

**Water and Environmental Programs
Engineering Success Stories**

State: Arizona

Borrower Name and Case No.: Town of Prescott Valley

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Congressional Information: Rep. Bob Stump

County: Yavapai

Keywords: Ground Water Recharge

Ground Water Recharge Project, Prescott Valley

Abstract

The Town of Prescott Valley, Arizona, recently built a Ground Water Recharge Project utilizing small lakes or ponds located in the center of town where permeable soils allow ground water recharge of excess treated wastewater effluent to gain future ground water rights. The project recharges treated effluent from a new wastewater collection and treatment system. The project will provide future water resources for development in an arid Arizona community that depends on ground water resources. This paper describes some of the aspects considered for the development of this groundwater recharge project.

Introduction

Prescott Valley, a 27 year old community, is in central Arizona near the largest stand of ponderosa pine in the world. It is 90 miles north of Phoenix at a mile high elevation. Nearby Prescott was the first Territorial Capital of Arizona. It was incorporated in 1978 and is one of the fastest growing communities in the second fastest growing state in the nation. Pronghorn antelope still live near and travel throughout the town in spite of its tremendous growth.

YEAR	POPULATION	GROWTH RATE
1980	2,284	
1990	8,858	25 %/year
1993	11,440	15 %/year
1997	18,500	15 %/year

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Developments outside the town limits increase the area population to more than 25,000. Recent commercial development has supported growth. ACE Home Distribution Center just finished a 15 acre warehouse in Prescott Valley and many other commercial and light industrial facilities have been attracted to the community. Prescott Valley has a large population of retired people because of the attractive four season climate without the intense heat of the lower desert or the extreme cold and snow of higher elevations.

The Town lies above two groundwater basins, the Little Chino Valley groundwater basin and the Upper Agua Fria groundwater basin. Both basins are in the Lonesome Valley sub-area, which receives recharge primarily from Lynx Creek. One third of the recharge flows into the Little Chino Valley basin and two thirds into the Upper Agua Fria basin. The depth to groundwater in the Town varies from 100 feet to 600 feet.

Prescott Valley recently completed a state-of-the-art sewage collection system and 2.5 million gallons per day extended aeration wastewater treatment facility. A conventional gravity flow collection system delivers wastewater to the treatment plant. The Town was not impacted by the construction of the wastewater treatment plant due to the isolated location. The Town was temporarily inconvenienced by the construction activities to install the new collection lines and decommission septic tanks, but the overall benefit of having adequate wastewater collection and treatment systems has more than compensated for the temporary inconvenience.

A major road and street resurfacing project was completed immediately after the collection lines were installed, reducing the dust in much of the Town which previously had unpaved streets.

Treated effluent was planned to be used for irrigating golf courses and parks or other green areas. Effluent not used for irrigation was planned to be discharged into percolation beds within the Agua Fria River bed immediately downstream from the treatment plant.

The Agua Fria River channel is approximately 30 feet deep in the vicinity of the treatment plant, with the plant site well above the 100 year flood level. The Agua Fria flood plain is largely undeveloped and has Great Basin Grassland Biotic community which is widespread through Northern Arizona, Nevada and Utah. Vegetation is dominated by short grasses with scattered forbs, shrubs and cacti. The natural landscape has been altered by grazing, but many of the native grassland species remain.

The Arizona Department of Water Resources (ADWR) determined in December 1994, near the completion of the wastewater treatment facility, that the "... proposed site (near the treatment facility in the Agua Fria River bed) is unsuitable for operation of a recharge project...". Prescott Valley is located within the Prescott Active Management Area (AMA) established by the Arizona 1980 Groundwater Code. At some future date

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the ADWR will likely determine that the safe yield of the area's groundwater resources has been reached. At that time no new groundwater resource use will be approved, and any development would be dependent on water sources from outside the AMA. In arid Arizona, water importation can be very expensive, and a deterrent to development. The ADWR water budget projection for the Prescott AMA assumes full utilization of effluent in the future.

Artificial recharge of high quality effluent could increase the AMA's annual water budget significantly. Maximum use of effluent resources is essential if sufficient yield is to be achieved without the implementation of more strict water conservation measures in later management periods. A suitable site was needed because the Town had already discharged approximately 365 million gallons of treated effluent which has percolated into the groundwater of the AMA but for which the Town has received no credit. Uncredited recharge continues at a rate of 1.4 million gallons per day.

The Town needed to locate a suitable site and get ADWR approval so ADWR could issue the Town an Underground Storage and Recovery (US&R) permit. Under the terms of the permit, groundwater credits accumulate without limit until such time as the water is reclaimed from groundwater for use. A rule of thumb used by ADWR is that a US&R system permit effectively triples the water resources of an area through what is basically a large scale recycling procedure. Without such a system in place in a timely manner, the Town's potential for future growth would be severely limited.

With the help of hydrogeological consultants, the Town developed an alternative which would eliminate all the ADWR technical concerns for recharge as well as allow for economical future direct reuse. The site selected at the Mountain Valley Park Lakes was far enough away from the AMA boundary to resolve the initial ADWR concerns and at a more favorable absolute elevation with respect to the elevation of the ground water table.

The site selected is located on the top of a plateau approximately 240 feet higher than the originally proposed facility which was only 30 feet above the water table of the regional aquifer. ADWR had concerns for any location located closer to the AMA boundary than the proposed location. Hydrogeological testing confirmed the desirability of the proposed location even though it will not recharge the volume desired. Future recharge sites will be located and added to the recharge effort when effluent capacity exceeds the recharge capacity of the proposed site.

The proposed site is located in a natural drainage near the center of Town at Mountain Valley Park Lakes. A tree beautification project has been underway at the site for a few years. It includes a small storm water retention basin that is dry except for periodic storm flows. Trees are small enough to be relocated as needed and the Construction for the first planned recharge site began late in 1996.

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A pump station was built near the wastewater treatment plant and the pipeline for the reuse effluent built from the pump station to the recharge site at Mountain Valley Park Lakes was finished during 1997. Mountain Park Lakes were deepened and inlet and outlet control structures designed to handle the reuse effluent as well as natural flood flows. The recharge facility is expected to be completed and fully functional early in 1998.

The recharge facility consists of two ponds divided by an earth fill levy that helps to maximize the recharge area. The slopes surrounding the ponds will be landscaped for recreational use. The design of the recharge ponds includes gabions around the perimeter of the ponds to stabilize the ponds from wave and water action. The gabions also provide a level area near the water line which will increase the safety for children and others enjoying recreation activities at waters' edge. The community hopes to include limited contact boating and fishing activities at the new Mountain Valley Park Lakes.

Along with the protection, preservation and replenishment of our limited, local water supplies and an increased opportunity for leisure time and recreation activities, the Prescott Valley Recharge Project at Mountain Valley Park Lakes provides an aesthetically pleasing area that adds to the betterment of the quality of life in the community. This park is also an excellent example of how a project can be constructed to perform its intended engineering functions and still be aesthetically pleasing to the environment.

(Information for this article taken from the author's personal observations and information available from the Prescott Valley construction file.)
