

SECTION SIX

UTILIZING RESOURCES TO MEET DEMAND

This section updates Tucson Water’s recommended resource-utilization plan presented in *Water Plan: 2000-2050*. This plan consists of a schedule for implementing essential programs and projects and specifies the scope and timing of critical decision points within the planning horizon.

COMMON ELEMENTS

The Common Elements are those programs and projects needed to ensure a resource-sustainable future for Tucson Water’s existing customers and for future ones as well. These elements, previously identified in *Water Plan: 2000-2050*, have been actively pursued by the Utility to guarantee planning flexibility and system reliability. The following provides a status update for each project and program.

Common Elements: 2000 to 2008	Status
Acquire Additional Supplies	Local and state-wide policy discussions continue with CAWCD exploring opportunities to serve as the water broker for its three-county region. Additional allocations of Colorado River water have been acquired under the Arizona Water Settlements Act & from Flowing Wells Irrigation District.
Develop a Salinity Management Program	Initial local salinity evaluations are complete. Phase II of the regional Central Arizona Salinity Study (2006) was completed with off-shoot pilot studies continuing.
Encourage Sewer Connections	The Utility continues working with Pima County’s Regional Wastewater Reclamation Department on long-range planning.
Additional Conservation Programming	Community Conservation Task Force was formed and a conservation consultant retained to assess potential options. The Task Force made 22 recommendations and these are discussed in Section Three and summarized in Appendix A. Some are being implemented while others are under review.
Evaluate Emerging Contaminants	Utility is involved with American Water Works Association Research Foundation and WateReuse Association which are conducting cutting-edge research and workshops.
Expand Public Outreach	The <i>Decision H2O</i> Program has fostered community dialogue on the first critical decision point of <i>Water Plan: 2000-2050</i> .
Provide Water-Resource Information	Tucson Water has met frequently with local water providers, state agencies, regulatory agencies, local business groups, professional organizations, and educators involved with water-resources planning efforts.

Common Elements: 2000 to 2008	Status
Pursue Regional Cooperation	Regional cooperation on long-range planning assumptions has been greatly improved. Several cooperative opportunities are currently under discussion in the local water community.
Reduce Lost and Unaccounted for Water	The Utility has established a capital program to replace aged meters in the distribution system to obtain more accurate water delivery information. A comprehensive system-wide “water audit” will be conducted in the near future.
Conduct SAVSARP Feasibility Assessment	Complete – the facility is under construction.
Construct Spencer Interconnect Pipeline	This project has been split into two separate pipelines – the Avra Valley Blending Main (to be constructed in the future) and the Viviana Transmission Main (not currently included in the Utility’s capital budget).
Design SAVSARP Facilities	Complete – the facility is under construction.
Expand Recharge Capacity of CAVSARP	The recommended action to re-permit the CAVSARP recharge capacity to 80,000 acre-feet per year is complete. A subsequent decision has initiated efforts to further expand the facility’s recharge capacity to 100,000 acre-feet per year.
Study Secondary Disinfectants	An initial assessment is complete. Additional studies will be conducted as the Utility expands its use of renewable water supplies.
Upgrade the Distribution system	Routine distribution system upgrades continue. The Utility is planning to expand the capital budget devoted to infrastructure replacement over time.

In addition to the projects and programs scheduled to be initiated by 2008, a second set of Common Elements was identified. These will allow the Utility to effectively address the priorities and challenges in the mid-term (through 2025) and long-term (2025-2050) planning periods.

Common Elements: Beyond 2008	Status
Preserve Ground-Water Credits	Ongoing development of renewable supplies in order to preserve ground-water credits for the future.
Achieve Full Colorado River Water Use	Ongoing fiscal planning efforts are being conducted to achieve this goal as early as 2009.
Achieve Sustainable Ground-Water Pumping	This goal is on track to be achieved by 2012.
Evaluate Effluent Exchanges	Opportunities to exchange effluent and/or expand the use of this renewable supply continue to be explored.
Augment Avra Valley Main	This project is under conceptual design and is planned to be constructed in phases over the next five to ten years.
Develop Additional Reclaimed Water Supply	Sweetwater Recharge Facilities expansion is underway. A permit amendment to bring its recharge capacity to 13,000 acre-feet/year has been submitted to the State. This volume will be attained by making operational and maintenance changes, by constructing additional recharge and recovery facilities, and by expanding booster/conveyance capacities.
Operate SAVSARP Phase I	This project is under construction and recharge is scheduled to begin in early 2008. Expanded recovery will begin in 2012. The scope of the facility has been expanded to include 60,000 acre-feet per year of recharge and recovery.

The process of making the critical decisions is underway, but these Elements can only be initiated when issues are resolved and direction is provided.

DECISION POINTS

Water Plan: 2000-2050 outlined four critical decisions to be made at two key points in time: 2006 and 2014. Since the plan was released in 2004, the Utility has focused primarily on resolving the first decision and has conducted a reassessment of the need, timing, and format of the others. The basic rationale underlying the original choices remains valid, but the schedule of the latter decisions has been revised in order to account for changing circumstances, new population projections, and new planning assumptions. In this update, the first decision point is projected to occur in 2008, and the second may occur by 2014 or as late as 2027. Any significant change in population projections, water policy, and/or planning assumptions could also change the time in which decision points will occur and perhaps even the substantive issues associated with those decisions.

Decision Point 2008

In *Water Plan: 2000-2050*, the first two resource-management decisions pertained to the use of Colorado River water; these decisions were originally projected to be made in 2006. The first decision was concerned with the long-term mineral content of the Clearwater blend of ground water and recharged Colorado River water. The second decision focused on whether the Utility should consider bringing a surface (direct) water treatment plant into service for a portion of the City's current Central Arizona Project allocation.

To develop support information to address the decision on long-term mineral content, Tucson Water launched *Decision H2O* and it has since been the subject of wide-spread public discussion. The scope of *Decision H2O* has included information review, extensive technological research, cost estimating, environmental impact projections, and public dialogue. Data collection and the accompanying assessment are in process with the expectation that a final decision will be made by the Mayor & Council in 2008. The current status of *Decision H2O* is discussed in Appendix E.

Since issuing *Water Plan: 2000-2050* in 2004, issues associated with the decision on the treatment plant have evolved in response to the changing planning environment. As originally conceived, this decision was centered on how best to bring the remaining balance of the City's unused Colorado River water allocation into service. The choice was either to rely on recharge and recovery or to incorporate an element of surface treatment by reconstituting the Hayden-Udall Treatment Plant. A study was conducted by Malcolm Pirnie (2007) which evaluated the two options. The study concluded that relying on recharge and recovery provided Tucson Water with greater operational performance and planning flexibility at less cost. In addition, drought-related discussions over the past few years as well as recent projections indicate that a worst-case shortage declaration on the Colorado River may occur sooner than previously predicted and before the Hayden-Udall Treatment Plant could be reconstituted. Due to the uncertainty and potential urgency regarding a possible

early declaration of shortage, Tucson Water moved forward with the following near-term initiatives in order to develop sufficient facility capacity to fully utilize the City's entire Central Arizona Project allocation as early as 2009:

- Expansion of the recharge and recovery components at the CAVSARP facility;
- Expansion of the recharge capacity of the first phase of SAVSARP; and
- Maximum utilization of the Pima Mine Road Recharge Project.

Building upon the proven success of the recharge and recovery approach, this decision has virtually eliminated the near-term uncertainty associated with having sufficient capacity in place to fully utilize the City's Central Arizona Project allocation prior to a shortage declaration. Nonetheless, the role of a surface (direct) treatment plant remains a potentially viable option as the range of possible futures evolve and new supply opportunities develop.

The Next Decision Point

In *Water Plan: 2000-2050*, the year 2014 was originally specified as the second critical decision point which focused on decisions associated with maximizing the paper-water and/or wet-water benefits of effluent reuse. With the updated assumptions of projected supply and demand, this Decision Point has been modified and may occur by 2014 or possibly as late as 2027. By the time this next decision point is reached, Tucson Water will need to have formulated its plans for bringing additional sustainable and/or non-renewable water supplies into use in order to update the City's Assured Water Supply (AWS) designation.

This next decision point will focus on how best to proceed with utilizing its available water resources. These include those that are already on hand as well as potentially new renewable supplies that would have to be imported into the area. In this process, Tucson Water will lay the groundwork for the next extension of the City's AWS designation. The options to be explored by the next decision point include the following both individually and in combination:

1. Acquire additional Central Arizona Project water;
2. Acquire higher priority rights to main-stem Colorado River water;
3. Import ground water from other basins in Arizona;
4. Initiate "full credit" effluent water banking in the Utility's service area; and/or
5. Exhaust the City's reserve of ground-water credits

In addition, other potential options to augment existing supplies such as seawater desalination and potential water exchanges may be possible in the future but such opportunities will most likely be the subject of decision points many decades further out in time.

Bullets #1, #2, and #3 all depend on the Central Arizona Project aqueduct to import new water supplies to Tucson Water's service area. As a result, the current role of CAWCD as operator of the 336-mile long Central Arizona Project system and its potential role as water broker for Maricopa, Pinal, and Pima Counties will likely prove critical in Tucson Water's efforts to augment its existing supplies with imported renewable resources. Intra-state discussions are on-going but it is unclear if and when such a new institutional arrangement will be in place to facilitate reallocations and water transfers. It is possible that imported resources may be available by 2014 but it could be later. Prudent planning dictates that all supply options be considered in the interim given the uncertainty.

The only local water resources currently available in the mid term are the City's effluent entitlement (Bullet #4) and the City's non-renewable reserve of ground-water credits (Bullet #5). The City's effluent entitlement is the only locally generated, renewable supply available to the Utility to support sustainable growth. Expanded use of effluent through marked increases in reclaimed water utilization and/or long-term full-credit banking would augment Tucson Water's renewable water supply portfolio and would further extend in time the availability of its reserve of ground-water credits. This option could ensure the City's ability to sustainably extend its wet-water supplies and its AWS designation for many years while preserving the City's non-renewable reserve of ground-water credits for their preferred purpose—as a transitional supply to be prudently debited while making preparations to acquire or develop the next renewable supply.

Without further developing the City's effluent resources and/or importing additional supplies in the mid term, the City's only option to extending its AWS designation would be to exhaust its reserve of ground-water credits. Although this action would allow the City to further extend its AWS designation for many years and in some scenarios for decades, it would be an unsustainable response to an immediate supply need which could reduce the Utility's planning flexibility in future years. If the ground-water credits were fully utilized to extend the City's AWS in the mid and longer terms, it would be in the City's interest to make arrangements with others (potentially with CAWCD) to import additional renewable supplies, develop its local effluent resources, and implement more aggressive demand-management measures to support sustainable growth in future years. As the Next Decision Point approaches, Tucson Water will provide status updates regarding the need to acquire and/or develop the next renewable supply to meet the projected water demand of anticipated growth.

PROJECTED DEMAND AND RESOURCES

The choices associated with the critical decisions to be made in 2008 and the Next Decision Point after that will help determine how the Utility's water resources will be utilized in future years. They will also affect how quickly Tucson Water will use its available water supplies, how demand may be managed in the future, and how additional wet-water supplies may be developed over time. The water-resource implications of the four demand scenarios discussed in Section Three illustrate how changes in the two critical planning variables could impact resource utilization and the City's AWS designation in future years.

Resource-Utilization Commonalities

Despite the key differences associated with *Demand Scenarios A through D*, the four share common resource-utilization assumptions and these are highlighted below:

- Reclaimed-water use will on average offset at least nine percent of the total projected annual water demand through 2050;
- Potable demand will be met in the near term through decreasing dependency on ground-water pumping and increasing reliance on renewable Colorado River water;
- Incidental Recharge refers to aquifer recharge which occurs after the Utility accesses its water sources for supply and constitutes four percent of Tucson Water's annual total demand;
- The City's entire Central Arizona Project allocation will be recovered before the Utility's contracted CAGR ground-water replenishment volume of up to 12,500 acre-feet per year is utilized;
- The point in time at which renewable water resources associated with imported Colorado River water, Incidental Recharge, and the City's CAGR contracted volume are fully utilized varies depending on the unique combination of assumptions represented by each of the four scenarios.

Additional background information and the rationales underlying each of the four water demand scenarios are provided in Sections Two and Three in this Update.

***Scenario A* – Increased Demand Management in the Obligated Area**

In addition to decreasing future demand by limiting the Utility's service area expansion to the Obligated Area, this scenario is predicated on the assumption that the Utility's potable GPCD would gradually be reduced by ten percent by 2030. It is assumed that this reduction in per capita demand would be achieved by implementing more aggressive demand-management measures beyond those already in place.

Review of Figure 6-1 provides a view of how the Utility's resource utilization plan is projected to occur under *Scenario A*. The Utility's total water demand is projected to increase from 128,141 acre-feet in 2000 to approximately 180,000 acre-feet in 2030 and to about 215,000 acre-feet by 2050. This projected increase in water demand over time is the smallest of the four scenarios.

Under this scenario, projected potable demand would exceed the sum of the City's annual Central Arizona Project allocation, its Incidental Recharge increment, and its annual CAGR contracted volume by about year 2032. However, Tucson Water would still have available

after 2032 the balance of its renewable effluent resources not committed to the Utility’s reclaimed water system and much of its reserve of non-renewable ground-water credits.

The City could extend its AWS designation to about 2050 by depleting its reserve of ground-water credits; instead, Tucson Water recommends these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed.

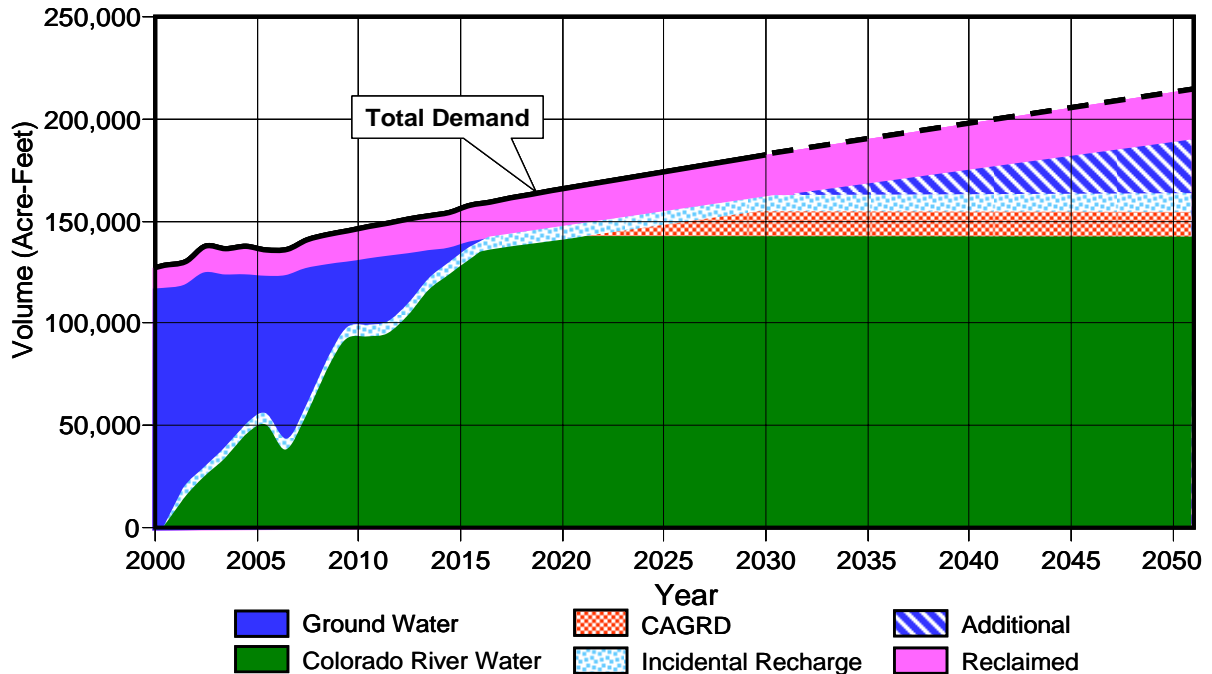


Figure 6-1: Scenario A, Projected Demand and Water Resource Utilization: 2000-2050.

Tucson Water recommends that the resource planning priority be placed on developing additional renewable resources such as the City’s effluent supplies, additional imported supplies or a combination of both. In this manner, new growth after 2032 would become more hydrologically sustainable and the City’s AWS designation could be extended well beyond the planning horizon of *Water Plan: 2000-2050*. Of the four future scenarios analyzed, *Scenario A* delays the need to develop or acquire additional renewable supplies furthest into the future and maximizes planning flexibility to deal with future uncertainties.

Scenario B – No Increased Demand Management in the Obligated Area

In addition to limiting future demand to within the Obligated Area, this scenario adopts the assumption that the Utility’s potable GPCD would remain constant at 163 through 2050 thus assuming a lack of further investment and/or community support for further demand-management activities. Review of Figure 6-2 provides a snapshot of how the Utility’s resource utilization is projected to occur under *Scenario B*. Tucson Water’s total water

demand is projected to increase from 128,141 acre-feet in 2000 to approximately 200,000 acre-feet in 2030 and to about 235,000 acre-feet by 2050.

Review of Figure 6-2 indicates that projected potable demand would exceed the sum of the City’s annual Central Arizona Project allocation, its annual Incidental Recharge increment, and its annual CAGR D contracted volume by about year 2022—ten years earlier than in *Scenario A*. As noted previously, Tucson Water would still have available after 2022 the balance of its renewable effluent resources not already utilized in the Utility’s reclaimed water system and most of its reserve of non-renewable ground-water credits.

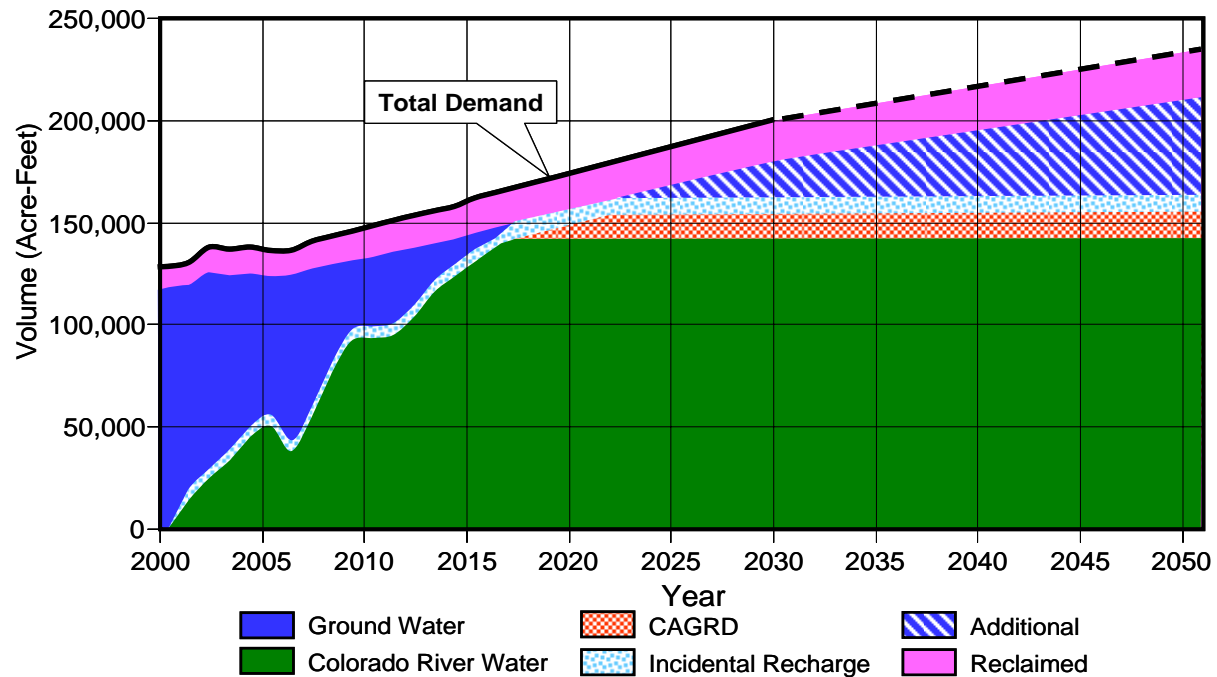


Figure 6-2: Scenarios B & C, Projected Demand and Water Resource Utilization: 2000-2050.

The City could extend its AWS designation to about 2035 by depleting its reserve of ground-water credits. Consistent with *Scenario A*, Tucson Water recommends these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed.

Tucson Water recommends that the resource-utilization priority be placed on developing additional renewable resources such as the City’s effluent supplies, additional imported supplies or a combination of both. In this manner, new growth after 2022 would become more hydrologically sustainable and the City’s AWS designation could be extended even further. Of the four future scenarios analyzed, *Scenario B* only moderately delays the need to develop or acquire additional renewable supplies and provides limited planning flexibility.

Scenario C – Increased Demand Management in the Potential Service Area

Scenario C assumes that Tucson Water’s ultimate service area would coincide with the larger Potential Service Area. This scenario also assumes that the Utility’s potable GPCD would gradually be reduced by ten percent by 2030. The Utility’s total water demand is essentially the same as shown for Scenario B in Figure 6-2. This means that Scenario C would also exceed the sum of the City’s entire annual Central Arizona Project allocation, its Incidental Recharge increment, and its annual CAGR D contracted volume by about year 2022. Similarly, the City could extend its AWS designation to about 2035 by depleting its reserve of ground-water credits. The same water-resource utilization strategy previously discussed for Scenario B would apply to Scenario C. Again, this scenario would only moderately delay the need to develop or acquire additional renewable supplies and provides limited planning flexibility.

Scenario D – No Increased Demand Management in Potential Service Area

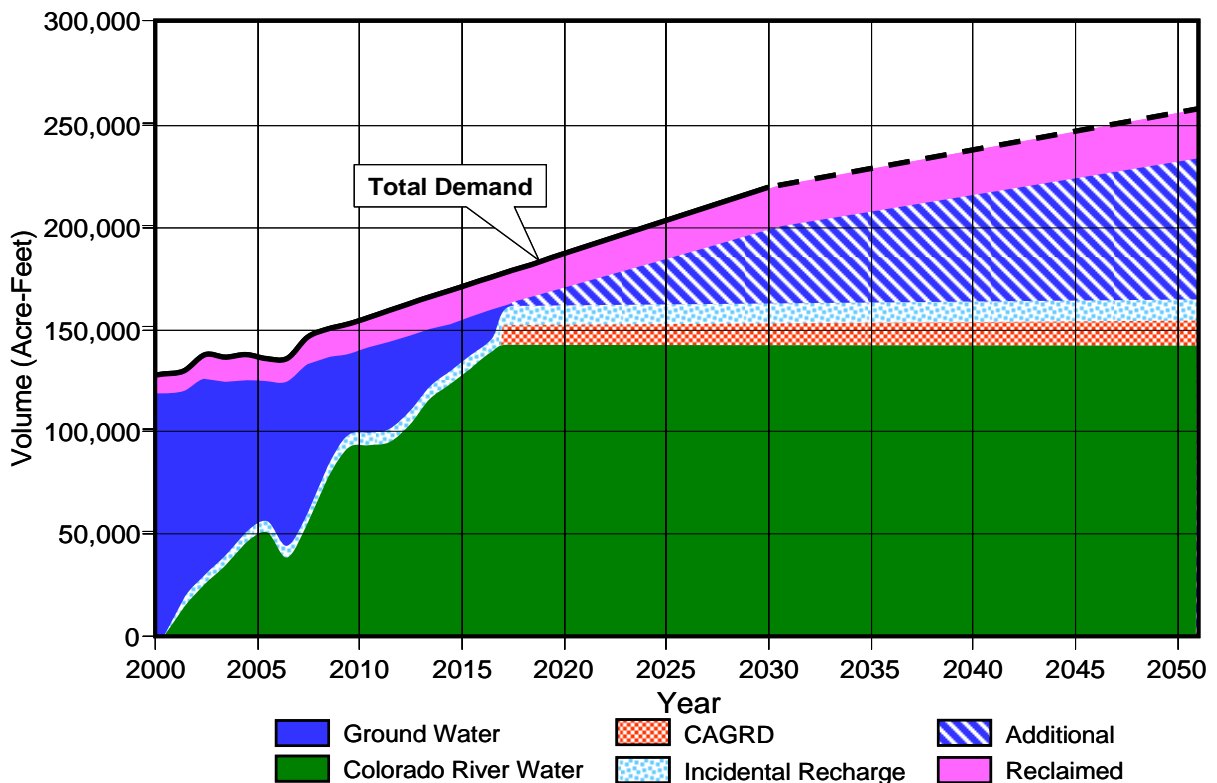


Figure 6-3: Scenario D, Projected Demand and Water Resource Utilization: 2000-2050.

Scenario D is based on the conservative demand assumptions used in *Water Plan: 2000-2050*. Scenario D assumes that Tucson Water’s future area of service is the larger Potential Service Area and that the Utility’s potable GPCD remains constant at 163 through 2050. The Utility’s total water demand is projected to increase to approximately 220,000 acre-feet per year by 2030 and about 255,000 acre-feet by 2050.

Review of Figure 6-3 indicates that projected potable demand would exceed the sum of the City's annual Central Arizona Project allocation, its Incidental Recharge increment, and its annual CAGR contracted volume by about 2017. Tucson Water would still have available beyond 2017 the balance of its renewable effluent resources and most of its reserve of non-renewable ground-water credits.

The City could extend its AWS designation to about 2025 by depleting its reserve of ground-water credits; instead, Tucson Water recommends these credits be preserved as long as possible to provide planning flexibility for the future. It is more prudent to use these credits as short-term transitional supplies while additional renewable supplies are being acquired and/or developed.

Tucson Water recommends that the resource planning priority be placed on developing additional renewable resources such as the City's effluent supplies, additional imported supplies or a combination of both. In this manner, new growth after 2017 would become more hydrologically sustainable and the City's AWS designation could be extended further out in time. Of the four future scenarios analyzed, *Scenario D* is the least able to delay the need to develop or acquire additional renewable supplies and provides the least planning flexibility with which to deal with future uncertainties.

WHAT LIES AHEAD

The water-resource opportunities, critical decision points, and conservation impacts described in this section are graphically summarized on Figure 6-4, a conceptual planning timeline which extends from 2000 to 2050. From 2000 to 2010, Tucson Water's primary focus is to fully utilize its annual CAP allotment before a shortage on the Colorado River is declared. To provide a solid foundation for a sustainable water future, Tucson Water must bring its full allocation of Colorado River water into use as early as 2009. The outcome of *Decision H2O* will determine if the Utility must bring an enhanced treatment plant into operation.

Beyond 2010, the community faces the challenge of determining its long-term water future. The Utility fortunately is not limited to exhausting its reserve of ground-water credits to extend its AWS designation to meet the needs of anticipated growth. Tucson Water has a number of potential opportunities to acquire or develop additional water supplies. These potential opportunities have been discussed in detail in this section and summarized on Figure 6-4.

Assuming either *Scenario B*, *C*, or *D* is the most representative portrayal of future demand, it is currently projected that the Utility would need to have a plan in place to acquire/develop additional supplies by about 2014 or 2017 in order to preserve its ground-water credits for the longer term. This would coincide with the time by which the Next Decision Point would occur.

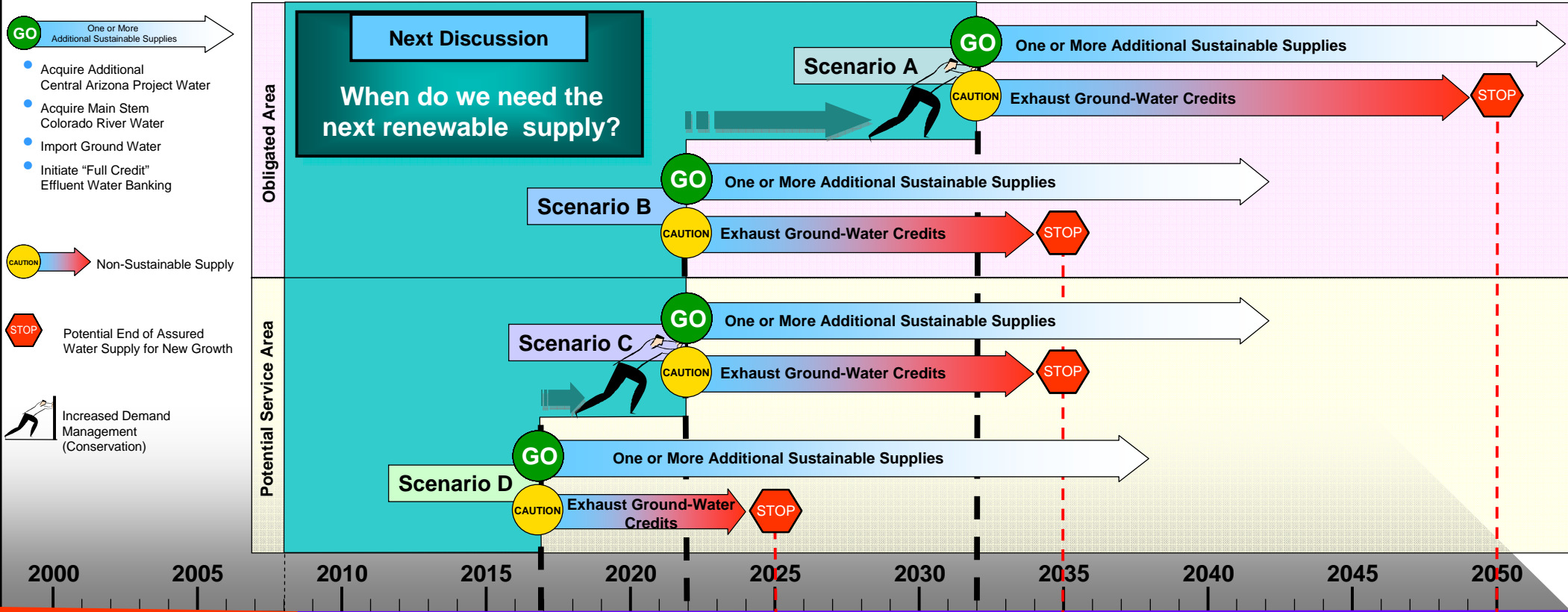
In contrast, if *Scenario A* more closely approximates future water demand, Tucson Water would need to have a plan to acquire/develop additional supplies in place by about 2027. Under *Scenario A*, this would be the approximate time of the Next Decision Point by which direction would be required. If additional renewable supplies are made available for use, the limit of the Utility's hydrologically sustainable water supply for new growth can be ensured and even extended beyond 2050.

How far this threshold can be extended into the future will depend on the areal extent of Tucson Water's future service area, whether there is a commitment to invest in additional, more aggressive demand-management measures, and the volume of additional renewable resources that the Utility is able to develop locally and/or import into the Utility's service area.

Explanation

	With Additional Demand Management	Without Additional Demand Management
Obligated Area	Scenario A	Scenario B
Potential Service Area	Scenario C	Scenario D

Figure 6-4. Demand-Resource Scenario Summary



Current Discussion

Decision Point: 2008
 Is 450 mg/L or 650 mg/L the acceptable long-term mineral content target for the Clearwater blend?

Begin Full Use of Colorado River Water

