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Re: Bella Vista Urban Enhanced Runoff (UER) Recharge Project Watershed Plan and Environmental Assessment Statement of Work

Dear Joaquin, Karen, Brad, and Jose:

In regard to the above referenced project, our project team is pleased to provide you with this proposal for professional engineering services to complete the Watershed Plan and Environmental Assessment (EA). Following are the project understanding, project approach, scope of professional services (scope), deliverables, fees for engineering services, schedule, and project assumptions/exclusions. The scope reflects our understanding of the project based on review of RFQ documents and recent discussions with Cochise County.

We appreciate the opportunity to submit this proposal and look forward to working with you on this project. If you have any questions or require additional information, please feel free to contact either Brian Wahlin or Ricardo Aguirre at your earliest convenience.

Sincerely,

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Project Understanding

BACKGROUND

Cochise County (County) has become a leader in Arizona and beyond in developing critical water security needs for local communities, surrounding rural areas, local agricultural operations, and ecosystem conditions that are currently in decline. For more than twenty-five years the County, a founding member of both the Upper San Pedro Partnership (USPP) and the Cochise Conservation and Recharge Network (CCRN), has been pioneering a vision to establish a regional water management program that would meet the long-term water needs derived from the San Pedro River watershed.

As a continued effort to fulfill this vision, the County was recently awarded a grant from the Natural Resources Conservation Service (NRCS) to conceive, design, and construct the Bella Vista Urban Enhanced Runoff (UER) Recharge Project (Project) on the County's 2,984-acre Bella Vista Property located in the Buena School Watershed. Partnered with The Nature Conservancy (TNC) and prompted by the work of the CCRN to implement a regional network of water management projects that meet the long-term needs of the San Pedro River watershed, this project has been identified as the next CCRN project to help achieve the long-term objective of increasing both the regional and alluvial aquifer levels and the base flows in the San Pedro River, providing benefit to ecological and agricultural conditions as well as economic stability.

ESTIMATED VS. MONITORED ANNUAL RUNOFF

In 2011, the County embarked on a three-year effort to launch the Palominas Recharge Project, the first CCRN pilot storm water recharge facility, that launched the County's initiative of increasing aquifer levels. Since its construction, the County has monitored the project's recharge performance and has recognized discrepancies between estimated annual runoff and actual annual runoff. Based on recent conversations with the County, the Palominas Recharge Project was sized to recharge approximately 90 ac-ft/year. During September 2014, Cochise County experienced one of the wettest years in recent history causing practically all major bridges along the Upper San Pedro River to be unpassable. The runoff from that event combined with other runoff that year was expected to meet or exceed the estimated annual recharge of 90 ac-ft. However, it only recharged 45 ac-ft, suggesting that the HEC-1 models used for the design (and verified by regression equations) predicted an overly conservative (high) runoff estimate.

Because of these apparent discrepancies found in the Palominas Recharge Project monitoring, several model parameters used to estimate UER volumes flowing to the Bella Vista Recharge Project site have been adjusted, resulting in an estimated range of 260 to 630 ac-ft/yr as opposed to the original estimate of 630 ac-ft/yr, which was also predicted based on an HEC-1 model and verified with regression equations. Given this information, the County desires that this Project be optimized for collecting runoff during heavy precipitation years, but not over-built for average precipitation years, which requires the need to identify an adaptive design to capture a range of flows that can truly be expected.

UER VS. PRE-DEVELOPMENT RUNOFF

In addition to optimizing the size of the Project for maximum recharge capability, regional surface to groundwater behavior needs to be understood as it relates to both the San Pedro River natural river flows

and flows coming from the uplands. The County has indicated that both the US Bureau of Land Management (BLM) and TNC are sensitive to how water resources within the San Pedro River and its uplands are managed. According to observations made by the BLM within their San Pedro Riparian National Conservation Area (SPRNCA), certain tree species, such as Cottonwoods, have been identified to require a flow regime natural to the river that supports their growth and survival. Given the monitoring discrepancies described above; however, the possibility exists that much less water coming from the Buena School Watershed makes it to the San Pedro River than previously thought. As such, this Project will also require determining a more realistic estimation of pre-development runoff, for both design concept decisions and for establishing a collective understanding of the difference between the UER and the pre-development flood flows.

PUBLIC OUTREACH

As the Project unfolds, starting with a clear understanding of the Buena School Watershed hydrology and then following with the conception and development of project alternatives, both the County and the NRCS expect an effective public outreach campaign that will be necessary to galvanize both decision makers and stakeholders who care about the Project and the impact that it will have on the communities and the ecosystem within the surrounding area. Because this project is a project of the CCRN, public outreach planning processes will include input from the CCRN group.

Project Approach

RAINFALL DATA

Based on the Project Team's understanding, it is necessary that continued monitoring of watershed precipitation into the future will be important, but evaluation of past rainfall data must begin immediately. Fortunately, the US Department of Agriculture's (USDA) Agriculture Research Service (ARS) has established the Southwest Watershed Research Center, which operates the Walnut Gulch Experimental Watershed (WGEW) located approximately 10 miles from the Coyote Wash outfall. The Project Team intends to extrapolate from both the historical data from WGEW and the monitoring data from the Palominas Recharge Project along with other monitoring data collected by either the USPP or the CCRN and apply to the Buena School Watershed. The Project Team will continue to refine both the extrapolated estimates and the monitoring information to see what can be expected annually from the Buena School Watershed.

SURFACE WATER MODELING

Given the Project Team's conversation with the County and the discrepancies between modeled and monitored results of the Palominas Recharge Project, Riverstone, and Bella Vista indicating that pre-development runoff is less than originally estimated (however, note that the monitoring periods ranges from 1 to 4 years on these sites), the Project Team understands that the goal for this Project is to develop an optimized preferred alternative concept design. As such, the Project Team recommends developing a FLO-2D model for the Buena School Watershed to compare with the existing HEC-1 model. According to the Flood Control District of Maricopa County (FCDMC) Drainage Policies and Standards for Maricopa County Supplemental Technical Document FLO-2D Verification Report (dated May 2016), HEC-1, in

some cases, gives higher discharge estimates than FLO-2D. Also, the report indicates that FLO-2D generally compares better with gage monitoring data than HEC-1.

The Project Team believes that FLO-2D will better inform the performance of conceptual alternatives in terms of both size optimization for varying return periods and to split the UER and pre-development runoff. Since post-development runoff is less than originally estimated, the preferred alternative infrastructure may not need to be as big, and FLO-2D is expected to help identify how infrastructure developed for the preferred alternative can be more efficient.

To create an effective FLO-2D model and establish a clear picture of the Buena School Watershed hydrology, the Project Team needs quality topography and city-wide planimetric data, consisting of building footprints, culverts, streets, storm drains, and walls. Fortunately, the Project Team currently has Federal Emergency Management Agency (FEMA) quality topography from the floodplain mapping efforts about to kick-off in Cochise County. Unfortunately, the Project Team does not have city-wide planimetric data, but after speaking to Alan Humphrey with the City of Sierra Vista, the Project Team will be able to collect some land use data that should improve the quality of the FLO-2D model. In discussions with Mr. Humphrey, the following data is available from the City of Sierra Vista:

- ◆ Aerial imagery (6-inch resolution) from the mountains to the San Pedro River that was flown in 2009. Newer developments are not included. However, there has not been much development since the flight date. For modeling purposes, newly developed areas would have had to meet criteria that peak flows would be reduced to pre-developed conditions, so it could just be modeled as bare ground.
- ◆ Digital Elevation Models (DEM) at a 5-foot resolution.
- ◆ The company that flew the aerial imagery gave the City of Sierra Vista a product that shows impervious areas. Mr. Humphrey believes the product underestimates impervious areas by approximately 18% (e.g., it does not include concrete pathways or areas under cars) and he has done a correction for the major commercial areas that he will provide. He has not corrected the product for less developed areas.
- ◆ Soil survey and land cover dataset.
- ◆ Mr. Humphrey has developed an HEC-HMS model for the City of Sierra Vista. He based his methodology on the FCDMC's and the Arizona Department of Transportation's (ADOT) Hydrology Manuals. Mr. Humphrey has "local knowledge" built into his HEC-HMS model.
- ◆ Mr. Humphrey is drafting a hydrology manual for the City of Sierra Vista, which he will also provide.
- ◆ Mr. Humphrey has a culvert dataset where he has geolocated culverts and has about 3 photos per location with a 1 square-foot PVC pipe square in each photo to help with sizing estimates. He estimates that in the Buena School Watershed, there is likely 200 to 300 data points.
- ◆ Mr. Humphrey said he has walked most of the washes and has noted any grade control structures and has made estimate of Manning's *n*-values.

GROUNDWATER MODELING

The Project Team would like to begin coordinating with TNC regional groundwater modeler, Laurel Lacher, to understand the behavior of the hydrogeology throughout the region and especially the Bella Vista area. Using the MODFLOW model updated by Laurel Lacher, the Project Team can create a linked surface

water/groundwater model to better estimate the recharge that would be expected for the Project. The MODFLOW model would be linked with the SWR (Surface Water Routing) package and the RIP (Riparian ET) package to determine complex interactions between surface water flows and groundwater flows. The SWR package has both 1D and 2D functionality. The 1D components can be linked to the 2D cells. Both the 1D components and the 2D cells can be linked to the existing MODFLOW model. In addition, evaporation and evapotranspiration can represent a significant volume of water lost in Coyote Wash. Using the RIP package, ET from non-irrigated lands, surface water ET, and irrigation recharge can be estimated. The exact formulation of the linked surface water / groundwater model needs further refinement that will come after discusses with Laurel Lacher. It is anticipated that the linked model would be a localized model and not a watershed-wide model. Thus, this modeling effort does not serve the same function as the FLO-2D model mentioned above. The FLO-2D model would give a general indication of the recharge that could be expected within the watershed; the MODFLOW/SWR model would specifically model the movement of the surface water and groundwater for the Project. This would more realistically quantify the estimated recharge from the Project while also determine how to maintain the natural flow regime in the SPRNCA.

SEDIMENTATION

Sedimentation is an important issue to consider during the Watershed Plan and EA. A sediment yield analysis needs to be completed to determine the amount of sediment delivered from the upstream watershed to the Project site. The uncertainty in sediment yield methodologies is quite high. Thus, comparing sediment yield results to measured data is an important step in the process. There are many sources that contain measured sediment yield results, including studies done on the WGEW.

In addition, how the sediment moves through the Coyote Wash and how it affects the Project performance needs to be defined. The Project Team will develop a sediment transport model of the Coyote Wash using HEC-RAS (latest release). Sediment transport phenomena are inherently complex and available transport functions have recognized limitations. Therefore, the development of a sediment transport model must proceed in a logical manner and be consistent with an understanding, derived from sound geomorphic assessment, of the physical phenomena that control sediment transport and the morphology of the system. Results of the field reconnaissance for the study and prior investigations will be used as the basis of that geomorphic understanding.

DEVELOPING THE PREFERRED ALTERNATIVE

At this time, four conceptual alternatives have already been prepared for consideration. These alternatives will be evaluated and further developed to determine the most appropriate preferred alternative for final design as part of the Watershed Plan and EA process. Despite efforts made to develop these alternatives, the Project Team believes that there may be value in identifying other concept alternatives for consideration, especially land treatment alternatives, based on the Project Team's understanding of current NRCS goals.

The Project Team will use FLO-2D along with HEC-RAS hydraulic and sediment transport models to size the proposed groundwater recharge infrastructure treatments based on previously developed design concepts as well as new design concepts selected to recharge between 260 and 630 acre-feet per year of UER from the City of Sierra Vista to develop a preferred alternative for final design.

The preferred alternative will be selected by following NRCS protocol, including public input.

Scope of Work for Professional Services

Below is the scope to complete the Watershed Plan and EA, which includes identifying a preferred alternative for final design. The task descriptions below have been developed to address the project understanding and project approach as described above. For all report deliverables, two (2) hard copies will be provided to the NRCS, if needed. Hard copies will be provided to the County, TNC, and CCRN at their request. All entities will receive an electronic submittal.

TASK 1: SCHEDULE AND COORDINATION

Task 1.1: Schedule

A detailed schedule for the Watershed Plan and EA (and the Engineering Design) is shown in Appendix A. It reflects all the necessary review times and public meetings needed to complete the project.

Task 1.2: Coordination

The Project Team will coordinate with the County, CCRN partners, and the NRCS throughout the project. The Project Team will perform the following tasks:

- ◆ Participate in a kick-off meeting at the County office (or other agreed upon location). The Project Team will prepare an agenda summarizing project goals, project schedule, and list issues for discussion. The Project Team will distribute meeting minutes.
- ◆ The Project Team will set up a coordination meeting with previous contractor to facilitate a smooth transition as the project moves between firms. The Project Team will prepare an agenda and distribute meeting minutes. The Project Team will coordinate with the previous contractor throughout the Scope of Work (SOW) to obtain background information on previously completed tasks.
- ◆ The Project Team will participate in monthly coordination meetings with the County, TNC, and the NRCS for the duration of the SOW. The Project Team will prepare an agenda for these meetings and distribute meeting minutes after the meetings.
- ◆ The Project Team will prepare and submit monthly Progress Reports to the County, TNC, and the NRCS that briefly discusses project activities and contains the following:
 - A description of the significant work accomplished during the reporting month, including approximate percent completed.
 - A description of the work to be accomplished in the following month.
 - A description of any issues encountered and actions taken.
- ◆ The Project Team will submit invoices to the County on a monthly basis. The Project Team will maintain a spreadsheet in support of the invoices indicating percent of work completed, the amount currently being billed, and the amount remaining. The Project Team will submit this spreadsheet to the County whenever an invoice is submitted.
- ◆ The Project Team will notify the County in writing of any potential work that is not within the SOW prior to the start of any such out-of-scope work.

- The Project Team will perform a thorough site investigation that will consist of taking photographs and measurements of existing utility (if present) and drainage infrastructure and drainage patterns to further understand the existing conditions of the site. The Project Team will share the findings of the site investigation with the Project Team survey firm. The County, TNC, and the NRCS will be invited to participate in this initial site investigation.

Task 1 Deliverables

- General coordination
- Project schedule
- Meeting agendas
- Meeting minutes
- Monthly Progress Reports
- Monthly invoices
- Field notes and photographs from the initial field visit

TASK 2: DATA COLLECTION AND ANALYSIS

To the furthest extent possible, the Project Team will utilize previous studies and documents to prepare the Watershed Plan and EA. Thus, the Project Team will research and collect any appropriate information associated with the project from available sources such as, the NRCS, the US Geological Survey (USGS), the US Army Corps of Engineers (USACE), TNC, the CCRN, the USPP, the City of Sierra Vista, the USDA-ARS WGEW, existing reports and studies, and other sources, as necessary, to determine what information already exists and what additional information needs to be developed or acquired.

The Project Team will review criteria described in the NRCS Engineering Design Statement of Work and the Cochise County Floodplain Regulations with plausible designs in mind. The data collected will help in defining the physical, biological, ecological, economic, and social environments.

Task 2.1: Define Purpose and Need of the Project

The Purpose and Need of the project is a critical component of the Watershed Plan and EA. During the data collection effort, the Purpose and Need of the project will be explicitly defined.

Task 2.2: General Data Collection

The Project Team will collect and review existing data and information concerning the study area from the County and the NRCS and other appropriate agencies. Data collected shall include available information and reports on the soils and geology, hydrology and hydraulics, biological resources, cultural resources, demographics, and other resources associated with the study area.

Task 2.3: Soils and Geological Data Collection

The Project Team will collect available soil and geological data and prior related investigations for the study area. The data will include soil and geologic maps and other applicable information. The Project Team will review published literature including studies completed by other consultants and information from the Arizona Geologic Survey, the NRCS, the Arizona Department of Resources (ADWR), and other

pertinent public entities to determine the geotechnical, geologic and groundwater conditions underlying the site and to obtain information (when available) regarding the engineering properties of the underlying native soil and bedrock materials at the location of the residential area and potential drainage corridors. The Project Team will analyze and summarize existing data and reports and develop recommendations regarding any new or updated planning-level soil and geological investigations that are needed for development of the Watershed Plan and EA.

Task 2.4: Hydrologic and Hydraulic Data Collection

The Project Team will collect available hydrologic and hydraulic (H&H) data and prior related investigations for the study area. The data will include precipitation studies, hydraulic evaluations, and other applicable information. The Project Team will analyze and summarize existing data and reports and develop recommendations regarding any new or updated H&H investigations that are needed for development of the Watershed Plan and EA.

Task 2.5: Biological Resources Data Collection

The Project Team will collect available biological resources data and prior related investigations for the study area. The data will include plant and wildlife inventories, threatened and endangered species and critical habitat within the study area, and other applicable information. The Project Team will analyze and summarize existing data and reports and develop recommendations regarding any new or updated planning-level biological investigations that are needed for development of the Watershed Plan and EA.

Task 2.6: Cultural Resources Data Collection

The Project Team will collect available cultural resources data and prior related investigations for the study area. The data will include cultural resources inventories and other applicable information. The Project Team will analyze and summarize existing data and reports and develop recommendations regarding any new or updated planning-level cultural resources investigations that are needed for development of the Watershed Plan and EA.

Task 2.7: Social and Demographics Data Collection

The Project Team will collect available social and demographics data and reports for the study area. The Project Team will analyze and summarize US Census Data for the study area and develop a discussion on population and demographic characteristics. The Project Team will include information on racial and ethnic populations and limited income populations in the study area. Note that the County has not perform a formal social and demographic study. Thus, some effort will be needed to define the social and demographics for the project.

Task 2.8: Topographic Data Collection

The Project Team will collect available topographic data and reports for the study area. The Project Team will analyze and summarize the topographic data available for the study area.

Task 2.9: Data Collection and Analysis Memorandum

The Project Team will prepare a Draft Data Collection and Analysis Memorandum listing all existing data and information collected with brief descriptions and sources. The memo shall also identify any significant data gaps and recommendations regarding any new or updated planning-level investigations that are needed

for development of the Watershed Plan and EA. The Project Team will submit the Draft Memorandum to the County, TNC, and the NRCS in electronic format and two hard copies for review. Supporting documentation will also be submitted.

The Project Team will address comments received from the County, TNC (through the County) and the NRCS and incorporate these comments into a Final Data Collection and Analysis Memorandum. The Project Team will submit the Final Memorandum to the Sponsor in electronic format and two hard copies.

Task 2 Deliverables

- ◆ Formal Purpose and Need of the project
- ◆ Draft Data Collection and Analysis Memorandum
- ◆ Final Data Collection and Analysis Memorandum

TASK 3: ALTERNATIVES FORMULATION AND EVALUATION

Although several studies have already been performed in the study area, the Project Team argues that a complete picture of how the Buena School Watershed operates is still missing (see discussion in Project Understanding and Project Approach). This complete picture of the existing conditions is necessary to make informed decisions when evaluating the alternatives. The existing conditions analysis is also needed to define the No Action scenario. Note that this work is geared towards understanding the overall watershed; detailed, design level models of each alternative will not be developed.

The full number of hydraulic structures in the Buena School Watershed are unknown but given that this is to develop a preferred alternative for final design the conveyance for hydrology is important and attention to detail would be necessary to ensure that the watershed is not over-attenuating flows. There are a few interesting structures that look like offline basins that could be challenging to model correctly. The biggest unknown here are the impacts of structures, some of the channels, and basins.

Task 3.1: Geotechnical Investigation

The Project Team will provide a geotechnical evaluation of the soils within and adjacent to the project limits. The Project Team will conduct field reconnaissance of the site to review pertinent geological and geotechnical conditions within the developed area and potential drainage corridors. This task will be conducted to confirm or modify geological information obtained from the literature review and to determine if there are any geological hazards that should be considered in the development of the overall design concept for the project.

On the basis of the literature review, the on-site reconnaissance and the information generated from the laboratory testing, the Project Team will formulate preliminary geotechnical engineering recommendations for the Project which should be considered in the design concept evaluation to determine the recommended alternative for final design. The Project Team will provide preliminary geotechnical engineering recommendations addressing foundation support of culverts, weirs and/or grade control structures, safe side slopes in areas of open channel improvements, considerations for linings in open channels for erosion control (when necessary), preliminary design recommendations for retaining walls used for channelization, and other preliminary recommendations for earth connected phases of the project that should be considered at the design concept level of project planning.

The results of the geotechnical investigations will be summarized in the Preliminary Alternatives Memorandum.

Task 3.2: Surface Water Modeling

The Project Team will prepare a two-dimensional (FLO-2D) combined hydrology and hydraulic model to determine the existing detailed drainage impacts throughout the Coyote Wash watershed and to the project area. The Project Team has developed Python scripts to be able to build large urban based FLO-2D models. These efficiencies will aid in developing a more comprehensive model to gain more clarity throughout the Coyote Wash Watershed. The Project Team also has a close working partnership with Riada Engineering, the developer of FLO-2D, which will provide additional support as appropriate for this project.

The Project Team will review aerial photos, existing documents, and perform one site visit to verify existing drainage patterns on and adjacent to the project site. The results of the surface water modeling will be summarized in the Preliminary Alternatives Memorandum. The Project Team has prepared the following assumptions for this task:

- 10-ft grid spacing will be used due to small narrow channels that cut through Sierra Vista. Without a finer grid element, a lot of topo manipulation will be required to accurately get the flow through those channels.
- Three models will be developed for the watershed (i.e., upper mountains, urban Sierra Vista, and downstream Bella Vista) at roughly 2 million grid elements each.
- Rainfall temporal distributions developed using HEC-1 hypothetical storm per ADOT methodology (24-hour duration).
- Green and Ampt infiltration using readily available ADOT soils information or Terrestrial Ecosystem Survey, if necessary.
- HEC-1 infiltration loss verification will be used.
- Hydraulic structures modeled using generalized culvert equations or HY8 rating curves, if necessary.
- Land use based available data and/or approximate delineation based on aerials.
- Area Reduction Factor estimated for land use codes relative to their density (no building footprints).
- No walls will be modeled.
- Outflow/Inflow developed from each model using built-in FLO-2D routine.

Task 3.3: Groundwater Modeling

The Project Team, in conjunction with Laurel Lacher, will develop a MODFLOW / SWR model. This model will start with the Lacher existing groundwater model and add on a surface water routing component as well as an ET component. The results of the groundwater modeling will be summarized in the Preliminary Alternatives Memorandum.

Task 3.4: Sedimentation Analyses

The Project Team will perform a sediment yield analysis of the watershed to determine the sediment loading that would occur to the proposed recharge facility. The Project Team will select the most appropriate

methodology for performing the watershed sediment yield. The hydrology needed for this analysis will be obtained from the FLO-2D model. This analysis will be confirmed comparing to measured data on similar watersheds. The Project Team will examine how the urbanization has cut off the sediment load to the proposed recharge facility.

The Project Team will develop a sediment transport model of Coyote Wash in the project area using HEC-RAS (latest version). The Project Team will determine sediment inflow rating based on the results of the sediment yield analysis. The appropriate sediment transport function will be selected. The inflow hydrology will be determined from the FLO-2D model. The results of the sedimentation analyses will be summarized in the Preliminary Alternatives Memorandum.

Task 3.5: Preliminary Alternatives

Work completed by the previous contractor has already identified four possible alternatives for the project. However, the Watershed Plan and EA requires that the Project Team formulate and evaluate all reasonable preliminary alternatives to address the goal(s) of the project and to meet the purpose and need for project action. Thus, the Project Team will expand this list of four possible alternatives to include other alternatives that meet the above criteria. The Project Team will document each preliminary alternative with a narrative description and a preliminary cost estimate for implementation. Narratives shall identify strengths, weaknesses, opportunities, and constraints of each alternative. The existing conditions analyses discussed above will be utilized to help identify the strengths, weaknesses, opportunities, and constraints of each preliminary alternative.

The Project Team will perform a value engineering exercise with the County and TNC to develop ideas for proposed groundwater recharge strategies. The value engineering process will include a focused analysis on a variety of groundwater recharge infrastructure treatments, such as, channels, culverts, basins, drop structures, bank protection, and impoundment structures. The value engineering process will also consider treatments for erosion protection, such as gabion baskets, soil cement, and other armoring techniques.

The first public meeting will occur during this task.

Task 3.6: Preliminary Alternatives Memorandum

The Project Team will summarize the results of the preliminary alternatives evaluation in a Draft Preliminary Alternatives Memorandum. The Project Team will submit the Draft Memorandum to the County, TNC, and the NRCS in electronic format and provide two hard copies for review. Supporting documentation will also be submitted. Public input from the first public meeting will be document in the memorandum.

The Project Team will address comments received from the County, TNC (through the County), and the NRCS and prepare a Final Preliminary Alternatives Memorandum. The Project Team will submit the Final Memorandum to the County, TNC, and the NRCS in electronic format and provide two hard copies.

Task 3.7: Preliminary Alternatives Workshop

The Project Team will arrange for and facilitate a half-day workshop with the County, TNC, and the NRCS to present the preliminary alternatives, identify any other feasible alternatives, and select the alternatives for detailed study. A proposed scheme for rating the effectiveness of the alternatives will be presented, discussed, and modified as the group proposes. Input from the CCRN will be considered as part of this process.

Task 3.8: Selected Alternatives Evaluation

The Project Team will further evaluate the alternatives selected for detailed study. The Project Team will document each selected alternative with an expanded narrative description, conceptual drawings, and a refined cost estimate for implementation. The narratives will expand upon the strengths, weaknesses, opportunities, and constraints of each alternative. The narratives will also describe the environmental effects of each alternative.

The Project Team will develop planning-level preliminary engineering designs to accurately define and evaluate selected alternatives for technical feasibility. Conceptual drawings shall provide a plan view and include approximate locations of structures and other features for each selected alternative.

Task 3.9: Economic Analysis

The Project Team will conduct an economic analysis for the alternatives selected for detailed study along with the no-federal-action (future without project) alternative. The Project Team will complete a benefit-cost analysis for each alternative to evaluate the economic, social, and environmental effects that are quantified (monetized and non-monetized) and those that are qualitative. The economic analysis will follow the procedures explained in the Guidance for Conducting Analyses Under the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resources Investment (PR&G and USDA Department Manual 9500-013) so that the economic findings can move smoothly between the Watershed Plan and EA and the alternative selection process.

The Project Team will identify the alternative that reasonably maximizes the net benefits. The economic analysis will be summarized in the Selected Alternatives Memorandum.

The Project Team will consult with the Economist and Planners at the NRCS National Water Management Center (NWMC) for assistance in clarifying the Economic Analysis policies and procedures consistent with applicable sections in the National Watershed Program Manual (NWPM) and National Watershed Program Handbook (NWPH) as well as the PR&G, which is to be used as the basis for the economic analysis. Note that all communications with the NRCS NWMC will be done through the NRCS Arizona Station Office (SO).

Task 3.10: Selected Alternatives Memorandum

The Project Team will summarize the results of the selected alternatives evaluation in a Draft Selected Alternatives Memorandum. The Draft Memorandum shall be submitted to the County, TNC, and the NRCS in electronic format and two hard copies for review. Supporting documentation shall also be submitted.

The Project Team will address comments received from the County, TNC (through the County), and the NRCS and prepare a Final Selected Alternatives Memorandum. The Project Team will submit the Final Memorandum to the County and the NRCS in electronic format and two hard copies.

Task 3.11: Preferred Alternative Selection Workshop

The Project Team will arrange for and facilitate a half-day workshop with the County, TNC, and the NRCS to present the results of the selected alternatives evaluation and to identify the preferred alternative for the Watershed Plan and EA. Input from the CCRN will be considered as part of this process.

Task 3.12: Preferred Alternative Documentation

The Project Team will fully document the preferred alternative, including a detailed narrative description, the rationale for alternative preference, measures to be installed, mitigation features, permits and compliance, costs and cost sharing, installation and financing, operation and maintenance, and NRCS tables (refer to NWPM and NWPB for full requirements).

Task 3 Deliverables

- ◆ FLO-2D model of the Buena School Watershed
- ◆ MODFLOW / SWR model of the site
- ◆ Sediment Yield Analysis
- ◆ HEC-RAS Sediment Transport Model
- ◆ Draft Preliminary Alternatives Memorandum
- ◆ Final Preliminary Alternatives Memorandum
- ◆ Preliminary Alternatives Workshop
- ◆ Draft Selected Alternatives Memorandum
- ◆ Final Selected Alternatives Memorandum
- ◆ Preferred Alternatives Workshop
- ◆ Preferred Alternative Documentation

TASK 4: PUBLIC PARTICIPATION

The Project Team will work with both the County and the NRCS, as necessary, to ensure proper execution of the NRCS Watershed Plan and EA and to collect any appropriate information associated with the project. The Project Team will write letters on behalf of the County and the NRCS to bring visibility to this forward-thinking project. Preparation of letters, advertising, and development of visual assets will be prepared during the public outreach effort. To assist with the public outreach effort, the Project Team will develop a Fact Sheet for the project.

The Project Team will coordinate with the County, TNC, and the NRCS to arrange for and facilitate two public meetings during development of the Watershed Plan and EA. The Project Team will provide pertinent presentations, exhibits, and handouts for the public meetings. The Project Team will prepare sign-in sheets and summary notes of each public meeting. The Project Team will prepare and submit to the County, TNC, and the NRCS a “Public Participation Notebook” to contain all information concerning the meetings, such as: presentations, exhibits, handouts, public notices, sign-in sheets, notes, and any other pertinent material.

- ◆ Public Meeting No.1: This meeting will be held during preliminary planning. The purpose of the meeting is to inform the public about the planning effort and to scope issues to be considered during development of the Watershed Plan and EA. Note that this meeting will be held during Task 3.5.
- ◆ Public Meeting No 2: This meeting will be held following submittal of the Draft Watershed Plan and EA. The purpose of the meeting is to present the preferred alternative and to invite comments.

The public participation task will allow for and consider input from the CCRN to ensure consistency with CCRN messaging and coordination with the other interrelated recharge and conservation projects.

Task 4 Deliverables

- ◆ Project Fact Sheet
- ◆ Arrangement and participation of two public meetings
- ◆ Public Participation Notebook

TASK 5: WATERSHED PLAN AND ENVIRONMENTAL ASSESSMENT DOCUMENT

The Project Team will prepare the Watershed Plan and EA document for the Buena School Watershed. The content and format of the Watershed Plan and EA will be in accordance with the NWPM and NWPB and will include the following major sections and subsections (refer to NWPM and NWPB for full requirements):

- ◆ Cover
- ◆ Abstract
- ◆ Watershed Agreement (excluded from preliminary and draft documents for external distribution)
- ◆ Table of Contents
- ◆ Summary (OMB Fact Sheet)
- ◆ Purpose and Need for Action
- ◆ Scope of the EA
- ◆ Affected Environment
- ◆ Alternatives (including relevant issues and concerns identified through scoping)
 - Alternatives considered but eliminated from detailed study
 - No-Action Alternative (the most likely future condition if none of the federally assisted action alternatives are selected)
 - Action Alternatives (may be a combination of alternatives)
 - Other reasonable alternatives
- ◆ Environmental Consequences
- ◆ Effects of each alternative (include context and intensity) on the relevant issues and concerns identified through scoping
- ◆ Consultation, Coordination, and Public Participation
- ◆ The Preferred Alternative (including Tables 1-6)
- ◆ References
- ◆ List of Preparers
- ◆ Distribution List
- ◆ Index
- ◆ Appendices
 - Appendix A — Comments and Responses
 - Appendix B — Project Map
 - Appendix C — Support Maps
 - Appendix D — Investigation and Analysis Report
 - Appendix E — Other Supporting Information

Task 5.1: Preliminary Watershed Plan and EA

The Project Team will prepare the Preliminary Watershed Plan and EA document. Documents will be submitted twice as follows:

1st Submittal

The Project Team will submit the document in electronic format as a Word document to the County, TNC, and NRCS AZ SO. Two (2) hard copies will be provided to the NRCS, if needed. The County and TNC can request a hard copy. The NRCS AZ SO review will follow the Watershed Plan Review Checklist for Technical and Policy Compliance document provided by the NRCS NWMC. Comments received will be forwarded by the County to the Project Team. The Project Team will submit to the County written responses to the review comments. Once the responses are concurred with the Project Team will incorporate applicable resolved comments into the Preliminary Watershed Plan and EA 2nd submittal.

2nd Submittal

The Project Team will submit document in electronic format to the County and TNC. The following will also be submitted to NRCS AZ SO for submittal to NRCS NWMC for their review:

- ◆ Six (6) hard copies (bounded or with binder clip, no 3-ring binders);
- ◆ Electronic copy as a Word document;
- ◆ Please compress all photos/maps to minimize file size; and
- ◆ NWMC will provide comments in “track changes” in Word.

Comments received will be forwarded by the County to the Project Team. The NRCS NWMC will make themselves available for a teleconference to provide clarification of comments to Project Team, if necessary. The Project Team will submit to the County and TNC written responses to the review comments. Once responses are concurred with the Project Team will incorporate applicable resolved comments into the Draft Watershed Plan and EA.

Task 5.2: Draft Watershed Plan and EA

The Project Team will prepare the Draft Watershed Plan and EA document. Documents will be submitted twice as follows:

1st Submittal

The Project Team will submit document in electronic format as a Word document to the County, TNC, and NRCS AZ SO. Two (2) hard copies will be provided to the NRCS, if needed. The County and TNC can request a hard copy. The NRCS AZ SO will forward the report to NRCS National Headquarters (NHQ) for a cursory review. During the cursory review NHQ will review the document for completeness per NRCS NWPM and NWPH guidelines. The NRCS AZ SO will conduct a concurrent review of the documents during NRCS NHQ’s cursory review. Comments received will be forwarded by the County to the Project Team. The Project Team will submit to the County and TNC written responses to the review comments. Once responses are concurred with the Project Team will incorporate applicable resolved comments into the Draft Watershed Plan and EA 2nd submittal.

2nd Submittal

The Project Team will submit document in electronic format as a document to the County, TNC, and NRCS AZ SO. Two (2) hard copies will be provided to the NRCS, if needed. The County and TNC can request

a hard copy. The County, in cooperation with the NRCS, will distribute the Draft Watershed Plan and EA for public and interagency review and comment. Comments received will be forwarded by the County to the Project Team. The Project Team will submit to the County and TNC written responses to the review comments. Once responses are concurred with the Project Team will incorporate applicable resolved comments into the Final Watershed Plan and EA.

Task 5.3: Final Watershed Plan and EA

The Project Team will prepare the Final Watershed Plan and EA document. Documents will be submitted twice as follows:

1st Submittal

The Project Team will submit document in electronic format as a Word document to the County, TNC, and NRCS AZ SO. Two (2) hard copies will be provided to the NRCS, if needed. The County and TNC can request a hard copy. The NRCS AZ SO will forward the report to NRCS NHQ for a programmatic review and approval.

The NRCS AZ SO will conduct a concurrent review of the documents during NRCS NHQ's review. Comments received will be forwarded by the County to the Project Team. The Project Team will submit to the County written responses to the review comments. Once the responses are concurred with the Project Team will incorporate applicable resolved comments into the Final Watershed Plan and EA 2nd submittal.

2nd Submittal

The Project Team will submit document in electronic format as a Word document to the County, TNC, and the NRCS AZ SO for final review and acceptance. Two (2) hard copies will be provided to the NRCS, if needed. The County and TNC can request a hard copy. Upon acceptance, the County, in cooperation with the NRCS, will distribute the Final Watershed Plan and EA to applicable parties for signatures.

Task 5 Deliverables

- ◆ Preliminary Watershed Plan and EA
- ◆ Draft Watershed Plan and EA
- ◆ Final Watershed Plan and EA

Assumptions and Exclusions

The following is a list of exclusions that are explicitly not included as part of this SOW. A request to perform these tasks will result in the need for a change in the scope of work and an increase in professional fees.

- ◆ It is assumed that sufficient laboratory testing of the soils has already been conducted during the previous studies. Thus, new laboratory tests are not including in this SOW.
- ◆ Survey will not be performed as part of this SOW.

- The public involvement for the two public meetings will not require a specialized public involvement person.
- Sufficient soils and geological data has already been collected. No new soils and geological data will be collected.
- Sufficient H&H data has already been collected. No new H&H data will be collected.
- Sufficient biological resources data has already been collected. No new biological resources data will be collected.
- Sufficient cultural resources data has already been collected. No new cultural resources data will be collected.
- Sufficient topographic data will be collected. No new topographic data will be collected.

Cost Estimate

The Project Team's cost estimate for complete the Watershed Plan and EA for a fee of \$212,839.00. A detailed cost estimate, broken out by tasks, is provided in Appendix B.

Appendix A: Watershed Plan and EA Schedule



Appendix B: Detailed Cost Estimate

COST PROPOSAL

**Cochise County
Bella Vista Watershed Plan and EA
April 24, 2018**

Prepared by:

Prepared for:



WEST Consultants, Inc.
8950 S. 52nd Street, Suite 210
Tempe, AZ 85284



Cochise County
Highway & Floodplain Division - Cochise County Community Development
1415 Melody Lane, Building F
Bisbee, AZ 85603

TASK	SUB-TASK	DESCRIPTION	WEST Consultants					HELM				Sampson	Fuller	Terracon			Total Task Hours	COST		
			Associate	Project Manager	Senior Engineer	Staff Engineer	GIS Technician	Clerical	Project Manager	Senior Engineer	Project Engineer 2	Project Engineer 1	Project Manager	Project Manager	Senior Principal	Project Manager			Field Engineer	Technician
Hourly Rate			\$252.00	\$205.00	\$158.00	\$103.00	\$119.00	\$76.00	\$158.00	\$158.00	\$137.00	\$122.00	\$125.00	\$135.00	\$215.00	\$150.00	\$95.00	\$85.00		
A. LABOR COSTS																				
Bella Vista Watershed Plan and EA																				
1		Schedule and Coordination																		
1.1		Schedule and Site Visit		10					10				16						36	\$5,630.00
1.2		Coordination		40					40				8	16					104	\$17,680.00
2		Data Collection and Analysis																		
2.1		Define Purpose and Need of the Project		2					2				4						8	\$1,226.00
2.2		General Data Collection		2		8						2	4						16	\$1,978.00
2.3		Soils and Geological Data Collection												8	2				10	\$2,020.00
2.4		Hydrologic and Hydraulic Data Collection		2		8			4			16							30	\$3,818.00
2.5		Biological Resources Data Collection		2		8			2										12	\$1,550.00
2.6		Cultural Resources Data Collection		2		8			2										12	\$1,550.00
2.7		Social and Demographics Data Collection		2		16	8		2				16		16				60	\$7,726.00
2.7		Topographic Data Collection					4		2			4							10	\$1,280.00
2.9		Data Collection and Analysis Memorandum																		
		Draft Data Collection Memo		3		16	4		2			4	8						37	\$4,543.00
		Final Data Collection Memo		1		8			2			4	4						19	\$2,333.00
3		Alternatives Formulation and Evaluation																		
3.1		Geotechnical Investigation											4		9	34	20	4	71	\$9,775.00
3.2		Surface Water Modeling							4	60	80	200	4						348	\$45,972.00
3.3		Groundwater Modeling																		
		Revise MODFLOW for E, ET, and Ag-Recharge		4		16							4						24	\$2,968.00
		Develop MODFLOW 1D SWR Package		4		70													74	\$8,030.00
		Develop MODFLOW 2D SWR Package		4		70													74	\$8,030.00
3.4		Sedimentation Analyses																		
		Sediment Yield		4		16	8												28	\$3,420.00
		Sediment Transport		8		90							4						102	\$11,410.00
3.5		Preliminary Alternatives		16		16			16			16	8						72	\$10,408.00
3.6		Preliminary Alternatives Memorandum		4		8	4		4			4	8						32	\$4,240.00
3.7		Preliminary Alternatives Workshop		8		8			8			8	16						40	\$5,728.00
3.8		Selected Alternatives Evaluation		8		8			8			8	8						40	\$5,704.00
3.9		Economic Analysis											16						16	\$2,000.00
3.10		Selected Alternatives Memorandum		4		8			4			4	8						28	\$3,764.00
3.11		Preferred Alternative Selection Workshop		8		8			8			8	16						32	\$4,904.00
3.12		Preferred Alternative Documentation		4		16			4			8	8						40	\$5,076.00
4		Public Participation																		
4.1		Public Meeting No. 1		12					12										24	\$4,356.00
4.2		Public Meeting No. 2		12					12										24	\$4,356.00
5		Watershed Plan and EA Document																		
5.1		Preliminary Watershed Plan and EA		8		24	8		8			8	8						64	\$8,304.00
5.2		Draft Watershed Plan and EA		4		16			4			4	8						36	\$4,588.00
5.3		Final Watershed Plan and EA		4		16			4			4	8						36	\$4,588.00
Sub total			0	182	0	454	36	0	164	60	80	286	188	16	17	52	20	4	1559	\$208,955.00
TOTAL HOURS			0	182	0	454	36	0	164	60	80	286	188	16	17	52	20	4	1559	
(Percentage of overall Base Labor Cost)			0%	12%	0%	29%	2%	0%	11%	4%	5%	18%	12%	1%	1%	3%	1%	0%		
TOTAL LABOR COST:			\$0.00	\$37,310.00	\$0.00	\$46,762.00	\$4,284.00	\$0.00	\$25,912.00	\$9,480.00	\$10,960.00	\$34,892.00	\$23,500.00	\$2,160.00	\$3,655.00	\$7,800.00	\$1,900.00	\$340.00		\$208,955.00

B. DIRECT COSTS		COST
Mileage	600 miles at \$ 0.545 per mile	\$327.00
Federal per diem	9 days at \$ 93.00 per day	\$837.00
Federal M&IE	20 days at \$ 51.00 per day	\$1,020.00
Airfare	3 trips at \$ 400.00 per day	\$1,200.00
Rental car		\$500.00
TOTAL DIRECT COSTS		\$3,884.00
TOTAL FOR ALL TASKS		\$212,839.00