Attachment B

COCHISE COUNTY and THE NATURE CONSERVANCY
HYDROGEOLOGIC INVESTIGATION SCOPE OF WORK OUTLINE
RIVERSTONE PROPERTY
April, 2013

Through hydrologic investigation, Cochise County ("the County") and The Nature Conservancy ("TNC") seek to assess the feasibility of a recharge facility or facilities on the 1,811-acre Riverstone property that will increase base flows in the San Pedro River to the maximum extent possible. The property is located approximately six miles southeast or the city of Sierra Vista, withjn 2 miles of the San Pedro River. and shares its eastern boundary with the BLM San Pedro Riparian National Conservation Area (SPRNCA). Recent hydrologic modeling scenarios indicate that recharge on Riverstone may result in increased San Pedro River base flows.

The project deliverable will identify locations for recharge facilities where post-development flows, stormwatcr and treated effluent water could be recharged to intluence the alluvial aquifer of the an Pedro River. These water sources may be recharged together via one or several distinct lcilities. Since recharge facilities may be developed as a phased project as the various water sources are acquired for the site, recommendations for the appropriate facility type for each water source will also be included in the deliverable. These recommendations may include surface basins, vadose zone and/or saturated zone injection wells, discharge to existing drainages. or other new recharge technologies. Proposed facilities may incorporate existing infrastructure on site, including eruihen berms, erosion-control drop structure, and wells.

Three potential water sources exist at this time. These include on-site post-development nood flows, captured and conveyed stormwater, and conveyed treated effluent. Project deliverables will include identified locations and recommendations for appropriate recharge technologies suitable for each water source, together referred to as ''recharge facilities'". At very least, the delivcrabJes for this scope of work will include letter-size conceptua l renderings of potential future facility designs for the recharge of flood flows, storm water. and effluent. Recharge facilities for the different water sources may be co-located, or distinct, and may include a series of facilities that may span property boundaries with the adjacent SPRNCA. If recharge proves to be feasible on Riverstone, budgeting for later phases will include actual facility design deliverables.

The 1irst design focus will be on recharge of immediately available post-development flood water, with the goaJ of captw·ing tlows created from impervious surfaces covering upstream watersheds, or ..LU'ban enhanced runoff'. Careful attention will be paid to allowing natural flows to continue across the site, while slowing the flow and capturing and infiltrating enhanced urban mnoff. Effectiveness of existing infrastructure on the property will be

evaluated as part of any recharge facility design. including the earthen benns bisecting the three main drainages and the cement drop-structure located near the confluence of Ramsey and CatT Canyon washes.

TI1e second design focus will be a facility capable of recharging a to-be-determined amOtmt of treated effl uent. Several options exist for effluent water sources, but negotiations with local mtmicipalities and water compan.ies have not yet commenced. To the extent that the conveyance system access from wastewater treatment plants (WWTP) to the recharge site needs to be considered for facility design, the locations of existing and planned WWTPs are available. The design for this facility will need to include all requirements associated with obtaining and implementing an Aquifer Protection Permit (APP) as required by the Arizona Department of Environmental Quality (ADEQ) under the Clean Water Act. The actual APP application preparation. submittal. and interactions with ADEQ will be included as an option as described below.

The third design focus will be on recharging stormwater captured in the upstream developed watersheds that would otherwise infiltrate or evaporate before arriving naturally at Riverstone. Stormwater would be collected and conveyed through a yet-to-be-determined conveyance system to Riverstone for recharge closer to U1c river. The recharge facility may utilize existing on site infi·astructure. If adequate funds arc available in the current contract. the deliverable will also include using the newly developed Cochise County GIS tool, Pipeline Feasibility Analysis, and other existing data to identify stormwater collection points. amount of stormwater generated, rights of way rrom collection to recharge facility and concept level pipeline or other conveyance system cosLs.

The project team includes TNC and the County who will fund and jointly manage the geotechnical and hydrologic investigation contract. The Upper San PedJ·o Partnersl1ip (USPP) also has contributed considerable funding for Lhe investigation. All team members will be provided monthly progress reports. The project team agrees that d1e approach for this investigation will be phased and iterative and "rill involve other interested parties at key decision points. Lacher Hydrologic Consulting will also serve on the project team, providing hydrologic analysis of recharge effects. to help understand the expected benefit and timing of recharge to the San Pedro River. Subsequent tasks will be designed based on resulting data and decisions made with the project team at key, pre-defined decision points.

Summary of Approach

The approach to field investigations will include decision points following each field task that will likely affect the type and/or extent of subsequent investigations due to the different recharge options being evaluated and their dependence on site-specific geotechnical and hydrogeologic conditions. We seek to maintain flexibility in the approach to ensure a cost-

effective program for obtaining sufficient and critical data to evaluate feasibility of potential recharge methods to meet TNC and County recharge goals.acknowledging that significant departure from scope could have substantial effects on cost and schedule.

Scope of Work Outline

Ta sk I. Project Scoping. The contractor will:

- Develop project scope details, including phasing, critical path items and decision points
- Clarify and prioritize recharge goals/approaches, and identify milestones leading to goals
- Assign roles and communication system for project team members
- Develop system for sharing hydrologic data obtained during the site- speci fie fieJd investigations
- fdentify key stakeholders groups, contacts for each group. and timing for project participation

Deliverable l: Scope of Work Report (required for TNC grant payment, due at latest by June 28,20l3)

Task 2. Data collection and evaluation of avai lable geotechnical and hydrogeologic data. The contractor will pe1'fom1 data collection and evaluation, incl uding, but not necessarily limited to:

- JE Fuller GIS tool and Pipeline feasibility study. 2012
- Cochise County Flood Control/Urban Runoff Recharge Plan, Stantec, 2006
- Rapid estimation of recharge potential in ephemeral-stream channels using electromagnetic methods. and measurements of channel and vegetation characteristics. Callegary, et al., 2007
- Upper San Pedro Partnersnip documents
- Lacher Hydrological Consulting reports
- Determine accessibility of existing wells
- Climate change effects on runoff to the extent possible (lhis may be qualitative rather than quantitative)
- Survey of recharge networks elsewhere/recharge benefits to strem11 Oow

Task 3. Preliminary Hydrologic Analysis. The contractor will perform a preliminary hydrologic analysis including, but not necessarily limited to:

- Determine existing and futw-e condition runoff volumes for tributaries drainages to Riverstone, including watershed delineation and applicaUon of rainfall runoff modeling for 2-. 5-, I 0-, and 1OO year events
- Develop detailed estimates of potential available capture vollunes of stom1water using historic precipitation datlandscape and impervious surface estimates

- Use Cochise County GIS tool, Pipelline Feasibility Analysis, and other exjsting data to identify stormwater collection points and cost to develop. rights of way from collection to recharge facility and pipeline costs
- Develop estimates for potential effluent sources, volumes from the EOP and planned future WWTPs, and conveyance cost estimates

Task 4. Comprehensive Site Reconnaissance/1nitial Recharge Feasibility

- Alternative site recharge screening level evaluation of potential alternative or complimentary sites using available information (no-onsite investigation)
- Evaluate hydrogeologic.soil, and surface geology data suitability for recharge of:
  a. Post-development floods (on-site)
  b. Stormwatcr conveyed ti·om orr"-site locations
  c. Et11uent conveyed from off-site locations
- Incorporate identified site constraints (physical, biological, archaeological. legaL water delivery infrastructure access etc.) and eliminate clearly unsuitable areas
- Finalize screening/ranking criteria for each ofJ water sources and upply to site to identif-y locations of shallow-subsurface site charactetization

Task 5. Coordinate with Project Team and Refine Plan for Field Investigations. The contractor "'rill:

- Evaluate identified initial constraints/considerations and select areas for field investigations
- Evaluate results of geotcclmical and hydrologic analysis. projected recharge benefits, and refine approach (if appropriate) to maximize benefits
- Incorporate Hydrologic Analyses of Recharge Effects (Lamel Hydrological Consulting) in order to continue to refine potential recharge benetit to SPRNCA/San Pedro River

Task 6. Conduct [nitial Recharge Feasibility Study. The contractor will evaluate recharge feasibility with subtasks that may include. but are not necessarily limited to. the following subtasks:

- Conduct shallow sub-surface site characterization/evaluation for recharge feasibility and develop options to maximize recharge effectiveness
- Conduct backhoe test pit/trenching investigations for lithologic characterization of sediments
- Petfom1infiltration testing for evaluation of in1iltration rates pertaining to possible recharge methods: recharge basins. in-channel, or injection wells (vadose zone and/or sahu·ated zone).
- Develop estimates of ·'achievable·· recharge volumes for possible recharge methods. ·'Achievable" means the volume of water that the aquifer can accept.

- Prepare work products (lithologic descriptions. graphic logs, hydrogeologic sections) and analyze results. Determine nwnber and select locations for exploration deeper subsurface site cha racterization (to be performed in task 9 below).
- Planned deeper subswface investigations may include, but are not necessarily limited to:
  a) Appropriate drilLing method at selected locations for characterization of upper 50 to100 feet of subsurface sediments
  b) Appropriate testing methods (if necessary) such as down-borehole permeability tests to evaluate subsw·face hydraulic properties.

- Sw·face geophysical survey (i.e. high rcsolurion resistivity) methods at transects selected from drilling results to project observed sediment lithologies to larger areas.

Task 7. Presentation of initial recharge feasibjlity results and initial plan for deeper sub-surface field investigations to the Project Team.

Task 8. Preparation of Draft and Final Technical Memoranda. The contractor will:

- Present resuhs of initial feasibility assessment of source waters and potential recharge mcthod(s), locations, and quantities. and "achi evable" volumes of water that the aquifer can accept from:
  a) Post-development Oood flows (on-site)
  b) Stormwater conveyed from on'-site locations
  c) Effluent conveyed from off-site locations

  Summru·ize methods and results of near-surface field investigations
  Present recommendations and order of magni tude costs for Phase II options.

Task 9 (Opti on #1 of Phase II). Conduct Detailed Recharge rcasibility Study. The contractor will conduct a deeper sub-surface site characterization/evaluation for recharge feasibility and develop options to maximize recharge effectiveness. Task deliverables will include lithologic descriptions, graphic logs, and hydrogeologic sections.

Task 10 (Option #2 of Phase 11). Install shaUow monitor wells. The contractor will:

- Install up to three sbaJiow monitoring wells in a method and locations to be proposed by the contractor to the Project Team. Monitoring three wells are lhe minimum number capable of determining ground water flow direction and gradient.

- Propose methodology and conduct aquifer tests for determining transmissivity of the alluvial or shallow (Upper Basin Fill) aquifer (whichever is encountered at the site).

Task 11. (Option #3 of Phase II). Presentation of Results and impact of Results on Potential Recharge Methods and Locations to the Project Team. The contractor will:

Evaluate results of deeper subsurface recharge feasibility
Evaluate ramifications for recharge methods and locations
Present the results and proposed additional tasks required to completed the design to the Project Team.

Task 12. (Option #4 of Phase II). Perform additional tasks. The contractor will perform additional tasks as proposed in Task 11 to reline recharge methods and locations.

Task 13. (Option #5 of Phase II). Preparation of Draft and Final Technical Memorandum. The contractor will:

- Summarize methods and results of field investigations
- Evaluate feasibility of recharge and recommend recharge method(s), locations, and quantities for recharge from the three potential sources:
  a. Post-development flood flows (on-site)
  b. Stormwater conveyed from off-site locations
  c. Effluent conveyed from off-site locations
- Combine results with LHC Phase 2 Riverstone Refinement & Simulation results

Schedule

It is anticipated that the contract will be awarded on or before June 1, 2013. The contractor shall propose a schedule for review and approval by the Project Team with the cost proposal. Due to potential site damage by trucks and heavy equipment, field work during the monsoon season will be subject to acceptable site and working conditions.

Budget

Available funding for this project is $165,000. This draft scope identifies basic tasks plus optional tasks that are within scope but may not be able to be accomplished with available funding. This scope may be modified to include options if funding is sufficient for award or turn basic tasks into options if funding is insufficient for basic tasks. This will be accomplished during negotiations following receipt of the initial proposal from the contractor.