A Tradition of Stewardship
A Commitment to Service

Napa County
Groundwater Resources
Advisory Committee

AGENDA

REGULAR COMMITTEE MEETING

Thursday, February 23, 2012, 2:00 p.m.

Agricultural Commissioner's Office/UCCE Conference Room
1710 Soscol Avenue, Napa CA

Committee Members

Michelle Benvenuto
Franklin Tucker Catlin
John Alan Galbraith
Donald Gleason
David Graves
Michael Haley
Peter McCrea
Charles Slutzkin
Steve Soper
Marilee Talley
William Trautman
James Frederick Verhey
Susanne von Rosenberg
Duane Wall
Dale Withers

1. CALL TO ORDER & ROLLCALL

2. WELCOME & OPENING REMARKS
   (Staff, Consultant, Committee)

3. ORGANIZATIONAL ITEMS *(5 min)*
   (Staff, Consultant, Committee)
   a. APPROVAL OF ACTION MINUTES & MEETING SUMMARY
   b. REVIEW MEETING AGENDA AND PROCESS

4. PUBLIC COMMENT
In this time period, anyone may comment to the Committee regarding any subject over which the Committee has jurisdiction, or request consideration to place an item on a future Agenda. No comments will be allowed involving any subject matter that is scheduled for discussion as part of this Agenda. Individuals will be limited to a three-minute presentation. No action will be taken by the Committee as a result of any item presented at this time. *(Chair)*

5. PRESENTATIONS AND DISCUSSION ITEMS:

BACKGROUND AND EDUCATIONAL ITEMS

a. GROUNDWATER AND GROUNDWATER-SURFACE WATER INTERACTION: HOW DOES IT WORK? *(35 min)*
   (Dr. Thomas Harter, PhD./University of California-Davis)
   - An Overview of Groundwater Concepts

b. SONOMA COUNTY GROUNDWATER MONITORING PROGRAM *(30 min)*
   (Marcus Trotta, Sonoma County Water Agency)
   - An Overview of the Sonoma Valley Program

c. WHAT IS INVOLVED IN MONITORING A WELL? *(10 min)*
   (Phil Miller, Deputy Director/Public Works; Mark Nordberg, DWR)
   - Hands-on Demonstration of Monitoring Equipment/Methods

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5. PRESENTATIONS AND DISCUSSION ITEMS: (cont'd)

COMMITTEE REVIEW, DISCUSSION & DIRECTION

d. REVIEW & ADOPT UPDATED GRAC WORKPLAN/SCHEDULE (*20 min)*
(Hillary Gitelman, Director/CDPD)
- Review and discuss updated workplan/schedule
- Recap/Overview previous Q&A responses/direction

e. HYDROLOGIC CHARACTERIZATION/MODELING/RECHARGE – NEXT STEPS *(35 min)*
(Vicki Kretsinger Grabert, Luhdorff & Scalmanini)
- Recap & Discussion of GW Recommendations
- Review next steps/phase of groundwater study (L&S Scope of Work)
- Discuss GRAC questions, including those related to new work

f. WELL LOCATION MONITORING/CONFIDENTIALITY (*20 min)*
(Phil Miller, Deputy Director/Public Works; Vicki Kretsinger Grabert, Luhdorff & Scalmanini)
- Recap and Discussion of previous Memo and new updates

g. DEVELOPING A GROUNDWATER MONITORING PROGRAM FOR NAPA COUNTY *(15 min)*
(Rick Thomasser, Flood District, Patrick Lowe, Deputy Director/CDPD)
- An Introduction to the Components of a Successful Groundwater Monitoring Program for Napa County (*Purpose/Key Components/Objectives?)*

h. DRAFT PLAN FOR COMMUNICATION AND EDUCATION *(15 min)*
(Dorian Fougeres/Consultant-Facilitator, Center for Collaborative Policy)
- Continued discussion/direction and possible referral to ad-hoc Committee

6. OTHER BUSINESS *(5 min)*

a. UPDATE ON PRESENTATION TO ST HELENA CITY COUNCIL RE: WELLS
(Steve Lederer, Director/Environmental Management)

7. ANNOUNCEMENTS

8. FUTURE AGENDA ITEMS

a. HISTORY & UPDATE ON THE MILLIKEN-SARCO-TULOCAY (MST) BASIN;

DRAFT GROUNDWATER MONITORING PROGRAM; OTHERS?
(Patrick Lowe, Deputy Director/CDPD)

9. ADJOURNMENT to the NEXT MEETING (*Chair)*

Thursday, April 26, 2012 – 2:00pm
Agricultural Commissioner's Office/UCCE Conference Room
1710 Soscol Avenue, Napa CA

Note: Where times are indicated for agenda items they are approximate and intended as estimates only, and may be shorter or longer, as needed. If requested, the agenda and documents in the agenda packet shall be made available in appropriate alternative formats to persons with a disability. Please contact Greg Morgan at 707-259-8621, 804 first St., Napa CA 94559 to request alternative formats.

A Tradition of Stewardship
A Commitment to Service

Napa County
Groundwater Resources
Advisory Committee

ACTION MINUTES
NAPA COUNTY GROUNDWATER RESOURCES ADVISORY COMMITTEE MEETING
December 12, 2011

1. CALL TO ORDER & ROLL CALL

The Napa County Groundwater Resources Advisory Committee (GRAC) met in special session on Monday, December 12, 2011 with the following members present:
Vice Chair Tucker Catlin; Bill Trautman; Charles Slutzkin; Dale Withers; Susanne von Rosenberg; Chair Peter McCrea; Duane Wall; Michael Haley; Steve Soper; Dave Graves; and Alan Galbraith. Jim Verhey and Michelle Benvenuto arrived during Item 2, and Don Gleason and Marilee Talley were excused.

2. WELCOME & OPENING REMARKS

Hillary Gitelman, Director, Conservation, Development and Planning, introduced support staff and mentioned Mark Nordberg from the California Department of Water Resources being present. Ms. Gitelman stated today's meeting would be more of an information exchange due to the large amount of information that was compiled before the GRAC's formation. Staff and the GRAC will begin working together on a groundwater monitoring plan during the next meeting in February, which will include reviewing examples of monitoring plans developed by other agencies and focusing on what the monitoring plan for Napa County should contain.

3. ORGANIZATIONAL ITEMS

a. APPROVAL OF ACTION MINUTES AND MEETING SUMMARY

Meeting Summary of the October 27, 2011 meeting approved. Action Minutes of the October 27, 2011 meeting approved as amended.

MB	TC	AG	DG1	DG2	MH	PM	CS	SS	MT	BT	JV	SVR	DW1	DW2
			X						X					

b. REVIEW & ADOPT AMENDED BYLAWS.

Copies of the amended Bylaws were distributed to the GRAC. Amended Bylaws adopted to reflect change in the meeting start time from 3:00 p.m. to 2:00 p.m. under Item II.B.

MB	TC	AG	DG1	DG2	MH	PM	CS	SS	MT	BT	JV	SVR	DW1	DW2
			X						X					

Item 3.b…Continued

Patrick Lowe, Deputy Director, Conservation, Development and Planning, mentioned the workplan did not reference the GRAC assisting staff and consultants with recommendations as stated under the GRAC's purpose in the initial Bylaws. The workplan would be revised to contain this reference and would be included in the meeting materials for February.

4. PUBLIC COMMENT

None.

5. PRESENTATIONS AND DISCUSSION ITEMS

a. NAPA COUNTY GROUNDWATER STUDY RESULTS – PART II

Dorian Fougères, Mediator, Center for Collaborative Policy, CSUS, distributed a handout of comments/questions received by five GRAC members on Chapter 4 of the Napa County Groundwater Conditions and Groundwater Recommendations final report, as well as a map of delineations of the Napa County subareas. Mr. Fougères stated that some of the questions in the handout would be answered during the presentation and others at the end. The item was turned over to Vicki Kretsinger Grabert, Principal Hydrologist, Luhdorff & Scalmanini Consulting Engineers. Ms. Kretsinger Grabert presented a PowerPoint presentation on the second part of the County's comprehensive groundwater monitoring program recommendations report. The outline of the presentation was to discuss data distribution – what is known and to identify data gaps; groundwater conditions, such as levels, contours and quality, and monitoring recommendations made as part of the work plan. Mr. Fougères briefly went over the topics and questions listed on page 2 of the Comments and Questions handout and entertained comments and questions. Chair Peter McCrea suggested the GRAC read the handout prior to submitting questions. Mr. Fougères added that there could be further discussion on the handout at the February meeting as appropriate.

b. CASGEM PROGRAM UPDATE

Phil Miller, Deputy Director-Flood Control and Water Resources, Public Works, presented a PowerPoint presentation on the California Statewide Groundwater Elevation Monitoring (CASGEM) program. Mr. Miller referred to the CASGEM network plan contained in the agenda packet and went over background information, as well as Napa County's current role in groundwater monitoring, outreach efforts to private property owners to participate in the CASGEM program, the current and future CASGEM network plan, and confidentiality related to well monitoring. Mark Nordberg, California Department of Water Resources, was introduced and provided a brief background on his work related to groundwater. Vicki Kretsinger Grabert, Principal Hydrologist, Luhdorff & Scalmanini Consulting Engineers, went over a handout pertaining to privacy issues and well location accuracy related to the CASGEM program.

c. DRAFT PLAN FOR PUBLIC OUTREACH/EDUCATION

Dorian Fougères, Mediator, Center for Collaborative Policy, CSUS, went over the Draft Communication and Education Plan contained in the agenda packet, briefly noting the purpose and overview, objectives and principles, audience and partners, messages, communication and education strategies, and evaluations. Mr. Fougères requested the GRAC to review the objectives and strategies listed in the plan and to think about audiences and partners for further discussion at the February meeting.

6. OTHER BUSINESS

a. GROUNDWATER RFP/CONSULTANT SELECTION UPDATE

Patrick Lowe, Deputy Director, Conservation, Development and Planning, provided an update on groundwater consultant interviews in which member Dave Graves was on the interview panel. Of the three firms interviewed, Luhdorff & Scalmanini Consulting Engineers were selected to continue their work with Napa County. Their scope of work will be taken to the Board of Supervisors in early January for approval and will be presented at the February GRAC meeting. Hillary Gitelman, Director, Conservation, Development and Planning, mentioned that cross sections and water budgets are included in the scope of work, and Mr. Lowe added that the four broad areas of the scope are to 1) prepare an updated conceptualization and characterization of the hydrologic conditions for various areas in the county, 2) refine and further characterize the areas of greatest recharge potential, 3) provide analysis of the surface water and groundwater interaction, and 4) help with guidance on CEQA issues.

7. ANNOUNCEMENTS

None were mentioned.

8. FUTURE AGENDA ITEMS

- **Annotated outline of monitoring program and examples – Marcus Trotta – Sonoma County Water Agency**
- **Street map version of groundwater study map**
- **Discussion of Comments and Questions handout**
- **Feedback on Communication Plan – objectives, strategies, audiences and partners**
- **Water budgets**
- **Luhdorff & Scalmanini Consulting Engineers scope of work**

Hillary Gitelman, Director, Conservation, Development and Planning, mentioned that additional questions can be submitted to staff by January 15 to be addressed at the February meeting.

Patrick Lowe, Deputy Director, Conservation, Development and Planning, stated that staff would provide an index of acronyms and definitions.

9. ADJOURNMENT to the NEXT MEETING

Adjourned to the next regular meeting of the Napa County Groundwater Resources Advisory Committee on Thursday, February 23, 2012 at 2:00 p.m.

_____
PETER McCREA, Chairperson

ATTEST:

_____
PATRICK LOWE, Secretary

_____
By: GREG MORGAN, Supervising Office Assistant

Voting Key

If not unanimous, member votes will be tallied (N = No; X = Excused; A = Abstained) using the following Committee Member abbreviations:

MB = Michelle Benvenuto; TC = Tucker Catlin; AG = Alan Galbraith; DG1 = Donald Gleason; DG2 = Dave Graves; MH = Michael Haley; PM = Peter McCrea; CS = Charles Slutzkin; SS = Steve Soper; MT = Marilee Talley; BT = Bill Trautman; JV = Jim Verhey; SVR = Susanne von Rosenberg; DW1 = Duane Wall; DW2 = Dale Withers

Example Key:

MB	TC	AG	DG1	DG2	MH	PM	CS	SS	MT	BT	JV	SVR	DW1	DW2

Draft

MEETING SUMMARY

Napa County Groundwater Resources Advisory Committee Meeting
December 12, 2011

Produced by the Center for Collaborative Policy, CSUS

Meeting Synopsis

The Napa County Groundwater Resources Advisory Committee (GRAC) held its second meeting on December 12, 2011. Luhdorff and Scalmanini Consulting Engineers (LSCE) completed the presentation of their Napa County Groundwater Conditions and Monitoring Recommendations Study, and answered questions about groundwater conditions submitted in advance or raised during the meeting by GRAC members. At its February 2012 meeting the GRAC will discuss how to best address questions on other topics that were submitted by members. County staff presented the CASGEM program and the voluntary monitoring work currently underway; in February GRAC members will discuss a memo on well location accuracy that was distributed as a supplemental handout. The GRAC also briefly reviewed a draft communication and education plan, and will continue developing this in future meetings. It was announced that LSCE had been selected as the technical consultant for the GRAC, and their scope of work will be shared at the next meeting. Please see the GRAC's webpage (www.countyofnapa.org/bos/grac) for copies of the December 12, 2011 presentations and handouts.

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Action Items

1. **Ms. KRETSINGER GRABERT** agreed to provide a hydrology map with street names. A map has been uploaded to the GRAC website http://www.countyofnapa.org/bos/grac.
2. **MS. KRETSINGER GRABERT** will provide future context on data reliability and degree of accuracy (i.e. to a foot or 100th of a foot) with hydrographs.
3. **ALL GRAC MEMBERS** will submit questions regarding groundwater monitoring and the study completed by Luhdorff & Scalmanini Consulting Engineers by January 15, 2012.
4. **ALL GRAC MEMBERS**, in preparation for discussions at the February 23 meeting, will review the GRAC questions handout and the draft communication and education plan.
5. **COUNTY STAFF** will provide information related to CASGEM on water-budgets and timing sequences by the February 23 meeting.
6. **COUNTY STAFF** will make available a glossary of terms and index of acronyms.
7. **MR. LOWE** will request guest speakers incorporate into their presentation a well log and slides on how groundwater level monitoring is conducted.
8. **MR. MORGAN** will amend minutes to correct spelling for Mr. Trautman's name.
9. **MR. FOUGERES** will amend the Draft Communication and Education Plan to add several messages identified in the meeting in advance of the February 23 meeting.

1. Call to Order & Roll Call

All members of the Napa County Groundwater Resources Advisory Committee (GRAC) were in attendance except for Ms. Marilee Talley and Mr. Donald Gleason.

2. Welcome & Opening Remarks

Ms. Hillary Gitelman, Director, Conservation Development and Planning, welcomed GRAC members and introduced supporting staff members. She highlighted the meeting focus as a continuation on sharing groundwater information gathered before the initiation of GRAC. This session was organized to allow for information sharing and to answer questions GRAC members may have. Ms. Gitelman introduced Mr. Mark Nordberg of the Department of Water Resources (DWR), who would be available to answer questions on CASGEM.

The February 2012 GRAC meeting will mark the start of working on a groundwater monitoring plan. In February, examples of other agency groundwater plans will be shared and discussion will follow on what Napa County's plan should contain.

3. Organizational Items

a. Approval of Action Minutes & Meeting Summary

AGREEMENT: The October 27th meeting minutes were approved with one minor modification to correct the spelling of Mr. Bill Trautman's name.

Mr. Patrick Lowe, Deputy Director, explained the two sets of notes for the October 27, 2011 meeting. Formal minutes, produced in-house, are provided as required by the bylaws. A longer meeting summary, produced by the Center for Collaborative Policy (CCP), offers more details for members who may have missed a meeting and for members who wish to reflect back on earlier conversations.

b. Review & Adopt Amended Bylaws

On October 27, 2011, the GRAC requested an amendment to their bylaws to reflect a 2:00 pm start time for GRAC meetings and to clarify language on "ad hoc committees." These amendments were approved by the Board and a signed resolution was provided, and the GRAC adopted the amended bylaws.
AGREEMENT: GRAC adopted the amended bylaws.

Mr. Tucker Catlin had previously requested a one-word revision in the GRAC work plan to mirror wording provided in the bylaws. This word change would clarify GRAC's role in the sustainability objectives as making recommendations, rather than implementation. This will be corrected at the February 23 GRAC meeting when the work plan will be revisited. The work plan will be reviewed and revised on-going as needed.

4. Public Comment

Chair McCrea invited public comments. No public comments were provided.

5. Presentations and Discussion Items

a. Napa County Groundwater Study Results – Part II

Ms. Vicki Kretsinger Grabert of LSCE presented the second part of the Napa County Groundwater Study. Five GRAC members presented questions in advance, many of which were incorporated into the presentation. Staff provided a supplemental handout that identified which questions would be addressed in the presentation or in future discussions, and which might be inconsistent with the group's charge; members agreed to discuss this in more detail at the February 2012 meeting.

The Napa County Groundwater Study compiled readily available data, and expanded on Napa's General Plan Update, to identify county-wide baseline conditions. It covers 17 subareas and basins across Napa County and the Milliken-Sarco-Tulocay (MST) area and mirrors what is used in CASGEM and by DWR. The report outlines what is currently known about conditions, what one might know with additional data and analysis, and what one needs to know to prepare Napa County to answer future questions. The report concludes with recommendations for groundwater monitoring.

QUESTIONS and DISCUSSION:

Groundwater Level Data

- **Historical differences in data availability:** Question: Why are more data points available in past than current years (2005 to present), and can past wells be used again as data points? Answer: More well data available in past years is likely the result of focused, short-term studies carried in the 1960s and 1970s on the Napa Valley Floor and on MST. Past wells monitored could potentially be monitored again in the future. However, it is critical that wells selected can be monitored over the long-term.
- **Current Data:** Question: How many wells are currently available? Answer: There are 181 available sites to monitor water levels and 182 sites to monitor water quality. These data points are readily available from DWR, the US Geological Survey (USGS), County data and GeoTracker facilities. Information from these data points can be culled to better spatially understand the water level and quality conditions. However, there are some data limitations. For example well construction data is needed for some wells to identify the aquifer being accessed.
- **GRAC Charge:** Several GRAC members asked for clarification of GRAC's charge. Ms. Gitelman clarified that part of the GRAC's charge is to develop and implement a groundwater monitoring program. To achieve this, GRAC must first establish a solid foundation of data that explains Napa's physical subsurface and how groundwater moves in Napa. This would provide Napa County a factual basis for future sound decision-making. Towards the end of GRAC's work plan (e.g., its third year), GRAC will offer recommendations on sustainability objectives and incentives. However, it is critical to first have a solid monitoring program in place. Page two of the GRAC work plan specifies the GRAC charge (work plan can be found in the October 27, 2011 Agenda Packet on the GRAC website http://www.countyofnapa.org/bos/grac).
- **Napa's Geology:** There are a number of county efforts and former studies that illustrate Napa Valley and MST area geology. These maps help identify areas with,

for example, younger alluvium which is a primary water bearing formation versus Sonoma volcanics which is less transmissive. Given geology impacts water flow, well location and construction data is important to better understand the information gleaned.

- **Well logs and construction data:** Question: Are well construction data and drilling reports available as an information source? Answer: Well construction data is available through the County and well driller reports are made available to DWR. LSCE is currently attempting to match well data reports with wells in the study. Still, some valuable well data points (i.e., with records dating back to 1918) do not have well construction data. Well log information is confidential and not publicly available.
- **Sub-area divisions:** Question: How are sub-areas delineated? Answer: Maps are organized according to Napa Valley Floor Subareas, Subareas South of Napa Valley Floor and Subareas East of Napa Valley Floor. It was asked if a physical barrier existed between the different areas. These areas make up a single basin from a hydrological standpoint, but separating them helps relate data to geographic areas. The areas mirror what was used in the County General Plan update.
- **Seasonal fluctuation:** Question: The study identified seasonal fluctuations varying roughly 10 feet in Calistoga up to 100 feet in the southwest border of St. Helena. What might cause these variations, and may nearby rivers have stabilizing effects? Answer: Factors that may impact fluctuation levels include the transmissiveness of the materials in which the wells are constructed, pumping from well(s) in the immediate vicinity, location near surface water, etc. Monitoring data points over a longer-period of time will help GRAC and the County to better understand impact of wetter and drier years, etc.
- **MST Decline:** Question: What is the velocity of the gradient of decline in the MST area? Answer: The velocity is included in the report and varies according to location. A more accelerated decline in the more central to middle area of MST.
- **Evaluating Decline by Drilling Logs:** Question: Are drilling logs being analyzed to better understand wells with more or less decline? Answer: At this time, LSCE has not completed this evaluation other than to explain large variances in a subarea.
- **Reasons for MST Stabilization:** Question: What may explain the lack of stability and re-assertion of stability in MST and other areas? Answer: Likely this is due to multiple factors. Data shows a relationship between decline and some quantity of extraction to where levels finally reach a state of equilibrium with what that area can receive from groundwater recharge. In the MST area, the geology is

complicated, less permeable and less able to transmit groundwater from a source of recharge. Until that new lower equilibrium state is reached, there is a continued state of decline.

  - With all factors remaining the same, why may a decline persist? One possibility could be well interference from wells extracting in close vicinity. A GRAC member emphasized that the equilibrium was not recovery, rather a new lower state.

- **MST Central Area and Hydrographs**: Hydrographs of the Central MST area show a long-term decline with hints of recent stabilization. One member remarked MST had a 20-40 feet decline in the 90s and 20-40 feet in the first decade in 2000. Most wells had gone down 80 feet or less and one went down 150 feet. Ms. Kretsinger Grabert added differences in well construction contribute to variances in well levels.
- **Fading wells:** A few members discussed whether deposits or obstructions would also prohibit accurate well readings and whether re-working wells would impact recorded levels. It was explained that there is no simple answer and exact sources for well variances are challenging to ascertain. For illustration, re-working a well may make the well more or less connected to a fractured system.
- **Extraction management:** A member mentioned many vineyard managers manage when their wells run dry. Some stabilization may be explained by this practice.
- **Lack of well data in Carneros:** A member asked for confirmation that no well data was secured for Carneros. LSCE was unable to identify wells in recent records (2005 to present). LSCE had sent a request to cities for data however did not receive a response. A GRAC member mentioned data exists, however, landowners are concerned about confidentiality so often refrain from sharing data. Education may spark sharing of data. Data and re-connecting past discontinuous data to present would be very valuable, especially if well construction information is provided.
- **Accuracy of well data:** Question: How reliable is water level data given confounding factors? Answer: In some studies there are significant assumptions with the data, leading to questions on reliability. This has not yet been looked into by LSCE. The facilitator suggested members capture this and other items as pieces of information that might be useful for developing a monitoring program.
  - What degree of accuracy for reference points was used in groundwater elevation measurements (i.e. a foot versus 100th of a foot) for regions such as Carneros and other regions where levels are inclined to sink? Answer: There may be a lot of variation with the degree of accuracy across data sources. LSCE attempts to

explain this variation in the technical memorandum and to reconcile differences. However it warrants attention in the data review.

LSCE agreed to try and provide future context on data reliability and degree of accuracy (i.e. to a foot or 100th of a foot) with hydrographs.

- **MST Contour Depressions and Fault Lines:** Question: MST groundwater contours show four depressions resulting from pumping in areas where there is less flow due to geologic formations. Might the fault line be a factor that contributes to the depression and/or individualized depressions? Answer: LSCE has yet to evaluate the connectivity across the fault line, but fault lines can often act as a barrier, retarding the flow. LSCE has a geologist looking closely at this to relate depressions with geological conditions.

  ACTION ITEM: Members requested a map of the groundwater study area showing roads, depressions and fault lines. LSCE supplied a map which is now available on the GRAC website at http://www.countyofnapa.org/bos/grac.

- **Relevancy of historical well data:** Question: Does data reported 20 years ago have relevance today due to changes in land use such as agriculture? Answer: Data was confirmed as relevant and has been collected prior to and after land use changes. There are more than 40 historical wells consistently assessed and a number of additional wells dating as far back as 60 years ago.

- **Wells being monitored today:** Question: How many wells in MST and in the County are being assessed? Answer: Fifteen wells have readings taken twice a year in the MST area. Overall, there is water level data for 181 wells provided by the County, GeoTracker, etc.

- **Message on stability:** Another suggestion was made for the Public Outreach and Education Plan to include a message that in the County's latest study, data from 181 wells showed relatively stable groundwater levels in Napa Valley and other areas.

- **Well confidentiality:** Question: What concerns do well owners have regarding sharing well information with the county, and is the longitude and latitude of well locations published? Answer: Data is made available to anyone who goes to the state website. Longitude and latitude are provided, plus or minus one mile for security reasons. The state mandates that water quality data be made publicly available.

- **What the data reveals:** A GRAC member noted well data available provides the "what" for water levels but not the "why", which was confirmed by LSCE. A better

understanding of the geology, well construction data, etc. is needed to have a better sense for what is occurring and the "why."

- **Evaluating impact of land management practices:** Question: Were historical changes in well water levels assessed according to land use and land management practices (i.e. reservoirs) to identify potential differences in performance? Answer: Historical and current contour data and well monitoring data could be used for this assessment, however there has not been a direct effort to study this. County staff suggested GRAC members focus on securing geological information first which may identify and help to explain trends. It is only towards the end of GRAC's work plan that GRAC will make recommendations on sustainability objectives.

Groundwater Quality Data

- **Groundwater quality:** Baseline groundwater quality data was reviewed with GRAC members. Geology (i.e. volcanic materials), land use (i.e. agriculture), sea water, etc. influence water quality. Additional well construction and geology data is needed to understand influences and to connect spatial patterns.
- **Data sources and home wells:** Question: A GRAC member noted that St. Helena has a great deal of shallower residential wells and asked what had been the sources for water quality information in St. Helena. Answer: Water quality data sources were secured from the department of public health, which looks at systems that have 25 or more connections, and through GeoTracker, which has shallower well completion with shorter records. Data is limited and serves more as a baseline.

Recommendations for Monitoring Information and Objectives

- **Priorities with plan development:** Future monitoring recommendations were shared. It was asked whether the hydrogeology, the Napa "bathtub," needed to be understood first prior to expanding the monitoring program. Ms. Kretsinger Grabert confirmed several pieces of information would be helpful to secure first such as location of wells (i.e. near Napa River and specific tributary areas), well construction and geology prior to expanding monitoring.
- **Surface water use:** A GRAC member noted the City of Napa uses surface water resources and back up supply wells, not groundwater, which was confirmed by County staff.
- **Future water sources:** Another GRAC member suggested untapped future resources may exist, such as in South County and as rumored with Napa Pipe. These may serve to alleviate future demand, especially for agriculture.

- **Understanding overdraft trends:** A member suggested a future data need would be to correlate water level and quality with well construction and geology data. Such information would add insight into how water flows, the recharge and to how best to manage groundwater. It could shed insight into whether or not there are overdraft trends and whether trends might be generalized or localized. Ms. Kretsinger Grabert added there are two main conditions generalized to Napa Valley and to MST. Whereas parts of the valley are more climatic in trends, MST has had an on-going water level decline. For Napa Valley, overall conditions seem stable and no long-term impact has been identified. But this needs to be more finely evaluated.
- **Water quality and use of data:** Question: Given many contaminants identified were from natural sources (i.e. geology or sea water), what contaminants can be controlled? Answer: Most of the contaminants are naturally occurring, however, the data is important for reasons such as treatment, standards, etc.
- **GRAC role in securing data:** Question: How can the GRAC help secure future data for the program? Answer: This may be through public outreach and education. At the next meeting, GRAC will continue discussing a draft communication plan prepared by the facilitator. In addition to informing the plan, GRAC members will be integral in communicating with constituents and developing general and audience-specific (i.e. by region) messages.

Comments and Questions Handout

The facilitator shared the questions received via email from GRAC members, and explained how questions and responses have been organized. Some questions were covered in the Groundwater Study presentation. Other responses are forthcoming in upcoming meetings or activities, and others may be inconsistent with the purpose of the GRAC identified in the bylaws. Initial answers and approaches to answers were provided by County staff and consultants.

ACTION ITEM: GRAC members will review the format used in the "Comments and questions Received Regarding Groundwater Conditions" document prior to the February GRAC meeting for discussion.

b. CASGEM Program Update

In November of 2009, SBX7-6 mandated groundwater elevations, in all basins and sub-basins in California, to be monitored to identify seasonal and long-term trends. Certain elements were also legislated to be made available to the public. In response, the Department of Water Resources (DWR) developed the CASGEM program and Napa County volunteered to be the countywide monitoring entity.

i. CASGEM Plan and Work plan

Phil Miller, Deputy Director of Public Works, provided an overview of Napa County's CASGEM program, public outreach and objectives. Napa's CASGEM Network plan, submitted to DWR in September of 2011, includes a network of four wells in MST, ten wells in Napa Valley Floor and one well in the Carneros Subarea.

ii. Volunteer well monitoring/outreach

Although the number of wells and locations meet CASGEM needs, the County hopes that with more outreach, additional wells will be included especially from the Pope Valley and Berryessa Valley basins. Napa County has no written confidentiality policy, however, property information is not publicly shared. CASGEM does makes public portions of the well completion report as required by State legislature. GRAC members were provided a handout on CASGEM and were directed to the CASGEM website (www.water.ca.gove/groundwater/casgem/online_system) and DWR's water data library (www.water.ca.gov/waterdatalibrary) for more information.

DISCUSSION:

- **Confidentiality:** It was inquired whether well locations in CASGEM were shared publicly. Theoretically, one can secure location information using the state well number. There is a dot indicating the generalized well location. However, one can secure longitude and latitude information to locate the specific well location. A memo was provided to GRAC outlining this, and members agreed to review it in preparation for their February 2012 meeting.
- **Withdrawal of Participation:** A question as to why the number of County wells monitored had dropped and whether it was due to landowners not wanting to participate in the CASGEM program. The drop was explained most often due to lack of accessibility. Some land owners did have confidentiality concerns.
- **Number of wells needed:** A question surfaced as to whether the number of wells was sufficient for CASGEM. Quantity wise, Napa County has met requirements. However, more data such as well construction is desired. Mr. Mark Nordberg of DWR confirmed the County report met DWR needs.
- **Well completion reports:** An inquiry was made as to whether the County had access to well completion reports. The Environmental Management department has well completion reports. Without charge, well owners may access well completion data by submitting a request and the AP number to Environmental Management. One may also request this information be completing a form on the DWR website.

- **Sufficient representation:** The CASGEM program has a general design and flexibility such that it may be applied to areas in both Northern and Southern California and the 515 basins and sub-basins included. CASGEM was modeled after other state programs which suggest 2 to 10 wells for each 100 square miles. A member inquired if the number of wells appropriately represented the size and acreage of Napa. It was explained that the focus is on aquifers and water bearing geological strata to understand availability of groundwater, shared by a community. A lot of data is available on the Napa Valley aquifer. More data is desired to monitor some smaller aquifers. A member suggested the group focus on fully understanding groundwater in the Napa Valley, and not on areas that do no have wells.
- **Well data per population measure:** A GRAC member suggested that the GRAC identify what number of wells per population size would offer an appropriate confidence level with the data. This information could then be incorporated into the public outreach messaging. Messaging should include representation in the monitoring program and how the coverage works.
- **Water budgets:** It was noted that page 4 of the CASGEM Network Plan mentions "develop and/or refine water budgets for key subareas, including recharge, extraction, and change in storage in the aquifer(s)". It was asked how extraction was defined, and whether and how this would be aligned with the GRAC's purpose, which did not include planning and management activities. Population information would be important, among other things.
- **GRAC education on well recording:** Members discussed whether there was value in learning more about how groundwater level is recorded.

  ACTION ITEM: Patrick Lowe will ask guest speaker Marcus Trotta, who is scheduled to present at the February GRAC meeting, to include slides on well sampling and to present a well log.
- **How wells are measured:** It was asked how well measurements were taken. Mr. Miller confirmed well measurements are taken by hand.

iii. County Compliance & Next Step

Ms. Kretsinger Grabert of LSCE reviewed a memo on privacy issues and well location accuracy related to the CASGEM program. LSCE developed the memo for the GRAC in response to the County's concern that earlier communications to CASGEM participating landowners did not accurately present the level of confidentiality and obscurity with well location data.

The memo provides context for the historical practice of providing well information through DWR's online Water Data Library system including water levels and longitude/latitude coordinates. The memo also illustrates interfaces one could use to visualize the wells with water data information. The memo also explains why the information and accuracy is important to scientists. It concludes by asking whether there is a need to change coordinates to obscure well location data, and notes the challenges associated with obscuring the data. Mr. Nordberg added that given agreements vary from area to area in the broader CASGEM program, privacy and confidentiality issues are challenging.

Examples of groundwater plans including confidentiality practices will be provided in February for consideration. Information on what should be made public will also be shared. For example, California is the only Western state without access to well log reports. SB 263 proposed increasing public access to well logs, but did not become law.

DISCUSSION:

- **Property Access:** It was asked whether a new landowner had a say in whether or not their land, which had been historically monitored, would continue to be monitored. It was confirmed that the decision lies with the new land owner. But, the County staff and DWR do not always know when ownership has changed. Monitoring of wells has been through casual agreements (i.e., handshake or verbal agreement) between field staff and the property owner. Should an owner choose to cease participation, efforts are made to find a replacement. With replacement well data, inferences can be made as to the health of the aquifer, but an apples-to-apples comparison is not possible.

c. Draft Plan for Public Outreach/Education

The facilitator highlighted that the draft public outreach and education plan developed, which will be discussed at the February meeting. This document serves as a starting point and GRAC members will need to help refine messages, identify target audiences and propose best mediums for outreach.

ACTION ITEM: GRAC members should review the draft plan, paying particular focus on *Objectives and Strategies* for the February 23 meeting.

6. OTHER BUSINESS *(5 minutes)*

a. Groundwater RFP/Consultant Selection Update

Patrick Lowe, Deputy Director of Conservation, Development and Planning, provided an update on contractor selection. Luhdorff and Scalmanini Consulting Engineers (LSCE) was selected by the joint interview panel, which included David Graves from GRAC. LSCE scope of work will be approved by the Board in January and available for review at the GRAC February 23 meeting.

7. Announcements

No announcements were provided.

8. Future Agenda Items

February 2012 will mark the start of GRAC's work to develop a groundwater monitoring program.

a. Components of a Monitoring Program (February Meeting)

In advance of the February 23, 2012, meeting, an annotated outline of a monitoring program will be provided. February's meeting will also provide examples of monitoring programs around the state, with specific examples from Sonoma County.

GRAC will also learn more about recharge, water budgets, the analysis of groundwater to surface water interaction and more at the next and subsequent sessions.

GRAC, County staff and consultants discussed how to improve meeting process and format.

Agreement: GRAC members all agreed that hard deadlines will be followed. Should information or questions be submitted past deadlines, County staff and consultants have discretion on whether to present items at the upcoming meetings. County staff and consultants agreed to circulate any discussion items in advance of meetings.

ACTION ITEM: GRAC members may supply additional questions on groundwater monitoring programs and the study by January 15.

ACTION ITEM: County staff will make available an index of acronyms and glossary of terms.

ACTION ITEM: For GRAC comfort, more physical space in the room set-up will be explored.

9. Adjournment to the Next Meeting

The meeting was adjourned until Thursday, February 23, 2012, at 2:00 p.m. in the Agricultural Commissioner's Office/UCCE Conference Room at 1710 Soscol Avenue.

Attendees

Groundwater Advisory Committee Members:

1. Michelle Benvenuto
2. Franklin Tucker Catlin
3. Alan Galbraith
4. David Graves
5. Michael Haley
6. Peter McCrea
7. Charles Slutzkin
8. Steve Soper
9. William Trautman
10. Susanne von Rosenberg
11. James Frederick Verhey
12. Duane Wall
13. Dale Withers

Public Attendees:

14. Rob Celsi
15. Christopher Heppner
16. Mark Nordberg
17. Ross Smith

County Staff Members and Consultant Attendees:

18. Taralyn Atkins-Brown, CCP
19. Dorian Fougères, CCP
20. Hillary Gitelman
21. Vicki Kretsinger Grabert, LSCE
22. Steve Lederer
23. Daisy Lee
24. Patrick Lowe
25. Phil Miller
26. Greg Morgan
27. Jeff Sharp
28. Rick Thomasser
29. Christine Secheli

Napa County Groundwater Resources Advisory Committee
February 23, 2012

A Tradition of Stewardship
A Commitment to Service

Groundwater and Groundwater – Surface Water Interaction: How Does It Work?

Thomas Harter
University of California, Davis

ThHarter@ucdavis.edu
http://groundwater.ucdavis.edu

UCANR MAKING A DIFFERENCE
UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES • Cooperative Extension • Agricultural Experiment Station

Groundwater Resources Association of California

Dr Thomas Harter Ph.D.

Cooperative Extension Specialist

Hydrology Program
Department of Land, Air, and Water Resources;
University of California
125 Veihmeyer Hall
Davis, CA 95616-8628
(530) 752-2709
thharter@ucdavis.edu
http://groundwater.ucdavis.edu

Specialty

Flow and transport processes in groundwater and in the vadoze zone; non-point source pollution of groundwater; groundwater remediation; groundwater resources management; geostatistics; stochastic analysis; numerical modeling.

Areas of Expertise

- Water
- Natural Resources and Environment
- Water
- Watershed Protection and Management

Biography

Thomas Harter, Ph.D., is the Robert M. Hagan Endowed Chair in Water Management and Policy at UC Davis. He received a B.S. in Hydrology from the Universities of Freiburg, Germany and a M.S. in Hydrology from the University of Stuttgart, Germany. He received his Ph.D. in Hydrology (with emphasis on subsurface hydrology) at the University of Arizona.

In 1995, Dr. Harter joined the faculty at the University of California, Davis, where he is in charge of the Groundwater Hydrology Cooperative Extension program. His research focuses on characterizing and assessing nonpoint-source pollution of groundwater, on the statistical and hydrodynamic evaluation of groundwater resources where data are limited, on groundwater modeling, and on a better understanding of contaminant transport processes at a wide range of spatial and temporal scales from the laboratory scale to the field, farm, and regional scale. He also works on groundwater resources assessments (recharge, conjunctive use) and on characterizing groundwater-surface water interactions.

A Tradition of Stewardship
A Commitment to Service

Napa County
Groundwater Resources
Advisory Committee

GROUNDWATER - INTRODUCTORY 101

EXCERPTS FROM DEPARTMENT OF WATER RESOURCES WEBSITE

Assembled Oct 2011, amended Jan 2012

CONTENTS

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Commonly Used Groundwater Terms 4

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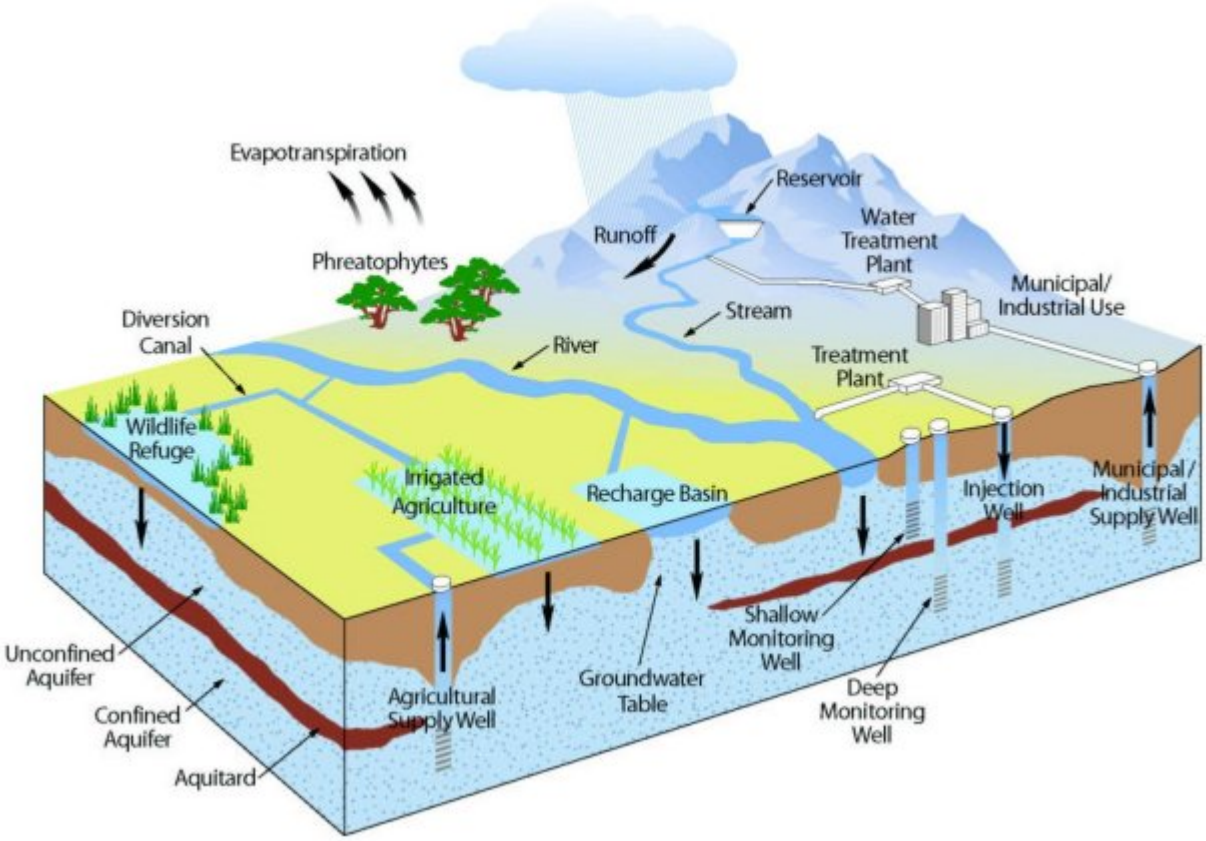
HYDROLOGIC CYCLE

Groundwater is a component of the hydrologic cycle. In simple terms, water or one of its forms-water vapor and ice-can be found at the earth's surface, in the atmosphere, or beneath the earth's surface. The hydrologic cycle has no beginning or ending location; however, it is often thought of as beginning in the oceans. Water evaporates from a surface water source such as an ocean, lake, or through transpiration from plants. The water vapor may move over the land and condense to form clouds, allowing the water to return to the earth's surface as precipitation (rain or snow). Some of the snow will end up in polar ice caps or in glaciers. Most of the rain and snowmelt will either become overland flow in channels or will infiltrate into the subsurface. Some of the infiltrated water will be transpired by plants and returned to the atmosphere, while some will cling to particles surrounding the pore spaces in the subsurface, remaining in the unsaturated zone. The rest of the infiltrated water will move gradually, driven by gravity, into the saturated zone of the subsurface, becoming groundwater. From here, groundwater will flow toward points of discharge such as rivers, lakes, or the ocean to begin the cycle anew.



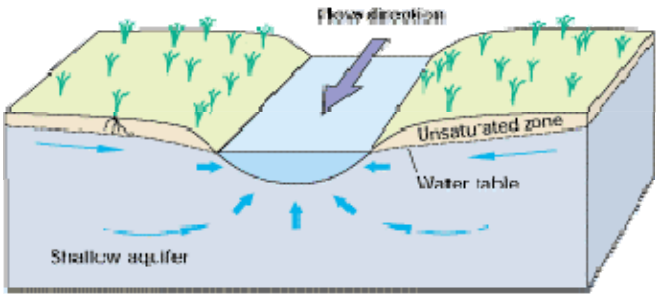
RELATIONSHIP BETWEEN GROUNDWATER AND SURFACE WATER

Although surface water and groundwater appear to be two distinct sources of water, they are not. Surface water and groundwater are basically one singular source of water connected physically in the hydrologic cycle.

If groundwater levels are above water levels in adjacent streams, the groundwater system will discharge water to the stream and increase flow in the stream. When groundwater levels are lower, however, water will leave the stream to recharge the groundwater and decrease flow in the stream. When groundwater is near the surface it creates wetlands and other similar habitat.

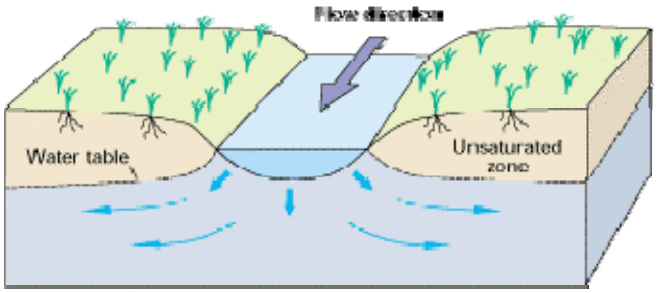
When groundwater discharges into an adjacent stream, it is called a gaining stream and when stream water recharges surrounding groundwater, it is called a losing stream. Knowledge of this groundwater-surface water interaction reveals that changes in either the surface water or groundwater system will affect the other. Effective management requires consideration of both water sources as one resource. With that in mind, more understanding and protection of groundwater, especially from contamination and overuse, is needed to increase the overall water supply. Monitoring and evaluation must be continued to gain the understanding needed so that future groundwater issues are not overlooked or misunderstood.

Gaining Stream



(reference: USGS Circular 1139, 1998)

Losing Stream



(reference: USGS Circular 1139, 1998)

COMMONLY USED GROUNDWATER TERMS

Following is a list of common terms that are used in conjunction with groundwater. For a more detailed list of terms, please refer to:

Groundwater Glossary

Bulletin 118 Update 2003

California Water Plan

Aquifer
A body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs.

Aquitard
A confining bed and/or formation composed of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs, but stores ground water.

Artesian Aquifer
A body of rock or sediment containing groundwater that is under greater than hydrostatic pressure; that is, a confined aquifer. When an artesian aquifer is penetrated by a well, the water level will rise above the top of the aquifer.

Artificial Recharge
The addition of water to a groundwater reservoir by human activity, such as putting surface water into dug or constructed spreading basins or injecting water through wells.

Basin/Subbasin Number
The basin numbering format is x-xxx.xx. The first number in the sequence assigns the basin to one of the nine Regional Water Quality Control Board boundaries. The second number is the groundwater basin number. Any number following the decimal identifies that the groundwater basin has been further divided into subbasins.

Basin or Subbasin Name
Basin names are based on published and unpublished reports, topographic maps, and local terminology. Names of more recently delineated basins or subbasins are based on the principal geographic feature, which in most cases corresponds to the name of a valley. In the case of a subbasin, its formal name should include the name of the basin (for example, Sacramento Valley Groundwater Basin, North American Subbasin). However, both locally and informally, the term subbasin is used interchangeably with basin (for example, North American Basin).

Confined Aquifer
An aquifer that is bounded above and below by formations of distinctly lower permeability than that of the aquifer itself. An aquifer containing confined ground water. See artesian aquifer.

Contaminant
Any substance or property preventing the use or reducing the usability of the water for ordinary purposes such as drinking, preparing food, bathing washing, recreation, and cooling. Any solute or cause of change in physical properties that renders water unfit for a given use. (Generally considered synonymous with pollutant).

Critical Conditions of Overdraft
A groundwater basin in which continuation of present practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts. The definition was created after an extensive public input process during the development of the Bulletin 118-80 report.

Groundwater Basin
An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom.

Groundwater Table
The upper surface of the zone of saturation in an unconfined aquifer.

Hydraulic Conductivity
A measure of the capacity for a rock or soil to transmit water; generally has the units of feet/day or cm/sec.

Overdraft
The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions.

Permeability
The capability of soil or other geologic formations to transmit water. See hydraulic conductivity.

Porosity
The ratio of the voids or open spaces in alluvium and rocks to the total volume of the alluvium or rock mass.

Potentiometric Surface
A hypothetical surface representing the level to which groundwater would rise if not trapped in a confined aquifer (an aquifer in which the water is under pressure because of an impermeable layer above it that keeps it from seeking its level). The potentiometric surface is equivalent to the water table in an unconfined aquifer.

Recharge
Water added to an aquifer or the process of adding water to an aquifer. Ground water recharge occurs either naturally as the net gain from precipitation, or artificially as the result of human influence. See artificial recharge.

Safe Yield
The maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect.

Specific Yield
The ratio of the volume of water a rock or soil will yield by gravity drainage to the total volume of the rock or soil.

Transmissivity
The product of hydraulic conductivity and aquifer thickness; a measure of a volume of water to move through an aquifer. Transmissivity generally has the units of ft2/day or gallons per day/foot. Transmissivity is a measure of the subsurface's ability to transmit groundwater horizontally through its entire saturated thickness and affects the potential yield of wells.

Unconfined Aquifer
An aquifer which is not bounded on top by an aquitard. The upper surface of an unconfined aquifer is the water table.

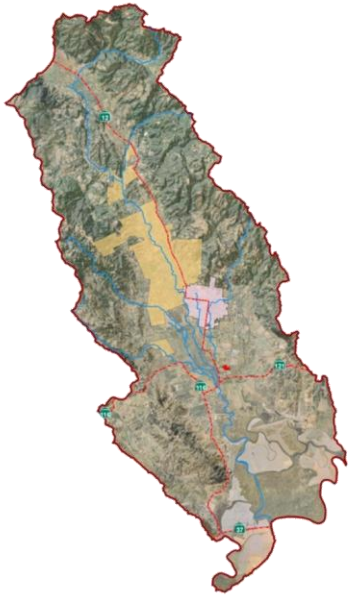
DWR CONTACTS FOR GENERAL GROUNDWATER INFORMATION IN NAPA COUNTY

North Central Region (map)
Chris Bonds
Senior Engineering Geologist
3500 Industrial Blvd
West Sacramento, CA 95691
916-376-9657
cbonds@water.ca.gov

DWR Headquarters (map)
Mary Scruggs
Supervising Engineering Geologist
Conjunctive Water Management Section
Regional Planning Branch
901 P Street, Room 213
P.O. Box 942836
Sacramento, CA 94236
916-654-1324
mscruggs@water.ca.gov

Sonoma Valley Groundwater Monitoring Programs

Sonoma Valley Groundwater Management Program



SONOMA COUNTY WATER AGENCY

www.sonomacountywater.org

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GROUNDWATER LEVEL MONITORING: WHAT IS IT? HOW IS IT DONE? WHY DO IT?

Allan Fulton[1], Toccoy Dudley[2], and Kelly Staton[2]

MONITORING ESSENTIAL TO PROTECT GROUNDWATER RESOURCE

The second issue of this groundwater informational series discussed "Incentives for Groundwater Management" illustrating an increasing reliance on groundwater in the northern Sacramento Valley and a growing need to manage the resource. The third issue explored "Possible Approaches to Groundwater Management" and highlighted an approach where monitoring is critical to protect and manage the groundwater resource. This issue (fourth) looks closely at the components of groundwater monitoring, specifically groundwater level monitoring.

THREE COMPONENTS OF GROUNDWATER MONITORING

Effective groundwater management will protect the quantity of groundwater and ensure a dependable and affordable supply of groundwater into perpetuity. It will also protect the water quality to ensure that the groundwater remains suitable for domestic, industrial, agricultural, and environmental uses and it will seek to prevent land subsidence that can damage expensive public and private infrastructure such as water conveyance and flood control facilities, and water wells.

Benefits of Monitoring Groundwater Levels:

- ❑ Determine annual and long-term changes of groundwater in storage
- ❑ Estimate recharge rates
- ❑ Determine direction and gradient of groundwater flow
- ❑ Understand how aquifer systems work
- ❑ Gain insight for well construction and where to set pump bowls for efficient extraction

Figure 1. Important benefits from monitoring groundwater levels.

GROUNDWATER LEVEL MONITORING GIVEN PRIORITY

Monitoring groundwater levels, groundwater quality, and land subsidence is expensive to implement all at once. Since implementation of groundwater management in rural areas of northern Sacramento Valley are in early stages and financial resources are limited, groundwater level monitoring usually takes priority over monitoring groundwater quality and land subsidence. Groundwater level monitoring is a direct indicator of the groundwater supply. Figure 1 highlights important benefits and reasons for monitoring groundwater levels.

Figure 2. Measuring the depth to water table through an entry point in a domestic well with a metal tape.

TECHNICAL ASPECTS OF MONITORING GROUNDWATER LEVELS

There are several aspects that should be considered in the establishment of a groundwater level monitoring program. They include: 1) determination of the elevation of the ground surface at each monitoring location; 2) type of wells to be used in measuring groundwater levels; 3) the level(s) at which the monitoring wells are perforated or screened and whether they represent typical extraction wells in the area; 4) type of well-sounding device(s) to be used to measure the groundwater level; 5) areas to be monitored and the number and locations of monitoring wells; 6) monitoring frequency and time of year; and 7) record keeping.

ESTABLISHING GROUND SURFACE ELEVATIONS

Measuring the depth to groundwater below the ground surface is more informative if the elevation of the ground surface is known. This can either be measured by surveying from a benchmark of a known elevation to a reference point on the well or estimated from topographic maps. The elevation of the groundwater surface then can be calculated by subtracting the depth to groundwater from the ground surface elevation. Then, comparisons of groundwater elevations can be made between monitoring well locations and the direction and gradient of groundwater flow can be determined.

Figure 3. Measuring the depth of water table in an irrigation well with an electric well sounder. Note pipe provides entry into well casing.

USING PRODUCTION OR OBSERVATION WELLS TO MEASURE GROUNDWATER LEVELS

Agricultural and domestic production wells can be used for measuring groundwater levels. Figure 2 shows the groundwater level being measured in a shallow domestic well. Figure 3 shows the groundwater level being measured in a deeper agricultural well. Figure 4 illustrates a dedicated groundwater monitoring well. Domestic and irrigation wells provide an opportunity to monitor groundwater through the well column without the added cost of installing dedicated monitoring wells. Dedicated monitoring wells are designed and

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[2]California Department of Water Resources, Northern District, 2440 Main Street, Red Bluff, CA 96080 (530) 529-7383

constructed specifically for measuring groundwater levels. Groundwater is not extracted from a dedicated monitoring well because they are typically too small in diameter to install a pump.

Domestic wells are generally shallow, limited to the top 50 to 100 feet of the Alluvial aquifer system (refer to the first issue of this series titled "Seeking an Understanding of the Groundwater Aquifer Systems in the Northern Sacramento Valley"). Agricultural wells are usually deeper than domestic wells, commonly 200 to 400 feet deep or deeper. The well casing of agricultural wells is often perforated at various depths transmitting water from more than one aquifer system (i.e. the Alluvial aquifer system and the Tuscan or Tehama Aquifer systems depending where the well is located). The effect of groundwater extraction on the groundwater level in the different aquifer systems and their interconnections cannot be evaluated under these monitoring conditions. Measuring groundwater levels from an agricultural production well where the depth of the perforations in the well casing are unknown is even more limited in providing useful information.

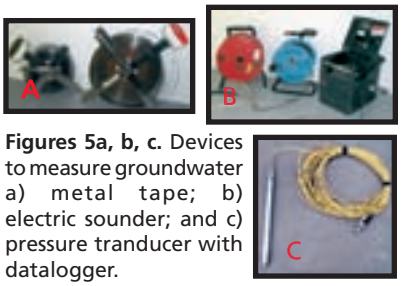
Figure 4. Using an electric well sounding device to measure the depth of groundwater at a triple completion, dedicated observation well.

Figure 4 shows a triple completion observation well inside a protective housing constructed of large diameter pipe with a lid. The three cement posts in the foreground protect the monitoring well from passing farm equipment and traffic. Inside this particular housing, three separate, two-inch diameter well columns extend to three different depths, about 200, 700, and 1000 feet deep, to the Alluvial, Upper Tuscan, and Lower Tuscan Aquifer Systems, respectively. Each well column is constructed with perforated well casing near the bottom of the well so groundwater levels within each of the aquifer systems can be measured independently of the other. The advantage of using dedicated groundwater monitoring wells is that they can determine the effects of groundwater extraction on each aquifer system and determine interconnections and vertical gradient between them.

Farmers are interested in the measurement of pumping lift because it has important implications on the cost of extracting water. However, a measurement of pumping lift is not a reliable indicator of the overall condition of the groundwater aquifer systems. The pumping lift can increase inside a well due to pump and well design factors not related to groundwater levels outside the well column. Therefore, measurements from a dedicated monitoring well or static (non-pumping) water levels inside a production well will better reflect conditions of the groundwater aquifer systems.

WELL SOUNDING DEVICES

Three types of devices are available to measure groundwater levels. Figures 5a, 5b and 5c show typical sounding devices: a metal tape, an electrical well sounding device, and a pressure transducer, respectively. A metal tape can be used to measure groundwater levels by inserting it between the well casing and pump column until it contacts water. The use of chalk on the lower part of the tape improves the visibility of the water line and helps verify that it has contacted the groundwater surface. The depth of water is then determined by subtracting the length of tape that was submersed in water from the total length of tape inserted in the well. An electric well sounding device is a simple continuity detector. The length of cable lowered down the well when continuity occurs is then noted as the depth to groundwater. Pressure transducers can be connected to a datalogger enabling continuous groundwater level measurements, although this method is more expensive.



Figures 5a, b, c. Devices to measure groundwater a) metal tape; b) electric sounder; and c) pressure tranducer with datalogger.

DETERMINING WHERE TO MONITOR GROUNDWATER LEVELS

Hydrologic, geologic, and land and water use settings will all influence where and how many locations are established for groundwater level monitoring. Hydrologic factors such as presence of surface water supplies for irrigation, sole reliance upon groundwater for irrigation, or a combination of both surface water and groundwater should be considered. Geologic factors should be considered such as known characteristics of the aquifer system being monitored and presence of geological fault lines that may influence groundwater movement. Changes in land and water use such as new residential, industrial, agricultural, environmental uses, and participation in water transfer programs are examples of land and water use considerations that may influence where and how many locations are established for groundwater level monitoring.

As an example, Figure 6 shows the general locations of groundwater level monitoring in Glenn County during 2002. There were a total of 136 monitoring wells used to measure groundwater levels across Glenn County. The neighboring counties of Tehama, Butte, and Colusa had 187, 89, and 67 groundwater level monitoring locations, respectively during 2002. As experience with groundwater level monitoring is gained, improvements in the groundwater level monitoring grid can be made.

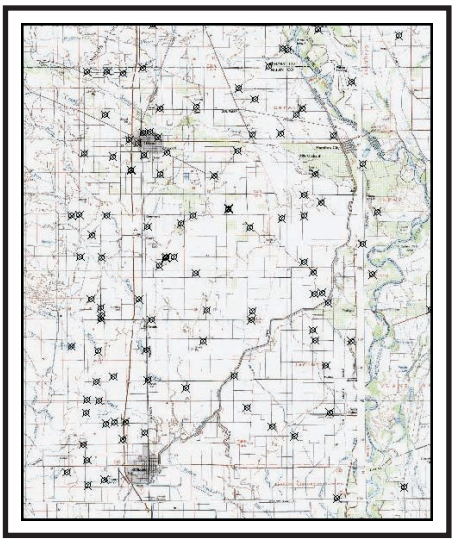


Figure 6. General locations of groundwater level monitoring in Glenn County during 2002.

DECIDING WHEN TO MONITOR GROUNDWATER LEVELS

Sound reasons exist for measuring groundwater levels in the spring, mid-summer, and in the fall. There are valid reasons for measuring static, pumping levels outside of a well with dedicated monitoring wells, and pump lift inside a well while in use, and there is an advantage of more frequent measurements. Realistically, limited financial resources to support groundwater level monitoring will likely require that some choices need to be made.

Spring and fall measurements generally occur before or after most of the irrigation season so static groundwater levels are usually measured in production wells. Because static levels are measured, elevation gradients between monitoring wells can be determined as well as groundwater flow direction within the aquifer systems. Springtime measurements also indicate the extent that the storage in the aquifer systems has recharged from winter precipitation. Static, fall groundwater levels may or may not correlate with mid-summer pumping levels but give insight about the amount of groundwater removed from aquifer storage during the irrigation season. Typically wells that are used to measure groundwater levels are in operation during mid-summer so pump lifts are often measured instead of static groundwater levels. Measurement of mid-summer pump lifts primarily help growers determine overall pump efficiency and pumping costs and have little relationship to long-term regional groundwater levels. Measurement of mid-summer groundwater levels in dedicated monitoring wells enable early detection of impacts from groundwater extraction related to water transfer programs.

Important Groundwater Records

- ❑ Name of well
- ❑ Location of well
- ❑ Ground surface elevation
- ❑ Date of measurement
- ❑ Depth to groundwater
- ❑ Elevation of groundwater surface
- ❑ Document reference point from which to consistently measure depth of groundwater
- ❑ Note well status (pumping or non-pumping) and any surrounding conditions that might affect groundwater levels

Figure 7. Important records that must be kept to effectively monitor the groundwater resource.

RECORD KEEPING

Record keeping can sometimes be overlooked as an important aspect of groundwater monitoring. However, without a commitment to record keeping to facilitate data analysis, the value gained from efforts to monitor groundwater may greatly diminish. Figure 7 highlights eight important groundwater records that need to be recorded and saved each time new groundwater measurements are taken.

APPLYING GROUNDWATER LEVEL MONITORING RESULTS

Figure 8 gives an example of how groundwater level monitoring data can be applied to help understand and protect the groundwater aquifer systems. The colored contour lines represent the groundwater elevations and show higher elevations in the northwest and lower elevations in the southeast. The red arrows indicate the direction of groundwater flow from northwest to southeast. The dashed box encompasses an area with a groundwater pumping depression. Comparisons of groundwater elevations and groundwater flow directions on an annual, semi-annual, or more frequent basis can identify early indicators of changes in the groundwater resource and help understand how to protect against or correct unwanted impacts. Hydrographs shown in previous issues of this information series (Figure 3 in Issue #2 and Figure 2 in Issue #3) are examples of other applications of the monitoring data. They can be used to set basin management objectives and to understand changes in the groundwater resource over time resulting from changing water and land uses, hydrology, and climate.

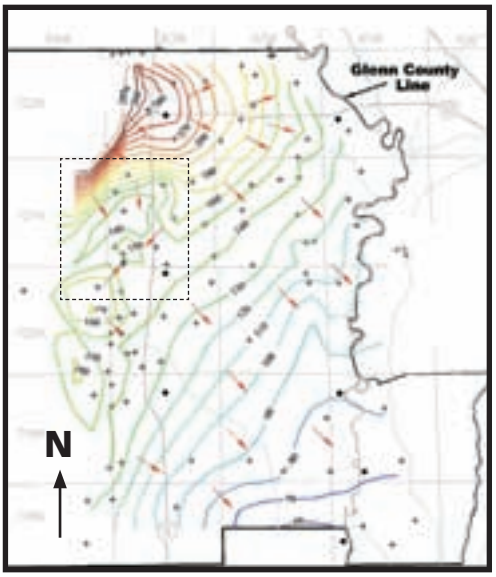


Figure 8. Example groundwater map for Glenn County. Contour lines show areas of equal groundwater elevation. Arrows show the direction of groundwater flow, and the dashed box shows a local pumping depression.

NEXT ISSUE

The past four issues of this series have emphasized topics related to protecting and managing the ground water resource from a broader, community perspective. The next issue will focus on water well design and construction, a topic of interest to the individual landowner and groundwater user.

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02-23-2012 Revised

Napa County Groundwater Resources Advisory Committee

GRA Committee Work Plan

Purpose:

The GRAC's duties and responsibilities are to assist staff and consultants with recommendations regarding : (a) the synthesis of existing information and identification of critical data needs; (b) the development and implementation of an ongoing groundwater monitoring program; (c) the development of revised well pump test protocols and related revisions to the County's groundwater ordinance; (d) the conceptualization of hydrogeologic conditions in various areas of the County and an assessment of groundwater resources as data becomes available; (e) the development of groundwater sustainability objectives that can be achieved through voluntary means and incentives and next steps; and (f) building community support for these activities.

Meeting Time & Location:

The GRAC will meet every other month at 2:00 ~~3~~PM on the 4th Thursday of the month (except in December, when the GRAC meets on the 2nd Thursday~~ - Dec. 15th~~ -). All meetings will be held at 1710 Soscol Ave, Suite 3, Napa, in the Napa County Agricultural Commissioner/UCCE conference room.

Work Plan Overview: The following provides a topical overview of scheduled meetings.

October 2011: Introduction & background

- Welcome/introduction/round table
- Organizational Items (bylaws, elect Chair/Vice Chair, calendar, ground rules, Brown Act)
- County Policies regarding groundwater
- Stakeholder assessment findings
- Groundwater Study Results Part 1
- Other Business (CASGEM participation & consultant selection)

December 2011: What we know & what we don't know

- Organizational items (cont.)
- Groundwater Study Results Part 2
- Confidentiality protocol for groundwater data/information
- CASGEM program requirements, County compliance & next steps
- Volunteer well monitoring & public outreach to date
- Discuss Draft Plan for Public Outreach/Education
- Other Business (Consultant contract & schedule)

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02-23-2012 Revised

February 2012: ~~Prioritizing data needs~~ Next Steps: Consultant Scope of Work, Monitoring & Outreach

- Overview of Groundwater Concepts and Sonoma County GW Monitoring program
- Review/discuss and adopt updated GRAC Workplan/Schedule
- Review/discuss Groundwater Study Recommendations (covered in Oct and Dec)
- Review/discuss Confidentiality Memo and Update to CASGEM Participants
- Review/discuss Consultant Scope of Work and Schedule and Geographic Focus Areas
- Review/discuss ~~adopt~~ revised Plan for ~~Public~~ ~~Outreach/~~ Communication & Education, and/or refer to an Ad Hoc Committee for further development
- ~~Conceptualizing the hydrogeology of Napa County & modeling challenges~~
- Monitoring wells background information/demo:~~,~~ ~~location~~, construction, function and cost ~~funding opportunities~~
- Introduction to components of a successful ~~robust~~ groundwater monitoring program
- ~~Prioritizing data needs~~
- ~~Other Business~~

April 2012: Draft groundwater monitoring program

- Review/discuss Communication and Education Plan from Ad Hoc Committee
- Overview of the History & Update on the Milliken-Sarco-Tulocay(MST) Basin
- Review/d~~D~~iscuss the working draft/annotated outline groundwater monitoring program
- Review/discuss well confidentiality and potential policy for the GW Monitoring Program
- ~~Review of work plan status & accomplishments~~

June 2012: Draft groundwater monitoring program

- Review and adopt Communication and Education Plan, and begin implementation
- Review/discuss conceptualization of hydrologic conditions
- Review/discuss first draft of groundwater monitoring program
- Review/discuss draft well confidentiality policy, if needed

July 2012: Joint meeting with the WICC Board & Subsequent Report to the Board of Supervisors

- Review/~~adopt~~ discuss revised groundwater monitoring program

August 2012 to June 2013:

- Complete conceptualization of hydrogeologic conditions
- Review and adopt ~~Assess/adjust~~ final groundwater monitoring program ~~as needed~~
- Continue ~~P~~public outreach & education

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02-23-2012 Revised

- Recommend updated well pump-test standards and related changes to groundwater ordinance
- Review of work plan status & accomplishments (Oct-1st Yr Completion)

August 2013 to June 2014:

- Continue groundwater monitoring program & outreach, and assess/adjust as needed
- Develop groundwater sustainability objectives and incentives
- Define next steps

August 2014 to December 2014:

- Conclude GRAC's work and make final recommendations to the Board of Supervisors

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A Tradition of Stewardship
A Commitment to Service

Napa County
Groundwater Resources
Advisory Committee

December 12, 2011
Updated February 15, 2012

COMMENTS AND QUESTIONS RECEIVED REGARDING GROUNDWATER CONDITIONS

Overview of This Document

Members of the Napa County Groundwater Resources Advisory Committee (GRAC) were asked at their October 27, 2011, meeting to review and provide comments on Chapter 4, Groundwater Conditions, of the *Napa County Groundwater Conditions and Groundwater Monitoring Recommendations* final report, produced by Luhdorff & Scalmanini Consulting Engineers. The comments were solicited to help develop presentation materials for the GRAC's December 12, 2011, meeting. Additional comments were submitted through January 15, 2012.

Five members submitted comments and questions on a range of topics. Speaking generally,

1. Several comments and questions were covered during the December 12, 2011, presentation on groundwater conditions.
2. Other comments and questions are likely to be addressed as the GRAC assists the County staff and technical consultants with recommendations regarding (A) the further synthesis of existing information and identification of critical data needs; (B) the conceptualization of hydrogeologic conditions in various areas of the County, and an assessment of groundwater resources as data becomes available; and (C) the development and implementation of an ongoing groundwater monitoring program.
3. Other comments and questions focus on planning questions (e.g., future demand and supply estimates), and are thus beyond the purpose of the GRAC.
4. Other comments and questions concern the GRAC collaborative process.

The full list of actual questions and comments submitted is provided below.

This document presents an initial sorting of comments and questions, developed by staff and technical consultants into the four categories described above. The sorting serves as a recommendation of whether, and if so when, to best address the comments and questions provided, and was initially presented to the GRAC for discussion following the groundwater conditions presentation on December 12, 2011. The document has been updated to address additional questions and will be presented to the GRAC at their February 23, 2012, meeting.

1. Topics Covered on December 12, 2011

- The integration of city wells in the County's monitoring program
- The range of wells historically and currently being monitored by the County and others, and the duration they have been monitored
- Extraction in different parts of the County
- The factual basis (or lack thereof) for public perceptions of groundwater conditions (further discussion is also planned as part of Category 2)

2. Topics to be Covered on February 23, 2012

- The relationship between groundwater conditions and environmental conditions, particularly groundwater/surface water interactions (including available data and information)
- The location of primary areas of groundwater recharge, and the relationship between groundwater basins and recharge sources (including available data and information)
- The geographic emphases of the monitoring program, including the Valley floor and mountainous areas
- Factors relating to assessment of groundwater elevations
- Differentiation of spring and fall well levels and trends in Valley subareas (partly covered on December 12, 2011)

3. Topics Likely to be Addressed during Future GRAC Activities

- Funds available for new monitoring wells, and the reuse of retired wells

4. Planning Topics beyond the Charge of the GRAC

- The relationship between groundwater conditions and home construction in hillside areas
- The use of water by wineries and trends in winery construction
- Trends in the use of drain tile and relationship to groundwater
- Future demands for urban, residential, and agricultural water use, and potential mismatches with future supplies (except to the extent this concern drives the development of "sustainability objectives" towards the end of the GRAC's work)
- The relationship between agricultural and residential groundwater use in rural areas
- The use of recycled water to replace demands on groundwater

5. Questions concerning the GRAC Collaborative Process

- The definition and scope of the problem that GRAC is seeking to address
- The County budget and detailed information of funds available to support the GRAC
- The need for detailed presentations on County water and groundwater regulations and policies
- The need for the GRAC to hear from a wide range of experts with practical and theoretical experience
- The need to assess the level of confidence/uncertainty associated with specific concepts

List of Comments and Questions Submitted by GRAC Members

#	Comment	Member	Date	Initial Response
1	The St. Helena General Plan Update (October 2010 draft), not yet adopted, states that the City will "collaborate with Napa County to establish an ongoing monitoring program to assess the long-term viability and recharge capability of the North Basin aquifer that supplies the City's wells." The City has two monitoring wells at/near its Stonebridge Well Complex (which contains its two production wells, as well as a small water treatment plant) near the Napa River south of the Pope Street Bridge. Has the County requested the spring/fall elevation data from the City's monitoring wells? If so, what tentative conclusions has it drawn if any? If not, does the County plan to make the City's monitoring wells part of the County monitoring program? If not, why not?	Alan Galbraith	11/21/11	To be covered on December 12. The County is willing to include cities subject to their permission and willingness to provide data.
2	In the 2006 ground water study the county had 30 or so wells that they had water level readings on twice a year. The records went back a number of years. Is the county still taking those yearly? All the well reporting that the consultants are looking into, how many have been continually monitored for the last 10 years with readings each one of those years.	Steve Soper	11/16/11	To be covered on December 12.
3	How many homes have been built in the unincorporated county over the last ten years? How many in the hills, and what impact do they have on ground water supply? In general, what is the impact of ground water usage in the hills as compared to the valley floor?	Michael Haley	11/16/11	Specific numbers and the relative importance of recent housing developments are beyond the purpose of the GRAC, which is charged with monitoring, data collection, and analysis. The GRAC is not charged with assessing or estimating historical or future groundwater demands although it may consider these issues when developing “sustainability criteria” and next steps.
4	How many brick and mortar wineries have been added in the last ten years, and how much water do they use on average per winery, per size of winery, etc.	Michael Haley	11/16/11	Same as previous.
5	Even if it is determined that there are plentiful groundwater resources in a particular area, what impact does a large draw down have on the environment?	Michael Haley	11/16/11	The general relationship between groundwater conditions and environmental conditions, including groundwater-surface water interactions, is likely to be covered by the GRAC’s hydrogeologic conceptualization effort.

6	In reviewing the Final August 2010 Report entitled "Assessment of the Feasibility of a Collaborative Groundwater Data Gathering Effort in Napa County" ("CCP Report") prepared by the Center for Collaborative Policy at Sacramento State University ("CCP"), there were a number of questions that arose from my reading of the Report covering the interviews conducted by CCP and the conclusions that they reached as a result of those interviews. It seems that the interviews identified a number of key perceptions regarding the use and status of groundwater resources in Napa County, some of which may be true and some of which may not be true. It seems that the NCGRAC, in order to adequately fulfill its responsibilities, needs to understand and agree on which of those perceptions are true (based upon good science) and which are not. Luhdorff & Scalmanini ("LS") potentially has the facts and science from their work to assist the members of the NCGRAC in determining which of those perceptions are supported by facts and science and which are not. Below is a series of questions that I would like to have input from LS on with regard to statements and conclusions from the CCP Report:	Jim Verhey	11/17/11	For context: The assessment documented issues of concern to stakeholders. It was not a technical assessment of groundwater conditions, and did not attempt to substantiate the concerns raised by interviewees. One of its key recommendations was to gather and synthesize existing scientific data.
7	"NC Groundwater is being extracted at unsustainable rates": a. Is that a true statement for Napa County as a whole? b. Is that a true statement for each of the water basins in Napa County or is it true for only certain basins? Which ones and why for those basins?	Jim Verhey	11/17/11	Groundwater data are not available for all subareas of the county, as such Part "a" cannot be fully addressed. Part "b" is likely to be covered on December 12. Based on available groundwater data, chronically declining groundwater levels and evidence of groundwater deficiency appears largely limited to the Milliken-Sarco-Tulocay area.
8	"Potential for urban and residential use to diminish the groundwater available for agriculture": a. Is there sufficient groundwater, over the long-term, for both urban and residential and agricultural uses? b. If not, how much is the likely shortfall in water resources and when is it likely to first occur? What are some of the options available to address such a shortfall? c. Is recycled water a viable option for agriculture? How about for Urban and residential uses?	Jim Verhey	11/17/11	Estimating future demands and supplies, associated contingency planning, and evaluating the use of recycled water as an alternative supply is beyond the charge of the GRAC, although these issues may inform development of "sustainability objectives" and next steps.

9	"Drawing down of groundwater could noticeably reduce streamflows, and thus threaten aquatic and riparian habitat, stimulate creekbank erosion and weaken fish populations": a. Is that true? If yes, how much is the impact likely to be and over what period of time?	Jim Verhey	11/17/11	As with #5, the general relationship between groundwater conditions and environmental conditions, including groundwater-surface water interactions, is likely to be covered by the GRAC's hydrogeologic conceptualization effort. Estimating future demands and corresponding relationships with the surrounding environment is beyond the charge of the GRAC.
10	"Agricultural overdraft is causing problems for [non-agricultural] rural areas [such as MST]": a. Is this a true statement and supported by LS's investigation/analysis? How significant is the impact of agricultural use? b. If agricultural use is not the primary cause of problems in the MST or Carneros basins, what is?	Jim Verhey	11/17/11	Estimating the relative importance of agricultural groundwater use is beyond the charge of the GRAC, which is charged with monitoring data collection and analysis.
11	"Use of drain tile in vineyards is impacting the recharge of the water basins in Napa County": a. Where, actually, are the primary areas of recharge for the water basins in Napa County? b. How extensive actually is the use of drain tile in vineyards in Napa County? c. Is it possible that the use of drain tile could have a material impact on the recharge of the water basins in Napa County?	Jim Verhey	11/17/11	Identification of recharge areas is likely to be covered by the GRAC's hydrogeologic conceptualization effort. Estimating the use of particular technologies and their relative importance for recharge is beyond the charge of the GRAC.
12	After the introductory meeting in October and after reviewing the documents distributed at that meeting, here's my response to the County Staff's request for Questions and Requests from the committee members:	Tucker Catlin	11/21/11	Not applicable.
13	THE PROBLEM. After reading through all of the materials, I'm still not sure that I have a crystal clear idea of what the problem is that we're being tasked to solve. So my first request is that we invest some time at the outset developing some committee consensus on a simple and clear DEFINITION and SCOPE OF THE PROBLEM. A thorough Problem Definition can lead to a quicker and clearer Solution.	Tucker Catlin	11/22/11	The Board of Supervisors established the GRAC to provide recommendations on a series of topics. Each topic will require its own discussion to clarify its importance, scope, and intended use.

14	THE COSTS AND FUNDING. According to the documents, this committee is being asked to make recommendations regarding monitoring wells in Napa County. In order to do that responsibly, we need to START with a clear context of the resources available to accomplish (and ultimately influence) the scope of this task. A good introduction would be: A short presentation of the COUNTY BUDGET for the next fiscal year(s) showing SOURCE OF FUNDS (pie chart with a detailed list in $ and % of total) and USE OF FUNDS (same), along with comments about the Source and Use of Funds for this particular project. This key element of COSTS and FUNDING needs to be at the beginning instead of at the end (or entirely absent from) our considerations and deliberations.	Tucker Catlin	11/23/11	The Department of Conservation Development and Planning has budgeted sufficient resources to support the next phase of LSCE's work through June 2013. The County has also devoted staff time to support the GRAC and has a grant from DWR for facilitation support through June 2012. Additional grant funding to support the GRACs efforts will be identified and pursued in 2012 and future years. DWR still has very limited grant funding available.
15	THE LAW. Before making any new regulations, we should have a fairly thorough presentation of the various Water and Groundwater Regulations (AND Policies) already in effect in Napa County.	Tucker Catlin	11/24/11	The County General Plan's water resources policies were presented on October 27, 2011. Additional detail will be provided on specific topics as needed to support GRAC discussions (e.g., for revising the County's groundwater ordinance). A detailed presentation on the County's groundwater ordinance is anticipated for the fall of 2012. The GRAC will not be developing any regulations except that it is expected to recommend changes to the County's groundwater ordinance needed to update pump test procedures.
16	THE EXPERTS. Locating and assessing groundwater has long been a topic with many unknowns, and (therefore) a very broad range of interpretations and opinions. The only reliable truth about wells is that you won't know if there's any water down there until you dig the hole and drop a pump in. We should minimize our inevitable mis-conceptions by hearing from a wide range of experts with the greatest practical and theoretical and local experience. For this topic, one voice is not enough.	Tucker Catlin	11/25/11	The County selected Luhdorff & Scalmanini Consulting Engineers (LSCE) through a rigorous, competitive process. LSCE will serve as the primary technical support to the GRAC. Additional expert support or review will require the Board of Supervisors to allocate additional funds. Professionals with relevant subject matter expertise are invited to attend GRAC meetings and share their experience.
17	THE CONFIDENCE FACTOR. Finally, we need to ask each of the various Experts to elaborate on the predictive uncertainties inherent to "Hydraulic Concepts", especially under different scenarios, and especially in earthquake country. We need to know what is the Confidence Factor that we're investing in (eg how many test wells are required for a reasonable statistical confidence to draw a conclusion?).	Tucker Catlin	11/26/11	Clarifying the assumptions, uncertainties, and confidence levels associated with specific concepts and approaches will be an important part of LSCE's presentations and communication with the GRAC.

18	I found the power point frame from Ludhorf Scalmanini's presentation which shows a total of 181 Level Monitor Wells and 182 Quality Monitor Wells under "Current Groundwater Monitoring". Apparently before the cost cuts in 2005 there were 382 Level Monitor Wells and 211 Quality Monitor Wells. That's a lot more than I expected. Question for Patrick's list: If there were funding cutbacks in 2005, do we have any new funds for new monitor wells?	Tucker Catlin	12/2/11	To be covered on Dec. 12. The numbers relating to the historically and currently monitored wells referenced in the cited slide include wells that have been monitored by a number of entities, including the County. Special studies such as the USGS study of the MST area included increased monitoring during that study period (and later reduction in the number of monitored wells when the study was completed).
19	If so, how much and what's the finding source?	Tucker Catlin	12/2/11	See previous.
20	If funded, can any of the retired wells be brought back to useful life?	Tucker Catlin	12/2/11	See previous.
21	In reviewing the proposed Napa County Groundwater Monitoring Program that was distributed at the December 15, 2011 GRAC meeting in more detail, I would like to have input from Luhdorff & Scalmanini ("LS") and/or Napa County Staff with regard to the questions listed below. My primary concern is that monitoring, by itself, won't provide the information necessary to understand whether or not there are groundwater quantity and quality issues in Napa County beyond just the MST and Carneros water basins.	Jim Verhey	1/12/12	Groundwater monitoring data do need to be complemented by other information (ex. precipitation, production estimates, etc.) to determine whether and to what extent groundwater quantity and/or quality issues (natural or otherwise) exist.
22	Given that the LS Napa County ("NC") Ground Water Conditions February 2011 Report indicated that the only water basins in the County that were shown to have significant declining groundwater levels were the MST and Carneros water basins, why shouldn't the proposed monitoring program be focused primarily on augmenting the number of monitoring wells in those areas rather than throughout the entire County? If the other NC water basins are stable, why not continue to monitor them with the existing monitoring wells unless and until future water levels show signs of decline?	Jim Verhey	1/12/12	To be covered 2/23/12; also relates to new work on the Updated Hydrogeologic Conceptualization and & Supplemental Monitoring Recommendations, especially for the NVF Subareas. The groundwater monitoring network needs to be designed to sufficiently address groundwater level and quality monitoring objectives as preliminarily summarized in the LSCE 2011 report and/or as may be supplemented by the GRAC.
23	It seems that having accurate well locations and well monitoring data are critical, so wouldn't the County be better off to encourage those current monitoring well owners to formerly allow the County to accurately show the location of their wells rather than trying to "mask" the locations? Can the County provide some indemnification or assurance to monitoring well owners that their participation would not, at some future date, be used to negatively impact those participating well owners? If not, why not?	Jim Verhey	1/12/12	Accurate well locations are important; see Dec. 8, 2011 Memo. The groundwater monitoring data are collectively intended to be indicative of and beneficially used to track groundwater conditions on a large/regional scale (e.g., these data are generally not intended to track long-term conditions for a single property). The County cannot offer assurances or indemnifications related to actions by third parties over which it has no control (To be covered 2/23/12).

24	The last page of the LS memorandum on the Groundwater Elevation Monitoring Program refers to "requiring" accurate data for the purpose of determining "surface water/groundwater interactions". What scientific evidence has LS assembled that accurately explains the relationship between surface water flows and groundwater levels in the various Napa County water basins? There was no information presented at the last GRAC meeting relative to that statement. To what extent is the level of groundwater in the various water basins impacted by surface water flows? How does a water level monitoring program by itself provide answers to that question?	Jim Verhey	1/12/12	To be covered 2/23/12. To be addressed as part of new tasks for the Updated Hydrogeologic Conceptualization and & Supplemental Monitoring Recommendations project. See also above comments relating to groundwater data use in conjunction with other data.
25	How will the monitoring program provide data to help LS analyze groundwater flows between water basins and recharge sources? Won't that require more extensive geological information and analysis that is not a part of the monitoring program? Why not focus on acquiring that information rather than merely expanding the groundwater level monitoring program? It seems that there is a major deficiency in the information available and necessary to accurately understand the status of groundwater in Napa County and I question whether the proposed groundwater monitoring program will provide that information.	Jim Verhey	1/12/12	To be covered 2/23/12. To be addressed as part of new tasks for the Updated Hydrogeologic Conceptualization and & Supplemental Monitoring Recommendations project, including evaluation of current groundwater monitoring, the extent to which the current monitoring meets groundwater level and quality monitoring objectives, and recommendations to augment the network to meet those objectives.
26	The mountains of Napa County are a major source of water replenishment for the valley groundwater basins. It appears the GRAC focus, if not its entire effort, is the valley groundwater basins. Many properties and some specific regions in the mountains are water challenged, if not entirely waterless during certain periods of time. What, if anything, is GRAC's mission and focus to understand and enhance the groundwater resources of properties in the mountains of Napa County?	Duane Wall	1/13/12	The current focus is the main Napa Valley Floor (including the MST). However, 2011 report recommendations include addressing additional data needs elsewhere in the County. The future recharge analysis work will include mountainous regions that provide water to the valley floor, but insufficient monitoring exists to aid in identifying mountainous areas with supply issues and is not currently a high priority area to increase monitoring.
27	How was it determined that groundwater elevations are generally stable in most of the Valley floor areas? Was any kind of mathematical analysis (e.g., fitting a least squares regression line through the data) conducted, or was the assessment qualitative?	Susanne von Rosenburg	1/17/12	Assessment of groundwater level and quality data has been qualitative on a larger scale (regional and countywide); mathematical analysis of the level data in isolation from consideration of other factors would have limited utility.
28	If the assessment was only qualitative, what was the basis for limiting the analysis?	Susanne von Rosenburg	1/17/12	To be covered 2/23/12. The initial scope (2009-2011 work) focused on gathering, organizing, assessing the quality of the data, and providing a preliminary analysis of countywide

				conditions. The new tasks for the Updated Hydrogeologic Conceptualization and & Supplemental Monitoring Recommendations project addresses the additional information needs for monitoring in high priority subareas (particularly the NVF), including linking well construction information to wells with historical groundwater measurements.
29	Looking at the data from representative wells in the Northern Napa Valley subarea (Figure 4.2 of Tech Memo 4) and the Southern Napa Valley subarea (Figure 4.2 of Tech Memo 4), it seems as though there may be some wells that actually do show some decline over time, although the annual changes in water levels may mask this trend (e.g., well 129 and possible 138 in the Northern subarea and 134/135 in the Southern subarea). It would be great to see the data at a larger scale and perhaps to have the spring and fall data separated. In each case, it would be very helpful to have a curve fit to the data to get a better sense of whether there is a trend.	Susanne von Rosenburg	1/17/12	To be covered 2/23/12. Groundwater levels for 129, 138, 134, and 135 presented on 12/12/11. Additional discussion to occur on 2/23/12, including presentation of data on a larger scale and with spring and fall data differentiated.
30	Well 138 seems to be showing increasing stress (greater and greater water level declines spring to fall) and to a lesser degree well 132 appears to be as well. 138 seems to be responding more and more strongly to drought years, as well (it's hard to tell at the scale of these diagrams, but it seems as though spring recovery during drought years is decreasing each decade), which suggests the well is strongly reliant on adequate rainfall to sustain its yield at the current level of demand. It would be helpful to get some added input on how sensitive the wells in various sections appear to be to drought, and whether the sensitivity to drought is increasing, because if drought is in fact increasingly stressing wells, that may increase the demand on the river as a source of recharge, and would affect groundwater well reliability in dry years.	Susanne von Rosenburg	1/17/12	To be covered 2/23/12. Groundwater levels for 138 and 132 presented on 12/12/11. Additional discussion to occur on 2/23/12, including presentation of data on a larger scale and with spring and fall data differentiated. Overall, spring groundwater levels in well 138 show full recovery (a spring 2008 measurement is atypically lower than other spring measurements; spring 2009, 2010, and 2011 measurements are consistent with spring measurements in the 1960s).

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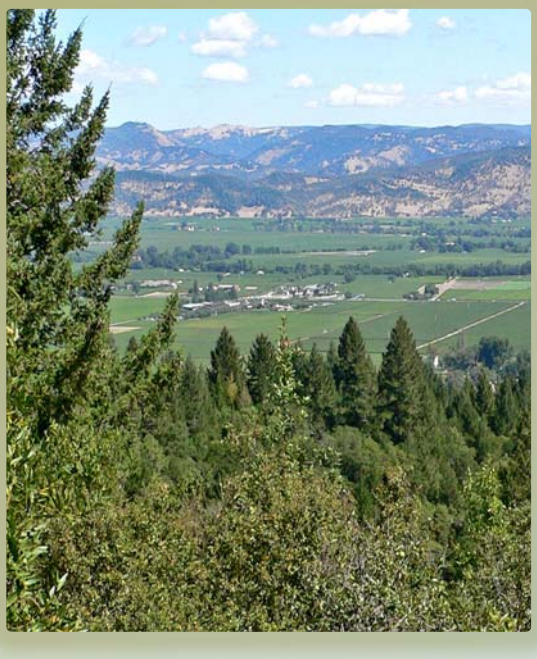
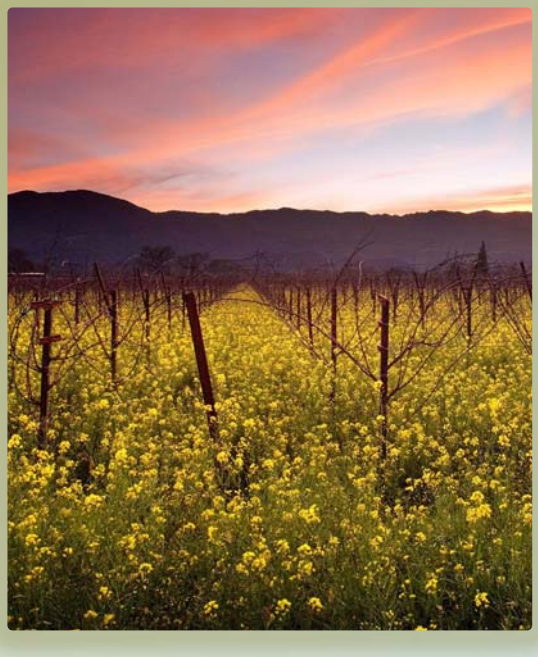
Napa County Comprehensive Groundwater Monitoring Program
Executive Summary

Prepared for:
Napa County
Department of Public Works

February, 2011





LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

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FIGURES

Figure ES-1 Napa County Subareas ..... Follows References\

ATTACHMENT 1

Napa County General Plan Update (2008), Water Resources Goals and Policies

groundwater deficient, additional regulations and review requirements under the California Environmental Quality Act (CEQA) have required application of "no net increase" and "fair share" principles in groundwater use associated with discretionary actions requiring county approval. The "no net increase" in groundwater use is required because there is no surplus water to support new projects without adverse environmental impacts.

ES.9 Findings and Recommendations

This section presents recommendations for enhancing and expanding countywide monitoring to facilitate understanding of groundwater availability and integrated regional water planning efforts. A table at the end of this section summarizes the recommended implementation steps, including the implementation time frame, a relative estimated budget, and the relative priority for implementation.

ES.9.1 Data Management System

At the outset of the development of the DMS, it was recognized that, in the future, the County would assist with the entry of other historical groundwater level and groundwater quality data. It was anticipated that future County staff time would be needed for this effort and also to incorporate well construction information for wells historically monitored in the County, recent surface water delivery information (as desired), and municipal pumping data. Recommendations for ongoing utilization and maintenance of the DMS are included in the Task 1 Technical Memorandum (LSCE, 2010a) and summarized in Table ES-3.

ES.9.2 CASGEM Groundwater Elevation Monitoring Program

Napa County's overall Comprehensive Groundwater Monitoring Program covers the continuation and expansion of countywide groundwater level monitoring efforts (including many basins, subbasins and/or subareas throughout the county) for the purpose of understanding groundwater conditions (i.e., seasonal and long-term groundwater level trends and also quality trends) and availability to enable integrated water resources management and planning to meet future water supply demands. Development of the countywide DMS, groundwater data quality evaluation, and the recommended groundwater level monitoring program provide a means for further coordination with statewide monitoring program interests, particularly the CASGEM program.

The Task 4 and Task 5 Technical Memorandums (LSCE, 2011a and 2011b) recommend that the County participate in the CASGEM program. The County Board of Supervisors recently approved the County's plan to notify DWR that it intends to become the monitoring entity for Napa County (Napa County Board of Supervisors, meeting December 14, 2010).

ES.9.3 Groundwater Monitoring Program

The County's Comprehensive Groundwater Monitoring Program has resulted in recommendations for continuation of current monitoring programs and expansion and/or refinement of the programs conducted by the County and others. For the overall groundwater level and quality monitoring program to be successful, coordination with other cooperating entities, such as representatives from cities and towns in the County and numerous other entities, is required. A successful program will also require interest by and the cooperation of landowner participants who have already authorized use of their wells for current monitoring programs and also those that express an interest in being an active participant in the County's efforts to expand the countywide groundwater level and quality monitoring programs.

The program presents a detailed list of the steps to expand and improve the County's groundwater monitoring program. Those steps include:

1. Establish the County's role as lead agency for ongoing groundwater monitoring program coordination and database oversight and management.
2. Establish plan for pertinent County departments (e.g., Groundwater Advisory Group representatives and others as appropriate, including County GIS persons(s)) to coordinate data collection, storage, and analysis efforts.
3. Identify potential collaborators (including local, federal, and state agency representatives) and interested stakeholders for the ongoing program.
4. Annually update the DMS (e.g., groundwater levels and quality and other water-related data), assess network and findings, and make changes to the program where necessary.
5. Discuss monitoring parameters of special interest with collaborators.
6. Review groundwater data annually and revise or make recommendations to revise data collection accordingly, pending changes to network wells and/or specific program objectives.
7. Identify locations for construction of dedicated monitoring wells for groundwater level and quality monitoring (e.g., County subareas where more subsurface information is required to better quantify groundwater availability and quality, recharge areas where aquifer-specific monitoring is lacking, surface water-groundwater interaction, etc.).
8. Replace (over time) wells in the monitoring network that have no well construction information (or are perforated in more than one zone) to improve the understanding of aquifer-specific conditions.
9. Coordinate efforts being conducted for water supply investigation work (e.g., testhole construction) with opportunities for constructing zone-specific dedicated monitoring facilities for countywide groundwater level and/or water quality monitoring.
10. Communicate program results to the cooperating entities in the form of periodic reports of groundwater conditions.
11. Provide an overview of program objectives, benefits, and results to general public via web information and other communication vehicles.
12. Seek funding to support program continuation, including DMS maintenance, data evaluation, and implementation of priority recommendations.

13. Explore the need to develop guidelines for testing private wells to evaluate potential groundwater quality issues.

ES.9.3.1 Groundwater Level and Quality Monitoring Networks

Groundwater level measurements have been recorded at a total of 676 wells (173 locations) through at least 2005. Groundwater quality monitoring has been conducted at a total of 283 wells (or 153 locations) through at least 2005. Recommendations to implement the expansion and improvement of countywide groundwater monitoring activities by the County and others are summarized in Table ES-3 and also include:

1. Continue groundwater level monitoring on at least a semi-annual basis; increase the spatial and vertical distribution of wells for monthly water level measurements as described in this report to allow more comprehensive evaluation of groundwater conditions and stream-aquifer relationships.
2. Implement efforts to expand and/or refine groundwater quality monitoring program such that more wells can be "qualified" with well construction information.
3. Review the historically monitored wells to determine whether some of these may be suited to the objectives of gathering basic data and/or expanding groundwater level and/or quality monitoring in the various County subareas.
4. Coordinate expansion of the groundwater quality monitoring program with the expansion/refinement of subarea groundwater level monitoring.
5. As feasible, replace water level monitoring wells that are completed in more than one aquifer with wells completed in (or representative of) a single aquifer (a phased approach is recommended for this effort that considers the historical record for existing wells in the network).

Additional recommendations are included in the Task 4 Technical Memorandum (LSCE, 2011a).

ES.9.4 Regional and Local Physical Conceptualization

Understanding the hydrogeology of Napa County is essential to determine how much water is available and to what extent it can be sustainably produced. Previous hydrogeologic studies have focused on the MST Subarea and northern portion of the Napa Valley without much attention to the other areas within the county. With the exception of the Farrar and Metzger (2003) study, which looked at the MST, all of these studies are more than 30 years old. In the last 30+ years, hundreds of new wells have been drilled to greater depths than previously reached, supplying a potential abundance of new data. Due in part to the scarcity of hydrogeologic data available for the majority of Napa County, data collection and analysis need to be prioritized; the highest priority needs are presented below.

ES.9.4.1 Napa Valley Floor – Update of Geologic and Hydrologic Conditions

Currently, analysis of the Napa Valley has been largely limited to two studies, one by Kunkel and Upson (1960) and one by Faye (1973). Since the Kunkel and Upson study, plate tectonics theory has been introduced, which significantly expanded the understanding of the relationship between individual geologic units within the County and the structures (faults, folds, and fractures) that accompany these relationships. Also, a large number of new wells (and therefore new well logs) have been added to the Valley, which expanded the breadth and depth of the aquifer materials explored and developed for groundwater production.

Delineation and description of the primary aquifer units are essential to determine how much available groundwater is present within the Napa Valley and to evaluate the response of the aquifer system to natural and induced stresses. The geologic cross sections prepared by Kunkel and Upson should be updated and expanded to include the last 50 years of new log data and plate tectonics theory. New cross sections should also be created throughout the Valley and into the surrounding foothills to better delineate the vertical/horizontal extent of the alluvium and underlying Sonoma Volcanics. Faye's isopach map of the alluvium and hydraulic conductivity distribution map should be updated to include the new well log data and be extended to the southern end of the Valley. As data become available, similar maps could be produced for the Sonoma Volcanics within the Napa Valley.

Faye's investigation identified direct infiltration of precipitation and percolation of surface water as the primary mechanisms for groundwater recharge in the Napa Valley. He also concluded that the contribution of percolating surface water was significantly limited by high groundwater levels. Farrar and Metzger (2003) subsequently noted that subsurface inflow to the southern Napa Valley has been significantly decreased by increased pumping within the MST. The interrelationships between surface water and groundwater due to changing stresses (including increased pumping) should be further examined. Both mass balance and streamflow infiltration methods could be used to improve estimates of regional and local recharge.

Summarized below are recommendations for three other areas of the County.

ES.9.4.2 Pope Valley, Carneros, and Jameson/American Canyon and Napa River Marshes Subareas: Update Hydrogeologic Understanding

Pope Valley: The Pope Valley Subarea is forecast to have an increase in development and a corresponding increase in groundwater pumping. Currently, subsurface geology has not been investigated and only limited hydrogeologic data are available.

Carneros: Limited data are available that describe the hydrogeologic setting of the Carneros Subarea. The available data suggest that groundwater resources are limited and may be susceptible to over development. Future planning decisions require knowledge of current groundwater conditions and the possible impacts that may result from additional pumping.

Jameson/American Canyon and Napa River Marshes: Limited data are available for the Jameson/American Canyons and Napa River Marshes Subareas which make up the southern county area. The two main issues facing this area are potential saltwater intrusion and the possibility that current water resources will not be sufficient to meet future demand. The current lack of groundwater data makes it difficult to determine the source and distribution of salinity in the southern county area with any certainty.

The further recommended activities and analyses to improve the hydrogeologic understanding in these areas include the following:

- Monitoring groundwater levels;
- Monitoring groundwater quality;
- Collection and interpretation of geologic data;
- Analysis of streamflow and precipitation;
- Estimation of pumping and irrigation demand;
- Estimation of groundwater recharge and discharge.
- Determination of the extent and properties of aquifer materials; and
- Investigation of the influence of natural and induced hydrologic stresses occurring in neighboring subareas.

ES.9.5 Napa Valley Groundwater Model

Application of the current Napa Valley groundwater model to basin-wide applications where the effects on groundwater resources from wet and dry periods, along with local site-specific planning applications, is not recommended until such additional work as described in the Task 3.2 Technical Memorandum (LSCE, 2010c) is completed. For example, a longer calibration period is needed for the modeled areas. Climatic variability (extended wet and dry periods) need to be better represented by the calibration data. The groundwater model represents a regional watershed perspective which does not incorporate local geologic and hydrologic attributes. Groundwater/surface water interactions are modeled, but not in a fully active and dynamic method.

The complexity of the MIKE SHE model code limits the ability of Napa County staff in using the model for in-house analysis of regional and/or localized applications where groundwater is a primary focus. If Napa County does not want to rely fully on outside consultants for modeling services, it is recommended that a public domain model code be considered. Once a regional model is developed with a longer calibration period, separate models which focus on localized areas of the county could also be developed, as needed, using boundary conditions from the regional model as a foundation.

ES.9.6 Groundwater Sustainability Planning

Counties, regions, and local entities throughout California are striving to sustain their surface and groundwater resources. The Task 5 Technical Memorandum (LSCE, 2011b) described California's groundwater management approaches and legislation and reviewed Napa County's groundwater goals, policies, ordinances and procedures, including its groundwater/well permitting process. The Task 5 Technical Memorandum also provided recommendations to achieve conformance with groundwater related policies, goals, and action items contained in the County's General Plan Update and to improve the well and groundwater permitting process. These recommendations are summarized below.

ES.9.6.1 Benefits of Groundwater Sustainability Planning

Napa County's General Plan describes surface and groundwater monitoring that shall be used to determine baseline water quality and quantity conditions, track groundwater levels, and identify where challenges may exist. This action item also describes that "where there is a demonstrated need for additional management actions to address groundwater problems, the County shall work collaboratively with property owners and other stakeholders to prepare a plan for managing groundwater supplies pursuant to State Water Code Sections 10750-10755.4 or other applicable legal authorities."

To undertake the actions described in the County's General Plan and to complement the recommendations culminating from the work conducted as part of the Comprehensive Groundwater Monitoring Program, it is recommended that the County prepare a countywide groundwater plan pursuant to Water Code Sections 10750 *et seq.* As defined in the Water Code, such a plan need not only address groundwater problems, but may describe coordinated and ongoing activities undertaken for the benefit of a groundwater basin, or a portion of a groundwater basin (Water Code Sections 10752(d and e)).

As envisioned by the State, a well designed plan benefits local planning efforts, and it would serve to implement the County's General Plan goals to "conserve, enhance, and manage water resources on a sustainable basis to attempt to ensure that sufficient amounts of water will be available for the uses allowed by the General Plan, for the natural environment and for future generations." There are many additional benefits to developing a countywide plan, including:

- **Monitoring Programs -** A plan includes monitoring programs that aid evaluation of surface and groundwater conditions, allowing for the ongoing assessment of the status of interrelated water resources in the county, facilitates identification of problems or potential problems, and helps identify appropriate actions in advance of adverse and potentially irreversible effects, and strengthens the understanding and assurance that sufficient amounts of water are and will continue to be available for human and environmental needs.
- **Regional Assessment** - The County's groundwater resources transcend local jurisdictional boundaries. The monitoring programs included within a countywide plan would enable

superior assessment of the appropriate scale of analysis to accomplish basin management objectives.

- **Coordination -** A countywide plan would encourage coordination of regional and local agency interests and efforts, including consistency between local and regional planning objectives and their implementation.
- **Funding Eligibility** - A countywide plan provides opportunities for the County, and other entities (other local agencies in the county) who decide to participate in or support the planning process, to in the future become eligible for DWR grant (e.g., Proposition 84) and loan funding.
- **Conjunctive Use -** A plan would facilitate identification of conjunctive use[1] strategies designed and implemented to build countywide water supply resiliency, while protecting the natural environment.
- **Community Education and Outreach -** A countywide plan would lend support to other county activities aimed at educational and public outreach in support of the General Plan goals to ensure, enhance, and manage water resources on a sustainable basis.
- **Define Responsibilities -** A countywide plan may not manage groundwater within the organized service areas of other local agencies unless there is agreement from the affected entity(ies) (Water Code Section 10750.7)[2]

The Task 5 Technical Memorandum (LSCE, 2011b) and Table ES-3 outline the recommended steps for preparing a groundwater sustainability plan.

ES.9.7 Groundwater Ordinance

The Task 5 Technical Memorandum (LSCE, 2011b) provides recommendations regarding ordinances on wells and groundwater are made to implement various objectives and policies of the County's General Plan Update. Various recommendations propose modifications to Title 13, Chapters 13.04, 13.12, and 13.15. An overview of key recommendations for each County chapter is as follows:

[1] Conjunctive use is defined as "the coordinated and planned management of both surface and groundwater resources in order to maximize the efficient use of the resource; that is the planned and managed operation of a groundwater basin and a surface water storage system combined through a coordinated conveyance infrastructure. Water is stored in the groundwater basin for later and planned use by intentionally recharging the basin during years of above-average surface water supply" (DWR, 2003).

[2] Water Code Section 10750.7(a) A local agency may not manage groundwater pursuant to this part within the service area of another local agency, a water corporation regulated by the Public Utilities Commission, or a mutual water company without the agreement of that other entity.

Chapter 13.04 Approved Water Supply Systems

- Modify what is acceptable for demonstrating the yield of a well.
- Add provision for water supply easement when lot line changes.

Chapter 13.12 Wells

- Modify technical terminology for accuracy and consistency.
- Increase property line offset for new well where it does not adversely affect land use.
- Streamline destruction standards by incorporating state requirements.
- Provide access for water level measurements under construction requirements.

Chapter 13.15 Conservation

- Add more provisions for some permits to monitor groundwater conditions.
- Incorporate current standards for water efficient landscaping.
- Update 2007 Water Availability Analysis Policy Report to reflect County's groundwater monitoring and basin studies.
- Add permit requirement for groundwater export and prohibit export without assuring the sufficiency of water supply for County uses.

ES.9.8 Summary of Recommended Implementation Steps for Comprehensive Groundwater Monitoring Program

Table ES-3 summarizes the steps necessary to implement the above-described recommendations. The summary table includes the following:

- **Implementation time frames**: near term, mid term and long term (approximately 3, 5, and 10-year periods, respectively);
- **Relative estimated preliminary budgets:** "$ to $$$", where $ budget ranges up to $50,000; $$ budget ranges up to $500,00, and $$$ budget ranges up to $1,000,000;
- **Relative priorities for implementation**: the priority ranking is on a scale of 1 to 4, with 1 being the highest priority and 4 being the lowest priority, and
- **Related document for additional information**: indicates in which Technical Memorandum or Report related to the Comprehensive Groundwater Monitoring Program additional information is presented.

Table ES-3

Summary of Recommended Implementation Steps
Comprehensive Groundwater Monitoring Program

Item	Summary Description	Implementation Time Frame[1]	Relative Estimated Budget [2]	Relative Priority Ranking [3]
1. Data Management System [see LSCE, 2010a for more information]				
1.1a	Entry of archived data not previously available, link WellMA table information, add well construction data from wells the County monitors, add recent surface water delivery information, add municipal pumping data, and other information along with development and implementation of quality control protocols for inputting new data and reviewing existing data discrepancies	**Near to Long Term**	**$**	**1**
1.1b	Establishment of a map-interface with the DMS to enhance the use of the database by non-database users	**Near Term to Mid Term**	**$**	**3**
2. CASGEM Groundwater Level Monitoring Program [see LSCE, 2011a and b for more information]				
2.1a	Input CASGEM groundwater level data into the DMS	**Ongoing**	**$**	**1**
2.1b	Establish data format to meet DWR guidelines for electronic data transfer	**Near Term**	**$**	**1**
2.1c	Optimize CASGEM monitoring well network per DWR guidelines by filling in data gaps where identified (Note: high cost ($$$) is assuming new monitoring wells will be required to fill data gaps in those DWR basins which currently have minimal to no monitoring)	**Mid to Long Term**	**$$ to $$$**	**3**
3. Napa County Monitoring Program [see LSCE, 2011a for more information]				
3.1a	Update County field procedures for measuring groundwater levels	**Near Term**	**$**	**1**

Table ES-3 Continued

Summary of Recommended Implementation Steps
Comprehensive Groundwater Monitoring Program

3.1b	Develop and/or expand aquifer-specific groundwater monitoring network in Napa Valley Floor, Pope Valley and Carneros Subareas by identifying existing wells with well construction data and constructing new aquifer-specific monitoring wells as needed where data gaps may exist (Note: cost is dependent on whether new facilities are required)	**Near to Mid Term**	**$ to $$$**	**2**
3.1c	Develop aquifer-specific groundwater monitoring network in the other Subareas (except for Napa Valley Floor, Carneros, and Pope Valley Subareas) by identifying existing monitored wells with well construction data and constructing new wells where data gaps may exist (Note: cost is dependent on whether new facilities are required)	**Mid to Long Term**	**$ to $$$**	**3**
4. Napa County Conceptualization of Hydrogeologic Conditions [see LSCE, 2011a and LSCE, 2011c for more information]				
4.1a	Update geologic cross sections for the Napa Valley Floor and Carneros Subareas (previous ones are 50 years old)	**Near to Mid Term**	**$ to $$**	**2**
4.1b	Develop new geologic cross sections in those areas with the greatest short- and long-term growth and/or land use potential	**Near to Long Term**	**$**	**2**
4.1c	Investigate groundwater/surface water interactions and the affect of recharge and pumping on groundwater levels in the Napa Valley Floor Subareas, along with the Carneros Subarea to assess the sustainability of groundwater resources. May include groundwater modeling, as needed.	**Near to Mid Term**	**$ to $$**	**1**
5. Groundwater Sustainability Planning [see LSCE, 2011b for more information]				
5.1a	Prepare workplan for the purposes of preparing a Groundwater Sustainability Plan; workplan includes steps to implement County Monitoring Program and CASGEM Program	**Near Term**	**$**	**1**

Table ES-3 Continued

Summary of Recommended Implementation Steps
Comprehensive Groundwater Monitoring Program

5.1b	Utilize the Watershed Information Center and Conservancy (WICC) Board for various public outreach components related to groundwater sustainability planning	**Near Term**	**$**	**2**
5.1c	Develop objectives for public outreach, including information sharing and education about the County's groundwater resources	**Near to Mid Term**	**$**	**2**
5.1d	Preparation of a Groundwater Sustainability Plan for Napa County	**Near to Mid Term**	**$ to $$**	**2**
5.2a	Public outreach, including information sharing and education about the County's groundwater resources	**Ongoing**	**$ to $$**	**3**
6. County Groundwater Ordinance and Well Permitting [see LSCE, 2011b for more information]				
6.1a	Updating of Ordinances 13.04, 13.12, and 13.15	**Mid Term**	**$**	**2**
6.1b	Update Groundwater Permitting Process	**Mid Term**	**$**	**3**

[1] Implementation schedule reflects relative multi-year time frames for completing or conducting the task. Near, Mid, and Long Terms are reflective of 3, 5, and 10 year periods.

[2] Relative estimated budget symbols: $, $$, and $$$ reflect preliminary budget ranges of up to $50,000 ($), up to $500,000 ($$), and up to $1,000,000 ($$$).

[3] Priority ranking is on a scale of 1 to 4 with 1 being the highest priority and 4 being the lowest.

Exhibit A-1

Scope of Work

CONTRACTOR shall provide COUNTY with the following services:

Description of Services

Luhdorff & Scalmanini Consulting Engineers(LSCE) previously completed a comprehensive report: *Napa County Groundwater Conditions and Groundwater Monitoring Recommendations* (LSCE, 2011a), five (5) technical memorandums, and a stand-alone Executive Summary for Napa County from 2009-11. (see: http://www.countyofnapa.org/planning/groundwater). This countywide assessment of data availability and groundwater conditions led to recommendations by LSCE on behalf of the County for expanded groundwater monitoring and the foundation for programs that facilitate integrated water resources management and planning and help enable the long-term protection of surface and groundwater resources.

Since completion of the above work, the County established a Groundwater Resources Advisory Committee (GRAC), and charged them with assisting County staff and technical consultants with recommendations regarding (a) the synthesis of existing information and identification of critical data needs; (b) the development and implementation of an ongoing groundwater monitoring program; (c) the development of revised well pump test protocols and related revisions to the County's groundwater ordinance; (d) the conceptualization of hydrogeologic conditions in various areas of the County and an assessment of groundwater resources as data become available; (e) the development of groundwater sustainability objectives that can be achieved through voluntary means and incentives; and (f) building community support for these activities and next steps.

In response to the County's needs and in support of the GRAC's efforts, Luhdorff & Scalmanini Consulting Engineers (LSCE) in collaboration with MBK Engineers (MBK), proposes the scope of work outlined below, which consists of the following main tasks:

- **Task 1 –** Updated Hydrogeologic Characterization and Conceptualization
- **Task 2 –** Supplemental Groundwater Monitoring in High Priority Subareas
- **Task 3 –** Further Characterization of Areas of Greatest Recharge Potential
- **Task 4 –** Develop Guidance to Assist County with Review of Discretionary Projects Pursuant to CEQA with focus on Potential Effect of Groundwater Pumping.

These main tasks and subtasks as outlined below describe our understanding of the project objectives, our approach to the accomplishment of each of four proposed tasks (including individual subtasks), task deliverables, the estimated budget and schedule.

Task 1– Updated Hydrogeologic Characterization and Conceptualization

A comprehensive hydrogeologic characterization and resulting physical conceptual model serve as the basis for decision-making related to sustaining groundwater and surface water resources in Napa County. Additionally, this conceptualization serves as the governing framework for the future refinement or

development of analytical and/or numerical models (including watershed models and surface water and groundwater flow models) for county water resources planning purposes. Importantly, the foundation of a physical conceptual model is the geologic setting in which the aquifer system is situated. As part of work on behalf of Napa County (LSCE, 2011a), LSCE prepared a detailed description of the subsurface geology from existing reports and records of exploration and groundwater development activities for the entire county. Based on this work, LSCE's recommendations included:

- Updating geologic cross sections, particularly for the Napa Valley Floor (NVF) area, including utilization of 50 years of new geologic log/drillers' report data and incorporating the theory of plate tectonics;
- Development of new cross sections with priority given to those areas with the greatest short- and long-term potential for increased groundwater demands.

The process of examining geologic data developed since the 1960 Kunkel and Upson U.S. Geological Survey (USGS) study and the construction of new and/or updated and extended geologic cross sections will greatly expand the current understanding of the lithology and saturated/unsaturated aquifer parameters governing groundwater availability and groundwater/surface water interactions throughout the Napa Valley Floor area.
Accordingly, existing and future surface water and groundwater models can be developed to more accurately reflect actual conditions by incorporating this expanded understanding of governing hydrologic and hydrogeologic parameters and their distribution.

The main goals of this task are to develop an updated representation of the hydrostratigraphy (particularly of the Napa Valley Floor), obtain improved estimates of the hydraulic properties of the water-bearing deposits and their distribution, and evaluate the dynamics of surface-water/groundwater interaction within the context of the geologic setting. This updated hydrogeologic characterization and conceptualization of the hydrostratigraphy is key to the County's successful, future use of modeling tools and for improvement of the models' predicative utility. The results of this task will be integrated with subsequent tasks, emphasizing the information needed for the County and the newly formed GRAC to evaluate conditions related to stream-aquifer interaction along the Napa River. The results of this task are also integral to many other aspects of future water resources planning in the county, including facilitation of other work to be conducted by or receive input from the new GRAC, development of guidance for the county's consideration of pumping effects of ministerial projects on surface water courses, and consideration of recommendations made by LSCE (LSCE, 2011b) with regard to the County's groundwater ordinance and permit process and follow on evaluation of associated processes.

Background

Hydrogeologic characterization of an area is dependent on the availability of detailed surficial geologic maps and subsurface information from water well drillers' reports. Napa County has a countywide, detailed surficial geologic map (Graymer, 2003). The county has been subdivided into four regional geologic areas based on the geologic formations and characteristics (LSCE, 2011a; Fig. 2-1).

The Eastern Area is characterized by Mesozoic consolidated, highly deformed Franciscan Complex and Great Valley Sequence rock types with small valley areas with thin, unconsolidated young sedimentary deposits. Limited groundwater production is obtained from the thin valley sediments and from the fractures, fissures, bedding planes and weathered zones of the older consolidated rocks.
The Western Area encompasses the Napa Valley Floor (NVF) and the uplands to the east and west which drain to the valley floor. The eastern mountains and the northern portion of the western mountains are underlain by volcanic rocks of the Sonoma Volcanics which include lava flows, tuffs, ash beds, and some volcanic-sedimentary rocks. Groundwater production is obtained from fractures, bedding planes, weathered zones, porous tuffaceous deposits, and volcanic-sedimentary rocks. The southern portion of

the western mountains is dominated by the older consolidated rocks of the Great Valley Sequence, as seen in the east side of the county, with similar groundwater characteristics.

The Southern Area is characterized by older, weakly consolidated sedimentary rocks overlain to the south by thick, finer-grained sedimentary deposits. Groundwater production is from the older sedimentary deposits in the Carneros area and from thin coarser-grained deposits in the Jameson/American Canyon area.

The Napa Valley Floor is underlain by unconsolidated sedimentary deposits of up to several hundred feet overlying Sonoma Volcanics. Groundwater production on the valley floor has been from the sedimentary deposits and the underlying volcanic deposits. The Milliken-Sarco-Tulucay Creek (MST) Subarea of the NVF is a unique geologic setting of low relief Sonoma Volcanics and volcanic-sedimentary deposits overlain by thin sediments. This subarea is separated, in part, from the main NVF, by the Soda Creek Fault.

Other Previous Hydrogeologic Studies

Previous hydrogeologic studies have largely concentrated on the sedimentary deposits below the Napa Valley Floor. Published subsurface geologic cross sections exist for the City of Napa area and the MST area (Kunkel and Upson, 1960; Farrar and Metzger, 2003; and Sweetkind and Taylor, 2010). Sweetkind and Taylor (2010) have translated the Kunkel and Upson (1960) well data to electronic format; however, even though this is a recent report, the geologic data set has not been updated to include well logs developed over the past 50 years. Upstream of the City of Napa, the subsurface geology has been characterized with thickness and conductivity maps (Faye, 1973).

The second element for hydrogeologic studies is the available water well drillers' reports for subsurface characterizations. A review of available reports for Napa (LSCE 2011a) indicates about 7,000 drillers' reports of which about 4,000 are for wells located in the NVF. A large portion of the remaining reports occur in the mountain regions surrounding the Valley. About 500 reports exist for wells in the Southern Area (mostly the Carneros Subarea). Another approximately 500 reports exist for wells in the Eastern Area.

There can be limitations to the usefulness of water well drillers' reports for purposes of subsurface characterization. Irrigation, industrial, and public supply wells tend to be deeper, have more lithologic detail on the boring log or drillers' report, may have geophysical (electric) logs, and have hydrologic data such as well yield, specific capacity, and/or aquifer test data. Domestic wells tend to be shallower in depth, have relatively poorer lithologic descriptions, and lack well yield information. Shallow monitoring wells constructed for purposes of contamination studies tend to have detailed lithologic logs and are generally limited to investigations for small geographic areas. Heat exchange or heat pump wells tend to have poorer lithologic logs.

An important element of all water well drillers' reports is the ability to locate the well with relative accuracy. Some reports have poor geographic descriptions, and lack a scale to reference points. Many reports in Napa County list a parcel number, but many seem incomplete, possibly list older numbers, or fail to locate the well on the parcel. Many reports have been assigned state wells numbers based on a scale of one mile. When drillers' reports include scaled drawings, their usefulness is significantly increased. The location of a certain percentage of well reports may remain unknown even after diligent investigation. Many existing wells found in the field may be unrelated to any known drillers' report due to a report not filed, lost, or mislocated. The review and locating of drillers' reports can be a time-consuming and challenging exercise.

Task 1 Scope Focus on Napa Valley Floor

For this task, the NVF is designated as the primary focus area for the updated hydrogeologic characterization and conceptualization. This area has the highest density of wells, population, agriculture, and consequently the highest water use in the county. For the updated hydrogeologic characterization, a series of detailed geologic cross sections are proposed across the valley floor. The cross sections will be located based on available well control (density of suitable drillers' reports) and occur at a distance of about every three to four miles apart. It is anticipated that two geologic cross sections would be prepared in each of the following four NVF subareas: the Calistoga, St. Helena, Yountville, and Napa Subareas. The cross sections will be constructed at a vertical scale that minimizes vertical exaggeration and also displays the lithologic nature of the sedimentary deposits encountered. Where well control allows, the cross-sections will extend slightly onto the adjacent mountain areas to examine possible correlation or geologic nature between the valley floor and lower uplands areas.

In the NVF-Napa Subarea, one of the proposed cross sections will attempt to utilize and expand upon published cross-sections across the MST area (Farrar and Metzger, 2003; and Sweetkind and Taylor, 2010) to examine the hydrogeologic relationships between the two areas. The southern-most cross section may also extend into the adjacent Carneros Subarea utilizing the cross section in Sweetkind and Taylor (2010).

If necessary for budgeting or time restrictions, the northernmost NVF-Calistoga Subarea may be deemed of lowest priority and deferred. This area has the thinnest sedimentary deposits ($\leq$ 100 feet) and narrowest valley floor width.

Between the proposed cross sections selected, readily locatable well drillers' reports will be reviewed to determine the thickness of the sedimentary deposits, lithologic character, and deeper encountered geologic units. From this information, general derivative maps of sedimentary thickness, lithologic character, and underlying geologic units will be compiled. These maps would be similar to those shown in Faye (1973, Figure 4. Hydraulic Conductivity of the Alluvium in Northern Napa Valley and Figure 5. Thickness of Alluvium in Northern Napa Valley). If budgeting or time constraints occur, and the NVF-Calistoga Subarea is deferred for cross section development, these maps will focus on the area from the NVF-St. Helena to the NVF-Napa Subarea to encompass the area of the NVF with the thickest sedimentary deposits.

Remainder of the County

This task does not attempt to perform detailed hydrogeologic characterization for the remainder of the county at this time. The remaining areas are perceived to lack well control, contain low populations, have relatively lower water use, and are underlain by complex geologic characteristics which do not lend these other areas to cross sectional analysis. It is recommended that the County perform well surveys and locate corresponding drillers' reports across these other areas for future reference as the need arises.

Subtasks

1.1 Obtain lithologic data from the USGS as utilized in Sweetkind and Taylor (2010). The USGS has digitized lithologic information for approximately 140 drillers' reports, which aids in utilizing these data for updating geologic cross sections, particularly in the main Napa Valley Floor. The borehole data include lithologic and stratigraphic data in the vicinity of the City of Napa and other communities. This subtask also involves an independent cross check of the USGS data synthesis (Sweetkind and Taylor, 2010) for areas currently being considered for updating or preparation of new geologic cross sections in the four NVF Subareas described above (i.e., Calistoga, St. Helena, Yountville, and Napa).

1.2 LSCE has obtained the actual drillers' reports from DWR on behalf of the County. This subtask involves coordination with the Napa County Environmental Management Department on identifying additional drillers' reports and/or geotechnical logs that the County may have compiled since 2010, to supplement what LSCE has already obtained for purposes of earlier work for the County.

1.3 Locate wells with drillers' reports in areas of planned cross section locations in the four NVF subareas. The wells would be located as possible based on the description and location details shown on the drillers' report, supplemental information as may be available from DWR for wells historically monitored for water levels or water quality purposes, and/or any additional information that might help to locate wells of interest, as available through County records with County staff assistance.

1.4 Develop spatially referenced geologic database for use in coordination with the County's DMS, including GIS applications.

1.5 Prepare at least 6 new and/or updated geologic cross sections for the NVF-St. Helena, NVF-Yountville, and NVF-Napa Subareas. Two or more additional cross sections would be added in the NVF-Calistoga Subarea, pending County assistance available to help with Subtask 1.3 to locate drillers' reports with corresponding well locations. As available (and locatable) drillers' reports and budget for this task allow, consideration will also be given to updating the geologic characterization of the NVF-Carneros Subarea.

1.6 Prepare soils map for purposes of correlating with surficial geologic map for use in coordination of estimating the hydraulic characteristics of unsaturated materials in the areas where geologic cross sections are developed.

1.7 Prepare general derivative maps of sedimentary thickness (isopach of the thickness of the Alluvium), lithologic character (hydraulic conductivity [as relevant based on drillers' well tests and/or aquifer testing of wells completed in the Alluvium and/or Sonoma Volcanics, and estimated hydraulic conductivities for unsaturated materials, based on the nature of the observed lithologic material]), and underlying geologic units (elevation of the top of the Sonoma Volcanics; also variable lithology of Sonoma Volcanics, pending sufficient well control to examine and illustrate via a facies map). These maps would be updated and more accurate compared to similar maps shown in Faye (1973, Figure 4. Hydraulic Conductivity of the Alluvium in Northern Napa Valley and Figure 5. Thickness of Alluvium in Northern Napa Valley). These maps will focus on the area from the NVF-St. Helena to the NVF-Napa Subareas to encompass the area of the NVF with the thickest sedimentary deposits. As above, if well control and budget allow, the NVF-Calistoga Subarea would be included.

1.8 Meeting with County staff and GRAC. Meet with County staff and GRAC to present updated hydrogeologic characterization and conceptualization, including draft geologic cross sections and general derivative maps as described above.

Deliverables

Geologic Database: This task involves the creation of a geologic database. The final geologic cross sections would be derived from the database (Subtask 1.4) using GIS software in conjunction with other software (e.g., Rockworks which creates an Access database file) designed specifically for well profiles and 2-D/3-D geologic representation of the data (i.e., geologic cross sections). The digitized data would also serve as the future basis for development of a fully coupled surface water/groundwater flow model and/or refinement of the County's existing model (pending other County considerations and preferences to refine existing model structures or the development of a fully coupled surface water-groundwater flow model with a different software code). All information would be spatially referenced, compatible with the County's Data Management System, and available for County use with GIS software.

Geologic Cross Sections: Prepare approximately six cross sections in the Napa Valley Floor, including at least two through the St. Helena-NVF, Yountville-NVF, and Napa-NVF subareas. Two additional cross sections would be added for the NVF-Calistoga Subarea, if well control and budget allow.

Soils Map: Prepare for purposes of correlating with surficial geologic map for use in coordination of estimating the hydraulic characteristics of unsaturated materials in the areas where geologic cross sections are developed.

General Derivative Maps: Sedimentary thickness (isopach of the thickness of the Alluvium), lithologic character (hydraulic conductivity), and underlying geologic units (elevation of the top of the Sonoma Volcanics; also variable lithology of Sonoma Volcanics with a facies map, pending sufficient well control to estimate). These maps will focus on the area from the NVF-St. Helena to the NVF-Napa Subareas to encompass the area of the NVF with the thickest sedimentary deposits. As above, if well control and budget allow, the NVF-Calistoga Subarea would be included.

Meeting with County Staff and GRAC. Meet with County staff and GRAC to present updated hydrogeologic characterization and conceptualization, including draft geologic cross sections and general derivative maps as described above.

Report Section. See Task 3 Report Deliverable.

Task 2 – Supplemental Groundwater Monitoring in High Priority Subareas

LSCE (2011a) recommended that a near-term priority for groundwater monitoring includes the development and/or expansion of an aquifer-specific groundwater monitoring network in Napa Valley Floor, Pope Valley and Carneros Subareas by identifying existing wells with well construction data and constructing new aquifer-specific monitoring wells as needed where data gaps may exist. This task focuses this effort on the Napa Valley Floor with particular emphasis on aquifer-specific monitoring that also helps the County address these primary objectives for groundwater level monitoring (see LSCE, 2011a, pg. 5 for other objectives):

- Evaluate groundwater levels in the various county subareas to describe the occurrence and movement of groundwater and identify vertical hydraulic head differences in the aquifer system;
- Detect the occurrence of, and factors attributable to, natural or induced components that affect groundwater conditions and trends, including direct infiltration of precipitation, surface water seepage to groundwater, groundwater discharge to streams, pumping, and purposeful recharge operations;
- Identify where data gaps occur and provide infill, replacement, and/or project-specific monitoring (e.g., such as may occur for planned projects or expansion of existing projects) as needed;
- Develop and/or refine water budgets for key subareas, including recharge, extraction, and change in storage in the aquifer(s); and
- Employ methods to better estimate groundwater basin conditions, assess local current and future water supply availability and reliability, and update analyses as additional data become available.

Groundwater level monitoring needs include improved spatial distribution of groundwater level monitoring, additional characterization of subsurface geologic conditions in each subarea to identify aquifer characteristics, further examination of well construction information to define which portion of the aquifer system is represented by water levels measured in the currently monitored wells (and in many cases to link construction information to the monitored wells), and improve the understanding of surface water/groundwater interactions and relationships.

Some groundwater monitoring exists in the Napa Valley Floor which is also in relatively close proximity to the river but there needs to be further work to evaluate the relationship between the measured data and the aquifer system (i.e., the measurements may represent groundwater levels for: the uppermost portion

of the aquifer system, a somewhat deeper portion of the aquifer system (beneath a confining unit, or a blended representation of the aquifer system where well screen intervals occur at shallower and greater depths)).

It is important that, prior to future work that utilizes a modeling tool, a detailed record of actual measured groundwater levels is developed that records how levels vary in response to recharge from the river and/or due to pumping that occurs locally or cumulatively on a larger scale. Specifically, groundwater levels representative of shallower or relatively deeper portions of the aquifer system are likely to vary according to where these recharge and/or discharge (pumping) effects are imposed. Accordingly, it is very important that the well structure of the monitored well be known and can differentiate between stresses on different portions of the aquifer system. Ideally, a shallow monitoring well designed to measure responses near the water table (uppermost portion of the aquifer system) would be coupled with a monitoring well that monitors responses in a relatively deeper portion of the aquifer system (i.e., a part of the aquifer that is more typically completed for groundwater production for domestic or agricultural purposes).

For purposes of assessing surface water/groundwater interaction, LSCE previously recommended to the County that there be a comprehensive review and analysis of available groundwater level elevation data for the Napa Valley in conjunction with historical stream gauging records, land use information, and groundwater pumping records in order to develop initial correlations between groundwater levels and streamflow (LSCE, 2010d; Figure 3). This approach involves the identification of areas where near-stream monitoring wells could be placed to assess potentially changing surface water/groundwater interactions. Such "new" monitoring wells (see subtask descriptions below) would be most useful in areas where historical groundwater level elevation data are available to facilitate the comparison to historical conditions.

The extent and nature of surface water/groundwater interactions are largely unknown in Napa County with the exception of the MST area. As discussed in (LSCE, 2010d), groundwater levels throughout much of the Napa Valley are within 5 to 20 feet (bgs) during times of seasonally high groundwater levels in the spring. Such shallow groundwater conditions suggest that groundwater is in direct hydraulic communication with stream channels for at least part of the year. Under these conditions, relatively small groundwater level declines have the potential to significantly influence surface water/groundwater interactions such that stream percolation losses increase and stream baseflow decreases. Given the increasing pressure on natural resources and land use, and since it is important to better understand water resource availability to meet projected increases in annual water demands (2020 and 2050 projections), monitoring of near-stream shallow groundwater conditions in key locations can contribute to this understanding. Therefore, it was recommended that such monitoring efforts be given high priority (LSCE, 2010d and 2011a).

Subtasks

2.1 Review location and construction of wells with historical groundwater level measurements (including wells that have historical measurements but monitoring has since been discontinued, and also those wells that have historical and current measurements. Attempt to identify drillers' report and confirm well location.

2.2 Identify completion of above wells (screen interval elevations) relative to Task 1 findings (i.e., determine whether screen is in uppermost portion of aquifer system or relatively deeper portion of aquifer system, or spans more than one part of aquifer system (if screens span more than one part of aquifer, this may obscure potentiometric head differences between the upper and lower portion of aquifer system)).

2.3 Identify areas to focus on for the addition of monitoring wells to the groundwater level monitoring

network for the purpose of examining surface water/groundwater interactions. The following criteria would be used to identify suitable wells to add to the network for purposes of addressing this objective:

a. There is an existing monitoring well with a historical water level record near the Napa River with known construction information.

b. If an existing well with a water level record spans an upper and lower part of aquifer, then LSCE would seek to identify a well that would provide complementary information, i.e., well that is screened only in the upper part of the aquifer. Existing wells with known construction information would be identified first, if available. Near communities, such wells might be located at regulated facilities where water levels are also monitored. Other existing wells may include shallow private domestic wells.

c. If no existing shallow wells are located near to the Napa River, recommendations would be provided for the location and future construction of a dedicated shallow monitoring well to aid in the understanding of surface water/groundwater interaction. Financial support to implement such construction might be through future grant funding opportunities and/or planned development that might affect surface water flows and/or groundwater levels in the vicinity of the desired monitoring location.

d. It is also desired that groundwater level measurements in wells completed in the upper part of the aquifer system be obtained near upstream and downstream streamflow gauging stations on the Napa River (i.e., vicinity of stations as shown in LSCE, 2010d; Figure 3). This subtask would be coordinated with the above subtasks to first identify existing wells with groundwater level records followed by identification of complementary wells completed in the uppermost part of the aquifer system.

2.4 **Meetings with County Staff and GRAC (two meetings).** One meeting with County staff and GRAC to discuss the purpose of additional groundwater level monitoring wells, particularly those recommended to better understand surface water/groundwater interaction. A second meeting with County staff and GRAC to discuss questions and comments on the recommended additions to the groundwater level monitoring network.

Deliverables

Map of Existing and Recommended Groundwater Level Monitoring Wells: Expanded groundwater monitoring network with focus on objective of improved understanding of surface water/groundwater interaction. Map would include existing monitoring wells with historical/current water level record. Map would also show wells that are recommended to be added to the network to complement the existing wells and to improve understanding of surface water/groundwater interaction. The proposed expanded network would be presented to the GRAC for its input and comments (see meeting below).

Table of Well Data for Existing and Recommended Groundwater Level Monitoring Wells: A well inventory would be prepared in tabular format that includes such information as well location, well identification, well construction, use, and other parameters (similar information to what has recently been developed for Napa County's CASGEM Plan (LSCE, 2011c)). These data would also be added to the County's DMS. The table would be suitable for inclusion in the County's CASGEM update for 2013 groundwater elevation monitoring.

Description of Recommended Dedicated Shallow Monitoring Wells for Future Construction: LSCE would prepare a summary of recommendations for the construction of dedicated shallow monitoring wells, if activities to identify existing shallow wells for this purpose are exhausted and no such suitable wells are able to be identified. This summary would be incorporated in the Report described as a deliverable to Task 3 that also includes the results of Tasks 1 and 2.

Meeting with County Staff and GRAC. Meet with County staff and GRAC to discuss the purpose of additional groundwater level monitoring wells, particularly those recommended to better understand surface water/groundwater interaction.

Meeting with County Staff and GRAC. Meet with County staff and GRAC to discuss questions and comments on the recommended additions to the groundwater level monitoring network . Finalize recommended network following receipt and discussion of comments for inclusion in the draft report prepared as part of Task 3.

Report Section. See Task 3 Report Deliverable.

Task 3 – Further Characterization of Areas of Greatest Recharge Potential

Napa County's General Plan Action Item CON WR-5(General Plan Update 2008) describes that there will be activities to: "Identify, map, and disseminate information on groundwater recharge areas, to the extent feasible.." Currently, the California Legislature has sent to the Governor Assembly Bill 359 which creates incentives for local water agencies, that opt to develop groundwater management plans, to include a groundwater map that identifies prime groundwater recharge areas. Consistent with the County's General Plan and the bill in progress, the County's Comprehensive Groundwater Monitoring Program has embarked on this effort. LSCE (2011a) describes groundwater recharge to the Alluvium of the Napa Valley Floor (Calistoga, St. Helena, Yountville, and Napa Subareas) by infiltration of precipitation, percolation from streams/rivers, and subsurface inflow from the surrounding subareas (LSCE 2011a; Figure 2.9). The high permeability of the alluvial sediments permits precipitation and surface water to readily infiltrate and recharge groundwater throughout the majority of the Valley. These high permeability soils combined with the large volume of water that flows through the Napa River create the potential for significant recharge to occur under the hydrologic circumstances and hydraulic gradient that allow for recharge from the river to groundwater to occur.

LSCE (2011a) reported that Faye (1973) had identified direct infiltration of precipitation and percolation of surface water as the primary mechanisms for groundwater recharge in the Valley. He also concluded that the contribution of percolating surface water was significantly limited by high groundwater levels. Farrar and Metzger (2003) note that subsurface inflow to the Napa Valley has been significantly decreased by increased pumping within the MST. It is similarly likely that increased pumping in the areas surrounding the Napa Valley has reduced recharge to the Valley, lowering groundwater levels and increasing the potential for streambed percolation. These surface water/groundwater reactions and their response to changing stresses in the county should also be examined.

Understanding the volume of and mechanisms driving groundwater recharge in the county will be essential in determining where and how much groundwater can be produced without incurring negative impacts (LSCE, 2011a). Currently, evaluation of recharge mechanisms and volumes within Napa County has been limited to the Napa Valley (Faye, 1973) and MST Subarea (Johnson, 1977; Farrar and Metzger, 2003). With the exception of Farrar and Metzger (2003), these studies are not able to account for the significant increase in groundwater pumping and accompanying geologic data available since the 1970s. Developing a comprehensive understanding of recharge within Napa County will require (LSCE, 2011a):

a. Updating the current geologic conceptualization to include more recent data (**this relates to work in Task 1**);
b. Refining and further characterizing those areas of greatest recharge potential, with priority given to those areas with the greatest short- and long-term growth potential;
c. Continued monitoring and analysis of precipitation, streamflow, and groundwater levels **(this relates to work in Task 2)**;

d. Expanding current monitoring to include a greater portion of Napa County **(this relates to work in Task 2)**;

e. Analyzing surface water/groundwater interactions and the influence of increased pumping on groundwater recharge from surface water;

f. Both mass balance and streamflow infiltration methods would be used to estimate regional and local recharge; and

g. Estimating the contribution of infiltration along fractures and joints to local and regional groundwater.

In conjunction with output developed from other tasks in this proposal that address items a, c, and d, Task 3 will focus on items b, e, and f. Task 3 will also begin to address item g. Additionally, Task 3 will include activities that address the identification of recharge areas as described in Legislative Bill AB 359, as this would be of benefit to the County whether or not the bill is passed.

Subtasks

1.1 The maps generated from Task 1 will be used in coordination with mapping conducted by LSCE (2011a) to refine and further characterize those areas of greatest recharge potential, especially in the main floor of the Napa Valley. Priority will be given to those areas with the greatest short- and long-term growth potential, as will be determined in coordination with County staff.

1.2 Prepare map of surveyed or estimated basis of thalweg elevation along main stem of Napa River and tributaries to the river as available data allow. Assess, provide, and receive from the County's GRAC recommendations on locations where further survey work by the County or others would be helpful to address questions relating to stream-aquifer interaction.

1.3 Based on available groundwater level data, streamflow data, and the results of Task 1, a preliminary surface water/groundwater interactions analysis will be conducted, and the potential influence of pumping on groundwater recharge from surface water infiltration would be preliminarily assessed. It is anticipated that the results and implementation of the recommendations from Task 2 will enhance this analysis as additional aquifer-specific data become available.

1.4 Evaluate recharge using mass balance (e.g., precipitation, stream gage records, evapotranspiration, land use data, estimated groundwater pumping, irrigation diversions and return flows, etc.) and streamflow infiltration methods to estimate regional and local recharge, with emphasis on the NVF and where available data allow. Provide recommendations on future use of these and other methods that can guide and support future efforts, including more detailed modeling analyses. Provide recommendations on data gaps that need to be further addressed.

1.5 Based on available data, determine whether estimates can be developed of the contribution of infiltration along fractures and joints to local and regional groundwater. Focus would be on developing an estimate for the NVF-MST. Provide recommendations on future use of these methods and data gaps that need to be further addressed.

1.6 A draft report, followed by a final report after the comments are received and addressed, will be prepared to document the approaches, methodologies, findings, and recommendations developed from the work described above in Tasks 1, 2, and 3.

1.7 Meet with County staff and GRAC to discuss questions and comments on the draft report. Finalize the report following receipt and discussion of comments.

Deliverables

Map of Thalweg Elevations. Map of surveyed or estimated thalweg elevations along main stem of Napa River and tributaries to the river as available data allow.

Map of Recharge Areas. Recharge area map enhanced to further characterize and identify the current recharge areas that substantially contribute to the replenishment of the groundwater basin.

Recharge Estimates in NVF Area. Develop preliminary estimate of recharge based on streamflow infiltration and mass balance approach as data allow for an area within the NVF. Describe expanded use of one or more approaches as data gaps are addressed. Based on available data, including soil and geologic mapping, recharge estimates would be developed for the NVF-MST as contributed in fractured rock areas (this would complement the work by Farrar and Metzger (2003)).

Recharge Estimates Near MST/NVF-Napa. Develop preliminary estimate of recharge based on analysis of the results of Task 1 and groundwater flow data in the vicinity of the MST/NVF-Napa Subareas where the Soda Creek fault occurs.

Draft and Final Report. A draft report will be prepared to document the approaches, methodologies, findings, and recommendations developed from the work described above in Tasks 1, 2, and 3.

Meeting with County Staff and GRAC. Meet with County staff and GRAC to discuss questions and comments on the draft report. Finalize the report following receipt and discussion of comments.

Task 4 – Develop Guidance to Assist County with Review of Discretionary Projects Pursuant to CEQA with Focus on Potential Effect of Groundwater Pumping on Surface Water Courses, Neighboring Wells, and Ecologic Factors

Background

The County has expressed interest in an element of the proposed project that results in a classification system or criteria for discretionary projects being reviewed pursuant to the California Environmental Quality Act (CEQA). Specifically, Napa County has expressed interest in identifying an approach that could be used to determine whether groundwater pumping proposed to occur for a project located near a surface water course (such as may be proposed by an individual property owner that does not otherwise warrant a full CEQA analysis) would have an impact on the surface water course. The approach would be guided by evaluation of hydrogeologic conditions (as can be identified with existing data) along a corridor defined in the vicinity of the Napa River and the use of the methodology described below to quantify the potential effect of such a project.

This task involves the development of guidance that allows County staff and other reviewers to determine when proposed groundwater projects for discretionary use: 1) will have an insignificant or no measurable effect on surface water resources, or the special status species they support, 2) will have insignificant or no adverse effect due to neighboring well interference, and 3) when additional site-specific analysis will be required. The approach to develop the proposed guidance includes the results of the work described in Task 1 – Updated Hydrogeologic Characterization and Conceptualization, including regional and site-specific hydrogeologic conditions, the location of the discretionary project site (particularly the proposed or existing well site(s) relative to principal and/or tributary water courses, well construction (including site lithologic information, or representative nearby lithologic information). The proposed guidance will also incorporate the results of Task 2 – Supplemental Groundwater Monitoring in High Priority Areas and also Task 3 – Recharge, where the latter task includes a subtask that involves the surveyed or estimated

basis of thalweg elevation along the main stem of Napa River and tributaries to the river as available data allow.

Methodology

One method for determining the effect pumping a well may have on a nearby stream is the Glover-Balmer (1954) approach, which was later modified by other researchers (Hantush (1965)) in order to better represent natural streambed conditions. For Napa County, this approach may be helpful for conceptualizing areas of potential well locations, where pending the local hydrogeology, may create the circumstance where pumping near a surface water course may have an effect on the stream (e.g., this is referred to as the potential for "stream depletion" due to pumping). The Hantush (1965) method uses the Glover-Balmer (1954) approach to estimate a stream depletion flow rate, which can in turn be used to estimate a cumulative volume of stream depletion over a period of pumping. The method makes many assumptions about the subsurface and stream, most notably that the surface water course is modeled as an infinitely long straight line with zero drawdown, the stream completely penetrates a homogeneous infinitely extensive aquifer, and over time water pumped from the well changes from coming completely out of aquifer storage to coming completely from the river. In other words, there is no recharge supplied to the system besides that originating from the infinite supply of the stream. Because of these assumptions, this approach yields a conservative estimate of stream depletion, as in reality, there are other streams/canals/ditches, precipitation, applied water return flows, etc. that play important roles in recharging the pumped aquifer.

A relatively simple spreadsheet model can be set up for the County to enter variables in order to solve the Hantush (1965) equation below (Hunt, 1999):

$$\frac{\Delta Q}{Q_w} = erfc\left(\sqrt{\frac{Sl^2}{4Tt}}\right) - \exp\left(\frac{Tt}{SL^2} + \frac{l}{L}\right) erfc\left(\sqrt{\frac{Tt}{SL^2}} + \sqrt{\frac{Sl^2}{4Tt}}\right) \qquad (1)$$

Where ΔQ is the stream depletion flow rate; Qw is the constant flow rate at the well; S is the aquifer storage coefficient, specific yield, or effective porosity; T is the aquifer transmissivity; t is time; l is the shortest distance between the well and stream edge; and L is a streambed leakance term that has dimensions of length and is defined below (Hunt, 1999):

$$L = \frac{K}{K'} b' \qquad (2)$$

Where K is the hydraulic conductivity of the aquifer; K' is the conductivity of the streambed; and b' is the thickness of the streambed.

The variables described above vary throughout the county, and some local investigation would be required to make appropriate estimated values (or ranges of values) that could be used to determine stream depletion rates and/or volumes over time. An area would be determined for use of this approach that would reasonably consider available information on the property where the pumping is proposed to occur and in the vicinity of the property and the surface water course. Sources of appropriate values for the aquifer parameters described above include, but are not limited to, the following: 1) published reports, for example the USGS has published estimates of hydraulic conductivity in a modeling effort for Northern Napa Valley (Faye, 1973); 2) conversions of specific capacity values to transmissivity values for the well in question (if the annual pumping volume is proposed to be increased), a proposed well on the same property, or wells completed similarly nearby; 3) using textbook hydraulic conductivities for materials encountered in the subsurface as depicted by drillers' reports.

Application of Methodology

The County may use this method as a conservative approach to assessing the possible cumulative effects that a new (or existing) well may have on a nearby stream. This approach is a simple calculation, and most of the effort comes in the form of estimating appropriate input parameters, including:

- **Aquifer Properties**: transmissivity, storativity, hydraulic conductivity (estimates of these properties would be facilitated based on the results of Task 1 and site-specific data);
- **Well Properties**: Distance to stream and well pumping rate (based on site-specific data, including well construction information);
- **Streambed Properties:** hydraulic conductivity of streambed, thickness of streambed, and streambed factor [a ratio based on other parameters as shown in Equation (2) above] (estimates would be facilitated based on the results of Task 1, local stream restoration or other stream-related studies where such information may have been previously generated, and/or future development of refined information as may be recommended to be developed as part of future projects that involve more detailed analyses for CEQA purposes).

With the utilization of Napa County's Data Management System (DMS), local well-specific aquifer properties may be input and archived to be easily referred to on an on-going basis as more wells become analyzed using this method. More investigation on known streambed properties would be needed to verify the level of connection between the stream and the underlying aquifer in order for the Hantush (1965) method to be more meaningful. This latter recommendation might be considered for inclusion on projects that are subject to an increased level of analysis (e.g., larger projects proposed in the vicinity of surface water courses that by the nature of those projects involve a full CEQA analysis).

Subtasks

4.1 This subtask would coordinate the results of Tasks 1, 2 and 3 to map the thalweg elevation, as known or estimated, with groundwater elevations and stream stage (as available) to address questions relating to the potential effect of pumping on surface water courses. This subtask would describe a process for updating groundwater elevation information based on the results of Task 2 and evaluating the relationship between the thalweg elevation to seasonal and temporal groundwater elevations to determine the potential for connectivity between surface water and the uppermost part of the aquifer system. Using these data sets (thalweg elevation, stream stage, and groundwater elevation for uppermost portion of aquifer system) and corresponding map displays, prepare combined map displays that illustrate locations along the Napa River area where seasonal and/or temporal connectivity occurs between surface water and shallow groundwater and also varying hydraulic properties (estimated for unsaturated and/or saturated conditions) for the mapped region along the Napa River.

To the extent there are areas that are able to be defined along the Napa River, or tributaries to the River, where unsaturated conditions beneath the riverbed and the uppermost portion of the aquifer can be evidenced from the thalweg elevation and long-term seasonal and temporal groundwater elevation data that clearly represent groundwater elevations for the uppermost part of the aquifer, then a zone (or zones) of low risk for discretionary projects may be identified. At this time, these specific data are anticipated to be highly limited and/or insufficient to create such zonal maps until other activities as described in Tasks 2 and 3 have been completed and additional groundwater elevation data have been collected for a sufficient period to establish seasonal and temporal trends for varying water year types.

4.2 Develop procedures that incorporate the results of Task 1 above, especially such information as the thickness of the shallow uppermost water bearing unit of the aquifer system, and hydraulic properties of that unit and information on any overlying unsaturated unit. Describe procedures for updating approaches as additional groundwater monitoring data (such as described as part of Task 2) become available and groundwater level trends in the uppermost portion of the aquifer system are better understood.

4.3 Describe the above analytical methodology in the guidance for application related to discretionary use groundwater projects.

4.4 Prepare guidelines that evaluate hydraulic conductivity of unsaturated/saturated geologic units relative to the proposed project information, including well construction (depth and screen interval of existing and/or proposed well relative to production from unconfined aquifer or confined aquifer), site location relative to the distance from the Napa River or tributaries to the Napa River, hydrogeologic criteria such as identification of a significant confining unit that limits connectivity between the target zone of groundwater production from the existing or proposed well and any surface water courses or wetland features, or other relevant information.

4.5 Prepare a Technical Memorandum, or Overall Guidance Document, on the Review of Discretionary Projects to Evaluate the Potential Effects of Groundwater Pumping. The TM would describe the purpose of the evaluation, including identifying potential effects of groundwater pumping on surface water courses, neighboring wells, and/or ecologic factors. The TM would describe the approach that utilizes all available physical evidence relating to the configuration of the well and its relationship to nearby surface water courses, other wells, and/or wetlands or other ecologic factors. The physical evidence would include (but not necessarily be limited to) the results of Task 1 that, as possible, defines the aquifer system, including thickness of the Alluvium (which may include lesser and more permeable units comprising the Alluvium) and the underlying Sonoma Volcanics. The hydraulic characteristics of subsurface materials, including unsaturated and saturated alluvial materials and the underlying Sonoma Volcanics, would be developed, as relevant, based on aquifer testing of wells completed in the Alluvium and/or Sonoma Volcanics, findings from Task 1, and estimated hydraulic conductivities based on the nature of the observed lithologic material. The connectivity of the surface water and underlying aquifer system would be examined based on the results of Subtask 4.1. The guidance document would describe the application of the Hantush (1965) methodology along with example applications. The TM would also recommend more investigation on known streambed properties as needed to verify the level of connection between surface water courses and the underlying aquifer in order for the Hantush (1965) method to be more meaningful.

4.5.1 The TM would be prepared with the assistance of additional professional resources (CEQA consultant and/or attorney), as needed, subject to County approval.

4.6 Meet with County staff and GRAC to discuss the draft guidance document and questions and comments on the draft guidance. Finalize guidance document following receipt and discussion of comments.

Deliverables

Comparative Map: Prepare combined map displays that illustrate locations along the Napa River area where seasonal and/or temporal connectivity occurs between surface water and shallow groundwater and also varying hydraulic properties (estimated for unsaturated and/or saturated conditions) for the mapped region along the Napa River.

Map Display of Potential Low Risk Zone(s) for Discretionary Groundwater Pumping: Where unsaturated conditions beneath the river bed and the uppermost portion of the aquifer can be evidenced from the thalweg elevation and long-term seasonal and temporal groundwater elevation data that clearly

represent groundwater elevations for the uppermost part of the aquifer, then a zone (or zones) of low risk for discretionary projects may be identified. As described above, this map would necessarily become a future objective if sufficient suitable data are unavailable at this time.

Prepare Guidelines for Evaluating Site Hydrogeologic Characteristics Relative to Site-Specific Discretionary Groundwater Use Projects. These guidelines would be provided to the County for review and comment prior to incorporation in an overall guidance document.

Prepare a Technical Memorandum, or Overall Guidance Document, on the Review of Discretionary Projects to Evaluate the Potential Effects of Groundwater Pumping: The TM would describe the purpose of the evaluation, including to identify potential effects of groundwater pumping on surface water courses, neighboring wells, and/or ecologic factors. The TM would describe the approach that utilizes available physical evidence relating to the configuration of the well and its relationship to nearby surface water courses, other wells, and/or wetlands or other ecologic factors. The guidance document would describe the application of the Hantush (1965) methodology along with example applications. The TM would also recommend more investigation on known streambed properties as needed.

Meeting with County Staff and GRAC. Meet with County staff and GRAC to discuss draft guidance document and questions and comments on the draft guidance. Finalize guidance document following receipt and discussion of comments.

Schedule

Table 1 below shows the estimated schedule for the conduct of the work outlined in Tasks 1 through 4. The individual task descriptions and associated deliverables provide full details. The schedule shown below can be adjusted pending the County's preferences for completion of task work and also meetings with County staff and the GRAC.

Table 1 - Estimated Schedule

Conceptualization/Characterization of Hydrogeologic Conditions

Task	Deliverables (see text for full descript	Ja 12	F 12	Mr 12	A 12	My 12	Jn 12	Jl 12	Au 12	S 12	O 12	N 12	D 12	Ja 13	Fb 13	Mr 13	Ap 13
1	Geodatabase; cross sections, soils & derivative maps	X	X	X	X	X	X										
1	Meet Co. staff/GRAC						X										
2	Map exist./rec. MWs; inventory				X	X	X										
2	Meet Co. staff/ GRAC								X								
3	Maps thalweg/ rechg; rechg. estimate			X	X	X	X	X	X								
3	Draft report									X	X	X	X				
3	Meet Co. staff/GRAC														X		
3	Final report														X		
4	Maps connectivity/ sensitive zones							X	X	X	X						
4	Guide eval. hydro-geo char.										X	X	X				
4	Draft TM													X	X	X	
4	Meet Co. staff/GRAC																X
4	Finalize TM																X

Budget

A budget for the work to be conducted for Tasks 1 through 4 is shown in **Attachment 1**.

Fee Schedules and Personnel Classifications

The LSCE and MBK Fee Schedules and Personnel Classifications are shown in **Attachment 2.** Key personnel involved in the work are also as indicated in the team's submitted SOQ; and other support staff of comparable qualifications are available as needed to meet the desired timeline for the work. LSCE will serve as the prime consultant for this work, and MBK will be a subconsultant to LSCE.

Attachment 1

Cost Estimate: Professional Services — Napa County Conceptualization/Characterization Hydrogeologic Conditions

	Task Description	LSCE Prin. Hydrol.	LSCE Sr. Hydrogeol.	LSCE Project Hydrogeol.	LSCE Staff Hydrogeol./Engr.	LSCE Data Technician	LSCE Cler. Support Various	Labor Cost	MBK Prin. Engr.	MBK Superv. Engr.	MBK Assoc. Engr.	MBK Engr./GIS	TBD CEQA Professional	Labor Cost	Service Fee (10%)	Direct Cost	Subtask Cost	Task Cost
		$188	$153	$137	$98	$88	$58		$230	$200	$140	$120						
Task 1 -- Updated Hydrogeologic Characterization and Conceptualization																		
1.1	Lithology data; cross check.	1	6	4	8			$2,438.00									$2,438.00	
1.2	Coordinate w/County on drillers' report info.	2	16		16			$4,392.00									$4,392.00	
1.3	Locate drillers' reports in geologic cross-section areas.	2	24	8	80			$12,984.00									$12,984.00	
1.4	Develop geodatabase; also for GIS use.	2	8	4	120			$13,908.00									$13,908.00	
1.5	Prepare 6 or more geologic cross sections in Main NVF.	4	160	6	100			$35,854.00									$35,854.00	
1.6	Prepare soils map for geology correlation purposes.	2	4	16	32	6		$6,844.00									$6,844.00	
1.7	Prepare hydrogeology-related derivative maps.	4	80	24	60	6		$22,688.00									$22,688.00	
1.8	Meeting (+prep) with County staff and GRAC.	8		8	12	8	1	$4,538.00									$4,538.00	
Task Total		25	298	70	428	20	1											**$103,646.00**
Task 2– Supplemental Groundwater Monitoring in High Priority Subareas																		
2.1	Link well construction info to wells w/historical WL data.	4			40			$4,672.00									$4,672.00	
2.2	Relate well construction for monitored wells to Tsk 1 results.	4	24	12	40	6		$10,516.00									$10,516.00	
2.3	ID areas for addn'l MWs to assess sw/gw intrxns.	4	8	12	24			$5,972.00									$5,972.00	
2.4	2 Meetings (+prep) with County and GRAC.	12		12	8	8	2	$5,504.00									$5,504.00	
Task Total		24	32	36	112	14	2											**$26,664.00**
Task 3– Further Characterization of Areas of Greatest Recharge Potential																		
3.1	Coordin. w/ County on priorities for refining areas greatest recharge potential.	4	4	6	6			$2,774.00						$0.00	$0.00		$2,774.00	
3.2	Map thalweg elev. Napa River/tributaries, as data allow.							$0.00		20	20	30		$10,400.00	$1,040.00		$11,440.00	
3.3	Prelim. analysis of sw/gw intrxn in coordination with Tsk 2 results.	6		24	32			$7,552.00	4	10	10			$4,320.00	$432.00		$12,304.00	
3.4	Evaluate recharge using mass balance approach.	6		8	8			$3,008.00	8	54	84	35		$28,600.00	$2,860.00		$34,468.00	
3.5	Determine approach and estimate, as possible, recharge in fractured rock areas (focus on NVF-MST).	8	8	6	20			$5,510.00			8			$1,120.00	$112.00		$6,742.00	
3.6	Draft and Final Reports (document Tasks 1, 2, and 3).	32	32	40	32	16	1	$20,994.00		20	20			$6,800.00	$680.00	$600.00	$29,074.00	
3.7	Meeting (+prep) with County and GRAC.	12	4	8		8	1	$4,726.00		10	10			$3,400.00	$340.00		$8,466.00	
Task Total		68	48	92	98	24	2	$44,564.00	12	114	152	65						**$105,268.00**
Task 4–Develop Guidance to Assist County with Review of Discretionary Projects & Potential Effect of GW Pumping on SW																		
4.1	Coordinate Tsk 1, 2, and 3 results to ID zones of lesser or greater sensitviity for gw projects.	8	16	24	24			$9,592.00									$9,592.00	
4.2	Develop procedures that link Tsk 1 results to evaluation of gw pumping effects & update future approach.	6	12	32	16			$8,916.00									$8,916.00	
4.3	Describe analytical methodology for use re gw projects.	8		12	4			$3,540.00									$3,540.00	
4.4	Prepare guidelines on hydrogeologic parameters for use in evaluating gw effect on sw and other factors.	12	8	20	8			$7,004.00									$7,004.00	
4.5	Prepare draft TM, overall guidance document on effect of gw pumping on sw and other factors.Finalize TM.	24	16	32	22			$13,500.00								$200.00	$13,700.00	
4.5.1	Coordinate TM preparation with CEQA-consultant and/or attorney (subject to County approval)												$25,000.00	$25,000.00	$2,500.00		$27,500.00	
4.6	Meeting (+prep) with County and GRAC.	12		8		8	2	$4,172.00									$4,172.00	
Task Total		70	52	128	74	8	2											**$74,424.00**
Project Management																		
	Overall project admin.	12						$2,256.00									$2,256.00	
Task Total																		**$2,256.00**
	Total Hours (Tasks 1 - 4)	199	430	326	712	66	7		12	114	152	65						
								Total All Tasks										**$312,258.00**

Cost Estimate: Professional Services — Napa County Conceptualization/Characterization Hydrogeologic Conditions

	LSCE	LSCE	LSCE	LSCE	LSCE	LSCE		MBK	MBK	MBK	MBK	TBD					
	Prin. Hydrol.	Sr. Hydrogeol.	Project Hydrogeol.	Staff Hydrogeol./Engr.	Data Technician	Cler.		Prin. Engr.	Superv. Engr.	Assoc. Engr.	Engr./GIS	CEQA Professional					
Task Description						Support Various	Labor Cost						Labor Cost	Service Fee (10%)	Direct Cost	Subtask Cost	Task Cost
	$188	$153	$137	$98	$88	$58		$230	$200	$140	$120						

A Tradition of Stewardship
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Napa County
Groundwater Resources
Advisory Committee

February 15, 2012

Development of a Groundwater Data Confidentiality Policy for Napa County

Purpose

Important components of the County's groundwater sustainability planning are the California State Groundwater Elevation Monitoring program (CASGEM) and long-term monitoring programs, which are distinct but related efforts to provide essential data needed to evaluate changes in the resource over time. The County also needs to use well completion and geology data to better characterize the local basins. With the collection of information on a large number of wells come concerns about use of that data, the public release of selected information and the context in which the information is published, and the potential use of information by third parties. The County currently does not have a policy on confidentiality of groundwater data which would serve as a guide to staff and as a source of information to well owners participating in the monitoring programs.

Key Components

It is envisioned that the confidentiality policy for Napa County would address the following key components:

- Outreach to well owners and authorization to collect data
- Release of CASGEM information to the public
- Use and release of other monitoring data
- Participation in the Water Data Library
- Data base security
- Compliance with Water Code Sections 13751 and 13752

Challenges/Strategic Considerations

Although groundwater level and groundwater quality monitoring has been conducted in Napa County by the County and partner agencies including the State Department of Water Resources (DWR) for many years; a data confidentiality policy has not been developed. In the past, compliance with Water Code Sections 13751 and 13752 has been the baseline for well information privacy. However; with the publishing of the DWR Water Data Library (WDL)

and CASGEM on the internet and recent County outreach to well owners, it has become apparent that simply complying with the water code is not sufficient to address the concerns of the community, CASGEM statutory compliance and maintenance of a robust data collection effort.

- The CASGEM program web site publishes some information deemed proprietary by the water code. DWR assumes that Monitoring Entities (e.g. the County) obtain the permission of the well owners before uploading information. Participation in the program was mandated by the legislature.
- The Water Data Library publishes information which is not proprietary under the water code but could be considered sensitive by some well owners. Submittal of data to the WDL is voluntary.
- The County has an interest in maintaining an improved and robust monitoring program to support a thorough understanding of our groundwater resources.
- Collection of well completion and geologic information is essential to characterizing the basins.
- A lack of participants due to privacy concerns could severely hamper future monitoring efforts. Additional participants are needed.
- Outreach materials and owner permissions (rights of entry) need to clearly inform participants of the County's policy on data privacy depending on program participation.
- Potential owner privacy concerns are: well location, ownership, groundwater elevation and quality information, well construction information, liability and misuse of information by third parties.
- All data is subject to a Public Records Act request.
- Luhdorff & Scalmanini prepared a memorandum on availability of well location information on the CASGEM website, copy attached. This memorandum highlights the availability of groundwater information on the internet and serves as an introduction to data privacy issues.

DWR California Statewide Groundwater Elevation Monitoring (CASGEM) Program and Well Location Accuracy

by
Luhdorff & Scalmanini, Consulting Engineers
December 8, 2011

Background Information in Preparation for February 2012 Groundwater Resources Advisory Committee Discussion

Background

There is a long history of landowner participation in Napa County's groundwater level monitoring network and the County's cooperation with the California Department of Water Resources (DWR). DWR has historically stored these data and made them accessible to the public in the Water Data Library (WDL) as an online data system with a mapping interface. Through the WDL website, the public has been able to access well location information (coordinates), the well use (i.e. domestic, monitoring, irrigation, etc.), the ground surface and reference point elevations, and what historic water level measurements have been made in the well on specific dates. The location information for these privately owned wells have not been obscured by DWR and represent the actual well location.

Currently the WDL is a separate database from the California Statewide Groundwater Elevation Monitoring (CASGEM) database that has been recently created by DWR as part of the new statewide program. Napa County is the designated CASGEM Monitoring Entity for the groundwater basins/subbasins in the County. **Figure 1** shows a screenshot from the CASGEM GIS Map interface. It is zoomed in and centered on Napa County (and also showing the neighboring counties).

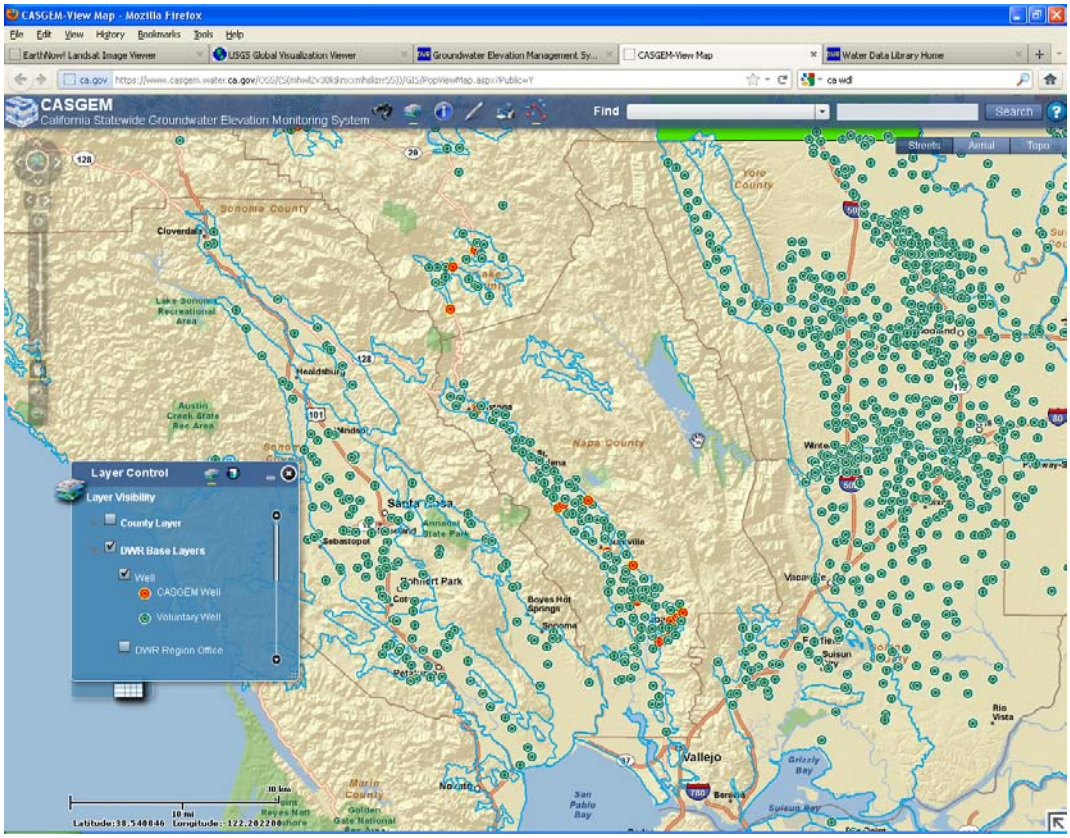

Figure 1-Napa County shown in CASGEM GIS Map (captured December 1, 2011)

As shown, two layers are active to show groundwater well locations and DWR groundwater basin/subbasin boundaries. The groundwater well layer dataset is a combination of the WDL and CASGEM well datasets. The GIS Map allows for zooming, panning and clicking on wells to show associated/available well information; it also includes options to change basemap content and provides search, measurement, and drawing tools. As the CASGEM program has just entered Phase 3, groundwater level data are currently being uploaded and migrated into the CASGEM database; soon groundwater level data and hydrographs will be available to view through this interface. DWR plans to merge the WDL and CASGEM databases in the future, and for now all wells that have been in the WDL are also visible in the CASGEM database (non-CASGEM wells are identified as 'voluntary').

Privacy Issue

There is some concern on the part of Napa County that they have communicated to landowners that have elected to participate in the CASGEM program that well location coordinates will be approximated or obscured when entering into the CASGEM monitoring program. It is unclear whether or not the well owners are aware that their well locations are currently public knowledge through the WDL, which they have been participating in for many years. Participation in the WDL/CASGEM programs hinges on owner cooperation, and the County wishes to protect the privacy of the well owners. As a result, the question has been raised about whether there is a need to change the coordinates to obscure the well locations. To address these concerns, we describe and illustrate the WDL and CASGEM map interfaces with screenshots from the

respective websites. A discussion follows about the importance of the accuracy of this information.

The CASGEM GIS Map interface allows a user to zoom and pan around a map and identify wells with groundwater level data. Historically, this has been performed in the WDL but with less functionality than with CASGEM. Previously (and currently) in the WDL, it was possible to view wells in Napa County (showing Wells #125 and 126) through the WDL map interface as shown in **Figure 2** (map scale shown is approximately 1:720). It is possible to zoom in 3 additional levels (allowing for the distinction between vineyard rows).

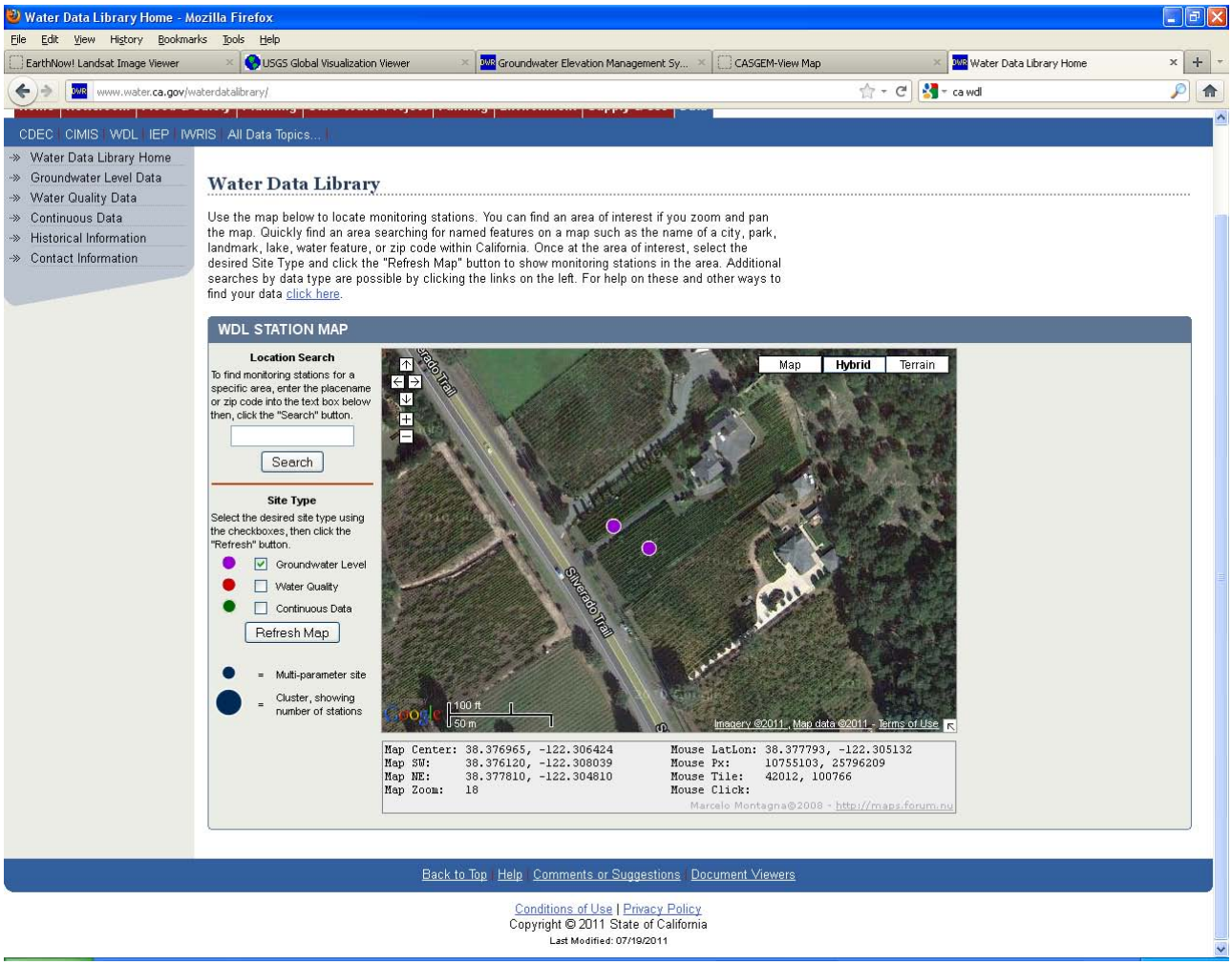

Figure 2-WDL Map Interface (captured November 30, 2011

Currently in CASGEM, there are two different map interfaces. The GIS Map interface will probably be the more commonly accessed view within CASGEM (**Figure 1 and 3**). This view of the same wells (125 and 126) allows for the maximum zoom to a scale of about 1:12,000 as shown in **Figure 3**. At this scale the well dots appear to be overlapping, and the size of the dot represents approximately 120' on the ground.

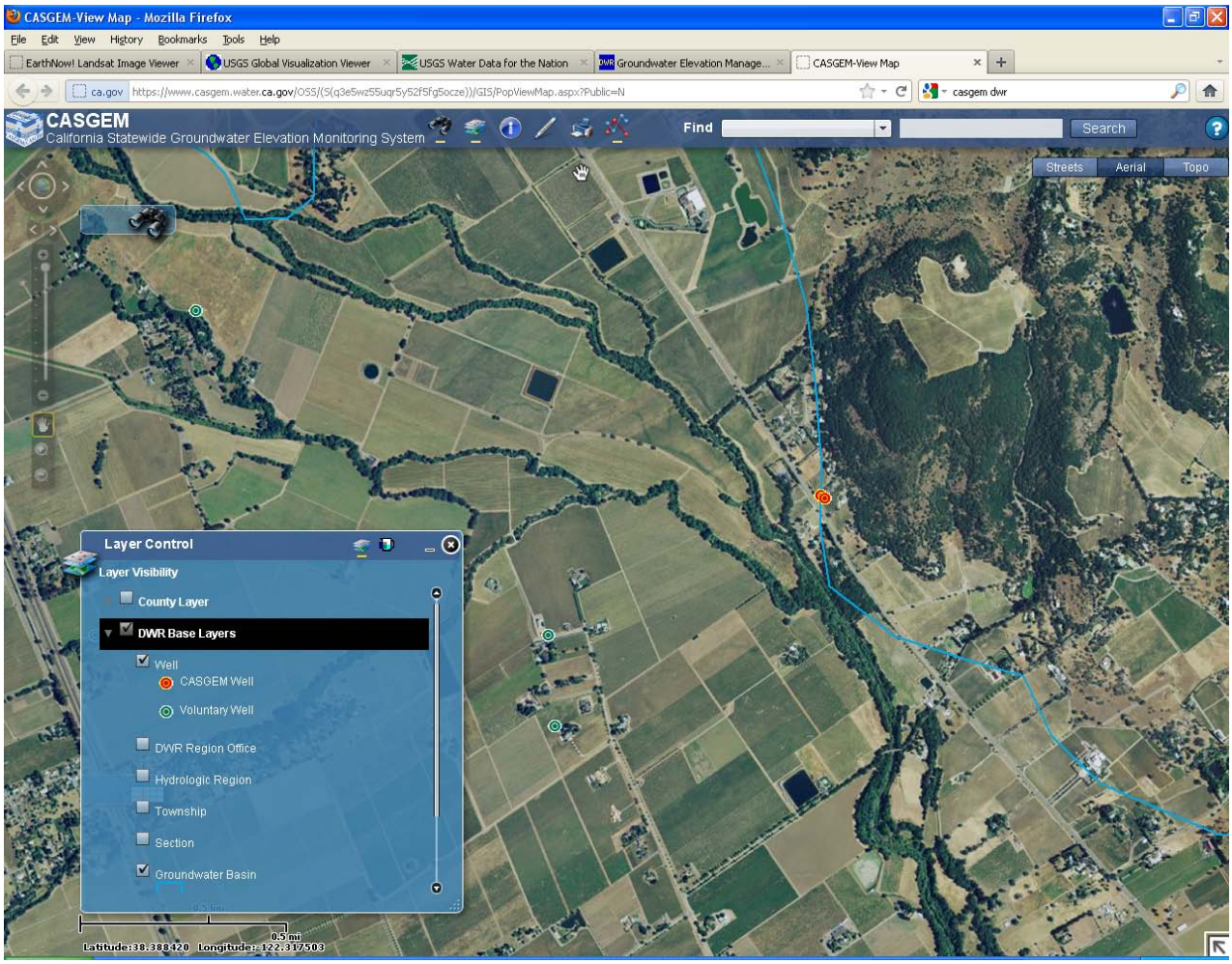

Figure 3-CASGEM GIS Map Interface (captured November 30, 2011)

The other map interface (showing one of the same wells from the previous examples) that is accessed directly from the well information table within CASGEM (the 'View Map' link) allows for a maximum zoom to about 1:3,000 as shown in **Figure 4**. It is not known why these two different view and zoom capabilities within CASGEM are available, but a request has been made to DWR to make them consistent.

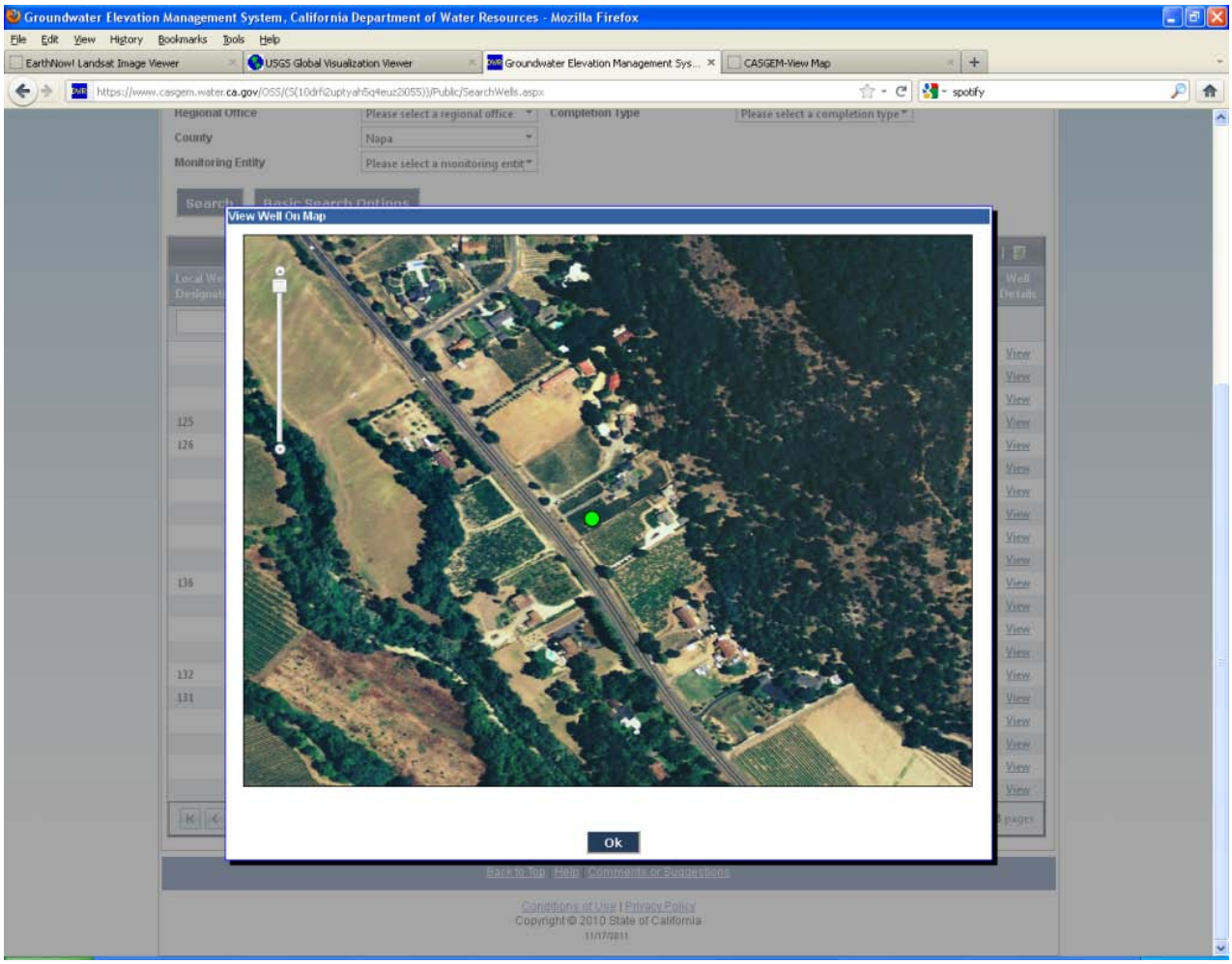

Figure 4-CASGEM 'View Map' Link from Well Information Table (captured November 30, 2011)

Importance of Accurate Well Location Coordinates

The quality of technical analysis depends on accuracy of the analyzed data. Purposefully obscuring data that is already publicly available is counter to this objective. CASGEM's two map interfaces only zoom into an approximate neighborhood scale – not a house scale. As with the WDL, it would take some effort to download the well's coordinates, and then plot them on a separate map to zoom in close enough to see where the exact well location is.

Options for approximating or obscuring well location data may be infinite and can include the following: rounding the coordinates arbitrarily, placing the well in the street in front of the well owner's house, randomizing the coordinates based on a radius of 1,000 feet, etc. These methods can lead to technical and other complications, including the potential to place wells on neighboring properties leading to concern on the part of a landowner who now believes that there is a well on his property that is being monitored for water level measurements without their consent or knowledge. Placing the well in the street does little to protect the identity of the well owner, as addresses (and therefore residences) are easier to determine from that method.

There are many reasons to protect the integrity of the well location data, which coincide with the County's Groundwater Monitoring Objectives (*Napa County Groundwater Conditions and Groundwater Monitoring Program Recommendations*, LSCE 2011). Investigations on behalf of the County that require the most accurate data include the following:

1. Surface water/groundwater interactions
    a. If the well location is changed, say to be closer or farther from a surface water course, the resulting relationship between surface water and groundwater would be altered.
    b. If the well location is changed such that the well is placed in a hard-rock aquifer instead of an alluvial aquifer, the surface water/groundwater interaction drastically changes and the analysis is incorrect.
    c. Considering the condition where a well is in direct connection to the alluvial materials that the surface water course is situated in, the distance between the surface water course and the well can have very significant effects on the proportion of water the well is pumping that comes from surface water versus groundwater.
2. Well interference
    a. Moving a well by 1,000 feet changes the analysis of well interference effects on neighboring wells in most aquifers.
    b. Well interference calculations based on incorrect well locations, and therefore distances between wells, would be inaccurate.
3. Groundwater flow analyses/recharge analyses
    a. Groundwater flow directions and gradients would be incorrect when well location data are not accurate.
    b. If the direction of groundwater flow is incorrect, sources of recharge may not be located appropriately.

Other applications for which accurate well location data are essential are numerous, and include: calibration for a groundwater flow model, reconciling reference point elevation discrepancies that might result from placing a well at an elevation different from its real elevation, groundwater elevation contour map construction, the possibility of creating duplicate wells based on older WDL data and newer CASGEM data that are really for the same well but the different coordinate locations suggest two different wells exist, etc.

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Napa County
Groundwater Resources
Advisory Committee

February 15, 2012

Developing a Groundwater Monitoring Program for Napa County

An Introduction to the Components of a Successful Program

Purpose

Groundwater is a vitally important resource in Napa County and the establishment of a comprehensive, long-term monitoring program will provide essential data needed to evaluate changes in the resource over time. A groundwater monitoring program will also serve as a foundation to develop and improve decision-analysis tools (e.g. groundwater models) used to forecast trends and ensure that Napa County's groundwater basins are available for future generations.

Key Components

It is envisioned that the monitoring program for Napa County will be more robust than the monitoring required by the State (CASGEM), and may contain the following key components:

- Summary of hydrogeologic conditions
- Groundwater elevation monitoring
- Groundwater quality monitoring (including saltwater intrusion)
- Surface water-groundwater interaction monitoring
- Precipitation monitoring
- Land subsidence monitoring
- Monitoring Protocols
- Central data/GIS management system
- Reporting and analysis of monitored data
- Systematic program review and adaptation

Challenges/Strategic Considerations

Although groundwater level and groundwater quality monitoring has been conducted in Napa County by the County and partner agencies, including the State Department of Water Resources, for many years; a formal groundwater monitoring program has not been adopted to systematically evaluate the resource over the long-term.

Recent adoption of guidelines by the State necessitates the County develop a more formalized monitoring program. Furthermore, it is in the best interests of the County that a monitoring program be established that can determine if there are trends or changes to the resource that are of concern. As the County develops a monitoring program, certain challenges exist that will need to be addressed:

- Reliance on voluntary private well owners
- Adequate geographic coverage of monitoring wells
- Private wells used for monitoring may not be ideal to meet all monitoring objectives due to unknown construction, geologic substrate and depth
- Confidentiality issues related to the use of private wells in the program and need to balance State requirements, private property rights, quality data needs and monitoring program objectives
- Integration of precipitation and stream gauging stations with the level monitoring program to achieve hydrologic monitoring objectives
- Water quality concerns such as saline intrusion
- Lack of long-term historical records in many areas of the County
- Standardization of past and future monitoring data
- Protocol for monitoring techniques and recordation
- Cost and location of dedicated (non-private) monitoring wells
- Funding for program initiation and long-term operation

Monitoring Benefits

- Ensure aquifer viability to meet current and future demands
- Maintain/improve water quality and ensure safe drinking water
- Improve resource modeling and prediction
- Maintain local control of the County's groundwater resources
- Preserve environmental benefits
- Increase opportunities for State funding
- Public awareness and appreciation of the resource

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DRAFT COMMUNICATION AND EDUCATION PLAN

Draft for Discussion on December 12, 2011
Drafted by Dorian Fougères, Center for Collaborative Policy, CSUS

I. Purpose and Overview

- This plan serves as a strategic guide for the public communication and education activities of the Napa County Groundwater Resources Advisory Committee (GRAC).
- The **communication goal** of the plan is to ensure that interested parties (e.g., members of the public, non-government organizations, and public agencies), and Napa County residents as a whole, are well-informed of the deliberations and activities of the GRAC.
- The **education goal** of the plan is to increase the understanding of groundwater resources so that interested parties and Napa County residents as a whole have a factual basis for discussion and decision making.
- Foundational elements of this plan include objectives and principles, audiences and potential partners, and messages. A series of communication and education strategies follow. The last element is an evaluation of plan implementation. An appendix lists names of potential partner agencies and organizations.

II. Objectives and Principles

1. Objectives

A. To ensure that interested parties and residents as a whole are aware of the work, schedule, progress, and deliberations of the GRAC, and have opportunities to provide input.
B. To expand participation in the County's voluntary groundwater monitoring efforts.
C. To establish a common understanding of groundwater resources in the County, including hydrogeologic conditions and trends evidenced by monitoring data and analyses.
D. To support more informed public dialogue and public policy decision-making regarding groundwater resources in Napa County.
E. **QUESTION: WHAT OBJECTIVES ARE MISSING OR UNCLEAR?**

2. Principles

A. The GRAC will proactively develop relationships and conduct activities related to communication and education.
B. The GRAC will partner with interested parties to leverage existing networks and outreach efforts, and to make the best use of limited resources.

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C. The GRAC will provide Information and materials on a timely basis to allow interested parties and residents to consider information and, as appropriate, provide input and participate.
D. The GRAC will consistently characterize its aims and activities in the same ways, so that people in different arenas hear the same messages.
E. The GRAC will tailor its messages and materials to different audiences to increase their effectiveness.
F. **QUESTION: WHAT PRINCIPLES ARE MISSING OR UNCLEAR?**

III. Audiences and Partners

Groundwater resource issues involve an array of geographical and interest-based audiences, including:

A. Landowners and other interested parties in the Pope Valley, Clearlake Pleistocine Volcanic Area, and Berryessa Valley groundwater basins.
B. Landowners and other interested parties in the Napa-Sonoma Valley groundwater basin, including the Milliken-Sarco-Tulocay, Angwin, Carneros, Calistoga, St. Helena, Yountville, and Napa sub-areas.
C. Environmental, agricultural, development, community, and landowner and homeowner interests.
D. Public agencies and elected officials.

QUESTION: WHAT OTHER KEY AUDIENCES ARE MISSING? WHICH ARE TYPICALLY OVERLOOKED?

Specific groups, organizations, and agencies will need to be identified, see Appendix 1 below.

Messages and materials will variously need to address County residents as a whole, or to be tailored to specific audiences.

Additional special audiences will need identification, such as disadvantaged communities.

Some members of these audiences may choose to support the County's communication and education efforts, thereby becoming the County's partner in outreach. In the 2010 Stakeholder Assessment, several organizations volunteered to use their existing networks to help share information and news with their constituencies; these will be critical to maximizing the efficiency and effectiveness of outreach efforts. Additional partners will be solicited as activities are developed.

Partners may also include specific press and media, see Appendix 2 below.

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IV. Messages

1. Universal Messages

A. The GRAC
   a. The GRAC is authorized by the Board of Supervisors and charged with making recommendations on (1) data needs, (2) a monitoring program, (3) pump test protocols and related revisions to the County's groundwater ordinance, (4) the conceptualization of hydrogeologic conditions, (5) groundwater sustainability objectives, and (6) building community support.
   b. GRAC members are appointed by the Board of Supervisors and represent the County's geographic and interested-based diversity. This includes each of the County's sub-areas and property, agricultural, and environmental interests, among others.

B. GRAC meetings are open to the public and all materials are available on their website.

C. Groundwater resources
   a. The County's geographic and geological diversity mean that the status and trends of groundwater resources vary dramatically from place to place. Recognition of this diversity is a fundamental starting point for the GRAC's work and activities.
   b. A common fact-based understanding of groundwater resources in the County will support more informed public dialogue and public-policy decision-making. While public observations help to identify concerns, factual information and thoughtful technical analyses will provide the foundation for GRAC decision-making.

QUESTION: WHAT ARE THE GRAC'S KEY MESSAGES?

2. Objective-Specific Messages

On the activities of the GRAC and public involvement, see Universal Messages above. Other messages will need to match the objectives developed by the GRAC. Examples include:

A. Participation in Voluntary Groundwater Monitoring
   a. Purpose of the effort
   b. What data will be gathered, when and by whom, and how it will be used
   c. Confidentiality
   d. Benefits to and incentives for participants

B. Importance of better understanding hydrogeologic conditions
   a. Purpose of the effort to update the hydrogeologic conceptualization of the valley
   b. How this information will be used and refined as more information becomes available

C. Education on Major Issues
   a. Messages will need to be developed for specific topics identified

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3. Special Messages

These will be developed as needed, for example, for specific geographic areas or for special audiences.

V. Communication and Education Strategies

This section identifies six primary communication and education strategies that provide a framework for more specific activities. Each strategy includes information on supporting materials, audiences that would benefit specifically, next steps and when these would occur, and constraints that will need to be managed.

1. Use the GRAC's website as the clearinghouse for all information and materials associated with the GRAC meetings and the communication and education efforts.

Materials: will post existing materials developed for meetings and activities
Special Target Audiences: none (it is for all audiences)
Next Steps & Timelines: the website has been official and functioning since June, 2011
Constraints: organization and accessibility as documents accumulate
Potential partners: none (the County will have to maintain the website)

2. Develop and maintain an interested parties email and address distribution list, including denotation of parties that express an interest in partnering.

Materials: email and address data management software, and existing news, promotional and educational materials (see below)
Special Target Audiences: individual interested parties
Next Steps & Timelines: develop and solicit initial list during 1st quarter of 2012, with ongoing expansion and maintenance
Constraints: need to maintain up-to-date entries
Potential partners: none (the County will have to develop the list)

3. Proactively develop and regularly utilize relationships with key press and media outlets for the purpose of sharing news and information.

Materials: meeting synopses, joint statements developed by the GRAC, telephone calls
Special Target Audiences: Napa County residents as a whole
Next Steps & Timelines: County staff to identify and contact at major press and media outlets during 1st quarter of 2012, and then utilize as needed
Constraints: inability to control final products, need to adhere to GRAC Media Protocol
Potential partners: *Napa Valley Register*

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4. Develop a standardized series of general promotional and educational materials, as well as activity-specific and topic-specific materials as needed.

Materials: trifold and booklet brochures, annual newsletter (electronic and hard copy)
Special Target Audiences: directly impacted audiences
Next Steps & Timelines: general promotional materials during 1st quarter of 2012, activity- and topic-specific materials in coordination with the GRAC's work plan
Constraints: need for subject matter expertise
Potential partners: none (the County will have to develop materials)

5. GRAC members periodically (e.g., twice a year) brief the geographical or interest-based groups that they serve on, participate in, or recommend, as applicable.

Materials: standard promotional materials; short powerpoint presentation with talking points about work plan, progress, and milestones
Special Target Audiences: constituencies represented on the GRAC, regional and sub-regional groups, community-based groups
Next Steps & Timelines: identify initial dates for briefings (e.g., March and October 2012), prepare materials
Constraints: need for consistent messaging and characterization of the GRAC's activities
Potential partners: organizations that GRAC members participate in

6. GRAC members and County staff conduct an annual round of briefings for elected officials and agency executive officers, including but not limited to via the Napa County Watershed Information Center and Conservancy (WICC).

Materials: standard promotional materials
Special Target Audiences: state legislative representatives, county supervisors, mayors and councilmembers, federal and state agency executive officers
Next Steps & Timelines: identify appropriate period for briefings and schedule well in advance (e.g., Joint GRAC-WICC meeting in June 2012), identify appropriate briefing format and appropriate group to conduct briefings, develop needed promotional materials
Constraints: limited availability of elected officials and agency executive officers
Potential partners: none (GRAC members will work with County staff)

7. The GRAC hosts public workshops or other public events to support the rollout of key deliverables, such as the County's monitoring program, revised pump test protocols and related revisions to the groundwater ordinance, and groundwater sustainability objectives.

Materials: special announcements; materials to support the event activities

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Special Target Audiences: Napa County residents as a whole, perhaps with identical workshops in the northern and southern parts of the County
Next Steps & Timelines: agree upon deliverables that will need a public rollout component, the type of public input desired (e.g., comment on draft, comment on final), and a corresponding timeframe (e.g., late 2012 for the draft groundwater monitoring program, mid-2013 for the draft protocols and ordinance revisions, and mid 2014 for the draft objectives)
Constraints: need for advance scheduling and publicity to ensure turnout, significant logistical and administrative work, and associated costs; this discussion will influence the next version of the GRAC's work plan
Potential partners: WICC, other local organizations or educational groups

QUESTIONS: WHAT ARE THE MOST EFFECTIVE WAYS TO REACH OUR AUDIENCES? HOW WILL YOU HELP? WHO ELSE CAN HELP US?

VI. Evaluation

As part of its normal business, the GRAC will evaluate annually the effectiveness of its communication and education efforts, and revise this plan accordingly.

Appendix 1: Potential Audiences and Partners

A. California Department of Water Resources
B. City of American Canyon
C. City of Calistoga
D. City of Napa
E. City of St. Helena
F. City of Yountville
G. Ducks Unlimited
H. EcoVines
I. Fire Safe Councils
J. Friends of the Napa River
K. Get a Grip on Growth
L. Groundwater Under Local Protection
M. Homeowner associations
N. Living Rivers Council
O. Los Carneros Water District
P. Napa County Farm Bureau
Q. Napa County Resource Conservation District
R. Napa County Watershed Information Center and Conservancy
S. Napa Sanitation District
T. Napa Valley Grape Growers Association
U. Napa Valley Land Stewards Alliance
V. Napa Valley Vintners
W. Regional Water Quality Control Board
X. Sierra Club, Napa County Chapter
Y. State legislative representatives
Z. Trout Unlimited
AA. USDA Natural Resource Conservation Service
BB. OTHER AUDIENCES AND PARTNERS?

Appendix 2: Potential Press and Media Partners

A. Napa Valley Register
B. OTHER PRESS AND MEDIA PARTNERS?

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Environmental Management

1195 Third Street, Suite 101
Napa, CA 94559
www.countyofnapa.org

Main: (707) 253-4471
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Steven Lederer
Director

A Tradition of Stewardship
A Commitment to Service

December 22, 2011

To: Gary Broad, St. Helena City Manager
Honorable Council Members

From: Steve Lederer, Director, Napa County Department of Environmental Management

Subject: Well Drilling Trends in St. Helena

Thank you for the opportunity to address the City Council. My office is responsible ensuring that environmental health and safety regulations are properly applied and enforced, and for issuing construction permits to those who desire to construct new and replacement wells within Napa County, including the incorporated cities. The purpose of this memorandum is to inform the Council of well drilling history within St. Helena, which hopefully can inform future policy making on this subject.

Application of well standards by my office is a "ministerial" function, meaning that we do not have discretion as to whether or not to issue a permit. If an application is submitted which meets all applicable standards in Chapter 13 of the Napa County Code (including such items as construction details, sealing of the well casing, setbacks from property lines, potential sources of contamination, septic, etc.), my office is obligated to issue a well construction permit. Some cities, such as Calistoga, have a well ordinance (Chapter 19.06 of the Calistoga Code), that specifically prevents us from issuing well permits until and unless they have signed off previously. Within St. Helena, we have a less formal process whereby we notify the well driller that they must consult with City staff and obtain their written approval prior to our issuing of permits. However, to the best of my knowledge, the City does not have any formal criteria as to what they are reviewing and has never rejected a well application.

Historically, well applications in St. Helena have been fairly consistent (see table below). However, recent trends have shown an increase in activity, and recently several actual and potential applicants have been approaching the County inquiring about installation of new wells either because of unavailability or cost of city provided water. The Council may want to consider the implications of this trend. While wells in large parcel, low density, settings have been used for centuries, they tend not to work well with small parcels and higher draw rates. Problems include (but are not limited to) nearby wells competing with each other, draw down of the overall water table, development reliant on an unreliable water source, contamination of wells from nearby contaminated sites, and contamination of the shared aquifer via improperly managed wells. Essentially, the more wells you have, the greater potential for these problems to occur.

Year	# of New Wells
2005	5
2006	3
2007	5
2008	8
2009	5
2010	6
2011	7

Due to small parcel sizes and the desire to maximize building on small parcels, my Department is also increasingly being asked to consider variances to setback requirements, such as setbacks from property lines, structures, roads, sewer lines, and septic systems. Variances were designed to provide some relief where existing conditions (say a failed well) limits the practicality in creating a new well for an existing use with limited space. However, prospective applicants/purchasers are now asking if they can "build their way into a variance", meaning that their development plans intentionally use up so much of the parcel that the only way to fit a well (or septic system) into the proposed plan is by granting a variance. The Department is neither authorized nor interested in approving variances in these situations.

From the perspective of County policy, the County's general plan is not generally supportive of urbanization based on groundwater use, except where groundwater is used in a conjunctive use arrangement to complement surface water supplies. Also, because of concerns about groundwater resources generally, the County Board of Supervisors has established a Groundwater Resources Advisory Committee (GRAC), which began meeting in October. The vicinity of St. Helena is represented on the GRAC by your Planning Commissioner Alan Galbraith, and the meetings are open to the public if you wish to participate further.

I want to emphasize that I see this as a **trend,** not an immediate **crisis.** Once again I appreciate the opportunity to provide information to the Council and welcome the opportunity to work with the City in all appropriate ways to ensure the health and safety of the environment and our citizens.

If you have any further questions regarding this matter, please contact me at (707) 253-4471 or by email at steven.lederer@countyofnapa.org.

Regards,

Steve Lederer
Director

Cc: Nancy Watt, CEO
Hillary Gitelman, CDPD
Phillip Miller, Public Works
Diane Dillon, District 3 Supervisor