



Boise • Carson City • El Dorado Hills • Fallon • Lake Tahoe • Reno

LumosInc.com

El Dorado Hills

3840 El Dorado Hills Blvd., Suite 301
El Dorado Hills, CA 95762

August 21, 2025

City of Angels Camp
Pamela Caronongan, City Administrator
200 Monte Verda St. Ste B
Angels Camp, CA 95222

Via email: chrisoflinn@angelscamp.gov

Subject: Task Order 9 - Groundwater Exploration for Secondary Water Source for City of Angels Camp.

Dear Mr. O'Flinn:

Lumos & Associates, Inc. (Lumos) is pleased to provide you with this proposal for assisting the City of Angels Camp with identifying a secondary water source for the City of Angels Camp.

Project Understanding

The City of Angels Camp existing water system consists of a surface water diversion to a water treatment facility, which treats the water and then conveys water to their consumers. In 2001, the Darby Wildfire destroyed large sections of the Utica Water and Power Authority (UWPA) wooden flume system from Arnold to Angels Camp cutting off the water supply to over 10,000 people in Murphys and Angel Camp, California. During the reconstruction of the flume system, UWPA constructed a temporary overland water pumping water system in order to restore a water source to the people until repairs could be completed to the damaged flumes.

Recognizing the challenges experienced during the 2012-2016 droughts in California, the potential increase frequency and severity of droughts under climate change, along with fire danger, the California Legislature worked proactively to pass legislature to mitigate future droughts in the State. One of the bills created (Senate Bill 552) is known as the "Small Water Systems and Rural Communities Drought and Water Shortage Contingency Planning and Risk Assessment". The Senate Bill 552 was developed in 2021 and signed into law by Governor Newsom in September 2021. Under Senate Bill 552, State and local governments will share the responsibility in preparing and acting in the case of a water shortage event. One of these requirements is for small water systems to develop a secondary water source in the event that their primary water source is effected by droughts or other natural disasters. Senate Bill 552 defines a small water supplier as a community water system serving 15 to 2999 service connections and provides less than 3000 acre-feet of water per year. The City of Angel Camp falls under this definition.

The City of Angel Camp has requested a proposal from Lumos to assist them with locating groundwater as their secondary water source for the water system. Lumos has generated the following Scope of Work to assist the City of Angel Camp (Angel Camp) with their groundwater exploration as a secondary water source.

Project Scope of Work

Task 1 – Desktop Research and Due Diligence.

Lumos will conduct a historical document search of the areas around Angel Camp researching the

local geology, hydrogeology, historical mining operations, and water wells. We will reach out to WGA to procure historical knowledge and procure documentation that they may have. The data will be used along with a LiDAR/Ortho survey to target potential areas for conducting a surface geophysical survey. The objective will be to better understand the potential fault structures and assist the survey team with establishing flight patterns for a LiDAR Survey proposed in Task-2.

Task 2 – LiDAR/Ortho Survey, Assessment, Geological Field Reconnaissance.

This task will include the following work: Survey Control for the project will be referenced to California State Plane Coordinate System, Zone 3, NAD83, modified to ground, and the vertical datum for the project will be referenced to NAVD88. Once in place, the LiDAR and Ortho data will be collected with a City Mapper H2 sensor at +/-16 points per square meter – estimated vertical accuracy 10cm (RMSE). LiDAR and Ortho data will be processed to survey control and Lumos will deliver bare-earth LAS file. This task is proposing to fly a defined area adjacent to Angel Camp along with a portion of the entire city boundary. The products of this effort are required to identify locations for surface geophysical survey and as a benefit the ortho photo will be used for the this project and planning of future infrastructure projects. Once the data has been processed, a digital elevation model (DEM) will be used to create a hill shade map using the geoprocessing tool “hillshade” to deliver a geotiff of the project area. The DEM hillshade map of the project area will be analyzed to identify lineaments for potential structural faults in the project area. Once the LiDAR/Ortho Survey is accomplished, Lumos will investigate potential lineaments identified on the LiDAR map and conduct a field reconnaissance for verification. The lineaments (potential faults) in the project area will be field investigated for determining the final targeted area(s) for the geophysical survey (Task-3).

Task 3 – Surface Geophysical Surveys.

This task will involve a specialized geophysical survey of the targeted area(s) identified from the LiDAR Survey and field reconnaissance work. The geophysical surface survey will target faults systems (and other potential aquifers) for determining geologic fault attitudes for focusing on drilling targets. The geophysical survey will consist of Radiometric Gamma Ray Scintillation Counting (RGRSC) survey and a Micro Seismic Resonance (MSR) system. The RGRSC survey is a passive system that measures the aggregate gamma emissions from subsurface rocks and soil. The signal is attenuated where water occurs in permeable (fractured) zones beneath the sensor, making it an excellent tool in conjunction with the MSR system to locate highly permeable (fracture) zones with high water content.

The MSR method detects structural weakness in rocks and can locate fracture zones with high accuracy down to depths of 3000 feet. The earth’s crust is always flexing due to the gravitational pull of other planets, lunar satellite (the moon), and rotation of the earth similar to how ocean tides are constantly in motion. These are known as earth tides. The flexing of the earth’s crust creates resonances that can be measured and interpreted to help identify structural weaknesses in rocks allowing for the location of fractures zone where groundwater is likely most concentrated and where groundwater preferentially flows through the subsurface.

Both survey techniques are compact and easily deployable, and 2D acoustic profiles showing strengths and weaknesses of the underlying stratigraphy can be produced rapidly in the field. The area of investigation can be narrowed down to final targets using this MSR system that provides 2D and 3D acoustic profiles of the lithology to review the structures highly prospective for groundwater.

Task 4 – Data Analysis & Geology/Hydrogeology Technical Memorandum (Partial)

Following the analysis of the previous tasks, Lumos will develop the first portion of the technical memorandum (tech memo) documenting the methods, practices and analysis for up to three (3) locations for drilling test holes on the project area. The partial tech memo will be provided to the client for review and comment. Once the client has provided all their comments, Lumos will schedule a virtual meeting to discuss the findings and address all the comments provided by the client. Once Lumos and the client are in agreement with the locations for the test wells, Lumos will proceed with the Task 5 in developing a Forest Service Construction Operating Plan.

Task 5 – Local Agency Permitting Support

The following local agencies may require permitting for the test holes:

- Calaveras County Health Department.

We understand that the well drilling Contractor will apply for and secure the drilling permits, and that permitting fees will be the responsibility of the Contractor. A National Pollution Discharge Elimination System (NPDES) permit may be required and will be the responsibility of the drilling contractor to obtain since they will be required to manage all fluids generated from the test hole locations. Lumos will provide limited permitting support on a T&M basis as requested by the Client, limited to providing technical answers/content for the permit applications if necessary.

Task 6 – Test Hole Drilling Project

Upon approvals for previous tasks, Lumos will prepare and complete an exploration test holes drilling program which includes preparation of bid documents with specifications, bidding, drilling contractor award notification, field data acquisition and testing. The exploration drilling program, by Lumos, shall include the following components:

- Specification of the acceptable drilling method for the exploration drilling and data acquisition.
- Preparation of a test hole drilling plan including technical specifications and subcontractor licensure requirements.
- Bid item schedule for unit costs for the exploration test hole drilling scope of work to be completed by the bidders.
- Preparation of contract documents.
- Notification and advertisement for drilling contractors.
- Addressing requests for information (RFIs) and addenda requested prior to the bidding deadline.
- Pre-bid site meeting.
- Review of submitted bid responses and recommendation to the client for award.
- Issuing notice of award letter on behalf of the client.
- Facilitating coordination and executing contract between the awarded drilling company and the client.
- Review and approval of drilling schedule.
- Pre-construction meeting (Virtual).
- Full time field observation and data acquisition during exploration test hole drilling by Lumos staff, including per diem and travel time to and from the project site.
- Collection, logging, and temporary storage of lithologic samples.

- Field water parameter measurements and documentation during drilling.
- Water quality samples and analysis by a Licensed and Certified Laboratory (lab analysis Inorganic chemicals, Secondary Drinking Water Standards, and Radionuclides will be paid for by Lumos. Any additional analysis and cost will be the responsibility of the Client).

Deliverables:

- Bid Documents, Specifications, Data Acquisition Documentation.

Assumptions/Exceptions:

- The pre-bid meeting will be held on the job site.
- The pre-construction meeting will be held virtually.
- The City will contract directly with the awarded drilling contractor.
- The contract documents will be either provided by the Client for integration into the bid documents or Lumos will provide a standard contract agreement for use by the Client.
- Preliminary estimates for the exploration test hole drilling project are anticipated to consist of the drilling of two (2) exploration test holes, each to a maximum total depth of 800 feet below ground level (ft bgl) if necessary. The number and depth of the boreholes will be based on data acquisition pending the findings of the geological/hydrogeologic investigation described in Task 5. The goal for this exploration test hole project is to identify the location with the highest potential for drilling a successful production well in the future.
- Lumos field representatives will travel to the project area during the duration of the drilling scope of work. The fees include costs and time associated with travel to and from the work location and per diem covering meals and lodging during the duration of drilling.
- Lumos will regularly communicate progress updates to the Client and oversight agencies (if required).

Task 7 – Data Analysis and Technical Memorandum (Final Report)

Under this task, Lumos will analyze the data and prepare the final technical memorandum summarizing the findings of the exploration test hole drilling project described in Task 8 followed by a possible recommendation for the production well location and preliminary well design in the future. A draft of this technical memorandum will be provided to the Client for their review and comments. Following the Client's review, Lumos will conduct a virtual meeting with the Client to address any questions or comments provided. Following the conclusion of the virtual meeting, Lumos will finalize the technical memorandum for the Client and incorporate any additional comments discussed during the meeting into the final technical memorandum.

Deliverables:

- Electronic PDF of the technical memorandum to be delivered to the Client and over-sight agencies (if required).

Assumptions/Exceptions:

- Recommendations for a future production well design should be considered preliminary. The final production well design will be determined and adjusted as necessary following field data acquisition and evaluation during the future drilling of the production well.

- There is a possibility that a recommended production well location may not be defined due to results from the exploration test hole drilling project analysis.

Task 8 – Reimbursables

Any fees or other associated project costs incurred by Lumos & Associates, Inc. for copies of previous plans or reports, additional mapping, permit fees paid by Lumos, and other unforeseen work tasks not provided in this proposal and/or reimbursable expenses shall be billed under this task on a Time & Material basis or expenses at cost plus 15%. Additional hard copies of technical reports, agency required document/plan set revisions, bid documents and specifications as requested by the Client will also be billed under this task on a time and materials basis in accordance with our current fee schedule.

Assumptions / Exceptions

Lumos has made the following assumptions in preparation of this proposal:

- Proposed improvements will be located in adjacent ranch lands with owner approvals. Therefore, submittal to agencies other than those listed in the scope of work will not be required.
- Water rights permitting and acquisition are not included in this scope of work.
- Any National Environmental Policy Act (NEPA) or California Environmental Quality Act (CEQA) requirements and policies which may include coordination and/or permitting, determination of categorical exclusions, determination of NEPA adequacy, and the production of an environmental assessment (EA) are NOT included in this proposal but may be added for an additional fee as agreed upon by the client and Lumos.
- No Cultural Resource Investigation is anticipated or scoped for this proposal.
- If an NPDES Permit is required, the responsibility will be put on the Client or drilling contractor to obtain and manage.

If any of these assumptions or exceptions are not true, Lumos reserves the right to provide the client with an amendment to this scope of work and cost to accomplish the unforeseen requirements.

Fees

The tasks described in the Scope of Work will be completed for the following fees. Time & Material Tasks (T&M) are noted for the specific tasks:

Task 1: Research and Geologic Field Reconnaissance (Fixed Fee).....	\$12,000
Task 2: LiDAR/Ortho Surveys (Fixed Fee).....	\$50,000
Task 3: Surface Geophysical Survey (Fixed Fee).....	\$35,500
Task 4: Data Analysis & Technical Memorandum - Partial (Fixed Fee).....	\$16,500
Task-5: Local Agency Permitting (T&M).....	\$9,500
Task 6: Test Well Drilling Project (T&M).....	\$131,000
Task 7: Data Analysis and Technical Memorandum – Final (Fixed Fee).....	\$27,500
Task 8: Reimbursables (T&M).....	TBD

Total Cost:.....\$282,000

If this proposal is acceptable, please execute the attached contract and provisions and return the same to our office. Any additional services requested but not covered by this Scope of Work can be provided with an addendum to this proposal. The attached Standard Provisions of Agreement are a part of this proposal. This proposal and its fees are good for a period of 60 days from the date of submittal.

Lumos & Associates, Inc. will send monthly progress billings on this project. The amount of these billings will be based upon the percentage of work completed. The terms are 'Due Upon Receipt' and accounts are past due after 30 days. Accounts over 30 days old will be subject to interest at the rate of 1 ½% per month and such collection action as may be necessary to collect the account. In addition, a "Stop Work Order" may be issued on past due accounts. In this case, no further work will be performed until the account is brought current.

Thank you again for allowing Lumos & Associates to provide you with this proposal. Please do not hesitate to call me if you have questions.

Sincerely,



Aaron Brusatori, P.E., Group Manager

Dan Stucky, P.E.; Engineering Director