

Job No. 16-1-010  
February 26, 2016

Mr. Steve Lederer  
Napa County  
Department of Public Works  
1195 Third Street, Suite 101  
Napa, CA 94559

**SUBJECT: NAPA COUNTY GROUNDWATER CONDITIONS REPORT – NORTHEAST OF CITY OF  
NAPA AREA**

Dear Mr. Lederer:

In response to your request, Luhdorff & Scalmanini, Consulting Engineers (LSCE) has prepared the following scope and budget for an analysis of groundwater conditions for the area northeast of the City of Napa and west of the Milliken, Sarco, and Tulucay (MST) area (Study Area). In December 2015, County staff reviewed updated groundwater monitoring data and the *Napa County Comprehensive Groundwater Monitoring Program 2014 Annual Report and CASGEM Update (2014 Annual Report)* and identified an area of potential concern, the northeastern corner of the Napa Subarea (Lederer, December 7, 2015 Memo; attached). The Memo highlights the historical groundwater level declines that had occurred in some wells, but have generally stabilized in recent years. The Memo recommended further investigation of factors leading to well replacements in the vicinity of Petra Drive and additional studies in the area to better understand groundwater conditions. The objectives of these efforts, as stated in the Memo, include a determination of whether the area is in fact experiencing an extension of the MST groundwater conditions (as described in the 2014 Annual Report) and whether controls similar to those implemented in the MST are warranted.

We understand that Planning, Building and Environmental Services (PBES) has received, or expects to soon receive, permit applications for several proposed discretionary projects in the above-described area. Because of the potential concerns relating to continued groundwater development in the area, and due to the hydrogeologic setting which includes mapped faults and the Napa River in relative close proximity to the area of interest, we understand the County wishes to conduct this study to better understand groundwater conditions and potential factors relating to historical groundwater level declines in this area. This analysis includes evaluation of the potential effects from pumping in the overall Study Area, potential mutual well interference in the Petra Drive area and potential streamflow effects.

The following scope and budget describe work to prepare the Groundwater Conditions Report and is organized in the following tasks:

1. Coordinate with County staff relating to Study Area data, including Petra Drive well locations, drillers' reports, water use information, etc.;
2. Evaluate the geologic and hydrogeologic setting and historical groundwater conditions and trends for the Study Area, including previously mapped faults, evaluation of the thickness of the alluvium in the Study Area, proximity of the proposed projects to the Napa River;
3. Tabulate and evaluate existing well performance data (to the extent available) including yield, specific capacity, and pump test data (if any). For Petra Drive area, tabulate/evaluate well construction and other well-related data;
4. Estimate potential recharge to the Study Area;
5. Conduct well interference analysis, which includes analysis of potential effects from the wells located in the Petra Drive area and also within the overall Study Area. A simplified numerical model would be used to assess mutual well interference and also to assess potential streamflow effects from current use and the proposed projects;
6. Estimate water demands for the overall Study Area along with sources of supply used to meet Study Area water demands. Water demands and supplies will be tabulated for the overall Study Area for variable water year types;
7. Estimate groundwater supply sufficiency to meet the current and projected groundwater demands for the overall Study Area and other potential considerations with respect to proposed future groundwater use;
8. Draft and final reports; and
9. Meetings

The nine tasks are described below and in the attached budget spreadsheet.

**Task 1            Data Request and Background Information**

This task will include coordination with County staff relating to data for the Study Area, including well locations, drillers' reports, water use information, etc.

**Task 2            Geologic Conditions at Project Site and Vicinity**

This task will summarize existing geologic information and evaluate existing geologic cross-sections that synthesize data from both regional scale and local sources to describe groundwater conditions and trends in the Study Area. Part of this work would draw upon prior analyses and also work in progress relating to the *Napa County Comprehensive Groundwater Monitoring Program 2014 Annual Report and CASGEM Update*. The work will include detailed assessment of available drillers' reports in the area to assess approximate thickness of alluvium relative to underlying materials, the depth to groundwater, typical completion depths of wells that would be used as part of the assessment of groundwater and surface water connectivity. This task will provide the physical conceptualization and basis for the groundwater model developed as part of Task 5.

### **Task 3 Well Data**

This task includes evaluation of existing well performance data, to the extent available within the Study Area. These data include well yields, specific capacities, water level recovery rates (from pumping tests), if any. Similarly, well construction and performance data will be collected for the Petra Drive area. To the extent useful yield or specific capacity information are available from the drillers' reports reviewed as part of Task 2, these may support data needs for Task 5.

### **Task 4 Estimate of Potential Recharge**

This task involves estimating potential recharge to the Study Area. The recharge estimate will use spatial analysis techniques with existing available datasets, including: surficial geologic maps, land surface slope data, soil permeability data, precipitation. The analysis will also consider runoff factors determined as part of earlier work (LSCE and MBK, 2013).

For this task, LSCE would use existing available datasets, including:

- Surficial geologic map(s); these are maps that LSCE maintains in-house and has used on previous Napa County hydrogeologic work.
- Land surface slope data obtained from digital elevation datasets publically available through the County of Napa Geographic Information System (GIS) Data Catalog. The elevation data were originally mapped at a scale of 1 inch = 200 feet using LiDAR data acquired in 2003. The slope will be calculated using GIS and classified into three categories: less than 15%, 15% to 25%, and greater than 25%.
- Soil permeability data for the parcel as available through the Natural Resources Conservation Service Soil Survey of Napa County, California (Lambert and Kashiwagi, 1978). In addition to the published soil survey, the NRCS provides a spatially-referenced database to enable more detailed mapping of recharge characteristics using GIS software. Within the soil database, data are compiled for one or more horizons that comprise each soil component.
- Precipitation has been established as the primary source of groundwater replenishment in Napa County (Kunkel and Upson, 1960<sup>1</sup>). While precipitation may reach groundwater through multiple routes, direct infiltration at the land surface is likely the most significant process at the subject parcel. In conjunction with the data from the nearest precipitation gauges, LSCE will use the LSCE and MBK (2013) study results for comparable sub watershed areas to derive the estimated average annual precipitation and also the estimated percentage of infiltration.

### **Task 5 Well Interference and Groundwater/Surface Water Interaction Analyses**

This task will evaluate the potential for well interference between neighboring wells, particularly wells in the Petra Drive area. The analysis will include identification of well locations and construction information, as available, for the Petra Drive area. The well interference analysis will involve use of a numerical groundwater flow model where the model domain includes the Study Area. The analysis will include the pumpage estimated to occur by others in the model

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<sup>1</sup> Kunkel, Fred and Upson, J.E., 1960. Geology and ground water in Napa and Sonoma Valley, Napa and Sonoma Counties, California. USGS Water Supply Paper 1495.

area. In addition to the assessment of well interference, modeling scenarios will include: 1) analysis of potential existing pumping effects on surface water, and 2) an analysis of the effect of the proposed additional groundwater use on the local groundwater conditions.

#### **Task 6            Water Demands and Supply**

This task will estimate the water demand for the Study Area, including an estimate of groundwater use for vineyard irrigation. [This estimate will utilize land use information already being developed by LSCE for the Napa Valley Subbasin groundwater conditions analysis report; therefore, this lowers the cost of the effort for this study.] Estimates will also be developed for normal to dry-year water demands, including average daily/monthly demand. The potential groundwater supply will be based on the results of Tasks 4 and 5. The current and planned water usage for the area will be compared with the Water Use Criteria for the Napa Valley Floor (1 af/a/yr).

#### **Task 7            Groundwater Availability Analysis**

This task will determine supply sufficiency that considers groundwater recharge to the Study Area, surficial geology and soils, slope, and nature of the subsurface geologic formations. This task will also consider the potential for effects of pumping on streamflow. Results of the groundwater model developed in Task 5 will be used as part of this assessment. The total estimated current and planned water use (Task 6) will be used in conjunction with Tasks 2, 4, and 5 to assess whether sufficient groundwater supplies (or other sources of supply) are available to support existing land uses and future groundwater availability in the Study Area.

#### **Task 8            Report**

This task involves preparation of a draft and final Study Area Groundwater Conditions Report that summarizes the results of Tasks 2 through 7. The report will discuss water demands for the Study Area, including demands during varying water year types and the relationship of those demands to the available groundwater supply. The report will present results relating to potential mutual well interference due to existing pumping, particularly in the Petra Drive area. The report will also include analysis of the extension of groundwater conditions from the MST. The report will present results relating to potential streamflow effects, including existing effects related to groundwater pumping in the Study Area. The report will include a review of the County's current monitoring program in the Study Area and recommended adjustments as appropriate. A draft report will be provided for review and comment. A final report will be developed that addresses comments received on the draft report (the budget assumes nominal comments are received on the draft report).

#### **Task 9            Meetings**

This task includes a conference call with County staff to discuss the draft report and preparation and attendance at one meeting with the Napa County Planning Commission to present the study findings and recommendations.

**Cost Estimate**

The total estimated costs to perform the work on Tasks 1-9 is **\$89,320** with costs for optional meetings included. The total estimated cost for each task is shown below:

<b>Task</b>	<b>Total Estimated Cost of Services</b>
Task 1 Data Request and Background Information	\$2,740
Task 2 Geologic Conditions	\$12,010
Task 3 Well Data	\$5,040
Task 4 Estimate of Potential Recharge	\$6,460
Task 5 Tier 2—Well Interference and SW/GW Interaction Analyses	\$26,600
Task 6 Water Demands	\$10,820
Task 7 Groundwater Availability Analysis	\$1,640
Task 8 Draft and Final Reports	\$18,860
Task 9 Meetings	\$5,150
<b>Total Estimated Cost</b>	<b>\$89,320</b>

<b>Optional Task</b>	<b>Cost of Services</b>
Task 9C Meetings--Each	\$2,655

Work conducted by LSCE will be on a time and materials basis in accordance with the attached Schedule of Fees.

## Schedule

LSCE is prepared to begin work on this project as soon as we are authorized to do so. Pending when work is authorized to begin, we estimate approximately four months to complete the draft report.

We appreciate the opportunity to be of assistance and would be pleased to respond to any questions.

Sincerely,




Vicki Kretsinger Grabert  
Senior Principal Hydrologist



Debbie Cannon, PG  
Senior Hydrogeologist

Attachment

 <b>LUHDORFF &amp; SCALMANINI</b> <b>CONSULTING ENGINEERS</b> 500 FIRST STREET WOODLAND, CALIFORNIA 95695	
<i>SCHEDULE OF FEES - ENGINEERING AND FIELD SERVICES</i> 2016	
<b>Professional:</b> *	
<i>Senior Principal</i>	\$200/hr.
<i>Principal Professional</i>	\$198/hr.
<i>Project Manager</i>	\$185/hr.
<i>Senior Professional</i>	\$175/hr.
<i>Project Professional</i>	\$135 to 168/hr.
<i>Staff Professional</i>	\$115 to 130/hr.
<b>Technical:</b>	
<i>Engineering Inspector</i>	\$115 to 130/hr.
<i>ACAD Drafting/GIS</i>	\$115/hr.
<i>Engineering Assistant</i>	\$98/hr.
<i>Technician</i>	\$98/hr.
<b>Clerical Support:</b>	
<i>Word Processing, Clerical</i>	\$69/hr.
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<i>Vehicle Use</i>	\$0.55/mi.
<i>Subsistence</i>	Cost Plus 15%
<i>Groundwater Sampling Equipment (Includes Operator)</i>	\$170.00/hr.
<i>Copies</i>	.20 ea.
*****	
<i>Professional or Technical Testimony</i>	200% of Regular Rates
<i>Requested Technical Overtime</i>	150% of Regular Rates
<i>Outside Services/Rentals</i>	Cost Plus 15%
<i>Services by Associate Firms</i>	Cost Plus 15%

\* Engineer, Geologist, Hydrogeologist, and Hydrologist