

TECHNICAL MEMORANDUM

TO: Mike Hermanson, Spokane County Water Resources **DATE:** April 23, 2008
FR: Matthew Benson, L.G. **OUR REF:** 083-93096
RE: Scope of Work for the West Plains Geophysical Orientation Survey.

The purpose of the geophysical orientation survey is to help determine the most suitable geophysical technique or techniques to use in wide scale determination of the geologic and hydrogeologic characteristics underlying the West Plains area. The study objective is to evaluate various geophysical techniques for their suitability to map the crystalline bedrock contact across the West Plains.

The West Plains is located just west of the City of Spokane and includes the City of Airway Heights, the City of Medical Lake, Fairchild Air Force Base, and the City of Cheney. The West Plains area occurs at boundary of WRIA 54 (Lower Spokane River Watershed), WRIA 56 (Hangman Creek Watershed) and WRIA 34 (Palouse River Watershed) and includes land within these three WRIs.

The Scope of Work is divided into 4 primary tasks. The scope of each task is detailed along with the specific deliverables for the task, and the projected deliverable date. Table 1 details the estimated costs for each of the 4 tasks. This project is expected to begin in May 2008 and be finished in June of 2009.

Task 1: Project Management:

The Golder project manager will prepare monthly and quarterly progress reports, invoices and payment requests, and other project documentation required by Spokane County.

Task 2: Develop Geophysical Orientation Survey Work Plan:

This phase will begin with a stakeholder planning meeting to establish specific project goals to be addressed in the work plan. Golder will compile the existing geologic and land use data from Spokane County and use this information to plan a Pilot Study. A Pilot Study field trial will be performed in an area with relatively well understood hydrogeologic conditions and a representative land use, e.g., county road. This study will be used to short-list geophysical methods for the orientation survey.

Following the Pilot Study, Golder will write an orientation survey Work Plan and Quality Assurance Project Plan in accordance with Department of Ecology's Guidelines and Specifications for Preparing Quality Assurance Project Plans for Environmental Studies, current edition, (Ecology Publication No. 04-03-030. At a minimum the work plan will include:

- A description of the study area;
- Summary of geologic and land use data compiled by and provided to Golder by Spokane County (Golder will provide direction to Spokane County in data collection);
- The findings of the Pilot Study;
- Selected sites;
- A discussion of the proposed geophysical techniques and their application at selected sites within the study area;
- A discussion of drilling and monitoring well construction techniques and procedures;
- Methods to address quality control and quality assurance;
- Description of data deliverables;
- Field work schedule; and,
- Cost budget.

Task 3: Geophysical Orientation Survey

Golder will perform the geophysical orientation survey based on the Work Plan and Quality Assurance Project Plan developed in Task 2. Spokane County will assist Golder in gaining property access necessary to conduct the Orientation Survey. Golder estimates the Orientation Survey will consist of four field trials. The survey design will be based largely on the results of the Pilot Study field trial. Each field trial will be focused on evaluating one geophysical method over a variety of geologic and land use conditions that adequately represent the larger West Plains area. Each selected geophysical method will be utilized at all sites deemed suitable for the method, i.e., a method applicable at 3 of 4 selected sites will be utilized at all 3 suitable sites.

After collection and preliminary analysis of geophysical data Golder will conduct a drilling program designed to provide empirical data to confirm geophysical findings. Borings will be completed as monitoring wells unless the water table is not encountered. Golder is responsible for all aspects of the drilling program including contracting the drilling company and providing field staff to collect data and supervise the drilling and installation of monitoring wells.

Funding for the drilling program is provided by a separate source than the main project. The drilling program budget is \$40,000. After collection and preliminary analysis of geophysical data Golder will provide a brief summary of the proposed drilling program including recommended location(s), anticipated depth(s), and projected cost. Depending on the likely range of well depths and costs for the drilling and well completion work, it may only be possible to install one well within the existing budget. Golder will work with the County to determine the most favorable location for the well.

Golder will submit monthly and quarterly reports detailing the progress of the Orientation Survey.

Task 4: Reporting

Golder will prepare a summary report of the orientation study. The report will document study results including, at a minimum:

- A geologic description of the pilot study area and sub-areas where field trials were conducted;
- A comparison to known geologic features within the field trial areas to features identified by geophysical techniques;
- A drilling program summary including well logs; and,
- Quality control/quality assurance concerns.

Golder will prepare a feasibility report for the larger West Plains area. The report will include, at a minimum:

- Identification of geophysical techniques that will likely yield usable data for the larger study area including a discussion of technique compatibility with various urban, suburban and rural land uses found in the West Plains area ;
- Comparison of method unit cost (cost per square mile), data quality and method implementation concerns for the identified techniques; and,
- Recommended alternative study techniques that may achieve the project objectives if the orientation survey determines that geophysical measurement techniques are not appropriate.

Golder will provide ten hard copies and PDF files of all deliverables. Geophysical data will be provided in GIS format according to Spokane County GIS data specifications.

TABLE 1
Summary of project costs, deliverable, and schedule.

Task	Task Description	Deliverable	Due Date	Cost
1	Project Management	Progress reports	Quarterly: within 30 days following ending fiscal quarter. Monthly: within 5 days following end of month.	\$1,700.00
2	Project Work Plan	Work Plan Quality Plan	June 30, 2008	\$28,100.00
3	Orientation Survey	Summary Report	Fieldwork completed by November 2008 Summary report by January 2009	\$57,100.00
	Drilling Program*	Well Logs	November 2008	\$40,000.00
4	Orientation Survey Report	Feasibility Report	April 2009	\$13,100.00
			ESTIMATED TOTAL	\$140,000.00