# Planning and Life-Cycle Cost Analysis of an Aquifer Storage and Recovery System (Well #299) in the Northeast Regional Aquifer, City of Phoenix

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ABSTRACT

Due to the disconnection and or abandonment of wells because of water quality issues and aging equipment, the City of Phoenix has the capability of currently meeting 10 to 15 percent of its peak day demand with groundwater. A need to substantially rebuild this well capacity for drought redundancy, operating flexibility, system emergencies, and managing surface water supplies has been identified. It is anticipated that groundwater needs for operating flexibility and system emergencies are more compelling in the short term than demands to offset drought impacts. The City's objective is to manage aquifers to ensure the future availability of good quality groundwater when needed, and to reduce the risks of land subsidence and other adverse environmental impacts. A life-cycle cost analysis and planning study was conducted for an Aquifer Storage and Recovery (ASR) well (Well #299) to assess whether this system is economically and technically feasible and determine if this system will provide the operating flexibility and system emergency when needed. The northeast aquifer in Phoenix was considered the best candidate for ASR based on the following:

- ASR would protect and sustain the water resources at our existing wellfield;
- With declining regional water levels (3.5 to 5.4 feet/year), there is adequate volume for water to be injected and stored in the aquifer;
- Aquifer hydraulic parameters in the Northeast Aquifer are ideal for ASR;
- Developing storage in this aquifer, would meet Safe Yield requirements per Arizona Administrative Code R12-15-703 (A.A.C. R12-15-703); and
- Existing infrastructure and land is available.

To assess a water source that would be most economical and meet Drinking Water Standards without extensive treatment requirements, we evaluated treated Central Arizona Project (CAP), untreated CAP, and reclaimed water from Cave Creek Water Reclamation Plant. The most cost-effective and technically feasible scenario is an ASR system that injects, stores, and recovers treated CAP water. Based on the ASR life-cycle cost analysis for treated CAP water coupled with the operational management of our distribution and treatment system, the following findings were identified:

- Existing infrastructure and treatment system can be utilized for the ASR system;

- Additional land acquisition is not required;
- From a well clogging/operational perspective, utilizing injected treated CAP water will not be as problematic as other water sources (i.e., raw CAP and reclaimed water);
- Operational flexibility and redundancy is achieved during emergency and drought conditions; and
- Injection/recharge demands are easily assessable through the CAP water wheeling process.

Once the first ASR well is piloted and tested, our intent is to develop a network of ASR wells that will meet our long-term water resources needs. We will also implement a joint management/planning strategy with City of Scottsdale so that both Cities can manage and sustain groundwater levels, and our future water resource supplies within the northeast aquifer.