250
NO <sub>x</sub>	0	0	0	0	0	25	250
ROG	0	0	0	0	0	25	250
<b>Pinal County</b>							
PM <sub>10</sub>	0	20	85	170	255*	250	250
CO	0	1	3	6	9	250	250
NO <sub>x</sub>	0	2	9	17	26	250	250
ROG	0	0	2	3	4	250	250
<b>Pima County</b>							
PM <sub>10</sub>	0	-23	-23	-23	-23	250	250
CO	0	-1	-1	-1	-1	100	250
NO <sub>x</sub>	0	-2	-2	-2	-2	250	250
ROG	0	-1	0	0	0	250	250
<b>Gila County</b>							
PM <sub>10</sub>	0	0	0	0	0	-	-
CO	0	0	0	0	0	-	-
NO <sub>x</sub>	0	0	0	0	0	-	-
ROG	0	0	0	0	0	-	-
Note: * indicate that significance thresholds would be exceeded.							

As indicated, air emissions from changes in agricultural production would exceed analysis thresholds in only one instance.

Air quality impacts resulting from construction activities would similar to those described under the Settlement Alternative.

**III.G.3.b.(3) Non-Settlement Alternative 2**

Non-Settlement Alternative 2 would have similar air quality impacts compared to the Settlement Alternative although the magnitude of these impacts would be different. Changes in air emissions would be generated by construction activities in the Indian sector and from changes in agricultural

production in the NIA and Indian sectors. Table III-22 summarizes the net changes in emissions associated with agricultural activities.

<b>Table III-22</b>							
<b>CAP Allocation Draft EIS</b>							
<b>Net Agricultural Air Emissions under Non-Settlement Alternative 2 (tpy)</b>							
<b>County</b>	<b>Year</b>					<b>Analysis Thresholds</b>	
	<b>2004</b>	<b>2016</b>	<b>2030</b>	<b>2043</b>	<b>2050</b>	<b>Pre-2010</b>	<b>Post-2010</b>
<b>Maricopa County</b>							
PM <sub>10</sub>	0	0	0	0	-22	15	250
CO	0	0	0	0	-1	50	250
NO <sub>x</sub>	0	0	0	0	-2	25	250
ROG	0	0	0	0	0	25	250
<b>Pinal County</b>							
PM <sub>10</sub>	0	20	173	344*	516*	250	250
CO	0	1	6	12	18	250	250
NO <sub>x</sub>	0	2	17	35	52	250	250
ROG	0	0	3	6	9	250	250
<b>Pima County</b>							
PM <sub>10</sub>	0	-23	-3	18	38	250	250
CO	0	-1	0	0	1	100	250
NO <sub>x</sub>	0	-2	-1	1	3	250	250
ROG	0	0	0	0	1	250	250
<b>Gila County</b>							
PM <sub>10</sub>	1	1	1	1	1	-	-
CO	3	3	3	3	3	-	-
NO <sub>x</sub>	7	7	7	7	7	-	-
ROG	1	1	1	1	1	-	-
Note: * indicate that significance thresholds would be exceeded.							

As indicated in Table III-22 above, the changes in emissions due to changes in agricultural production are relatively small in magnitude and would generally not exceed significance thresholds. The exception is Pinal County during the latter part of the 50-year study period. By 2050, PM<sub>10</sub> emissions from new agricultural activities could exceed threshold current standards. Follow-on NEPA documentation conducted for Indian development projects would evaluate potential air quality impacts using conditions and standards that exist and are applicable at those future points in time, including regulations related to conformity and new source review standards for sources of air emissions. NEPA documentation would include mitigation measures that would require projects, which involve involving Federal funds or require Federal approval, to comply with applicable Federal, State and local air pollution and dust control laws, regulations and ordinances. This is consistent with past and current Reclamation practice.

Generally, construction-related air quality impacts would be similar to those described under the Settlement Alternative. Under Non-Settlement 2, two additional major construction projects would need to be undertaken to develop delivery facilities for the CAP water allocations to the SC Apache Tribe, the Navajo Nation, and the Hopi Tribe. Construction of these facilities would generate substantial, but short-term, emissions of criteria pollutants associated with tailpipe emissions from construction vehicles and equipment, and fugitive dust. These projects are located in area that are currently in attainment for all criteria pollutants. There would be a substantial but short-term effect

on local air quality. Implementation of mitigation measures would reduce the magnitude of the impact.

### III.G.3.b.(4). Non-Settlement Alternative 3

Non-Settlement Alternatives 3A and 3B would have fairly identical air quality impacts with only minor differences in calculated net emissions. Changes in air emissions would be generated by both construction activities in the M&I (under Non-Settlement Alternative 3B only) and Indian sector, and from changes in agricultural production in the NIA and Indian sectors. Tables III-23 and III-24 summarize the net changes in emissions associated with agricultural activities.

County	Year					Analysis Thresholds	
	2004	2016	2030	2043	2050	Pre-2010	Post-2010
<b>Maricopa County</b>							
PM <sub>10</sub>	0	2	2	-9	-32	15	250
CO	0	0	0	0	-1	50	250
NO <sub>x</sub>	0	0	0	-1	-3	25	250
ROG	0	0	0	0	0	25	250
<b>Pinal County</b>							
PM <sub>10</sub>	0	20	523*	1046*	1568*	250	250
CO	0	1	19	37	56	250	250
NO <sub>x</sub>	0	2	52	105	157	250	250
ROG	0	0	9	18	27	250	250
<b>Pima County</b>							
PM <sub>10</sub>	0	-23	-3	18	38	250	250
CO	0	-1	0	0	1	100	250
NO <sub>x</sub>	0	-2	-1	1	3	250	250
ROG	0	0	0	0	1	250	250
<b>Gila County</b>							
PM <sub>10</sub>	2	2	2	2	2	-	-
CO	3	4	4	4	4	-	-
NO <sub>x</sub>	12	12	12	12	12	-	-
ROG	2	2	2	2	2	-	-
Note: * indicate that significance thresholds would be exceeded.							

County	Year					Analysis Thresholds	
	2004	2016	2030	2043	2050	Pre-2010	Post-2010
<b>Maricopa County</b>							
PM <sub>10</sub>	0	2	2	-11	-33	15	250
CO	0	0	0	0	-1	50	250
NO <sub>x</sub>	0	0	0	-1	-3	25	250
ROG	0	0	0	0	0	25	250
<b>Pinal County</b>							
PM <sub>10</sub>	0	20	523*	1046*	1568*	250	250
CO	0	1	19	37	56	250	250
NO <sub>x</sub>	0	2	52	105	157	250	250
ROG	0	0	9	18	27	250	250
<b>Pima County</b>							
PM <sub>10</sub>	0	-23	-3	18	38	250	250
CO	0	-1	0	0	1	100	250
NO <sub>x</sub>	0	-2	-1	1	3	250	250
ROG	0	0	0	0	1	250	250
<b>Gila County</b>							
PM <sub>10</sub>	2	2	2	2	2	-	-
CO	3	4	4	4	4	-	-
NO <sub>x</sub>	12	12	12	12	12	-	-
ROG	2	2	2	2	2	-	-
Note: * indicate that significance thresholds would be exceeded.							

As indicated in Tables III-23 and III-24 above, the changes in emissions due to changes in agricultural production are relatively small in magnitude and would generally not exceed significance thresholds. The exception is Pinal County during the latter part of the 50-year study period. By 2030, PM<sub>10</sub> emissions from new agricultural activities could substantially exceed current threshold standards. Follow-on NEPA documentation conducted for Indian development projects would evaluate potential air quality impacts using conditions and standards that exist and are applicable at those future points in time, including regulations related to conformity and any applicable new source review standards for sources of air emissions. NEPA documentation would include mitigation measures that would require projects, which involve Federal funds or require Federal approval, to comply with applicable Federal, State and local air pollution and dust control laws, regulations and ordinances. This is consistent with past and current Reclamation practice.

Construction-related air quality impacts would be similar to those described under Non-Settlement Alternative 2.

#### **III.G.4. Summary of Air Quality Impacts**

The following is a summary of air quality impacts that are described in this section.

**III.G.4.a. Impacts related to urbanization/new construction**

Air quality impacts associated with urbanization or new development would be limited to short-term emissions associated with construction of water conveyance structures and related facilities. These emissions would be substantial on a local level but mitigation measures can be used to reduce adverse effects. No air quality impacts are anticipated from the perspective of changes in growth patterns and rates in the individual M&I entities. Growth is expected to continue at current projected rates because of the availability of water to these entities with or without implementation of the proposed allocations.

**III.G.4.b. Agricultural production**

From the perspective of air quality, this activity has the highest potential for generating significant emissions of air pollutants. Changes in water allocations to NIA and Indian sectors would, to varying degrees under each alternative, generate changes in the quantity of agricultural lands put into production in central and southern Arizona. This impact would be greatest in Pinal County during the latter portion of the study period.

**III.G.5. Mitigation Measures****III.G.5.a. Mitigation of Construction Impacts**

Air quality impacts related to construction activities can be reduced through implementation of mitigation measures designed to reduce generation of PM<sub>10</sub> at construction sites in the form of fugitive dust. Examples of these measures include the following:

- ◆ Cover, enclose, or maintain adequate soil moisture of active storage piles to prevent visible dust emissions.
- ◆ Cover inactive storage piles.
- ◆ Maintain adequate soil moisture on unpaved haul roads to prevent visible dust emissions.
- ◆ Cover securely, or maintain at least 2 feet of freeboard on, all haul trucks when transporting materials.
- ◆ Prohibit all grading activities during periods of high wind (greater than 25 miles per hour).
- ◆ Plant vegetative ground cover in disturbed areas that are no longer needed for permanent facilities as soon as possible;
- ◆ Install wheel washers for all exiting trucks;
- ◆ Sweep streets if visible soil is carried onto adjacent public roads; and

- ◆ Post a publicly visible sign at the construction site to specify the telephone number and person to contact regarding complaints. This person would be responsible for responding to complaints and taking corrective action within 48 hours.

In addition, the following measures address minimizing O<sub>3</sub> precursor emissions:

- ◆ Maintain off-road construction vehicles so they meet the most stringent EPA NO<sub>x</sub> emission standards (currently 6.9 grams per brake-horsepower-hour).
- ◆ Properly maintain all equipment per manufacturers' specifications.
- ◆ Utilize alternative fuel equipment where feasible.

#### **III.G.5.b. Mitigation of Air Quality Impacts**

On June 17, 1999, the EPA approved the State of Arizona's plan for reducing fugitive dust from agricultural sources in the Phoenix area. This plan requires farmers to implement best management practices (BMPs) to reduce fugitive dust by December 31, 2001. The Governor of Arizona has established a BMP committee comprised of local farmers, State and local agencies, and universities to develop BMPs for submittal and approval by the State legislature. A program designed to educate the agricultural community on the requirements of the State plan would begin by June 10, 2000. These same or similar BMPs, if used in Pinal County, would facilitate reduction of potential PM<sub>10</sub> emissions from agricultural activities in that County.

## **CHAPTER IV**

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### **OTHER ENVIRONMENTAL CONSIDERATIONS**

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## **IV OTHER ENVIRONMENTAL CONSIDERATIONS**

### **IV.A. CUMULATIVE IMPACTS (40 CFR 1508.7, 1508.25)**

#### **IV.A.1. Introduction**

A cumulative impact is defined by the CEQ regulations as follows:

The impact on the environment which results from the incremental impact of the action, when added to other past, present and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions. (40 CFR 1508.7)

The evaluation of cumulative impacts considers potential incremental impacts of the proposed allocation alternatives when added to other past, present, and reasonably foreseeable future actions.

Due to the number of assumptions that were developed in order to conduct the analyses associated with this draft EIS, the discussion of cumulative impacts in this chapter relates primarily to cumulative impacts that would be anticipated based upon past and present conditions and trends.

Cumulative impacts associated with actions that are reasonably expected to occur in the future are based upon the future as envisioned under the No Action Alternative.

A brief summary is provided, of past and present actions related to water use within central Arizona, to furnish some background information regarding the trends that have occurred in water supply demand and use. Then, the cumulative impacts resulting from the proposed allocation of CAP water and long-term contract execution, for each of the three water use sectors identified in the EIS are discussed.

#### **IV.A.2 Past and Present Actions**

By 1930, essentially all of the surface water supplies in the Gila River watershed had been developed and were being put to use. The major projects were the SRP, San Carlos Irrigation Project and Waddell Dam. Following development of the surface water supplies, expanding irrigation and domestic developments began using large quantities of groundwater that were available. Uses quickly expanded to far exceed naturally occurring recharge. Groundwater levels began to drop and it became clear that users in central Arizona were taking water at rates greater than supply.

Water development occurred in disregard of the extent of the federal reserved water rights for Indian Reservations that were assured by the U.S. Supreme Court in *Winters v United States* 1908. The same Court did not quantify those reserved rights until 1963 in *Arizona v California*. Three major actions were initiated in response to the imbalance of supply and demand in central Arizona and the uncertainty of the extent of Indian water rights. First, the CAP was authorized in 1968 to divert and convey Arizona's remaining unused entitlement of Colorado River water to the central part of the State. Second, a general stream adjudication was initiated with the objective of establishing the extent and priority of water rights, including Tribal reserved claims. And third, the State enacted the GMA. All three of these actions are interrelated and the success of each is somewhat dependent on the total success of the others.

The general stream adjudication is progressing, although it is a slow, expensive and cumbersome process. Many of the major issues before the courts in these proceedings can be resolved with the settlement of the Indian Tribes' reserved water right claims. Specific Tribes at issue are the GRIC, SC Apache Tribe, TON, Navajo Nation, and Hopi Tribe. Allocation and contracting of CAP water for these Tribes is an essential element of water rights settlement.

The GMA is a comprehensive set of laws and rules that control and manage the uses of groundwater in the State. Under the GMA, no new irrigation may be developed, and use by all non-irrigation users must meet strict water conservation requirements. New urban development must be supplied by a renewable water supply. CAP supply is, in effect, the only significant new renewable water available in central Arizona. The GMA has been implemented; however its full success is dependent on full utilization of CAP water.

The CAP is authorized to deliver water to Indian and non-Indian users. Indian supplies may be used for any beneficial use including new agriculture and, if authorized by Congress, for leasing to other non-Indian users such as cities. Non-Indian uses generally include agricultural and municipal. Use of CAP water to replace groundwater pumping is unique for a Reclamation project. For non-Indian users, CAP water cannot be used to bring new land into production, and groundwater pumping must be reduced by the amount of CAP water delivered. This is consistent and compatible with the GMA. CAP water for M&I use is for the purpose of meeting needs of expanding cities and towns. This provides a renewable supply which satisfies the GMA's requirement that new development not rely on nonrenewable groundwater.

The completion and successful implementation of the GMA, the settlement of Indian water rights claims and the allocation and contracting of CAP supplies would have the long-term effect of average water use achieving equilibrium with the long-term sustainable supply. This would be the case even with the rapid urban growth that is now occurring and is expected to continue into the future. Additionally, culmination of these programs would provide the Indian communities with water supplies in satisfaction of their unsatisfied claims and the opportunity to proceed with economic development programs that are dependent on water supplies.

The allocation and contracting of CAP supplies among the various use sectors in the CAP service area is an essential element for completion of a successful water management program. This EIS evaluates a series of alternative allocations that might be made to distribute this water supply to meet the project and program purposes.

Following is a brief discussion of the general cumulative impacts that can be expected to occur in each of the water use sectors affected by the proposed allocation alternatives.

### **IV.A.3 M&I Sector**

The urban population in central Arizona is expanding rapidly. This growth is occurring on desert and agricultural land. As a result, there are many impacts to the human and natural environment. However, because of the relatively small magnitude of the M&I supplies being reallocated, the proposed allocations addressed in this EIS would not impact the rate or location of growth. The different allocation alternatives provide different amounts of water to municipal suppliers; however, the difference among all the alternatives, including the No Action Alternative, are not expected to impact growth in any area. The analysis indicates alternative water supply sources

would be available to adjust for the differences among alternatives. The difference among all the alternatives would only be different levels or timing of effort to secure alternative supplies. For example, under the Settlement Alternative, the M&I sector would have an additional 65,647 af of supply under contract, as well as water leased from the Indian communities and an additional 95,263 af that could be designated for M&I use in the future. This would satisfy the needs of the cities for a relatively long period of time. Nevertheless, eventually it is anticipated they would need to develop additional supplies; however, this need would occur beyond the 50-year study period.

The No Action Alternative and other action alternatives would provide lesser supplies to the cities. This would cause them to find alternative supplies earlier than under the Settlement Alternative. The impacts of finding alternative supplies, when added to other past, present and reasonably foreseeable activities, may include:

- ◆ Impacts to groundwater and land disturbance from construction and operation of recharge facilities;
- ◆ Potential reduction in riparian habitat along effluent-dominated streams due to increased reuse of effluent (e.g., to accrue recharge credits or to avoid increasingly stringent Section 402 discharge limitations);
- ◆ Expedited retirement of irrigated lands and transfer of water supplies for city use;
- ◆ Changes in water use practices and landscaping resulting from implementation of intensive water conservation programs;
- ◆ Economic impacts to M&I users due to increased cost of water to users; and
- ◆ Changes in water taste and quality due to changes in water supply.

#### **IV.A.4 NIA Sector**

The amount of non-Indian irrigated agriculture in central Arizona reached its maximum levels in the 1950s. With declining groundwater levels, increasing groundwater pumping costs and declining agricultural revenues, the number of irrigated acres has decreased substantially from these historic high levels. Some NIA districts located adjacent to expanding metropolitan areas have also experienced reduced irrigated acreage as a result of urbanization.

Commodity prices and the rate and extent of urban development will determine the future levels of agricultural activity within the NIA sector. If agricultural revenues are sufficient to sustain farming families or retain land ownership until land values rise due to development potential, agricultural activity will continue. If agricultural revenues are not sufficient to either provide sufficient income to farming families or retain the land base until it can be developed, the land will be fallowed. To the degree that commodity prices are low and agricultural profitability is more sensitive to the cost of water, the availability and cost of CAP water will determine the future levels of irrigation in districts using CAP supplies.

Under all alternatives, including the No Action Alternative, it is anticipated sufficient excess water would be available to the NIA sector at affordable prices, to satisfy projected irrigation needs at least until the year 2016. After that, the Ag Pool will diminish at varying rates among the action alternatives (see Appendix A). The impacts resulting from these reductions in CAP water availability, when added to other past, present and reasonably foreseeable activities, include the following:

- ◆ Additional groundwater use, resulting in groundwater level declines, water quality changes (generally to that of poorer quality), and subsidence above the area of groundwater decline;
- ◆ Increased costs to pump groundwater;
- ◆ Agricultural land fallowed with related environmental impacts such as increased dust and obnoxious weeds;
- ◆ Potential loss of land and/or an agricultural lifestyle for those farmers no longer able to maintain their family farms; and
- ◆ Potential change in clientele from NIA sector to Indian agricultural sector for agriculturally related businesses.

#### **IV.A.5 Indian Sector**

Under the proposed alternatives, five Indian communities or Tribes would be allocated varying amounts of CAP water. Depending upon the community or Tribe, it is anticipated this water would be used mainly for agricultural development, groundwater recharge, improving the dependability of potable water supplies, and/or generation of revenues from water leases. Under the Settlement Alternative, the water rights claims of the GRIC would be resolved. Under the Settlement Alternative and Non-Settlement Alternatives 2 and 3, the source of 28,200 afa of water suitable for agricultural use provided to TON by SAWRSA would be identified as CAP water. Under any of the non-settlement alternatives, water allocated to Indian Tribes would be made with the intent that these amounts would be credited against Tribal water rights based upon terms and conditions to be agreed upon with the Secretary.

The impacts from receiving and using CAP water that would be allocated and contracted to the Indian Tribes and communities, when added to other past, present and reasonably foreseeable future actions, include the following:

- ◆ Improved Tribal economy from revenue generated from water leases;
- ◆ Improved living standards due to provision of a reliable potable water source and potential reductions in unemployment;
- ◆ Increased self-sufficiency of and self-determination by Tribal communities;
- ◆ Return to agricultural way of life as desired by community members;

- ◆ Increased dust and air pollution generation;
- ◆ Potential increased exposure to agricultural chemicals;
- ◆ Substantial loss of native desert; and
- ◆ Potential loss of significant cultural resources.

Under several alternatives some portion of the CAP allocation to the Indian sector is comprised of NIA-priority water. As discussed briefly in Chapter II, NIA priority water is the lowest priority of CAP water and is reduced to zero prior to any reductions to Indian or M&I priority water during shortage. Beyond the 50-year study period beginning in 2055, Reclamation studies predict the probability of shortage would increase to approximately 50 to 55 percent and to continue at that level thereafter. Agricultural land developed using the NIA-priority water would either have to be fallowed during shortage or an alternative water supply, such as increased levels of groundwater pumping, would have to be developed.

#### **IV.B. RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY (NEPA SECTION 102(2)(C)(V) AND 40 CFR 1502.16)**

##### **IV.B.1. Introduction**

This section discusses the long-term productivity that would result from the allocation of CAP water and execution of long-term service contracts, and the short-term uses of resources that would be required to realize the long-term productivity. Short-term use of man's environment refers to either the actual use of or impacts to resources (i.e., energy, manpower or monetary investment). Long-term productivity refers to the benefit that would be realized from the allocation of CAP water.

##### **IV.B.2. Long-term Productivity and Short-term Uses of Resources**

Short-term uses typically involve the "commitment" of certain resources typically associated with construction-related activities including habitat disturbance or disturbance to cultural resources, increased air emissions and fugitive dust from construction vehicles. Construction of delivery facilities would be required by some entities to take and use CAP water (see Appendix L). These short-term commitments of resources cannot be completely quantified at this time, so Reclamation has made a commitment to carry out a second level environmental review of delivery facilities (see Chapter V).

The most significant "commitment of resources" is the commitment of the water supply itself, which is the subject of the EIS. This is a long-term commitment of 50 years for CAP contracts and subcontracts, unless provided otherwise by Congress.

Long-term benefits that would be realized from the allocation of CAP water and execution of long-term contracts include the increase of water to Indian users which would contribute to increased agricultural production on Indian lands and provision of dependable potable water supplies. It is

expected that most of the newly allocated CAP water would be used to irrigate Indian agricultural lands.

Increased agricultural production (farming) on Indian lands can provide short-term productivity, while maintaining and enhancing the long-term productivity of land resources with environmental protections in place and the use of sound agricultural practices (PMIP PEIS 1997). Various federal and State regulations (including the CRBPA and the State of Arizona GMA) preclude the expansion of irrigated farmlands on non-Indian lands, increasing the value of agricultural production on Indian land as an important long-term benefit. Long-term benefits also include a final allocation of CAP water to M&I users that would contribute to certainty in planning for long-term water needs. To the extent the Settlement Alternative also resolves litigation with CAWCD and Indian water rights litigation with GRIC, such certainty is greatly enhanced

#### **IV.C. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES (NEPA SECTION 102(2)(C)(V) AND 40 CFR 1502.16).**

Irreversible commitments are decisions affecting renewable resources such as soils, wetlands, and wildlife habitat. Such decisions are considered irreversible because their implementation would affect a resource that has deteriorated to the point that renewal can occur only over a period of time or at great expense, or because the resource is removed. The term irreversible describes the loss of future options and applies to the effects of using nonrenewable resources or resources that are renewable only over a long period of time.

Irretrievable commitment of natural resources means loss of production or use of resources as a result of a decision. It represents opportunities foregone for the period of time that a resource cannot be used. Irretrievable refers to the permanent loss of a resource including production, harvest or use of natural resources. Production or loss of agricultural lands can be irretrievable, while the action itself may not be irreversible.

As noted earlier, the level of urbanization is identical for all alternatives, including the No Action Alternative. Therefore, loss of open space and wildlife habitat and damage to cultural resources due to M&I urbanization would not be directly related to decisions made regarding allocation of CAP water. However, loss of production or loss of agricultural lands within the NIA sector that may result from reductions in the availability of reasonably priced CAP water would be irretrievable.

Increased farming activities on Indian lands would require the irreversible and irretrievable commitment of fossil fuels, chemicals, manpower and the commitment of CAP water being used for irrigation when those lands are under production. It is anticipated that the number of acres of Indian lands going into production would increase as CAP water is used to irrigate agricultural lands. Between 8,000 and 50,000 acres, depending upon the alternative, would be developed for agriculture on Indian lands using CAP water allocated and contracted to the Tribes.

#### **IV.D. INDIAN TRUST ASSETS**

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States for Indian Tribes or individuals. Examples of things that may be trust assets are lands, minerals,

hunting and fishing rights, and water rights. In addition, Native American Grave Protection and Repatriation Act (NAGPRA) cultural items and other cultural property may be considered ITAs. The United States, with the Secretary as trustee, holds many assets in trust for Indian Tribes or Indian individuals. The ITA policy states that activities should be carried out to protect ITAs and avoid adverse impacts when possible. When adverse impacts cannot be avoided, appropriate mitigation or compensation will be provided.

In general, ITAs that could be adversely impacted by allocating CAP water to any of the five Tribes and entering into long-term contracts would include lands that would need to be disturbed during construction of delivery facilities, any underlying cultural properties, and minor amounts of water that would need to be used during construction and any associated land subjugation. If lands that are to be developed for agriculture are currently used for other purposes, such as mining, hunting or grazing, these lands would no longer be available for those uses. On the other hand, Indian lands currently unused within the Reservations could be developed for economic purposes, thus enhancing their value and assisting the Tribes in their movement toward economic self-sufficiency. Most importantly, as illustrated by the purpose and need statement, CAP water would be allocated to facilitate the resolution of Indian water rights claims. This goal would be most effectively realized under the Settlement Alternative, which would actually result in a final GRIC settlement, as well as final implementation of the SAWRSA. Non-Settlement Alternatives 2 and 3, however, would also allocate a significant amount of CAP water to the Tribes. It is anticipated this water would ultimately be part of water rights settlements for those Tribes. In the meantime, the Tribes would have the opportunity to use that water to meet Reservation needs.

The exact nature and magnitude of impacts to ITAs cannot be described in any greater detail unless and until more specific plans are identified for the delivery and use of CAP water that would be allocated and contracted to each of the Tribes. Planning for these CAP-related developments would most likely be carried out by the Tribes or their consultants, with assistance and/or oversight from Reclamation. Reclamation would consult with the Tribes during specific project planning and construction, to protect ITAs as much as practicable, and to identify mitigation or compensation when impacts cannot be avoided.

Some concern has been expressed that the Settlement Alternative, which includes resolution of the *CAWCD v United States* litigation, would institutionalize central Arizona water users' reliance on unused water rights belonging to mainstem Colorado River Tribes. This concern stems from the fact that the Settlement Alternative assumes the continuation of CAWCD's excess water program in which CAWCD delivers unused CAP and other unused Colorado River water to central Arizona water users, including non-Indian agricultural districts and the AWBA. Although the basis for this concern is acknowledged, that reliance is not the result of the settlement itself. In addition, CAP's right to divert water is expressly subordinate to the senior rights of the mainstem Tribes ("prior, perfected rights"), a point made clear in the *CAWCD v United States* stipulation.

#### **IV.E. ENVIRONMENTAL JUSTICE**

On February 11, 1994, the President issued Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.” This order established the requirements to address Environmental Justice concerns within the context of agency operations. As part of the NEPA process, agencies are required to identify and address disproportionately high and adverse human health or environmental justice effects on minority or low-income communities. Federal agencies are directed to ensure that federal programs or activities do not result, either directly or indirectly, in discrimination on the basis of race, color, or national origin. The Executive Order on Environmental Justice also requires that “the responsibilities set forth shall apply equally to Native American programs.” Therefore, when minority and low-income populations are discussed, Indian populations may also be included. The three goals of the order are:

- ◆ To focus federal agency attention on the environment and human health conditions in minority communities and low-income communities;
- ◆ To promote nondiscrimination in federal programs that substantially affect human health and the environment; and
- ◆ To provide minority communities and low-income communities greater access to information on and opportunities for public participation in matters relating to human health and the environment.

Federal agencies are required to provide opportunities for input in the NEPA process by affected communities and to evaluate significant and adverse environmental effects of proposed federal actions on minority and low-income communities during preparation of federal environmental documents. If a proposed federal action will not result in significant adverse impacts on minority and low-income populations, the environmental document must describe how the order was addressed during the NEPA process.

Environmental Justice includes any adverse effects on minority and low income populations in the analysis area and would include Indian populations as well. Each of the Indian Tribes was contacted during the planning and scoping process and asked to provide input into both the proposed CAP allocation and the draft EIS. As described in Chapter I, three public scoping meetings were held to facilitate greater participation by the potentially affected local community. The locations of the public meetings were selected to include both a rural and an urban audience as well as to be conveniently located near populations that were expected to have the greatest public interest.

##### **IV.E.1. M&I Sector**

There are 21 municipal and private water providers that would be affected by the proposed allocation. These M&I entities are located in Maricopa, Pinal, and Pima Counties. CAP water would be allocated to each of the 21 providers under the Settlement Alternative and Non-Settlement Alternatives 1 and 3B. No CAP water would be provided to these entities under the other

alternatives. A detailed summary of the CAP allocations proposed for M&I water providers under the alternatives is provided in Appendix L.

All of the M&I entities potentially receiving a CAP allocation are estimated to be able to meet future water consumption demands, with or without additional CAP water. No adverse effects, as defined by Executive Order 12898, are anticipated as a result of allocations of CAP water to M&I entities as proposed under the alternatives.

#### **IV.E.2. NIA Sector**

Nine irrigation districts in Maricopa and Pinal Counties would be affected by the proposed allocation. These districts originally entered into contracts with the United States and CAWCD for a percentage of CAP water remaining after water was delivered in accordance with subcontracts to the M&I and Indian sectors. As mandated by the GMA, CAP water supplied for NIA must be used in lieu of equal amounts of groundwater and cannot be used to increase acreage under production.

Six of the nine irrigation districts would receive an additional CAP water allocation through subcontracts with the United States and CAWCD only under Non-Settlement Alternative 3A. This water would be delivered on an as-available basis. The other three districts were not identified as receiving an allocation in the 1992 reallocation decision. A detailed summary of the CAP allocations proposed for each NIA district under the alternatives is provided in Appendix L.

Agricultural lands that are currently being irrigated may go out of production in the long term. Changes in land use and loss of farm acres would be influenced by water availability, economics, and urbanization. Loss of access to CAP water may result in some farmland becoming fallow.

Farm owners within the affected service areas collectively do not constitute a minority or low-income population. Conversely, the general population of farm workers is primarily composed of low-income and minority groups. Among this population, wages are low and work is seasonal. Long-term reduction of farm acres attributable to loss of access to CAP water would displace a portion of this labor force. These losses would be partially offset by additional employment opportunities created by urban expansion and by expansion of agricultural development on Indian Reservations.

#### **IV.E.3. Indian Sector**

Data compiled by the U.S. Census Bureau and other sources consistently demonstrate lower incomes and higher unemployment rates for Indians relative to the general population. Significant water resource issues on the Reservations have limited economic growth and adversely affected the quality of life. Shortages of safe drinking water, insufficient supplies of water to satisfy agricultural and industrial development, and lack of adequate systems to distribute water persist on many Reservations.

Environmental Justice issues were considered for the Indian Tribes potentially affected by the allocation of CAP water. Five Tribes are examined in this analysis: GRIC, Hopi Tribe, Navajo Nation, SC Apache Tribe, and TON. A detailed summary of the CAP allocations proposed for each Tribe under the alternatives is provided in Appendix L.

Under the Settlement and Non-Settlement Alternatives, GRIC would receive CAP allocations ranging from 53,400 afa to 188,000 afa. The primary use of this water would be for irrigated agriculture through the PMIP. The Settlement Alternative would also provide water for lease or exchange with several municipalities and mining interests.

The Hopi Tribe and Navajo Nation currently do not have CAP allocations. Under Non-Settlement Alternatives 2 and 3, the Navajo/Hopi would receive a combined allocation of CAP water totaling 13,500 afa, which would likely be used for domestic and industrial consumption. Construction of facilities would be needed to convey this allocation directly from the Colorado River. Specific construction projects to use a CAP allocation are described at a programmatic level in Appendix L and will require additional environmental clearances prior to delivery of CAP water.

The SC Apache Tribe would receive, under Non-Settlement Alternative 2 and Non-Settlement Alternative 3, CAP allocations of 23,447 afa and 40,000 afa, respectively. No additional CAP water would be allocated under the other alternatives. It is assumed the SC Apache Tribe would have to enter into an exchange agreement with a downstream party that has rights to the Gila River and access to CAP water. Specific construction projects to use a CAP allocation are described at a programmatic level in Appendix L and will require additional environmental clearances prior to delivery of CAP water. The primary application of a CAP allocation is anticipated to be for agricultural irrigation, although some industrial use may occur.

The TON would receive a CAP allocation of 28,200 afa under the Settlement Alternative and Non-Settlement Alternatives 2 and 3. No additional CAP water would be allocated under the No Action Alternative and Non-Settlement Alternative 1. Potential uses of CAP water received as part of the proposed allocation include expansion of agricultural development and groundwater recharge in the San Xavier and Schuk Toak districts. Any additional water provided under the alternatives would be conveyed through distribution facilities presently under construction or recently completed.

In general, greater availability of CAP water supplies is expected to lead to more land under cultivation, increased agricultural production, and in some instances water for domestic and industrial use. Additional Indian agricultural or industrial activity resulting from additional CAP allocations would increase incomes and employment for a population that experiences high poverty and unemployment rates. The long-term effect would be to stimulate economic growth and reduce poverty. Because the alternatives would not reduce available water supplies or introduce disproportionately high and adverse human health and environmental effects on the Reservation, there would be no adverse effect as defined by this Executive Order.

#### **IV.F. COMPLIANCE WITH ENVIRONMENTAL STATUTES AND POLICIES**

##### **IV.F.1. Federal Statutes and Policies**

As part of Reclamation's compliance with NEPA, this draft EIS is intended to provide decision-makers and the public with information regarding the environmental effects associated with the allocation of CAP water and execution contracts. In addition to the requirements of NEPA, there are a number of other environmental laws, rules and regulations that may be applicable to actions taken in the future before entities may take and use allocated and contracted CAP water. As

previously described in Chapter III, many entities have only conceptual plans for taking and using CAP water. For these entities, construction-related activities are discussed at a “programmatic” level. Consistent with longstanding Reclamation practice and previous CAP contracting actions, Reclamation would require that specific on-the-ground environmental clearances be completed prior to water delivery.

Compliance with environmental statutes that are applicable to the proposed allocation is discussed below.

- ◆ **Clean Water Act of 1977, as amended.** Section 404 of this Act identifies conditions under which a permit is required for construction projects that result in the discharge of fill or dredged material into waters of the United States. Neither an individual 404 permit nor a Nationwide Permit would be needed for the proposed allocation and contract execution. However, if proposed construction of any delivery and/or treatment facilities would result in discharge of dredged or fill material, the municipality or water company would be required to comply with Section 404. Similarly, if development of agricultural land and/or construction of irrigation delivery or recharge facilities would alter washes or stream channels, a Section 404 permit, as appropriate, would need to be acquired. Section 402 of this Act identifies conditions under which a permit is required for the discharge of pollutants into waters of the United States. No permits would be required as there would be no pollutants discharged as a result of the proposed allocations. However, if pollutants would be discharged to waters of the U.S. as a result of constructing facilities to take and use the CAP water, the entity would be required to comply with section 402.
- ◆ **Safe Drinking Water Act of 1974, as amended.** Section 1424 of this Act regulates underground injection into an aquifer, which is the sole or principal drinking water source for an area. No underground injection is proposed as part of the proposed allocation and contract execution. Should an entity, whose sole or principal drinking water source is currently groundwater (e.g., Tucson area, Navajo Nation or Hopi Tribe), choose to recharge CAP water via underground injection, that entity would need to comply with this Act.
- ◆ **Executive Order 11988, Floodplain Management, May 24, 1977.** Executive Order 11988 requires avoiding or minimizing harm associated with the occupancy or modification of a floodplain. The proposed allocation and contract execution would not cause any harm to the floodplain. Any irrigation and/or recharge project developed to utilize CAP water would need to be sited and operated in such a manner that it would not result in adverse modification to a floodplain or cause harm to any adjacent or downstream land owner.
- ◆ **Executive Order 11990, Protection of Wetlands, May 24, 1977.** Executive Order 11990 provides for the protection of wetlands through avoidance or minimization of adverse impacts. The proposed allocation and contract execution would not impact any wetlands. Any future use of CAP water proposed to be allocated and contracted would need to comply with Section 404 of the Clean Water Act (CWA), as well as this Executive Order, which would ensure that adverse impacts to wetlands are avoided, or minimized and mitigated.
- ◆ **Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994.** This Order directs federal

agencies to identify and address, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies and activities on minority and low-income populations. There were three public scoping meetings held for the project. These meetings were held in the communities that were the three major population centers of the CAP three-County service area, to facilitate greater participation by the potentially affected local communities. Under the action alternatives, up to five Indian communities would receive additional water supplies. The long-term effect would be to stimulate economic growth, improve living conditions, and reduce poverty. Because the alternatives would not reduce available water supplies or introduce disproportionately high and adverse human health and environmental effects on the Reservation, there would be no adverse effect as defined by this Executive Order.

- ◆ **Executive Order 13007, Indian Sacred Sites, 1996.** Executive Order 13007 (May 24, 1996) requires that all Executive Branch agencies that have responsibility for the management of Federal lands will, where practicable, permitted by law, and not clearly inconsistent with essential agency functions, provide access to and ceremonial use of Indian sacred sites by Indian religious practitioners and will avoid adversely affecting the integrity of such sacred sites. The order also requires that Federal agencies, when possible, maintain the confidentiality of sacred sites. Reclamation will comply with this Executive Order where applicable to the reallocation of CAP water and construction of CAP delivery facilities.
- ◆ **Wild and Scenic Rivers Act of 1968.** This Act requires consideration of wild and scenic rivers in planning water resources projects. Developing water resources projects is prohibited on any river designated for study as a potential component of the national wild and scenic river system. There are no such rivers or candidates in the area that would be affected by the proposed allocation.
- ◆ **Fish and Wildlife Coordination Act of 1934, as amended (FWCA).** This Act requires coordination with federal and State wildlife agencies (USFWS and Arizona Game and Fish Department [AGFD]) for the purpose of mitigating project-caused losses to wildlife resources. Reclamation met with USFWS to discuss FWCA on December 9, 1999. It was agreed that Reclamation would not request a FWCA report be prepared. The scoping report and draft EIS are being provided to USFWS for review, and Reclamation's consideration of USFWS's comments on the draft EIS will satisfy the requirements of the FWCA.
- ◆ **Endangered Species Act of 1973, as amended (ESA).** Section 7 of the Act requires federal agencies to consult with the USFWS to ensure that undertaking, funding, permitting or authorizing an action is not likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat includes: 1) areas within the geographic area occupied by a species at the time it is listed on which are found those physical or biological features essential to the conservation of the species and that may require special management consideration or protection; and 2) those specific areas outside the geographic area occupied by a species at the time it is listed essential to the conservation of the species. Designation of critical habitat only applies to federal projects or private action with a federal nexus. Reclamation has determined this reallocation of CAP water would have no effect on T&E species. For construction projects that are required in order for entities to take and use their CAP water, and for land disturbing activities on Indian

lands that involve Federal funds or federally managed lands, follow-on compliance with this Act would be required once final plans are known and implementation is proposed.

- ◆ **National Historic Preservation Act of 1966, as amended (NHPA).** Federally funded undertakings that have the potential to affect historic properties are subject to Section 106 of the NHPA; however, other jurisdictions, including State, county, and municipal agencies, often have their own regulations pertaining to cultural resources and historic preservation. Under this Act, federal agencies are responsible for the identification, management, and nomination to the National Register of Historic Places (NRHP) of cultural resources that would be affected by federal actions. Consultation with the Advisory Council on Historic Preservation and the SHPO is required when a federal action may affect cultural resources on, or eligible for inclusion on, the National Register. This draft EIS provides an overview of the types of cultural resources present in the areas for each affected M&I entity, NIA user and Indian Tribe. There is no Section 106 consultation required for the proposed allocation, although a copy of the draft EIS is being provided to the SHPO and interested Tribes.
  
- ◆ **Clean Air Act of 1963, as amended.** This Act requires that any federal entity engaged in an activity that may result in the discharge of air pollutants must comply with all applicable air pollution control laws and regulations (federal, State or local). It also directs the attainment and maintenance of NAAQS for six different criteria pollutants, including CO, O<sub>3</sub>, particulate matter, sulfur oxides, oxides of nitrogen, and lead. Short-term emissions associated with construction of M&I water conveyance structures and related facilities would occur under the Settlement Alternative, and Non-Settlement Alternatives 1 and 3B. These emissions would be localized; dust abatement measures would be required to be implemented during construction. Land subjugation and agricultural activities would generate air pollution, particularly particulate matter, under all alternatives. The increases that would occur in agricultural production on Indian lands, and the fallowing of lands within NIA districts would contribute additional impacts to air quality, especially in Pinal County during the latter portion of the study period. Follow-on NEPA documentation conducted for Indian development projects would evaluate potential air quality impacts using conditions, air quality standards and any SIPs that exist and are applicable at those future points in time. NEPA documentation would include mitigation measures that would require projects involving federal funds or requiring federal approval to comply with applicable federal, State and local air pollution and dust control laws, regulations and ordinances, as is consistent with past and current Reclamation practice.
  
- ◆ **General Conformity Rule, 40 CFR Part 51, Subpart W.** This Rule ensures that federal projects or projects receiving federal funding conform to applicable SIPs, so that they do not interfere with strategies employed to attain the NAAQS. The rule applies to federal projects in areas designated as non-attainment areas for any of the six criteria pollutants for which the EPA has established NAAQS and in some areas designated as maintenance areas. The rule applies to all federal projects except: 1) programs specifically included in a transportation plan or program that is found to conform under the federal transportation conformity rule; 2) projects with associated emissions below specified *de minimis* threshold levels; and 3) certain other projects that are exempt or presumed to conform. Estimated net emissions resulting from development of agricultural lands on Indian lands and fallowing of agricultural lands on NIA district lands were calculated for each alternative. Most changes would be relatively small in magnitude which do not exceed significance thresholds

related to conformity or new source review standards. The only exception occurs in Pinal County where calculations indicate emission thresholds could be substantially exceeded during the latter part of the 50-year study period (year 2043 and beyond). It is unknown what ambient conditions would exist at that time, standards that would be in place, or SIPs that would be in effect. Follow-on NEPA commitments, as described above for the Clean Air Act, would also apply to General Conformity Rule requirements.

#### **IV.F.2. Other Environmental Statutes**

In addition to compliance with the federal statutes identified in the section above, there are other State agencies that may have additional permit or approval authority and other State regulatory requirements that are applicable to the project. Table V-1 provides a summary of these applicable permits, approval and regulatory requirements. Table V-2 provides a list of contracts, legislation and agreements with which the CAP allocation and execution of long-term contracts must comply.

<b>Table IV-1 CAP Allocation Draft EIS Chapters Applicable State Permits, Approvals and Regulatory Requirements</b>		
<b>Agency</b>	<b>Applicable LOR</b>	<b>Action Required or Purpose</b>
State of Arizona Groundwater Management Act	The Groundwater Management Code	<p>The State of Arizona enacted the Code in 1980. With the Code, Arizona made a commitment to the long-term management and conservation of its limited groundwater supplies. The goals of the Code are to eliminate severe groundwater overdraft in the State's most populated areas where groundwater supplies have been rapidly diminishing and to provide the means for allocating Arizona's limited groundwater resources to most effectively meet the State's changing water needs. The Code established four AMAs in specific groundwater basins that have experienced extensive water level declines, and established goals for each AMA to control water development and use. The Phoenix, Pinal and Tucson AMAs occupy most of the area proposed for the CAP allocation. The goal established for the Phoenix and Tucson AMA's is to achieve safe-yield by 2025 by increasing the use of renewable water supplies and decreasing groundwater withdrawals in conjunction with efficient water use (ADWR 1999). The goal for the Pinal AMA, where a predominately agricultural economy exists, is to allow the development of non-irrigation water uses and extend the life of the agricultural community for as long as feasible while preserving water supplies for future non-irrigation uses (ADWR 1999).</p> <p>Although CAP water deliveries will facilitate meeting the goals of the Code, this is not a specific purpose of the allocations. Instead the use of CAP allocations to achieve groundwater management goals is left to the State's discretion in their recommendation of allocations to the M&amp;I and NIA sectors. Providing CAP water is inherent in the State's plan to achieve safe yield for the Phoenix and Tucson AMAs.</p>
Arizona Legislature	Assured Water Supply Rules	<p>The Groundwater Management Code prohibits the sale or lease of newly subdivided land in an AMA absent the demonstration of an AWS. The Assured Water Supply Program (AWS Program) was instituted as part of the GMA in 1980. The program has been actively enforced since 1995 with the adoption of the AWS rules. The AWS rules require new development within an AMA to demonstrate that sufficient water supplies of adequate quantity and quality are available to meet proposed uses for 100 years. Municipal providers seeking a designation of AWS for a service area must demonstrate there are adequate water supplies available to the provider to meet current and future demands of the customers</p>

<b>Table IV-1 CAP Allocation Draft EIS Chapters Applicable State Permits, Approvals and Regulatory Requirements</b>		
<b>Agency</b>	<b>Applicable LOR</b>	<b>Action Required or Purpose</b>
		currently on the system and the demands of customers it has committed to serve, for 100 years. The water supplies used to demonstrate an AWS may include surface water, effluent, imported groundwater, credits from extinguishment of groundwater rights, a quantity of allowable groundwater use specified by the rules, or water stored pursuant to an underground storage permit. Water received as part of the CAP allocation could be used to demonstrate an AWS.
Central Arizona Groundwater Replenishment District	Replenishment District Laws	CAGRDR is a tax-exempt public improvement district authorized by Arizona's legislation to acquire water supplies to replenish aquifers depleted by district members. The CAGRDR is an organizational unit of the CAWCD and is overseen by the CAWCD board. The CAGRDR was created to provide entities with physically available groundwater
Arizona Water Bank Authority	Authority Laws	AWBA was created in 1996, to ensure that Arizona's CAP allocation to the M&I sector will be protected in times of shortage: a) support Indian water rights settlements and fully use Arizona's CAP allocation; b) project M&I users of Colorado River water from shortages. AWBA used several funding sources to buy excess CAP water and recharge it for future benefit of users both inside and outside of the CAP area.
Arizona Department of Environmental Quality		ADEQ develops and enforces water quality regulations. The ADEQ and the Water Quality Assurance Revolving Fund (WQARF) participate jointly in specific activities related to the protection of groundwater quality and remediation.
State of Arizona	Irrigation and Water Conservation District Statutes	The NIA users of CAP water are organized into irrigation districts under the authority of Arizona State Law. They are organized for the purpose of delivering water for irrigation and other uses within their district boundaries.
State of Arizona	Underground Storage and Recovery Statutes (A.R.S. 45-801-et seq.)	In 1994, the State Legislature consolidated the legal framework for storing surplus water underground for later recovery into the Underground Water Storage, Savings, and Replenishment Act (UWS). This framework requires the issuance of permits by ADWR for both storage and recovery facilities. Each permit establishes a storage account that keeps track of the amount of stored water and the amount of water which has been recovered or pledged for an AWS. Surface that cannot be reasonably used directly may be stored. Since CAP water was intended to replace groundwater pumping and lessen Arizona's groundwater overdraft, only CAP water that cannot be reasonably used directly can be stored.
State of Arizona	Indirect Groundwater Storage and Recovery	In 1990, the State Legislature expanded the previously mentioned underground storage statutes by allowing for the

<b>Table IV-1 CAP Allocation Draft EIS Chapters Applicable State Permits, Approvals and Regulatory Requirements</b>		
<b>Agency</b>	<b>Applicable LOR</b>	<b>Action Required or Purpose</b>
	Statues	indirect storage of surplus water. The program was included in the 1994 UWS Act. Indirect groundwater storage and recovery projects allow for water to be provided to a person who would otherwise have pumped and used groundwater. If the stored water is CAP water, water must first be offered to all CAP users for direct use before being indirectly stored under these Arizona statutes.
State of Arizona	Annual Storage and Recovery Projects	Provisions for annual storage and recovery projects were created by legislation in 1992 and included in UWS Act of 1994.. While similar in nature to the underground and recovery projects, these are not intended for long-term carryover supply. These projects are intended to allow an alternative means for direct use of water. Instead of treating CAP water and piping it to customers, annual storage projects allow the storage of CAP water underground and recovery through wells and use on an annual basis.
Arizona Game and Fish Department (AGFD)		The AGFD has issued a list of Wildlife of Special Concern in Arizona (WSCA). This species list is used as a supplement to the federal list of T&E species; however it has no special legal status or regulatory authority. Those species described and listed in WSCA are species for which AGFD has special management concerns.
Arizona Department of Agriculture	Arizona Native Plant Laws, Arizona Revised Statutes, Chapter 7	This legislation ensures the protection of selected native plants. These plants cannot be removed from any lands without the permission of the landowner and a permit. Landowners have the right to destroy or remove plants growing on their land, but prior to destruction of any protected native plants, landowners are required to notify the ADWR.

<b>Table IV-2 CAP Allocation Draft EIS Applicable Contracts, Legislation, and Agreements</b>	
<b>Contract, Legislation or Agreement</b>	<b>Purpose</b>
<b>FEDERAL</b>	
Boulder Canyon Project Act of 1928 - Public Law 70-642	In part, authorized construction of Hoover Dam and provides the Secretary authority to execute contracts for water made available under the Boulder Canyon Project. Pursuant to this Act, water delivered would also have to be used within the Lower Colorado River Basin.
Reclamation Project Act of 1939, as amended - Public Law 53 Stat. 1193	This Act authorizes the Secretary to enter into contracts before furnishing water for irrigation uses provided that the agreements include certain requirements and restrictions. The Act also provides the general statutory authority for Reclamation to enter into repayment contracts with ID's receiving a CAP allocation for the repayment of their distribution system construction costs. The Act also allows the Secretary to enter into repayment contracts for municipal and miscellaneous water.
Colorado River Basin Project Act of 1968 - Public Law 90-537	In relevant parts, authorized the planning, construction, and repayment of costs of the CAP and provides the Secretary authority to execute contracts for water made available under the project. The Act also prohibits the use of CAP water for irrigation on NIA lands without a history of irrigation between 1958 and 1968, and requires that contracts for use of CAP water must contain provisions to control the expansion of groundwater use.
<b>INDIAN WATER RIGHTS SETTLEMENTS</b>	
SAWRSA of 1982 - Public Law 97-293	Authorized the settlement of water rights claims of the TON for the San Xavier and Schuk Toak Districts. The settlement provided 37,800 afa of CAP water to the two districts. In addition, the settlement authorized delivery of 28,200 afa of additional water supplies, suitable for agricultural use: 23,000 afa to San Xavier District and 5,200 af to Schuk Toak District; however, the source of this additional 28,200 af was not identified.
Ak-Chin Indian Community Water Rights Settlement Act of 1984 - Public Law 98-530	Provided for the settlement of water rights claims of the Ak-Chin Indian Community. The Community received 50,000 afa of Colorado River water from the YMD to be delivered by CAP in addition to its CAP allocation. The Community receives a supply of 75,000 afa, and an additional 10,000 af when supplies are available.
SRPMIC Water Rights Settlement Act of 1988 - Public Law 100-512	Authorized settlement of SRPMIC water rights claims. The settlement provided 5,000 afa of additional CAP supply and 22,000 afa of Colorado River water formerly allocated to WMIDD, to be delivered by CAP. The Act also addressed reallocation of uncontracted NIA water and provided for RWCD

	to relinquish its NIA allocation.
FMIC Water Rights Settlement Act of 1990 - Public Law 101-628	Authorized settlement of water rights claims of the FMIC. The Community received 13,933 afa of CAP water. This water was acquired as a result of HVID's relinquishment of its NIA allocation. The remaining HVID water (19,318 afa) is reserved for federal use in the settlement of Indian water rights claims to the Salt and Verde River watersheds.
SC Apache Tribe Water Rights Settlement Act of 1992 (as amended) - Public Law 102-575	Authorized settlement of water rights claims to the Salt River watershed by the SC Apache Tribe. The Tribe received 33,300 afa of CAP water formerly contracted to the Ak-Chin Indian Community. In addition, it received 3,480 afa of M&I water previously allocated to the Town of Globe, and 14,665 afa previously allocated to PD, pending implementation of the SC Apache Tribe Water Rights Settlement Agreement.

## **CHAPTER V**

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### **ENVIRONMENTAL COMMITMENTS**

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This draft EIS describes, to the extent possible based on available information, the environmental impacts associated with allocation and use of CAP water under the proposed alternatives. As noted elsewhere, Appendix L contains information on proposed or potential uses of the allocated CAP water, and describes the potential CAP delivery facilities required. Where there is insufficient information to fully describe the environmental impacts, Reclamation is committed to carry out supplemental environmental review associated with future federal actions, when more specific details about plans for taking and using water are identified. This chapter describes Reclamation's commitment to carry out such reviews for the federal actions contemplated under the proposed allocation alternatives.

#### V.A. CAP WATER ALLOCATED TO M&I ENTITIES

**Federal Action Required: Execution or amendment of 20 CAP water service subcontracts** - This would occur under the Settlement Alternative and Non-Settlement Alternatives 1 and 3B. No additional CAP water would be provided to the user pursuant to the new contract or amendment until environmental clearance is granted by Reclamation. Such environmental clearance would be based on a review of the entities' plans for taking and using CAP water. An internal checklist procedure would then compare the proposed plans to what was described in Appendix L of this EIS and make conclusions about the level of additional environmental review required. If construction of new delivery or water treatment facilities are necessary to take delivery and put CAP water to use, site-specific environmental clearances (e.g., cultural and biological resource surveys) of these facilities would be required by Reclamation prior to construction.

The specific scope of Reclamation's environmental review would be made on a case-by-case basis, depending on the specific situation and facilities proposed. In general, however, Reclamation's review under NEPA, ESA, and NHPA would extend from the facilities needed to connect to the CAP Aqueduct to the immediate point of conveyance, such as a water treatment facility. Once the CAP delivery system becomes connected to the entities' water distribution system, Reclamation's environmental oversight would end.

#### V.B. CAP WATER ALLOCATED TO INDIAN ENTITIES

**Federal Action Required: Execution or amendment of CAP water service contracts** - Contracts would be amended for the GRIC under all action alternatives and for the TON under all action alternatives except Non Settlement-Alternative 1. Contracts would be executed or amended for Navajo/Hopi and SC Apache Tribe under Non-Settlement Alternative 2 and Non-Settlement Alternative 3. Each water service contract or contract amendment would contain a provision that no additional CAP water would be provided to the user pursuant to the new contract or amendment until environmental clearance is granted by Reclamation. Such environmental clearance would be based on a review of the entities' plans for taking and using CAP water. An internal checklist procedure would be used to compare the proposed plans to what was described in Appendix L of this EIS and determine the level of additional environmental review required, if any.

### V.B.1. CAP Water Allocated to GRIC

**Settlement Alternative** - In addition to the general approach described above, the CAP water allocation to GRIC under the Settlement Alternative includes specific aspects which are part of the GRIC settlement. Water allocated to GRIC under the Settlement Alternative includes an additional CAP allocation of 102,000 af, plus 17,800 af of CAP water originally allocated to HVID, 18,600 af of CAP water originally allocated to RWCD, and 17,000 af of CAP water originally allocated to ASARCO. The allocation and contracting for all of these increments of CAP water are included in the EIS. The specific uses of the total 155,400 af of CAP water and the environmental impacts are described in the EIS to the extent possible. Commitments for additional environmental review are as follows:

#### V.B.1.(a) CAP Water Leased and Exchanged by GRIC to Seven Municipalities

**Federal Action Required: Approval of GRIC lease of 41,000 af to seven municipalities; approval of GRIC exchange of 32,500 af to the Cities of Mesa and Chandler** - The proposed lease and exchange are parts of the proposed GRIC settlement. In general, the impacts of these actions have been described in this EIS. The water budgets developed for this EIS (for the analysis of groundwater and urban water demands) include this lease and effluent exchange in the Settlement Alternative. It is anticipated that separate federal approvals of the lease and exchange would be required.<sup>48</sup> At that time, a review would be carried out to determine if supplemental NEPA documentation is necessary.

#### V.B.1.(b) CAP Water Leased by GRIC to Two Mining Companies

**Federal Action Required: Approval of GRIC leases to ASARCO (for 17,000 af) and Phelps Dodge Corporation (for 12,000 af)** - These proposed leases might be part of the proposed GRIC settlement. The potential environmental impacts of these leases have not been described in this EIS because specific information on the proposed uses of the leased water and details of the lease arrangements, including whether these options would eventually be exercised, are not available at this time. It is anticipated that separate federal approvals of the leases would be required. At that time, a review would be carried out to determine if supplemental NEPA documentation is necessary.

### V.C. NIA ENTITIES

**Action Required: Voluntary relinquishment of CAP subcontracts under the Settlement Alternative** - No federal action is anticipated and no further environmental review is proposed.

**Federal Action Required: Execution of NIA contracts offered under Non-Settlement Alternative 3A** - Reclamation would review the earlier NEPA documentation prepared in 1991 (Reclamation 1991) and determine whether supplemental NEPA compliance documentation would be required.

**Federal Action Required: Future reallocation of the 95,263 af of NIA priority water reserved for future NIA or M&I use pursuant to a process to be developed (Settlement Alternative)** - This is an aspect of the Settlement Alternative that remains to be finalized and is expected to be addressed in

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<sup>48</sup>Consistent with other recent Indian water rights settlements in Arizona, it is expected that the GRIC settlement legislation would include a provision that the execution of the settlement agreement is not a major federal action, but that compliance with NEPA and other environmental legislation would be required for the specific federal actions required to implement the settlement agreement.

legislation. NEPA compliance may or may not be required for the future allocation of this water supply, depending on whether discretionary federal actions are required.

**CHAPTER VI**



**LIST OF PREPARERS**



## CHAPTER VI

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The following individuals assisted in the preparation of the draft EIS:

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## **CHAPTER VII**



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Superintendent, Bureau of Indian Affairs, Papago Agency, Sells, AZ  
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Colorado River Indian Tribes, Parker, AZ  
Fort McDowell Mohave-Apache Indian Community, Fountain Hills, AZ  
Fort Mojave Indian Tribe, Needles, CA  
Gila River Indian Community, Sacaton, AZ  
Havasupai Tribe, Supai, AZ  
Hopi Tribe, Kykotsmovi, AZ  
Hualapai Indian Reservation, Peach Springs, AZ  
Navajo Nation, Window Rock, AZ  
Pascua Yaqui Tribe, Tucson, AZ  
Quechan Indian Tribe, Yuma, AZ  
Salt River Pima Maricopa Indian Community, Scottsdale, AZ  
San Carlos Apache Tribe, San Carlos, AZ

Tohono O'odham Nation, Sells, AZ  
Tohono O'odham Nation, San Xavier District, Tucson, AZ  
Tohono O'odham Nation, Schuk Toak District, Sells, AZ  
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Defenders of Wildlife, Washington, D.C.  
Ducks Unlimited, Inc., Long Grove, IL  
Environmental Defense Fund, Inc., New York, NY  
The Fund for Animals, Inc., New York, NY  
National Audobon Society, New York, NY  
National Water Resources Association, Arlington, VA  
National Wildlife Federation, Washington, D.C.  
Natural Resources Defense Council, Inc., New York, NY  
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Sierra Club, San Francisco, CA  
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Friends of the Earth, Tucson, AZ  
Nature Conservancy, Arizona Chapter, Tucson, AZ  
Sierra Club, Phoenix, AZ  
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Southern Arizona Environmental Council, Tucson, AZ  
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The Wildlife Society, Arizona Chapter, Phoenix, AZ

Newspapers:

The Arizona Republic, Phoenix, AZ  
The Arizona Daily Star, Tucson, AZ  
The Tucson Citizen, Tucson, AZ  
Mesa Tribune, Mesa, AZ  
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Arizona Department of Water Resources, Santa Cruz Active Management Area, Nogales, AZ  
Arizona Department of Game and Fish Department, Phoenix, AZ  
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Arizona State Land Department, Phoenix, AZ  
Arizona State Clearinghouse, Phoenix, AZ  
Central Arizona Water Conservation District, Phoenix, AZ  
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Pima County Board of Supervisors, Tucson, AZ  
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Gila County Board of Supervisors, Globe, AZ  
LaPaz County Board of Supervisors, Parker, AZ  
Santa Cruz County Supervisor's Office, Nogales, AZ  
Yavapai County Board of Supervisors, Prescott, AZ  
Navajo County Board of Supervisors, Holbrook, AZ

## Arizona Cities:

City of Avondale  
Town of Buckeye  
City of Chandler  
Town of El Mirage  
City of Eloy  
Town of Florence  
City of Glendale  
City of Goodyear  
City of Mesa

Town of Oro Valley  
Town of Payson  
City of Peoria  
City of Phoenix  
City of Scottsdale  
Town of Superior  
City of Surprise  
City of Tempe  
City of Tucson

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Carefree Water Company, Inc., Carefree, AZ  
Cave Creek Water Company, Scottsdale, AZ  
Chaparral City Water Company, Fountain Hills, AZ  
H2O Water Co., Mesa, AZ  
AVRA Cooperative, Tucson, AZ  
Del Lago (Vail) Water Co., Tucson, AZ  
Community Water Co. of Green Valley, Green Valley, AZ  
Metropolitan Domestic Water Improvement District, Tucson, AZ  
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Harquahala Valley Irrigation District, Tonopah, AZ  
Hohokam Irrigation and Drainage District, Coolidge, AZ  
Maricopa-Stanfield Irrigation and Drainage District, Maricopa, AZ  
New Magma Irrigation and Drainage District, Queen Creek, AZ  
Tonopah Irrigation District, Tonopah, AZ  
Chandler Heights Citrus Irrigation District, Chandler Heights, AZ  
San Tan Irrigation District, Chandler Heights, AZ  
New Magma Irrigation and Drainage District, Queen Creek, AZ  
San Carlos Irrigation and Drainage District, Coolidge, AZ  
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Arizona Department of Library Archives and Public Records, Phoenix, AZ  
Phoenix Public Library (Main), Phoenix, AZ  
Arizona Collection, Hayden Library, Arizona State University, Tempe, AZ  
Government Document Service, Arizona State University, Tempe, AZ

Arizona State University-West Library, Glendale, AZ  
University of Arizona, Main Library, Tucson, AZ  
Director of Library, City Hall Annex, Tucson, AZ  
Law Library, County Courthouse, Tucson, AZ  
Government Reference Library, City Hall, Tucson, AZ  
Globe Public Library, Globe, AZ  
Coolidge Public Library, Coolidge, AZ  
Coconino County Public Library, Flagstaff, AZ  
Cline Library, Northern Arizona University, Flagstaff, AZ  
Tuba City Public Library, Tuba City, AZ  
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Parker Public Library, Parker, AZ  
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## **CHAPTER VIII**

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## **LIST OF ACRONYMS**

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## CHAPTER VIII

## LIST OF ACRONYMS

ACC	Arizona Corporation Commission
ACS	Archaeological Consulting Services, Ltd.
ADEQ	Arizona Department of Environmental Quality
ADES	Arizona Department of Economic Security
ADWR	Arizona Department of Water Resources
af	acre-feet, also acre-foot
afa	acre-feet annually
AGFD	Arizona Game and Fish Department
AMA	Active Management Area
ARPA	Archaeological Resources Protection Act
APS	Arizona Public Service
ASLD	Arizona State Land Department
ASM	Arizona State Museum
AWBA	Arizona Water Banking Authority
AWS	Assured Water Supply
BIA	Bureau of Indian Affairs
BKW	Bing K. Wong Farms
BLM	Bureau of Land Management
BO	Biological Opinion
C	Critical Habitat
CAGR	Central Arizona Groundwater Replenishment District
CAIDD	Central Arizona Irrigation and Drainage District
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District
CAVSRP	Central Avra Valley Storage and Recovery Project
CCD	County Census Division
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHCID	Chandler Heights Citrus Irrigation District
CMID	Cortaro-Marana Irrigation District
CO	Carbon Monoxide
Corps	U.S. Army Corps of Engineers
CRBPA	Colorado River Basin Project Act
CRSS	Colorado River Simulation System
CWA	Clean Water Act
CWTP	Chandler Water Treatment Plant
dbh	diameter breast height
DES	Department of Economic Security
DWR	Department of Water Resources
EA	Environmental Assessment

EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FEA	Final Environmental Assessment
FEIS	Final Environmental Impact Statement
fhd	Foliar Height Density
FICO	Farmers Investment Company
FIP	Federal Implementation Plan
FIRE	Financial, Insurance, and Real Estate Sector
FMIC	Fort McDowell Indian Community
FMP	First Management Plan
FONSI	Finding of No Significant Impact
FR	Federal Register
FWCA	Fish and Wildlife Coordination Act
GMA	Groundwater Management Act
gpm	gallons per minute
gpcd	gallons per capita per day
GRIC	Gila River Indian Community
GRUSP	Granite Reef Underground Storage Project
GSF	Groundwater Savings Facility
GWh	gigawatt
HCP	Habitat Conservation Plan
HIDD	Hohokam Irrigation and Drainage District
HVID	Harquahala Valley Irrigation District
ID	Irrigation District
IDD	Irrigation and Drainage District
ITA	Indian Trust Asset
kaf	thousand acre-feet
kafa	thousand acre-feet annually
KAI	Kai Farms
kWh	kilowatt hour
LORS	Laws, Ordinances, Regulations and Standards
M	Meters
maf	million acre-feet
mafa	million acre-feet annually
MAG	Maricopa Association of Governments
MBTA	Migratory Bird Treaty Act
MDWID	Metropolitan Domestic Water Improvement District
mgd	million gallons per day

Mi <sup>2</sup>	square miles
M&I	Municipal and Industrial
MPA	Municipal Planning Area
MSIDD	Maricopa-Stanfield Irrigation & Drainage District
MVWCD	McMullen Valley Water Conservation District
MW	Megawatts
MWD	Maricopa Water District
MWh	Megawatts per hour
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Grave Protection and Repatriation Act
NAU	Northern Arizona University
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIA	Non-Indian Agriculture
NMIDD	New Magma Irrigation and Drainage District
NO <sub>2</sub>	Nitrogen Dioxide
NOI	Notice of Intent
NO <sub>x</sub>	Oxides of Nitrogen
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
O <sub>3</sub>	Ozone
O&M	Operation & Maintenance
OM&R	Operation, Maintenance and Replacement
ORV	Off-road Vehicle
OVWU	Oro Valley Water Users
PA	Programmatic Agreement
PAG	Pima Association of Governments
PD	Phelps Dodge
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM <sub>2.5</sub>	Particulate matter with a diameter of 2.5 microns or smaller
PM <sub>10</sub>	Particulate matter less than 10 microns in diameter
PMIP	Pima Maricopa Irrigation Project
ppm	parts per million
QCID	Queen Creek Irrigation District
RAZ	Regional Analysis Zones
RID	Roosevelt Irrigation District
ROD	Record of Decision
ROG	Reactive Organic Gas
RRA	Reclamation Reform Act
RWCD	Roosevelt Water Conservation District

SAWRSA	Southern Arizona Water Rights Settlement Act
SC	San Carlos
SCIDD	San Carlos Irrigation and Drainage District
SCIIP	San Carlos Indian Irrigation Project
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLCAIP	Salt Lake City Area Integrated Projects
SMP	Second Management Plan
SO <sub>2</sub>	Sulphur Dioxide
SOI	Secretary of the Interior
SRP	Salt River Project
SRPMIC	Salt River Pima-Maricopa Indian Community
SRV	Salt River Valley
STID	San Tan Irrigation District
TAZ	Transportation Analysis Zones
TDS	Total Dissolved Solids
T&E	Threatened and Endangered
THPO	Tribal Historic Preservation Officer
TID	Tonopah Irrigation District
TMP	Third Management Plan
TON	Tohono O'odham Nation
tpy	tons per year
UofA	University of Arizona
ug/m <sup>3</sup>	Micrograms per cubic meter
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
WAPA	Western Area Power Administration
WCPA	Water Consumer Protection Act
WESTCAPS	West Salt River Valley CAP Subcontractors
WMIDD	Wellton-Mohawk Irrigation Drainage and District
WQARF	Water Quality Assurance Revolving Fund
WSCA	Wildlife of Special Concern in Arizona
YMD	Yuma Mesa Division

## **CHAPTER IX**

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## **REFERENCES**

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- Arizona Agricultural Statistics. 1997. *About Arizona Agricultural Statistics*, U.S. Department of Agriculture.
- Arizona Department of Commerce. 1999a. Profile: Maricopa County, Arizona.
- Arizona Department of Commerce. 1999b. Profile: Pinal County, Arizona.
- Arizona Department of Commerce. 1999c. Profile: Pima County, Arizona.
- Arizona Department of Commerce. 1999d. Profile: State of Arizona.
- Arizona Department of Environmental Quality. 1998. *Air Quality Planning Standards*. February 12, 1998. Accessed March 12, 1998. Uniform Resource Locator. <http://www.adeq.state.az.us/air/plan/stand.htm>.
- Arizona Department of Water Resources. 1999. *Technical Assessment of the San Carlos Apache Tribe Water Rights Settlement*. Phoenix, Arizona. May 17, 1999.
- Arizona Department of Water Resources. 1999a. Hydrographic survey report for the Gila River Indian Reservation; in re the general adjudication of the Gila River System and Source.
- Arizona Department of Water Resources. 1999b. Third Management Plan, 2000-2010, Phoenix Active Management Area. June 1999.
- Arizona Department of Water Resources. 1999c. Third Management Plan, 2000-2010, Santa Cruz Active Management Area. June 1999.
- Arizona Department of Water Resources. 1999d. Third Management Plan, 2000-2010, Tucson Active Management Area. June 1999.
- Arizona Department of Water Resources. 1999e. Third Management Plan, 2000-2010, Pinal Active Management Area. June 1999.
- Arizona Department of Water Resources. 1993. *Governor's Central Arizona Project Advisor Committee-Description of The Central Arizona Project*. Arizona Department of Water Resources, Central Arizona Water Conservation District and U.S. Bureau of Reclamation. April 1983.
- Arizona Department of Water Resources. 1991a. Hydrographic Survey Report for the San Pedro River Watershed, Volume 4: Benson Subwatershed, Watershed File Reports, in re the general adjudication of the Gila River System and Source. November 20, 1991.

- Arizona Department of Water Resources. 1991b. Second Management Plan, Phoenix Active Management Area, 1990 - 2000. Phoenix, Arizona. March 1991
- Arizona Department of Water Resources. 1991c. Second Management Plan, Prescott Active Management Area, 1990 - 2000. January 1991.
- Arizona Department of Water Resources. 1991d. Second Management Plan, 1990-2000.
- Arizona Department of Water Resources. 1984. Management Plan, First Management Period: 1980-1990. December 1984.
- Arizona Department of Water Resources, by Edwin F. Corkhill and Bradley M. Hill. 1990. Pinal Active Management Area, regional groundwater flow model, phase two: numerical model, calibration, sensitivity and recommendations. Modeling Report No. 2. Phoenix, Arizona. December 1990.
- Arizona Department of Water Resources by Edwin F. Corkhill and Dale A. Mason. 1995. Hydrogeology and simulation of groundwater flow, Prescott Active Management Area, Yavapai County, Arizona. September 1995.
- Arizona Department of Water Resources, by Edwin F. Corkhill and Paul R. Plato. 1992.. Pinal Active Management Area, Second Management Plan, simulation of water use scenarios utilizing the Pinal AMA regional groundwater flow model. Modeling Report No. 4. Phoenix, Arizona. September 1992.
- Arizona Department of Water Resources, Matthew P. Wickham and Edwin F. Corkhill. 1989. Pinal Active Management Area, regional groundwater flow model, phase one: hydrogeologic framework, water budget and phase one recommendations. Modeling Report No. 1. Phoenix, Arizona. June 1989.
- Bookman-Edmonston Engineering, Inc. 1979a. Salt River Project, report on evaluation of potential water requirements, Camp Verde Indian Reservation. May 1979.
- Bookman-Edmonston Engineering, Inc. 1979b. Salt River Project, executive summary, evaluation of potential water requirements of Salt River, Fort McDowell, Fort Apache, San Carlos, Camp Verde and Yavapai-Prescott Indian Reservations. May 1979.
- Bookman-Edmonston Engineering, Inc. 1979c. Salt River Project, report on evaluation of potential water requirements, San Carlos Indian Reservation. May 1979.
- Census Atlas for Pinal County. 1990. *Census Tracts and Block Groups*. Research Advisory Services, 1992.
- Census of Population and Housing. 1990. *Summary Population and Housing Characteristics: Arizona*. U.S. Department of Commerce, Economic and Statistics Administration, Bureau of the Census.

- Franzoy, Corey. 1988. Tohono O'odham Nation-Water Supply Project, Schuk Toak District, Environmental Assessment of the Schuk Toak Development Plan. Prepared for U.S. Department of the Interior, Bureau of Reclamation under Contract No. 7-CS-30-05900. November 1988.
- Gregonis, Linda M. and Reinhard, Karl J. 1979. Hohokam Indians of the Tucson Basin. The Arizona Board of Regents. The University of Arizona Press, Tucson, Arizona.
- Maricopa Association of Governments. 1999. *Maricopa County On Line-County at a Glance*.
- Maricopa Association of Governments. 1997. *Socioeconomic Projections, Interim Report*. June.
- Maricopa County, Arizona. 1996a. Historical overview and population background report, 2020 eye to the future.
- Maricopa County, Arizona. 1996b. Land use element, inventory & analysis report, 2020 eye to the future.
- Merchant, James, P., David M Dornbusch & Company. 1995. Report for economic assessment of the value of groundwater depletion from Central Arizona Irrigation and Drainage District pumping, Gila River Indian Community. Prepared for the U.S. Department of Justice. September 8, 1995.
- Natural Resources Conservation Service. 1997. *Acres of Prime Farmland*.
- Nichols Certified Court Reporters, Reported by Clark L. Edwards. 1999. Bureau of Reclamation, Environmental Division. Public scoping meeting. September 15, 1999.
- Northwest Replenishment Program Executive Management Team. 1998a. Canada del Oro recharge and recovery project, feasibility report. January 1998.
- Northwest Replenishment Program Executive Management Team. 1998b. Lower Santa Cruz Replenishment Project, summary of feasibility investigations. February 1998.
- Pima Association of Governments. 1999. *Pima Association of Governments 1999 Population Handbook*. Tucson, Arizona.
- Pinal Active Management Area. Phoenix, Arizona.
- Powell, Lawrence Clark. 1990. *Arizona, A History*. University of New Mexico Press, Albuquerque, New Mexico.
- Shadegg, Stephen C. 1949. Arizona-An Adventure in Irrigation. *Times Mirror Press*. Los Angeles, California.
- Shadegg, Stephen C. 1949. *The Miracle on the Salt River*.

- SRP. 1998. Annual water quality report.
- U.S. Bureau of Reclamation and the Pima County Wastewater Management Department. 1997. Southern Arizona water rights settlement act effluent utilization study. July 1997.
- U.S. Bureau of Reclamation, Lower Colorado Region. 1982. Central Arizona Project, Final environmental impact statement, water allocations & water service contracting. March 1982.
- U.S. Bureau of Reclamation. 1999a. *Final Environmental Assessment-Tohono O'odham Nation Water Supply Project, Central Arizona Project-CAP Link Pipeline Project*. Lower Colorado Region, Phoenix Area Office, Phoenix, Arizona. July 1999.
- U.S. Bureau of Reclamation. 1999b. *San Xavier Cap Link Pipeline Final EA*.
- U.S. Bureau of Reclamation. 1998a. *Draft Environmental Assessment-Central Arizona Project Water Assignment, Berneil Water Company to City of Scottsdale*.
- U.S. Bureau of Reclamation. 1998b. *Record of Decision, Gila River Indian Community Pima-Maricopa Irrigation Project*. Lower Colorado Region, Boulder City, Nevada. July 20, 1998.
- U.S. Bureau of Reclamation. 1998c. *Tucson Aqueduct System Reliability Investigation Final Environmental Impact Statement*. U.S. Department of the Interior, Bureau of Reclamation. April 1998.
- U.S. Bureau of Reclamation. 1997a. *Final Programmatic Environmental Impact Statement for the Pima-Maricopa Irrigation Project*. Prepared by the Gila River Indian Community and EcoPlan Associates, Inc. September 1997.
- U.S. Bureau of Reclamation. 1997b. *Pima-Maricopa IP Environmental Impact Statement*.
- U.S. Bureau of Reclamation. 1995. *Operation of Glen Canyon Dam-Colorado River Storage Project-Final Environmental Impact Statement*, Bureau of Reclamation, Salt Lake City, Utah. March 1995.
- U.S. Bureau of Reclamation. 1991. *Final Environmental Assessment, Central Arizona Project-Reallocation of Non-Indian Agricultural Water*. Lower Colorado Region, Arizona Projects Office, Phoenix, Arizona. July 1991.
- U.S. Bureau of Reclamation. 1982. *Water Allocations and Water Service Contracting Final Environmental Impact Statement*, INT FES-82-7, filed March 19, 1982/Record of Decision, U.S. Department of the Interior, Bureau of Reclamation. March 1982.
- U.S. Department of Agriculture. 1997a. *Agricultural Census for Maricopa County*.
- U.S. Department of Agriculture. 1997b. *Agricultural Census for Pima County*.

- U.S. Department of Agriculture. 1997c. *Agricultural Census for Pinal County*.
- U.S. Department of Agriculture. 1997d. *Agricultural Census for the State of Arizona*.
- U.S. Department of the Interior, Lower Colorado Region, Arizona Projects Office. 1991. Final environmental assessment, Central Arizona Project reallocation of Non-Indian agricultural water. July 1991.
- U.S. Department of the Interior, Bureau of Reclamation, Lower Colorado Region. 1988. Tohono O'odham Nation, Papago water supply project. Environmental assessment of the Schuk Toak development plan. November 1988.
- U.S. Department of the Interior, Bureau of Reclamation, Lower Colorado Region. 1981. Final Environmental impact statement, water allocations & water service contracting, Central Arizona Project. September 1981.
- U.S. Department of the Interior, Bureau of Reclamation, Lower Colorado Region. 1976a. Central Arizona Project. Geology and groundwater resources report. Maricopa and Pinal Counties, Arizona. Volume 1. December 1976.
- U.S. Department of the Interior, Bureau of Reclamation, Lower Colorado Region. 1976b. Central Arizona Project. Geology and groundwater resources report. Maricopa and Pinal Counties, Arizona. Volume 2. December 1976.
- Water & Environmental Systems, Technology, Inc. 1995. Gila River Indian Community. Impacts of CAIDD pumping on SCIIP and GRIC lands as determined using a hydrologic model. September 11, 1995.

**CHAPTER X**



**GLOSSARY**



**A**

**Acre-foot:** A quantity or volume of water covering one acre to a depth of one foot (43,560 cubic feet).

**Active Management Area:** An initial active management area is a geographical area which has been designated by the Legislature as requiring active management of groundwater or, in the case of the Santa Cruz Active Management Area, active management of any water, other than stored water, withdrawn from a well. Subsequent active management areas may be designated through local initiative or by the director of the Arizona Department of Water Resources.

**Ag Pool:** The CAWCD sells water to the NIA sector out of the Ag Pool, as available at a subsidized price. The Ag Pool is composed entirely of excess water.

**Allocation:** An amount of CAP water designated by the Secretary of the Interior as being assigned to a particular user.

**Aquifer:** An aquifer is a geologic formation that contains sufficient saturated materials to be capable of storing and transmitting water in usable quantities to a well.

**Arizona Water Banking Authority (AWBA):** The AWBA was formed in 1996 to purchase excess CAP for groundwater recharge. The AWBA uses both direct and indirect (in-lieu) recharge facilities. The groundwater credits will be used in the future for supplies during Colorado River shortage conditions, Indian water rights settlements, and are not available for use in securing an Assured Water Supply.

**Assured Water Supply:** A developer may not offer to sell or lease in an Active Management Area subdivided lands (six or more lots under 36 acres in size) until it first demonstrates to the Arizona Department of Water Resources that it has a water supply that meets certain criteria. In this regard, the developer has two options: (1) the developer may obtain a certificate of Assured Water Supply from the Arizona Department of Water Resources; or (2) the developer may obtain water service from a water provider whose service area has a designation of Assured Water Supply. Either the developer applying for a certificate of Assured Water Supply or the water provider applying for a designation must demonstrate that it has a water supply that meets the following criteria: (1) the supply is of “adequate quality;” (2) the supply will be continuously available to meet the water needs of the proposed use for at least 100 years; (3) the projected use is consistent with the management plan of the Active Management Area; (4) the projected use is consistent with achievement of the management goal of the Active Management Area; and (5) the financial capability has been demonstrated to construct the water facilities necessary to make the supply of water available for the proposed use, including a delivery system and any storage facilities or treatment works.

**C**

**CAGRDR:** The Central Arizona Groundwater Replenishment District is operated by the CAWCD and is charged with replenishing groundwater pumped with CAP or other water for

members on an annual basis. Subdivisions, cities, or other entities may enroll their lands in the CAGRDR to allow them to obtain an Assured Water Supply certificate or designation from ADWR. To join, the entities must have physically available groundwater (which may not be otherwise legally available) and must encumber their lands with the CAGRDR tax. The CAGRDR is charged with replenishing member pumped groundwater, as close to the area of hydrologic impact as is practicable, within several years of its withdrawal. The CAGRDR cannot replenish anticipated groundwater withdrawals in advance. A certain amount of direct delivery is allowed to Scottsdale and several other small east-Valley communities. Although the CAGRDR does not currently have a CAP allocation, it is actively seeking one. The CAGRDR was created by the Arizona legislature in 1993 to provide alternatives to Central Arizona communities to meet AWS requirements.

**CAP-eligible lands:** Only lands with a “recent history of irrigation” prior to the 1968 passage of the CAP authorizing legislation are eligible for CAP irrigation water.

**Central Arizona Water Conservation District (CAWCD):** The CAWCD is the State entity formed to repay the cost of constructing the CAP. CAWCD also operates the CAP.

**Consumptive use:** The use of water by plants, animals or humans. This includes evapotranspiration but does not include water that returns to the surface or groundwater system.

**Conversion right:** A provision allowing for conversion of water rights from agricultural to M&I water supply (at one acre-foot per acre, minus available surface supplies). Intended to supply M&I water to acreage which is urbanized.

## D

**Darcy’s Law:** Equation which relates the flow of groundwater across a boundary to the hydraulic gradient across the boundary (i.e., slope of the groundwater surface), the transmissivity of the aquifer, and the width of the boundary.

**Debt Relief:** Under the Settlement Alternative, some degree of debt relief to the irrigation districts is being negotiated. This refers to the Reclamation 9(d) loans, which the irrigation districts obtained from the Federal government to help fund the construction of their irrigation distribution systems in order to take delivery of CAP water. The irrigation districts also have private debt in the form of bonds, which helped fund their irrigation distribution system construction.

***De minimis:*** Having minimal impact, significance, or consequence.

**Direct Recharge:** See Groundwater Recharge.

## E

**Effluent:** Effluent is collected in sewer systems, treated at a wastewater treatment plant, and is available for other uses. Typically, the water is then discharged to effluent-dependent streams

(such as the Gila River downstream of the 91<sup>st</sup> Avenue Wastewater Treatment Plant), recharged to replenish groundwater, or used for irrigation of turf facilities or non-food crops.

**Excess Water:** CAP water that is either not under contract or is under contract but is not ordered. Also includes surplus Colorado River water. The CAGR, Ag Pool, and Recharge Pool rely on excess water.

## F

**Firming:** Refers to the concept of recharging groundwater with the intent of recovering it during periods of shortage when CAP water is not available. Lower priority CAP water, such as NIA-priority, would require “firming” to be comparable to M&I-priority CAP water in terms of reliability.

## G

**General adjudication:** A court action to determine the type, amount, and priority date of every user’s respective water right in a particular watershed or basin.

**Groundwater Recharge:** The practice of replenishing a groundwater aquifer with surface water, primarily river water or effluent. Direct recharge spreads water on the surface in basins to infiltrate to the aquifer. Indirect or in-lieu recharge delivers water to farmers, who use the surface water in-lieu of groundwater, which would otherwise have been pumped. Whether direct or indirect methods are used, groundwater credits accrue and may be used (pumped) at a later point in time such as during a CAP shortage.

## I

**In-lieu Recharge:** See Groundwater Recharge.

**Indirect Recharge:** See Groundwater Recharge.

## L

**Law of the River:** A series of treaties, laws, contracts, and agreements that govern the allocation and use of Colorado River water.

## M

**Manning’s Equation:** Channel flow is considered uniform when the flow resistance is just balanced by gravitational force. The depth of flow occurring under conditions of uniform flow is defined as the normal depth. Manning’s Equation is one of the most widely used open channel, uniform flow equations. The equation is used to compute flow velocity for uniform flow conditions. For a known discharge, Manning’s Equation may be used to solve for normal depth.

**Municipal and Industrial (M&I) Sector:** Includes cities, private water companies, industries, and other water providers. Does not include agricultural irrigation but does include landscape irrigation.

**Municipal Planning Area (MPA):** Delineated by Maricopa Association of Governments (MAG) for each city and town within Maricopa County, it represents the area of planning concern for a municipality. Minimally, the planning area for each city or town includes all of its incorporated area plus portions of the county surrounded by strip annexations. These areas are filed with the Arizona Department of Water Resources and MAG.

## N

**Non-Indian Ag (NIA) Sector:** The NIA sector is composed of irrigation districts and other agricultural entities.

**Normal Year:** Sufficient Colorado River supplies are available to provide delivery of 1.415 maf through the CAP system.

## P

**Phreatophyte:** A deep-rooted plant that obtains its water from the water table or the layer of soil just above it.

**Priority:** Priority refers to the hierarchy of water availability during shortage conditions. Higher priority water would be delivered before lower priority water.

## R

**RRA:** Reclamation Reform Act, which sets single-owner acreage restrictions on farmers receiving CAP water. Under the Settlement Alternative, farmers may be relieved of a degree of RRA acreage-restrictions. RRA applies to all Reclamation irrigation projects except as exempted by Congress.

**Reasonably-Priced:** Under the Settlement Alternative, CAWCD has committed to providing a “reasonably-priced” Ag Pool for the next 30 years if enough excess water is available. As the intent of the Ag Pool is to provide water at a price at which farmers will buy it, it may be assumed that it will be priced comparably with the price of pumping groundwater.

**Recharge:** See Groundwater Recharge.

**Recharge Pool:** As defined for the purposes of this document, the Recharge Pool is excess water which will be used to recharge groundwater for M&I uses. Purchasers of the Recharge Pool water include the AWBA and individual M&I entities. The water may be recharged in direct or indirect (in-lieu) recharge facilities.

**S**

**Safe Yield:** Term commonly used to describe groundwater conditions such that groundwater uses are equal to or less than recharge.

**Sector:** Refers to a description of the use and/or the priority of CAP water. There are three broad sectors of CAP water use: M&I, Indian, and Non-Indian Agriculture.

**Service Area:** The area currently being served by an M&I entity water provider. It is defined by the presence of distribution pipes of at least four inches in diameter. The Groundwater Code defines the service area of a city, town or private water company as the area of land actually served by the entity and any additional areas that contain an operating distribution system owned by the entity and used primarily for the delivery of non-irrigation water. These areas are filed with the Arizona Department of Water Resources and the Arizona Corporation Commission.

**Shortage:** Water supply conditions on the Colorado River such that the Secretary of the Interior determines normal contract deliveries cannot be met. If the Secretary of the Interior declares a shortage, a schedule of reduced deliveries would be implemented. For the purposes of this DEIS, a shortage is defined as deliveries of 925,000 acre-feet per year through the CAP system.

**Subcontract:** A contract for the delivery of CAP water, typically between water users and the delivery agency, CAWCD.

**Subsidence:** Subsidence is the settling or lowering of the land's surface as a result of groundwater pumping.

**Surplus:** More Colorado River water is available than in a normal year.

**Surplus Water:** Surplus water is available on the Colorado River system when the Secretary of the Interior declares surplus conditions. During surplus conditions, the Lower Colorado River Division may divert more than the standard 7.5 maf. Surplus water may be used with fewer restrictions and by more entities than CAP water.

**T**

**Three-party subcontract:** A contract among the users, the Secretary, and CAWCD which is required in order for non-Indian CAP allottees to purchase and use CAP water. This contracting mechanism identifies the specific terms and conditions for delivery of CAP water.

**Two-party letter agreement:** Agreements entered into between NIA subcontractors and CAWCD wherein each party "mutually agreed to waive certain rights and obligations under the Water Service Subcontract." This contracting mechanism identifies the specific terms and conditions for delivery of CAP water.

**Note:** Some of these definitions are taken from the Phoenix AMA Third Management Plan.

**CHAPTER XI**



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