EL PASO COUNTY WATER AUTHORITY
EL PASO COUNTY WATER REPORT

DRAFT Executive Summary

The El Paso County Water Authority (EPCWA) has prepared this Water Report to assist in evaluating how water demands of the EPCWA members can be met to the year 2020.

Current annual water demands in El Paso County (County) are estimated to be approximately 89,600 acre-feet (ac-ft). These values include Colorado Springs Utilities (CSU), which is not a member of EPCWA. The estimated current annual water demand, without CSU, is approximately 19,600 ac-ft. The future water demand for year 2020 is estimated to be 163,300 ac-ft with CSU and approximately 30,000 without CSU. Therefore, this Water Report looks at not only continuing to provide the current water demands of approximately 20,000 ac-ft per year (ac-ft/yr), but also expand that water supply to provide up to 30,000 ac-ft/yr by the year 2020.

County Ground Water Resources

Ground water provides much of the municipal water supplies in the County. Some of the County's water supplies are non-renewable in nature, while others are replenished annually.

In the northern portion of the County, the principal aquifer resources are the sedimentary bedrock aquifers of the Denver Basin. These water supply resources are non-renewable in nature, as they receive only minimal recharge to replace the water which is currently being pumped out of these aquifer systems. In the Denver Basin aquifers underlying the County, there is approximately 66,000,000 ac-ft of potentially recoverable water. By state statute, this would make approximately 667,000 ac-ft of water available annually. However, with the County's 300-Year Rule, the total annual volume of water available may be limited to a value of less than 667,000 ac-ft/yr. Yields from Denver Basin aquifer wells generally range from approximately 50 gallons per minute (gpm) to 500 gpm.

In the southern portion of the County, south of where the Denver Basin aquifers either subcrop or outcrop, the principal bedrock ground water resources are found in the Pierre Shale and Dakota/Cheyenne aquifers. The aquifers are generally low-yielding (15 gpm or less), but do receive some recharge on an annual basis and are considered renewable water resources.

Along the western edge of the County, in the foothills of the Rocky Mountains, the principal bedrock ground water resources are found in the pre-Cambrian granitic rocks. This water resource is also fairly limited in terms of yield per well (1 to 20 gpm), but is recharged on an annual basis through precipitation events and snowmelt runoff and, therefore, is considered to be a renewable water resource.

Throughout the County there are several major streams which flow over the Denver Basin, Dakota/Cheyenne, and pre-Cambrian aquifers. Associated with these stream systems are alluvial deposits that carry significant volumes of water which are currently being used by County water providers. Some of the principal alluvial aquifer systems are associated with Fountain Creek, Monument Creek, Sand Creek, Upper Black Squirrel Creek, and Jimmy Camp Creek.

The most reliable ground water resource in the County is associated with the alluvial aquifers. Not only can wells completed in some of the primary alluvial aquifer systems (such as the Fountain Creek alluvium) produce in excess of 1,000 gpm, but the water supplies are renewable in nature, being replenished by the stream flow.

County Surface Water Resources

The principal stream systems currently being used for irrigation and municipal water supplies are Fountain Creek, Monument Creek, Jimmy Camp Creek, Sand Creek, and Upper Black Squirrel

Creek. Generally, the surface waters in each of these stream systems is governed by the Colorado Doctrine of Appropriation. In the Arkansas River Basin, there is additional regulation under the Amended Arkansas River Rules.

Under Colorado's priority system, an analysis of water rights within the Arkansas River Basin indicates that a priority date of 1874, or earlier, essentially will be in priority all of the time, while water rights with priority dates of 1890 or earlier will only be available for use 50 percent of the time, or less. Therefore, water rights that are more junior to an 1890 priority likely will only be available during wet years, or extremely wet periods of time.

Since most of these early water rights (pre-1890) were originally related to irrigation use, a change of water right is necessary to convert these rights for potential use for municipal purposes. While many irrigation water rights have already been converted to municipal use, such as shares in the Fountain Mutual Irrigation Company, there are still many irrigation water rights in the County which potentially could be converted to municipal use.

In addition to the historic irrigation rights which have been developed (mostly on Fountain and Monument Creeks), there is a major trans-basin diversion project, the Frying Pan-Arkansas Project (Fry/Ark), which provides water for Southern El Paso County Water Providers.

The use of alluvial water can be enhanced with surface storage capability. There are some existing surface water storage structures currently available to EPCWA members, such as Bristlecone Reservoir, Pinon Reservoir, Woodmoor Reservoir, and Monument Lake, which could be used to regulate direct flow rights with surplus storage capacity. In addition, CSU operates several reservoirs with significant storage capacity.

The ability to develop additional surface water resources within the County is mostly tied to the development of historic water rights for municipal use, with the regulation of these water supplies through surface storage projects.

Water Supply Shortfalls and/or Limitations

There are two distinct types of water suppliers in the County, the Northern Water Providers, which rely on the non-renewable resources of the Denver Basin aquifers, and the Southern Water Providers, which rely on renewable water resources associated with trans-basin diversions and water associated with Fountain Creek and the Widefield aquifer.

It is estimated that there is approximately 66,000,000 ac-ft of recoverable water from the Denver Basin aquifers beneath the County, which would indicate a surplus of water. However, there are potentially significant water supply availability limitations. In the near term, this may be associated with providing peak day demands while, in the longer term, the issue may be the ability just to meet average annual demands. Ways to address this issue include water re-use, water conservation, development of satellite well fields, regionalization of water supply systems, and/or development of new, renewable water supplies.

The Southern Water Providers currently rely entirely on renewable water resources, either local water supplies from the Fountain Creek system or trans-basin supplies from the Fry/Ark Project. Both water supplies are renewable in nature, with the Fry/Ark water also having the additional benefit of being fully consumable, since it is trans-basin water. When the estimated annual water demands at year 2020 are compared to the available water supplies, there appears to be adequate water to meet year 2020 demands for the Southern Water Providers.

Some water supply providers also rely on the renewable water resources of the Upper Black Squirrel Creek, within the Upper Black Squirrel Creek Designated Basin. While a comparison of the water supplies available to these entities appears to meet year 2020 demands, water levels have been declining over time in the Upper Black Squirrel Designated Basin. Based on studies that have been conducted to date, there are significant differences in the expected useful life of the Upper Black Squirrel alluvial aquifer, but there is agreement that the water levels are declining and that the alluvial aquifer is being mined at the current time. Therefore, there could be a future need for replacement water supplies in this area.

Water Conservation and Water Reuse

Water conservation and water reuse are two ways to maximize the efficiency of use of limited water resources. Water conservation can take the form of voluntary in-house water conservation measures and voluntary landscaping irrigation measures, as well as mandatory means to encourage water conservation, such as tiered pricing schedules and, ultimately, water rationing. Water reuse can take the form of indirect reuse, e.g. releasing wastewater treatment plant effluent, then producing an equivalent volume from the stream system, or direct reuse, e.g. taking wastewater treatment plant effluent and applying it to irrigated areas.

While in-house and landscaping water conservation measures can reduce overall water consumption and help to reduce peak-day demands, the most effective water conservation is achieved through water pricing, i.e., where the price continues to rise with each incremental increase in use.

One of the benefits of Denver Basin aquifer water use is that this water can be used, and reused, to extinction. An augmentation plan is the legal tool available in Colorado to allow water supply providers to reuse this water to meet municipal in-house and landscaping demands. Based on standard consumptive use factors, 100 ac-ft of first-use Denver Basin aquifer water can achieve, through multiple uses, an additional 86 ac-ft of water through an augmentation plan. Therefore, augmentation plans and the reuse of water can be critically important in achieving the most efficient use of this reusable water.

County Water Distribution Infrastructure Options

Because the water supply systems for the Northern Water Providers are distinctly different than the water supply systems for the Southern Water Providers, water distribution infrastructure options were evaluated separately for each water provider group.

Infrastructure options for the Northern Water Providers generally included (a) development of additional Denver Basin aquifer water supplies through satellite well fields, (b) increase in reuse by utilizing available surface storage facilities, and (c) development of replacement renewable water supplies using available surface storage structures. Capital costs for these various options generally range between $6,200 and $9,575 per ac-ft, while the annual unit costs to provide this water ranged from $2.75 per 1,000 gallons to over $6.00 per 1,000 gallons.

The infrastructure analysis for the Southern Water Providers indicated that these entities are currently interconnected locally and there are also emergency interconnections to CSU through Cherokee, Colorado Centre, and Stratmoor Hills. Therefore, the Southern Water Providers have already implemented a regionalized infrastructure plan.

Two additional infrastructure options that potentially could be pursued by the Southern Water Providers are (a) to provide better use of the reusable effluent from the Fry/Ark Project and (b) to seek additional surface storage so that these water supplies could be tapped in the event of problems with delivery from the Fountain Valley Authority Pipeline.

Synergistic Projects With Colorado Springs Utilities

The EPCWA has investigated whether there are possible areas where CSU and EPCWA can act cooperatively on water rights, water supply and infrastructure components. Meetings have been held with CSU personnel to discuss these possible synergistic projects. Currently, CSU is participating in the Southern Water Delivery System and EPCWA members have been provided the opportunity to participate in this project. However, the Southern Water Delivery System would impose a fee on water providers that would compensate the City of Colorado Springs for revenues lost as a result of development occurring outside the city. Currently, because of the fees imposed on this project, the only participants in the Southern Water Delivery System within EPCWA are the City of Fountain and Security Water and Sanitation District.

Water Plan for Private Well Owners

There are almost 22,000 individual residential wells in the County, with approximately 19,000 of these wells completed in the Denver Basin aquifers, while approximately 3,000 of these wells are completed in the eastern portion of the County in the Pierre Shale and/or Dakota/Cheyenne aquifers. While water use is low in these generally rural areas, the aquifers are still experiencing water level declines due to the

pumping of others and, ultimately, it may be necessary to drill wells to tap deeper aquifers or to find alternate water supplies.

As current water supplies decline at these individual residential wells, there are four potential options to maintain water supply availability, (a) drill separate, deeper wells, (b) install cisterns at individual homes and have water trucked in, (c) have either individual or collective homeowners' associations finance the construction of a community-type well or well field, and/or (d) participate in a regional water supply distribution system. Individual residential wells are currently the cheapest source of water, since residences typically tap the uppermost aquifer, which minimizes the cost of drilling and the power to lift the water from the aquifer to the residences. It is likely that individual residential wells will continue to be the preferred alternative for water supplies in rural areas until such time as these uppermost aquifers can no longer support individual residential use.

At the time when deeper aquifers have to be tapped to provide residential water supplies, it may then become more economical to look at the community-type well, which would serve multiple dwellings and provide limited, centralized water service. A community-type well can provide an economy of scale by tapping a deeper aquifer with a single well, rather than several small individual wells.

To serve a relatively large area of individual residences in rural areas would require a regional water supply system. Given capital costs of over $8,000 per ac-ft and annual operating costs of approximately $5.00 per 1000 gallons, it is apparent that regional water supply systems would be extremely expensive to implement for individual residential use and it is unlikely that this type of system would ever be feasible in the low-density, rural areas of the County.

Potential Water Import Projects

The development of new, renewable water supplies in the County would likely require the import of water, as the Arkansas River Basin is fully appropriated and it is unlikely that significant additional water supplies could be developed locally. There are several potential water import projects that have been identified, although none of these projects is currently at a state of development where County water providers could reasonably assume that new, renewable water supplies will be available in the near future. These potential water import projects include (a) the marketable pool at Blue Mesa Reservoir, (b) the Baca Ranch Water Supply and Delivery Project, (c) the CSU Southern Delivery Pipeline, (d) conversion of agricultural water rights to municipal use, either in the Arkansas River Basin or the South Platte River Basin, (e) the Big Straw Project, which envisions a pump back system from the Colorado/Utah State Line, and (f) development of additional water supplies in the designated basins of Colorado.

Optimally, the best situation for County water providers would be to develop sufficient renewable water supplies to serve all of its customers and maintain the non-renewable water supplies of the Denver Basin as emergency water supplies in time of drought, since the Denver Basin aquifers' water supply availability is not subject to short-term variabilities in the hydrologic cycle. However, given the difficulty of developing new, renewable water resources, this is an unlikely scenario to develop at any time in the near future.

Current County Water Supply Standards

The County currently has water supply standards that seek to provide a "sufficient quantity to meet the average annual demand of the proposed subdivision for a period of three hundred (300) years." Purportedly, it was the intent of these regulations to allow minimal development of Denver Basin aquifer water to generate sufficient revenue to allow developments to then pursue the purchase of renewable water supplies as the ultimate water supply for that subdivision and/or to encourage annexation of developments that would otherwise be in unincorporated areas. Therefore, the 300-Year Rule, as adopted, has two basic premises, (a) that Denver Basin aquifer water can provide an interim water supply (for up to 300 years if necessary), and that (b) revenues generated from the development of land based on Denver Basin ground water would fund the ultimate purchase of renewable water supplies as the long-term water supply solution.

It is difficult to assure that Denver Basin aquifer water can provide a 300-year water supply, since ground water is continually moving into, and out of,

any specific piece of property based on hydraulic gradients within the aquifer. Most areas within the Denver Basin are susceptible to greater outflow than inflow in the underlying aquifers, therefore, the volume of water in storage can be reduced regardless of the use of Denver Basin water on the property. It has been estimated that approximately 3 percent of the water supply beneath the County will be lost over the 300-year period just by virtue of water moving out of storage from beneath the County.

The concept that developments could be initiated with Denver Basin aquifer water and generate sufficient revenues to purchase renewable water as a long-term water supply solution does not acknowledge the complex political, environmental, and water availability issues associated with the development of renewable water resources. It is not simply a financial transaction to obtain and develop renewable water resources. In fact, it is an extremely difficult process, which is evidenced by the fact that no major trans-basin projects have been developed in the past 20 years.

A numerical model was used to evaluate changes in water level which would result from various operating scenarios in the County. The results of the model indicate that there is little difference in water level changes if all water providers operate under the 100-Year Rule versus the 300-Year Rule, except within the centroid of pumping of the Northern Water Providers. Operation of a satellite well field in the County to provide future demands lessens the water level change in the Northern Water Providers' area due to the spreading out of Denver Basin aquifer pumping over a larger area. Therefore, a satellite well field in north-central El Paso County can be a beneficial concept to preserving water levels in the Denver Basin aquifers. Any large well field that is located in close proximity to the County, but at a lower elevation, has the potential for increasing water level changes in the Northern Water Providers' area. Depending on distance, this impact could be relatively significant, with as much as 200 additional feet of water level change as a result of adjacent large satellite well fields. However, these changes would be under confined aquifer conditions, and water level changes would be less under unconfined conditions.

The El Paso County Water Report has been prepared as a guide to assist EPCWA water providers in water policy decisions. This plan represents work conducted from 2000 to 2002, and should be updated as water issues change and/or new issues arise.