

July 13, 2016

John Munderloh
Water Resources Manager
TOWN OF PRESCOTT VALLEY
7501 E. Civic Circle
Prescott Valley, AZ 86314

**SUBJECT: SCOPE OF WORK AND COST ESTIMATE FOR DEVELOPMENT OF
RECHARGE AND RECOVERY PLANNING DOCUMENT**

Dear Mr. Munderloh,

In accordance with your request, Montgomery & Associates (M&A) has prepared this scope of work (SOW) and cost estimate for professional hydrologic services to evaluate options for meeting near-term and long-term goals for recharge and recovery of treated effluent produced by the Town of Prescott Valley (the Town), and to prepare a conceptual level planning document. M&A's understanding of the Town's recharge and recovery goals is summarized as follows:

- Immediate goal is to increase recharge capacity to approximately 2,400 acre-feet per year (AF/yr) to maximize storage credits for currently available effluent.
- Near-term goal (within next few years) is to increase recharge capacity by an additional 1,600 AF/yr as discharge of effluent from existing ATF grows from 2,400 AF/yr to 4,200 AF/yr, while implementing recovery at appropriate locations as needed.
- Long-term goal (within 10 to 30 years) is to increase recharge capacity to accommodate additional effluent from expansion of the existing ATF or construction of a future ATF, which could be as much as 6,000 AF/yr in 30 years (based on assumption that treatment volumes will be approximately 65% of potable water deliveries), while implementing recovery at appropriate locating as needed.

PROJECT BACKGROUND

The following background information is based on M&A's historical involvement with recharge planning for the Town and recent discussions with you and Neil Wadsworth:

- The existing ATF is currently permitted to treat 3.75 million gallons per day (rate of 4,200 AF/yr), and produced 2,400 AF in 2015.

- Permitted capacity of existing recharge facilities (Upper Agua Fria Recharge Project [UAFRP], including the Constructed in-channel USF and Phase 1 of North Plains Constructed USF) is as large as 3,600 AF/yr
 - Accrual of storage credits at existing recharge facilities has been limited due to small infiltration rates and excessive groundwater mounding at the North Plains facility and non-compliance issues (related to natural stormflow) with the constructed in-channel facility; in 2015, a total of 1,730 AF of credits were accrued, representing a loss of 670 AF of credits in 2015

- Reconnaissance studies of potential surface recharge sites were conducted from 2006 to 2008
 - Approximately 26 potential sites were identified and evaluated based chiefly on existing data
 - Trenching and/or drilling investigations were conducted at 9 sites
 - Led to selection of North Plains site for a Constructed USF

- Since the 2008 reconnaissance study was completed, the Town:
 - Has been progressing toward purchase of land for Agua Fria Park
 - Has conducted infiltration testing on a site on Glassford Hill
 - Drilled a borehole near each of the three alert-level piezometers at North Plains USF to evaluate the effect of creating local conduits to promote downward movement of water (through a possible perching layer) and locally lowering water table
 - Is willing to consider direct injection into the saturated zone as well as the vadose zone
 - Is willing to consider recharge in vicinity of the North and Santa Fe wellfields

PROJECT APPROACH

Proposed investigations would chiefly comprise reconnaissance studies using available data for hydrogeologic conditions, land ownership and use, reclaim water infrastructure, performance of existing recharge facilities, and other pertinent factors, together with input from the Town. The current study does not include field investigations such as trenching, infiltration testing, or drilling. M&A assisted the Town with reconnaissance investigations for a large area within and adjacent to the Town limits during the period from 2006 to 2008. Some of the potential recharge sites identified and preliminarily evaluated during those reconnaissance investigations may be relevant to the present study and SOW. The recharge matrix prepared for the previously evaluated sites is attached and may provide a useful format and starting point for the present study.

Recharge facility siting and planning is considered the most critical and urgent goal for the present study; maximizing recharge and accrual of long-term storage credits is the first priority. However, recovery options and opportunities (or constraints) should be considered in the context of recharge facility siting and will be evaluated for long-term recharge and recovery planning.

The primary components of the proposed investigations include:

- Kickoff meeting to review objectives, scope, previously identified potential recharge sites, recovery considerations, and additional information and data resources held by the Town

- Initial review of available data, identification of potential recharge sites to be further evaluated in relation to planning horizons, and site visit to assess potential sites with Town staff
- Data analysis, screening of sites, and ranking of recharge sites based on feasibility, cost, environmental, regulatory, and recovery considerations
- Identification of data needs and preparation of recommendations for focusing future efforts at selected sites, and preparation of recharge and recovery planning document

The following key issues and considerations will be examined:

- **Recharge limitations:** Based on the ultimate goal to recharge as much as 6,000 AF/yr of additional effluent in the next 30 years (8,000 AF/yr total), together with known constraints related chiefly to land access and hydrogeologic conditions, it is likely that more than one recharge facility (in addition to the UAFRP) will eventually be required to accommodate the Town's recharge goals
- **Recharge method:** Given hydrogeologic and land availability constraints on recharge via surface infiltration, M&A will examine technical feasibility and options for direct injection into the saturated zone as well as the vadose zone
- **Recovery locations:** M&A will evaluate the advantages and opportunities to locate recharge and recovery facilities in close proximity by considering:
 - Locations and construction of future recovery wells relative to existing recharge facilities (currently only two permitted recovery wells, located within 1-mile "Safe Harbor" of UAFRP)
 - Locations of future recharge facilities relative to existing production wells that could be permitted as recovery wells
 - Chemical quality of recovered water

SCOPE OF WORK

TASK 1 – PROJECT KICKOFF MEETING, ADMINISTRATION, AND COORDINATION

Primary aspects of Task 1 include:

- Kickoff meeting (via teleconference) to review the SOW with Town staff, refine objectives and approach, review potential sites and current conditions based on Town input, identify useful information and data resources held by the Town, and arrange for acquiring data
- Additional meetings via teleconference at conclusion of each of remaining Tasks (2 through 5); assume total of four 1-hour meetings

TASK 2 – REVIEW DATA, IDENTIFY POTENTIAL SITES, AND CONDUCT SITE VISIT

Task 2 includes review and analysis of available data from relevant sources and reports, as needed to identify and rank recharge and recovery options, and inspection of potential recharge sites. More specifically, Task 2 includes:

- Review most recent ADWR groundwater flow model for Prescott AMA and coordinate with Keith Nelson of ADWR, particularly in relation to confining units represented in the model, and evaluate and refine regional hydrogeologic framework
- In coordination with the Town, identify potential sites to be further evaluated
- Summarize and evaluate relevant results of previous recharge feasibility investigations and reconnaissance investigations for additional recharge sites (build on previous recharge matrix and update the matrix)
- Conduct site visit to assess potential recharge sites with Town staff (assume 2 days, including travel)

TASK 3 – DEVELOP RECHARGE PLAN ELEMENTS

Evaluation of recharge facility goals and potential sites may be affected by the Town's planning horizons. For the purposes of the present SOW, it is assumed that recharge planning will be conducted for near-term (next few years) and long-term (next 10 to 30 years) horizons. As described previously, "immediate" options for increasing recharge capacity will also be evaluated and are essentially a "subset" of near-term options. The primary differences between the options for these three planning horizons are the recharge/storage volumes that would need to be accommodated and the possible ease of constructing/adding recharge capacity.

The immediate goal is to identify a feasible, cost-effective, and quickly-implementable option for accommodating all of the Town's presently available effluent. The goal would then be to identify a single recharge site that, ideally, could be developed in phases to not only accommodate the Town's near-term goals, but also to meet long-term goals through one or more facility expansions. However, based on previous reconnaissance investigations, it does not appear likely that a single site can be identified that would accommodate recharge of up to 6,000 AF/yr.

Immediate Options

In coordination with the Town, M&A will evaluate options for achieving additional capacity at existing recharge facilities or facilities/areas already covered by the existing APP and AZPDES permits; examples include:

- Addition of deep injection wells within or adjacent to North Plains existing recharge basins to convey water to deeper zones for the purpose of reducing height of mounding and increasing total recharge capacity
- Expansion of North Plains constructed basins (selected Phase 2 basins)

- Deep injection wells at Mountain Valley Park
- Other potentially identified sites that are owned by the Town, are very near the existing reclaim pipeline, and would not have apparent unreasonable harm concerns.

Near-Term Options

Near-term options may essentially include the “immediate” options described above, if successful and capable of recharging/storing a significant increase in effluent volume with time, and/or would be determined through the process described below under “long-term options”. For the latter case, the near-term option may comprise the first phase of an expandable recharge facility ultimately capable of accommodating the Town’s long-term recharge/storage goals (more ideal) or may comprise a separate facility than would only provide limited additional recharge capacity (less ideal).

Long-Term Options

Long-term options would require evaluation of expanding recharge capacity by constructing new recharge facilities at other site(s) based on the following process (as described above, this process may also apply to near-term options):

- In coordination with the Town, evaluate recharge facility options (locations and methods), including multi-use facility with recreational benefits
- Develop recharge facility screening and evaluation criteria based on technical feasibility, potential cost, environmental impacts, and regulatory considerations (further described below)
- Screen recharge facility options to remove from consideration options that have fatal flaws or are very unfavorable
- Estimate relative conceptual-level capital costs for remaining potential recharge facility designs/sites for the purpose of comparing options
- Evaluate and rank remaining options

Relevant Criteria for Evaluating Surface Recharge and Direct Injection Options

Criteria will be developed for screening and evaluation of surface recharge options, including:

- Technical feasibility and potential recharge capacity based on land availability, hydrogeologic conditions (near surface soils, vadose zone, and saturated zone)
- Water conveyance system considerations

- Conceptual-level capital costs for construction of recharge facilities and water conveyance pipelines
- Nearby land and water uses, and potential for unreasonable harm
- Regulatory permitting requirements of ADWR and ADEQ

Criteria will be developed for screening and evaluation of direct injection options, including construction of new injection wells and selection of existing supply wells that may be retrofitted for use as injection wells. Criteria are expected to include:

- Technical feasibility and potential injection capacity based on hydrogeologic conditions, including hydraulic conductivity and thickness of injection zones, presence of confining unit(s), and depth to groundwater level or potentiometric surface
- Chemical quality of injection source water and receiving waters
- Water conveyance system considerations
- Construction, age, condition, and productivity of existing supply wells that may potentially be retrofitted for use as injection wells (or as dual-purpose injection and recovery wells)
- Conceptual-level capital costs for construction of new injection wells and retrofitting of existing supply wells
- Location, depth, and use of nearby water supply wells
- Regulatory permitting requirements of ADWR, ADEQ, and U.S. EPA (Underground Injection Control Program)

Recommendations

In coordination with the Town, M&A will develop recommendations for focusing future efforts at selected sites, which may include:

- Field investigations at one or more selected surface recharge sites (may range from low-cost trenching to drilling and/or infiltration testing)
- Field investigations at one or more selected potential direct injection sites (may range from injection testing of existing well(s) using potable water to exploration drilling and/or completion and testing of pilot injection well(s))
- Pursue accessibility of land for potentially favorable sites, acquisition or lease

- Groundwater flow modeling to evaluate effects of recharge and recovery such as groundwater mounding, migration of effluent in the aquifer, effects of recovery on mounding and migration of effluent, and quality of recovered water

TASK 4 – DEVELOP RECOVERY PLAN ELEMENTS

Relevant Criteria

Criteria will be developed for siting and design of new recovery wells, and for selection of existing wells for use as recovery wells. Criteria are expected to include:

- Potential well yield
- Chemical quality of recovered water
- Effects of recovery pumping on mitigation of groundwater mounding from recharge
- Distribution system considerations
- ADWR recovery well permitting requirements

General Approach

The approach for evaluating recovery options would be based on the following considerations:

- First or primary option: evaluate use of existing wells either owned by the Town or that could potentially be acquired, and that can be permitted as recovery wells
- Prepare and evaluate conceptual alternative plans for recovery, including dual-purpose ASR (aquifer storage and recovery) wells
- Identify data needs and prepare recommendations for focusing future efforts for recovery well siting/selection

TASK 5 – PREPARE RECHARGE AND RECOVERY PLANNING DOCUMENT

M&A will prepare a recharge and recovery planning document to guide the Town's activities for meeting near-term and long-term recharge and recovery goals. The planning document will summarize:

- Recharge and recovery goals and relevant background information
- Summary of options and sites considered, including screening of options, estimation of general infrastructure costs, evaluation and ranking of recharge and recovery options
- Recommendations for focusing future efforts at selected sites and timeline for completing critical identified tasks

ESTIMATED COSTS AND SCHEDULE

Cost to complete the present scope of work has been estimated on the basis of time and reimbursable expenses in accordance with M&A's 2016 fee schedule. Estimated costs for M&A personnel and reimbursable expenses are summarized below:

TASK	ESTIMATED PROFESSIONAL FEES	ESTIMATED EXPENSES	TOTAL ESTIMATED COST
1. Kickoff Meeting, Administration, and Coordination	\$ 3,520	\$ 0	\$ 3,520
2. Review Data, Identify Sites, and Site Visit	\$ 10,560	\$ 350	\$ 10,910
3. Develop Recharge Plan Elements	\$ 11,710	\$ 0	\$ 11,710
4. Develop Recovery Plan Elements	\$ 3,980	\$ 0	\$ 3,980
5. Prepare Recharge and Recovery Planning Document	\$ 18,850	\$ 150	\$ 19,000
TOTAL	\$ 48,620	\$ 500	\$ 49,120

Work will be conducted on a time and materials basis and will be invoiced monthly. If the actual scope of work varies from the described scope of work, actual costs will vary from these estimated costs. However, the total estimated cost of **\$49,120** will not be exceeded without prior authorization by the Town.

If you have questions or require further discussion, please contact us.

Sincerely,
MONTGOMERY & ASSOCIATES



Jeffrey J. Meyer
Principal



Mark M. Cross
President

SENT VIA EMAIL