

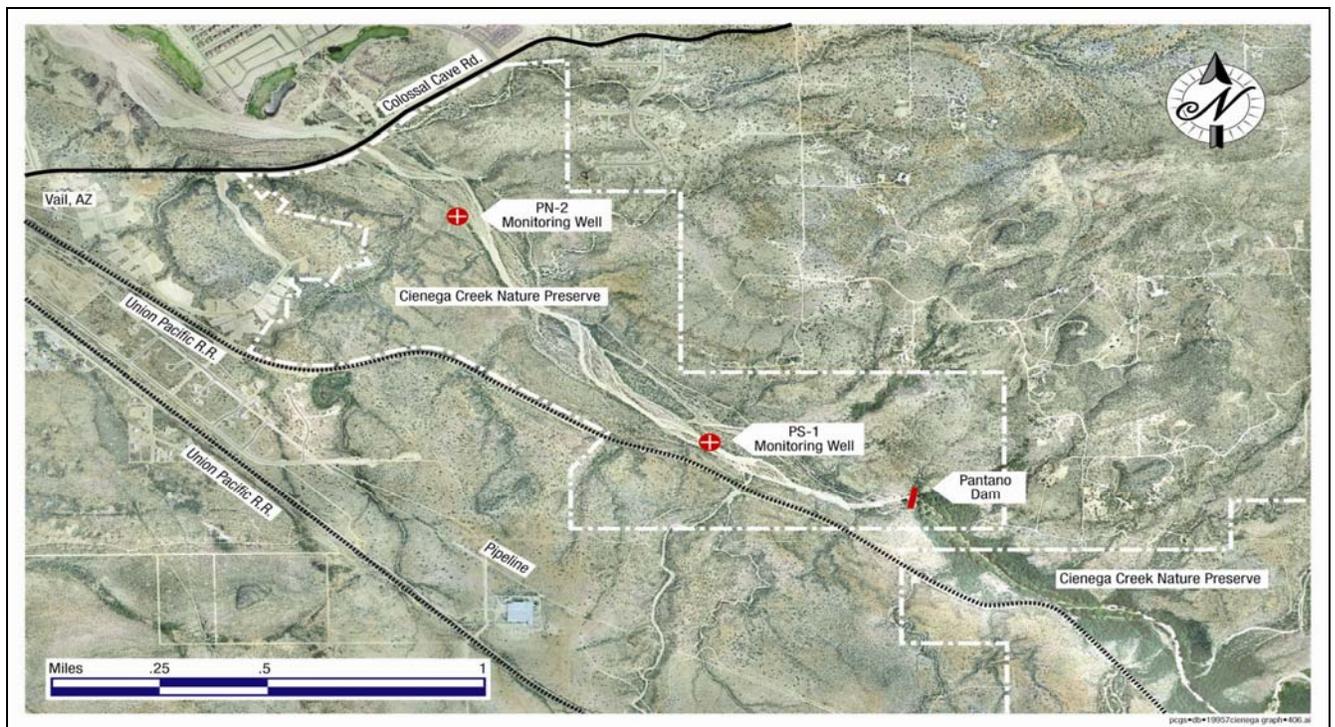
Geophysical Survey and Well Installation Downstream of Pantano Dam

In 1986, Pima County Board of Supervisors established the Cienega Creek Natural Preserve. Several groundwater studies have been conducted to examine the projected impacts of future ground-water pumping impacts on the surface and subsurface flow of the Creek. However, little direct information was available to evaluate the depth to shallow groundwater and changes in water levels surrounding and along the down stream reach from Pantano Dam to Colossal Cave Road. Aerial photographs also show vegetation in the area of the floodplain just down stream of the Dam that is denser than other portions of this reach.

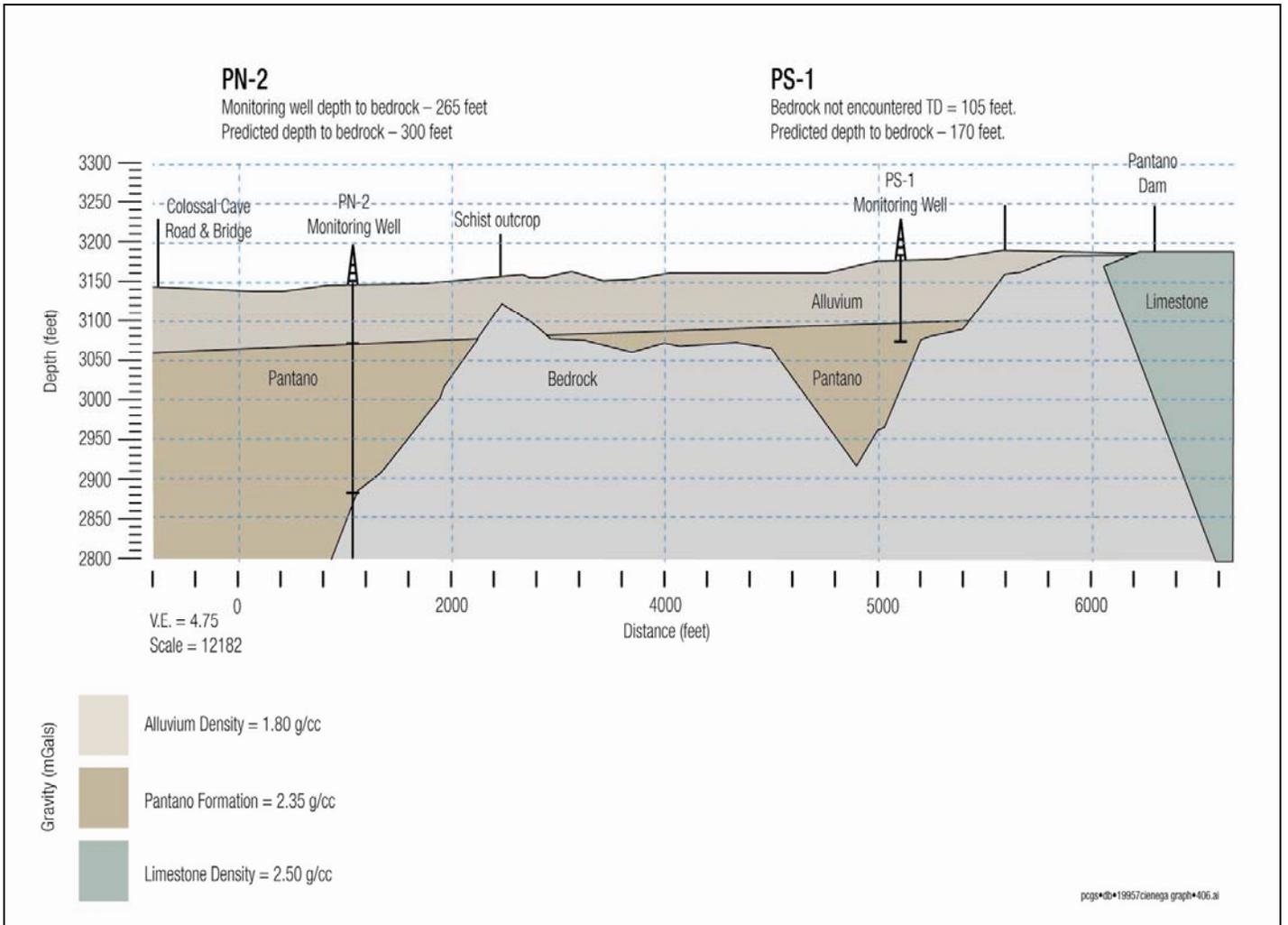
This program evaluated the reach between Pantano Dam and Colossal Cave Road by use of geophysical methods and constructing shallow water-level monitor wells. The purpose of the program is to evaluate if down-gradient pumping is already affecting shallow groundwater and riparian vegetation within this valuable reach of Cienega Creek; and if impacts could occur in the future. Such information would also be useful in evaluating the potential for recovery of water levels downstream of the dam should surface-water diversions of Cienega Creek water cease. Currently, perennial surface water flow from the Creek at Pantano Dam is diverted to the Del Lago Golf Course.

The preferred surface geophysical method was a gravity technique to identify hydrologic bedrock along the Cienega Creek/Pantano Wash and margins. This technique has been useful in identifying bedrock features in the Tucson Basin, including studies done in the early 1980s and 2003. These studies depicted large basin areas and were strongly correlated with existing borehole data, so inferences could be made in areas where little to no drilling data was present.

This approach coupled existing surface data on bedrock with two strategically placed wells, one to hydrologic bedrock, and additional gravity measurements to complete the picture.



Cienega Creek/Pantano Wash Recently Drilled Monitor Wells



Hydrogeologic Cross Section of the Reach from Pantano Dam to Colossal Cave Bridge

The drilling results were similar to the depths to bedrock predicted with the geophysics survey. The cross section model was then adjusted based on the drilling data. Well PN-2 was drilled on a terrace along the southwest bank of the stream channel and about 1800 feet southeast of Colossal Cave Road Bridge. The site confirms the interval of steeply dipping bedrock that is essentially the edge of the Tucson Basin. The upstream well, PS-1, completed to 105 feet, encountered the semi-confining Pantano Formation at 80 feet. These wells will be measured monthly with possible installation of real-time water-level transducers so water level response to flood flows and the impacts of pumping large groundwater volumes can be monitored. These wells will be incorporated into the existing Cienega Creek monitoring well system to give a more complete picture of the effects of natural and man-made conditions on the perennial flow and subsurface water-level conditions of the Preserve.