Grant Soil and Water Conservation District
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May 2st, 2024

TO: All Interested Vendors

FROM: Kyle Sullivan
District Manager
Grant Soil and Water Conservation District (District)

SUBJECT: Addendum No. 1 – AEM Survey for Upper John Day Aquifer Characteristics Request for Proposals

The following addenda are issued and incorporated into the Request for Proposals (RFP) For Airborne Time-Domain Electromagnetic (AEM) Survey for the Upper John Day Aquifer Characteristics Project and resulting contract.

Addenda Items

Section 10.5.1 Test Line – The following is added to this section:

> ***GSWCD and Reclamation reviewers will be on standby the day of the test line flights and will be available to immediately start review of the preliminary resistivity model provided by the contractor for the test line. A response will most likely be provided within 2-3hrs following delivery of the test line data/resistivity model, or by 7am the next morning at the very latest.***

Section 10.6.1 Flight Speed – Replace this section with the following:

> ***A safe range of ground speed is considered to be 70-110kph. The lower-end of safe flight speeds during production flights are desired by the District, as this will translate to more densely-spaced soundings and help maximize lateral resolution of subsurface features/targets along a given flight line. However, the system ground speed shall not fly faster than 110 kph over a distance of 5km, and no speeds will exceed 125kph.***

Section 10.7.1 Laser Altimetry – Replace this section with the following:

> *A laser altimeter shall be used to record the ground clearance of the electromagnetic sensors. The absolute accuracy of the altimeter over flat terrain shall be specified by the Contractor and shall become a requirement. The methods used to calibrate the altimeter shall be specified. The altimeter shall be calibrated at the beginning of the survey and as often as required to ensure that it is operating within specifications. The altimeter information shall be recorded by the data acquisition system with sample interval of no more than 0.1 second. The final report shall describe the method of altimeter calibration. The data shall be of sufficient quality to plot*

altitude paths and terrain topography maps. A laser altimeter shall be installed in the electromagnetic bird to measure altitude of the bird above the land surface. The absolute accuracy of the laser altimeter over flat terrain shall be specified and shall become a requirement. ***The use of either a radar or laser altimeter is required; a continuously recording barometric altimeter is not required.*** *The altimeter shall be certified under FAA regulations.*

Section 10.7.2 – Replace this section with the following:

Submeter GPS data accuracy using GPS receivers mounted ***either*** *on the sensor frame* ***or above the transmitter and receiver coils (e.g., on an auxiliary loop or other location on the sling harness, as standard for the system's configuration and deployment).*** *The acceptable datums for the system are NAD83 and the NAVD88 vertical datum, or similar (e.g., WGS84/EGM96).*

Section 10.7.3 – Replace this section with the following:

Sensor frame attitude measurements including an Inclinometer(s) ***mounted either*** *on the sensor frame* ***or above the transmitter and receiver coils (e.g., on an auxiliary loop or other location on the sling harness, as standard for the system's configuration and deployment).*** *A minimum of one inclinometer shall be* ***affixed*** *and shall be recorded by the data acquisition system with sample interval of no more than 0.1 second.*

Section 10.7.4 System Response Consistency Checks – Replace this section with the following:

The platform shall be periodically elevated until the earth response vanishes. The raw data shall be recorded during ascent, at altitude, and upon descent. ***This system QA check must at least be performed once by the contractor at the beginning of the survey. If system response stability concerns arise during the production survey, the contractor shall immediately repeat this system check in order to help inform cause of any performance issues and appropriate fixes prior to completing the production flights****.*

Section 10.7.8 – Replace this section with the following:

Airborne survey data shall not be acceptable when gathered during magnetic storms or short-term disturbances of magnetic activity at the ground station used that exceeds the following:

1. *Monotonic changes in the magnetic field of* ***10 nT*** *in any five-minute period.*
2. *Pulsations having periods of 5 minutes or less shall not exceed* ***5 nT****.*
3. *Pulsations having periods between 5 and 10 minutes shall not exceed* ***10 nT****.*
4. *Pulsations having periods between 10 and 20 minutes shall not exceed* ***20 nT.***

If magnetic storm conditions occur, the contractor shall use their best judgement on whether or not to go on standby-status, and communicate the situation to the District, as appropriate. Adequately severe and long-duration magnetic storm conditions are an appropriate reason for going into standby-status, in addition to any other causes for significant halting/delay of flights (e.g., excessive wildfire smoke or adverse weather conditions). Standby rates shall apply to this scenario, either on a daily-rate term or negotiated hourly-rate.

Section 10.7.11 Electromagnetic System – Replace with the following:

> *A digital transient/time-domain electromagnetic (EM) system: For time domain measurements the system should have selectable repetition rates, transmitter pulse widths and duty cycles****. No adjustable time gates are required; however, the system transmitter and receiver parameters shall be appropriately configured to minimize 60Hz power grid noise.***

Section 10.7.13 Data Acquisition/Recording System – Disregard the reference to barometric altimeter.

Section 10.8.2 AEM Data, item 7 – Replace with the following:

> ***Soundings shall be corrected for altitude above ground surface using altimeter data. Contractors proposing systems and/or data processing/inversion workflows that don't account for coil roll/pitch relative to vertical are required to explicitly state such in their proposals as well as describe how they will avoid or otherwise filter out data recorded during non-horizontal coil orientation as to avoid negative impacts on the resulting model(s). Additionally, this plan or workflow shall be incorporated into their Quality Control Plan.***

Section 10.8.2 AEM Data, Item 11 – The following is added to this section:

> ***Final EM data shall, at a minimum, be visually inspected for significant anthropogenic noise, and affected data/soundings shall be appropriately filtered or muted prior to or during inverse modeling. If these noise signals are somehow automatically filtered or suppressed during the inverse modeling steps of the workflow, the contractor shall describe in detail how any impacts on nearby/adjacent areas of model space/soundings will be minimized in order to avoid potential bias.***

Section 10.8.4 AEM Inverse Modeling, Item 2 – The following is added to this section:

> ***Spatial smoothness model constraints are required; appropriate software necessary to achieve this is subject to the contractor's discretion. The data shall not be inverted as a set of independent 1-D soundings without the application of horizontal smoothness between adjacent/nearby soundings.***

Section 10.8.4 AEM Inverse Modeling, Item 3 – Replace with the following:

> ***Spatial regularization of the model space during the inversion process shall account for topography*** *(i.e., do not invert a flat model space and then warp the inverted model to fit the ground surface post-inversion).* ***The inversion process shall not handle each sounding independently without lateral constraints, and shall account for topography during the spatial regularization. Contractors whose proposed inversion software lacks this capability shall provide an adequate, high-level description of inversion algorithm/approach that will be used.***

Sections 10.9.5, 10.9.6 and 10.9.7 – Replace all three sections with the following:

> ***AEM system response characterization/calibration shall be clearly specified in the proposal, shall be documented in the Quality Control Plan, and become a requirement. This system***

response calibration procedure shall at a minimum be performed before the start of survey, and as necessary during the survey, in order to ensure stable and unbiased data. A description of all calibration procedures and resulting usable time gates shall be included in the final report.

Section 10.11.1 – Replace with the following:

The airborne EM system must consist of a time-domain/transient EM system, incorporating a rigid-frame mounted horizontal-loop active-source transmitter coil with vertical (Z) dipole moment orientation, and a Z oriented planar receiver coil (at a minimum), or dual rigid-frame mounted X and Z oriented planar receiver coils (preferred), that are either centered (symmetric system) or located off-center (asymmetric system configuration) relative to the transmitter coil. ***Semi-rigid (e.g., inflatable) transmitter and receiver coil frames or other approaches to mounting/slinging the transmitter and receiver coil are also permissible, as long as the coil shapes and geometries are adequately maintained during the survey flights such that impacts to the recorded data are within survey tolerances.***

Section 10.11.3 – Replace with the following:

The airborne EM system platform can include its own power supply or be powered by the aircraft.

Section 10.11.5 – Replace this section with the following:

The transmitter and receiver coil geometric configuration shall not encompass a total horizontal planar area greater than ***500m^2****, for the sake of collecting data with adequately high lateral resolution (small horizontal sensitivity distribution/minimal lateral averaging of earth resistivities per sounding).*

Sections 10.15.2 and 10.15.3 – These sections are now redacted/deleted.

Section 10.15.4 – Replace this section with the following:

The proposed system must demonstrate an appropriate transmitter waveform/adequate system bandwidth to achieve unbiased and usable data in both early and late time-gates spanning the approximate range of 10micro-seconds to 15 milli-seconds after each transmitter waveform (i.e., during off-time). Alternatively, if a proprietary waveform and corresponding data calibration/correction approach is used in order to achieve corrected/calibrated early time-gates that are recorded during transmitter on-time (e.g., during current ramp-down), this shall be clearly stated and an adequate high-level description of the approach and system bandwidth shall be provided.

Section 10.25 Period of Performance, 1. Flying – Replace this section with the following:

FLIGHT OPERATIONS CAN BEGIN AFTER DISTRICT RECEIPT AND/OR APPROVAL OF PERTINENT DELIVERABLES AND SHALL BE COMPLETED BY SEPTEMBER 1ST, 2024.

Section 10.26 Summary of Schedule of Deliveries – Replace the "Due" schedule for Section 10.25.1 (referenced) with the following:

> ***Can begin after District receipt and/or approval of pertinent deliverables and shall be completed by September 1st, 2024.***

End Addendum No. 1

Please take note that all responsive proposers must acknowledge this Addendum No. 1 in Attachment 1 – Proposal Cover Sheet.

Please feel free to contact me if you have any questions pertaining to the RFP or this Addendum.