WESTCAPS
our west valley
water coalition

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The West Salt River Valley CAP Subcontractors Planning Process

Augmentation Grant No.: AUG96PH13-00
2000-01 Overall Project Report

June 30, 2001

Prepared By: Harold W. Thomas Jr.

Director

Acknowledgements

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Other Papers Prepared By WESTCAPS:

"WESTCAPS Stakeholder Analysis", Harold Thomas, October 21, 1997

"Maricopa Water District Beardsley Canal And Associated Delivery System Hydraulic Capacity Analysis – Phase 1", Bookman_Edmonston Engineering, May 14, 1999

"WESTCAPS Strategic Priorities Workshop", The Rozelle Group, May 14, 1999

"Beardsley Canal Capacity Study – Phase 2", Bookman_Edmonston Engineering, October 8, 1999

"Present Worth Analysis of the Basecase", Thomas K. Poulson, P.E, Bureau of Reclamation, Phoenix Area Office, April 2000

"Evaluation of Regional Solutions and Recommended WESTCAPS Strategy", The Rozelle Group, May 31, 2000

"Present Worth Analysis Of The Options", Thomas K. Poulson, Bureau of Reclamation, Phoenix Area Office, March 2001

"West Salt River Valley Ground-Water Supply Study", Bureau of Reclamation, Phoenix Area Office, April 2001

"WESTCAPS Strategic Plan for using Central Arizona Project Water in the West Salt River Valley 2000 to 2025", WESTCAPS and Bureau of Reclamation, Phoenix Area Office, April 2001

WESTCAPS GENERAL COMMITTEE
AUTHORIZED REPRESENTATIVE & ALTERNATES

Member	Representative	Alternate
Town of Buckeye	Joe Blanton	
City of Glendale	Ken Reedy	Doug Kukino
City of Goodyear	Stephen Cleveland	Michael Lacey
City of Peoria	Terry Ellis	Meredith Flinn
City of Phoenix	George Britton	Michael Gritzuk
City of Surprise	James Swanson	Grace Sargent-Flack
Arizona Water Company	James Livingston	William Garfield
Citizens Water Resources	Ray Jones	Keith Larson
West Maricopa Combine	John Mihlik	Bill Sullivan
Arizona State Land Dept.	Cynthia Stefanovic	

WESTCAPS TECHNICAL COMMITTEE
AUTHORIZED REPRESENTATIVE & ALTERNATES

Member	Representative	Alternate
City of Glendale	Doug Kukino	Harold Goodman
City of Goodyear	Michael Lacey	
City of Peoria	Brad Hill	Eric Dial
City of Phoenix	Michael Gritzuk	Carlos Padilla
Arizona Water Company	William Garfield	Richard Distler
Citizens Water Resources	Keith Larson	Ray Jones
West Maricopa Combine	John Mihlik	Bill Sullivan

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Member	Representative	Alternate
ACC	Steve Olea	
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CAWCD/CAGRD	Cliff Neal	
MAG	Brenda Geisen	
MCFCD	Tim Phillips	
MWD	Jim Sweeney	Glen Vortherms
SRP	Julia Shepherd	Bruce Hallin
USGS	Jack Edmonds	
WESTMARC	Diane McCarthy	Dave Iwanski

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Abbreviations and acronyms

ACC	Arizona Corporation Commission
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AMA	Active Management Area
ac-ft	acre-foot
ac-ft/day	acre-foot per day
ac-ft/yr	acre-foot per year, acre-feet per year
AWBA	Arizona Water Banking Authority
AWS	assured water supply
CAGRD	Central Arizona Groundwater Replenishment District
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District
CC&N	Certificate of Convenience and Need
cfs	cubic feet per second
CRIT	Colorado River Indian Tribes
D/DBPR	Disinfectant/Disinfection By-Products Rule
DOI	Department of the Interior
EPA	Environmental Protection Agency
ESRV	East Salt River Valley
ESWTR	Enhanced Surface Water Treatment Rule
ft^3/day	cubic feet per day
GRIC	Gila River Indian Community
LAU	lower alluvial unit
MAU	middle alluvial unit
M&I	municipal and industrial
MCL	maximum contaminant level
MF	microfiltration
mg/L	milligrams per liter
mg	million gallons
MGD	million gallons per day
MWD	Maricopa County Municipal Water Conservation District No. 1
NB-WTP	North Beardsley Water Treatment Plant
NCI	Navigant Consulting, Incorporated
O&M	operation and maintenance
OM&R	operation, maintenance and replacement
ppb	parts per billion
ppm	parts per million
psi	pounds per square inch

RID	Roosevelt Irrigation District
RO	reverse osmosis
RUS	Rural Utilities Service
SB-WTP	South Beardsley Water Treatment Plant
SROG	Arizona Municipal Water Users Association Sub-Regional Operating Group
SRP	Salt River Project
SRV	Salt River Valley
TDS	total dissolved solids
THM	trihalomethanes
TOC	total organic carbon
UAU	upper alluvial unit
UF	ultrafiltration
USDA	U.S. Department of Agriculture
USDOI	U.S. Department of the Interior
WESTCAPS	coalition of West Valley Central Arizona Project Subcontractors
WMC	West Maricopa Combine
WTP	water treatment plant
WSRV	West Salt River Valley
WPA	water planning area

Executive Summary

Summary

The West Valley CAP Subcontractors (WESTCAPS) are 10 Central Arizona Project (CAP) subcontractors in the West Salt River Valley (WSRV) who formed a coalition to identify and evaluate options that will allow its members to use CAP water to which they are entitled. WESTCAPS membership consists of: Arizona State Land Department, Arizona Water Company, Town of Buckeye, Citizens Water Resources, City of Glendale, City of Goodyear, City of Peoria, City of Phoenix, City of Surprise, and West Maricopa Combine. WESTCAPS was formed in July 1997 through an intergovernmental agreement among the members. WESTCAPS receives funding through membership dues ($75,000 per year), a grant from the Arizona Department of Water Resources ($75,000 per year), and technical assistance ($400,000 per year) from the Bureau of Reclamation, an agency of the U.S. Department of the Interior.

The WSRV is poised for rapid urbanization that will significantly increase water demand. State law requires new development in the Phoenix metropolitan area to demonstrate a 100-year assured water supply. Full use of CAP water is deemed critical to the continued development and prosperity of the WSRV.

A 1995 study authorized by the Arizona legislature showed that most of the WSRV has experienced significant groundwater decline, resulting in up to 17 feet of land subsidence in portions of the WSRV. Other portions of the West Valley are facing groundwater quality issues that will increase the cost of continued groundwater use. Some municipalities have made the transition and are primarily using renewable water resources; other WSRV water providers are still largely reliant on groundwater.

While Phoenix and Glendale have been using CAP allocations for 15 years, and more recently Peoria by its participation in the Glendale Pyramid Peak Water Treatment Plant, the majority of West Valley water providers are small municipalities and private water companies with limited financial resources and are located some distance away from the CAP canal. WESTCAPS members are concerned that CAP water may continue to be unused if regional solutions are not developed to allow for the treatment, storage, and delivery of CAP water.

WESTCAPS has developed a water delivery plan to shift the communities' reliance from groundwater to renewable water supplies by 2025. Groundwater supplies would be used in a peaking or reserve role. Referring to Figure 4, facilities included in this plan are:

- Use of nearly 4 million gallons per day (MGD) of available capacity in the planned Phoenix Lake Pleasant Water Treatment Plant (WTP)
- Two new WTPs with capacities of approximately 58 and 79 MGD
- Use of approximately 16 MGD of capacity in West Maricopa Combine's (WMC) recharge and recovery project

Staff analyzing these facilities envisioned them phased in over time: the first phase completed by year 2005, the second phase by year 2015, and the last phase by year 2025. Adjustments in the timing and location of these facilities are anticipated as this

strategy is further developed and the ability and desire of the individual members to participate are determined.

Institutional and financing arrangements for funding infrastructure development were explored and are currently under discussion. Some of the institutional arrangements being considered are: joint powers of authority, simple contractual agreements, privatization, and a water authority.

WESTCAPS estimated that approximately 104,000 ac-ft per year of additional renewable water supply would have to be secured by 2025 to implement the proposed water delivery plan. Water cost and availability information was prepared to get a sense of the membership's ability to acquire the necessary supply. It was concluded that there are sufficient renewable supplies available to implement the proposed plan.

Background

The West Valley CAP Subcontractors (10 Central Arizona Project subcontractors in the WSRV) formed a coalition to assess how they can work together to utilize their CAP allocations. WESTCAPS consists of the following agencies: Arizona State Land Department, Arizona Water Company, Town of Buckeye, Citizens Water Resources, City of Glendale, City of Goodyear, City of Peoria, City of Phoenix, City of Surprise, and West Maricopa Combine. WESTCAPS is organized as shown in Figure 1.

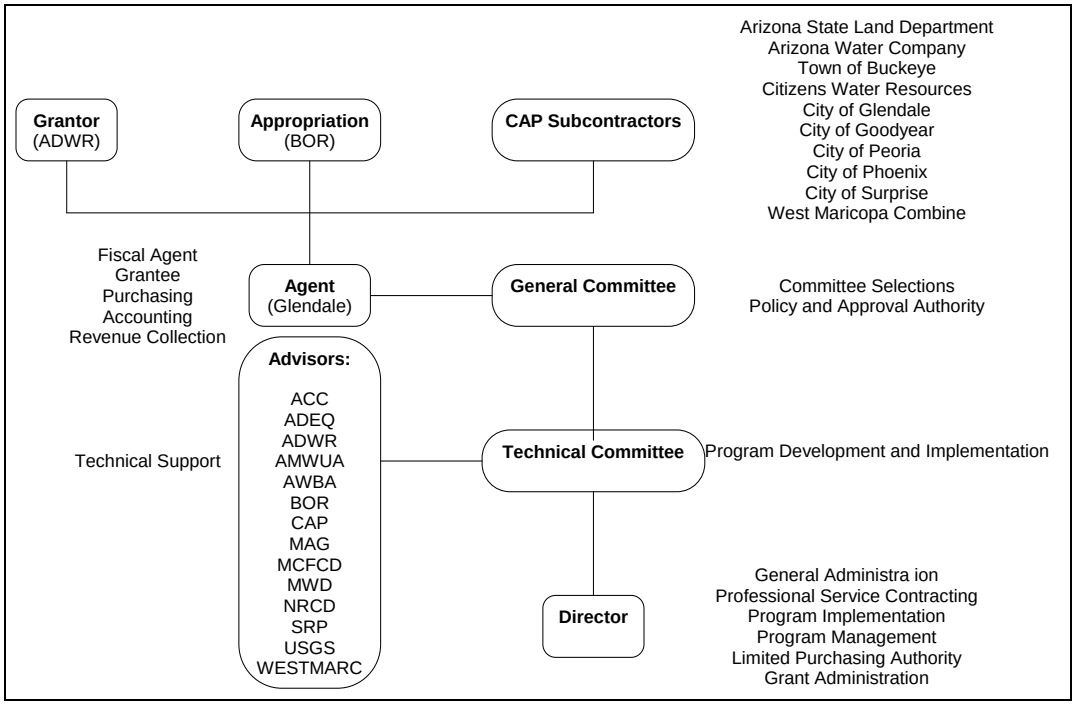


Figure 1.—West Valley CAP Subcontractors

The study area shown in Figure 2 represents the geographic boundaries of the WESTCAPS water study area and includes both present and proposed WESTCAPS members' year 2025 service areas.

Problem Statement

Each water provider in the WSRV conducts its own water resources planning and management without much consideration for the plans and actions of neighboring communities. The WSRV communities all share the groundwater aquifer and local surface water supply systems. Water providers in the WSRV must work together to protect, preserve, and develop these shared resources and to respond to issues of increasing regulatory pressure, CAP water utilization, declining groundwater levels, groundwater quality, and land subsidence.

If no workable solution is implemented, certain water providers may be unable to obtain a designation of "Assured Water Supply," as defined by the State of Arizona. Growth and development in the area may become limited. As the aquifer is drawn down, the cost to pump groundwater will increase, water quality will degrade, land subsidence problems will worsen, and the area will not have enough supply to meet future demands.

WESTCAPS Mission and Goals[15]

The following mission and goals were adopted by the WESTCAPS General Committee at its meeting on November 7, 1997.

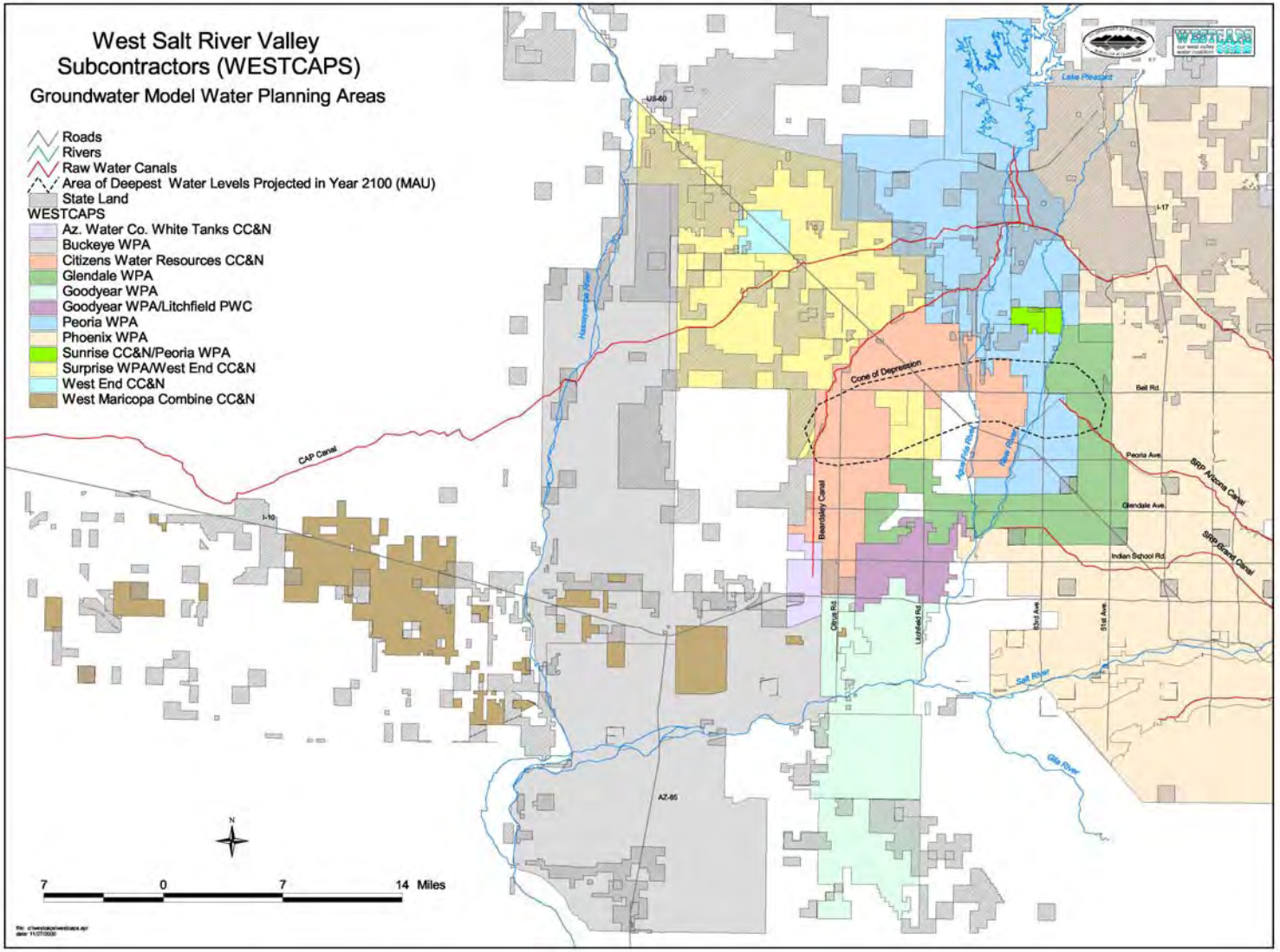
"WESTCAPS is a coalition of CAP subcontractors most of whom serve drinking water to communities in the west SRV. WESTCAPS' mission is to develop workable alternatives for its members to provide their customers with a cost effective, sustainable, reliable, and high quality water supply through partnerships and cooperative efforts in regional water resource planning and management, emphasizing CAP utilization."

The primary goal of the planning process is to increase the efficient use of CAP water by WSRV entities possessing municipal and industrial subcontracts. In addition to this goal, WESTCAPS members expressed desired outcomes for both the planning process and what the process implementation. They are:

- Develop a plan that each WESTCAPS member can support
- Develop a common base of understanding of the issues and options
- Develop a mission statement and define the tenets for member involvement
- Protect, preserve, and enhance CAP allocations
- Maximize efficient use of CAP and other renewable resources available to the west SRV
- Understand and influence water policy in Arizona related to water and wastewater management in the WSRV (ADEQ, Arizona Department of Water Resources, Central Arizona Water Conservation District, and the Arizona Corporation Commission)
- Develop long-term, sustainable regional water resource management, infrastructure, and implementation strategies

Originally, the planning process was expected to take 4 to 5 years to complete. The planning process was completed in 4 years.

Figure 2.—WESTCAPS water supply study area.



Strategic Research

The intent of the Strategic Research phase of the planning process is to identify and describe the factors that drive change by assessing the current situation facing water providers in the WSRV, considering potential future outcomes, and summarizing the key strategic issues. For this planning effort, a strategic issue is a driving factor for change that will, or may, influence WESTCAPS' ability to use its CAP allocations. Strategic research helped WESTCAPS members develop a common understanding of the existing situation for each member and the region as a whole. The outcome from doing strategic research was: (1) a common basis for understanding, (2) an identification of key strategic issues, and (3) development of strategic priorities.

After the strategic research was completed and consensus was developed on the strategic issues, the next step of the planning process was for WESTCAPS to review the list of strategic issues and identify the issues of highest priority. This reduced list of strategic issues then became WESTCAPS' strategic priorities. WESTCAPS strategic priorities are:

1. Insufficient water infrastructure
2. Lack of financing capability
3. Insufficient renewable resources
4. Opportunity to promote recharge in the WSRV
5. Arizona Corporation Commission policy and direction

From this point forward in the planning process, WESTCAPS work efforts were focused on addressing these five strategic priorities.

Strategic Modeling

WESTCAPS identified all of its available options for using CAP and other renewable water supplies in the west Salt River Valley. From these options, WESTCAPS developed six potential infrastructure strategies. A groundwater model analysis was completed for each strategy. In addition, a present worth analysis was also developed for each strategy. It was the intent of WESTCAPS to select one of these strategies as its collective vision of the water infrastructure that should be in place by 2025 to meet projected water demands.

The final phase of WESTCAPS planning process, the Gap Analysis, addressed: (1) possible refinements to the WESTCAPS infrastructure strategy selected on June 30, 2000, (2) preliminary cost estimates for financing the WESTCAPS strategy, (3) potential institutional and financing arrangements, and (4) sources of additional renewable water supply to meet projected supply deficits.

The proposed WESTCAPS strategy shown in Figure 3 is that by the year 2025, WESTCAPS members would primarily rely on renewable supplies to meet customer demands. Surface WTPs and related infrastructure would be in place by 2025 to meet projected demands, and groundwater supplies would be used in a peaking or reserve role. The Town of Buckeye, West Maricopa Combine, and a portion of the City of Surprise would rely on recharge and recovery projects. Facilities included in this strategy are:

- Use of nearly 4 million gallons per day (MGD) of available capacity in the planned Phoenix Lake Pleasant Water Treatment Plant (WTP)
- Two new WTPs with capacities of approximately 58 and 79 MGD
- Use of approximately 16 MGD of capacity in West Maricopa Combine's (WMC) recharge and recovery project

Staff analyzing these facilities envisioned them phased in over time: the first phase completed by year 2005, the second phase by year 2015, and the last phase by year 2025. Adjustments in the timing and

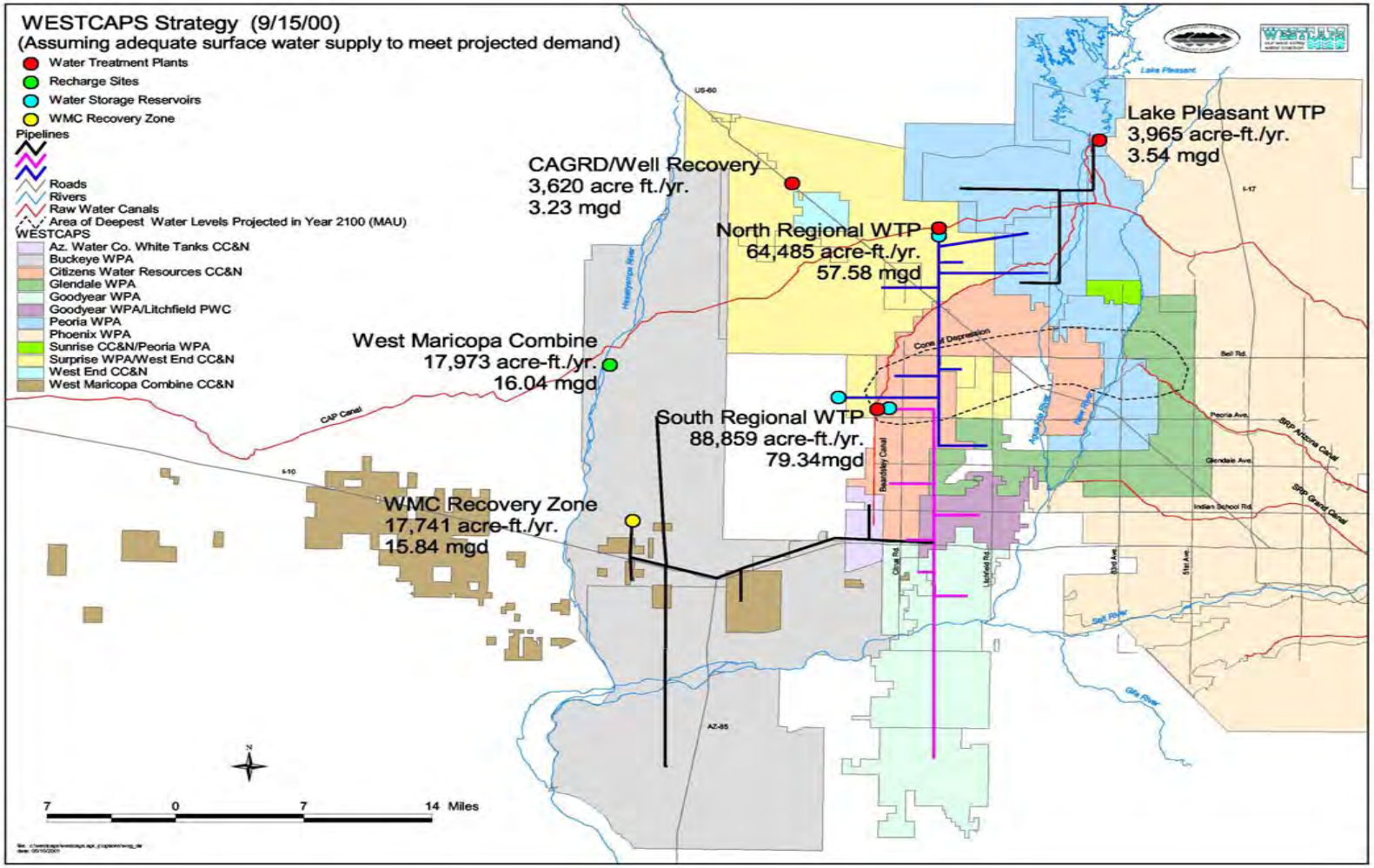


Figure 3.—Revised WESTCAPS strategy, dated September 15, 2000.

location of these facilities are anticipated as this strategy is further developed and the ability and desire of the individual members to participate are determined.

The interim strategy for CAP utilization would be for each WESTCAPS member, either individually or cooperatively with others, to consider the following options:

- Existing water treatment plants
- Recharge and recovery in existing and future groundwater savings facilities
- Recharge and recovery in existing and future underground storage and recovery projects

In addition, the Central Arizona Groundwater Replenishment District and Arizona Water Banking Authority should be encouraged to recharge as much water as possible in the WSRV. Existing and future underground storage and recovery projects include:

- West Maricopa Combine Pipeline to The Future
- Central Arizona Project Agua Fria Recharge Project
- Surprise's McMicken Dam Recharge Project
- Goodyear's Beardsley Canal Recharge Project
- Maricopa County Flood Control District New River Watercourse master planned area
- Salt River Project's Proposed Underground Storage and Recovery Project in the WSRV
- Subregional Operating Group's Agua Fria Recharge Project
- Avondale's Crystal Lakes Project

The WESTCAPS General Committee decided to adopt, on a preliminary basis, the proposed strategy, but requested the Technical Committee make additional refinements to the strategy in the following areas:

- Evaluate potential institutional and financial mechanisms

- Develop regional and sub regional alternative plant configurations including transmission and distribution infrastructure

Project Phasing, Institutional and Financing Options

The two new regional WTPs in the WESTCAPS strategy would be phased in three increments, occurring in the years 2005, 2015, and 2025.

Institutional and financial arrangements for funding infrastructure development were explored and are currently under discussion. Some of the institutional arrangements considered are: joint powers of authority, simple contractual agreements, privatization, and a water authority.

Sources of Additional Renewable Supply

Water availability to meet the 2025 demand was gathered to ascertain the membership's opportunity and ability to acquire the necessary supply. WESTCAPS concluded that there are sufficient renewable supplies available within Arizona to implement the revised WESTCAPS strategy (the proposed strategy). The renewable water supply requirement, currently available surface water supplies, and potential sources for additional renewable supplies are shown in Figure 4.

Demand.—By the year 2025, it is projected that an additional 211,874 acre-feet per year (ac-ft/yr) of renewable supply will be needed to meet projected demands. However, incidental recharge to the aquifer in that year is expected to be 8,475 ac-ft/yr. The projected net regional water supply demand, after adjustment for incidental recharge, is 203,399 ac-ft/yr.

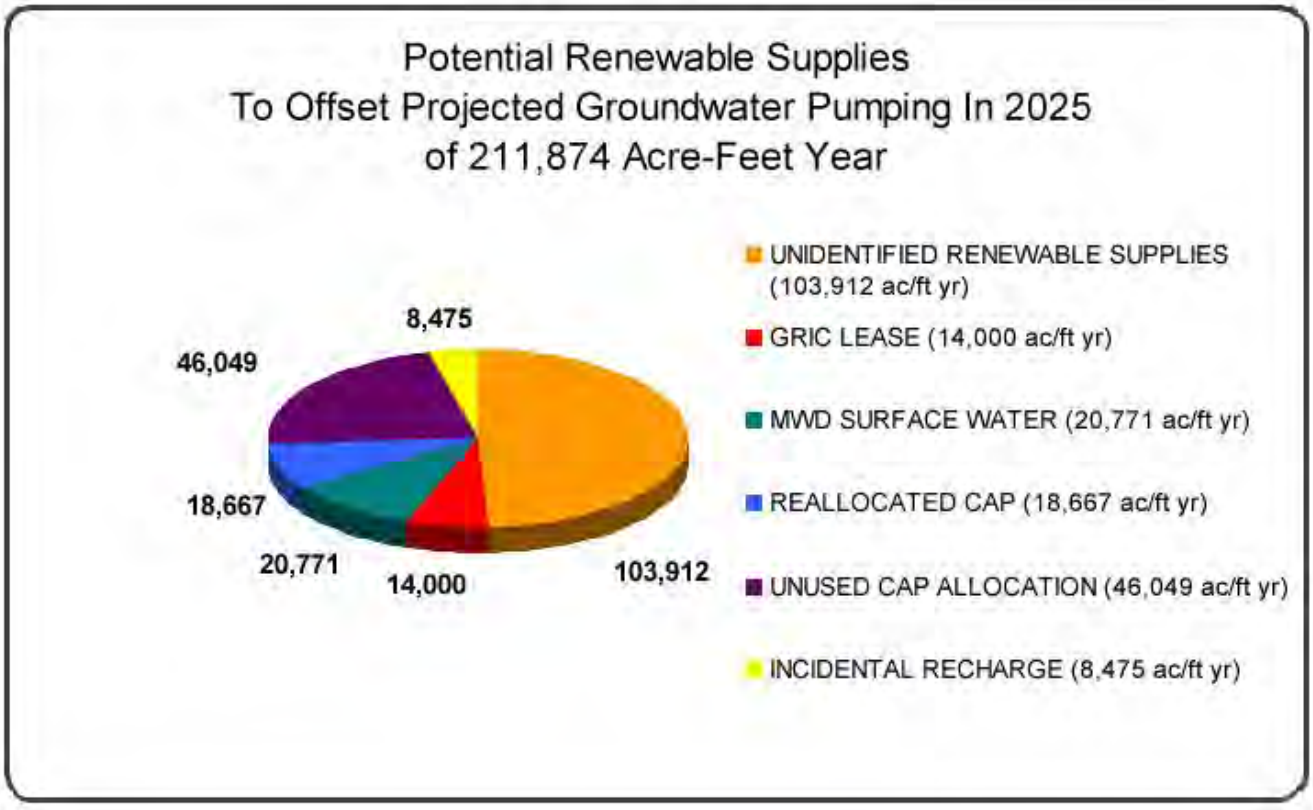
Supply.—Available renewable water supplies in the year 2025 are expected to come from the following water supplies:

- Unused CAP water allocations
- Reallocated CAP water
- Maricopa Water District surface water supplies
- Gila River Indian Community (GRIC) long-term water leases

The total estimated available renewable water supply is 99,487 ac-ft/yr.

Deficit.—The estimated water supply deficit in the year 2025 regional water budget is 103,912 ac-ft/yr. Potential water supplies that could be considered to offset the projected year 2025 groundwater pumping include:

- Potential Indian water leases from GRIC, Colorado Indian Tribes, Ak-Chin Indian Community, Ft. McDowell Indian Community, and San Carlos Apache Tribe
- CAP agriculture priority water
- Groundwater from waterlogged areas
- Reclaimed water



- Butler Valley groundwater

Figure 4.—Potential renewable supplies.

Recommended Next Steps

WESTCAPS has determined that the proposed WESTCAPS strategy has enough technical merit to warrant the development of regional facilities and to initiate discussion with policymakers in the WSRV. On a regional basis, the proposed WESTCAPS strategy would provide the following benefits:

- Be less costly than if each of the WESTCAPS members sought to plan and manage their water resource needs alone
- Mitigate groundwater decline in the northwest Salt River Valley
- Improve water system reliability
- Enable water providers to more easily address current and future water quality regulations

Therefore, the next step in the planning process is to discuss the proposed WESTCAPS strategy with WESTCAPS decision makers for policy consideration and to explore the members interest.

Background

This report summarizes the activities of WESTCAPS under this grant from its inception. It serves to meet contractual obligations with the Arizona Department of Water Resources for the FY2000/2001 Four Quarter Report and for an overall project report.

The West Valley CAP Subcontractors (WESTCAPS) are ten Central Arizona Project (CAP) subcontractors in the west Salt River valley who formed a coalition to identify and evaluate options that will allow its members to use Central Arizona Project (CAP) water to which they are entitled. WESTCAPS membership consists of: Arizona State Land Department, Arizona Water Company, Town of Buckeye, Citizens Water Resources, City of Glendale, City of Goodyear, City of Peoria, City of Phoenix, City of Surprise, and West Maricopa Combine. WESTCAPS was formed in July 1997 through an intergovernmental agreement among the members. WESTCAPS receives funding through membership dues ($75,000 per year), a grant from the Arizona Department of Water Resources ($75,000 per year), and technical assistance from the United States Bureau of Reclamation ($400,000 per year).

WESTCAPS is organized as illustrated in Figure 5 below.

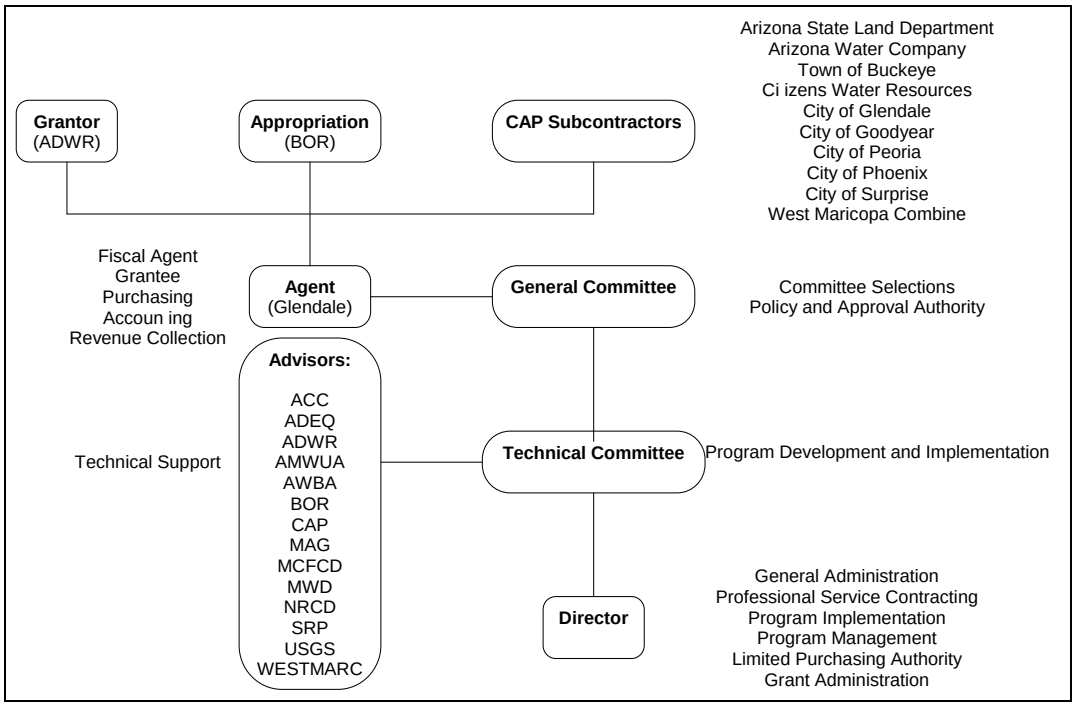


Figure 5.—WEST VALLEY CAP SUBCONTRACTORS

Problem Statement

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The following mission and goals were adopted by the WESTCAPS General Committee at its meeting on November 7, 1997.

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The primary goal of the planning process is to increase the efficient use of CAP water by WSRV entities possessing municipal and industrial subcontracts. In addition to this goal, WESTCAPS members expressed desired outcomes for both the planning process and what the process implementation. They are:

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- Understand and influence water policy in Arizona related to water and wastewater management in the WSRV (ADEQ, Arizona Department of Water Resources, Central Arizona Water Conservation District, and the Arizona Corporation Commission)
- Develop long-term, sustainable regional water resource management, infrastructure, and implementation strategies

Originally, the planning process was expected to take 4 to 5 years to complete. WESTCAPS now expects to complete the planning process within 4 years.

Critical Success Factors

The following critical success factors were set for measuring WESTCAPS progress towards meeting its goals:

- Number of members who have been provided with workable solutions for addressing their water resources needs
- The degree to which the use of renewable water supplies are increased
- The degree to which the efficient use of existing CAP allocations are maximized
- The level of member and public acceptance

Planning Process

The process diagram illustrated in Figure 6 shows the major program elements of the planning process. It was understood that the planning process is a general guideline and may be revised as circumstances dictate.

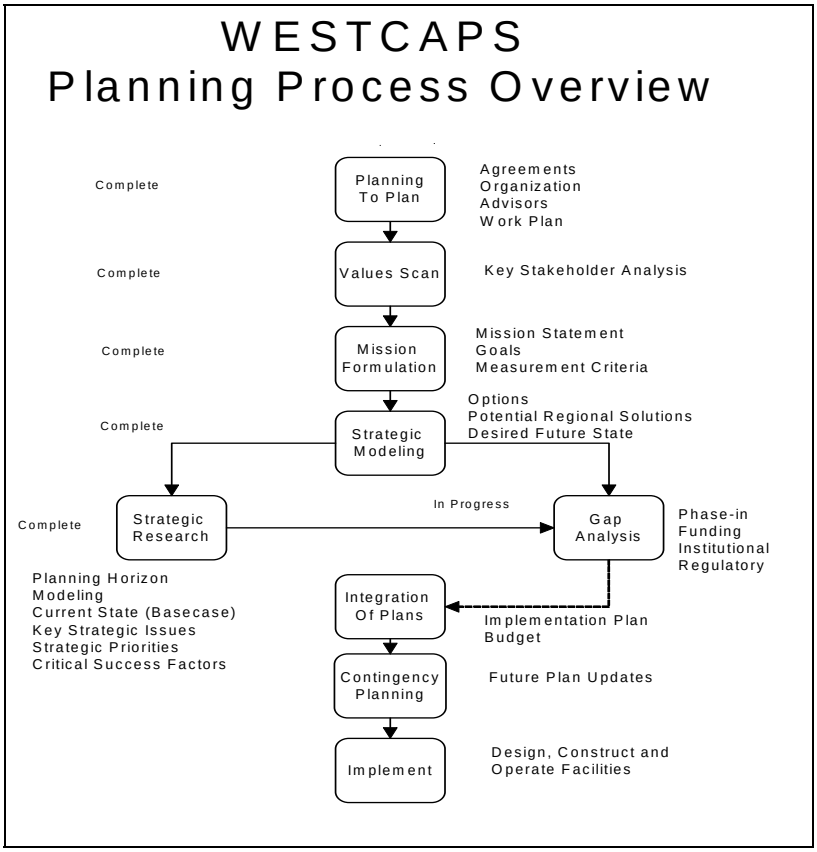


Figure 6.—WESTCAPS Planning Process

Strategic Research

The intent of Strategic Research is to identify and describe the drivers for change by assessing the current situation facing water providers in the west Salt River Valley, potential future outcomes, and summarizing the key strategic issues. For this planning effort, a strategic issue is a driver for change that will or may influence WESTCAPS' ability to utilize its CAP allocations. Strategic research helped to develop a common understanding between WESTCAPS members of where things stand for each member and the region as a whole. Its deliverables were: (1) a common basis for understanding, (2) identification of key strategic issues, and (3) development of strategic priorities.

After the strategic research was completed and consensus was developed on the strategic issues, the next step of the planning process was to narrow the list of strategic issues to the ones that WESTCAPS determined to be of highest priority. This narrowed list of strategic issues then became WESTCAPS' strategic priorities. WESTCAPS strategic priorities are:

1. Insufficient water infrastructure
2. Lack of financing capability
3. Insufficient renewable resources
4. Opportunity to promote recharge in West Salt River Valley
5. Arizona Corporation Commission policy and direction

From this point forward in the planning process, WESTCAPS work efforts were focused on addressing these five strategic priorities.

Strategic Modeling

WESTCAPS identified all the options available to it for putting CAP and other renewable water supplies to use in the west Salt River Valley. From these options, WESTCAPS developed six potential infrastructure strategies. A groundwater model analysis was completed for each strategy. In addition, a present worth analysis was also developed for each strategy. It was the intent of WESTCAPS to select one of these strategies as its collective vision of the water infrastructure that should be in place by 2025 to meet projected water demands.

GAP Analysis

The final phase of WESTCAPS planning process, the Gap Analysis, addressed (1) possible refinements to the WESTCAPS infrastructure strategy selected on 6/30/2000, (2) cost estimates and cash flow for financing the WESTCAPS strategy, (3) potential institutional and financing arrangements, and (4) sources of additional renewable water supply to meet projected supply deficits.

Strategic Research

Summary Of Key Strategic Issues

Institutional

- Water quantity (ADWR) and quality (ADEQ) regulation will continue to become more stringent and limit the ability of WESTCAPS participants to use groundwater or recovered effluent in the West Salt River Valley and potentially curtail urban development.

- The Secretary of the Interior may decide to use 24,220 acre-feet per year of CAP_water currently earmarked for the West Salt River Valley and other surface water resources to resolve Indian water right and Colorado River (California & Nevada) issues. This action would limit available renewable water supplies to WESTCAPS participants and increase competition between participants for remaining surface water supplies.

- Arizona Corporation Commission (ACC) approval is critical to private water company participation in a regional solution. The uncertainty of cost recovery for CAP water may force , private water companies to relinquish their CAP allocations and those allocations would be reassigned to other water providers or lost in the CAP / DOI litigation.

- The institutional framework is not in place to allow WESTCAPS participants to wheel CAP or other renewable water supplies on a long term basis through most raw water conveyance systems in the West Salt River Valley.

Supply & Demand

- Groundwater use by municipal, industrial, and agricultural users in the West Salt River Valley have and will continue to cause significant decline in groundwater levels in the northwest Salt River Valley.

- WESTCAPS participants do not have enough renewable water supplies to meet forecasted water demands and mitigate declining groundwater levels.

- Poor quality groundwater throughout the WSRV in general and, more specifically, in the mid to southern WSRV specifically limits the use of untreated groundwater for potable water uses.

Infrastructure

- Additional water conveyance, treatment, and storage infrastructure will be needed in the WSRV to meet future demands with renewable supplies and to mitigate declining groundwater levels.

- The cost of constructing water infrastructure would place a large financial burden on existing water customers of many WESTCAPS participants.

Purpose

The environment in which WESTCAPS members operate is constantly changing. The dynamics for change was best illustrated by Water Environment & Technology as an “Engine of Change” . Referring to Figure 8, they state that the Engine of Change in the water industry is fueled by information. “As this information makes its way through the cycle, the responsibilities of each group come into consideration, new information is added, value judgments are made, and actions are taken. The nature of the information is thus refined and changed. To one degree or another, all groups are connected to each other by information pipelines.”

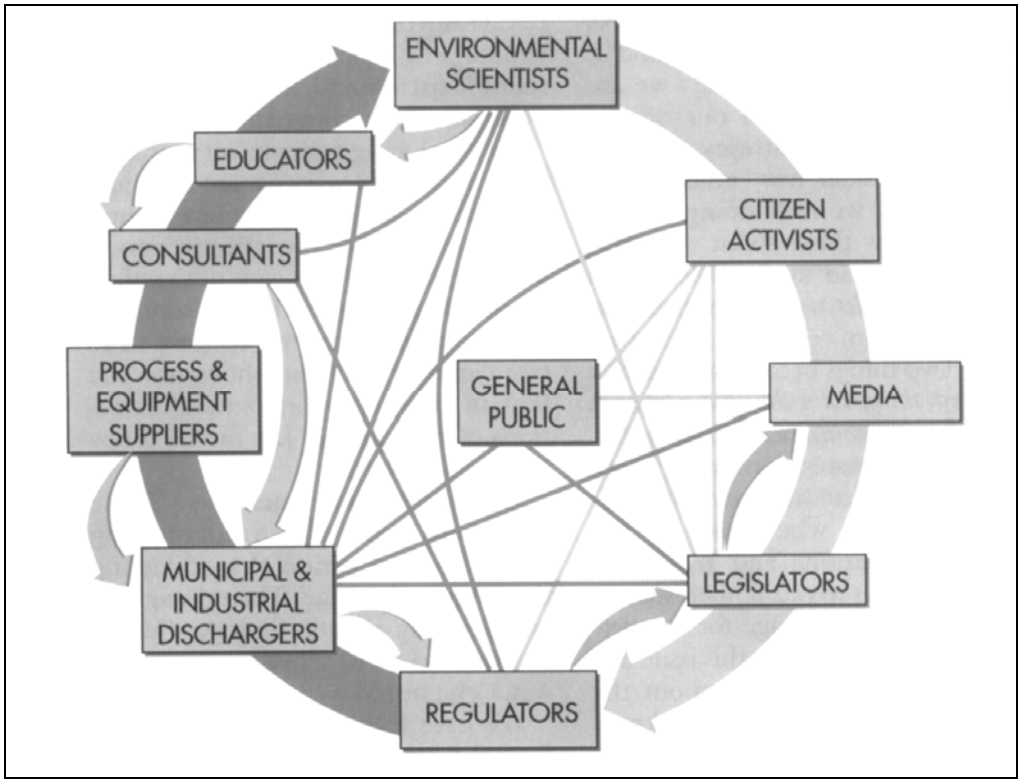


Figure 8.—Engine of Change
Source: Water Environment & Technology, December 1991, Page 38

The intent of Strategic Research is to identify and describe the drivers for change by assessing the current situation facing water providers in the west Salt River Valley, potential future outcomes, and summarizing the key strategic issues. For this planning effort, a **strategic issue** is a driver for change that will or may influence WESTCAPS' ability to utilize its CAP allocations. Strategic research helps to develop a common understanding between WESTCAPS members of where things stand for each member and the region as a whole. Its deliverables will be: (1) a common basis for understanding, (2) identification of key strategic issues, and (3) development of strategic priorities. Strategic research will address the following questions:

- What are the major issues and trends facing west SRV water providers?
- What are the likely implications?
- How does the WESTCAPS membership stack up in light of future challenges?
- Where should WESTCAPS focus its efforts to best accomplish its goals and utilize its CAP allocations?

The Strategic research is conducted through a comprehensive review of existing documents and records, and discussions with key contacts. Models and databases are developed as necessary. The Strategic Research consists of the following elements:

- Institutional Issues
- Supply & Demand Issues
- Physical Infrastructure Issues

After the strategic research is completed and consensus is developed on the strategic issues, the next step of the planning process is to narrow the list of strategic issues to the ones that WESTCAPS

determines to be of highest priority. This narrowed list of strategic issues then become WESTCAPS' **strategic priorities**.

Strategic priorities are those issues that WESTCAPS will specifically address through the development of regional water resource management strategies to optimize the efficient use of CAP allocations in the west Salt River Valley.

Institutional Issues

Groundwater Management Act

Background [1]

The purpose of the Groundwater Management Act (GMA) is to preserve groundwater resources to ensure an adequate and reliable water supply. The GMA has three primary objectives. They are:

- to control severe groundwater depletion;
- to provide the means for allocating Arizona's limited groundwater resources; and
- to augment Arizona's groundwater reserves through supply development.

The West Salt River Valley (WSRV) is in the Phoenix Active Management Area (AMA) -- one of five AMA's which are created by the GMA. The primary goal of the Phoenix AMA is to achieve safe yield by the year 2025. Safe yield being a balance between the amount of groundwater withdrawn and the amount of natural and artificial recharge over time. Each AMA is charged with developing and implementing five management plans. The Phoenix AMA is currently developing the Third Management Plan (TMP) for the period of 2001 to 2010.

Third Management Plan [1,4]

The Arizona Department of Water Resource's (ADWR) strategy for the TMP is:

- continuing mandatory conservation requirements for large users;
- identifying areas of critical groundwater level decline, rapidly increasing decline, extremely limited availability, potential land subsidence and poor quality groundwater;
- improving monitoring, updating ADWR's hydrologic groundwater models and expanding available databases;
- increasing the use of available renewable supplies while decreasing the dependency on groundwater resources; and
- identifying existing and projected overdraft conditions and identifying potential changes in ADWR strategy to achieve safe yield.

Structurally the TMP will be very similar to the regulations contained in the current Second Management Plan. The TMP is expected to allow municipal water providers to choose among two or three water conservation programs, e.g., the: 1) Total GPCD; 2) Alternative Conservation; and 3) Non-GPCD Programs. Individual municipal water providers will also be subject to lost and unaccounted for water standards and monitoring/reporting requirements.

ADWR projects that the Phoenix AMA will not achieve safe yield by 2025 and that more emphasis to reduce reliance on groundwater is needed to reach safe yield. The following is a partial list of ideas and

potential actions identified in the October 1, 1998 Draft Third Management Plan to address water management issues in the Phoenix AMA:

- Possible programs and authorities to reduce residual groundwater pumping (residual pumping is continued groundwater use authorized through service area rights, the Assured Water Supply program groundwater accounts, grandfathered rights and groundwater withdrawal permits):

  ⇒ Reexamine the ability of irrigation grandfathered rights to be converted to Type 1 non-irrigation rights with no replenishment obligation, or reexamine the conversion rate

  ⇒ Reduce groundwater mining by new General Industrial Use permits either through pumping limitations or a replenishment obligation

  ⇒ Limit or require replenishment by new residential growth in small dry-lot subdivisions, existing undeveloped lots, and new subdivisions of less than six lots that are not subject to the Assured Water Supply (AWS) rules

  ⇒ Evaluate replenishment requirements for undesignated municipal providers and reevaluate allowable groundwater pumping by designated providers

  ⇒ Ensure that all water uses associated with a development plan, including golf courses, are required to meet the assured water supply restrictions regarding renewable water sources

- Possible programs and authorities to address the under-utilization of renewable resources:

  ⇒ Address the disparity between the cost of groundwater and the cost of renewable supplies

  ⇒ Develop incentives for utilization of renewable supplies that are consistent with overall management objectives

  ⇒ Encourage the Central Arizona Groundwater Replenishment District (CAGRD) to expand its authority to replenish supplies for members and non-members

  ⇒ Increase public education efforts

- Possible programs and authorities to address localized water management problems in critical areas:

  ⇒ Obtain the authority to protect nonrecoverable water and water that is stored in critical areas but is recovered outside the area of impact from new users and from existing residual pumpers who do not shift onto renewable supplies

  ⇒ Provide the ability to manage water levels in critical areas by restricting pumping

  ⇒ Encourage the CAGRD and the Arizona Water Banking Authority (AWBA) to replenish supplies in critical areas or in the location where the groundwater pumping obligation was incurred

  ⇒ Require groundwater pumpage that is to be replenished to be consistent with the management plan drawdown criteria

  ⇒ Develop well spacing rules that have specific provisions to protect critical areas

  ⇒ Provide economic or regulatory incentives to utilize renewable supplies in lieu of pumping groundwater in critical areas

Although the TMP focuses mainly on water conservation requirements for individual water providers, ADWR has raised the possibility of restricting certain activities that contribute to excessive draw-down (e.g. recovery wells) for the purpose of mitigating groundwater level decline rates. Current regulations allow the aquifer to be drawn down at a maximum rate of 4 feet per year. ADWR has considered restricting aquifer draw-down to 2 feet per year and establish critical groundwater decline management areas within the Phoenix Active Management Area. Restricting annual draw-down to 2 feet could significantly hamper WESTCAPS' ability to use underground storage and recovery projects as a means to manage CAP supplies.

ADWR has questioned whether the 1000 foot physical availability criteria is adequate to prevent permanent irreversible damage to the aquifer due to land subsidence. ADWR has identified two potential critical groundwater decline management areas in the West Salt River Valley (WSRV). It is believed that significant land subsidence and earth fissures have resulted from the drop in the groundwater table. The first area, situated in the vicinity of Luke Air Force Base has experienced declines in the water table of more than 300 feet. Land subsidence (up to 18 feet in elevation) have resulted in significant damages to nearby drainage structures, buildings, wells, canals, flood control structures, and Air Force base runways. The second area where declining groundwater levels have caused concern is located in the vicinity of Sun City, Sun City West, Peoria, and North Phoenix. This area has experienced groundwater level declines of up to 350 feet.

Assured Water Supply [5]

The 1980 Groundwater Management Act requires a demonstration of an assured water supply (AWS) for new subdivisions located in Active Management Areas (AMA). AMA's were established to manage groundwater use in areas experiencing severe groundwater depletion. The urbanized portion of the West Valley is located in the Phoenix AMA. The Arizona Department of Water Resources (ADWR) adopted specific rules to implement the current AWS program effective February 7, 1995.

The current AWS rules have tremendous implications to cities, towns, private water companies, and developers/landowners located within the Phoenix AMA. In order to sell or lease subdivided lands within the Phoenix AMA, a demonstration of an assured water supply must be made prior to the approval of the final plat and public report. (A subdivision is defined as six or more parcels with at least one parcel having an area less than 36 acres.) ADWR makes the determination of whether an assured water supply exists. If an assured water supply does not exist, the land may not be subdivided. Those areas without an assured water supply would eventually be forced to stop urban development.

ADWR can either issue a designation of assured water supply or a certificate of assured water supply for those lands with sufficient renewable water supplies. Cities, towns, and private water companies may choose to obtain a designation of assured water supply if they have sufficient renewable water resources to meet anticipated demand of their service area. The developer of a subdivision located within the water service area of a city, town, or private water company with a designation of assured water supply (AWS) is not required to obtain a certificate of assured water supply. If a city, town, or private water company does not obtain a designation, the developer/landowner/subdivider can apply for a certificate of AWS. In both cases the applicant is required to have a water service agreement with the water provider that has the water service area right in which the proposed development is located and, for a certificate, must demonstrate that their subdivision have sufficient renewable water sources to meet demand for 100 years.

The AWS program is a significant commitment by Arizona to protect its groundwater resources. The AWS program is expected to cause water service providers to shift from groundwater to renewable resources, such as surface water and effluent. An applicant for an assured water supply must prove five conditions to ADWR's satisfaction.

1. Physical Availability of a 100-year Water Supply

The physical availability criteria requires the applicant to show that it has enough water resources to meet projected (current and committed) demands for 100-years. For cities, towns, and private water companies the assured water supply demand is determined by using their current water demand and the estimated build-out demand from undeveloped subdivided lands within their service area. For applicants of a certificate of assured water supply, the projected demand is the estimated build-out water demand of their subdivision over a 100 year period. Water supplies must be shown to be legally and continuously available.

If groundwater is used as a supply, ADWR will analyze whether its use will cause the depth-to-static water level (measured from the surface of the earth) to exceed the 1,000 feet after 100 years of pumping. This is a serious concern for water providers located in the West Salt River Valley, including all WESTCAPS member agencies. The amount of groundwater available to West Valley water providers for purposes of demonstrating an assured water supply is limited.

2. Water Quality

Applicants for an assured water supply must prove to ADWR that its supplies will meet federal and state water quality standards for the proposed use. It is expected that surface water processed at water treatment plants will meet the water quality requirement. Depending on the prevailing contamination levels of the aquifer underlying the West Salt River Valley, groundwater, recovered effluent and recovered surface water credits may eventually require treatment in order to pass the water quality requirement.

3. Consistency with the Management Plan

West SRV cities, towns and private water companies seeking a designation or desiring to maintain a designation of AWS must be in compliance with ADWR's water conservation regulations, including lost and unaccounted for water as described in the Phoenix AMA management plan. Developers, sub-dividers, and landowners seeking certificates of AWS whose water use may likely cause a water provider to violate its conservation requirement will still be allowed to obtain a certificate. In this instance, the water provider will be warned of potential compliance problems resulting from providing water service to the new certificate holder.

4. Consistency with the Management Goal

ADWR does allow applicants for an assured water supply to use a limited allocation of mined groundwater in proving physical availability and consistency with the management goal. The amount of mined groundwater allowed for each applicant is calculated using a formula prescribed in AWS rules and is also constrained by the physical availability criteria.

For those that receive a groundwater allocation, the allocation may be "banked" for use during any time within the 100-year assured water supply period.

5. Financial Capability

Cities and towns seeking an assured water supply designation must demonstrate that financing is available in their respective five-year capital improvement plans for major system improvements, such as storage or treatment facilities. If the platting authority (e.g., county, city, or town) has adequate bonding requirements to insure the installation of the necessary facilities, an applicant for a certificate may not be required by ADWR to provide evidence of financial capability. Private water companies can use the Arizona Corporation Commission approval as evidence of financial capability.

Options For Obtaining An Assured Water Supply [5]

A city, town or private water company will have to decide two key points. First, does the water provider have sufficient amounts of renewable water resources. Second, does the water provider have adequate financial resources to demonstrate financial capability. Table 1 provides a summary of the options.

	Case #1	Case #2	Case #3	Case #4
Water Resources	Yes	No	Yes	No
Financial Capability	Yes	Yes	No	No
Options	Seek Designation or join the CAGRD and seek designation	Join CAGRD and seek designation or make developer obtain water resources or join CAGRD and obtain certification	Make developer pay for water related infrastructure and seek designation	See cases #2 and #3

Table 1.---Assured Water Supply Options

In Case 1, where the water provider has sufficient renewable water resources and can demonstrate financial capability, the designation option would be advisable because it simplifies the AWS documentation process and it is more supportive of the AMA's groundwater management goals. A provider can get designated based on groundwater availability and membership in the CAGRD, if groundwater is available.

In Case 2, where the water provider lacks sufficient renewable water resources, but can demonstrate financial capability, the water provider has the following three choices. The water provider could attempt to:

1. acquire the water resources needed,
2. join the Central Arizona Groundwater Replenishment District (CAGRD), or
3. place the burden of securing additional water resources on the developer.

If the water provider chooses the latter, the developer could choose to attempt to acquire the water resources needed for their development. If successful, the developer could pledge the resource to the water provider. Whether the developer does or doesn't pledge the resource to the provider, the developer has to enter into a water service agreement with the water provider and obtain an assured water supply certificate. If the developer is not successful, a certificate of assured water supply can be obtained if the developer enrolls the property in the CAGRD, providing sufficient groundwater is available.

In Case 3, where the water provider has sufficient renewable water resources, but is not able to demonstrate financial capability, the water provider may want to explore the possibility of placing the burden of paying the construction of water-related infrastructure on the developer through development fees.

In Case 4, where the water provider lacks the needed renewable water resources and is not able to demonstrate financial capability, all of the aforementioned options need to be explored.

Assured Water Supply, Recharge and CAGRD Issues Relating To Aquifer Draw-down [25]

In developing a water resources strategy for the West Salt River Valley there are three key issues that need to be understood. First, ADWR's groundwater model shows that the West Salt River Valley aquifer is projected to be drawn down to levels that are likely to exceed the 1,000 feet physical availability criteria, unless renewable water resources are more widely used. Second, the CAGRD does not guarantee that a member will be granted an assured water supply. The water provider is still subject to the 1,000 feet depth-to-static water level physical availability limitations of the aquifer on which they rely. Third, new

wells used to pump groundwater or recover stored water credits are subject to ADWR's rules regarding draw-down of the aquifer. Currently, recovery wells are subject to a 4-feet per year draw-down limit, unless the well is within the area of impact of a recharge facility. Table 2 presents the applicability of ADWR's assured water supply, recharge and CAGRD requirements to various types of water produced from wells. Each water provider seeking an assured water supply must show that it will be in compliance with these requirements. Similarly, if WESTCAPS plans to store and/or recover CAP water from the West Salt River Valley aquifer, it must also comply with the assured water supply and recharge requirements.

REQUIREMENT	PROVIDERS THAT HAVE AWS DESIGNATION (WITH OR WITHOUT CAGRD)
1,000 Ft Draw-down	
Incidental Recharge	Yes, subject to 1,000 ft draw-down
Groundwater Account	Yes, subject to 1,000 ft draw-down
Recovery of credits inside hydro-impact area	No, not subject to 1,000 ft draw-down
Recovery of credits outside hydro-impact area	Yes, subject to 1,000 ft draw-down
Pump water to be replenished by CAGRD	Yes, subject to 1,000 ft draw-down
4 feet/year or more Draw-down	
Incidental Recharge	No, not subject to the 4ft/yr draw-down
Groundwater Account	No, not subject to the 4ft/yr draw-down
Recovery of credits inside hydro-impact area	No, not subject to the 4ft/yr draw-down
Recovery of credits outside hydro-impact area	Yes, subject to the 4ft/yr draw-down
Pump water to be replenished by CAGRD	No, not subject to the 4ft/yr draw-down

Table 2.---AWS, Recharge, And CAGRD Rules Related To Aquifer Drawdown

Central Arizona Project Issues

Background

The Central Arizona Water Conservation District, now referred to as the Central Arizona Project, was created to operate and maintain the Central Arizona Project system and to repay the federal treasury the reimbursable costs for building the project.

The Central Arizona Project aqueduct is 336 miles long and was designed to deliver a maximum annual supply of 1.9 million acre-feet of Colorado River water to central and southern Arizona. The aqueduct is expected to deliver an annual average of 1.5 million acre-feet of Arizona's total annual entitlement of 2.8 million acre-feet of Colorado River water. Figure 8 illustrates the CAP water service area and the canal that supplies water to that area.

Figure 8.--- Central Arizona Project
Source: Central Arizona Project

The Central Arizona Project water was allocated by the Arizona Department of Water Resources to 85 municipal and industrial users, 12 Indian communities, and 23 non-Indian agriculture districts. Currently the Central Arizona Project has subcontracts with 56 of the municipal and industrial users, 10 Indian communities, and 10 non-Indian agriculture districts.

CAP/DOI Litigation [6]

CAP and the Department of the Interior are currently in the middle of litigation regarding repayment issues which could have an impact on WESTCAPS members. The outcome of this litigation is obviously unclear at this time, however, some of the potential impacts include the following:

- CAP Repayment costs could be significantly higher than anticipated by CAWCD, thus possibly requiring an increase in the capital component of CAP water costs;

- A significant volume of CAP water could be reserved for use by the Secretary to settle Indian water rights disputes. This could include uncontracted-for M&I water, which means that there would be little or no water available under a reallocation. There may be water available through long-term lease agreements with Indian communities, but the cost of such leases is unknown;

- More water reserved as Indian-priority water could exacerbate canal capacity restrictions during peak water demand months.

CAP Subcontracts, Policies, Pricing & Strategies [6]

There are three components of CAP water prices: capital, operation and maintenance (O&M), and energy. CAP subcontracts extend through the year 2050 and contain provisions which state that the capital component of the CAP water price must be paid whether the water is used or not. This provides considerable incentive to begin using the CAP water as soon as possible. The capital component is currently scheduled to be $48 per acre-foot in 1999, and will be $54 per acre-foot from the year 2000 on.

The energy component of CAP water prices covers the cost of energy required to pump the water from Lake Havasu on the Colorado River to the customer's turnout on the CAP aqueduct. CAP's pricing includes a "postage stamp" energy rate for CAP water use. This means that the energy component of the CAP price is the same for all customers regardless of their location on the system. The price of energy available to CAP is strongly based on energy contracts which are effective until the year 2011. Thus, the energy component of CAP water prices could change significantly in 2011.

In 1993, the CAP Board of Directors established the Forward Pricing Program which provided more stability and predictability for its customers regarding pricing of CAP water. Under this program, CAWCD reviews forward prices annually, formally establishes the current year's prices, and sets a schedule for the succeeding five years.

CAP has also established an incentive recharge program which provides excess CAP water to M&I subcontractors at a reduced rate. The water must be used to earn long-term storage credits at an underground storage facility. The program has been approved by the Board through 1999. The price for this incentive recharge water is $41/AF.

CAP is currently working on establishing a policy for wheeling non-project water through the aqueduct system. The policy will undoubtedly include the requirement that non-project water maintains a lower priority than all project uses and that wheeling cannot negatively impact CAP users. Other provisions of the policy that are not so clear include: the source of energy which may be used to wheel non-project water, the price for wheeling, and the priority relating to other non-project uses of the CAP system.

State Demonstration Projects [6]

1990 legislation gave CAWCD the responsibility of developing State Demonstration recharge projects and the authority to assess an ad valorem tax to fund those projects. The tax (4 cents per $100 assessed valuation) was assessed in Maricopa and Pima Counties from 1991 through 1996. Legislation dictated that the funds were to be used for the benefit of the county in which they were collected. Funds collected in Maricopa County totaled about $28 million. About $15 million still remains in the fund and CAWCD is actively pursuing development of direct recharge projects with those funds. CAWCD's primary focus in Maricopa County is on development of the Agua Fria Recharge Project northwest of the Phoenix metropolitan area. As currently envisioned, this project will have the capability of storing 100,000 acre-feet per year. There will likely be capacity available for use by west valley water providers to store CAP water supplies. CAWCD has also been asked by the City of Surprise to provide State Demonstration funding for the development of a recharge project behind McMicken Dam on land owned by the Flood Control District of Maricopa County. CAWCD is also investigating other sites in the Phoenix AMA for developing State Demonstration projects, however, all of the available funding is not committed at this time.

State Demonstration recharge projects may provide a very useful service to WESTCAPS members. The projects will provide a place to take delivery of CAP water for either long-term or annual storage. State Demonstration projects are generally operated by CAWCD, thus their use would not require additional staffing by the storer. Since the projects are being developed using tax funds, there will be no capital recovery costs to be paid by the storer.

ADWR policies governing CAP water use [4,6]

The State of Arizona has a policy to encourage the use of renewable water supplies such as CAP water. ADWR is relying upon the assured and adequate water supply rules to encourage M&I water providers to use their CAP allotments.

State law allows for the storage of surplus CAP water underground through either direct or indirect (groundwater savings) projects. The water, when recovered, retains its legal identity as CAP water. Long-term storage CAP credits may be used by water providers to demonstrate an assured water supply. The ability to recharge CAP water provides an alternative to municipal water providers to store and deliver CAP water without developing water treatment facilities.

In some cases, ADWR policies do not encourage CAP use instead of groundwater. For example, gpcd conservation requirements do not provide incentive for using CAP water instead of groundwater. However, if an agency is totally on renewable water resources (like CAP water), there would be no need to comply with gpcd requirements. It should be noted that due to ADWR's existing conservation requirements, the BOR has deferred setting their own CAP conservation requirements.

In the Assured Water Supply Rules adopted in 1995, water providers deemed to have an Assured Water Supply were given a three-year "grace period" during which time they could continue mining groundwater with no penalty. After the grace period, they must comply with the AWS Rules and begin making an effort to rely on renewable supplies, including their CAP allocations.

Original allocations of CAP water were made based on projected demands. Management plans developed by ADWR have assumed that the CAP water allocated to users within each AMA would remain in that AMA. Therefore, reallocation of uncontracted-for CAP supplies might be limited to the AMA in which it was originally allocated in order to achieve safe yield as envisioned under the management plans.

CAP water reallocation process [4]

In 1983, the Secretary of Interior issued the final allocations of CAP water. A total of 638,823 acre feet of CAP water was allocated to Municipal and Industrial (M&I) users. Those entities that were granted CAP allocations were offered subcontracts. While the vast majority of entities signed subcontracts to receive CAP water, several entities declined the opportunity to obtain CAP water. Approximately 66,000 acre feet of the 638,823 acre feet originally allocated to M&I users were left uncontracted.

The Bureau of Reclamation asked ADWR for a recommendation on the reallocation of uncontracted CAP M&I water. ADWR's recommendation would be taken into consideration by the Secretary of Interior in issuing the final reallocation decision. ADWR initiated a reallocation process in 1994. Applications were distributed to all entities that either had a CAP subcontract or had expressed an interest in obtaining a CAP allocation. ADWR prepared its recommendation in 1995, but has chosen to delay its formal submission to the Secretary of Interior until the outcome of the repayment contract litigation between CAP and the U.S. is settled. ADWR is concerned that the Secretary of the Interior may decide to use some or all of the uncontracted for CAP M&I water to resolve Indian water rights issues. The latter would have an adverse impact on M&I interests in the State. Table 3 shows the proposed reallocations for entities located in the WSRV included in the preferred alternative.

Applicant	Amount (acre-feet)
El Mirage	520
Peoria	2,760
Goodyear	14,535
Buckeye	295
Litchfield Park Service Co.	5,860
Valley Utilities Water Co.	250
Total	24,220

Table 3.---ADWR's Recommended CAP Reallocations To WSRV Water Providers

CAP water transfers & leases [4,6]

ADWR is authorized to review proposed transfers of CAP water. A transfer is defined by ADWR to include the assignment, sale, lease or relinquishment of a CAP M&I subcontract for more than one year. After ADWR's review, the recommendations are submitted to the Secretary of Interior for final decision. Due to the importance of CAP water to the future of Arizona, ADWR, in conjunction with the Central Arizona Water Conservation District have adopted policies and procedures on CAP transfers. The adopted state policies have also been approved by the U. S. Department of Interior.

In the case of a transfer of CAP water the first priority will be given to entities that succeed the interest to a water provider and which will provide water to the same service area. The second priority will go to entities (including the CAGRD or county augmentation districts) which will use the CAP water to mitigate adverse impacts caused by future groundwater withdrawals by the transferring entity. The third priority goes to entities that can demonstrate future adverse impacts caused by the withdrawal of groundwater that resulted from the transfer of CAP water. Fourth priority goes to entities in the same AMA which demonstrate the need for additional assured water supplies to meet committed demand. Fifth priority goes to entities in the same AMA which demonstrate the need for additional assured water supplies up to the year 2035. The sixth priority goes to entities in the same AMA which demonstrate the need for additional water supplies for the period after 2035. Seventh priority goes to replenishment districts in the same AMA as the transferring entity to meet projected obligations in the year 2035. The final priority goes to entities in other AMA's consistent with the aforementioned priorities.

According to policy passed by the CAWCD Board, any transfer of a CAP M&I subcontract allocation must be accomplished with no profit to the relinquishing entity. All financial transactions must be fully disclosed. The only payment to the relinquishing entity will be made by CAWCD and will consist of reimbursement of CAP capital charges that were paid by that entity plus 5% of that amount as compensation for costs associated with the CAP subcontract. [Reimbursement for the Arizona State Land Department will be as provided in A.R.S. § 37-106.01(c)]. A "cost of money" payment will also be made. Such payment will consist of interest beginning on the date the original payment was received by CAWCD using a simple annual interest rate equal to the weighted average rate earned by CAWCD for that calendar year less 1%. No payment will be made for capital payments associated with any water delivered from October 1, 1993 through the date of relinquishment.

The entity that receives the subcontract allocation will be required to pay CAWCD 1) the amount CAWCD paid to the relinquishing entity with interest from the date payment was made by CAWCD; 2) any outstanding payments due under the subcontract with interest from the due date; and 3) any charges paid by CAWCD to the United States associated with the transfer. Interest paid by the receiving entity will be simple annual interest at a rate equal to the weighted average rate earned by CAWCD for each calendar year or portion of a calendar year.

In those instances where the assignment and transfer is made to a successor-in-interest that will serve the original subcontract service area, payment for certain administrative, legal, or engineering fees may

be permitted. CAWCD will review and approve these situations on a case by case basis and will facilitate those financial transactions directly between the involved entities.

The ADWR will determine who ultimately is reassigned any relinquished allocations. CAWCD will cooperate and coordinate with ADWR in the reassignment of CAP M&I subcontract allocations.

Long-term leases of Indian contract water may be an option that WESTCAPS members could consider. Negotiations will have to take place with the Indian Community and the United States. In using lease water, an entity will have to pay lease costs in addition to the cost of the CAP water.

Arizona Water Bank [4, 8]

While the CAP water use has increased, a significant amount of the CAP M&I allocation remains unused. Of the 56 municipal CAP subcontractors, 20 are actually using CAP water. Those CAP subcontractors that are not using their allocation are unable to do so because they lack the required water treatment or underground storage and recovery facilities. These facilities are capital intensive and a sizable customer base is required to finance such infrastructure. The inability of CAP M&I subcontractors to utilize their CAP water has created opportunities for the short-term leasing of unused CAP water.

The Arizona Water Banking Authority was created in 1996 to store unused CAP water for future use. The stored CAP water can be used as long-term storage credits to: 1) firm existing water supplies for municipal users during Colorado River shortages or CAP service interruptions; 2) help meet the water management objectives of the Arizona Groundwater Code; 3) assist in the settlement of American Indian water rights claims; and 4) exchange water to assist Colorado River communities.

The Authority is required to have an annual Plan of Operation. The Authority anticipates recharging approximately 307,000 acre feet of Colorado River water in 1999. (Approximately 181,000 acre feet is planned for the Phoenix AMA) Initially, the Authority plans to use water storage facilities that have already been permitted or are anticipated to be permitted in 1999.

Currently, only one water storage facility in the West Salt River Valley is scheduled to receive CAP water in 1999. The Maricopa Water District (MWD) Groundwater Savings Facility (indirect recharge) will receive approximately 20,000 acre feet.

Maricopa Water District Issues

Background [9]

Maricopa County Municipal Water Conservation District Number One (MWD) provides water and power service to approximately 40,000 acres through an extensive network of canals and laterals.. MWD is entitled to storage capacity in Lake Pleasant and has water rights to surface and subflows of the Agua Fria River and its tributaries. In addition, MWD augments its surface water supplies with approximately 50 wells. As illustrated in Figure 9, several WESTCAPS members may be entitled to water service from MWD. Currently there is no institutional framework in place to formalize water service between MWD and the WESTCAPS entities or to allow entities to transport CAP water through MWD's canal system on a long-term basis.

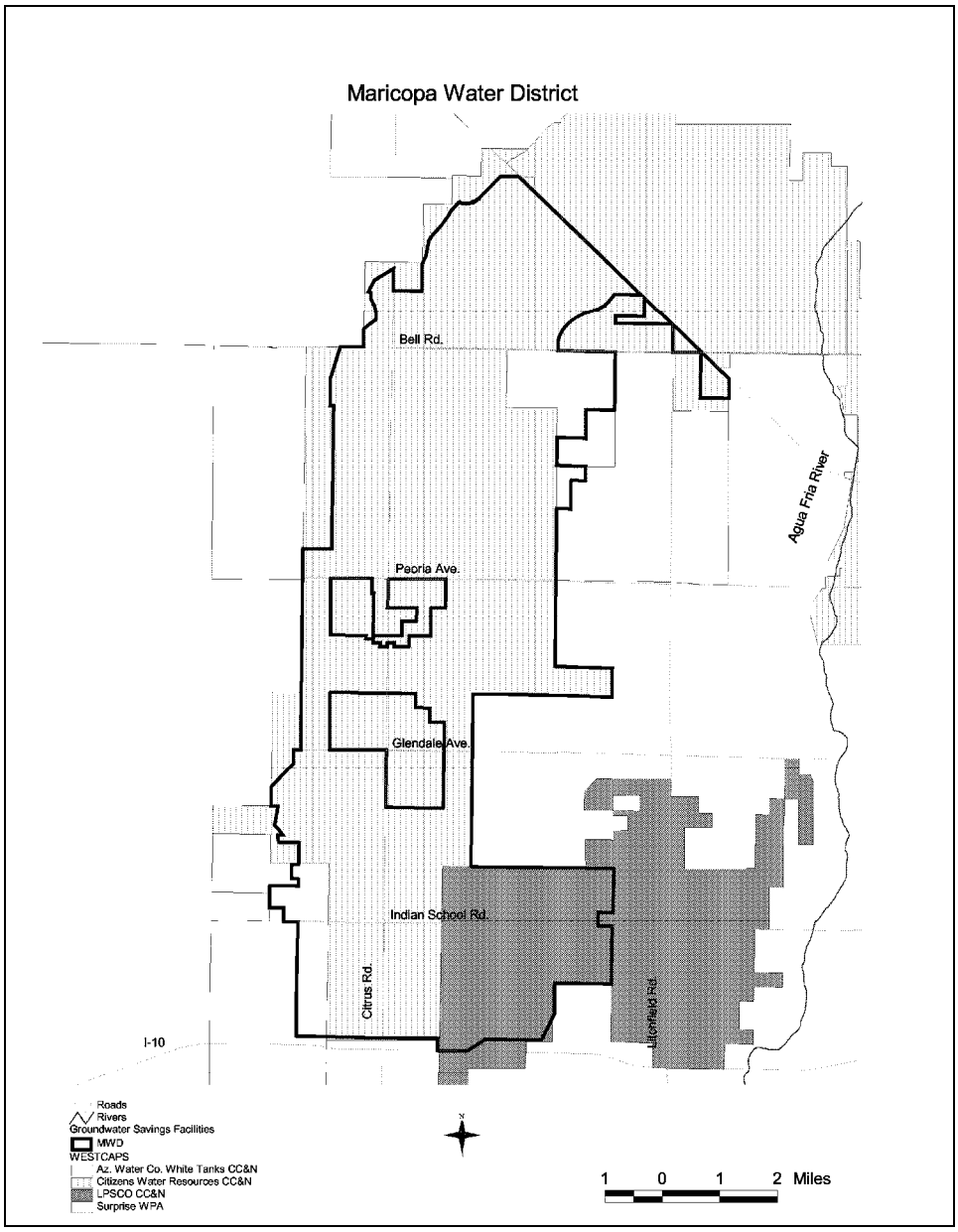


Figure 9.---Maricopa Water District

MWD Groundwater Savings Facility[24]

MWD received a permit from ADWR to operate a "groundwater savings facility" (GSF) within its water service area pursuant to the underground water storage statutes. MWD's GSF is allowed to accept CAP water from other parties, and use such water in lieu of pumping groundwater that was planned to be pumped during the year. By accepting such "in lieu water," groundwater is preserved for later use, hence the term "groundwater savings." The party who gives in lieu water to MWD receives an underground water storage credit from ADWR based on the source of water given (minus a 5% cut to aquifer assessment). These water credits can be used by such parties for assured water supply or conservation requirement purposes. The in lieu water used by MWD counts as groundwater to MWD.

The agreement, which is between MWD and the supplier of in lieu water, provides for flexibility, since MWD water supply conditions dictate MWD's ability to accept in lieu water, but more importantly, the suppliers ability to receive a long-term water credit.

MWD currently has a GSF agreement with Citizens Water Resources.

Salt River Project Issues

Background [3]

Salt River Project (SRP) surface water supplies originate from the 13,000 square mile Salt River and Verde River watersheds. SRP's also relies on approximately 250 wells to augment surface water deliveries. SRP's water service area is approximately 250,000 acres and includes an extensive network of canals. As illustrated in Figure 11, several WESTCAPS members are entitled to water service from SRP. Glendale and Phoenix currently are utilizing their SRP water supplies. The City of Peoria is planning to build a water treatment plant that would allow them to treat and deliver SRP surface water supplies.

The Kent Decree [3]

The Kent Decree established the relative rights of Project lands to the water of the Salt and Verde rivers. The decree formally stated the principle of normal flow rights and reaffirmed the long-standing legal principle of prior appropriation. The purpose of the Kent Decree was to establish which lands had normal flow rights prior to delivery of stored water from Roosevelt Dam.

In the Kent Decree, all local valley rights to the normal flow of the Salt and Verde were set chronologically from 1869 through 1909 based on continuous beneficial use of water. For example, land which used water in 1869 had the first right to water in the river, then land which used water in 1870, and so on up to 1909. Three classes of lands were established based on their initial date of appropriation and "reasonably constant" beneficial use thereafter: Class A lands included all lands under "reasonably constant" cultivation from their first year of use up to the year 1903. Class B lands included those which had been intermittently irrigated but which were not in cultivation in 1903. Class C lands specified those areas which had never been irrigated from the flow in the Salt River at or above Joint Head Dam.

Class A lands were decreed to have rights to normal flow. Their priority was based on their first year of cultivation. Normal flow water is in addition to rights to stored and developed water, which all Association members share equally. Class B lands were decreed to have no rights to normal flow but were entitled to stored and developed water. Class C lands are also not entitled to normal flow but are entitled to stored and developed water. The Kent Decree did make a distinction between Class B and Class C lands. For the period of one year, Class B lands along with Class A lands would be given preference over Class C lands in their claim for stored water. The significance of this stipulation was in 1903 (when the Association was formed) the anticipated available water supply from Roosevelt Dam could not supply all the lands applying for it. Once members of the Association, however, all three classes had equal rights to stored and developed water.

1929 and 1948 Pump Rights [3]

In 1929 and 1948, the Association instituted programs that provided shareholders with the opportunity to augment their water supplies by investing in the construction of a total of seventy-nine deep wells within the Salt River Reservoir District (SRRD). These programs were offered primarily in response to: the need for additional water supplies for specific shareholders; and, the drought conditions of the late 1940's, where runoff in the Salt and Verde watersheds was significantly below average. Only those shareholders who invested in the programs were able to use this augmentation device.

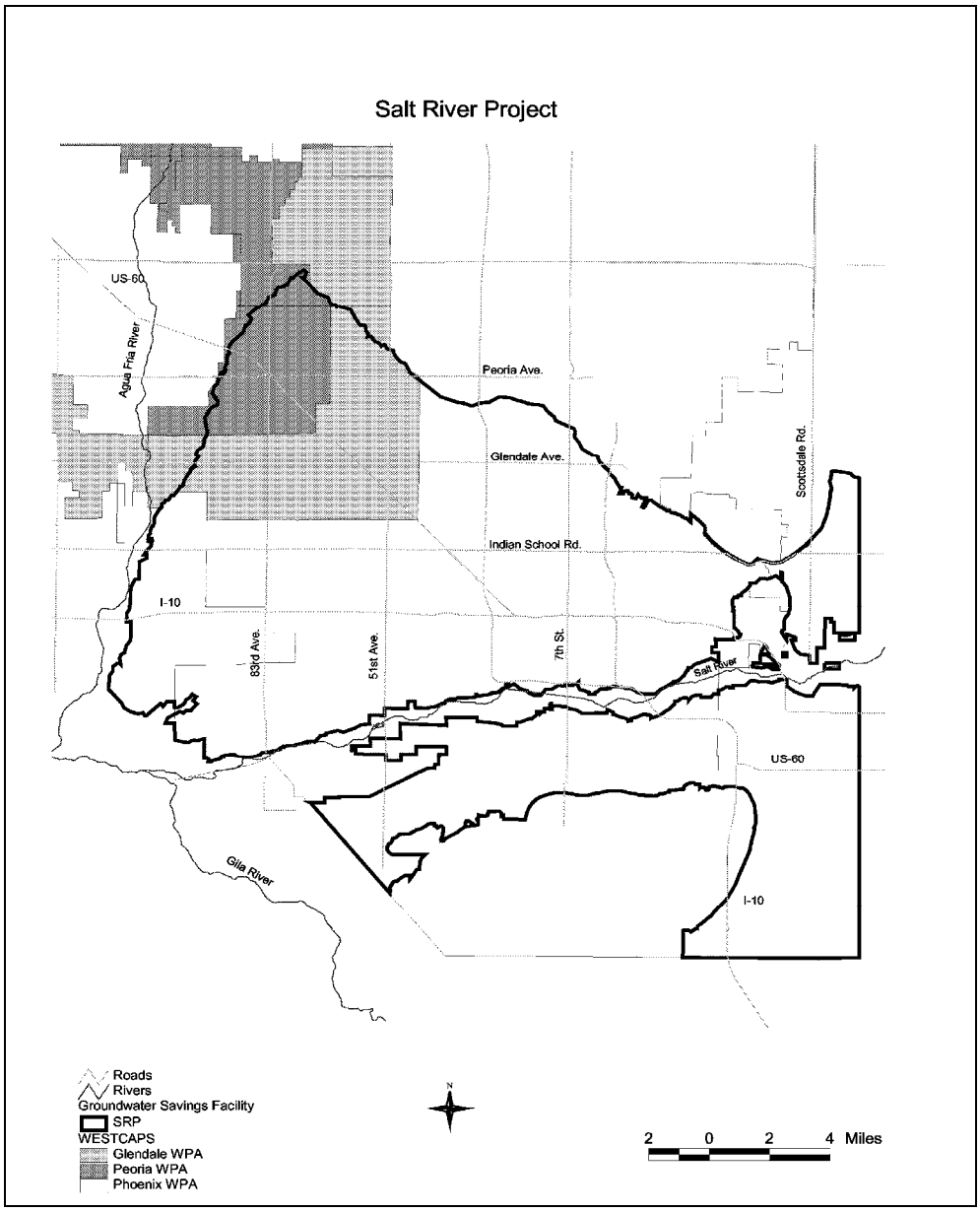


Figure 10.---Salt River Project Water Service Area

Pump right water service is limited to one acre foot per acre per year per program (1929, 1948), and must be used within the SRRD boundaries. Although pump right water can be used on non-member land, ownership of such rights are tied to the member lands to which they were originally attached. As a result, as Association land urbanizes, and shareholder water entitlements are moved to on-Project municipality water accounts, such municipalities are given access to pump rights under the conditions described in the 1929 and 1948 contracts. Therefore, on-Project municipality access to pump right water is limited to the amount of member land within their respective water service areas. Currently, about 90,051 acres of pump right have been moved to on-Project municipality water accounts, while 84,324 acres remain in agricultural accounts.

Because pump right water is currently the most expensive type of water available to shareholders (currently $35 per AF), it is the last water source called upon.

There are four factors which may impact the use of pump rights: drought, water quality, state and federal regulations, and operational needs. Drought continues to be the main factor in maintaining pump right wells. This supply offers shareholders who have such rights an alternate water supply should surface water supplies be affected by drought conditions. However, water quality and state and federal regulations, primarily the Groundwater Management Act and the Clean Water Act, may limit the use of this water supply in the future.

Those wells which were constructed pursuant to the 1929 and 1948 programs are also used to assist the Association with operational problems (i.e., canal capacity constraints), and notwithstanding the above mentioned limitations, it is envisioned that these wells will continue to be used in this capacity.

Pump right wells are maintained by SRP as part of SRP's overall groundwater management strategy. Since these contractual arrangements are in perpetuity, SRP will continue to maintain these wells for pump right lands, as required in the 1929 and 1948 contracts. However, SRP does not guarantee the quality or amount of water available from pump right wells, since those shareholders who invested in the programs agreed to share in the benefits and risks of the programs.

General Adjudication of the Gila and Little Colorado River Systems [3]

A judicial determination of the extent and priority of all rights to surface water is ongoing in the Gila and Little Colorado River Systems. These lawsuits, known as General Stream Adjudication, were filed in the Superior Courts of Maricopa and Apache counties to resolve conflicting claims, including the federal reserve right Claims of Indian Tribes to the water of the Gila and Little Colorado River systems. This massive undertaking has potentially the single largest impact on future water supply availability for SRP's shareholders.

The ADWR has the task of providing administrative and technical assistance to the courts in preparing various technical reports. These reports will assist each claimant in the review of all claims to water, conflicting or otherwise. Ultimately, a water decree will be issued by the court. This is expected to set relative priority dates, quantify, and validate the water rights of all water users including domestic, municipal, agricultural, industrial, mining, state and federal agencies, ranchers, and Indian tribes. Ongoing negotiations to settle many of the federal claims are in progress. Settling federal water claims before litigation is considered the largest single factor to the successful completion of these lawsuits.

Whether or not water pumped from wells is subject to the adjudication is still in debate, however, it is expected that all surface water and some related underground water will be included.

The adjudication may ultimately result in a reduction of SRP water supplies. The magnitude of the reduction is very difficult to estimate. To assist in minimizing the impacts of the Gila River general adjudication on SRP surface water supplies, SRP has been active in:

- The negotiation of Indian water right claims to reduce SRP's water supply liability, and to prevent such claims from going to costly and unpredictable litigation;

- Opposing the Superior Court's narrow ruling regarding the interrelationship of groundwater and surface water; and,

- Participating in the proceedings in the Silver Creek and San Pedro watersheds to resolve major legal issues which may set a precedent in the Salt, Verde, and Lower Gila watersheds.

Some water loss can be expected either through negotiated settlements or litigation. The next 15-20 year period will determine the impact to SRP as ADWR continues its investigation of water rights and associated claims.

Water Delivery & Use Agreement[25]

The Water Delivery & Use Agreement (WDUA) provides for the delivery of SRP entitlement water to municipalities located partially or completely within the SRP water service area for use by SRP shareholders located within such municipalities. The WDUA also permits SRP and the municipalities to exchange water sources pursuant to state law.

The WDUA also allows for the use of SRP wells by municipalities who wish to directly connect to such wells for part or all of their water supplies (referred to as "direct connect" wells). When a municipality uses a direct connect well, such water use is accounted for as entitlement water, and SRP maintains that such water must be used on SRP member lands.

Due, in part, to Arizona's assured water supply requirements, the WDUA is a 107-year agreement. The west valley cities of Avondale, Glendale, Peoria, and Tolleson currently have WDUAs which have been permitted for exchanges through the Arizona Department of Water Resources (ADWR).

Water Transportation Agreement[25]

The Water Transportation Agreement (WTA) provides for the wheeling of non-SRP water in SRP canals. Non-SRP water includes CAP water, modified Roosevelt Dam water (New Conservation Space, or NCS water), Cliff Dam replacement water, and others as agreed by the parties.

The major principles embodied in the WTA are (1) transportation priority (SRP entitlement water has higher priority), (2) fees (current fee is $10 per acre foot plus annual administration fee of about $2,000), and (3) water quality (SRP does not guarantee the quality of water delivered. The term of the WTAs is 50 years to coincide with CAP subcontract terms.

GRUSP/CSIF[25]

In 1994, SRP, Chandler, Gilbert, Mesa, Phoenix, Scottsdale, and Tempe signed an intergovernmental agreement (IGA) for the construction and operation of the state's largest underground water storage facility. In May 1994, the Granite Reef Underground Storage Project (GRUSP) became operational. SRP is the operating agent for GRUSP. The current storage capacity of GRUSP is about 120,000 acre feet per year (subject to operational conditions). The permitted capacity is 200,000 acre feet per year.

In the IGA, each participant is provided the right to utilize its ownership entitlement in GRUSP for its own use (i.e., storage of water), use by other participants, or use by non-participants. For use by non-participants, the participants agreed to pool any unscheduled entitlement for leasing purposes, and share in any costs and revenues associated with such leasing. The lease agreement, which was developed by SRP, was approved by the GRUSP participants. Any non-participant use of GRUSP must be approved by the GRUSP participants.

The major provisions of the lease agreement include (1) priority of use (GRUSP participants have first right of use on a monthly basis), (2) water quality, and (3) fees (currently $8 per acre foot, plus $5 per acre foot for use of the CAP/SRP Interconnection Facility [CSIF] by non-CSIF participants, and about $2,700 annual administration fee). A WTA (or similar agreement) is also required.

In 1997, the Arizona Water Banking Authority (AWBA) signed a long-term lease agreement for use of GRUSP. The five-year agreement allows for the use of at least 50,000 acre feet of space per year (if operationally available). Currently, the only west valley city which has received approval from the GRUSP participants to lease GRUSP space is Peoria. However, Peoria has never signed an agreement.

SRP Groundwater Savings Facility[25]

In 1996, SRP received a permit from ADWR to operate a "groundwater savings facility" (GSF) within its water service area pursuant to the underground water storage statutes. SRP's GSF is allowed to accept CAP water or effluent from other parties, and use such water in lieu of pumping groundwater that was planned to be pumped during the year. By accepting such "in lieu water," groundwater is preserved for later use, hence the term "groundwater savings." The party who gives in lieu water to SRP receives an underground water storage credit from ADWR based on the source of water given (minus a 5% cut to aquifer assessment). These water credits can be used by such parties for assured water supply or conservation requirement purposes. The in lieu water used by SRP counts as groundwater to SRP.

The agreement, which is between SRP and the supplier of in lieu water, provides for flexibility, since SRP water supply conditions dictate SRP's ability to accept in lieu water, but more importantly, the suppliers ability to receive a long-term water credit. As such, SRP carefully plans for GSF through its annual Project Reservoir Operations Plan (PROP) process, and communicates GSF activities to ADWR on a regular basis.

SRP currently has GSF agreements with two west valley cities: Glendale and Peoria.

Implications of Non-use of Water Entitlements[25]

Pursuant to statutes on abandonment and forfeiture of water rights (ARS §45-141 and §45-189), a water right holder who does not use the water right within any five successive year period may be subject to losing the water right. However, there are many exceptions to this rule:

- Use of all water available pursuant to a water right on less than all of the land to which such right is appurtenant does not constitute abandonment or forfeiture for any part of such water right.
- Underground water storage for future use does not constitute abandonment or forfeiture.
- The following water exchanges or substitutions do not constitute abandonment or forfeiture:
    - ⇒ Exchanging surface water for groundwater, effluent, Colorado River water, or another surface water source.
    - ⇒ Use of groundwater, effluent, Colorado River water, or another surface water source in substation for surface water.

With regard to SRP entitlement water, as long as water right holders within the SRP water service area exercise their water right (i.e., direct use, underground storage and use pursuant to state law and the WDUA, or use of alternate sources of water via exchange or direct delivery), the risk of losing a water right within the SRP water service area is greatly reduced.

Certain non-use of water situations may be exempt from abandonment or forfeiture. See ARS §45-189.E.

Water Quality Issues

Federal Clean Water Act / State Environmental Quality Act [1]

The Clean Water Act Amendments were signed into law in 1977. The goals of the CWA are:

- restore and maintain the chemical, physical, and biological integrity of the nation's waters so they are suitable for fishing and swimming
- eliminate discharge pollutants into navigable waters
- prohibit the discharge of toxic pollutants in toxic amounts

Elements of the CWA are: regional planning; dredge and fill; state water quality standard setting; National Pollutant Discharge Elimination System (NPDES); national pretreatment standards to regulate sewer discharges; and Spill Prevention Control and Countermeasure (SPCC) program.

Pursuant to the CWA and the 1986 Environmental Quality Act of Arizona (EQA), ADEQ is required to review and modify, as necessary, water quality standards for all navigable waters in the State. The State's standards must attain the CWA's goal of fishable, swimmable waters, whenever attainable, and at a minimum must preserve and protect water quality for all current and reasonable foreseeable future uses. Water quality standards set by ADEQ are reviewed every three years and are subject to EPA's approval.

In addition to State surface water quality standards, the EQA requires that ADEQ set standards focused on protecting aquifers. ADEQ does this through its Aquifer Protection Permit (APP) program and by setting aquifer water quality standards. All aquifers in the West Salt River Valley are currently protected for drinking water uses. Examples of facilities that are required to have an APP permit are: surface impoundment's; point source discharges to navigable waters; and sewage or sludge ponds and wastewater treatment facilities.

For WESTCAPS members, this means that all aquifers, lakes, rivers, streams, washes, and, arguably, canals in the West SRV are be protected under the CWA and the EQA. Protected uses are: domestic water source, fish consumption, full body contact, partial body contact, aquatic and wildlife, agricultural irrigation, agricultural livestock watering. All discharges into these water bodies would be regulated, including: reclaimed water, wells, storm drains, and industrial discharges.

The re-authorization of the CWA is long overdue. Although no federal action is expected this year to re-authorize it, such action is expected in the near future. The Western Coalition of Arid States (WESTCAS), which is primarily made up of wastewater agencies in the southwest, has taken the lead in arguing for appropriate regulation of discharges into these water systems in the arid west. The outcome of this national debate could affect reclaimed water resource management options in the West SRV and even the availability of future surface water supplies as interests explore how to reallocate water supplies to address environmental issues (such as endangered species).

State and Federal Superfund Programs [1]

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) established the "superfund" program. CERCLA, which enables the federal government to act in emergency situations to initiate cleanup, consists of two parts: cleanup and assignment of costs. Individuals or parties whose activities can be connected to the superfund site are jointly and severally liable for cleanup costs. The EPA is empowered to negotiate with identified responsible parties to establish degree of financial obligations.

The state Water Quality Assurance Revolving Fund (WQARF) program parallels the federal superfund program. If provides funds for monitoring, risk assessment, matching funds and remediating hazardous substances which may pose a hazard to "waters of the State." Mitigation of non-hazardous substances is also allowed under the statues.

Several contaminated sites have been identified in the West Salt River Valley. These sites are shown in Figure 11.

Safe Drinking Water Act [7]

The SDWA was signed into law in December 1974. Under the provisions of the SDWA, USEPA was required to establish the National Primary Drinking Water Regulations (NPDWR). Enforceable Maximum Contaminant Limits (MCLs) were promulgated in 1975 as a part of the National Interim Primary Drinking Water Regulations (NIPDWR). The NIPDWR were amended in 1977 and 1979 to include MCLs for additional contaminants. In addition to the health-related primary drinking water regulations, the SDWA

also authorized USEPA to develop secondary regulations for contaminants which may adversely affect the aesthetic quality of drinking water. Non-enforceable secondary maximum contaminant levels (SMCLs) were promulgated in 1979.

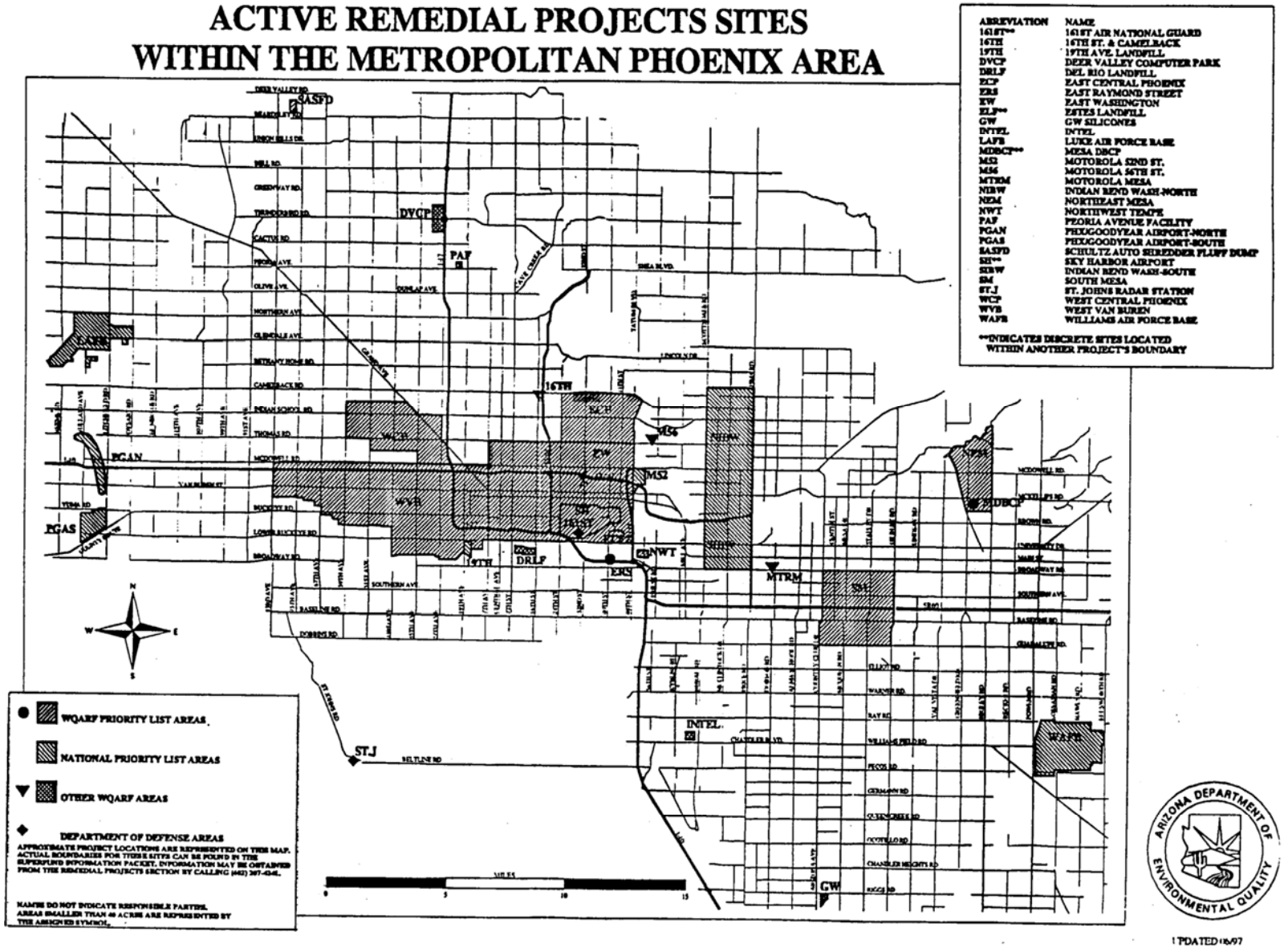


Figure 11.---Active Remedial Projects Sites Within The Metropolitan Phoenix Area
Source: Arizona Department of Environmental Quality

In June 1986, the SDWA amendments were signed into law to strengthen the regulations and to provide additional protection of groundwater. In 1986, MCLs were in place for 25 contaminants, and SMCLs were in place for 13 contaminants. Under the 1986 amendments, USEPA is required to continually increase the number of contaminants regulated. In addition, the amendments required disinfection of all public water supplies (including groundwater) and authorized USEPA to develop filtration criteria for surface water supplies. No regulatory changes are expected in the near future. Water quality maps showing levels of the following constituents in the West Salt River Valley can be found in the Appendix A.

- Total Dissolved Solids
- Nitrates
- Trichloroethylene and Tetrachloroethylene
- Metals
- Arsenic
- Fluoride

National Environmental Policy Act [10]

The National Environmental Policy Act (NEPA) requires that environmental impact evaluations be conducted prior to construction of a federally funded/sponsored project or federally assisted project. Alternative ways of lessening the environmental impact of the project must be considered and the public must be given the opportunity to provide input into the entire evaluation process. The costs associated with completing NEPA clearances are the responsibility of the applicant or initiating entity.

For federally sponsored or funded projects, a determination of significant impact must be made. An environmental assessment (EA) is usually prepared to determine whether an environmental impact statement (EIS) is required or a finding of no significant impact can be issued. If significant impacts are anticipated to occur as a result of the project, that cannot be reduced to acceptable levels through implementation of mitigation measures, an EIS must be prepared.

The construction of water treatment and/or underground storage and recovery facilities that processes, transports, stores or utilizes CAP water will be subject to NEPA, and will most likely require preparation of an EA. CAP M&I subcontracts contain a provision that requires plans for the use of CPA water to be submitted to the Bureau of Reclamation for NEPA review. In addition, CAP water infrastructure projects that require a 404 permit from the Corps of Engineers (Corps) (e.g., a pipeline that crosses a riverbed or recharge basins located within a riverbed) will also be subject to the Corps' NEPA review.

Reclaimed Water Issues

Background

The State of Arizona regulations for effluent reuse require wastewater treatment plants to have a permit authorizing them to discharge reclaimed water for reuse. The degree of regulation and permitting requirements are dependent on the intended uses of the resource. Generally, reclaimed water reuse falls into the following categories: direct non-potable reuse and indirect potable reuse.

Direct non-potable reclaimed water reuse (irrigation and urban lakes) is regulated through Arizona's Administrative Code based on its intended use. Specific non-potable reclaimed water reuses regulated are: orchards; fiber, seed & forage; pastures; livestock watering; processed food; restricted access landscaped areas; open access landscaped areas; food consumed raw; incidental human contact; and full body contact. Some irrigation districts in the West SRV are using reclaimed water for irrigation purposes.

Currently, direct potable reuse of reclaimed water is not permitted. Indirect potable reuse of effluent is regulated by both the Aquifer Protection Permit (APP) section and the drinking water section of ADEQ. The drinking water section determines if this water is "groundwater under the direct influence of surface water". If so, additional filtration and disinfection will be required. Indirect potable reuse, involving aquifer

storage and recovery, is allowed providing an APP is obtained and Best Available Demonstrated Control Technology is used (BADCT). All aquifers in the West SRV are protected for drinking water uses. Therefore, water quality standards are set in accordance with the Safe Drinking Water Act. Reclaimed water is currently being recharged in the West SRV and studies have been conducted on potential future sites.

Regulation of reclaimed water discharged into rivers, lakes, streams and, arguably, water conveyance systems (canals) are governed by the Clean Water Act (CWA) and the State's surface water quality standards. Each water system is protected based on its designated uses. Reclaimed water discharges to these water systems are regulated through the National Pollutant Discharge Elimination System (NPDES) under the authority of the CWA. The City of Phoenix's Tres Rios project is an example of a project that would be regulated in this manner.

MAG 208 Water Quality Planning [4]

The Federal Water Pollution Control Act recommends the development and implementation of area-wide waste treatment management programs. Section 208 of the Act establishes a mechanism for the establishment of regional water quality/waste control planning and management. Federal funds are available to assist local planning jurisdictions in identifying, quantifying, and addressing complex and difficult urban, industrial and nonpoint source water quality problems.

The Maricopa Association of Governments (MAG) has been designated the 208 planning agency for Maricopa County. MAG has incorporated the 208 program as part of their overall Comprehensive Regional Planning Program. On July 28, 1993, the MAG Regional Council adopted the most recent version of the MAG 208 Water Quality Management Plan. The Plan contains/identifies the existing and future wastewater treatment systems for the local jurisdictions for a twenty year planning period (through 2010). The State requires that wastewater treatment systems to be consistent with the regional 208 water quality management plans. If a wastewater plant is inconsistent with the plan (e.g., not in the plan), the State and County will not issue a permit to construct and operate. Any plans developed by WESTCAPS involving the treatment of wastewater would have to comply with the MAG 208 program.

ADWR accounting [4]

ADWR's water accounting is important to water providers because of how it impacts their ability to demonstrate an assured water supply and comply with state water conservation requirements. One water resource encouraged by ADWR is effluent. ADWR encourages effluent reuse by not counting its use in its GPCD calculation and by allowing its use in filling and maintaining artificial urban lakes. Effluent reuse can occur through direct reuse, indirect reuse (e.g., storage and recovery) or exchanges. In order to receive the full benefit of effluent reuse, recovery of effluent must occur in the area of hydrologic impact of its storage. Recovery of effluent credits outside of the area of hydrologic impact is included in the GPCD calculation.

There are two types of underground storage facilities that can be used to obtained stored water credits, including effluent. At a constructed underground storage facility, the permit holder can store water in the aquifer using percolation basins. At a managed underground storage facility the permit holder may utilize a natural streambed and allow the water to percolate into the aquifer (i.e., in-stream recharge) without constructing percolation basins. The permit holder receives 100% credit on water stored at a constructed facility. By comparison, the permit holder receives only a 50% credit for water stored in a managed underground storage facility. The type of underground storage and recovery facility has tremendous impact on the amount of water credits that can be accumulated and recovered.

Background [11]

The Arizona Corporation Commission (the "A.C.C.") is the regulatory authority having jurisdiction over public service corporations operating in Arizona. A private water company (a "company") is one form of public service corporation regulated by the A.C.C.

Municipally-owned water utilities provide water service to areas that are determined by municipal limits and charge water rates that are set by city or town council resolution. In contrast, a company can only provide water service to customers located within an area included in or contiguous to an area defined as a Certificate of Convenience and Necessity (a "CC&N") and may only charge water rates that are approved by the A.C.C. A CC&N is an area with a well-defined legal description that could be compared to a city limit. The A.C.C. reviews any requests for establishing or expanding a company's CC&N, with the determining factor being the public interest. The A.C.C. evaluates the company's capabilities and qualifications for providing water service to the requested service area before granting or denying the company's request to establish or expand its CC&N.

The A.C.C.'s scope of regulation of water companies does not end with rates or CC&N's, but also includes financing, reporting and the terms and conditions for the provision of water service.

The A.C.C. regulates rates that companies may charge their customers, compared to a municipally-owned water utility, whose rates are generally set by their respective city or town council. The process of rate review by the A.C.C. is handled formally through a process known as a rate case filing. The filing is based on an historical 12-month period called a test year. Rate case filings are quite complex and include an extensive set of standardized exhibits specified by the A.C.C. covering rate base, test year income, cost of capital, financial statements and statistical schedules, projections and forecasts, cost of service analyses and various billing and revenue analyses, as specified in R14-2-103. Witnesses with expertise in finance, engineering, rate design, economics, etc. may be required to support the company's rate case exhibits and related testimony.

The A.C.C. rate setting process may be time consuming and complex. It officially begins when a company submits a set of standardized rate case exhibits and the prepared testimony, if necessary, of its various witnesses to the A.C.C. The A.C.C. Staff evaluates the company's rate application for adequacy before the case is docketed, i.e., officially accepted for consideration. Once the case is docketed, the A.C.C. rules specify the maximum time period until a Decision must be entered. For large water companies, classified as Class "A" and "B" utilities by the A.C.C., the time period is approximately 360 days. For these large companies, the A.C.C. rules also specify that the hearing officer assigned to the company's rate case must issue a procedural order within 30 days of the date that the application is docketed, and the A.C.C. Staff must file its testimony and exhibits within 180 days of the docketed date.

For the large companies, a number of activities go on during the first six months after the company's application has been docketed. The company must notify its customers and publish general notices in newspapers throughout the state. In response to these notices, interested parties, including the State Residential Utility Consumer Office ("RUCO"), might file an application to intervene in the case. The A.C.C. considers these applications and decides who will be allowed to intervene and actually become a participant in the discovery and hearing process.

The discovery phase of the case is a very busy time for the company. The A.C.C. Staff auditors and rate analysts will spend time auditing the rate application and financial statements for the historical test year used in the case. The A.C.C. engineers will make field visits to inspect the company's facilities and meet with the company's engineers and other employees as part of their investigation of the company's physical operations and capabilities. The A.C.C. consumer service specialists will prepare a report of the company's relations with its customers based on all of the matters that have come to its attention since the last rate order.

The discovery phase also includes two other types of activities. First, the A.C.C. Staff and any intervenors research and investigate the company's case by means of data requests served on the company. Each data request generally includes multiple questions that the company must review, research, and formally answer. Most answers require detailed explanations and many also must be supported with worksheets. Second, once the A.C.C. Staff and any intervenors file their testimony according to the schedule set forth in the procedural order, the company must analyze testimony and prepare data requests to establish the basis and rationale for their proposals. In rate cases filed by the large water companies, the volume of data requests and utility responses can be extensive.

During the time that discovery is taking place, the A.C.C. may schedule a series of public meetings at various locations throughout the company's service territory. Representatives of the company and one or more A.C.C. Commissioners and Staff meet with and answer questions from the local customers.

Some time after the discovery phase is completed, formal administrative hearings are held in front of an A.C.C. hearing officer. These are evidentiary hearings where company, A.C.C. Staff, and any intervenor witnesses who are submitting testimony in the case, appear, sponsor their testimony and exhibits, and stand for cross examination by attorneys for each of the parties. A court reporter takes down the proceedings to create a record that can be reviewed by the courts if any party appeals the A.C.C.'s Decision.

Some time after the hearings have been completed, the Hearing Officer will prepare a recommended Order to be submitted to the A.C.C. Commissioners for their review and approval, which takes place as part of an open meeting. The A.C.C. Commissioners can accept, reject, or alter the Hearing Officer's recommendations before producing the official A.C.C. Decision. The Decision can be challenged through an appeal process if the company is unwilling to accept the Decision in its final form.

Investments by companies in new water utility facilities will not be allowed in rate base by the A.C.C. until such investments are accepted by the A.C.C. as "used and useful." The A.C.C. allows companies to earn a rate of return on such investments. Not all utility plant funded by companies is allowed in rate base, especially if the A.C.C. can show that an investment is unnecessary to provide water service. A new well that is not needed or that provides excess capacity could be excluded from rate base even though the well may be in use.

The rules under which companies are regulated by the A.C.C. are complex, and a rate case could be a complex filing with the A.C.C. Knowledge of how rates are set is critical to the role and function of WESTCAPS, especially as it pertains to those companies looking for a cost-effective means to put Central Arizona Project ("CAP") water to beneficial use. Any solutions that are proposed by WESTCAPS, i.e., water treatment plants, recharge projects, etc., can only be considered feasible for those members of WESTCAPS that are private water companies if the A.C.C. approves expenses and capital investments through a rate case proceeding. It is critical, therefore, that WESTCAPS work toward a cost-effective solution to the use of CAP water. The risk or rewards to the private water companies for selection or implementation of any capital improvement project, or any operation that results in increased expenses, can only be answered as the result of successfully filing a rate case with the A.C.C.

While WESTCAPS may be working toward achieving one or more means of putting CAP water to beneficial use in the West Valley, those members of WESTCAPS that are private water companies face the challenge of not only choosing the best means of using CAP water within their CC&N, but also being prepared to defend their choice in a rate case filing before the A.C.C.

Arizona State Land Department

Background[26]

An objective of the Arizona State Land Department (ASLD) is to generate revenue for the State Trust beneficiaries by promoting orderly growth and development on the properties it manages. Based on

market conditions, ASLD times the selling or leasing of these properties to maximize revenues. The ASLD has such properties within the service areas of Goodyear, Peoria, and Phoenix.

The ASLD has acquired a CAP allocation of approximately 13,150 AF to promote development on these properties: 150 AF in Goodyear, 1,000 AF in Peoria, and 12,000 AF in Phoenix. The ASLD considers this resource supplemental to the city's or private water company's existing water supply and currently has not assigned this CAP water supply to any specific project. If a city or private water company were to utilize this water supply, it would have to repay ASLD for all CAP capital costs incurred to date.

In addition to a CAP allocation, ASLD has the legal ability to transport ground water from the Butler Valley. Conceptually, this water supply could be delivered to developing state lands through the CAP system.

Several task forces are underway evaluating development issues in Maricopa County. They are Valley Vision 2025 and Growing Smarter. The work of these task forces could potentially influence future development in Maricopa County and in the West Salt River Valley.

CAP Transfers [12]

The steps involved with a transfer of CAP allocation from ASLD to another agency is as follows:

1. The requesting agency would send ASLD a letter expressing interest in a CAP transfer from ASLD's subcontract. ASLD would review the request through an internal process called PEP - Project Evaluation Panel. PEP would either approve or not approve the proposed CAP transfer to proceed.

2. ASLD would discuss with the requesting agency the terms of a potential agreement.

3. ASLD would provide repayment information and request a letter from the requesting agency finalizing their intent to proceed with the CAP transfer.

4. ALSD would seek approval from the State Selection Board (Governor, Attorney General, and the State Treasurer). The State Selection Board would issue a resolution authorizing the transfer.

5. The requesting agency would seek approval from their Board or Council authorizing the transfer.

6. ASLD and the requesting agency would negotiate the agreement, partial assignment, and amendments.

7. The Department of Water Resources and the Central Arizona Project would review the documents described in 6 above.

8. The CAP would place the proposed CAP transfer on the CAP Board agenda for approval.

9. ASLD and the requesting agency would review, modify and finalize the agreement, partial assignment and amendments.

10. The requesting agency would obtain the signature of their Mayor or Corporate Executive on the documents described in 9 above. The documents are then forwarded to ASLD and signed by the State Land Commissioner. Amendment to ASLD's subcontract requires the signature of the Chairman of the Joint Legislative Budget Committee, the Governor, and the Secretary of State.

11. The partial assignment and the amendments are then forwarded to the CAP, who seeks the approval of the Bureau of Reclamation.

12. After all the documents have been executed, the requesting agency would seek court validation of their subcontract amendment and ASLD would file the documents with the Secretary of State's Office.

Demand And Supply Issues

Central Arizona Project[6]

The Central Arizona Project (CAP) maintains a junior priority to use of water from the Colorado River. Therefore, the CAP will be subject to shortages in the future. The extent and frequency of those shortages will depend on a number of variables, including:

- Speed of development in the Upper Basin States;
- Extent to which California's uses are scaled back to its entitlement of 4.4 MAF/yr.;
- Hydrology (nature's role in keeping reservoirs full);
- Policies established regarding operation of the reservoir system (i.e., will shortages be declared at a Lake Mead elevation which protects power generation, Nevada diversions, or minimum recreation pool?; Will the volume of shortage deliveries to CAP be sufficient to meet higher priority CAP user demands?).

Colorado River reservoirs are currently full. In fact, a surplus has been declared for the past two years and excess releases are being made to reduce the risk of flooding on the system. This means that a shortage declaration is not expected to occur within the next 25-30 years. However, after that time period, shortages could occur relatively often and CAP customers need to be prepared.

Salt River Project[3,13]

Overall, SRP's water demand is expected to decline slightly over the next 20 years and then begin to slowly increase as higher density urban development occurs. Eventually overall demands are expected to meet or exceed historic levels when service was primarily agriculture. SRP considered a range of total annual demand of 800 thousand acre-feet (KAF) to 1,100 KAF. The following demand characteristics were noted by SRP:

- SRP expects to be almost completely urbanized by the year 2030
- Urban irrigation demand will remain constant throughout the planning horizon
- Agricultural demand declines more rapidly than Municipal & Industrial demand increases until 2030
- Municipal & Industrial demand will start to increase more rapidly after 2030 as in fill occurs and SRP anticipates this demand will eventually equal historical agricultural demands

The amount of surface water available to SRP from the Salt and Verde River systems is variable and generally beyond SRP's control. Based on historical inflows to the SRP system and on its operating practices in 1988, surface water supplies can provide 950 thousand acre-feet a year approximately 30% of the time.

Historically, SRP's annual groundwater pumping has averaged 282 thousand acre-feet since 1950. However, from 1975 through 1993 annual groundwater pumping averaged 142 thousand acre-feet. A minimum amount of annual groundwater pumping, approximately 50 thousand acre-feet, is needed to meet demands that cannot be served with surface water. At the time the water resource plan was published, SRP indicated that it had the potential to deliver approximately 340 thousand acre-feet of groundwater annually.

In its water resource plan, SRP evaluated the implications of reductions in its annual groundwater pumping capability from 340 thousand acre-feet in 1988 to 275 or 180 thousand acre-feet in 2008. Potential reductions in groundwater production capability could result from changes in location of SRP water demands or be due to water quality considerations.

Assuming SRP maintains its annual groundwater pumping capability at 340 thousand acre-feet to augment its surface water supplies, SRP would be able to provide 950 thousand acre-feet annually approximately 91% of the time.

SRP anticipates that under normal supply conditions, it will have an adequate supply to meet projected water demands. Under drought conditions, SRP anticipates an a supply shortfall ranging from 74 to 126 thousand acre-feet.

WESTCAPS[19]

Supply and demand projections for the WESTCAPS planning areas were developed utilizing the Arizona Department of Water Resources groundwater model. Please refer to the" West Salt River Valley Ground-water Supply Study", April 2001, prepared by the Bureau of Reclamation - Phoeinx Area Office for a detailed discussion of the assumptions behind the supply and demand projections. WESTCAPS made the following changes to ADWR's model:

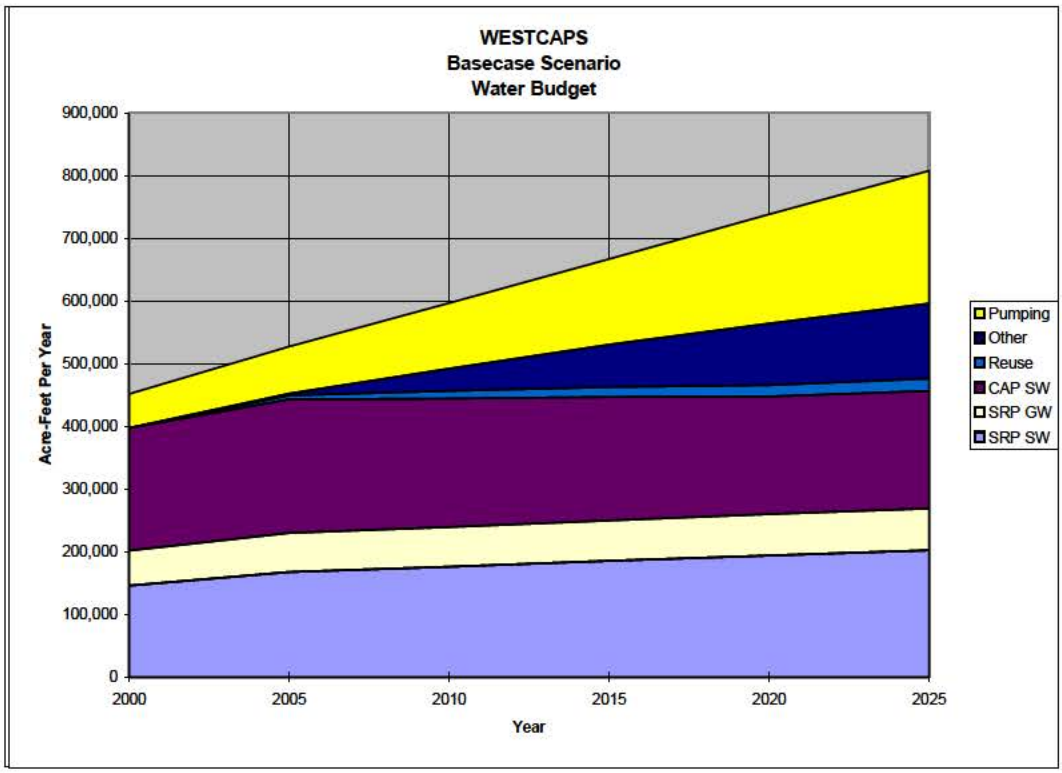
- Updated agency water planning areas
- Updated the allocation of water resources for each water planning area
- Utilized the1997 MAG residential unit projections, with slight modifications
- Updated the municipal demand multiplier
- Updated the industrial / turf demand multiplier
- Included only currently permitted recharge activities
- Assumed only current authorized CAP allocations were available for use
- Projected groundwater levels in the West Salt River Valley by the year 2100 assuming no growth after 2025

Modeling assumptions that did not change were:

- Non-municipal pumping
- Irrigated agriculture
- Natural recharge
- Underflow into or out of the modeled area

Refer to the Appendix B for summary information on the WESTCAPS water planning areas, residential unit projections, population projections, water demand projections, and the potential allocation of supply to meet projected water demands.

Figure 12 summarizes the projected water budget for the WSRV from the year 2000 through 2025. Continued groundwater pumping would be the primary method of meeting future water demands above each agencies current ability to utilize renewable resources. Pumping is projected to increase from 54,652 acre-feet per year in the year 2000 to approximately 211,874 acre-feet per year by 2025. Collectively, WESTCAPS members would have 60,903 acre-feet per year of unused CAP allocations to use to offset the projected groundwater pumping. An additional 165,825 acre-feet per year of renewable supply would need to be acquired by 2025 to fully offset projected groundwater pumping.



Water Budget Projections (Acre-Feet Per Year)

Water Source	Year 2000	2005	2010	2015	2020	2025
SRP SW	146,019	167,901	175,859	185,278	194,208	202,293
SRP GW	55,722	62,023	63,419	64,856	65,918	66,705
CAP SW	195,592	213,286	205,100	196,922	187,590	187,590
Reuse	0	6,577	12,409	15,641	18,041	19,641
Other	0	2,350	35,421	67,489	98,269	119,930
Pumping	54,652	75,140	104,687	136,833	174,776	211,874
Total	451,985	527,277	596,895	667,019	738,802	808,033

Figure 12.—WESTCAPS Base Case Water Budget

Strategic Issues

After completing strategic research, the following key strategic issues were developed and refined after extensive discussion by WESTCAPS and its advisors:

State/Federal Negotiations.—The Secretary of the Interior may decide to use a significant amount of CAP water currently earmarked for the WSRV and other surface water resources to resolve Indian water right and Colorado River (California and Nevada) issues. This action could limit available renewable water supplies to WESTCAPS participants and increase competition between participants for remaining surface water supplies. The opportunity also exists for WESTCAPS members to negotiate additional supply.

Reallocation of Additional Supply.—Reallocation of CAP supplies from subcontracts that were either declined or terminated has not been completed. WESTCAPS participants currently do not have enough renewable water supplies to meet forecasted water demands.

Flexible State and Federal Laws and Regulations.—Water quantity (ADWR) and quality (ADEQ) regulation will continue to become more stringent, limit the ability of WESTCAPS participants to use groundwater or recovered effluent in the WSRV and potentially curtail urban development. WESTCAPS may want to influence the regulatory process to develop more flexible policy to facilitate practical water management decisions.

Arizona Corporation Commission (ACC) Policy and Direction.—ACC approval is critical to private water company participation in a regional solution. The uncertainty of cost recovery for CAP water may force private water companies to relinquish their CAP allocations, and those allocations would be reassigned to other water providers or lost in the CAP/Department of the Interior (DOI) litigation.

Insufficient Institutional Infrastructure.—The institutional framework may not be in place to allow WESTCAPS participants to implement the most efficient water management solution.

Opportunity to Promote Recharge in WSRV.—The potential exists to encourage the Arizona Water Banking Authority (AWBA) and the Central Arizona Groundwater Replenishment District (CAGRD) to store renewable supplies in the WSRV. WESTCAPS participants do not have enough renewable water supplies to mitigate declining groundwater levels.

Declining Groundwater Levels.—Groundwater mining by municipal, industrial, and agricultural users in the WSRV has significantly reduced groundwater levels and caused associated impacts in the northwest Salt River Valley. These declines are expected to continue.

Poor Quality Groundwater.—Poor quality groundwater throughout the WSRV in general and, more specifically, in the mid-to-southern WSRV limits the use of untreated groundwater for potable water uses.

Insufficient Renewable Resources.—Current modeling indicates that WESTCAPS participants do not have enough CAP (or other) renewable water supplies to meet forecasted water demands or mitigate declining groundwater levels. Additional renewable resources will be needed.

Insufficient Water Infrastructure.—Additional water conveyance, treatment, and storage infrastructure will be needed in the WSRV to meet anticipated future demands with renewable supplies and to mitigate declining groundwater levels.

Lack of Financing Capability.—Currently, the cost of obtaining additional renewable resources and constructing new water infrastructure places a large financial burden on individual WESTCAPS participants.

Strategic Priorities[16]

On May 14, 1999, WESTCAPS General and Technical Committees met in a joint meeting to establish its strategic priorities for the remainder of the planning process. These strategic priorities guided the creation and selection of options to meet the four WESTCAPS goals of:

1. Protect, preserve, and enhance CAP allocations
2. Influence water and wastewater policy
3. Maximize use of CAP and other renewable supplies

4. Develop long-term, sustainable, regional, water resource, infrastructure, and implementation strategies.

The session was designed and facilitated by Dr. Martha Rozelle of The Rozelle Group. Participants included members of the General and Technical Committees and the Advisors. Information about the group composition is shown in the following tables:

Are you a member of the:

Type Group	Number of Participants
General Committee	9
Technical Committee	4
Advisors	8

Which entity do you represent?

Type Group	Number of Participants
City or Town	6
Private Water Company	6
State Regulatory Agency	2
Water Purveyor	2
Federal Agency	2
County Agency	0
Advocacy Group	2
Other	1

Which portion of the West Salt River Valley do you represent?

Type Group	Number of Participants
South WSRV	4
North WSRV	5
Entire WSRV	12

Process Description

The process included three main steps:

1. Define the key strategic issues.
2. Prioritize the issues with regard to importance and to the probability that WESTCAPS can affect the issue.
3. Discuss and evaluate the results.

Key Strategic Issues

The following issues were developed and refined after extensive discussion by the Technical Committee and the Advisors and review and approval by the General Committee.

- ***State / Federal Negotiations (Negotiations):*** The Secretary of the Interior may decide to use a significant amount of CAP water currently earmarked for the West Salt River Valley and other surface water resources to resolve Indian water right and Colorado River (California & Nevada) issues. This action could limit available renewable water supplies to WESTCAPS participants and increase competition between participants for remaining surface water supplies. The opportunity also exists for WESTCAPS members to negotiate additional supply.

- ***Reallocation of Additional Supply (Reallocation):*** Reallocation of CAP supplies from subcontracts that were either declined or terminated has not been completed. WESTCAPS participants currently do not have enough renewable water supplies to meet forecasted water demands.

- ***Flexible State & Federal Laws & Regulations (Laws):*** Water quantity (ADWR) and quality (ADEQ) regulation will continue to become more stringent and limit the ability of WESTCAPS participants to use groundwater or recovered effluent in the West Salt River Valley and potentially curtail urban development. WESTCAPS may want to influence the regulatory process to develop more flexible policy to facilitate practical water management decisions.

- ***Arizona Corporation Commission (ACC) Policy & Direction (ACC):*** ACC approval is critical to private water company participation in a regional solution. The uncertainty of cost recovery for CAP water may force, private water companies to relinquish their CAP allocations and those allocations would be reassigned to other water providers or lost in the CAP / DOI litigation.

- ***Insufficient Institutional Infrastructure (Institution):*** The institutional framework may not be in place to allow WESTCAPS participants to implement the most efficient water management solution.

- ***Opportunity to Promote Recharge in WSRV (Recharge):*** The potential exists to encourage the AWBA and the CAGRD to store renewable supplies in the West Salt River Valley. WESTCAPS participants do not have enough renewable water supplies to mitigate declining groundwater levels.

- ***Declining Groundwater Levels (Decline):*** Groundwater mining by municipal, industrial, and agricultural users in the West Salt River Valley have and will continue to cause significant decline in groundwater levels and associated impacts in the northwest Salt River Valley.

- ***Poor Quality Groundwater (Quality):*** Poor quality groundwater throughout the WSRV in general and, more specifically, in the mid to southern WSRV limits the use of untreated groundwater for potable water uses.

- ***Insufficient Renewable Resources (Renewable):*** Current modeling indicates that WESTCAPS participants do not have enough CAP or other renewable water supplies to meet forecasted water demands or mitigate declining groundwater levels. Additional renewable resources will be needed.

- ***Insufficient Water Infrastructure (Infrastruct):*** Additional water conveyance, treatment, and storage infrastructure will be needed in the WSRV to meet anticipated future demands with renewable supplies and to mitigate declining groundwater levels.

- ***Lack Of Financing Capability (Financial):*** Currently, the cost of obtaining additional renewable resources and constructing new water infrastructure places a large financial burden on individual WESTCAPS participants.

Issue Prioritization

The key strategic issues were prioritized using a dual-paired comparison technique in the CoNexus electronic polling process. To prioritize the issues, participants compared all combinations of the different issues and answered the question: *"Which of the key strategic issues should receive priority attention from WESTCPS over the next two to three years?"*

Participants answered two more questions about the strategic issues: *"On a scale of 1 to 9 what is the probability that WESTCAPS can affect this issue?" "Should WESTCAPS address this issue?"*

Results

Answers to these questions resulted in a mapping of the relative importance of the strategic issues and the extent of probability that WESTCAPS could affect the issue. The results are shown in the following figures.

The four most important issues for the entire group are ***Insufficient Water Infrastructure, Lack of Financing Capability, Opportunity to Promote Recharge in WSRV,*** and ***Insufficient Renewable Resources***. The opportunities to improve infrastructure and implement recharge were considered to have the highest probability. The issues of least priority to the full group and having the lowest probability of affecting the outcome were ***Negotiations*** and ***Groundwater Quality.***

The importance of the ***ACC Policy and Direction*** issue varies significantly among the three groups as shown in Figure 2. The General Committee believes that ACC support and ownership of the WESTCAPS regional plan is critical to private water company involvement. The discussion following the polling increased understanding of the ramifications of this issue and prompted several participants to state they would score it higher if a second vote were held.

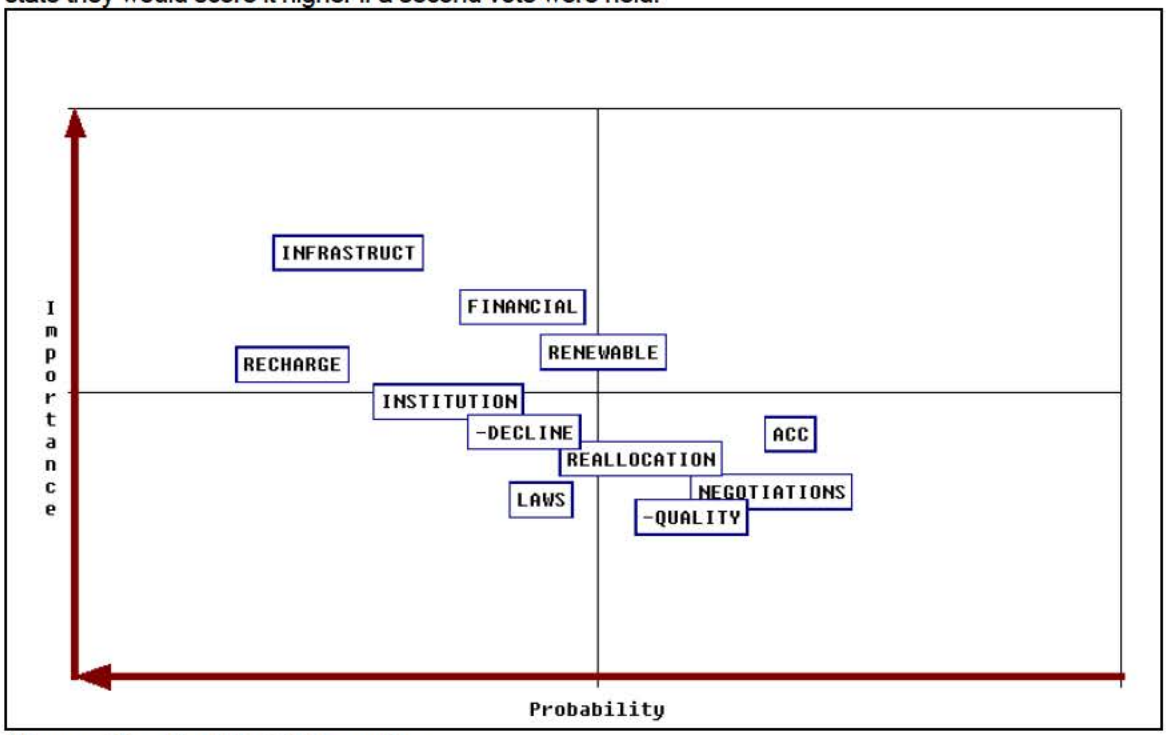


Figure 13.—Profile Of Results

The scale on the vertical axis reflects the level of importance based on normalized scores from 0 to 100. Other notable areas of commonality or differences are summarized below.

- The need for ***infrastructure*** to use currently unused CAP allocations and to meet projected water demands was clearly an important issue for all groups.

- The ***economic feasibility*** of a regional plan from the perspective of its actual cost and the ability to achieve support of the customer for tax or rate increases was important to all groups.

- Agreement was very high on the need for the regional plan to put WESTCAPS unused CAP allocations to use and to meet projected water demands. A long-term plan to address additional ***renewable*** resources will be important in the future.

- The Arizona Water Banking Authority (AWBA) and the Central Arizona Groundwater Replenishment District (CAGRD) should be encouraged to ***recharge*** in the West Salt River Valley. More emphasis should be placed on ABWA recharge.

- Issues considered to be of medium importance included ***institutional infrastructure*** and ***declining groundwater*** levels. The need for regional cooperation in creating a more efficient institutional infrastructure was more important to the advisors than the two committees. Declining groundwater was more important to the entities in the north portion of the West Salt River Valley, while the poor quality groundwater issue was more important to the south portion. Overall importance of these issues was greatly diminished by the need to use the ***renewable supply.***

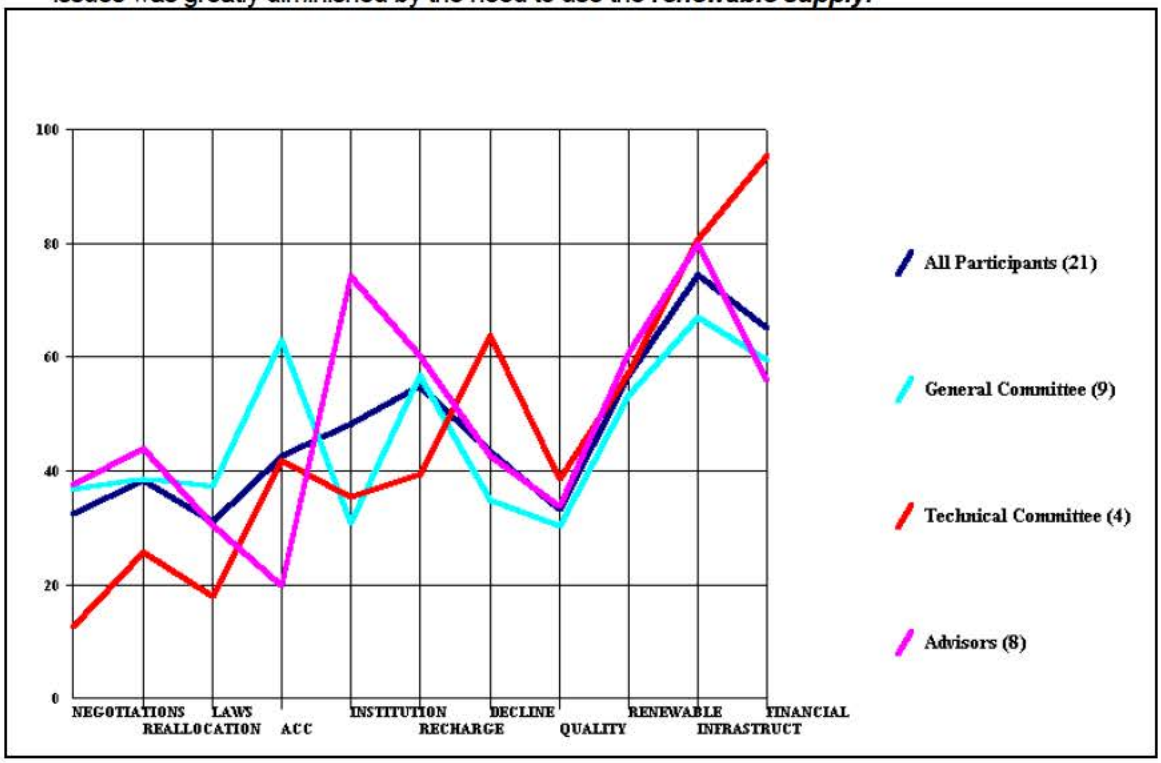


Figure 14.—Importance By Membership

The top five strategic priorities established by the General Committee are:

1. Insufficient Water Infrastructure
2. Lack of financing Capability
3. Insufficient Renewable Resources
4. Opportunity to Promote Recharge in WSRV
5. Arizona Corporation Commission Policy and Direction

From this point forward in the planning process, WESTCAPS work efforts were focused on addressing these five strategic priorities.

Strategic Modeling

Potential Options

WESTCAPS developed options for putting CAP and other renewable supplies to use. A summary of each option was prepared by WESTCAPS members and advisors that (1) described the option, (2) discussed how the option fared against established evaluation criteria, (3) and evaluated the economics on a regional basis. Those summaries are below. In addition, the Bureau of Reclamation performed a least cost analysis[18] on each option and regional strategy considered by WESTCAPS. Refer to Appendix C for background information on current water infrastructure in the West Salt River Valley, a map showing the location of the various options considered, and maps illustrating the alternative WESTCAPS strategies considered.

Current Options (CO):

- WESTCAPS members continue to rely on groundwater and join the CAGRD
- Recharge CAP water at the SRP Granite Reef Underground Storage Project
- Recharge CAP water at the MWD Groundwater Savings Facility
- Recharge CAP water at the SRP Groundwater Savings Facility
- Recharge CAP water at the Avondale Crystal Lakes project

Near-term Options (NT):

- Recharge and recover or only recharge CAP water at West Maricopa Combine's Hassayampa River recharge site
- Expand the City of Glendale Pyramid Peak Water Treatment Plant
- Expand the City of Peoria Greenway Water Treatment Plant
- Lease capacity on a short-term basis in the planned City of Phoenix Lake Pleasant Water Treatment Plant
- Recharge CAP water at CAP's Agua Fria Recharge Project on a year-by-year basis or with long-term leased storage capacity
- Recharge CAP water at Surprise's McMicken Dam Recharge Project
- Recharge CAP water at Goodyear's Beardsley Canal Recharge Project
- Recharge CAP water into the MCFCD New River Water Course Master Plan areas
- Recharge CAP water at the Sun Cities / Youngtown Groundwater Savings Facility
- Develop groundwater pump and treat facilities in the South West Salt River Valley
- Recharge CAP water at SRP's New River / Agua Fria Underground Storage and Recovery Project

Long-term Options (LT):

- Recharge CAP water in the SROG Agua Fria Linear Recharge Project

Transmission Options (TO):

- Salt River Project canal system
- Maricopa Water District canal system
- Citizens Water Resources Lake Pleasant Road Water Conveyance System

CO1: BASECASE – WESTCAPS MEMBERS CONTINUE TO RELY ON GROUNDWATER AND JOIN THE CAGRD[27]

DESCRIPTION: The "no action" option assumes that water agencies in the West Salt River Valley (WSRV) will continue to meet water demand as they have in the past. Continued groundwater pumping would be the primary method of meeting future water demands above each agencies current ability to utilize renewable resources. It is assumed that there would not be any additional recharge activities in the West Salt River Valley by water agencies, such as the CAGRD.

In evaluating the economics related to continued groundwater pumping, assumptions were made on the current capability to pump groundwater in the West Salt River Valley. Based on the assumptions used to establish the basecase scenario in ADWR's groundwater model, current pumping capability was established. Any groundwater pumping above the current pumping capability was assumed to come from new wells. Approximately 121 new wells would be needed to meet projected water demands through 2025.

SUMMARY: This option assumes that future water demands will be met by pumping groundwater. No action would be taken to fully utilize the CAP allocations of the WESTCAPS members or any other renewable supply. Although in the short-term groundwater is an economical resource for most WESTCAPS members, in the long-term declining groundwater levels, poor water quality and regulatory constraints will limit the availability and cost effectiveness of good quality groundwater in the future.

OPTION CONSIDERATIONS:

CAP Utilization: This option does not increase the utilization of the unused portion of WESTCAPS members CAP allocations.

Renewable Resource Utilization: This option does not increase the utilization of additional renewable resources.

Groundwater Decline: This option does not take any action towards mitigating groundwater decline in the northwest SRV. WSRV pumping is projected to increase from 74 thousand acre-feet per year in the year 2000 to 287 thousand acre-feet per year in 2025. Groundwater levels will continue to decline. In some areas of the northwest Salt River Valley, groundwater levels are projected to reach 600 feet by 2025 and below 1,000 feet by the year 2100.

Financial Viability: The major cost in continuing to pump groundwater will be the CAGRD fee. The CAGRD fee applies to both current and future demand for designated providers (municipal water agencies) and to only future demand for undesignated water providers (private water companies and the Town of Buckeye). Other items that will increase the cost of pumping groundwater in the future are: (1) increased pumping costs resulting from declining groundwater levels in the northwest Salt River Valley and (2) additional costs for treating groundwater in the southwest Salt River Valley to meet potable water quality standards. Using a modified version of a present worth analysis called a "least cost method", the average "least cost" per acre-foot of groundwater is $110. This value is only a comparative tool for evaluating costs of the various options being studied by WESTCAPS. The actual cost to develop an acre-foot of groundwater to meet any new demand will be approximately $250 in the year 2000 to $520 in 2025. The following table summarizes the economic analysis relative to each member of WESTCAPS that serves as a water utility.

Summary Of Least Cost Analysis (Normalized To 2000 Dollars)

Agency	Total Supply 2000 - 2025 (Ac-Ft)	New Supply 2000 - 2025 (Ac-Ft)	No. Of New Wells	Least Cost ($)	Least Cost ($ / Ac-Ft)
AWC	28,508	18,808	0.99	$3,765,864	$132
Buckeye	131,948	98,048	7.74	$18,292,601	$139
Citizens	1,091,643	396,443	14.76	$75,063,762	$69
Glendale	394,943	144,588	9.10	$43,006,784	$109
Goodyear	896,024	676,449	35.64	$158,231,903	$177
LPSCo	270,166	190,741	9.07	$21,493,925	$80
Peoria	1,044,955	505,080	22.80	$115,114,935	$110
Phoenix	254,194	88,954	16.96	$18,152,632	$71
Sunrise/Westend	37,335	17,810	0.59	$3,078,016	$82
Surprise	59,187	33,251	2.28	$6,299,951	$106
WMC	55,019	28,033	2.06	$5,412,771	$98
Total	4,246,744	2,181,027	121.99	$467,913,144	$110

Legal / Regulatory Considerations: Water quantity (ADWR) and quality (ADEQ) regulation will continue to become more stringent and limit the ability of WESTCAPS participants to use groundwater or recovered effluent in the West Salt River Valley and potentially stop urban development. In the northwest Salt River Valley, several areas are projected to see groundwater decline to 1,000 feet below ground level. Regulatory restrictions on growth and development in these “critical management areas” will come into effect.

This option would likely be the easiest to obtain support from the Arizona Corporation Commission since it is a continuation of current service practices, would not involve large water rate increases to customers in the short-term, and would have the tendency to distribute capital costs over a long period of time.

Public Acceptability: From the perspective of rates, the public will view this option favorably since it will likely be one of the least cost alternatives in the short-term. From the perspective of other incidental impacts to the customer, such as: poor water quality, land subsidence, and the potential to slow economic growth in the West Salt River Valley, the public may not view this option favorably.

Timeliness: This option is currently used to meet water demands and requires relatively little time to plan and implement.

Adaptability: This option easily adapts to additional supply requirements by adding new wells as needed.

Environmental Acceptability: This option does not take any action to address environmental issues such as land subsidence and depletion of the area’s groundwater supply. These issues will continue to grow worse.

High Total Dissolved Solids (TDS) and nitrate levels in groundwater will limit the use of groundwater in the southwest SRV. In addition, groundwater contamination throughout the WSRV will move towards the cone of depression caused by declining groundwater levels.

CO2: SRP'S GRANITE REEF UNDERGROUND STORAGE PROJECT (GRUSP)[25]

DESCRIPTION: The GRUSP facility was constructed principally for the long-term storage of Colorado River water conveyed by the Central Arizona Project (CAP) Aqueduct to the Phoenix metropolitan area. It is also used for short-term storage and management of supply/demand peaks. The GRUSP facility has been in operation for five years. It has stored nearly 400,000 acre-feet of water since May of 1994. The source water for recharge at the GRUSP facility is a blend of Salt and Verde Rivers (Salt River Project) water and CAP water.

The GRUSP site covers approximately 350 acres. It is owned by Salt River Project (SRP) in partnership with six municipalities of the Phoenix metropolitan area. Existing and future recharge capacities developed within the 350 acres is tagged for use by the seven original partners. However, storage entitlements for the expansion of the GRUSP beyond the 350 acres or for new facilities at a different site are open for negotiation.

GRUSP is permitted by the Arizona Department of Water Resources to store 200,000 acre-feet per year. However, operational constraints have limited its storage capacity to one half that amount. To increase capacity, two additional recharge bays were built in 1999 for a total of six bays to date. Further expansion with the addition of one more bay is likely by the end of 1999. Leasing unused GRUSP capacity by non-participants is possible, subject to a majority vote of original seven participants.

SUMMARY: Currently there is no available capacity in GRUSP or the CAP/SRP Interconnect to recharge CAP water for WESTCAPS members who are not already a member of GRUSP. However, WESTCAPS could utilize 50,000 acre-feet per year currently being used by the Arizona Water Banking Authority. As recharge basins are added in the future, additional recharge capacity will be added that could potentially available to WESTCAPS members. Phoenix or any other agency with Interconnect rights could lease part of their capacity to WESTCAPS members. The lessor entity would have to notify SRP.

In this option, it is assumed that all WESTCAPS members could collectively recharge 50,000 acre-feet per year of CAP water at GRUSP and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($129 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small for two reasons. First, there is no reduction in groundwater pumping since the recharged CAP water would be "recovered" through the use of the wells. Secondly, the CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: This option currently does not have the capacity to enhance WESTCAPS use of its existing CAP allocations. However, in the next 1 to five years, it has the potential to do so.

Additional Renewable Resource Utilization: This option would not increase utilization of other renewable supplies available to the West Salt River Valley, unless those supplies can be accessed through the SRP system or its interconnect with the CAP.

Groundwater Decline: This option would not have any direct hydrologic benefit to the aquifer in the West Salt River Valley since the recharge site is in the East Salt River Valley.

Financial Viability: Costs are accrued and charged to participants based on entitlement and actual acre-feet stored on their behalf. Participants must pay for their CAP allocation, GRUSP facility costs, and about eight dollars per acre-foot use rate. WESTCAPS members that are not a partner in the SRP / CAP Interconnect would have to pay an additional $9.00 per acre-foot to lease capacity in the Interconnect. The cost for WESTCAPS members to recharge the entire unused portion of their CAP allocations is as follows:

$ 10.00 ac-ft to wheel through SRP canals
$ 9.00 ac-ft to use the interconnect (except Peoria, Glendale and Phoenix)
$ 8.00 ac-ft to recharge
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital costs for CAP allotment
$ 129.00 ac-ft

$2000.00 annual administrative fee to SRP

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Comparison of CO2 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

Member	CO2	Base Case
Arizona Water Co.	$130	$132
Town of Buckeye	$138	$139
Citizens Utility Co.	$ 65	$ 69
City of Glendale*	$109	$109
City of Goodyear	$175	$177
LPSCO	$ 76	$ 80
City of Peoria	$103	$110
City of Phoenix*	$ 71	$ 71
Sunrise & Westend Water Co	$ 77	$ 82
City of Surprise	$ 97	$106
West Maricopa Combine	$ 98	$ 98
Average	**$106**	**$110**

*No allocation available for recharge, already have complete use

Legal/Regulatory Considerations: GRUSP meets all regulatory and permitting statutes.

Public Acceptability: Recharge is a highly acceptable mode of water management due to its benefits to the groundwater and future water users.

Timeliness: System is in operation. Limiting factor is availability of subscriptions for recharge.

Adaptability: Limited. East Valley location is a negative.

Environmental Acceptability: Addresses groundwater depletion by recharge directly to underground aquifer, but in East Valley only.

CO3: Maricopa Water District Groundwater savings facility[24]

DESCRIPTION: Maricopa County Municipal Water Conservation District Number One (MWD) provides water and power service to approximately 40,000 acres through an extensive network of canals and laterals. MWD is entitled to storage capacity in Lake Pleasant and has water rights to surface and subflows of the Agua Fria River and its tributaries. In addition, MWD augments its surface water supplies with approximately 50 wells.

MWD received a permit from ADWR to operate a "groundwater savings facility" (GSF) within its water service area pursuant to the underground water storage statutes. MWD's GSF is allowed to accept up to 40,000 acre-feet per year of CAP water from other parties, and use such water in lieu of pumping groundwater that was planned to be pumped during the year. By accepting such "in lieu water," groundwater is preserved for later use, hence the term "groundwater savings." The party who gives in lieu water to MWD receives an underground water storage credit from ADWR based on the source of water given (minus a 5% cut to aquifer assessment). Such parties can use these water credits for assured water supply or conservation requirement purposes. The in-lieu water used by MWD is accounted for by ADWR as groundwater.

The agreement, which is between MWD and the supplier of in lieu water, provides for flexibility, since MWD water supply conditions dictate MWD's ability to accept in lieu water, but more importantly, the suppliers ability to receive a long-term water credit.

MWD currently has GSF agreements with Citizens Water Resources, the City of Goodyear, the City of Surprise and the Arizona Water Banking Authority.

SUMMARY: Any WESTCAPS member that wants to recharge all or part of its unused CAP allocation could implement this option immediately. Currently all of MWD's GSF capacity has been contracted. However, MWD has verbally indicated that it would be willing to recharge West Valley CAP water supplies over Arizona Water Banking Authority water supplies.

In this option, it is assumed that Goodyear, Surprise and Citizens could collectively recharge 20,000 acre-feet per year of CAP water in MWD's GSF and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($87 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small for two reasons. First, there is no reduction in groundwater pumping since the recharged CAP water would be "recovered" through the use of the wells. Secondly, the CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: This option does increase the utilization of the unused portion of WESTCAPS members CAP allocations.

Renewable Resource Utilization: This option does not increase the utilization of additional renewable resources.

Groundwater Decline: This option does take action towards mitigating groundwater decline in the northwest SRV. MWD groundwater pumping occurs in this area. GSF arrangements with MWD would have the effect of reducing groundwater pumping and thus recharging the aquifer.

Financial Viability: No costs were available regarding this option. However, it is expected to be competitive with other GSF's in the Phoenix AMA. The WESTCAPS agency would pay for its CAP allocation. MWD would pay the agency a negotiated amount for use of the CAP supply in lieu of using its groundwater system (possibly 15 to 17 dollars per acre-foot). The WESTCAPS agency would gain CAP water credits, less losses, from ADWR and MWD would be accounted for groundwater use. The cost for WESTCAPS members to recharge 20,000 acre-feet per year of CAP water is as follows:

$54.00 ac-ft to pump CAP water (energy and fixed)
$48.00 ac-ft capital costs for CAP allotment
-$15.00 ac-ft what MWD pays for the CAP water
$87.00 ac-ft

Out of the WESTCAPS members unused portion of their CAP allocation, it was assumed that 20,000 acre-feet per year could be recharged at MWD's GSF. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. Assuming that Citizens Water Resources, the City of Surprise, and the City of Goodyear would be the likely participants in this facility, The following table shows that this option is economically more favorable than the Base Case.

Legal / Regulatory Considerations: MWD's GSF currently meets all regulatory and permitting statutes. WESTCAPS members will not be able to use the GSF to demonstrate an assured water supply, except for long-term storage credits that were accrued prior to applying for an AWS.

As a part of MWD's permit to operate a groundwater savings facility, ADWR has set certain conditions that must me bet in order for an entity to receive credit for water stored at the GSF. For instance, pumping has to be greater than 40,000 acre-feet per year and flow on the Agua Fria River has to be less than 75,000 acre-feet per year. If these conditions are not met, an entity may not receive credit for a portion of the water supply recharged at the GSF.

Public Acceptability: From the perspective of cost and natural resource conservation, the public would be expected to consider this option favorably.

Timeliness: This option is currently in operation and would require no time to implement. Interested parties would have to negotiate GSF agreements with MWD. However, since such agreements are already in place with other agencies, it is expected that the time to negotiate such agreements would be minimal. Urbanization of agricultural lands over time will reduce the future capacity of the GSF, therefore the long-term viability of this option is uncertain.

Adaptability: Any interested WESTCAPS member up to the capacity of the GSF can utilize this option.

Environmental Acceptability: This option does take action to address environmental issues such as land subsidence and depletion of the area's groundwater supply by reducing groundwater pumping near the area of significant groundwater decline in the northwest SRV.

Comparison of CO3 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

Agency	CO3	Base Case
Arizona Water Co.	$ 132	$ 132
Town of Buckeye	$ 139	$ 139
Citizens Utility Co.	$ 61	$ 69
City of Glendale*	$ 109	$ 109
City of Goodyear	$ 173	$ 177
LPSCO	$ 80	$ 80
City of Peoria	$ 110	$ 110
City of Phoenix*	$ 71	$ 71
Sunrise & Westend Water Co	$ 82	$ 82
City of Surprise	$ 81	$ 106
West Maricopa Combine	$ 98	$ 98
Average	**$ 107**	**$ 110**

*No allocation available for recharge, already have complete use

CO4: SRP'S GROUNDWATER SAVINGS FACILITY[25]

DESCRIPTION: Arizona revised statutes (A.R.S. § 45-812.01) encourage the use of Central Arizona Project (CAP) water in place of groundwater by authorizing the operation of groundwater savings facilities (GSF) in active management areas (AMA's). Salt River Project (SRP) established a GSF to acquire CAP water for delivery and use by its shareholders within its territory in-lieu (In-Lieu Water) of groundwater pumping. The SRP GSF permit allows SRP to receive up to 200,000 AF of In-Lieu Water per year, subject to the conditions of SRP's Plan of Operation, which was approved by ADWR, and is part of the GSF permit.

To participate, a municipality must enter into a GSF contract with SRP, and have a CAP subcontract with CAWCD. A water storage permit for SRP's GSF must also be acquired by the city from ADWR. After contracts and permits are in place, SRP can order In-Lieu Water directly from CAWCD, and use the water in substitution of groundwater on an acre-foot for acre-foot basis.. In return, a municipality receives a CAP long-term storage credit, minus any losses that ADWR may determine to have incurred in transporting the In-Lieu Water. However, pursuant to SRP's GSF Plan of Operation, no losses are currently assessed by ADWR.

SUMMARY: WESTCAPS members could participate in SRP's Groundwater Savings Facility today, provided that (1) SRP has the demand for In-Lieu Water (can use the water in lieu of pumping), (2) there is enough capacity in SRP's ownership to the CAP/SRP Interconnect Facility (CSIF), and (3) those municipalities who are SRP customers decide not to participate (on-Project municipalities are given first

right of refusal to provide In-Lieu Water). Regarding the CSIF, Phoenix, Glendale, Peoria or other municipalities with CSIF rights have the right to lease all or part of their CSIF capacity to others, including WESTCAPS members. The municipality who wishes to lease to another party would have to notify SRP.

In this option, it is assumed that all WESTCAPS members could collectively recharge 50,000 acre-feet per year of CAP water in SRP's GSF and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($96 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small for two reasons. First, there is no reduction in groundwater pumping since the recharged CAP water would be "recovered" through the use of the wells. Secondly, the CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: This option could put CAP water to use immediately, subject to SRP's ability to accept In-Lieu Water (i.e., operational, weather, watershed, and water supply conditions).

Additional Renewable Resource Utilization: This option would not put any other renewable supply to use.

Groundwater Decline: This option decreases pumping in the SRP's water service area, which is south and east of the cone of depression in the northwest Salt River Valley. SRP operates its surface and groundwater systems in the east and west valley conjunctively. As such, it is difficult to ascertain how much SRP's GSF will help mitigate declining groundwater levels in the northwest SRV. However, SRP is currently working on a well leasing concept whereby a municipality who stored CAP water in SRP's GSF could lease SRP wells for recovery of the water, and have SRP transport the water to the municipality via SRP's water delivery system. Although it is anticipated that this option would have limited impact on mitigating groundwater decline in the northwest SRV, the use of SRP wells for recovery could assist those in the northwest SRV better manage their groundwater resources.

Financial Viability: Very viable. Based on actual usage of facilities. City pays for their CAP allocation and releases it to SRP. SRP pays city SRP's current reimbursement rate ($15 per acre foot; subject to annual adjustment based on power and other costs for pumping). WESTCAPS members that are not a partner in the CSIF would have to pay an additional $9.00 to $10.00 per acre-foot to lease CSIF capacity from SRP. The cost for WESTCAPS members to recharge the entire unused portion of their CAP allocations is as follows:

$ 48.00 ac-ft Capital cost for CAP allotment
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 9.00 ac-ft to use SRP-CAP interconnect (except Peoria, Glendale, and Phoenix)
-$15.00 ac-ft what SRP pays for the CAP water
$96.00 ac-ft

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Comparison of CO4 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

Member	CO4		Base Case
Arizona Water Co.	$124	$132	
Town of Buckeye	$138		$139
Citizens Utility Co.	$ 61		$ 69
City of Glendale*	$109		$109
City of Goodyear	$172		$177
LPSCO	$ 69		$ 80
City of Peoria	$ 91		$ 110
City of Phoenix*	$ 71		$ 71
Sunrise & Westend Water Co	$ 70		$ 82
City of Surprise	$ 86		$106
West Maricopa Combine	$ 97		$ 98
Average	**$101**		**$110**

*No allocation available for recharge, already have complete use

Legal/Regulatory Considerations: SRP's GSF currently meets all regulatory and permitting statutes. WESTCAPS members will not be able to use the GSF to demonstrate an assured water supply, except for long-term storage credits that were accrued prior to applying for an AWS.

As a part of SRP's GSF permit, ADWR has set certain conditions that must me bet in order for an entity to receive LTS credit for water stored at the GSF (annual storage and recovery still an option). SRP feels their GSF Plan of Operation meets ADWR's conditions for an entity to receive LTS credit and, the chances of an entity not receiving LTS credit for a portion of the water supply recharged at the GSF is small.

Public Acceptability: Water banking via a GSF is an acceptable mode of water management due to its benefits to the groundwater and future water users. However, ADWR has in the past taken, and is currently taking, a hard look at the water management benefits of GSFs, and therefore the ability and cost of a municipality to gain LTS credits may change in the near future (related to agriculture's ability to use CAP Ag Pool Water directly).

Timeliness: SRP's GSF has been in operation since 1996, and is currently operating due to the dry conditions in the Salt/Verde watersheds. Urbanization of agricultural lands over time will reduce the future

capacity of the GSF, and therefore, the long-term outlook of this option is that SRP's ability to accept In-Lieu Water will gradually reduce as agricultural lands urbanize and demands reduce.

Adaptability: Can be utilized by all WESTCAPS members, contingent on the limitations of SRP's GSF as stated above.

Environmental Acceptability: May be used as a tool to address environmental issues. In fact, SRP's GSP was used in 1999 to address a specific groundwater management issue within a WQARF area (targeted reduction of pumping from specific SRP wells for WQARF purposes). Ability to use this tool for environmental purposes by a municipality must be on a case-by-case basis.

CO5: AVONDALE'S CRYSTAL LAKES PROJECT[25]

DESCRIPTION**:** The City of Avondale has constructed a combined wetlands treatment and artificial recharge project for utilization of their CAP water. Because conveyance of CAP water through SRP canals and laterals contribute varying quantities of nitrates, Avondale constructed the wetlands area to "scrub" nitrates from the water before recharge. The recharged water is used to augment present municipal supplies and provide long-term storage. The system is permitted by ADWR for up to 20,000 acre-feet per year. Eventually, the recharge capacity could be expanded to as much as 40,000 acre-feet per year.

The initial pilot-scale system consists of over 72 acres of wetlands and 35 acres of spreading basins. The recharge basins are located adjacent to the Agua Fria River near McDowell Road. The wetlands are located between McDowell and Thomas and west of 107th Avenue.

City staff estimates that there are approximately 2,000 acre-feet per year in excess capacity at the present facility. Additional phases of the recharge project are in the planning stage. It is anticipated that an additional 10,000 acre-feet per year in excess capacity might be available to other parties for recharge.

Avondale is interested in discussing potential leasing or partnering opportunities.

SUMMARY**:** In this option, it is assumed that a Goodyear could recharge 2,000 acre-feet per year of CAP water at the Avondale site and continue to pump groundwater to meet demands. Within the next 1 to 5 years, an additional 10,000 acre-feet per year may potentially be recharged; however due to the uncertainty surrounding this additional capacity, it was not included in the analysis. In either case, a contract would have to be negotiated with the City of Avondale before recharge could begin. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($134 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the economics are insignificant since the amount of CAP water being recharged is so small. In addition, there is no reduction in groundwater pumping since the recharged CAP water would be "recovered" through the use of the wells.

OPTION CONSIDERATIONS:

CAP Utilization: Currently 2,000 acre-feet per year of CAP water could be recharged and within the next 1 to 5 years an additional 10,000 acre-feet per year could be recharged.

Additional Renewable Resource Utilization: This option would not put any other renewable resources to use, unless those resources could be transported through the CAP and SRP systems to the recharge site.

Groundwater Decline: This option would not address mitigation of declining groundwater levels in the northwest Salt River Valley.

Financial Viability: Avondale has no rate structure or contracts established for leasing or partnering in this project. All fees would need to be negotiated. For the purposes of this analysis, it is assumed that fees for participation in the Avondale recharge project would be equivalent to the fees for participation in SRP's Granite Reef Underground Storage Project. In addition SRP would charge fees for transporting the water through their system to the recharge site. If the City of Goodyear were to participate in this recharge site, its costs would be as follows:

$ 10.00 ac-ft to wheel through SRP canals
$ 9.00 ac-ft to use the interconnect
$ 13.00 ac-ft to recharge
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital Costs for CAP allotment
$134.00 ac-ft

$2000.00 annual administrative fee to SRP

Of the 2,000 acre-feet per year of CAP water recharged, 1,900 acre-feet per year of credits would be received by the City after a 5% cut to the aquifer. The following table shows that this option does not alter the regional economics as presented in the Base Case.

Least Cost Analysis Comparison of CO5 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

WESTCAPS member	CO5	Base Case
Arizona Water Company	$132	$132
Town of Buckeye	$139	$139
Citizens Utility Company	$ 69	$ 69
City of Glendale*	$109	$109
City of Goodyear	$176	$177
LPSCO	$ 80	$ 80
City of Peoria	$110	$110
City of Phoenix*	$ 71	$ 71
Sunrise & West End Water Co.	$ 82	$ 82
City of Surprise	$106	$106
West Maricopa	$ 98	$ 98

Combine		
Total	**$110**	**$110**

*No allocation available for recharge, already have complete use

Legal / Regulatory Considerations: Avondale's wetlands and recharge project meets all regulatory and permitting statutes. Depending on the individual circumstances of each WESTCAPS member, recharging at this facility may or may not replace the need to join the CAGRD.

Public Acceptability: Recharge is a highly acceptable mode of water management due to its benefits to the groundwater and future water users.

Timeliness: System is in operation. There is available capacity. Limiting factor is wheeling through SRP's system and available lateral capacity to wheel to Avondale's system.

Adaptability: West Valley location is a plus. Can be utilized now.

Environmental Acceptability: Could improve groundwater quality in recharge mound.

NT1A PIPELINE TO THE FUTURE -- RECHARGE, RECOVERY AND DELIVERY[28]

DESCRIPTION : The PIPELINE TO THE FUTURE (PTTF) is an innovative, privately funded, project implementing the State's goal of economically and effectively putting Central Arizona Project water to use. In particular, the PTTF integrates a managed underground storage facility located in the bed of the Hassayampa River (capable of storing 25,000 acre feet of CAP water (or other renewable resources) per year) with its recovery and delivery *as a potable water supply* to various communities located in the Southwest Salt River Valley (SWSRV). Deliveries are anticipated at between 25,000 and 37,000 acre feet per year. The PTTF also provides: 1) an opportunity for communities to minimize and/or satisfy replenishment obligations; 2) a storage site for the CAGRD and the AWBA; and 3) a method for firming CAP supplies.

To minimize costs, the recharge facility is located adjacent to the CAP canal where it crosses the Hassayampa River. No construction is to be performed within the Hassayampa riverbed thereby eliminating both the cost of constructing (and frequently rebuilding) berms within or adjacent to the river channel. The requirement of a 404 permit is also eliminated.

Although the area of the recharge site is currently largely uninhabited, significant future groundwater demand is projected due to two, or more, communities currently in the planning stages. The PTTF thus provides a renewable water resource to a portion of the Northwest Salt River Valley (NWSRV) in anticipation of significant future water demand while providing the SWSRV with a significantly higher quality of potable water supply.

The use of the Hassayampa River eliminates the need to construct many miles of pipeline to deliver CAP water. Locating recovery sites in high quality groundwater areas may eliminate the need to build treatment facilities for both the CAP water and the local water supplies in the SWSRV (which is high in Total Dissolved Solids).

A unique aspect of the PTTF is a 48 inch in diameter, 26 mile long pipeline from the recovery site to the SWSRV communities. This pipeline will be designed to deliver at least 25,000 acre feet of potable water per year. In addition, recovery sites in proximity to the CAP canal will be secured so that long-term storage credits can be utilized to firm the CAP supply of those receiving CAP waters downstream of the recharge site and to increase its usefulness to the CAGRD and AWBA. Of course, any participant in the recharge project can also develop their own recovery plan.

In developing the economics of the PTTF, West Maricopa Combine, Inc. examined other cost alternatives being explored by communities as well as the cost of independent recharge projects. As discussed more fully under Financial Viability, it was determined that this project was an economically viable alternative to other projects utilizing similar water sources.

SUMMARY**:** Extensive design and engineering has been performed for the recharge site. Reconnaissance level engineering has been performed for both the recovery and delivery systems. The exact configuration of the recovery and delivery systems will be dependent upon the participants, but at a minimum is intended to accommodate withdrawals and delivery of 25,000 acre feet of potable water per year. A Managed Underground Storage Facility Permit was issued by the Department on August 7, 1998. However, a dispute with a landowner resulted in an appeal of the Permit. The matter is in the Superior Court and a decision is expected in 1999. As an alternative, the Facility is being redesigned to exclude the objecting property owner. It is anticipated the recharge component will be operational in early 2000 with the recovery and delivery components operational by January, 2002.

This option considers use of both the recharge and conveyance capabilities of this facility by Arizona Water Company, Buckeye, Citizens, Goodyear, and West Maricopa Combine. Only 19 miles of the potential 26-mile pipeline was considered in this evaluation. It is assumed that WESTCAPS members could recharge and recover 25,000 acre-feet per year of CAP water at the facility. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($445 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small since CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: The PTTF is designed to recharge not less than 25,000 acre feet of CAP water annually and to recover and deliver the CAP water as a potable water supply. The PTTF also provides a vehicle for the WSRV communities to meet their replenishment obligations with the CAGRD. Further, the PTTF can also be utilized by the AWBA to help firm CAP allocations for any entity taking delivery downstream of the Recharge Facility.

Renewable Resource Utilization: As noted above, the PTTF is currently designed as a recharge, recovery and delivery vehicle for CAP water. However, it could be modified to accommodate any renewable supply which may be transported through the CAP canal. It could also be modified to work in conjunction with a wastewater treatment plant as a source of disposal and recharge of reclaimed water as the surrounding lands are developed.

Groundwater Decline: Neither the recharge site nor recovery site is presently located in an area of overdraft. However, significant developments are currently planned in the vicinity of the recharge site. Groundwater wells are their projected source of supply. For the short term, the PTTF focus is providing renewable supply in place of the poor quality groundwater found in the SWSRV. The PTTF will allow its participants to curtail groundwater withdrawals by 25,000 acre feet per year thereby reducing their dependence on groundwater. Longer term, the PTTF will also address potential groundwater declines in the NWSRV.

The recovery plan provides no known adverse impact on groundwater decline. Our engineers estimate the recovery area has approximately 6 million acre-feet of good quality water above the 1,000-foot level.

Moreover, overtime, the area of hydrologic impact for the Recharge Facility will intersect with the recovery area.

Financial Viability: The initial estimated cost for the recharge component of the project is $13.00 per acre-foot. The estimated cost of delivered water for those participating in the recharge, recovery and delivery components of the PTTF is approximately $1.10 per 1,000 gallons. Including the cost of CAP water, the cost to recharge, recover and deliver an acre-foot of CAP water is currently estimated at $445.00. The participant would have to add the cost of any facilities necessary beyond the pipeline. In order to proceed with construction of the recovery and delivery systems, water recharge, recovery and delivery contracts must be executed with a sufficient number of participants to support the private financing of this project. Estimated additional capital costs for connection and distribution infrastructure are:

Town of Buckeye:	$ 200,000
Arizona Water Company:	$ 300,000
City Of Goodyear:	$ 500,000
Citizens Water Resources:	$1,000,000

From a financial perspective, this option is more cost effective than the Base Case for water agencies that can avoid using wellhead treatment. Water agencies that cannot avoid wellhead treatment costs or would not incur such costs at all will find this option to be less cost effective than the Base Case. Refer to the following table.

Legal / Regulatory Considerations: ADWR as been supportive of the project as evidenced by the issuance of a Managed Underground Storage Facility Permit in August of 1998. (The landowner's objection is being addressed both in the courts and through redesigning the project eliminating the objecting landowner's property.) The ADWR has also noted that any recovery must be consistent with the then current Management Plan for the Phoenix AMA.

This project will not require the consent of the Arizona Corporation Commission. Any private water company participating in the project will be utilizing the Recharge Facility and/or receiving a potable water supply. As a result, these costs should be recoverable by the participant under current ACC policies.

Public Acceptability: The PTTF furthers the public policy to encourage use of CAP water. The recharge and recovery sites are no presently heavily populated and will be in operation when development occurs. Those members of the public receiving water from the PTTF should appreciate the improved water quality. We anticipate an informed public will appreciate the fact that treatment is avoided (eliminating costs and chemical additions to their drinking water) and that overdraft in the AMA is being addressed.

Timeliness: WMC anticipates that the various government permits and approvals necessary for the recharge activity will be in hand and the recharge facility operational by early 2000. The participants to the project would be signed up within six months following approvals. Construction of the recovery and delivery systems should be completed and the PTTF recovery water available to the participants by January 2002.

Adaptability: The present design of the PTTF will allow for increased recharge to match demonstrated infiltration rates and to provide up to 37,500 acre feet of potable water supplies by pressurizing the pipeline. In addition, the Facility Permit may be amended to accommodate other forms of renewable water supplies made available at the recharge site.

Environmental Acceptability: The PTTF is compatible with all environmental laws and policies. No 404 Permit or discharge permit is required for the PTTF, as presently designed. No federal action is involved so as to invoke NEPA. The Facility Permit includes extensive monitoring of water quality to protect against any potential adverse impacts from the recharge activities. The recovered water is of a

better overall quality than the water currently found in the areas targeted for participation in the PTTF. Finally, as demonstrated by the Tempe Lake Project, one would anticipate that flowing water, in what normally would be a dry riverbed, would be welcomed as an environmental enhancement.

Comparison of NT1A to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

WESTCAPS member	NT1A	Base Case
Arizona Water Company	$104	$132
Town of Buckeye	$134	$139
Citizens Utility Company	$ 84	$ 69
City of Glendale*	$109	$109
City of Goodyear	$168	$177
LPSCO	$ 80	$ 80
City of Peoria	$110	$110
City of Phoenix*	$ 71	$ 71
Sunrise & West End Water Co.	$ 82	$ 82
City of Surprise	$106	$106
West Maricopa Combine	$ 94	$ 98
Totals	**$111**	**$110**

*No allocation available for recharge, already have complete use

NT1B: WEST MARICOPA COMBINE RECHARGE PROJECT[28]

DESCRIPTION: The recharge project is a managed underground storage facility located in the bed of the Hassayampa River (capable of storing 25,000 acre feet of CAP water (or other renewable resources) per year). The site provides: 1) an opportunity for communities to minimize and/or satisfy replenishment obligations; 2) a storage site for the CAGRD and the AWBA; and 3) a method for firming CAP supplies.

To minimize costs, the recharge facility is located adjacent to the CAP canal where it crosses the Hassayampa River. No construction is to be performed within the Hassayampa riverbed thereby eliminating both the cost of constructing (and frequently rebuilding) berms within or adjacent to the river channel. The requirement of a 404 permit is also eliminated. Although the area of the recharge site is currently largely uninhabited, significant future groundwater demand is projected due to two, or more, planned communities currently in the planning stages.

SUMMARY: Extensive design and engineering has been performed for the recharge site. A Managed Underground Storage Facility Permit was issued by the Department on August 7, 1998. However, a dispute with a landowner resulted in an appeal of the Permit. The matter is in the Superior Court and a decision is expected this year. As an alternative, the Facility is being redesigned to exclude the objecting property owner. It is anticipated the recharge component will be operational in early 2000.

This option considers use of both the recharge capabilities of this facility by Arizona Water Company, Buckeye, Citizens, Goodyear, and West Maricopa Combine. The pipeline conveyance capabilities are not utilized. It is assumed that WESTCAPS members could recharge 25,000 acre-feet per year of CAP water at the facility and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($115 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small for two reasons. First, there is no reduction in groundwater pumping since the recharged CAP water would be "recovered" through the use of the wells. Secondly, the CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: The recharge site is designed to recharge not less than 25,000 acre feet of CAP water annually. The site also provides a vehicle for the WSRV communities to meet their replenishment obligations with the CAGRD. Further, the site can also be utilized by the AWBA to help firm CAP allocations for any entity taking delivery downstream of the Recharge Facility.

Renewable Resource Utilization: As noted above, the site is currently designed as a recharge vehicle for CAP water. However, it could be modified to accommodate any renewable supply that may be transported through the CAP canal. It could also be modified to work in conjunction with a wastewater treatment plant as a source of disposal and recharge of reclaimed water as the surrounding lands are developed.

Groundwater Decline: Neither the recharge site nor recovery site is presently located in an area of overdraft. However, significant developments are currently planned in the vicinity of the recharge site. Groundwater wells are their projected source of supply.

Financial Viability: The initial estimated cost for the recharge component of the project is $13.00 per acre-foot. It is based on current, per acre-foot estimate of: $7.00 for Operations and Maintenance; $3.00 for Capital & Interest; $1.50 for Land Lease; and $1.50 for Contingencies & Profit. This cost will be reviewed and adjusted if necessary after 1999, once actual construction costs and operation costs have been developed.

The cost for WESTCAPS members to recharge the entire unused portion of their CAP allocations is estimated as follows:

$ 13.00 ac-ft to recharge (includes capital costs)
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital costs for CAP allotment
$ 115.00 ac-ft

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Comparison of NT1B to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

Member	NT1B	Base Case
Arizona Water Co.	$127	$132
Town of Buckeye	$137	$139
Citizens Utility Co.	$ 63	$ 69
City of Glendale*	$109	$109
City of Goodyear	$174	$177
LPSCO	$ 80	$ 80
City of Peoria	$110	$110
City of Phoenix*	$ 71	$ 71
Sunrise & Westend Water Co	$ 82	$ 82
City of Surprise	$106	$106
West Maricopa Combine	$ 97	$ 98
Average	**$108**	**$110**

*No allocation available for recharge, already have complete use

Regulatory Considerations: ADWR as been supportive of the project as evidenced by the issuance of a Managed Underground Storage Facility Permit in August of 1998. (The landowner's objection is being addressed both in the courts and through redesigning the project eliminating the objecting landowner's property.) The ADWR has also noted that any recovery must be consistent with the then current Management Plan for the Phoenix AMA.

This project will not require the consent of the Arizona Corporation Commission. Any private water company participating in the project will be utilizing the Recharge Facility and/or receiving a potable water supply. As a result, these costs should be recoverable by the participant under current ACC policies.

Public Acceptability: The PTTF furthers the public policy to encourage use of CAP water. The recharge and recovery sites are not presently heavily populated and will be in operation when development occurs.

Timeliness: WMC anticipates that the various government permits and approvals necessary for the recharge activity will be in hand and the recharge facility operational by early 2000. The participants to the project would be signed up within six months following approvals.

Adaptability: The present design of the site will allow for increased recharge to match demonstrated infiltration rates. In addition, the Facility Permit may be amended to accommodate other forms of renewable water supplies made available at the recharge site.

Environmental Acceptability: The site is compatible with all environmental laws and policies. No 404 Permit or discharge permit is required for the site, as presently designed. No federal action is involved so as to invoke NEPA. The Facility Permit includes extensive monitoring of water quality to protect against any potential adverse impacts from the recharge activities. Finally, as demonstrated by the Tempe Lake Project, one would anticipate that flowing water, in what normally would be a dry riverbed, would be welcomed as an environmental enhancement.

NT2: PYRAMID PEAK WATER TREATMENT PLANT[4]

DESCRIPTION: The Pyramid Peak Water Treatment Plant was initially built in 1986 to treat the City of Glendale's Central Arizona Project and Colorado River water supplies. The plant was expanded in 1998 to accommodate the growing demand for water.

The Pyramid Peak WTP is located on the south side of the CAP Aqueduct at 28101 North 63rd Avenue in Phoenix, Arizona. The plant is situated on a 49 acre site and is ideally located to provide treated water to an expansive area south, southwest of the site via gravity flow. Gravity flow of treated water minimizes the need for pump stations and the costs associated to build, operate and maintain such features.

Raw water from the CAP Aqueduct is taken into the plant through a 72-inch turnout pipeline that is operated by the Central Arizona Water Conservation District. The turnout has a nominal hydraulic capacity of 90 million gallons per day (145 cubic feet per second).

Pyramid Peak WTP utilizes a chlorine treatment process. The Pyramid Peak WTP has a total design capacity of 26 mgd with a hydraulic overload capacity of 39 mgd. There also is a 10 million gallon potable water reservoir located on-site at the water treatment plant. The reservoir is used to provide the necessary chlorine contact time.

The plant can be expanded to a 56 mgd design capacity on the current site. There is also space available for another 10 mg reservoir. The City is in the process of obtaining additional land that could ultimately accommodate an 86 mgd treatment plant.

The City of Glendale and the City of Peoria jointly own the water treatment plant. Glendale is the exclusive manager and operator of the plant. Glendale has an agreement with the City of Peoria to treat and deliver up to 6 mgd of potable water. Peoria receives the water at a turnout structure at 67th Avenue and Jomax Road.

The transmission system consists of a 72-inch pipeline stemming from the 10 mg reservoir to 63rd Avenue. The transmission system is reduced to a 60-inch pipeline from 63rd Avenue to Jomax Road, and west to the Peoria 67th Avenue turnout structure. South of Jomax Road the system is further reduced to a 54-inch pipeline. The transmission system enters Glendale at Pinnacle Peak Road.

The Pyramid Peak WTP's treatment capacity, reservoir capacity and transmission system is fully subscribed. Currently, there is no unused capacity that can be leased to other entities. Additional capacity must be built in order for other entities to have their CAP water to be treated at the Pyramid Peak WTP. It is envisioned that the treatment capacity would be expanded in 10 mgd modules or larger.

SUMMARY: Glendale is willing to expand the Pyramid Peak WTP to treat and deliver WESTCAP member's CAP water for their use. The cost of expansion would have to be paid by the entity requesting the expansion. Expansion costs include design, construction, and a proportional share of the operation and maintenance of the treatment plant. Participants expanding the treatment capacity would also be responsible for the design and construction of necessary reservoir storage and transmission lines to deliver the treated water to their respective service area.

It is envisioned that Glendale and the entity requesting expansion would enter into two separate agreements, a construction agreement and an operation and maintenance agreement. Operation and maintenance cost include electrical, chemical, labor, maintenance, and associated overhead cost.

The Pyramid Peak WTP is ideally located to provide drinking water to an expansive area in the West Salt River Valley economically, via gravity flow. The plant utilizes modern technology to minimize operating labor costs.

In this option, it is assumed that the plant would be expanded by 12 mgd to treat and deliver treated CAP water to Peoria (12,983 acre-feet per year) and Sunrise (1,101 acre-feet per year). The cost for implementing this option ($169.85 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. On a regional basis, the change in economics is small since the CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: The Pyramid Peak WTP treatment capacity can be expanded by 30 mgd on the current 49 acre site, a capacity capable of treating and delivering 33,600 acre-feet of CAP water per year.

Renewable Resource Utilization: This option will put CAP water, a renewable resource, to direct use. Since the Pyramid Peak WTP can treat water that is delivered via the CAP Aqueduct, the plant would also be capable of treating other renewable water resources delivered through the CAP Aqueduct.

Groundwater Decline: Direct use of CAP water will reduce the need to utilize groundwater and/or recover water credits stored in underground aquifers.

Financial Viability: Entities desiring to participate in an expansion of the Pyramid Peak WTP will be required to pay for the design and construction of the facilities needing expansion. The entities will also be required to pay for associated operational and maintenance cost to manage and operate the facility. Perhaps the most challenging issue will be the need to site and construct a transmission system to transport drinking water to their respective service areas.

Since there is no rate structure or contracts established for in this project. The estimated cost for Peoria and Sunrise to have Glendale treat and deliver their unused portion of their CAP allocation is as follows:

$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital costs for CAP allotment
$ 36.83 ac-ft plant O&M costs
$138.83 ac-ft in overall O&M Costs

Estimated capital costs:

Water treatment plant expansion construction cost:	$14,280,000
Pipeline distribution construction cost:	$ 5,380,000
Total estimated capital cost:	$19,660,000

$ 31.02 ac-ft average capital cost for Peoria and Sunrise

$169.85 ac-ft overall average cost to Peoria and Sunrise

Legal/Regulatory Considerations: The Pyramid Peak WTP is an existing facility that has all the necessary construction and operating permits. Glendale does not foresee any major legal or regulatory constraints that would prevent future expansions to the facility.

Public Acceptability: Glendale water customers have been receiving CAP water treated at the Pyramid Peak WTP for over 10 years. The water meets all federal, state and local drinking water regulations. There has been no significant concerns regarding taste and odor.

Timeliness: Design engineering to expand the Pyramid Peak WTP is likely to take 18 to 24 months. Construction of the additional treatment capacity and reservoir is estimated to take 24 to 30 months. It is currently not known how long it would take to site (including the obtaining the right to use the property), design and construct a transmission system.

Adaptability: The existing Pyramid Peak WTP design capacity is 26 mgd. The treatment plant can be expanded up to 56 mgd on the current site. Glendale is in the process of acquiring additional land that would ultimately allow for an 86 mgd treatment plant. It is envisioned that expansions will occur in modules of 10 mgd or more.

Environmental Acceptability: The use of the Pyramid Peak WTP should be viewed by the public, regulatory agencies and environmental groups as very environmentally acceptable. Direct use of CAP water minimizes the need to use wells. Surface water treatment processes are very reliable in producing clean drinking water.

Pyramid Peak WTP Profile

Facilities	**Existing**	Expansion on Current 49-Acre Site
CAP Turnout	72" Pipeline 90 mgd (145 cfs)	72" Pipeline 90 mgd (145 cfs)
Design Capacity	26 mgd	56 mgd
Reservoir Capacity	10 mg	20 mg
Transmission Capacity	Fully Committed	TBD
Compliance Lab	Yes	Yes
Operational Staff	8	10

Estimated Cost for 30 mgd Expansion

Capital Cost	**Estimated Cost ($1999)**
	$29.5 million
Construction (WTP & reservoir capacity)	$4.72 million
Engineering Design/Construction Management	$1.475 million
Glendale Administrative Cost	$1.19gd
Total Capital ($/gallons per day)	
Operation, Maintenance	$113/mg (not including raw water cost)
Transmission Main	To Be Determined

NT3: GREENWAY WATER TREATMENT PLANT[29]

DESCRIPTION: The City of Peoria is currently undergoing design of a surface water treatment plant. The Greenway Water Treatment Plant will have an initial treatment capacity of 16 million gallons per day (mgd) and an ultimate build out capacity of 32 mgd. This new supply will replace the majority of annual groundwater withdrawals south of Bell Rd. The plant is to be located near the intersection of Greenway Rd and 73rd Ave adjacent to the Salt River Project's Arizona Canal and will treat both SRP and CAP water supplies.

SUMMARY: Salt River Project's recent canal capacity study suggests that there is only sufficient capacity in the Arizona Canal to support currently planned water treatment facilities. For this reason, expansion of the Greenway Water Treatment Plant to serve the needs of other WESTCAPS members is not possible unless restrictions are removed from the SRP delivery system. However, potential use of this facility by other WESTCAPS members on a short-term basis might be possible until such time that the City of Peoria needs that portion of the plant to meet its water demands.

OPTION CONSIDERATIONS:

CAP Utilization: The plant will be able to treat CAP water supplied through the Interconnect with the SRP system.

Renewable Resource Utilization: Yes

Groundwater Decline: Through the treatment of surface water, the plant will assist in mitigating the decline of groundwater levels by using renewable resources.

Financial Viability: The City of Peoria voters have approved bonds to finance the facility.

Legal / Regulatory Considerations: May not move SRP surface water off-project and will need to wheel non-SRP sources through the CAP/SRP Interconnect to use water off-project.

Public Acceptability: From the perspective of regulatory compliance, water quality, and assured water supply for Peoria's citizens, the public has viewed this option favorably. However, from the perspective of funding and subsequent water rate increase, and the location adjacent to prime residential property, the public may not view this option favorably.

Timeliness: This plant is projected to be on line by March 2002.

Environmental Acceptability: This option does not take any action to address environmental issues.

NT4: CITY OF PHOENIX LAKE PLEASANT WATER TREATMENT PLANT[30]

DESCRIPTION: The City of Phoenix is planning to construct a new water treatment plant located approximately 1.5 miles southeast of the Lake Pleasant. Phoenix has purchased a 225-acre plant site from the Arizona State Land Department. The current project schedule is to have the plant on-line to meet City of Phoenix water demands by 2004. The first plant module will have a capacity 80 MGD. The site can accommodate three additional future expansions of 80 MGD for a total build-out plant capacity of 320 MGD. The plant will draw raw water from the Waddell Canal downstream of Waddell Dam. Treated water will be conveyed to the Phoenix water distribution system through a planned 78" diameter pipeline in the Carefree Highway alignment. The plant site, raw water pump station site and the finished water transmission main alignment are shown on the attached map.

The City has submitted an application to purchase the raw water pump station site from Central Arizona Project/USBR. Phoenix has initiated a water quality pilot-testing program aimed to define the treatment

processes that will be used at the new plant. A consultant has been selected to conduct the study, which is scheduled to be completed by December 2000.

SUMMARY: The City of Phoenix may be willing to consider treating a limited amount of WESTCAPS member CAP allocations at the Lake Pleasant Treatment. Such an arrangement would be on the basis of a wholesale water sales agreement having a limited-term. Phoenix would maintain full ownership of the Lake Pleasant Plant. A unit price for wholesale water deliveries would have to establish at a later date when capital and operation costs for the plant's first phase are known. Some capacity-charges would also be involved. Phoenix estimates that approximately 20 mgd might be available, if any, to treat other entities water supplies and the term for which the treated water could be made available is uncertain. This analysis would have to be completed closer to the time the plant becomes operational. Limited-term purchases of water from the plant by WESTCAPS could provide a treated CAP water source to the northern part of the WESTCAPS planning area until another regional water treatment plant can be financed and constructed by West Valley water providers.

OPTION CONSIDERATIONS:

CAP Utilization: This option would increase the utilization of the unused portion of WESTCAPS members CAP allocations.

Renewable Resource Utilization: This option would not increase the utilization of additional renewable resources. However, if WESTCAPS members did acquire additional CAP water allocations, they could potentially be treated through a wholesale water agreement, subject to the restrictions discussed above.

Groundwater Decline: Direct use of CAP water in lieu of continued groundwater pumping by WESTCAPS members addresses groundwater depletion and land subsidence issues.

Financial Viability: Financial viability for the WESTCAPS members will depend on capacity and water treatment charges set by Phoenix, and the cost of constructing and maintaining water distribution mains, reservoirs, or pump stations needed to deliver water to the existing water distribution grids of WESTCAPS members. More work will need to be done to define needed water transmission systems to further evaluate this option.

Legal / Regulatory Considerations: This project is viable from legal and regulatory aspects. Treatment of CAP water for potable use is accepted as a renewable water supply that is in keeping with safe-yield goal for the AMA. This option should be looked on favorably by the Arizona Corporation commission since it would provide an immediate benefit to participating water providers. It would not involve as large an immediate capital cost outlay for water providers compared with construction of a new WESTCAPS regional water treatment plant.

Public Acceptability: The public should view this option favorably from the standpoint of putting renewable resources to use, reducing groundwater pumping and associated negative environmental impacts such as land subsidence, poor quality groundwater, and the potential of slower economic growth.
Timeliness: This option can potentially be implemented within 5 years.

Adaptability: This project could potentially provide treatment of some WESTCAPS members CAP water for potable uses through limited-term, wholesale water sales agreements, if capacity is available beyond City of Phoenix immediate needs following plant start-up.

Environmental Acceptability: No environmental issues have been identified related with construction of the project that are potential difficulties to project implementation. Water treatment plant and pipeline construction are commonly implemented projects in Arizona and the procedures that must be followed to obtain the necessary environmental permits are well documented.

NT5A: LEASE STORAGE CAPACITY IN THE CAP AGUA FRIA RECHARGE PROJECT ON A YEAR-BY-YEAR BASIS[31]

DESCRIPTION: The Agua Fria Recharge Project (AFRP) is being developed by the Central Arizona Water Conservation District (CAWCD) as a State Demonstration Recharge Project financed through the State Water Storage Fund. The AFRP is located in the floodplain of the Agua Fria River beginning at the CAP Agua Fria River Siphon (Section 17, TSN RIE) and extending downstream approximately five miles to Jomax Road (Section 6 T4N RIE). The project consists of two operational components, an in-channel or "managed" recharge segment and a "constructed" facility composed of infiltration basins with a combined recharge capacity of 100,000 ac-ft/yr. Independent recharge feasibility studies conducted by the Arizona Municipal Water Users Association (AMWUA), the City of Phoenix and CAWCD demonstrated suitability of the site for a large-scale recharge project. Underground Storage Facility Permits granting the authority to construct and operate the project have been issued by the Arizona Department of Water Resources (ADWR).

SUMMARY: This option would be available for WESTCAPS membership use within the next 1 to 5 years, depending on CAP's successful resolution of property owner issues. In-channel recharge operations are scheduled to begin September 2000 with spreading basins completed and operational by January 2001. The capacity of the AFRP is sufficient to allow full utilization of WESTCAP subcontractor's CAP allocations through direct recharge in the West Salt River Valley groundwater basin. Additional capacity is available to recharge additional renewable supplies. WESTCAPS members can participate in the facility three ways: (1) leasing storage capacity from the CAP on a year-by-year basis, (2) purchasing long-term storage capacity from the CAP, and (3) joining the CAGRD and entering into a contract to replenish using the member's own CAP water supply. The recharge site is located in a position to potentially help mitigate declining groundwater levels in the Northwest Salt River Valley, even though this option does not reduce reliance on groundwater pumping to meet demands.

It is assumed that all WESTCAPS members could collectively recharge 50,000 acre-feet per year of CAP water at the facility and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($112 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small for two reasons. First, there is no reduction in groundwater pumping since the recharged CAP water would be "recovered" through the use of the wells. Secondly, the CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: Design capacity of the AFRP is 100,000 ac-ft/yr. The project turnout from the Central Arizona Project (CAP) canal is capable of delivering 400 cubic feet/second (300,000 ac-ft/yr.) to allow operational flexibility and ensure recharge deliveries when excess aqueduct capacity is available. Additionally, the AFRP is strategically located west of the Waddell Canal to allow uninterrupted project deliveries concurrent with maximum releases from Lake Pleasant through the Waddell Canal to supply peak summer agricultural demands.

The capacity of the AFRP is sufficient to allow full utilization of WESTCAP subcontractor's CAP allocations through direct recharge in the West Salt River Valley groundwater basin. Storage

capacity will be available to the Central Arizona Groundwater Replenishment District (CAGRD), CAP subcontractors and entities holding Excess CAP Water contracts. The Arizona Water Banking Authority (AWBA) will utilize any remaining capacity.

Renewable Resource Utilization: Available capacity of the AFRP is sufficient to accommodate recharge in excess of WESTCAP member's CAP allocations.

Groundwater Decline: This option will result in direct and appreciable mitigation of groundwater level declines. Severe historic groundwater declines exceeding 350 feet have occurred directly south of the AFRP creating a significant cone of depression in the aquifer. The AFRP is located up-hydraulic gradient from this cone of depression. Recharged water will flow generally south toward the cone of depression; however, numeric groundwater modeling indicates that groundwater levels will rise over the entire West Salt River Valley.

WESTCAPS projects that groundwater withdrawals in the West Salt River Valley will increase by over 200,000 ac- ft/yr. by 2025 and continue to exacerbate groundwater level declines. Recharge of 100,000 ac-ft/yr. at AFRP will compensate for a significant portion of increased pumpage and decrease the rate of water level decline. Eventual recovery of stored water may reduce the degree of mitigation; however, there will be an overall positive impact due to recovery restrictions imposed by statute. For example, only 95% of the stored water can be legally recovered leaving a 5% "cut to the aquifer" for the benefit of the Active Management Area (AMA). After 20 years of operation at the AFRP approximately 100,000 acre-feet would be added to aquifer storage.

Financial Viability: The AFRP will be developed as a State Demonstration Recharge Project pursuant to CAWCD's statutory authority. Monies derived from the State Water Storage Fund will fund construction of the project. Total project development costs are estimated at $7.5 million of which CAWCD has incurred costs to date of $2 million for design, permitting, technical studies and construction of the turnout structure. Sufficient funds are available in the Maricopa County account of the State Water Storage Fund to finance construction.

The fee to lease storage capacity of the facility on a year-by-year basis from CAP would be approximately $10 per acre-foot. The cost for WESTCAPS members to recharge the entire unused portion of their CAP allocations is as follows:

$ 10.00 ac-ft to recharge (includes capital costs)
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital costs for CAP allotment
$ 112.00 ac-ft

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Comparison of NT5A to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

Member	NT5A	Base Case
Arizona Water Co.	$127	$132
Town of Buckeye	$137	$139
Citizens Utility Co.	$ 63	$ 69
City of Glendale*	$109	$109
City of Goodyear	$174	$177
LPSCO	$ 71	$ 80
City of Peoria	$101	$110
City of Phoenix*	$ 71	$ 71
Sunrise & Westend Water Co	$ 73	$ 82
City of Surprise	$ 91	$106
West Maricopa Combine	$ 97	$ 98
Average	**$105**	**$110**

*No allocation available for recharge, already have complete use

Regulatory Considerations: The Arizona Corporation Commission (ACC) has no regulatory authority over State Demonstration Recharge projects. ADWR and Arizona Department of Environmental Quality (ADEQ) regulate all recharge projects in Arizona through a statutory permit program. This program requires demonstration of hydrologic feasibility; hydrologic and environmental impact analysis; and demonstration of technical and financial capability. CAWCD obtained the necessary approval and received Underground Storage Facility Permits from ADWR in December 1998. Additionally, ADWR has expressed its support of the AFRP to accomplish Phoenix AMA water management goals of mitigating groundwater overdraft in the West Salt River Valley.

Other state, local and federal requirements have been addressed during project development. The Maricopa County Flood Control District (MCFCD) issued a Floodplain Use Permit for construction of recharge basins and other structures within the Agua Fria River floodplain. The US Army Corps of Engineers (Corps) requires a Clean Water Act Section 404 Permit for activities within jurisdictional waters and coordinates with other federal agencies including the Environmental Protection Agency (EPA), US Fish and Wildlife Service, Arizona Game and Fish Department, State Historic Preservation Office and others. CAWCD applied for the Clean Water Act Section 404 Permit in November 1998.

Depending on the individual circumstances of each WESTCAPS member, recharging at this facility may or may not replace the need to join the CAGRD.

Public Acceptability: Artificial groundwater recharge is generally acceptable to the general public in the Salt River Valley as evidenced by support for SRP's Granite Reef Underground Storage

Project. State Demonstration Recharge Projects are developed for the benefit of the State of Arizona and its citizens. By statute, the purposes of this project are to: 1) protect the general economy and welfare of this state and its citizens by wise resource management of the water of the CAP; 2) store for future needs or use for replenishment purposes the CAP water not now utilized by CAP subcontractors; 3) provide an additional source of water for times of serious water shortage due to a substantial reduction in the supply of CAP water available for delivery to CAP subcontractors of a prolonged interruption of deliveries of CAP water.

A measure of the degree of public acceptability can be inferred by the public notice process for state and federal permits. ADWR advertised notice of the recharge permit application in two local papers for two consecutive weeks and sent notice by first class mail to each city, town, private water company, irrigation district and electrical district that serves land within the area of impact of the stored water (i.e. the West Salt River Valley). No protests were received by ADWR. The Corps mailed notice to federal and state agencies and to all landowners adjacent to the AFRP. No comments were submitted by adjacent landowners and only three comments were received from federal and state agencies, which were addressed by CAWCD.

From a cost perspective, the general public should have no objection to this option. The Water Storage Fund was established expressly for the purpose of financing development of State Demonstration Projects for the benefit of the state. WESTCAPS members will likely support this option as a low cost alternative for utilizing CAP allocations. Water storage rates are projected at $10.00 per acre-foot, which is the estimated operation and maintenance (O&M) cost. Rates are held low because CAWCD will not include capital costs or profit in its water storage rate structure.

Timeliness: Depending on successful resolution of property owner issues, construction of the recharge facilities is scheduled to begin in early 2000 upon completion of final permitting and right-of-way acquisition. Construction will be phased to complete the in-channel managed project first. In-channel recharge operations are scheduled to begin September 2000 with spreading basins completed and operational by January 2001.

Adaptability: The Underground Storage Facility Permit issued by ADWR authorizes recharge of 100,000 acre-feet per year for a 20-year period. If demand for recharge capacity exceeds the authorized volume, CAWCD can apply to ADWR for a permit modification to increase the permit volume. The facility turnout is capable of maximum deliveries of 300,000 acre-feet per year and additional basins could be added to accommodate increased demand if necessary. Current ADWR policy limits recharge permits to no more than 20 years in duration; however, CAWCD intends renew the permit and operate AFRP for at least 50 years.

Environmental Acceptability: Assessment of environmental issues was required under the Clean Water Act Section 404 Permit. Preliminary determinations by the Corps indicate that the AFRP would not affect federally listed endangered or threatened species or their critical habitat.

NT5B: LEASE LONG TERM STORAGE CAPACITY IN THE CAP AGUA FRIA RECHARGE PROJECT[31]

DESCRIPTION: The Agua Fria Recharge Project (AFRP) is being developed by the Central Arizona Water Conservation District (CAWCD) as a State Demonstration Recharge Project financed through the State Water Storage Fund. The AFRP is located in the floodplain of the Agua Fria River beginning at the CAP Agua Fria River Siphon (Section 17, TSN RIE) and extending downstream approximately five miles to Jomax Road (Section 6 T4N RIE). The project consists of two operational components, an in-channel or "managed" recharge segment and a "constructed" facility composed of infiltration basins with a combined recharge capacity of 100,000 ac-ft/yr. Independent recharge feasibility studies conducted by the Arizona Municipal Water Users Association (AMWUA), the City of Phoenix and CAWCD demonstrated suitability of the site for a large-scale recharge project. Underground Storage Facility Permits granting the authority to

construct and operate the project have been issued by the Arizona Department of Water Resources (ADWR).

SUMMARY: This option would be available for WESTCAPS membership use within the next 1 to 5 years, depending on CAP's successful resolution of property owner issues. In-channel recharge operations are scheduled to begin September 2000 with spreading basins completed and operational by January 2001. The capacity of the AFRP is sufficient to allow full utilization of WESTCAP subcontractor's CAP allocations through direct recharge in the West Salt River Valley groundwater basin. Additional capacity is available to recharge additional renewable supplies. WESTCAPS members can participate in the facility three ways: (1) leasing storage capacity from the CAP on a year-by-year basis, (2) purchasing long-term storage capacity from the CAP, and (3) joining the CAGRD and entering into a contract to replenish using the member's own CAP water supply. The recharge site is located in a position to potentially help mitigate declining groundwater levels in the Northwest Salt River Valley, even though this option does not reduce reliance on groundwater pumping to meet demands.

It is assumed that all WESTCAPS members could collectively recharge 50,000 acre-feet per year of CAP water at the facility and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($107 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small for two reasons. First, there is no reduction in groundwater pumping since the recharged CAP water would be "recovered" through the use of the wells. Secondly, the CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: Design capacity of the AFRP is 100,000 ac-ft/yr. The project turnout from the Central Arizona Project (CAP) canal is capable of delivering 400 cubic feet/second (300,000 ac-ft/yr.) to allow operational flexibility and ensure recharge deliveries when excess aqueduct capacity is available. Additionally, the AFRP is strategically located west of the Waddell Canal to allow uninterrupted project deliveries concurrent with maximum releases from Lake Pleasant through the Waddell Canal to supply peak summer agricultural demands.

The capacity of the AFRP is sufficient to allow full utilization of WESTCAP subcontractor's CAP allocations through direct recharge in the West Salt River Valley groundwater basin. Storage capacity will be available to the Central Arizona Groundwater Replenishment District (CAGRD), CAP subcontractors and entities holding Excess CAP Water contracts. The Arizona Water Banking Authority (AWBA) will utilize any remaining capacity.

Renewable Resource Utilization: Available capacity of the AFRP is sufficient to accommodate recharge in excess of WESTCAP member's CAP allocations.

Groundwater Decline: This option will result in direct and appreciable mitigation of groundwater level declines. Severe historic groundwater declines exceeding 350 feet have occurred directly south of the AFRP creating a significant cone of depression in the aquifer. The AFRP is located up-hydraulic gradient from this cone of depression. Recharged water will flow generally south toward the cone of depression; however, numeric groundwater modeling projects groundwater levels will rise over the entire West Salt River Valley.

WESTCAPS projects that groundwater withdrawals in the West Salt River Valley will increase by over 200,000 ac- ft/yr. by 2025 and continue to exacerbate groundwater level declines. Recharge of 100,000 ac-ft/yr. at AFRP will compensate for a significant portion of increased pumpage and decrease the rate of water level decline. Eventual recovery of stored water may reduce the degree of mitigation; however, there will be an overall positive impact due to recovery restrictions imposed by statute. For example, only 95% of the stored water can be legally recovered leaving a 5% "cut to the aquifer" for the benefit of the Active Management Area (AMA). After 20 years of operation at the AFRP approximately 100,000 acre-feet would be added to aquifer storage.

Financial Viability: The AFRP will be developed as a State Demonstration Recharge Project pursuant to CAWCD's statutory authority. Monies derived from the State Water Storage Fund will fund construction of the project. Total project development costs are estimated at $7.5 million of which CAWCD has incurred costs to date of $2 million for design, permitting, technical studies and construction of the turnout structure. Sufficient funds are available in the Maricopa County account of the State Water Storage Fund to finance construction. *This financial analysis assumes that WESTCAPS members would pay for long-term storage capacity in the facility.* Each member shares in the capital cost according to how much CAP water they could recharge.

The fee to purchase long-term storage capacity in the facility is estimated to be $107 per acre-foot, depending on the final cost of the project.

The cost for WESTCAPS members to recharge the entire unused portion of their CAP allocations is as follows:

$ 5.00 ac-ft to recharge (O&M and administrative costs)
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital costs for CAP allotment
$ 107.00 ac-ft

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Regulatory Considerations: The Arizona Corporation Commission (ACC) has no regulatory authority over State Demonstration Recharge projects. ADWR and Arizona Department of Environmental Quality (ADEQ) regulate all recharge projects in Arizona through a statutory permit program. This program requires demonstration of hydrologic feasibility; hydrologic and environmental impact analysis; and demonstration of technical and financial capability. CAWCD obtained the necessary approval and received Underground Storage Facility Permits from ADWR in December 1998. Additionally, ADWR has expressed its support of the AFRP to accomplish Phoenix AMA water management goals of mitigating groundwater overdraft in the West Salt River Valley.

Other state, local and federal requirements have been addressed during project development. The Maricopa County Flood Control District (MCFCD) issued a Floodplain Use Permit for construction of recharge basins and other structures within the Agua Fria River floodplain. The US Army Corps of Engineers (Corps) requires a Clean Water Act Section 404 Permit for activities within jurisdictional waters and coordinates with other federal agencies including the Environmental Protection Agency (EPA), US Fish and Wildlife Service, Arizona Game and Fish Department, State Historic Preservation Office and others. CAWCD applied for the Clean Water Act Section 404 Permit in November 1998.

Depending on the individual circumstances of each WESTCAPS member, recharging at this facility may or may not replace the need to join the CAGRD.

Public Acceptability: Artificial groundwater recharge is generally acceptable to the general public in the Salt River Valley as evidenced by support for SRP's Granite Reef Underground Storage Project. State Demonstration Recharge Projects are developed for the benefit of the State of Arizona and its citizens. By statute, the purposes of this project are to: 1) protect the general economy and welfare of this state and its citizens by wise resource management of the water of the CAP; 2) store for future needs or use for replenishment purposes the CAP water not now utilized by CAP subcontractors; 3) provide an additional source of water for times of serious water shortage due to a substantial reduction in the supply of CAP water available for delivery to CAP subcontractors of a prolonged interruption of deliveries of CAP water.

A measure of the degree of public acceptability can be inferred by the public notice process for state and federal permits. ADWR advertised notice of the recharge permit application in two local papers for two consecutive weeks and sent notice by first class mail to each city, town, private water company, irrigation district and electrical district that serves land within the area of impact of the stored water (i.e. the West Salt River Valley). No protests were received by ADWR. The Corps mailed notice to federal and state agencies and to all landowners adjacent to the AFRP. No comments were submitted by adjacent landowners and only three comments were received from federal and state agencies, which were addressed by CAWCD.

From a cost perspective, the general public should have no objection to this option. The Water Storage Fund was established expressly for the purpose of financing development of State Demonstration Projects for the benefit of the state. WESTCAPS members will likely support this option as a low cost alternative for utilizing CAP allocations. Water storage rates are projected at $10.00 per acre-foot, which is the estimated operation and maintenance (O&M) cost. Rates are held low because CAWCD will not include capital costs or profit in its water storage rate structure.

Timeliness: Depending on successful resolution of property owner issues, construction of the recharge facilities is scheduled to begin in early 2000 upon completion of final permitting and right-of-way acquisition. Construction will be phased to complete the in-channel managed project first. In-channel recharge operations are scheduled to begin September 2000 with spreading basins completed and operational by January 2001.

Adaptability: The Underground Storage Facility Permit issued by ADWR authorizes recharge of 100,000 acre-feet per year for a 20-year period. If demand for recharge capacity exceeds the authorized volume, CAWCD can apply to ADWR for a permit modification to increase the permit volume. The facility turnout is capable of maximum deliveries of 300,000 acre-feet per year and additional basins could be added to accommodate increased demand if necessary. Current ADWR policy limits recharge permits to no more than 20 years in duration; however, CAWCD intends renew the permit and operate AFRP for at least 50 years.

Environmental Acceptability: Assessment of environmental issues was required under the Clean Water Act Section 404 Permit. Preliminary determinations by the Corps indicate that the AFRP would not affect federally listed endangered or threatened species or their critical habitat.

Comparison of NT5B to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

Member	NT5B	Base Case
Arizona Water Co.	$131	$132
Town of Buckeye	$137	$139
Citizens Utility Co.	$ 64	$ 69
City of Glendale*	$109	$109
City of Goodyear	$174	$177
LPSCO	$ 73	$ 80
City of Peoria	$102	$110
City of Phoenix*	$ 71	$ 71
Sunrise & Westend Water Co	$ 76	$ 82
City of Surprise	$101	$106
West Maricopa Combine	$ 97	$ 98
Average	**$106**	**$110**

*No allocation available for recharge, already have complete use

NT6: McMICKEN RECHARGE FACILITY[32]

DESCRIPTION**:** The City of Surprise is continuing to develop the McMicken Recharge Facility (MRF). In general, the facility is located between Grand Avenue and Bell Road just west of the McMicken Dam flood control structure within the City of Surprise. Regionally, the facility is centrally located within the City's 277 square mile planning area and the midpoint of the Beardsley Canal. Hydrologic analysis and recharge testing shows that the facility could recharge up to 100,000 acre-feet per year for twenty years. Additionally, a recent study of the Beardsley Canal estimates over 100,000 acre-feet per year of available capacity in the canal. The combination of recharge capacity, canal capacity, and location make this facility an excellent candidate for a regional recharge facility and park.

SUMMARY**:** In this option, it is assumed that all WESTCAPS members could collectively recharge 50,000 acre-feet per year of CAP water at the site and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($125 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small since the amount of CAP water being

recharged is small. In addition, there is no reduction in groundwater pumping since the recharged CAP water would be "recovered" through the use of the wells. However, this site is located near the cone off depression in the northwest Salt River Valley and would help to mitigate further decline in groundwater levels.

OPTION CONSIDERATIONS:

CAP Utilization: Phase 1 of the MRF will be designed for 10,000 acre-feet per year.

Additional Renewable Resource Utilization: Initial hydrologic analysis shows that this site could accept 100,000 acre-feet per year of recharge water. This would more than accommodate the City's CAP allocation (7,373 AF) and allow for the storage of additional CAP supplies and Agua Fria River water.

Groundwater Decline: This facility will add CAP water to the regional aquifer and will replace and eventually surpass the amount of mined groundwater in the area to create a situation of rising water levels.

Financial Viability: The City has committed to design, construct, and operate Phase 1 of the MRF by June 30, 2000 and will be committing additional funds to the expansion of the facility in future years. Surprise has no rate structure or contracts established for leasing or partnering in this project. All fees would need to be negotiated. For the purposes of this analysis, it is assumed that fees for participation in the McMicken recharge project would be equivalent to the fees for participation in West Maricopa Combine's recharge project. In addition MWD would charge fees for transporting the water through their system to the recharge site. If the WESTCAPS members were to participate in this recharge site, it's costs would be as follows:

$ 10.00 ac-ft to wheel through MWD canals
$ 13.00 ac-ft to recharge
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital Costs for CAP allotment
$125.00 ac-ft

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Legal / Regulatory Considerations: State of Arizona (USF Permit, WS Permit, RW Permit, General APP, and any other statues, rules, or permits), Maricopa County (Flood Control Permit, Certificate of Approval to Construct, and any other statues, rules, or permits), and any other regulatory agencies. In order to expedite the USF permitting process the City will apply for a pilot USF permit then 1 year prior to the expiration of the pilot permit the City will apply for a full scale USF permit in the amount of 50,000 acre-feet annually. The City has obtained a long-term land lease agreement with the Maricopa County Flood Control District for 1,500 acres. The City is in the process of hiring an engineer to design Phase 1.

Public Acceptability: Recharge is a highly acceptable mode of water management due to its benefits to the groundwater and future water users.

Timeliness: The City has obtained a long-term land lease with the Maricopa County Flood Control District and will be meeting with the Maricopa Water District to develop a wheeling agreement. It is the City's hope to have a finalized wheeling agreement by November 1, 1999 and to begin recharging water at the facility by June 30, 2000.

Adaptability: This project will be divided into phases. At the present time, each phase will include recharge capacity and park amenities (e.g., walking/nature trails and upper desert vegetation). This phased approach will allow the expansion of the facility to the needs of the City and its partners.

Environmental Acceptability: Recharging CAP water at the MRF will replace and eventually surpass the amount of mined groundwater in the area to create a situation of rising water levels.

Comparison of NT6 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

WESTCAPS member	NT6	Base Case
Arizona Water Company	$128	$132
Town of Buckeye	$137	$139
Citizens Utility Company	$ 64	$ 69
City of Glendale	$109	$109
City of Goodyear	$174	$177
LPSCO	$ 73	$ 80
City of Peoria	$103	$110
City of Phoenix	$ 71	$ 71
Sunrise & West End Water Co.	$ 76	$ 82
City of Surprise	$ 96	$106
West Maricopa Combine	$ 97	$ 98
Totals	**$106**	**$110**

*No allocation available for recharge, already have complete use

NT8: BEARDSLEY CANAL RECHARGE / RECOVERY[33]

DESCRIPTION: The City of Goodyear is pursuing the development of a groundwater recharge facility located along the Beardsley Canal at Lateral 12 (Bethany Home Road alignment). The City's CAP allocation (and other CAP and its limited Agua Fria supplies) will be recharged in infiltration basins. The recharge facilities will be sized to take advantage of seasonally available Beardsley Canal capacity so as to not compete for canal space with the District's agricultural demand base. Partial recovery of the stored water is anticipated to occur within close proximity to the recharge activities. To the greatest extent possible, the water will be recovered on a molecular basis in order to maximize the potential for potable quality recovery wells and minimize the impact of the pumping to other nearby groundwater users. The project is envisioned as an interim program to be implemented until such time as the infrastructure necessary for reliable continuous direct deliveries of CAP water is developed for the southwest Salt River Valley.

SUMMARY: This option assumes a portion of the future water demands of the City of Goodyear (and potentially other communities) will be met by recharging CAP water during times of available Beardsley Canal conveyance capacity and construction of a recovery well system designed to recover on demand in close proximity to the recharge facility. It is assumed that Arizona Water Company, Citizens, and Goodyear could recharge 26,000 acre-feet per year of CAP water at the facility and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($136 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. Water providers facing water quality issues could potentially avoid anticipated wellhead treatment costs by utilizing this option. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small for two reasons. First, there is no reduction groundwater pumping since the recharged CAP water would be "recovered" through the use of wells. Secondly, The CAGRD fee of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

The project would require the acquisition of approximately 160 acres of land at $30,000 per acre near the Beardsley Canal. Recharge would be accomplished through a series of shallow, rapid infiltration basis's constructed adjacent to the canal. Recharged water would be recovered directly through an estimated 5 or 6 recovery wells located in close proximity to the recharge facilities and indirectly through 12 additional supply wells located throughout the City's distribution system by a 20-inch pipeline 5 miles long. It is anticipated that some improvements to the Beardsley Canal will be required to facilitate sufficient deliveries to the recharge facility in the latter stages of the project. Land acquisition for the recharge project is assumed to be on a long-term land lease from MWD.

OPTION CONSIDERATIONS:

CAP Utilization: This option would allow the City of Goodyear to use their currently unused CAP allocation of 3,381 acre-feet. By the year 2025, the City could potentially utilize 26,000 acre-feet through direct recharge into the Beardsley facility, up to 20,000 acre-feet of CAP water at the CAP Agua Fria Recharge Project, and over 14,000 acre-feet of in-lieu water. This option would allow other communities / developments within close proximity to Goodyear to recharge and recover a potion of their unused CAP allocations up to available canal capacity limits.

Renewable Resource Utilization: This option directly increases the utilization of additional renewable resources by up to 26,000 acre-feet or more by the year 2025.

Groundwater Decline: This option will reduce the demand on the groundwater system, thus helping to stabilize groundwater levels in the vicinity of the Luke Cone of Depression. The proposed recharge facility is located within the area dominated by the Luke Cone of Depression. While it is envisioned that all water recharged at this facility will be recovered by the recovery well system, any recovered CAP water, or water recovered from within the Gila River dominated groundwater system will directly augment the groundwater system in an area currently experiencing significant water level declines. The facility will allow for new growth to be reliant on renewable supplies.

Financial Viability: Goodyear has no rate structure or contracts established for leasing or partnering in this project. Costs would be developed based on entitlement and actual acre-feet stored on the participants behalf. Participants must pay for their CAP allocation, facility costs (based on a 25-year payout) and use rate. The cost for WESTCAPS member to recharge their unused portion of their CAP allocation (up to available canal capacity limits) based on year 2000 estimated costs is as follows:

$ 10.00 ac-ft to wheel through MWD canals
$ 24.00 ac-ft to recharge

$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital Costs for CAP allotment
$136.00 ac-ft

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Least Cost Analysis Comparison of NT8 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

WESTCAPS member	NT8	Base Case
Arizona Water Company	$ 98	$132
Town of Buckeye	$139	$139
Citizens Utility Company	$ 66	$ 69
City of Glendale*	$109	$109
City of Goodyear	$171	$177
LPSCO	$ 80	$ 80
City of Peoria	$110	$110
City of Phoenix*	$ 71	$ 71
Sunrise & West End Water Co.	$ 82	$ 82
City of Surprise	$106	$106
West Maricopa Combine	$ 98	$ 98
Total	$108	$110

* No unused CAP allocation available for recharge.

Legal/Regulatory Considerations: This option will require regulatory approval of the storage and recovery facilities by ADWR. It is anticipated that all necessary permits and approvals for facilities development can be secured. Additionally, legal agreements with MWD for land acquisition and water deliveries will need to be secured. MWD has indicated support of the recharge project during previous feasibility testing activities.

Public Acceptability: This project represented the least cost alternative for CAP utilization of all options considered by the City of Goodyear. As such, it represents the alternative likely to have the smallest rate impact. This option will also eliminate future rate impact uncertainty associated with other water resource development projects that would require the City to join the Central Arizona Groundwater Replenishment District. It is anticipated that the groundwater supplied through this option will be of higher quality than groundwater extracted through an expanded City well field and, therefore, be more readily accepted by the citizens of Goodyear.

The proposed project is envisioned toe extract water at some distance from the customers to be served. Concurrence and support of nearby utilities and landowners will need to be secured. One of the primary project themes of only recovering water that has been recharged will be a critical component of achieving this support.

Timeliness: The City has conducted feasibility testing for this option and is currently developing plans for full-scale facilities. Phase 1 is anticipated to be complete in one year.

Adaptability: This option will be developed in three phases through 2025, with a proposed expansion in 2011. This phased approach will allow the City to size, design, and construct facilities to meet future demands as needed.

Environmental Acceptability: Recovered water from the recharge area is anticipated to be of higher quality than most of the groundwater in the Goodyear vicinity.

The project will require clearing and excavation of undeveloped desert for the recharge basins.

At the present time, no environmental enhancements, such as riparian areas, habitats, etc. are planned for this site.

NT9: GROUNDWATER RECHARGE -- NEW RIVER WATER COURSE MASTER PLAN[34]

DESCRIPTION: The New River Water Course Master Plan includes a study of aquifer replenishment possibilities along the New River channel from below New River Dam to its confluence with Skunk Creek. Water for recharge would likely come from the CAP and CAP allocations provided to the Cities of Glendale and Peoria. Wastewater effluent is a possible, but less probable, source.

The amount of groundwater replenishment possible along this stretch of the New River is dependent upon several things: the infiltration rate, the width of the recharge zone, the volume of water applied, the rate of inflow, the aquifer characteristics, and the resultant water table rise, among others. Preliminary estimates suggest that this stretch of river may be able to recharge as much as 147,000 acre-feet of water per year. Recent, more conservative estimates, suggest a recharge capacity somewhere between 20,000 and 36,500 acre-feet per year.

The project could be designed to meet short-term water needs, with storage and recovery cycles closely timed, or longer-term assured water supply needs.

SUMMARY: In this option, it is assumed that all WESTCAPS members could collectively recharge 50,000 acre-feet per year of CAP water in the master planned area and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($115 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. Water providers facing water quality issues could potentially avoid anticipated wellhead treatment costs by utilizing this option. On a regional basis, the change in economics is small for two reasons. First, there is no reduction groundwater pumping since the recharged CAP water would be “recovered” through the use of wells. Secondly, The CAGRD fee of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: Dependent upon hydrogeologic characteristics and facility design, this project has the potential to fully utilize CAP allocations for several WESTCAPS members.

Renewable Resource Utilization: Dependent upon hydrogeologic characteristics and adequate operation and maintenance, the project has the potential to substantially increase renewable resource utilization with time.

Groundwater Decline: This project has the potential to mitigate the northwest SRV groundwater declines assuming the participating municipalities develop appropriate recovery plans.

Financial Viability: A detailed cost-benefit analysis has not yet been completed. Qualitatively, MCFCD could assume that start-up costs would include design of the facility including infrastructure to transport the CAP water from the Aqueduct to below New River Dam, and any channel improvements. Alternatively, a turn-out could be placed in the CAP Aqueduct above New River Dam and water could be allowed to flow freely in the impoundment area before flowing into the New River channel through the outlet structure. In addition, the project would incur ongoing operation and maintenance costs.

While project start-up costs could be minimized by utilizing the New River Dam impoundment area and the channel thalweg for infiltration, the financial viability of the project will ultimately depend upon the hydrogeologic characteristics of the reach.

Since there is no rate structure or contracts established for leasing or partnering in this project. The estimated cost for WESTCAPS member to recharge their unused portion of their CAP allocation is as follows:

$ 13.00 ac-ft to recharge
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital Costs for CAP allotment
$115.00 ac-ft

$2,000 annual administrative fee

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Legal/Regulatory Considerations: There are no obvious reasons ADWR or the ACC would oppose this project.

Public Acceptability: This project would likely be highly acceptable to the public. This stretch of the New River channel currently lacks aesthetic value. A relatively continuous stream flow, perhaps coupled with recreational amenities, would likely be viewed quite favorable by the public. In addition, the long-range goals of the project, i.e., assured water for current and future residents, would also be viewed favorably by the public.

Timeliness: Lithologic and hydrogeologic data should be collected, along with a design alternatives analysis. This work could be completed within a six-month time frame. ADWR would likely require a 12-month (or longer) pilot project. A full-blown recharge project could be undertaken within 24 to 36 months.

Adaptability: Again, dependent upon hydrogeologic characteristics and adequate operation and maintenance, the project could be easily adapted to meet future needs.

Environmental Acceptability: This project will make steps towards reducing groundwater overdraft and reducing land subsidence. In addition, it could be easily coupled with environmental and recreational improvements along the channel.

Least Cost Analysis Comparison of NT9 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

WESTCAPS member	NT9	Base Case
Arizona Water Company	$131	$132
Town of Buckeye	$138	$139
Citizens Utility Company	$ 67	$ 69
City of Glendale*	$109	$109
City of Goodyear	$175	$177
LPSCO	$ 76	$ 80
City of Peoria	$108	$110
City of Phoenix*	$ 71	$ 71
Sunrise & West End Water Co.	$ 81	$ 82
City of Surprise	$ 97	$106
West Maricopa Combine	$ 98	$ 98
Total	$108	$110

* No unused CAP allocation available for recharge.

NT10: SUN CITIES/YOUNGTOWN GROUNDWATER SAVINGS PROJECT[35]

DESCRIPTION: There are 19 golf courses located in Sun City and Sun City West. These courses currently meet 100% of their demands with groundwater pumped from a variety of withdrawal authorities. The total demand for all the golf courses is approximately 12,600 acre-feet per year. Demands for two of the courses are met with effluent recovered from golf course wells, leaving a total of roughly 11,600 acre-feet of demand that can be offset with CAP water.

Sun City Water Company and Sun City West Utilities Company have CAP allocations totaling 6,561 acre-feet. This leaves an additional capacity of around 5,000 acre-feet available for other water providers and for entities like the Central Arizona Groundwater Replenishment District and the Arizona Water Banking Authority.

The project requires the conveyance of the CAP water through a non-potable pipeline down to a storage facility located at the existing water campus for the Sun City West Utilities Company Wastewater Treatment Plant. From the water campus, booster pumps will force the water into an irrigation distribution system that will carry the water to its final destination at each golf course irrigation reservoir.

The following costs are estimated for the project:

Facility	Thousand Dollars
Transmission Pipeline and Turnout	$5,196
Storage Reservoirs	$1,956
Booster Pumps	$414
Irrigation Distribution System	$4,600
Contingency	$3,649
Engineering/Administration/Legal	$3,041
Total Capital Cost	***$18,856***

This option will largely be paid for by using revenues from Sun City Water Company and Sun City West Utilities Company. The incremental cost needed to increase the capacity of the facility to receive an additional 5,039 acre-feet and some currently undetermined portion of the base cost of the facility represents the cost of this option to outside parties.

SUMMARY: This option is intended to provide a capacity of 6,561 acre-feet. Under a regional concept, this project could be expanded to include an additional 5,039 acre-feet of golf course demand, or the project could be increased to include other non-golf course demands. The project has some regulatory and legal considerations that could delay or even stop project construction. The most notable aspect of the project is that it replaces long-time existing groundwater demands and brings water users to the table who are not obligated to curtail groundwater pumping.

In this option, it is assumed that Peoria could recharge 5,039 acre-feet per year of CAP water in the GSF and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($147.55 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. On a regional basis, the change in economics is small for two reasons. First, there is no reduction in groundwater pumping by WESTCAPS members since the recharged CAP water would be “recovered” through the use of the wells. Secondly, the CAGRD tax of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: This option increases the utilization of the unused portion of CAP subcontracts controlled by members of WESTCAPS by 6,561 acre-feet on the low end of the range to 11,655 acre-feet on average on the high end of the range. The capacity of the project could be expanded to include other non-golf course demands, making projected maximum capacity unpredictable.

Renewable Resource Utilization: This option will not directly increase the utilization of additional renewable resources, but it could be used to facilitate an exchange that could bring about the utilization of renewable supplies other than CAP water.

Groundwater Decline: This option directly serves to mitigate groundwater decline in the northwest Salt River Valley by reducing groundwater pumping at the cone of depression.

Financial Viability: The incremental cost of expanding this facility to meet 100% of the golf course demands is roughly $4.1 million. This increased capacity would provide an additional 5,000 acre-feet. At $4.1 million, the cost to construct the additional capacity would be slightly over $800 per acre-foot of annual delivery capacity or approximately $32.55 per acre-foot of water delivered over the 25-year period. In comparison to the original cost of the facility would be roughly $2,286 per acre-foot of annual storage capacity or approximately $114.96 per acre-foot of water delivered over the 25-year period. The incremental costs of the expansion would be nearly one third of the base costs. This appears to provide some financial viability for expansion of the project. The capital cost to a WESTCAPS member interested in participating in this facility would include all the incremental capital costs and some, yet to be determined, portion of the base cost of the project.

Since there is no rate structure or contracts established for leasing or partnering in this project. The estimated cost for WESTCAPS member to recharge their unused portion of their CAP allocation is as follows:

$ 12.54 ac-ft O&M cost to pump water to golf courses
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital costs for CAP allotment
$115.00 ac-ft in overall O&M Costs

$114.96 ac-ft Capital cost for Citizens (incremental cost only)
$ 32.55 ac-ft Capital cost for WESTCAPS member (incremental cost only)

$229.96 ac-ft overall cost to Citizens
$147.55 ac-ft overall cost to WESTCAPS member

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Legal/Regulatory Considerations: These considerations are further divided into considerations related to the Arizona Corporation Commission (Commission) and those related to the Arizona Department of Water Resources (ADWR).

1. Commission Considerations

For Sun City Water Company and Sun City West Utilities Company to participate financially in the project, the Commission must approve the groundwater savings facility concept, before Citizens will be prepared to invest the capital to plan, design and construct the project. The merits of the project debated before the Commission on October of 1999.

Should the Commission approve the project and Sun City Water Company or Sun City West Utilities Company ultimately finance, construct and own the Sun Cities/Youngtown Groundwater Savings Project and capacity is increased to bring an additional 4,439 acre-feet, the Commission could structure the costs of participating in the project such that all costs, not just the incremental increase, of the project would be placed on outside parties.

2. ADWR Considerations

The ability to effect a groundwater savings facility permit, while not specifically disallowed, is not explicitly authorized by State statute. In practice, ADWR has only issued groundwater savings facility permits for irrigation districts and irrigation grandfathered rights. If a groundwater savings facility cannot be effected, the project could be facilitated through an exchange instead. An exchange could be limited by the type 1 non-irrigation rights held primarily in Sun City West.

Public acceptability: This project currently enjoys the support of all but one of the major organizations in the Sun City and Sun City West area even though the monthly cost would represent a dramatic increase in water bills in those areas. Outside the Sun Cities, this project should be positively viewed since existing demands would be weaned off groundwater causing less damage to surrounding users. The incremental costs are manageable. The project is located in an area that will best mitigate the 83rd Avenue and Bell Road cone of depression.

Timeliness: The project is currently planned to be constructed by 2003. This project will take considerable time to plan, design and construct.

Adaptability: This project is adaptable from the perspective of shifting from a groundwater savings project to a surface water treatment plant or a direct recharge project. The pipeline will bring the water to the heart of the Sun Cities. From there, the water could be used in a variety of ways. Should the golf course project derail, the project could change course and provide finished water. The project is not as adaptable from an expandability perspective. The pipeline and facilities will be designed to meet the golf course demands (i.e. roughly 11,000 acre-feet). Since this is the extent of the demand at the courses, to expand the project, non-golf course demands would have to be identified. The pipeline would need to be upsized to meet these new demands. The pipeline is planned to be located in prime location to bring CAP water to a number of communities making it more versatile than other projects.

Environmental Acceptability: Since this project will eliminate existing groundwater pumping, the aquifer will realize an immediate benefit as opposed to offsetting a future demand. This will free up more groundwater for proving physical availability under the assured water supply rules.

Least Cost Analysis Comparison of NT10 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

WESTCAPS member	NT10	Base Case
Arizona Water Company	$132	$132
Town of Buckeye	$139	$139
Citizens Utility Company	$ 80	$ 69
City of Glendale*	$109	$109
City of Goodyear	$177	$177
LPSCO	$ 80	$ 80
City of Peoria	$111	$110
City of Phoenix*	$ 71	$ 71
Sunrise & West End Water Co.	$ 82	$ 82
City of Surprise	$106	$106
West Maricopa Combine	$ 98	$ 98
Total	**$113**	**$110**

* No unused CAP allocation available for recharge.

NT11: NORTH VALLEY ENTITY PUMPS & TREATS BUCKEYE GROUNDWATER FOR DELIVERY TO LUKE AGRICULTURAL PRESERVATION DISTRICT, EARNS INLIEU GROUNDWATER CREDITS[36]

DESCRIPTION: A waterlogged area has been defined in the ADWR Phoenix Active Management Area Third Management Plan report as encompassing the Buckeye Water Conservation and Drainage District, St. Johns Irrigation District, and Arlington Canal Company district areas. The concept is to recover 11000 af/yr. (about 10 MGD) from the waterlogged area, improve water quality to agriculture standards, and make delivery to the Luke Agricultural Preservation Area (LAPD) for in lieu groundwater credits. A municipal water provider, to recover groundwater to meet future demand, will use these credits. BOR estimates removal of 15000 to 20000 acre-feet annually until 2025 would have minimal impact on existing depth-to-water levels (25 feet or less additional draw down) in the most waterlogged area. It is believed that current dewatering in the waterlogged area exceeds this amount.

SUMMARY: It is assumed for purposes of this conceptual assessment that four new Buckeye area wells each approximately 100-foot deep pumping 1660 gpm (2.39 MGD to correspond with a conceptual treatment design shown as Figure 25 in the 1996 Reclamation Maricopa study report) would be completed in the waterlogged area to supply a nanofiltration plant.

Assuming a salt rejection rate of 84% from the 1996 Reclamation report (pg. 66), average raw water TDS concentration of 3000 mg/L from the wells would be reduced through the plant to 480 mg/L. Some pretreatment will probably be required to control biologic fouling and turbidity fouling of the membrane using chlorination/ozonation and filtering, respectively. This effluent will then be blended with a fractional volume of the ambient 3000 ppm groundwater to yield about 750 ppm water. This water would then be piped roughly 28 miles to the LAPD for reinjection.

OPTION CONSIDERATIONS:

CAP Utilization: This option does not have the capacity to enhance WESTCAPS use of its existing CAP allocations.

Additional Renewable Resource Utilization: This option would increase utilization of an underutilized groundwater resource. It is presumed that future recover of water from the waterlogged zone would not be subject to the CAGRD.

Groundwater Decline: This option would have several direct hydrologic benefits to the aquifer in the West Salt River Valley. First, recover wells in the waterlogged zone will lessen Buckeye dewatering needs. Second, providing an alternative water source to the LAPD will reduce their pumping requirement in an area of significant water level declines.

Financial Viability: In this option Peoria (was selected) to build a nano-filtration water treatment plant (WTP) in the southwest Salt River valley (waterlogged area) then pipe it to the Luke Preservation District to gain in lieu groundwater credits. The WTP would be constructed in the years 2001 to 2005 and come on line in the year 2006. This plant would process 11,000 acre-feet/ year. Peoria would receive groundwater credits for 95% of the water delivered. They would then use the groundwater credits to avoid paying the CAGRD tax. This option does not use CAP water.

Capital costs considered for this option are;

Shallow de-watering wells	$ 2,000,000
Nano-filtration water treatment plant (11,000 af/yr)	$22,800,000
Disposal basins (evaporation ponds)	$ 3,000,000
Pipeline (29 miles of 24" steel pipe)	$10,800,000
Pump station	$ 500,000
	$39,100,000

O&M costs considered in this option:

$ 6.58 ac-ft to pump h2o from water logged area
$ 82.36 ac-ft to pump 29 miles up 320 feet in elevation
$ - 6.58 ac-ft credit from Buckeye farmers for de-watering
$ -41.66 ac-ft credit from Luke Agriculture District for replacing groundwater pumping
$ 40.70 ac-ft

$2.5 million annual maintenance fee on the nano-filtration plant (evaporation ponds)

The results are summarized in the following table. This option causes Peoria's costs to increase dramatically over the base case, by approximately 28%.

Least Cost Analysis Comparison of NT11 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

Member	NT11	Base C**ase**
Arizona Water Co.	$132	$132
Town of Buckeye	$139	$139
Citizens Utility Co.	$ 69	$ 69
City of Glendale*	$109	$109
City of Goodyear	$177	$177
LPSCO	$ 80	$ 80
City of Peoria	$141	$110
City of Phoenix*	$ 71	$ 71
Sunrise & Westend Water Co	$ 82	$ 82
City of Surprise	$106	$106
West Maricopa Combine	$ 98	$ 98
Average	**$117**	**$110**

*No allocation available for recharge, already have complete use

Legal/Regulatory Considerations: Recovery of water from the waterlogged area may require special permits and possible regulatory changes from the PAMA. The LAPD will require designation as a GSF.

Public Acceptability: Hydraulic benefits in both the waterlogged area and the LAPD should make this an acceptable concept. Providing a water supply should enhance the LAPD chances of success as well.

Timeliness: Would take at least 5 years to permit and construct.

Adaptability: Project is easily expandable, yield for the waterlogged area (acceptable level of impacts to the flow of the Gila River) and costs will be the limiting factors.

Environmental Acceptability: Preservation of surface flow in the Gila River will be a concern.

NT12: A NORTHWEST VALLEY WATER PROVIDER PUMPS & TREATS BUCKEYE GROUNDWATER FOR EXCHANGE WITH GOODYEAR FOR ITS CAP ALLOCATION[36]

DESCRIPTION: A waterlogged area has been defined in the ADWR Phoenix Active Management Area Third Management Plan report as encompassing the Buckeye Water Conservation and Drainage District, St. Johns Irrigation District, and Arlington Canal Company district areas. The concept is for a sponsoring entity to recover approximately 4000 af/yr. from the waterlogged area, improve water quality to drinking water standards, and make delivery to Goodyear in exchange for Goodyear's CAP water. Goodyear's CAP allocation could then be used by the sponsoring entity. BOR estimates removal of 15000 to 20000 acre-feet annually until 2025 would have minimal impact on existing depth-to-water levels (25 feet or less additional drawdown) in the waterlogged area. It is believed that existing de-watering in the waterlogged area exceeds this amount.

SUMMARY: This option is conceptual look on what might be entailed in pumping shallow groundwater high in total dissolved solids and nitrates from the waterlogged Buckeye area and treating this water in a Reverse Osmosis (RO) plant. This treated water would be blended with ambient well water to obtain a quality suitable for use in the Goodyear and Arizona Water Co. service area. The treated water would be conveyed about 16 miles by pipeline along Baseline Road, S.R. 85, and the railroad tracks. A north valley entity would sponsor the project providing the treated groundwater to Goodyear and Arizona Water Company in exchange their combined 4000 AFY CAP allocation. The treated water piped from Buckeye to Goodyear/AZ Water Co. would be considerably less distance than if taken from the CAP Canal many miles north.

Reclamation's 1996 pilot treatment study report showed reverse osmosis could treat a host of inorganic salts, metals, and dissolved organic contaminants to below MCL levels. Salt rejection rates for RO were assumed to be 95 percent for this paper. Using a representative TDS of 3000 mg/L for the waterlogged area and a blended water goal of 750 mg/L for use, pumped well water at 3000 ppm would be reduced with pretreatment through a RO plant, to about 150 ppm TDS with the brine disposed in an evaporation pond.

Five new wells are envisioned each 100 feet deep, spaced far enough apart to avoid interference, and pumping 500 gpm (807 AFY). A simple weighted average shows blending the treated volume of 6133 AFY from eight wells at 150 ppm with 1614 AFY at 3000 ppm from two wells would yield 1075 cfs (7,747 AFY) at 744 ppm TDS. There would be a reserve plant capacity of 3,453 AFY. Alternatively, the treated volume from three or four shallow wells blended with untreated water from one well would achieve a similar TDS concentration and provide the CAP allocation amount.

OPTION CONSIDERATIONS:

CAP Utilization: Goodyear is a great distance from the CAP aqueduct. This option will allow Goodyear to receive CAP benefits via an exchange avoiding transporting CAP water long distances.

Additional Renewable Resource Utilization: This option would increase utilization of an underutilized groundwater resource. It is presumed that future recovery of water from the waterlogged zone would not be subject to the CAGRD. The sponsoring entity increases their water supply.

Groundwater Decline: This option would have several direct hydrologic benefits to the aquifer in the West Salt River Valley. First, recovery wells in the waterlogged zone will lessen dewatering needs. Second, a sponsoring entity will be less dependent on groundwater to meet future demands.

Financial Viability: In this option Peoria (was selected) to build a Reverse Osmosis-filtration water treatment plant (WTP) in the southwest Salt River valley (waterlogged area) then pipe treated water to Goodyear and Az. H2O Co. in exchange for their CAP allocation. Goodyear and Az. H2O Co. operate the WTP. The WTP would be constructed in the years 2001 to 2004 and come on line in the year 2005.

This plant would process 4,000 acre-feet/ year. Goodyear and Az. H2O Co. would transport the CAP water to the Salt River Valley. Peoria will recharge it's own, Goodyear's and Az. H2O Co.'s CAP allotments at CAWCD's Agua Fria Recharge site.

Capital costs Peoria incurred for this option are;

Shallow de-watering wells	$ 2,000,000
Nano-filtration water treatment plant (4,000 af/yr)	$ 9,120,000
Disposal basins (evaporation ponds)	$ 1,000,000
Pipeline (16 miles of 18" steel pipe)	$ 4,800,000
Pump station	$ 500,000
	$17,120,000

O&M costs considered in this option for Peoria to recharge at the Agua Fria location

Peoria's costs to recharge their own CAP water
$ 10.00 ac-ft to recharge
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft capital costs on CAP water
$112.00 ac-ft

Peoria's costs to recharge Goodyear and Az H2O Co. CAP water
$ 10.00 ac-ft to recharge (Goodyear & Az H2O Co pay CAP capital and transport costs)

O&M costs considered in this option for Goodyear and Az. H2O Co.

$ 6.58 ac-ft to pump h2o from water logged area
$ 39.34 ac-ft to pump 16 miles up 65 feet in elevation
$ 54.00 ac-ft to transport CAP water to Central Arizona
$ 48.00 ac-ft for capital costs for CAP water
$ 147.92 ac-ft

$0.948 million annual O&M fee on the RO-filtration plant (evaporation ponds) Goodyear
$0.252 million annual O&M fee on the RO-filtration plant (evaporation ponds) Az. H2O Co.

The results are summarized in the following table. This option works for all three partners. Arizona Water Company shows a small improvement of 3%, Goodyear shows an improvement of 6% and Peoria shows a very small improvement of less than 1%.

Least Cost Analysis Comparison of NT12 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

Member	NT12	Base Case
Arizona Water Co.	$128	$132
Town of Buckeye	$139	$139
Citizens Utility Co.	$ 69	$ 69
City of Glendale*	$109	$109
City of Goodyear	$166	$177
LPSCO	$ 80	$ 80
City of Peoria	$109	$110
City of Phoenix*	$ 71	$ 71
Sunrise & Westend Water Co	$ 82	$ 82
City of Surprise	$106	$106
West Maricopa Combine	$ 98	$ 98
Average	**$107**	**$110**

*No allocation available for recharge, already have complete use

Legal/Regulatory Considerations: Recovery of water from the waterlogged area may require special permits and possible regulatory changes from the PAMA.

Public Acceptability: Hydraulic benefits in both the waterlogged area and sponsoring entity's area should make this an acceptable concept.

Timeliness: Would take at least 5 years to permit and construct.

Adaptability: Project is expandable up to the south valley CAP allocation. Water yields in the waterlogged area and costs will be the limiting factors.

Environmental Acceptability: Preservation of surface flow in the Gila River will be a concern.

NT13: SRP'S FUTURE NEW RIVER/AGUA FRIA UNDERGROUND STORAGE AND RECOVERY PROJECT (NAUSRP)[25]

DESCRIPTION: SRP is planning to construct a 300-acre westside underground recharge facility. Approximate location is at the tail end of the Grand Canal near the confluence of the New and Agua Fria Rivers. The NAUSRP will be utilized for the long-term storage of waters conveyed by the CAP and SRP to the Phoenix metropolitan area. It would also be used for short-term storage and management of supply/demand peaks.

The facility will be built in two phases. The first phase is slated to begin operation by December, 2001. The second phase is slated for some time in 2004. Annual capacity of phase one will be 30,000 acre-feet. Annual capacity of phase two is projected at 70,000 acre-feet. Expected total capacity is 100,000 acre-feet per year in recharge. Final determinates to capacity will be State permit, capacity of SRP's transmission system, aquifer recharge capacity, and management of potential project impacts.

The first phase basin construction costs, including the canal turnout structure, are projected to be $1.5 million. Second phase basin construction costs are projected to reach $1.3 million.

Ownership and use of the facility is expected to be similar to the east valley recharge facility (GRUSP) with participants paying capital construction and O&M costs based on their share of water entitlements to the facility. Operations and maintenance of the facility will be performed by SRP.

SUMMARY: Approximately 100,000 acre-feet of total annual recharge capacity will be available at NAUSRP by 2004. First phase capacity of 30,000 acre-feet is expected to be available by the end of 2001.

Lack of CAP/SRP Interconnect rights may prove problematic for some WESTCAPS members to transport CAP allocations to the west valley recharge site. However, agencies with Interconnect rights could lease part of their capacity to WESTCAPS members to move CAP water. Other considerations for utilization of NAUSRP should include implementation of water exchanges and/or use of reclaimed water.

In this option, it is assumed that all WESTCAPS members could collectively recharge 50,000 acre-feet per year of CAP water at the facility and continue to pump groundwater to meet demands. If ADWR allows WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, the cost for implementing this option ($137.10 per acre-foot) would replace the CAGRD fee of $188 per acre-foot. If ADWR does not allow WESTCAPS members to use the recharged water to demonstrate an Assured Water Supply, this option would simply represent an additional cost to WESTCAPS members. This option would allow a water provider to accumulate CAP water credits that could be used to write off groundwater pumping with ADWR and to potentially help demonstrate an Assured Water Supply. Whether or not the credits can actually be used to demonstrate an Assured Water Supply or to write off future groundwater pumping depends upon the individual circumstances of the water agency involved. Water providers facing water quality issues could potentially avoid anticipated wellhead treatment costs by utilizing this option. On a regional basis, the change in economics is small for two reasons. First, there is no reduction groundwater pumping since the recharged CAP water would be "recovered" through the use of wells. Secondly, The CAGRD fee of $188 per acre-foot is still assessed on most of the projected groundwater pumping by 2025.

OPTION CONSIDERATIONS:

CAP Utilization: This option will provide capacity to enhance WESTCAPS use of its existing CAP allocations and could be used as an Annual Storage and Recovery facility by the municipalities.

Additional Renewable Resource Utilization: This option could increase utilization of other renewable supplies available to the West Salt River Valley, such as reclaimed water.

Groundwater Decline: This option would have direct hydrologic benefit to the aquifer in the West Salt River Valley through active mitigation of Luke's cone of depression.

Financial Viability: Costs are accrued and charged to participants based on entitlement and actual acre-feet stored on their behalf. Participants must pay for their CAP allocation, recharge facility costs, and about eight dollars per acre-foot use rate. WESTCAPS members that are not a partner in the SRP / CAP Interconnect would have to pay an additional $9.00 per acre-foot to lease capacity in the Interconnect. The cost for WESTCAPS members to recharge the entire unused portion of their CAP allocations is as follows:

$ 10.00 ac-ft to wheel through SRP canals
$ 9.00 ac-ft to use the interconnect (except Peoria, Glendale and Phoenix)
$ 13.00 ac-ft to recharge*
$ 54.00 ac-ft to pump CAP water (energy and fixed)
$ 48.00 ac-ft Capital costs for CAP allotment
$ 134.00 ac-ft in overall O&M costs

$ 3.10 ac-ft Capital cost for WESTCAPS members (total capital cost / total water recharged by 2025)

$137.10 ac-ft overall cost to WESTCAPS members

$2000.00 annual administrative fee to SRP

*Based on GRUSP. NAUSRP recharge rate may be higher.

Each WESTCAPS members unused portion of their CAP allocation is recharged up to but not exceeding their estimated Base Case water demand. Five percent of the recharged amount is cut to the aquifer, so groundwater credits are received on the remaining 95%. The following table shows that this option is economically more favorable than the Base Case.

Legal/Regulatory Considerations: NAUSRP will meet all regulatory and permitting statutes.

Public Acceptability: Recharge is a highly acceptable mode of water management due to its benefits to the groundwater and future water users.

- Luke cone of depression
- Subsidence control
- Improved groundwater quality

Potential public recreational uses/greenbelt facility.

Timeliness: This is a near-term option with operation in the 2001-2004 timeframe.

Adaptability: West Valley location is a plus. NAUSRP could be part of a totally integrated regional solution allowing for recharge of not only CAP water, but also Annual Storage and Recovery (AS&R) water, reclaimed water, etc.

Environmental Acceptability: Addresses groundwater depletion by recharge directly to underground aquifer in West Valley and directly mitigates Luke cone of depression, land subsidence and groundwater quality.

Least Cost Analysis Comparison of NT13 to Base Case
Dollars Per Acre-Foot (Normalized To The Year 2000)

WESTCAPS member	NT13	Base Case
Arizona Water Company	$133	$132
Town of Buckeye	$138	$139
Citizens Utility Company	$ 66	$ 69
City of Glendale*	$109	$109
City of Goodyear	$175	$177
LPSCO	$ 76	$ 80
City of Peoria	$105	$110
City of Phoenix*	$ 71	$ 71
Sunrise & West End Water Co.	$ 79	$ 82
City of Surprise	$103	$106
West Maricopa Combine	$ 98	$ 98
Total	**$107**	**$110**

* No unused CAP allocation available for recharge.

LT1: SROG AGUA FRIA LINEAR RECHARGE PROJECT[30]

DESCRIPTION: The multi-city Subregional Operating Group (SROG) and the U.S. Bureau of Reclamation (Reclamation) are currently studying the Agua Fria Linear Recharge Project as part of two-part plan for reuse of 91 Avenue Wastewater Treatment Plant reclaimed water. A feasibility study was completed in 1997 and follow-up studies are on-going. The current concept for the project is to modify the Agua Fria channel to create recharge facilities that could include berms constructed with riverbed materials. The berms would channel the flow to increase contact with the river bed to enhance infiltration. The structures would not be permanent and would washout during flooding events. The project would qualify as a constructed recharge facility and be eligible for 100 percent recharge credits.

The project is located on a 10-mile stretch of the river from Bell Road on the north to Thomas Road on the south, with water discharged to the river at one-mile intervals (See attached map). The project would include the construction of major pumping and pipeline facilities from the 91st Avenue WWTP to as far north as Bell Road. The 1997 feasibility study evaluated a project capacity of 90,000 MGD (Average volume of 67,000 AF). However, current thinking is that approximately 40,000 AF/YR of reclaimed water would be recharged in the project with the remainder of 91st Avenue WWTP water being reused in other ways, including the Tres Rios Project.

The advantages of the Linear Recharge Project are that it:

- Minimizes mounding and water quality impacts on any one area.

- Uses high recharge rates of the river sediments

- Minimizes land requirements

SUMMARY: SROG prepared the feasibility study as part of an application to Reclamation for Federal funding pursuant to the Reclamation Wastewater and Groundwater Study and Facilities Act of 1992. The study found the project to be technically feasible, financially feasible, and a cost-effective alternative for development of reclaimed water sources. The estimated project capital cost (1997 dollars) is $85.9 million (90,000 MGD capacity). Annual operation and maintenance costs are projected at $2,700,000 for 67,000 AF/YR of recharge ($40 per AF, 1997 dollars). Currently, SROG, project consultants, and Reclamation are conducting meetings to seek public input on the project from West Valley stakeholders. SROG has authorized expenditures for additional preconstruction studies and public participation efforts.

OPTION CONSIDERATIONS:

CAP Utilization: It is very likely that additional recharge capacity could be incorporated into this project for use by WESTCAPS members to recharge CAP allocations. The project is well located for potential mitigation of groundwater level declines in the West Valley. The northern terminus of the project is at Bell Road, about 3 miles west of the center of the existing and projected area of greatest groundwater levels declines in the WESTCAPS Planning Area.

The Arizona Canal and the Beardsley Canal are two potential conveyance systems that could be utilized to move water to within approximately 6 miles of the Agua Fria River at Bell Road (northern end of the project). A gravity pipeline could deliver water from a Beardsley Canal turnout to the Agua Fria Channel. A pipeline and pump station would be needed to deliver CAP water through SRP's Arizona Canal to the project. CAP/Reclaimed water exchanges between WESTCAPS members and SROG members are also a possibility. Exchanges could eliminate the need for the pipelines discussed above.

Renewable Resource Utilization: This option increases the use of additional renewable resources.

Financial Viability: The project is a cost-effective way to recharge 91st Avenue WWTP reclaimed water and conserve a vital resource that would otherwise be lost or underutilized. Whether or not the project is an attractive alternative for recharge of WESTCAPS members CAP allocations will depend on the cost of other recharge project options available to WESTCAPS members.

Legal / Regulatory Considerations: SROG consultants have evaluated the numerous permits and approvals that would be required to construct the project. This work indicates that there are no current regulations or standards that would prevent the development of the project.

Public Acceptability: SROG has conducted a public information program for the linear recharge project. Presentation have been made to many groups, including technical groups at seminars and conferences, non-technical groups and several meetings held for the general public in the West Valley. In general, a good deal of public support for the project has been generated.

Timeliness: Construction of the project would most likely not begin until the 2005/2006 time frame. Time is required to complete the public participation process, complete an environmental impact study or assessment, and design and construct the project. The project would not be constructed until after the Tres Rios Project is constructed.

Adaptability: This project could accommodate of recharge of WESTCAPS members CAP water with some modification of the recharge facility design.

Environmental Acceptability: The project is well located to recharge water very close to the worst area of groundwater level decline in the West Valley. This addresses groundwater depletion and land subsidence issues.

TO1: SALT RIVER PROJECT CANAL SYSTEM[25]

The SRP system of canals and reservoirs was built over many decades to provide a dependable supply of water to the Salt River Valley and encourage agricultural development. The canals follow the paths of the ancient Hohokam civilization. The construction of Theodore Roosevelt Dam, SRP's first dam, was authorized under federal legislation as set forth in the National Reclamation Act of 1902. The 1902 law provided government loans "to reclaim the arid lands of the West" using irrigation projects. Theodore Roosevelt Dam and Granite Reef Diversion Dam were built to provide a dependable water supply for the Phoenix valley. In 1917, the Bureau of Reclamation relinquished the SRP cams and canal system operation to the Salt River Water Users Association (SRP), which still operates these facilities for the federal government (Location Map, Figure II-4).

The SRP water service area is limited to shareholder lands – those lands that were offered a collateral for the construction of Roosevelt Dam. Water supplies are delivered from reservoirs constructed on the Verde and Salt River watersheds and well water located in the SRP service areas. A CAP interconnect turnout is located at the intersection of the CAP and SRP Granite Reef Diversion Dam. The water from the CAP can be delivered to either the Arizona (north) or South transmission canals.

Annually, in the fall and winter, SRP ceases water deliveries for a period of approximately 30 days. This is done alternately on the north and south transmission canals and known as canal dry-up. During this dry-up period, various repairs, cleaning, and construction projects are performed on the SRP system.

In the following are descriptions of SRP's major canals (transmission canals) and laterals (distribution canals) accessible by the WESTCAPS.

The Arizona Canal, representing the northern boundary of the SRP, is 38-miles-long and has historically provided water to the far north portion of SRP's member lands. The Arizona Canal starts at Granite Reef Diversion Dam and terminates in the area of 75th Avenue and Paradise Lane at SRP's Lateral 20. The Arizona Canal also supplies water to SRP's Grand Canal via a Crosscut Canal in the area of 64th Street. Along with agricultural and urban water deliveries, three municipal water treatment plants receive water directly off the Arizona Canal: Two owned by the city of Phoenix, one owned the city of Glendale. A fourth water treatment plant is under construction by the city of Peoria located in the area of 73rd Avenue. The city of Scottsdale is studying the feasibility of locating a fifth plant along the Arizona Canal in the area of Hayden Road.

Use of the Arizona Canal for the transport of CAP or other non-SRP water by WESTCAPS' members beyond the Crosscut Canal is limited due to the relatively high demands and capacity constraints now placed on the Arizona Canal by municipal, agricultural and urban users.

The Grand Canal, is fed from the Arizona Canal via the Crosscut Canal located in the area of Indian School and 64th Street. Termination of the Grand Canal is at the New River via a drain north of Bethany Home Road. Tempe's municipal water treatment plant takes water off the Crosscut Canal in the McKellips road area. No other water treatment plants are located on the Grand Canal. The Grand Canal provides water to the SRP member lands located north of the Salt River and south of member lands serviced by the Arizona Canal. The Grand Canal also receives return irrigation flows from laterals off of the Arizona Canal. Capacity constraints, lower water quality (due to return flows), and distance from the CAP headworks (water losses) make the Grand Canal a poor candidate for consideration in transport of WESTCAPS' CAP allocations for water treatment plants.

The SRP is conducting a canal capacity study of its entire system with results expected to be available by mid-2001. Based on the results of the SRP study, reconsideration of the SRP system as a raw water supplier to water treatment plants may be warranted.

TO2: MARICOPA WATER DISTRICT CANAL SYSTEM[21,22]

WESTCAPS contracted with Bookman-Edmonston Engineering to conduct two studies evaluating the canal capacity and potential capital costs to transport renewable supplies through the Maricopa Water District canal system. The findings of these studies are as follows.

The Beardsley Canal, owned and operated by Maricopa County Municipal Water Conservation District No. 1 (Maricopa Water District or MWD), is one of several options that WESTCAPS is considering for conveying CAP water to its members. The Beardsley Canal is approximately 33 miles long and has an initial reach capacity of approximately 300 cfs. The canal was constructed in the early 1930s and is primarily a shotcrete-lined, trapezoidal-shaped canal with varying cross-section dimensions. No as-built drawings are available for the canal, and actual flow capacity by reach is unknown due to the age of the canal and structures, and the modifications that have been made over the years.

Bookman-Edmonston Engineering, Inc. (B-E) contracted to study the Beardsley Canal. The goals of this study were to:

- Determine the capacity of the Beardsley Canal.
- Determine how much of the capacity is currently used by MWD.
- Determine the unused capacity difference (i.e., how much could be available for transporting CAP and other water for WESTCAPS' members without impacting MWD operations.)

B-E first undertook a survey of the Beardsley Canal and used the data collected to construct a hydraulic analysis using the HEC-RAS software. The model was calibrated using known flows and water surface elevations. Following calibration, the flows were increased in the model on a reach-by-reach basis to determine the estimated maximum capacity.

In order to estimate how much of the Beardsley Canal capacity may be available for WESTCAPS members, B-E collected MWD water use information for five representative years (1988, 1993, 1994, 1995, and 1996)..

Based on water use information for the five representative years, unused or available canal capacity was estimated for each identified reach. Losses due to evaporation and seepage were estimated and incorporated in the analysis. It was assumed that there were no deliveries during December and January, the canal dry-up period. Figure 15 depicts the estimated available capacity in the Beardsley Canal based on a high MWD demand year. Table 4 shows the estimated available capacity on a reach-by-reach basis for the five-year study period.

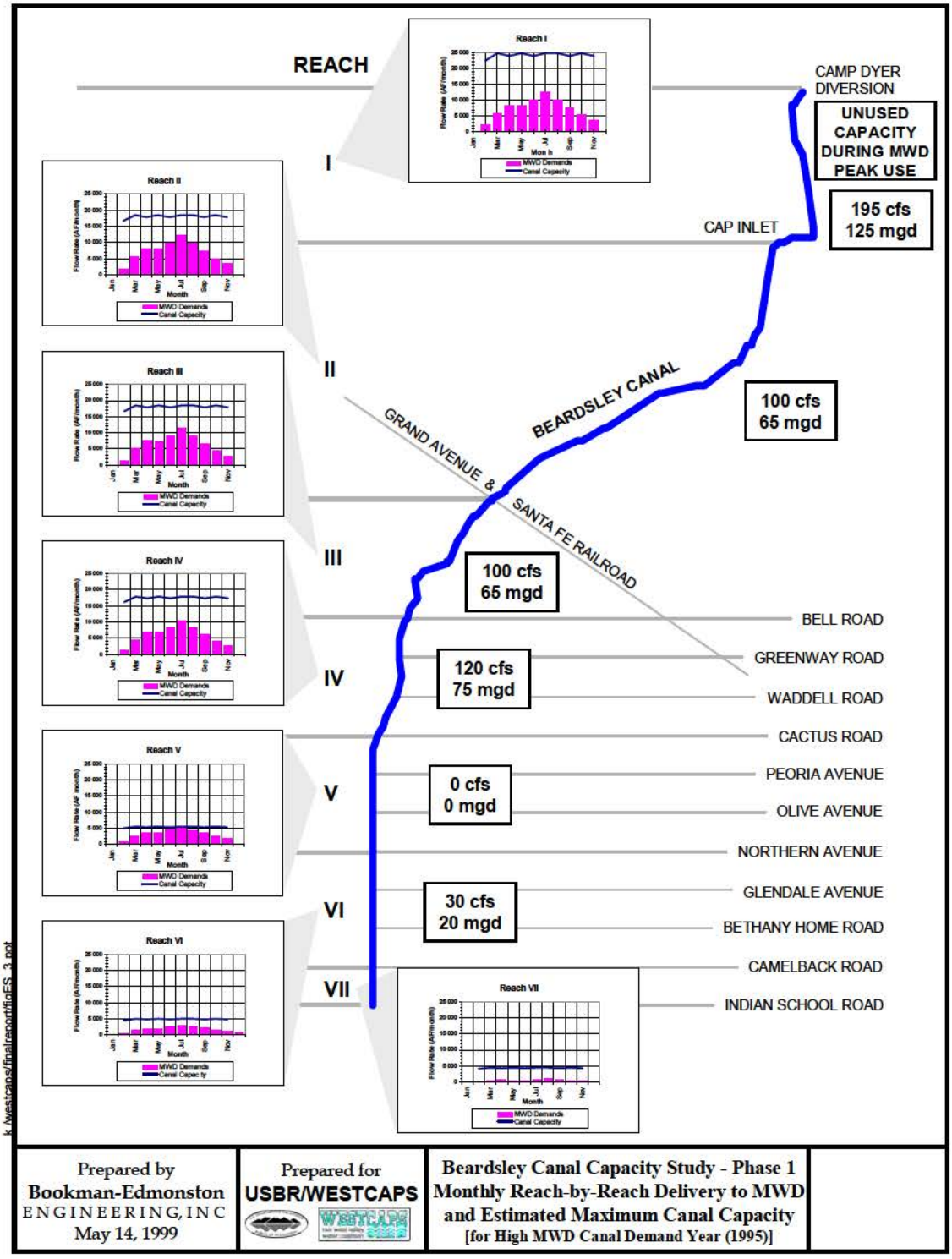


Figure 15.---Monthly Reach-by-Reach Deliver to MWS and Estimated Maximum Canal Capacity

Beardsley Canal Capacity Study - Phase 1 Estimated Available Capacity Remaining in the Beardsley Canal For the Five-Year Study Period (Acre-Feet)						
Reach No.	**Reach Description**	**1988**	**1993**	**1994**	**1995**	**1996**
I	Lake Pleasant to CAP Inlet	193,700	185,900	178,500	166,900	174,200
II	CAP Inlet to Grand Avenue	136,300	128,700	121,300	109,700	116,800
III	Grand Avenue to Bell Road	142,000(1)	134,400(1)	127,000(1)	115,400(1)	122,500(1)
IV	Bell Road to Cactus Road	137,400(1)	132,900(1)	126,300(1)	115,200(1)	119,300(1)
V	Cactus Road to Northern Avenue	33,200	31,900	27,700	20,900	20,900
VI	Northern Avenue to Camelback Road	36,000(1)	36,200(1)	33,500(1)	30,500(1)	30,100(1)
VII	Camelback Road to Indian School Road	41,000(1)	40,600(1)	39,600(1)	39,000(1)	39,300(1)

Note:
1. Reach capacity currently unattainable because upstream reach unable to deliver total quantity.

Table 4.---Estimated Available Capacity Remaining in the Beardsley Canal

In the second phase of the study (Phase 2), Navigant Consulting, Inc. (NCI) was asked to determine, on an appraisal-level, the cost of canal modifications which would be necessary to improve the capacity to five pre-determined flow regimes. These flow regimes are 50,000, 100,000, 150,000, 200,000, and 300,000 acre-feet per year, in addition to the volume currently delivered to MWD users. Five reaches of the canal were determined for the study of each flow regime. They are:

- From Camp Dyer Diversion to the CAP Inlet;
- From the CAP Inlet to Grand Avenue;
- From Grand Avenue to Cactus Road;
- From Cactus Road to Camelback Road; and
- From Camelback Road to the end of the canal (Thomas Road).

Each flow regime was converted to a constant flow rate considering MWD peak month deliveries (as experienced in July 1995). These values are presented in Table 5. The modifications for each structure were determined through HEC-RAS hydraulic models for each flow regime. Costs of modifications were summarized for each reach and for each flow regime.

Canal Reach	50,000 af	100,000 af	150,000 af	200,000 af	300,000 af
Reach 1 - Lake Pleasant to CAP Inlet	285 cfs 185 Mgd	370cfs 240 Mgd	455 cfs 295 Mgd	535 cfs 345 Mgd	705 cfs 455 Mgd
Reach 2 - CAP Inlet to Grand Ave.	285 cfs 185 Mgd	365 cfs 235 Mgd	450 cfs 290 Mgd	530 cfs 340 Mgd	700 cfs 450 Mgd
Reach 3 - Grand Ave. to Cactus Rd.	275 cfs 175 Mgd	355 cfs 230 Mgd	440 cfs 285 Mgd	520 cfs 335 Mgd	690 cfs 445 Mgd
Reach 4- Cactus Rd. to Camelback Rd.	170 cfs 110 Mgd	255 cfs 165 Mgd	340 cfs 220 Mgd	420 cfs 270 Mgd	590 cfs 380 Mgd
Reach 5 - Camelback to Thomas Rd.	105 cfs 70 Mgd	185 cfs 120 Mgd	270 cfs 175 Mgd	350 cfs 225 Mgd	520 cfs 335 Mgd

Table 5.---Flow Rates for Delivery Quantities By Canal Reach at Peak MWD Demands (1995)

Capital Cost of Improvements

The costs of capital improvements for each of five reaches and five flow regimes of the Beardsley Canal are displayed in Table 6. No capital improvements would be required to deliver an additional 50,000 acre-feet per year to WESTCAPS members at Cactus Road. Approximately $5 to $6 million in capital improvements would provide for the delivery of 200,000 acre-feet per year to Cactus Road, or for the delivery of 100,000 acre-feet to Camelback Road.

Beardsley Canal Capacity Study - Phase 2
Capital Costs of Improvements to Achieve Minimum Delivery Requirements[(1)]

Canal Reach	50,000 af	100,000 af	150,000 af	200,000 af	300,000 af
Reach 1 - Lake Pleasant to CAP Inlet	$0	$0	$934,000	$1,140,000	$12,721,000
Reach 2 - CAP Inlet to Grand Ave.	$0	$13,000	$30,000	$2,785,000	$27,168,000
Reach 3 - Grand Ave. to Cactus Rd.	$0	$326,000	$871,000	$1,187,000	$12,769,000
Reach 4- Cactus Rd. to Camelback Rd.	$4,805,000	$5,314,000	$7,495,000	$7,854,000	$9,782,000
Reach 5 - Camelback to Thomas Rd.	$1,697,000	$1,814,000	$2,330,000	$2,442,000	$3,084,000
Total Cost	$6,502,000	$7,467,000	$11,660,000	$15,408,000	$65,524,000

Table 6.---Capital Costs of Improvements to Achieve Minimum Delivery Requirements

[(1)]With 1995 MWD peak use, costs include 20 percent for contingencies; 15 percent for engineering and administration. All costs are in 1999 dollars. The current 9/99 construction cost index is listed at 6117 based on year 1913 (Engineering News Record). Right-of-way costs are not included.

TO3: LAKE PLEASANT ROAD WATER CONVEYANCE SYSTEM[35]

As a part of the Sun Cities/Youngtown Groundwater Savings Project, Citizens will construct a pipeline down Lake Pleasant Road from the CAP canal to Citizens' water campus located roughly at Deer Valley Road between 107th and 115th Avenues.

This pipeline can be oversized to not only include capacity for the Sun Cities/Youngtown Groundwater Savings Project, but for other nearby demands. In this analysis, Citizens assumes two volumes. The first volume is related to a 30 inch pipeline which would provide an average capacity of 16,900 acre-feet. The second volume, a 36 inch pipeline, would provide an average capacity of 24,245 acre-feet. These volumes includes the original capacity (6,651 acre-feet) for the Sun Cities/Youngtown Groundwater Savings Project and additional capacity (around 5,000 acre-feet) to meet 100% of the golf course demands served by the Sun Cities/Youngtown Groundwater Savings Project.

The incremental capacity will be an average of 5,339 acre-feet for the 30 inch pipeline and an average of 12,684 acre-feet for the 36 inch pipeline. The following costs are estimated for the project:

Facility	**30" Pipeline**	**36" Pipeline**
	1000 $	**1000 $**
Transmission Pipeline and Turnout	$2,148	$3,392
Contingency, Engineering, Administration and Legal	$1,181	$2,163
Total Capital Cost	***$3,329***	***$6,095***

The incremental cost needed to increase the capacity of the facility to receive the additional quantities of water and some yet to be identified portion of the base cost represents the overall cost of this option to outside parties.

SUMMARY: As presented in this analysis, the Lake Pleasant Road Conveyance System will provide 17,000 acre-feet of CAP water to a centrally located water campus at Deer Valley Road between 107th and 115th Avenues. This water will be untreated and could meet non-potable demands directly or be conveyed to a nearby treatment facility to be treated to drinking water standards. This project brings a substantial amount of CAP water to an area experiencing the most severe declines in the west Salt River Valley.

OPTION CONSIDERATIONS:

CAP Utilization: This option increases the utilization of the unused portion of CAP subcontracts controlled by members of WESTCAPS by a range of roughly 5,000 to 13,000 acre-feet.

Renewable Resource Utilization: This option will not directly increase the utilization of renewable resources other than CAP water, except to the extent that it could facilitate an exchange that would include CAP water and some other supply.

Groundwater Decline: Since this option simply transports the CAP water supply to the intended user, it does not, in itself, take action to mitigate declining groundwater levels in the northwest Salt River Valley. This option would could be mechanism to get the water supply to an option that would help mitigate declining groundwater levels.

Financial Viability: The incremental cost of expanding the conveyance pipeline to 30 inches is roughly $3.3 million. This increased capacity would provide an additional 5,000 acre-feet. At $3.3 million, the cost to construct the additional capacity would be slightly over $620 per acre-foot. In comparison to the original cost of the facility, roughly $2,286 per acre-foot, the incremental costs of the expansion would be slightly over 25% of the base costs. This appears to provide some financial viability for expansion of the project. The incremental cost of expanding the facility to 36 inches is expected to be around $6.1 million. Over an average capacity of 12,684 acre-feet, the additional capacity will cost $480 per acre-foot to construct or 21% of the base costs.

In comparison to other projects, however, per acre-foot cost may appear exorbitant. The demands in the area will not warrant any additional expansion.

The project costs do not include the cost to divert the CAP water from the water campus and deliver it to another entity, for example, the City of Peoria or Sunrise Water Company.

Legal/Regulatory Considerations: To the extent that a private water company like Sun City Water Company or Sun City West Utilities Company participate financially in the project, the Commission must approve the project, before Citizens will be prepared to invest the capital to plan, design and construct the project. Should the Commission approve the project and Sun City Water Company or Sun City West Utilities Company ultimately finance, construct and own the pipeline, the Commission could structure the costs of participating in the project such that all costs, not just the incremental increase, of the project would be placed on outside parties.

Public acceptability: This project should be positively by the public. The incremental costs are manageable. The project is located in an area that will best mitigate the 83rd Avenue and Bell Road cone of depression.

Timeliness: An expanded pipeline could be constructed when the Sun Cities/Youngtown Groundwater Savings Project is constructed sometime around 2002 or 2003. While both projects will take considerable time to plan, design and construct, this time frame is meaningless from a hydrologic perspective.

Adaptability: This project is very adaptable. The pipeline will bring the water to the heart of an existing high water demand, urbanized area. From there, the water could be used in a variety of ways. Additionally, the pipeline will be constructed in a corridor where substantial growth potential exists. New uses could be diverted north of the water campus.

Environmental Acceptability: Since this project could eliminate existing groundwater pumping, the aquifer would realize an immediate benefit as opposed to offsetting a future demand. This will free up more groundwater for proving physical availability under the assured water supply rules. Additionally, this project will bring CAP water for projected uses north of Sun City and Sun City West.

Potential Regional Strategies

WESTCAPS identified all of its available options to it for using CAP water and other renewable water supplies in the WSRV. From these options, WESTCAPS developed six potential infrastructure strategies (see Figure 16). A groundwater model analysis was completed for each strategy. In addition, a present worth analysis was also performed for each strategy. It was the intent of WESTCAPS to select one of these strategies as its collective vision of the water infrastructure that should be in place by 2025 to meet projected water demands. In reviewing the potential strategies and how they performed in the analysis, some points considered were:

- Potential Strategy A represented a regional strategy whereby all future water demands are met solely through the use of WTPs.

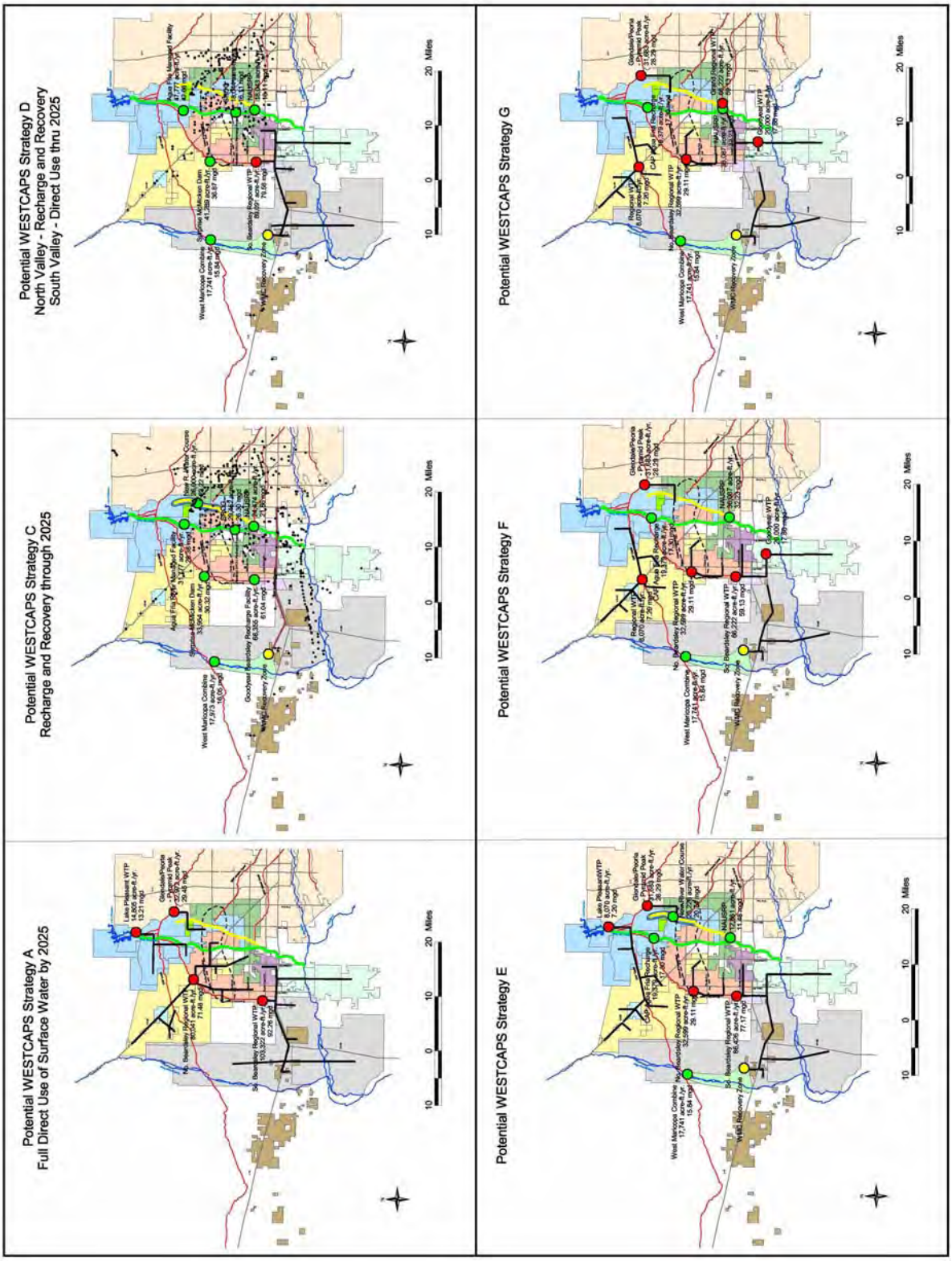


Figure 16.---Potential WESTCAPS Strategies

- Potential Strategy C represented a regional strategy whereby all future water demands are met solely through the use of recharge and recovery projects.

- Potential Strategy D represented two subregional strategies. The northwest SRV future water demands would be met through recharge and recovery projects. The southwest SRV future water demands would be met through water treatment plants. Except for Buckeye, whose demands would be met using WMC's recharge and recovery project.

- Potential Strategy E represented a strategy whereby future water demands are met through the use of Phoenix's Lake Pleasant WTP, an expansion of Glendale's Pyramid Peak WTP, a new WTP located on MWD's Beardsley Canal, and large recharge and recovery projects strategically located near the groundwater cone of depression in the northwest SRV. Buckeye would be served by WMC's recharge and recovery project.

- Potential Strategies F and G represented strategies whereby future water demands are met through the use of either Phoenix's Lake Pleasant WTP or a new WTP off the CAP Canal, an expansion of Glendale's Pyramid Peak WTP, a new WTP located on MWD's Beardsley Canal, a pump and treat facility located in Goodyear, and large recharge and recovery projects strategically located near the cone of depression. Buckeye would be served by WMC's recharge and recovery project.

- In potential Strategies F and G, another member of WESTCAPS would cost share in the pump and treat facility, be charged by the ADWR for a portion of the groundwater pumping at the facility, and, in exchange, would receive a portion of Goodyear's CAP allocation.

- Direct use of surface water supplies WTPs and groundwater savings facilities have the most immediate positive effect towards reducing groundwater decline (wells are turned off).

- Recharge projects in the area of hydrologic impact would be the next best strategy towards reducing groundwater decline. The location, timing, and amount of recovery through the use of wells will reduce the effectiveness of recharge projects in mitigating groundwater decline.

Some key issues identified by the Technical Committee were:

- Each regional solution assumes that there will be sufficient surface water supply to meet the projected future demand. Is this a valid assumption?

- In light of groundwater decline and groundwater quality issues, is recharge and recovery of surface water supplies a regional strategy that WESTCAPS would really want to pursue, or is it an interim strategy to be used until surface water treatment plants are in place?

Recommended WESTCAPS Strategy[20]

The WESTCAPS Technical Committee met on April 14, 2000 to discuss and prioritize the evaluation criteria that would be used to recommend a WESTCAPS strategy for the best use of CAP water available to the West Salt River Valley. The WESTCAPS Technical Committee had identified six potential regional solutions that would reduce the members' reliance on groundwater and utilize their CAP allocations. They met again on May 17, 2000 and used the evaluation criteria to rate the performance of the potential regional solutions and the base case. Now and in the future the Technical Committee will refer to these potential regional solutions as "strategies." It was the Technical Committee's intent to select one strategy as its collective vision of the water infrastructure that should be in place by 2025 to meet projected water demands. Their recommendation will be forwarded to the General Committee, which will make the final decision.

A computer-assisted decision support tool called CoNexus was used to facilitate discussion and selection of a preferred strategy. The CoNexus technology uses individual remote terminals or keypads that allowed each participant to simultaneously input their preferences. Through the use of computer analysis, the polling results were immediately presented back to the group for evaluation and discussion.

These sessions were designed and facilitated by Dr. Martha Rozelle of the Rozelle Group, Ltd., and Dr. Mary Gendron operated the CoNexus system. This report documents the process and presents the results.

Twelve people participated at the April 14, 2000 meeting. In order to better understand the group's perspectives on the evaluation criteria, demographic information about the group was collected at the beginning of the session. This information is shown below:

Are you a member of the:

Type of Group	Number of Participants
Technical Committee	6
Advisors	5
Other WESTCAPS Members	1

Which portion of the West Salt River Valley do you represent?

Type of Group	Number of Participants
South WSRV	3
North WSRV	4
Entire WSRV	5

Which entity do you represent?

Type of Group	Number of Participants
City or Town	3
Private Water Company	4
Water Purveyor	2
Federal Agency	1
Advocacy Group	2

The Technical Committee had met several times previously and identified a list of possible evaluation criteria. At the start of the April 14th meeting the facilitator helped the group narrow the list of criteria to those which would clearly distinguish among the strategies. The group agreed on the definitions of the six criteria:

CAP Utilization - the degree to which the potential regional solution allows for full use of CAP allocations.

Groundwater Decline - the degree to which the potential regional solution mitigates groundwater decline in the northwest Salt River Valley.

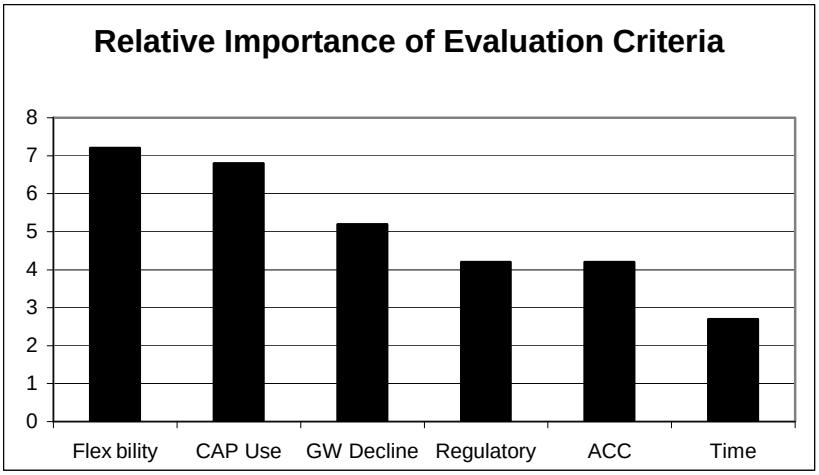
Regulatory Considerations - the extent to which the potential regional solution fits within the existing ADWR and ADEQ regulations.

Timeliness - the degree to which the potential regional solution can be implemented sooner than later.

Flexibility – the degree to which the potential regional solution can adapt to future water quality considerations, changes in demand centers, and changes in supply sources.
ACC Acceptability – the extent to which ACC approval can be achieved.

Prioritization of Selection Criteria

The six criteria were prioritized using a dual-paired comparison technique in the CoNexus electronic polling process. For every paired combination of criteria participants answered the question, *"Assume the best WESTCAPS strategy has been built and is operating, which of these criteria was most important in reaching that goal and how important was it?"* Every possible combination was compared and a relative ranking of the criteria was calculated based on the responses of the participants. The result of this ranking is shown in the following chart.



The most important criteria to the participants were ***flexibility and CAP utilization. Flexibility*** rated the highest, though some private water companies felt it was less important since their water systems will be completed sooner than those of other members.

Some private water companies rated ***CAP utilization*** low because they felt all strategies would make full use of the memberships' CAP allocations. They were willing to let the Central Arizona Groundwater Replenishment District (CAGRD) be responsible for CAP utilization, thereby allowing the membership to continue pumping groundwater.

Groundwater decline rated third highest in priority. However members in the southwest portion of the Salt River Valley believed decline to be less of an issue, especially in waterlogged areas.

Regulatory considerations and ***ACC acceptability*** were rated equally. Both were given more emphasis by the private water companies than by municipal interests. The criteria of least priority to the full group was ***timeliness.*** Municipal interests rated it higher than private water companies because they want to reduce reliance on groundwater and need water infrastructure in place within five years. Private water companies are not as concerned with either maintaining or obtaining designation of an assured water supply.

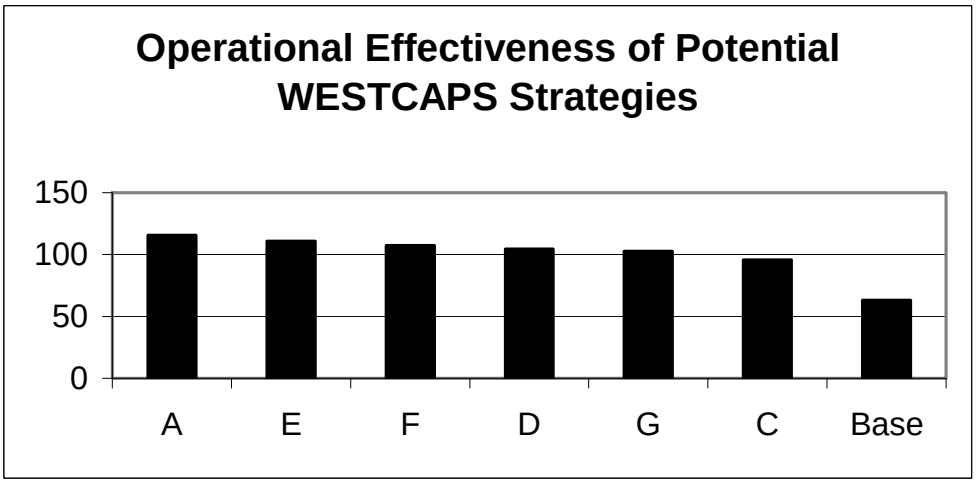
The Technical Committee approved the revised evaluation criteria and the resulting ranking.

Evaluation of WESTCAPS Strategies

At their May 17th meeting the Technical Committee rated each of the strategies on a scale of one to nine against each criterion. A rating of "9" indicated the highest level of performance and a "1" the lowest.

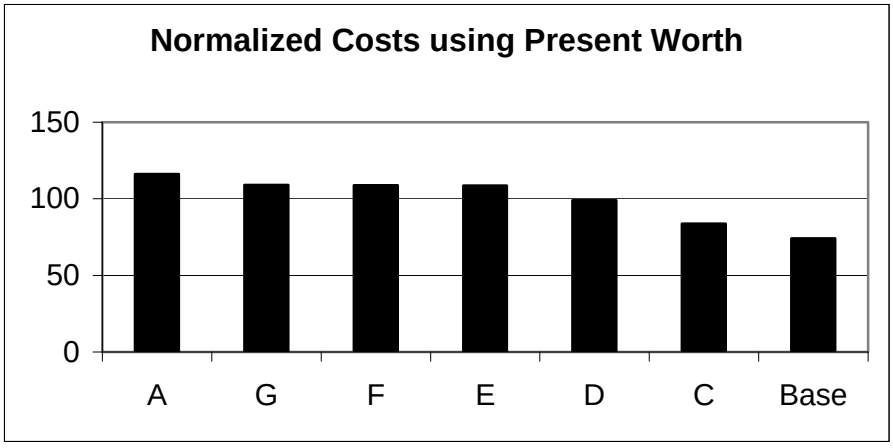
The actual ratings for strategies are shown in Tables 1 and 2. The ratings were multiplied against the relative weight or importance of each criterion and summed to obtain an overall score, which represents the operational effectiveness or the "worth" of each strategy. Except for the base case, all strategies have a similar performance on the weighted criteria. The relative operational effectiveness is illustrated below.

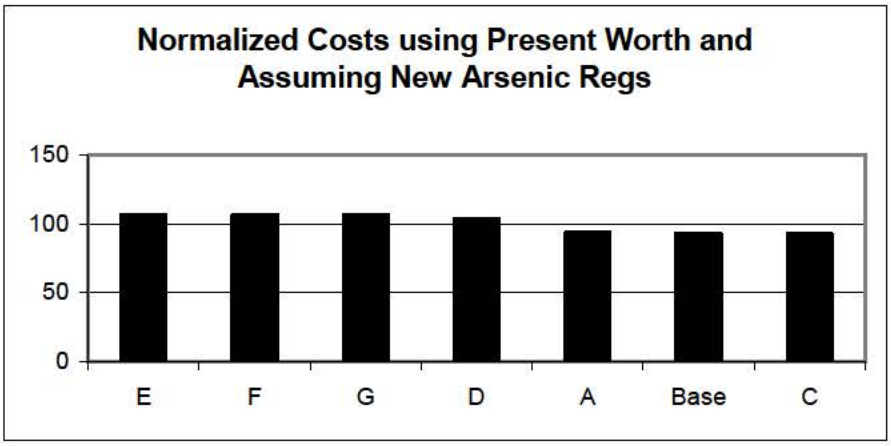
The above rankings are calculated by multiplying the strategy ratings for each evaluation criterion by the weighted importance of that criterion and summing the products of the evaluation criteria to obtain a total score. The scores were then normalized by dividing the individual strategy scores by the average score



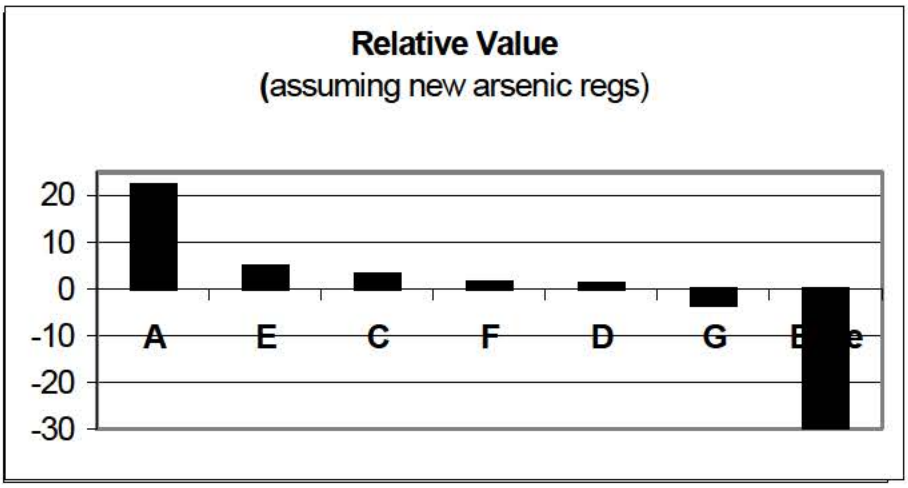
for all strategies and multiplying by 100. A score of 100 represents the average of all of the strategies. A score greater than 100 is above average and a score less than 100 is below average. Normalization insures that the relationship between the numbers in a set is maintained, but changes the actual numbers into sets which can be subtracted from one another.

The cost of each of the strategies and the base case was also normalized by dividing the individual strategy cost by the average cost of all strategies and multiplying by 100. Again, a normalized score of 100 represents the average cost for strategies. A score greater than 100 represents a cost greater than the average cost, and a score of less than 100 is below the average cost. The strategies were further evaluated using two sets of present worth costs. The second set of costs assumed new EPA standards limiting arsenic levels to 5 parts per billion. Both sets of costs are show in the following charts.





Because the operational effectiveness rankings and the cost rankings have both been normalized to 100, it is possible to assess the relative value or the net value. Net value can be defined as the greatest operational effectiveness for the least cost. This value is determined by subtracting the cost score from the operational effectiveness score for each strategy. In determining net value the CoNexus program gives equal weight to cost and operational effectiveness scores. Since a high score for operational effectiveness and a low score for cost is most desirable, the greater the positive difference, the better the relative value as shown on the next two charts. Some of the Committee and advisors at the May 17th meeting were concerned that too much weight was being assigned to the "cost" factor. Their ultimate recommendation took this concern into consideration.



Recommended WESTCAPS Strategy:

On June 30, 2000, the WESTCAPS General Committee met to consider a recommendation proposed by its Technical Committee to adopt a direct delivery strategy, known as the "WESTCAPS Strategy" as the best plan to fulfill WESTCAPS goals, see Figure 17.

The proposed WESTCAPS strategy is that by 2025 WESTCAPS members would rely on renewable supplies to meet customer demands. Surface water treatment plants and related infrastructure would be in place by 2025 to meet projected demands and that groundwater supplies would be used in a peaking or reserve role. Buckeye and West Maricopa Combine would rely on recharge and recovery projects. Facilities included in this strategy are:

- Use of 13.21 mgd of available capacity in the planned Phoenix Lake Pleasant Water Treatment Plant
- Expansion of Glendale's Pyramid Peak Water Treatment Plant by 29.45 mgd
- Two new water treatment plants located on Maricopa Water District's Beardsley Canal with capacities of 53.52 and 77.17 mgd
- Use of 15.85 mgd of capacity in West Maricopa Combine's Pipeline To The Future

Staff analysis envisioned these facilities would be put into place in two increments. The first phase by 2010 and the second phase by 2020. Adjustments in the timing and location of these facilities are anticipated as this strategy is further developed and the ability and desire of the individual members to participate is determined.

The interim strategy for CAP utilization would be for each WESTCAPS member, either individually or cooperatively with others, to utilize the following options:

- Utilize existing water treatment plants
- Recharge and recover in existing and future groundwater savings facilities
- Recharge and recover in existing and future underground storage and recovery projects

In addition, the Central Arizona Groundwater Replenishment District and Arizona Water Banking Authority should be encouraged to recharge as much water as possible in the west valley. Existing and future underground storage and recovery projects include:

- West Maricopa Combine Pipeline To The Future
- Central Arizona Project Agua Fria Recharge Project
- Surprise's McMicken Dam Recharge Project
- Goodyear's Beardsley Canal Recharge Project
- Maricopa County Flood Control District New River Water Course Master Planned Area
- Salt River Project's NAUSRP Recharge Project
- Sub Regional Operating Group's Agua Fria Recharge Project
- Avondale's Crystal Lakes Project

The General Committee decided to adopt, on a preliminary basis, the proposed strategy, but requested the Technical Committee make additional refinements to the strategy in the following areas:

- Evaluate potential institutional and financial mechanisms
- Develop regional and sub-regional alternative plant configurations including transmission and distribution infrastructure.

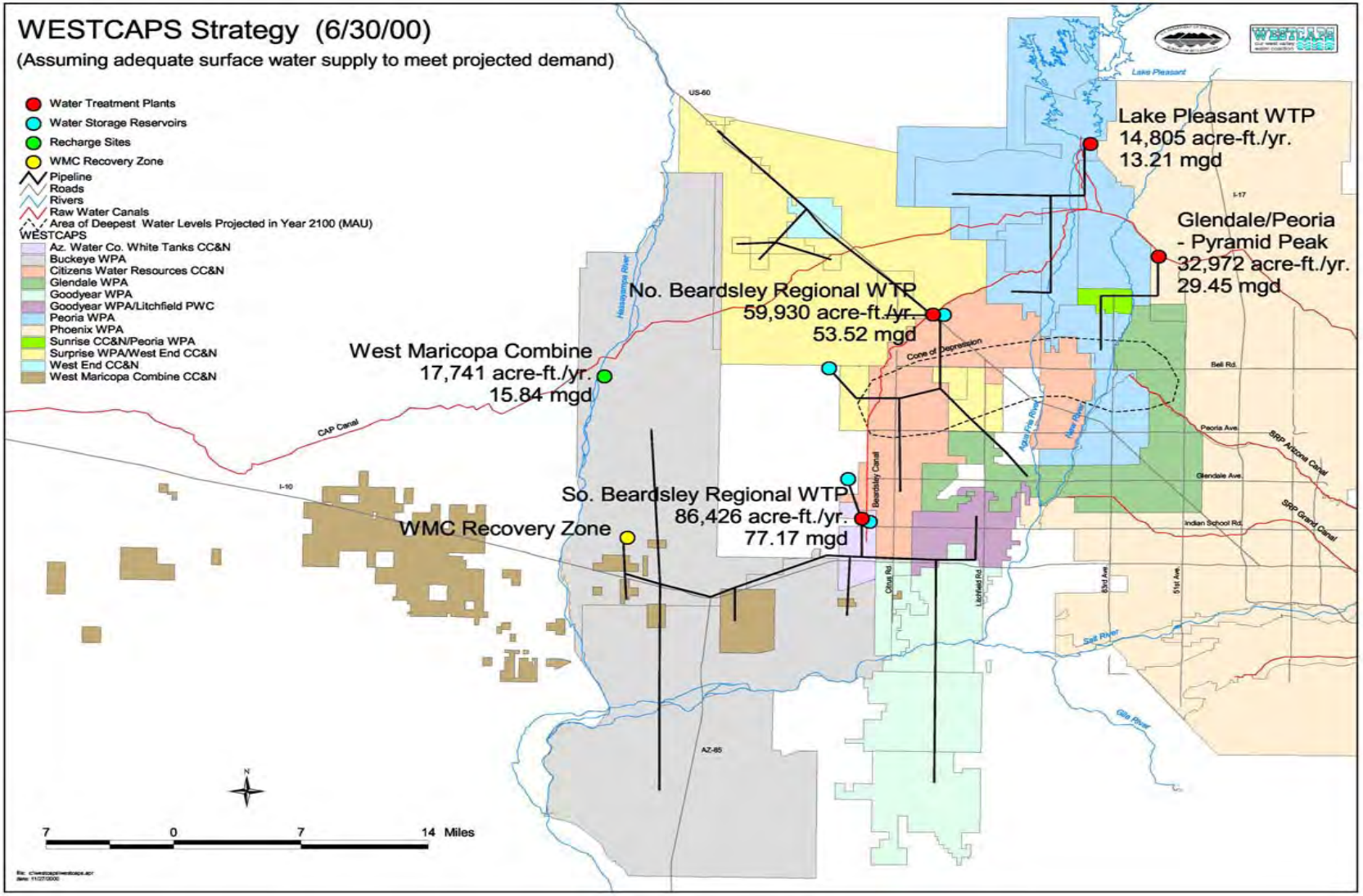


Figure 17.—WESTCAPS strategy, adopted on June 30, 2000.

GAP Analysis

The final phase of WESTCAPS planning process, the Gap Analysis, addressed (1) possible refinements to the WESTCAPS infrastructure strategy selected on 6/30/2000, (2) cost estimates and cash flow for financing the WESTCAPS strategy, (3) potential institutional and financing arrangements, and (4) sources of additional renewable water supply to meet projected supply deficits.

Refinement of the WESTCAPS Strategy:

After further staff analysis, it was recommended to the General Committee to revise the WESTCAPS Strategy by relocating the proposed new water treatment plants on the Maricopa Water District Beardsley Canal as follows: (1) move the north Beardsley water treatment plant to the Central Arizona Project canal and (2) move the south Beardsley water treatment plant north to a location on the Beardsley Canal somewhere between Cactus and Bell Road. In addition, a portion of the City of Surprise water planning area would remain on wells and some of the City of Peoria's projected water demand would be shifted from the planned Phoenix Lake Pleasant Water Treatment Plant to the proposed CAP water treatment plant. The result is, the revised WESTCAPS Strategy dated 9/15/00, Figure 18. On a regional basis there is no significant difference in capital cost between the two strategies. However there is a significant operations and maintenance savings. By relocating the plants, the elevation between the water treatment plants and the respective water service areas will increase. The increased elevation, or head, will allow for the pipelines to be adequately pressurized without booster pumps and will result in a power savings. In addition, by locating the new water treatment plants on two different canal systems and by interconnecting the distribution systems from the plants improved overall system reliability is improved.

A groundwater model analysis was preformed to compare the projected hydrological impacts between the WESTCAPS Strategy (6/30/00) and WESTCAPS Strategy (9/15/00). Results showed no significant difference between the two strategies. In addition, long-term groundwater draw down projections showed the WESTCAPS Strategy (9/15/00) markedly reduces the projected water level declines in the northwest valley.

Project Phasing, Cost, and Financing:

The two new regional water treatment plants in the WESTCAPS Strategy would be phased in three increments occurring in the years 2005, 2015, and 2025.

The WESTCAPS strategy (9/15/00) is estimated to cost, in year 2000 dollars, approximately $500 million in capital costs over twenty-five years with an annual operations and maintenance (OM&R) expense of $17 million. The change in regional cost from 6/30/00 to the 9/15/00 strategy was a decrease in total capital costs of $1.7 million and an annual OM&R cost reduction of $2.5 million.

Institutional and financing arrangements for funding infrastructure development were explored.. Some of the institutional arrangements considered are: joint powers of authority, simple contractual agreements, privatization, and a water authority. Further work on institutional and financing arrangements was deferred to the actual participants in any of the proposed regional facilities.

WESTCAPS analyzed potential recovery mechanisms for the estimated capital costs. Estimated capital cost recovery, in the year 2000 dollars, are: impact fees at $2,000 per new residential unit; or bond recovery at $14 per month for each residential unit (existing and new); or $600 per acre-foot of water delivered.

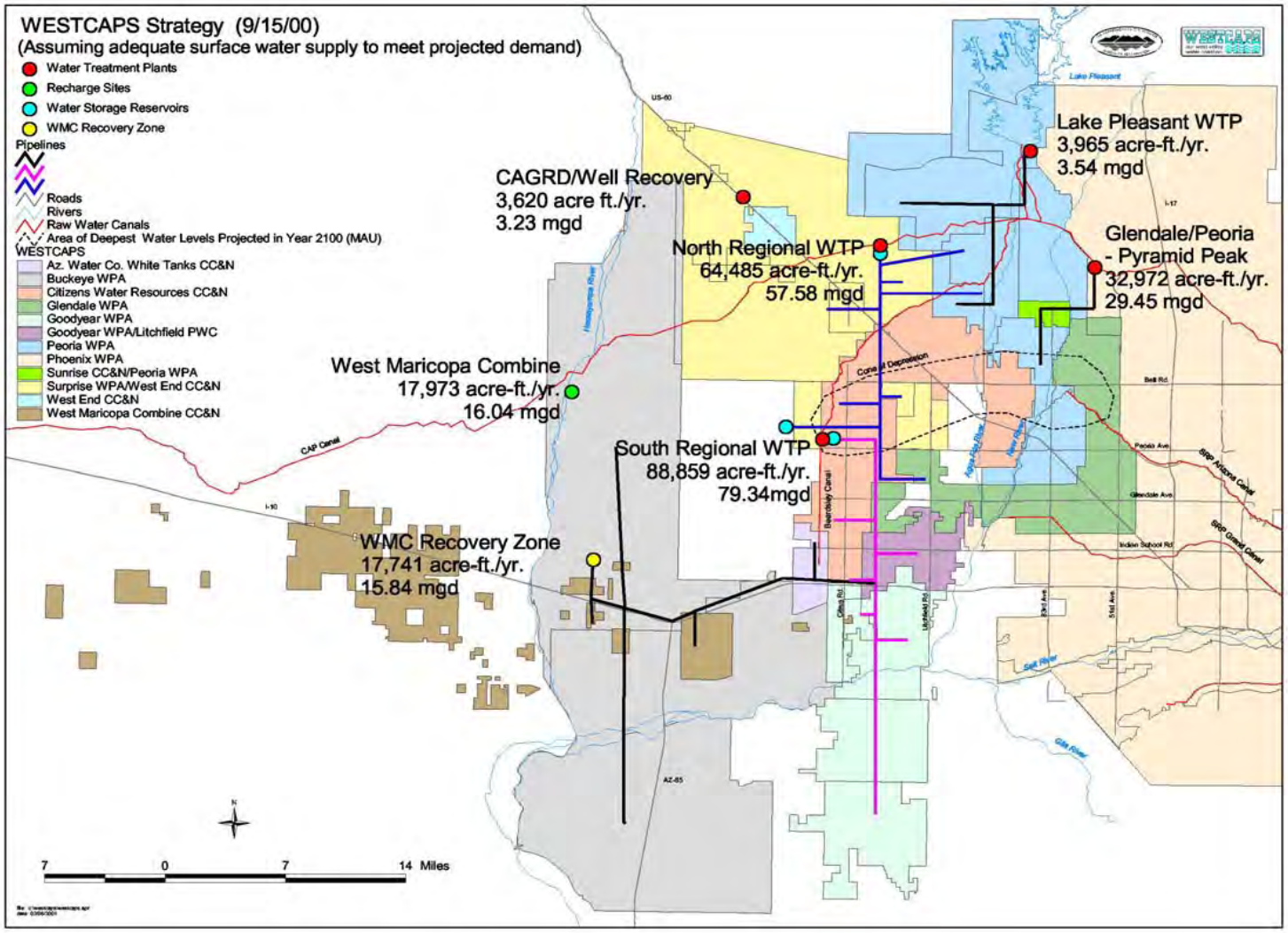


Figure 18. WESTCAPS Strategy 9/15/00

Sources Of Additional Renewable Supply

Water availability to meet the 2025 demand and cost information was prepared to get a sense of the membership's opportunity and ability to acquire the necessary supply. WESTCAPS concluded that there are sufficient renewable supplies available within the State to implement the proposed WESTCAPS strategy. The renewable water supply requirement, currently available surface water supplies, and potential sources for additional renewable supplies are characterized in Figure 19.

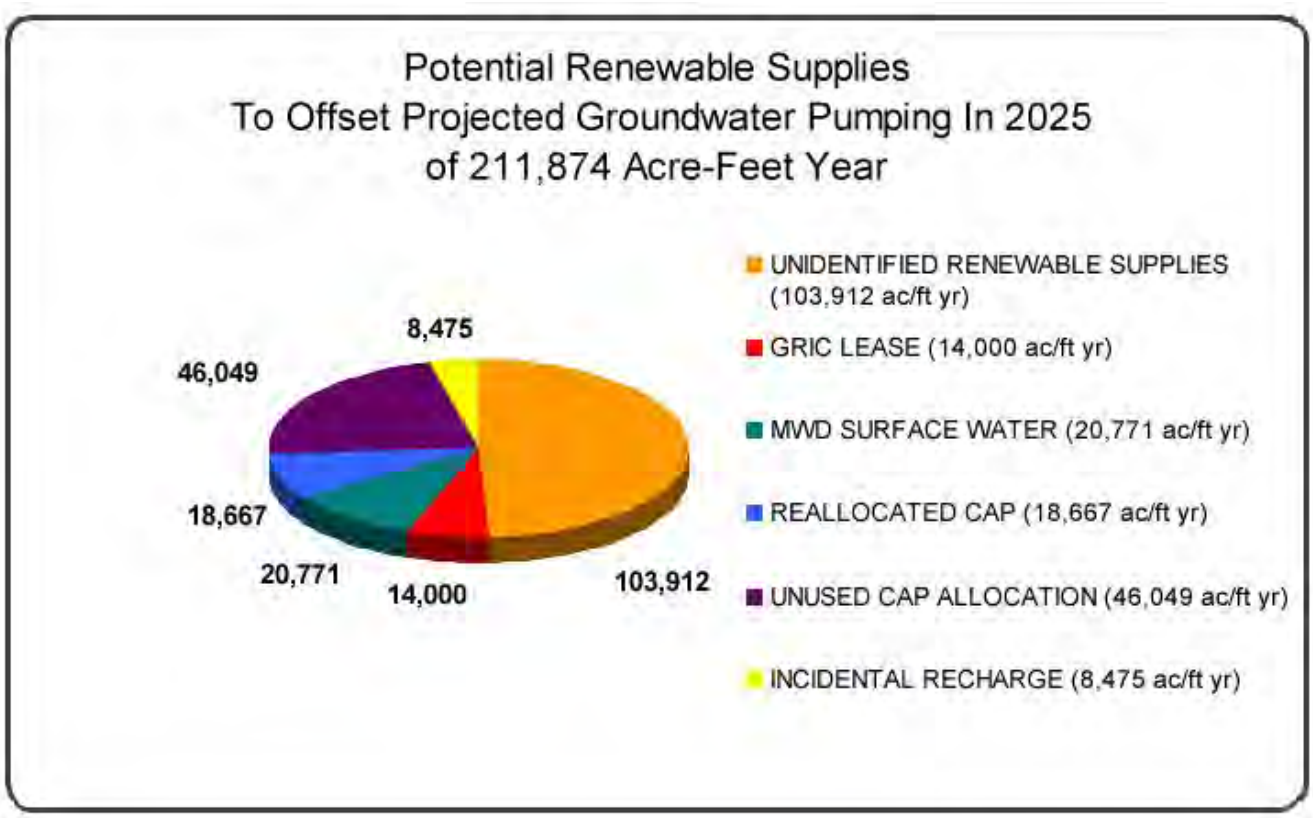


Figure 19. Potential Renewable Supplies

Demand: By the year 2025, it is projected that an additional 211,874 acre-feet per year (ac-ft/yr) of renewable supply will be needed to meet projected demands. However, incidental recharge to the aquifer in that year is expected to be 8,475 ac-ft/yr. The projected net regional water supply demand, after being adjusted for incidental recharge, is 203,399 ac-ft/yr.

Supply: Available renewable water supplies in year 2025 are expected to come from the following water supplies:

- Unused CAP water allocations
- Reallocated CAP water
- Maricopa Water District surface water supplies
- Gila River Indian Community (GRIC) long-term water leases

The total estimated available renewable water supply is 99,487 ac-ft/year.

Deficit: The estimated water supply deficit in the year 2025 regional water budget is 103,912 ac-ft/year. Potential water supplies that could be considered to offset the projected year 2025 groundwater pumping include:

- Potential Indian water leases Gila River Indian Community (GRIC), Colorado Indian Tribes (CRIT), Ak-Chin Indian Community, Ft. McDowell Indian Community, San Carlos Apache Tribe
- CAP agriculture priority water
- Groundwater from waterlogged areas
- Reclaimed water
- Butler Valley groundwater

Subsequent Changes To The WESTCAPS Strategy

Subsequent to WESTCAPS adopting the 9/15/200 Strategy, the City of Glendale requested that expansion of its Pyramid Peak Water Treatment Plant be removed from the Strategy. With this change approximately 32,000 acre-feet per year of City of Peoria water demand in the year 2025 would not be served by the revised strategy. City of Glendale staff has stated that they would be open to discussing the possibility of expanding Pyramid Peak. Other options available to the City of Peoria would be to either (1) expand one or both of the proposed new regional water treatment plants or (2) expand its Greenway Water Treatment Plant. Figure 20 illustrates the proposed WESTCAPS Strategy as it stands today.

Recommended Next Steps

WESTCAPS has determined that the proposed WESTCAPS strategy has enough technical merit to warrant the development of regional facilities and to initiate discussion with policymakers in the WSRV. On a regional basis, the proposed WESTCAPS strategy would provide the following benefits:

- Be less costly than if each of the WESTCAPS members sought to plan and manage their water resource needs alone

- Mitigate groundwater decline in the northwest Salt River Valley

- Improve water system reliability

- Enable water providers to more easily address current and future water quality regulations

Therefore, the next step in the planning process is to discuss the proposed WESTCAPS strategy with WESTCAPS decision makers for policy consideration and to explore the members interest.

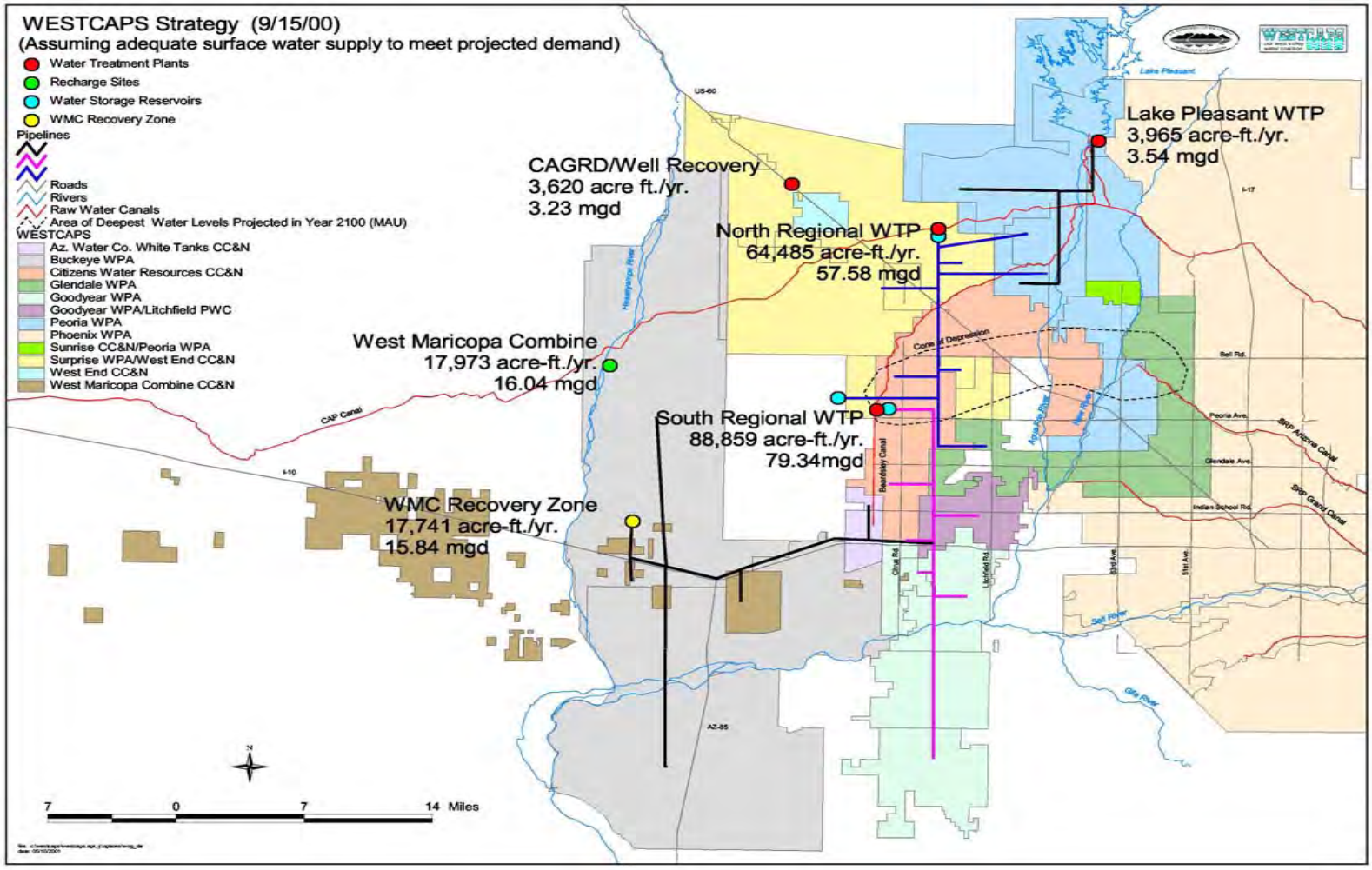


Figure 20.—Revised WESTCAPS strategy, dated September 15, 2000.

List of References

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25. Prepared by SRP, either Richard Siegel or Julia Shepherd

26. Prepared by Cynthia Stefanovic, ASLD

27. Prepared by Harold Thomas, WESTCAPS

28. Prepared by John Mihlik, WMC

29. Prepared by Brad Hill, City of Peoria

30. Prepared by Keith Larson, City of Phoenix

31. Prepared by Tom Harbour, CAP

32. Prepared by James Swanson, City of Surprise

33. Prepared by Mike Lacey, Fluid Solutions

34. Prepared by Doug Williams, Flood Control District of Maricopa County

35. Prepared by Terri Sue Rossi, Citizens Water Resources

36. Prepared by Warren Greenwell, Bureau of Reclamation, Phoenix Area Office