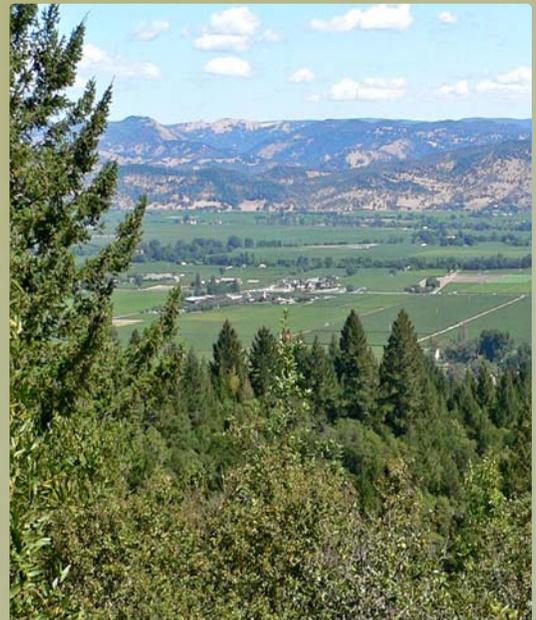




Napa County Comprehensive Groundwater Monitoring Program *Executive Summary*

*Prepared for:
Napa County
Department of Public Works*

February, 2011



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CONSULTING ENGINEERS

EXECUTIVE SUMMARY

Napa County Comprehensive Groundwater Monitoring Program

prepared for

NAPA COUNTY



A Tradition of Stewardship
A Commitment to Service

February, 2011

The complete documents for the
Napa County
Comprehensive Groundwater Monitoring Program
are available at:

www.countyofnapa.org/planning/groundwater

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NAPA COUNTY



A Tradition of Stewardship
A Commitment to Service

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ATTACHMENT 1

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

OVERVIEW

Groundwater and surface water are highly important natural resources in Napa County. Collectively, County entities along with numerous others, including municipalities, water districts, commercial and industrial operations, the agricultural community, and the public, are stewards for the water resources available to Napa County. The Napa County community actively supports and invests in its water resources to sustain agricultural productivity. Concurrently, municipal and private stakeholders are actively engaged in assessing the potential for the development of additional water supplies, both groundwater and surface water of good quality, to meet future urban and rural water demands. Similar to other areas in California, the County faces many future water-related challenges including:

- Increased competition for available supplies,
- Preserving the quality and availability of imported water supplies,
- Sustaining groundwater supplies,
- Additional challenges arising during drought conditions, and
- Changes due to global warming and/or climate change.

To address these challenges, long-term, systematic monitoring programs are essential to provide data that allow for improved evaluation of water resources conditions and availability to facilitate effective water resources management. Previously established groundwater and surface water monitoring networks in Napa County have resulted in the collection of data necessary to distinguish trends from short-term fluctuations, anticipate unintended consequences due to historical land uses, identify emerging issues, and design water resources management strategies.

In 2009, Napa County embarked on a countywide project referred to as the “Comprehensive Groundwater Monitoring Program, Data Review, and Policy Recommendations for Napa County’s Groundwater Resources” (Comprehensive Groundwater Monitoring Program) to meet identified action items in the 2008 General Plan update (Napa County, 2008; Attachment 1). The program emphasizes developing a sound understanding of groundwater conditions and implementing an expanded groundwater monitoring and data management program as a foundation for future coordinated, integrated water resources planning and dissemination of water resources information.

The Comprehensive Groundwater Monitoring Program involved many tasks that led to the preparation of five technical memorandums and a report on *Napa County Groundwater Conditions and Groundwater Monitoring Recommendations* (LSCE, 2011a).

The report on groundwater conditions is based on the reconnaissance evaluations completed in Tasks 1 and 2 which concerned the collection, review, and organization of groundwater-related data and the development of a countywide data management system. The report documents the results of the existing knowledge of countywide groundwater conditions and establishes the framework for the reporting of water levels and water quality on a periodic basis. The report includes: spatial and vertical descriptions and illustrations of geologic units and the occurrence

of groundwater; groundwater elevation hydrographs throughout the county; historical and current contours of equal groundwater elevations for some subareas; time-series plots and illustrations of the distribution of key groundwater quality constituents. Historical trends or occurrences are described to explain historical groundwater levels and/or quality in relation to the current condition.

An updated hydrogeologic picture has been developed to describe the occurrence and movement of groundwater beneath Napa County, especially key subareas of the county. As additional data become available, “layers” of detail can be added to describe and illustrate various hydrologic, groundwater quality and other related items of pertinence or interest (i.e., response of groundwater levels to changes in pumping stresses and/or existing or new recharge activities).

It is intended that the report will serve as a basis for future periodic reports that expand on the existing knowledge of countywide groundwater conditions; provide an update on groundwater conditions (including groundwater level and quality trends and variations); and recommends enhancements and/or modifications to the framework for future reporting of groundwater conditions.

Other tasks included a review of precipitation and streamflow stations; review of the County’s regional planning models, especially the groundwater model; and review of California’s groundwater management approaches and legislation along with review of the County’s groundwater ordinance and permit process. Technical memorandums were prepared for each of these tasks that summarized the review work and recommendations for expanding streamflow monitoring, improving the tool(s) utilized to assess current and future surface water/groundwater interrelationships; and improving the County’s groundwater ordinance and permit process.

The program has led to a broader awareness of available groundwater data and an assessment of current groundwater conditions and trends, and also identified factors related to future assessment of groundwater availability. Spatial data coverage was good for some County subareas; however, for other subareas, monitoring network enhancements are needed. Recommendations are presented to enhance and expand countywide monitoring to facilitate understanding of groundwater availability and integrated regional water planning efforts. A table in section ES.9 summarizes the recommended implementation steps, including the implementation time frame, a relative estimated budget, and the relative priority for implementation.

ES.1 Napa County Comprehensive Groundwater Monitoring Program

ES.1.1 Program Goals

The countywide Comprehensive Groundwater Monitoring Program addresses the initial goal of the County to understand current and historical groundwater conditions based on available data, develop an expanded data management system to store monitoring data from different County, state, and federal sources, and develop recommendations for expanded groundwater monitoring

and water resources management. Broad program goals included gathering available groundwater-related data, cross-correlating ancillary data, evaluating historical groundwater level and quality data, and developing a centralized data management system that contains the data necessary to manage regional water resources and enable long-term protection of surface and groundwater resources in the county. This program led to a broader awareness of available groundwater data and how those data can be better used to assess current groundwater conditions and trends and also identify factors related to future assessment of groundwater availability. The program also led to an awareness of data security issues, data gaps, and actions needed to continue efforts to “qualify,” organize, store, and disseminate water-related data to enhance the long-term value of the data. The County has been divided into 17 subareas based on geographic, geologic, and political boundaries. Spatial data coverage was good for some County subareas; however, for other subareas, monitoring network enhancements are needed (Figure ES-1). The program includes recommendations to enhance and expand countywide monitoring in order to facilitate understanding of groundwater availability and integrated regional water management and planning efforts.

ES.1.2 Program Tasks

The overall Napa County Comprehensive Groundwater Monitoring Program included a series of tasks that culminated in the six documents summarized in **Table ES-1**.

Task Number and Document Title	Reference
Task 1, <i>Napa County Data Management System</i> . Technical Memorandum	LSCE, 2010a
Task 2, <i>Review and Evaluation of Data Collection Procedures and Recommendations for Improvement</i> . Technical Memorandum.	LSCE, 2010b
Task 3.2, <i>Conceptual Model Review of Napa Valley Groundwater Model</i> . Technical Memorandum.	LSCE, 2010c
Task 3.3, <i>Guidance on Precipitation and Streamflow Monitoring Activities, Napa County, CA</i> . Technical Memorandum.	LSCE, 2010d
Task 4, <i>Napa County Groundwater Conditions and Groundwater Monitoring Recommendations</i> . Report.	LSCE, 2011a
Task 5, <i>Groundwater Planning Considerations and Review of Napa County Ordinance and Permit Process</i> . Technical Memorandum.	LSCE, 2011b

The program tasks and the resulting documents that describe the work conducted and recommended steps in support of the countywide Comprehensive Groundwater Monitoring Program are summarized in the sections below.

ES.2 Geology and Groundwater Resources

A first step in the study was to review prior investigations to understand the geology and hydrogeology in the County and the region. Essentially, the geology of Napa County can be divided into three broad geologic units based on their ages and geologic nature. These units are: 1) Mesozoic Basement Rocks (pre-65 million years (my)), which underlie all of Napa County, but they are primarily exposed in the Eastern County area and the Western Mountains Subarea, 2) Older Cenozoic Volcanic and Sedimentary Deposits (65 my to 2.5 my), including Tertiary Sonoma Volcanics (Miocene and Pliocene; 10 my to 2.5 my) which are found throughout the County, especially in the mountains surrounding Napa Valley, and 3) Younger Cenozoic Volcanic and Sedimentary Deposits (post 2.6 my to present), including the Quaternary alluvium of the Valley Floor. The two primary water-bearing units for Napa County are the tuffaceous member of the Sonoma Volcanics and the Quaternary alluvium.

Outside of the Napa Valley Floor, percolation of surface water appears to be the primary source of recharge. The rate of recharge within areas such as the Milliken, Sarco and Tulucay (MST) Subarea has been shown to be significantly higher where streams and tributaries cross highly permeable outcrops (e.g., the tuffaceous member of the Sonoma Volcanics or shallow alluvium). Direct infiltration of precipitation is a major component of recharge in the main Napa Valley. Recharge throughout much of the county is generally limited by underlying shallow bedrock of low permeability. An additional component of groundwater recharge is deep percolation through fractured rock and fault zones. This type of recharge can be very difficult to quantify due to the highly variable size and distribution of faults, fractures, and joints in a given area.

ES.3 Data Management System

As part of the task to establish a countywide data management system (DMS), historical groundwater level data from the California Department of Water Resources (DWR), the U.S. Geological Survey (USGS), the State Water Resources Control Board (SWRCB), and the County were gathered and organized. Groundwater quality data as available from these entities as well as from the SWRCB GeoTracker program and the California Department of Public Health (DPH) were also incorporated. The countywide DMS was developed to establish a centralized repository for historical groundwater level and quality measurements, providing a foundation for programs that enhance integrated water resources management and planning. The countywide data can be further expanded upon to better understand available water resources (e.g., surface water resources and precipitation). Future applications of the DMS will lead to identification and improved understanding of the issues that may affect the quantity and/or quality of the County's water resources (e.g., climate change, human stresses due to withdrawal, or land use). Recommendations for the maintenance and utilization of the DMS are provided in section ES.9.1 and Table ES-3.

ES.4 Groundwater Conditions

ES.4.1 Groundwater Levels

Groundwater level data are primarily available for the subareas in the Napa Valley Floor. Most groundwater level data are not able to be correlated to specific aquifer units due to a lack of well construction and lithologic log information associated with the monitored wells. As a result, evaluation of groundwater levels and conditions specific to individual aquifer zones is limited.

Based on the available groundwater level data, groundwater levels in the county are generally stable, with the exception of the MST Subarea. Groundwater in the Napa Valley Floor generally flows toward the axis of the valley and south when not influenced by local pumping depressions. The MST Subarea, however, has shown significant declines in groundwater levels, especially in the central portion of the subarea. Contemporaneous changes in water level trends are possible to discern throughout the MST. The variation and timing of groundwater level declines and trends in the north, central, and southern areas of the MST that have historically occurred may be attributable to increased pumping and/or variations in geologic conditions. Wells in the immediate vicinity of the MST Subarea may be vulnerable to these variations as well, as seen from limited data in the eastern portion of the Napa Valley Floor-Napa (NVF-Napa) Subarea and the southwestern part of the Eastern Mountains Subarea. Most wells elsewhere in the valley with a sufficient record indicate that groundwater levels are more affected by climatic conditions, are within historic levels, and seem to recover from dry periods during subsequent wet or normal periods.

Groundwater level conditions outside of the Napa Valley Floor are much less known. Subareas south of the Valley have very limited water level data, making it difficult to impossible to assess any potential for historic or current saltwater intrusion from San Pablo Bay. Subareas east and west of the valley floor all have limited data or are lacking groundwater level data entirely (as seen in Livermore Ranch, Southern Interior Valleys, and Western Mountains Subareas). Where data are available, most records are short, spanning a few years at most, and it appears that groundwater level conditions are stable.

ES.4.2 Groundwater Quality

Less is known about the quality of Napa County's groundwater. Historical groundwater quality records are typically lacking in Napa County. From records that do exist, groundwater is generally of good quality throughout most subareas. Poor groundwater quality exists in the south and the north central parts of the county. The areas with poor groundwater quality contain concentrations of metals such as arsenic, iron, and manganese that exceed drinking water standards. Elevated levels of boron are prevalent in most subareas. The Calistoga Subarea of the Napa Valley Floor also has poor quality water in many wells due to hydrothermal conditions resulting in higher concentrations of metals. Nitrate concentrations are not generally a concern throughout the county, but nitrate levels tend to be higher in agricultural areas in the Napa Valley Floor.

Areas of potential saltwater intrusion were preliminarily assessed through examination of available chloride, total dissolved solids (TDS), and sodium concentrations. The highest concentrations of each constituent are observed in the Napa River Marshes, Jameson/American Canyon, and Carneros Subareas. A lack of groundwater quality and well construction data for these areas is a limiting factor in determining the source and distribution of salinity.

Available groundwater quality data in the county are incomplete in regards to spatial distribution, number, and record. Many subareas do not have sufficient spatial coverage to gain a full understanding of groundwater quality. Six out of the 17 subareas have ten or less wells with available groundwater quality data, which limits the ability to determine representative quality, and some subareas have no historical data. Without sufficient groundwater quality records, trends are not able to be determined.

ES.5 Historical and Future Groundwater Monitoring

Historical to current (data extending through at least 2005) groundwater level and quality data were examined and groundwater data gaps identified in county subareas. Groundwater level measurements have been recorded at a total of 676 wells (at 173 locations, as most regulated facilities tend to have clusters of monitoring wells with data that represent one location) through at least 2005. Of these sites where levels are measured, some type of well construction information (depth and/or perforated interval(s)) is readily available for 118 locations. Groundwater quality monitoring has been conducted at a total of 283 wells (or 153 locations) through at least 2005. Of these sites where groundwater quality samples are collected, some type of well construction information (depth and/or perforated interval(s)) is readily available for 15 locations.

There are many areas in the county where further efforts to establish groundwater monitoring, using existing or new monitoring facilities, will improve the understanding of groundwater conditions and availability. The objectives and priorities for addressing groundwater level and quality monitoring needs are summarized below.

ES.5.1 Groundwater Monitoring

The primary objectives of the countywide groundwater monitoring program include:

- Evaluate groundwater conditions in the various county subareas to describe the occurrence, movement, and trends of groundwater levels and quality, spatial variability between areas, and vertical variability in the aquifer system(s) in the subareas;
- Detect the occurrence of, and factors attributable to, natural (e.g., direct infiltration of precipitation, surface water seepage to groundwater, groundwater discharge to streams) or induced factors (e.g., pumping, purposeful recharge operations) that affect groundwater conditions and trends;
- 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.

A preliminary ranking and priorities for improving or expanding groundwater level monitoring was prepared for each county subarea. Seven subareas (including the NVF-Calistoga, NVF-MST, NVF-Napa, NVF-St. Helena, NVF-Yountville, Carneros, and Pope Valley Subareas) are given a higher priority for improving the groundwater level monitoring network based on factors of current and/or projected land and water use. A preliminary ranking and priorities for improving or expanding groundwater quality monitoring was prepared for each of the county subareas. Four subareas (including NVF-MST, Carneros, Jameson/American Canyon, and Pope Valley Subareas) are given a higher priority for improving the groundwater quality monitoring network based on factors of current and/or projected land uses and also the lack of spatially distributed groundwater quality monitoring. Three subareas, including Livermore Ranch, Southern Interior Valleys, and Western Mountains, are preliminarily assigned lower priorities for groundwater quality monitoring due to the likely lower levels of projected land and groundwater use. The ten remaining subareas are designated as medium priorities for groundwater quality monitoring. Many of these areas have current monitoring programs, so the emphasis is to further examine land use with respect to monitoring locations and the units(s) of the aquifer system represented by this monitoring.

Many subareas outside the Napa Valley Floor have limited spatial distribution of the current groundwater monitoring wells (or monitoring locations). Basic data are described as a key monitoring need and expansion and/or refinement of groundwater monitoring conducted in all subareas should be coordinated with efforts to provide additional characterization of subsurface geologic conditions and well construction information. This will allow for the evaluation groundwater conditions specific to an aquifer rather than composite information which limits the ability to fully understand groundwater conditions in the County and in individual subareas.

Recommendations for improving the groundwater level and quality monitoring networks and program are provided in section ES.9.1 and Table ES-3.

ES.6 Review of Napa Valley Groundwater Model

A task within the overall Comprehensive Groundwater Monitoring Program was to provide a general review of a previously developed groundwater model produced by DHI Water & Environment (DHI) as part of the 2005 *Napa County Baseline Data Report (2005 BDR)* (Jones & Stokes et al., 2005). The product of the review was a Technical Memorandum (LSCE, 2010c) based solely on a review of the 2006 *Final BDR Technical Appendix* (DHI, 2006), which

presents the model code, model construction, calibration, and application of modeling efforts introduced in Chapters 15, 16, and 17 of the BDR. Further information on the groundwater model was reviewed from the 2005 BDR and a 2007 technical memorandum *Modeling Analysis in Support of Vineyard Development Scenarios Evaluation* (DHI, 2007) in which the groundwater model was updated/expanded and applied in evaluating various vineyard development scenarios. The information reviewed included the conceptual model developed by DHI from which the inputs to the groundwater model were based. In addition, information provided on the model code (the actual model code was not part of the general review), construction, and development of the groundwater model and model calibration were also reviewed.

ES.6.1 Napa County Regional Planning Models

In 2005/2006, a group of models was developed by DHI as regional planning tools to evaluate Napa County watershed-scale conditions and how potential land-use changes in the watershed would affect groundwater and surface water conditions. A key document developed during the County's General Plan Update (2008 and later update in 2009) was the 2006 BDR Technical Appendix (DHI, 2006); this document describes the development, calibration, and application of several surface and groundwater models (i.e., the Napa County Models). The names and purposes of the Napa County Models are shown in **Table ES-2**.

Model	Purpose	Model Domain
Napa Valley Surface Water	Streamflow and water budgets	Napa River watershed
Napa Valley Groundwater (MIKE SHE Model)	Groundwater levels	Napa River watershed except its southernmost portion
Napa Valley Water Quality	Surface and groundwater quality	Napa River watershed
Lake Berryessa Surface Water	Streamflow and water budgets	Putah Creek and Suisun Creek watersheds within Napa County
Lake Berryessa Water Quality	Surface water quality	Putah Creek and Suisun Creek watersheds within Napa County
SEAGIS	Sediment erosion and transport	All of Napa County

The Napa County 2006 BDR Technical Appendix states that the objectives for the Napa County Models were to “establish baseline (existing) conditions by which county-wide planning efforts and programs can be assessed and evaluated for their benefits, constraints, and environmental impacts. The models are an analytical tool and data management system capable of evaluating the hydrologic and water quality effects of landscape-scale planning decisions....”

ES.6.2 Groundwater Model Purpose and Review

The groundwater model (referred to as the MIKE SHE Model) was developed by DHI in conjunction with the Napa Valley and Lake Berryessa Surface Water models to simulate existing groundwater and surface water conditions on a regional basis. The groundwater model focused primarily on three regions: the North Napa Valley and the MST and Carneros Subareas. These areas currently experience significant amounts of private pumping (i.e., little or no municipal pumping). The purpose of the groundwater model as currently constructed has been to assess regional rather than local groundwater conditions. Overall, the MIKE SHE groundwater model provides a short-term snapshot of regional groundwater conditions for the Napa River watershed; however, the short calibration period (four years) limits the application of the current version of the model to assess long-term changes in groundwater conditions resulting from droughts and wet periods. Recommendations for improving the modeling tool to simulate groundwater and surface water conditions and interrelationships on regional and local scales are provided in Section ES.9.5 and Table ES-3.

ES.7 Review of Precipitation and Streamflow Monitoring Stations

Another part of the overall program included reviewing Napa County's currently active precipitation and streamflow monitoring stations and providing guidance in the Task 3.3 Technical Memorandum (LSCE, 2010d) on the design of a countywide network of precipitation and streamflow monitoring stations that would help:

1. Improve the County's understanding of the major watersheds' responses to precipitation and natural and/or anthropogenic changes, and
2. Attain goals outlined in the *Napa River Sediment TMDL and Habitat Enhancement Plan* (Napa River TMDL [Total Maximum Daily Load]) (San Francisco Bay RWQCB, 2009) that pertain to instream sediment occurrence and temperature.

Data collected from the recommended monitoring network would provide the necessary information to continue the calibration of the County's water quantity and water quality models (Napa County Models), discussed in the *Napa County Baseline Data Report* (Napa County BDR) (Jones and Stokes & EDAW, 2005) and its appendix the *Final BDR Technical Appendix – Water Quantity and Water Quality Report, Napa County, CA* (Napa County BDR Technical Appendix) (DHI, 2006). In addition, the Task 3.3 Technical Memorandum (LSCE, 2010d) discussed near-stream groundwater level monitoring for assessing surface water/groundwater interactions and aiding the interpretation of streamflow changes that cannot be explained solely with surface water data and modeling.

The extent and nature of surface water/groundwater interactions are largely unknown in Napa County with the exception of the MST area. 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 that public and regulatory interest in surface water/groundwater interactions will likely continue to grow during the implementation of the Napa River TMDL, 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, such monitoring efforts should be given high priority (see recommendations in section ES.9.3). Other recommendations on priorities for precipitation and streamflow monitoring are provided in the Task 3.3 Technical Memorandum (LSCE, 2010d); the County has begun to implement some of these recommendations.

ES.8 Groundwater Planning Considerations and County Ordinance and Permit Process

The overall Comprehensive Groundwater Monitoring Program will provide the County a scientifically based assessment and facilitate effective groundwater planning as defined and promoted by the California Department of Water Resources (DWR). The Program will also serve as the foundation for effective and fair implementation of current and future County policies embodied in ordinances and permits related to groundwater. To establish the important link between the recommended monitoring program, groundwater sustainability actions, and the County's Groundwater Ordinance, an overview of California groundwater management history and related state legislation is presented in the Task 5 Technical Memorandum (LSCE, 2011b). The Task 5 Technical Memorandum also includes examples of the preparation and implementation of integrated regional water management plans, groundwater management plans, and groundwater ordinances in nearby areas that were reviewed to gain an appreciation for the ways in which neighboring counties and regions have addressed groundwater resources in their planning documents or local ordinances.

The focus of work conducted for Task 5 was on a review of groundwater planning considerations and the County's Groundwater Ordinance and permit process in the context of the County's General Plan goals and policies, and future steps towards integrated regional water planning that ensures sustainability for all water resources in the county.

ES.8.1 California Groundwater Management Approaches and Legislation

California's groundwater resources are widespread and diverse. There are 431 delineated groundwater basins in California. Twenty-four of these basins are subdivided into 108 subbasins, resulting in 515 groundwater systems that underlie 40 percent of the state in 10 hydrologic regions (DWR, 2003). In an average year, groundwater supplies about 30 percent of the state's overall water demands; in drought years, groundwater may account for 40 percent, or greater, of supply (DWR, 2003).

Future groundwater availability in the state is not well understood. In many basins, information is insufficient to assess or quantify overdraft. Additionally, the impacts of urban and other land uses on groundwater quality, and also elevated concentrations of naturally occurring physical and chemical constituents, contribute to other stresses, or restrictions, on the available supply. The California legislature has taken measures toward improving water resources management approaches on a statewide scale. Recently, the frequency of legislative and other initiatives have increased partly in response to public awareness and concern, which are more acute during dry periods when problems are more evident. The state's long-term goal is to provide incentives and implement integrated regional water management that achieves sustainable water resources.

Groundwater management began to occur in California long before it became formally recognized through state legislative initiatives. Groundwater management may be defined as the ongoing performance of coordinated actions related to groundwater withdrawal and replenishment to achieve long-term sustainability of the resource without detrimental effects on other resources (Kretsinger and Narasimhan, 2006). Preferably, such management programs are a local responsibility, conducted in coordination with other entities (including cooperative monitoring programs), and regularly evaluated to ensure consistency with basin-wide management objectives.

The Task 5 Technical Memorandum (LSCE, 2011b) describes the history of groundwater-related legislation and groundwater management approaches in California. Two key legislative bills relating to groundwater management and one bill regarding groundwater elevation monitoring are summarized below.

ES.8.1.1 AB 3030 and SB 1938

In 1992, legislation passed as AB 3030, the Groundwater Management Act, was considered a breakthrough for groundwater management at the local level. This legislation outlined voluntary plans for groundwater management that could be developed and implemented at the local level. SB 1938, the Groundwater Management Act adopted in 2002, amends and expands AB 3030 groundwater management plans. The law now also requires public agencies seeking state funds administered through DWR for the construction of groundwater projects or groundwater quality projects to prepare and implement a groundwater management plan with certain required components (Water Code Section 10753.7). Previously, all plans were voluntary, and there were no required plan components. The requirements now include establishing basin management objectives, preparing a plan to involve other local agencies in the basin in a cooperative planning effort, and more comprehensive monitoring programs (including groundwater levels and quality; surface water flows and quality; and inelastic land surface subsidence for basins where it is identified as a potential concern) to assess changes in basin conditions and “generate information that promotes efficient and effective groundwater management” (Water Code Section 10753.7). Water Code Sections 10750 through 10755.4. The amended Water Code does not require groundwater management and monitoring by all local entities, but moves the State further toward addressing the many issues and questions about the future of groundwater management in

California that were brought forth by the staff of the Governor's Commission on Water Rights Law (Schneider, 1977).

ES.8.1.2 Statewide Groundwater Elevation Monitoring Program

In 2009, a state bond package was passed that included a bill referred to as SBX7 – 6 and the newly created California Statewide Groundwater Elevation Monitoring (CASGEM) program (<http://www.water.ca.gov/casgem/>) which is a statewide groundwater elevation monitoring program. DWR is facilitating the statewide program where local entities can apply to DWR to assume the function of regularly and systematically collecting groundwater level data to determine seasonal and long-term trends in the state's groundwater basins and subbasins. The legislature added a key aspect to SBX7 – 6 which was to make certain elements of the groundwater level information available to the public. Napa County's combined efforts through the Comprehensive Groundwater Monitoring Program along with the related AB 303 Public Outreach Project (CCP, 2010) and the efforts of the Watershed Information Center & Conservancy (WICC) of Napa County create a framework for applying the findings and recommendations from these programs to the County's continued efforts to increase public outreach and participation. An informed and engaged public enables support of planned water resources projects and programs proposed by the County and others. Recommendations for the County's participation in the CASGEM program are provided in the Task 4 and 5 Technical Memorandums and are summarized in ES.9.2 and Table ES-3.

ES.8.2 Napa County Groundwater Ordinance and Permit Process

One of the key purposes of Task 5 was to review the County's Groundwater Ordinance and permitting process in the context of the County's goals and policies for protection and conservation of water resources and to provide recommendations on potential improvements. This task also involved review of the County's existing groundwater well permit application process and how conditions are imposed on projects that affect groundwater resources. The review included the County's well and groundwater ordinances (including Chapters 13.04, 13.12, and 13.15 of Title 13 of the municipal code) and an assessment of the County's Water Availability Analysis application forms and recommendations on how to best integrate permit conditions (e.g., monitoring actions) with the County's Comprehensive Groundwater Monitoring Program and related General Plan policies to a broad-scale long-term evaluation of the County's groundwater resources (i.e., regional hydrology, trends in groundwater levels and quality, and recharge sources and mechanisms).

Napa County adopted a groundwater conservation ordinance (Chapter 13.15) which is intended to regulate the extraction and use, and promote the preservation, of groundwater resources in the county. Compliance with this ordinance applies to development of new water systems or improvements to an existing water system that may use groundwater and imposes conditions on that use if it exceeds pre-determined thresholds. The groundwater conservation ordinance makes a distinction with respect to permitting requirements within groundwater deficient areas of which one is currently recognized: the NVF-MST Subarea. Because this area is considered

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 use¹ 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 Frame¹	Relative Estimated Budget²	Relative Priority Ranking³
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.

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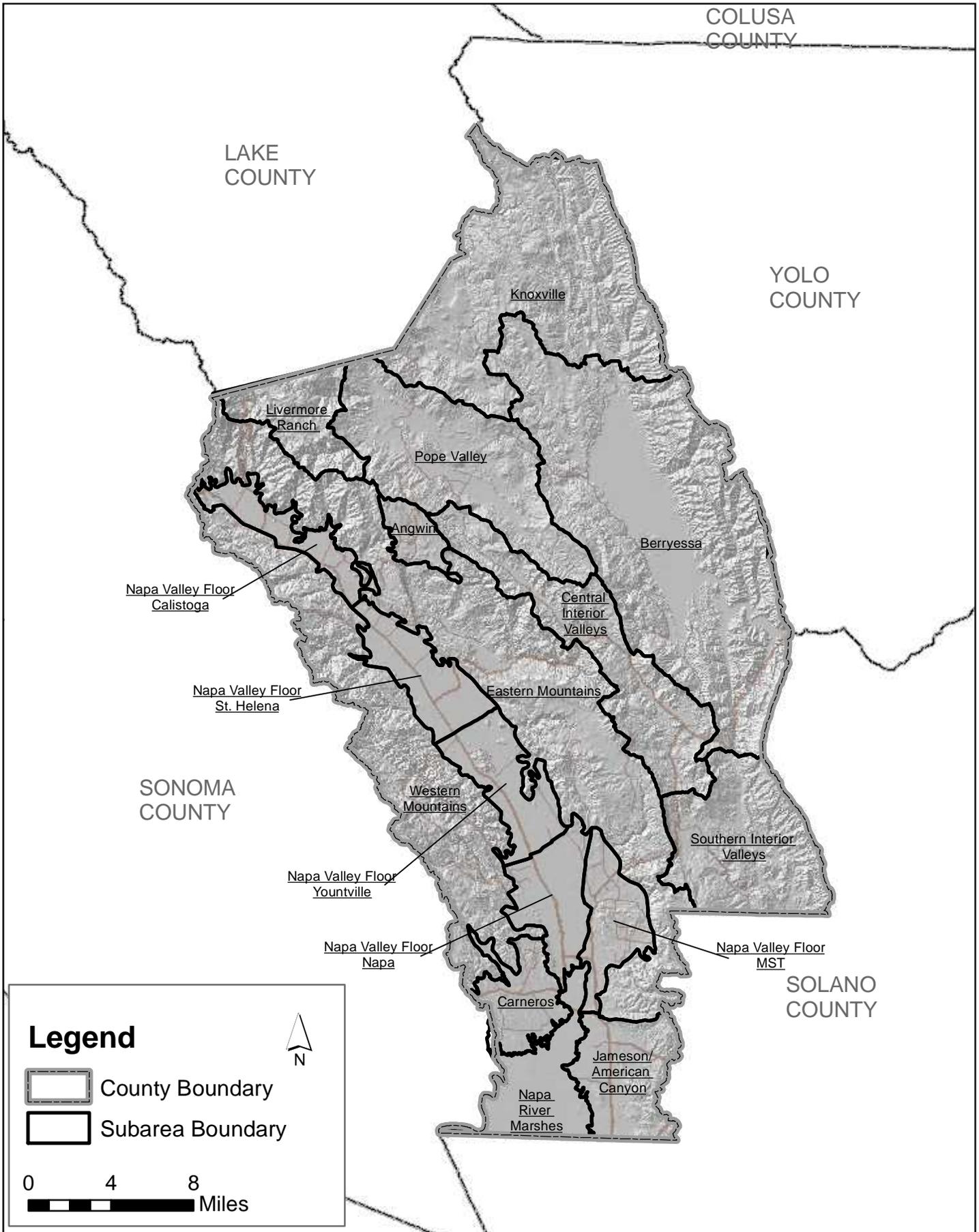
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ATTACHMENT 1

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

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

As recognized in the County's General Plan (2008, amended June 23, 2009), "water is one of the most complex issues related to land use planning, development, and conservation; it is governed and affected by hundreds of federal, state, regional, and local mandates pertaining to pollution, land use, mineral resources, flood protection, soil erosion, reclamation, etc. Every year, the state legislature considers hundreds of bills relating to water issues, and in Napa County, more than two dozen agencies have some say in decisions and regulations affecting water quality and water use."

As part of the General Plan update in 2008, and within the Conservation Element, six goals are set forth relating to the County's water resources, including surface water and groundwater. Complementing these goals are twenty-eight policies and ten water resources action items (one of which is "reserved" for later description). The County's six water resources goals are included below (the entire group of water resources goals, policies, and action items is included in LSCE, 2011b).

Goal CON-8: Reduce or eliminate groundwater and surface water contamination from known sources (e.g., underground tanks, chemical spills, landfills, livestock grazing, and other dispersed sources such as septic systems).

Goal CON-9: Control urban and rural storm water runoff and related non-point source pollutants, reducing to acceptable levels pollutant discharges from land-based activities throughout the county.

Goal CON-10: 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 this General Plan, for the natural environment, and for future generations.

Goal CON-11: Prioritize the use of available groundwater for agricultural and rural residential uses rather than for urbanized areas and ensure that land use decisions recognize the long-term availability and value of water resources in Napa County.

Goal CON-12: Proactively collect information about the status of the County's surface and groundwater resources to provide for improved forecasting of future supplies and effective management of the resources in each of the County's watersheds.

Goal CON-13: Promote the development of additional water resources to improve water supply reliability and sustainability in Napa County, including imported water supplies and recycled water projects.

Key General Plan Action Items related to the focus of this Program include:

Action Item CON WR-1: Develop basin-level watershed management plans for each of the three major watersheds in Napa County (Napa River, Putah Creek, and Suisun Creek). Support each basin-level plan with focused sub-basin (drainage-level) or evaluation area-level implementation strategies, specifically adapted and scaled to address identified water resource problems and restoration opportunities. Plan development and implementation shall utilize a flexible watershed approach to manage surface water and groundwater quality and quantity. The watershed planning process should be an iterative, holistic, and collaborative approach, identifying specific drainage areas or watersheds, eliciting stakeholder involvement, and developing management actions supported by sound science that can be effectively implemented. [Implements Policies 42 and 44]

Action Item CON WR-4: Implement a countywide watershed monitoring program to assess the health of the County's watersheds and track the effectiveness of management activities and related restoration efforts. Information from the monitoring program should be used to inform the development of basin-level watershed management plans as well as focused sub-basin (drainage-level) implementation strategies intended to address targeted water resource problems and facilitate restoration opportunities. Over time, the monitoring data will be used to develop overall watershed health indicators and as a basis of employing adaptive watershed management planning. [Implements Policies 42, 44, 47, 49, 63, and 64]

Action Item CON WR-6: Establish and disseminate standards for well pump testing and reporting and include as a condition of discretionary projects that well owners provide to the County upon request information regarding the locations, depths, yields, drilling and well construction logs, soil data, water levels and general mineral quality of any new wells. [Implements Policy 52 and 55]

Action Item CON WR-7: The County, in cooperation with local municipalities and districts, shall perform surface water and groundwater resources studies and analyses and work toward the development and implementation of an integrated water resources management plan (IRWMP) that covers the entirety of Napa County and addresses local and state water resource goals, including the identification of surface water protection and restoration projects, establishment of countywide groundwater management objectives and programs for the purpose of meeting those objectives, funding, and implementation. [Implements Policy 42, 44, 61 and 63]

Action Item CON WR-8: The County shall monitor groundwater and interrelated surface water resources, using County-owned monitoring wells and stream and precipitation gauges, data obtained from private property owners on a voluntary basis, data obtained via conditions of approval associated with discretionary projects, data from the State Department of Water Resources, other agencies and organizations. Monitoring data shall be used to determine baseline water quality conditions, track groundwater levels, and identify where problems may exist. 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. [Implements Policy 57, 63 and 64]

Action Item CON WR-9.5: The County shall work with the State Water Resources Control Board (SWRCB), California Department of Water resources (DWR), Department of Public Health (DPH), California Environmental Protection Agency (CalEPA), and applicable County and City agencies to seek and secure funding sources for the County to develop and expand its groundwater monitoring and assessment and undertake community-based planning efforts aimed at developing necessary management programs and enhancements.