

Napa Valley Groundwater Sustainability: A Basin Analysis Report for the Napa Valley Subbasin

A report prepared pursuant to California Water Code Section 10733.6(b)(3)

EXECUTIVE SUMMARY (354.4(A))¹

1.0 INTRODUCTION

1.1 Background (354.4(b))

An overview of the following:

- *Napa County's established role in the management of groundwater within the county (includes a summary of the Board of Supervisors appointed Groundwater Resources Advisory Committee and the sustainability objectives developed through that process),*
- *Review of the Sustainable Groundwater Management Act's (SGMA) authorization of Alternatives to Groundwater Sustainability Plans (Alternative)*
- *Designation of the Napa Valley Groundwater Subbasin by the CA Department of Water Resources (DWR) as a medium priority pursuant to SGMA,*
- *Napa County's decision to develop a Basin Analysis Report as an Alternative defined by California Water Code Section 10733.6(b)(3); due January 1, 2017.*
- *DWR final emergency regulations for Alternative submittals (by June 1, 2016 DWR shall adopt final regulations for GSPs and Alternatives)*
- *A list of references and technical studies referenced by Napa County in developing the Basin Analysis Report*

1.2 Purpose and Objectives

To document groundwater usage and conditions in the Napa Valley Subbasin in the context of determining sustainable yield.

1.3 Beneficial Uses and Public Participation (354.10)

A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties. A listing of public meetings at which the Basin Analysis Report was

¹ Parenthetical references in Section, Sub-Section, and Figure titles refer to relevant sections of the Groundwater Sustainability Plan Regulations approved by the California Water Commission on May 18, 2016.

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discussed, comments received, and a summary of responses by Napa County. An explanation of Napa County's decision-making process, identification of opportunities for public input, and methods used by Napa County to inform the public about the status of subbasin conditions and the status of projects and actions.

1.4 Agency Information (354.6)

The name and mailing address of for Napa County. The organization and management structure of applicable departments within Napa County. The name and contact information for persons responsible for implementing management actions and projects identified in the Basin Analysis Report. Napa County's legal authority to develop a Basin Analysis Report. An estimate of the costs for implementing management actions and projects and a general description of how Napa County plans to meet those costs.

1.5 Report Organization

2.0 PHYSICAL SETTING AND HYDROGEOLOGY

2.1 Groundwater Basins and Subbasins

2.1.1 Napa Valley Subbasin Setting and Boundaries (354.8)

A characterization of the physical and political geography of the Napa Valley Groundwater Subbasin and Napa River Watershed.

Includes maps of the area covered by this Report (denoting areas managed by Napa County and any adjacent basins), topographic map, and a map of jurisdictional boundaries within the area covered by the Report.

2.2 Hydrogeologic Conceptual Model (354.14)

2.2.1 Regional Geology

Includes at least two cross sections that display the information. Includes surficial geology (including locations of geologic cross sections) map.

2.2.2 Quaternary Alluvial Deposits of the Napa Valley Subbasin

2.2.3 Other Water Bearing Geologic Deposits of the Napa Valley Subbasin

2.2.4 Lateral and Vertical Subbasin Boundaries

2.2.5 Aquifer Parameters

Physical properties of aquifer and aquitards, including vertical and lateral extent, hydraulic conductivity, and storativity.

2.2.6 Structural Geology/Barriers to Groundwater Flow

Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, etc.

3.0 MONITORING NETWORK AND PROGRAM

Based on County GW Monitoring Plan (2013) and 2015 Annual Groundwater Monitoring Report

3.1 Napa Valley Subbasin Groundwater and Surface Water Monitoring Network and Program Summary (354.34)

Describes approaches used to monitor impacts to the beneficial uses or users of groundwater, monitor changes in groundwater conditions relative to the establishment of measurable objectives and minimum thresholds, and quantify annual changes in water budget components. (Minimum thresholds and measurable objectives established based on groundwater conditions are discussed in Chapter 7)

3.1.1 Groundwater Levels

3.1.2 Groundwater Quality

3.1.3 Surface Water

3.2 Monitoring Program Summary (354.36)

Discussion of monitoring network for ongoing groundwater sustainability program. (Representative monitoring site selection discussed in Chapter 7)

3.3 Monitoring Program Best Management Practices (352.2, 352.4)

Discussion of BMPs and monitoring protocols applied by the County.

4.0 GROUNDWATER CONDITIONS (354.16)

4.1 Current and Historical Groundwater Conditions

A summary of available data for historic and current conditions relevant to subbasin groundwater management.

4.1.1 Groundwater Levels

Presentation of groundwater level data for the unconfined and semi-confined geologic deposits. Includes groundwater elevation data (spring and fall contour maps for current and historic conditions, and representative hydrographs) demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns based on the best available data.

4.1.2 Groundwater Quality

General water quality of the principal aquifers

4.1.3 Surface Water Conditions

Presentation of the best available data on surface water/groundwater interactions. Identification of interconnected surface water systems within the basin; estimate of the quantity and timing of depletions of those systems.

Includes maps showing surface water features significant to the management of the basin, and the source and point of delivery for imported water supplies.

- A. Historical surface water conditions
 - a. Overview of surface water features, setting, and historical monitoring
 - b. Map of streamflow gage locations with representative wells and groundwater/surface water monitoring sites
 - c. Historical annual average streamflow (all years with base period identified)
 - d. Historical monthly average streamflow (all years with base period identified)
 - e. Historical dry flow conditions – duration, timing, and variability
- B. Historical estimated baseflow conditions
 - a. Historical estimated baseflow related to observed streamflow
 - b. Average estimated baseflow by water year type (all years and base period)
 - c. Overall average estimated baseflow over water year
- C. Relationships between baseflow and groundwater levels
- D. Surface water and groundwater dependent ecosystems

Discussion of occurrences of vegetation and wetlands, and their association with surface water and groundwater.

- a. An overview of vegetation
 - b. An overview of types of wetlands and their spatial distribution
- E. Summary of historical surface water quality

Includes best available data on surface water quality

4.1.4 Seawater/Freshwater Interface

Discussion of seawater interface or intrusion conditions in the basin, including maps and cross sections of the saltwater front for each principal aquifer. Includes local groundwater elevation contour maps and chloride data.

4.1.5 Land Subsidence

Discussion of availability of land subsidence monitoring and graphs showing the vertical displacement of land using CGPS data

4.1.6 Data Gaps (354.38)

4.2 Groundwater Recharge

Description of the current understanding of recharge processes in the subbasin

Includes maps: soil survey map, delineation of existing recharge areas/potential recharge areas/discharge areas.

4.2.1 Areas of Naturally-Occurring Recharge

4.2.2 Areas of Potential Artificial Recharge

Presentation of best available data to delineate areas within the Napa Valley Subbasin where potential future artificial recharge projects would be best suited.

Includes a discussion of recharge potential mapped by the UC Davis Soil Agricultural Groundwater Banking Index (O'Geene et al.) and Basin Characterization Model (Flint et al.)

5.0 HISTORICAL, CURRENT, AND PROJECTED WATER SUPPLY AND DEMAND

5.1 Land Use and Water Demands

A summary of projections, goals, or targets contained in the Napa County General Plan and Urban Water Management Plans within the subbasin

5.1.1 Historical Land Use and Water Demands

5.1.2 Current Land Use and Water Demands

5.1.3 Projected Land Use and Water Demands

5.2 Groundwater

Includes a summary of the distribution and density of wells by type (i.e., domestic, agricultural, municipal, other) located in the Napa Valley Subbasin.

5.2.1 Historical Groundwater Supply

5.2.2 Current Groundwater Supply

5.2.3 Projected Groundwater Supply

5.3 Surface Water

5.3.1 Historical Surface Water Supply

Include an analysis of surface water supply for irrigation and other beneficial uses (e.g., frost protection, domestic, recreational). Annual water diversion and use reported by water right holders to State Water Resources Control Board (from 2008 to 2014) and available data from the four municipalities within the subbasin are referenced in this discussion.

5.3.2 Current Surface Water Supply

Includes an analysis of surface water supply for irrigation and other beneficial uses using data reported in 2015 annual water diversion and use reported by water right holders to State Water Resources Control Board and available data from the four municipalities within the subbasin.

5.3.3 Projected Surface Water Supply

Summarizes projections of surface water supply and demand considering expected changes in land use and other controlling factors (e.g., irrigation methods, use of reclaimed water, water conservation practices).

5.4 Recycled Water

5.4.1 Historical Recycled Water Supply

5.4.2 Current Recycled Water Supply

5.4.3 Projected Recycled Water Supply

6.0 SUSTAINABLE YIELD ANALYSIS (354.18)

Summary of SGMA requirements for sustainable yield analysis.

6.1 Napa Valley Subbasin Hydrologic Base Period

Evaluation of available long-term precipitation and streamflow data to determine appropriate end points for subbasin water budget analyses, including wet and dry periods and other criteria.

6.2 Summary of Water Year 2015 Hydrologic Conditions

An evaluation of precipitation, gaged runoff, and other data as necessary to characterize Napa Valley Subbasin conditions relevant to the January 1, 2015 SGMA Date of Accountability

6.3 Water Budget Framework

Includes water budget analyses for the Napa Valley Subbasin hydrologic base period, 2015, and a projected future scenario.

6.4 Root Zone Model

6.4.1 Methodology

6.4.2 Land Use Model Inputs

6.4.3 Soil Model Inputs

6.4.4 Hydrologic Model Inputs

6.4.5 Crop Coefficient Model Inputs

6.4.6 Root Zone Model Results

6.5 Subbasin Water Budget

6.5.1 Subbasin Inflows

6.5.2 Subbasin Outflows

6.6 Subbasin Water Budget Results

Includes results for the Napa Valley Subbasin hydrologic base period, the 2015 water year, and a future scenario.

6.6.1 Qualitative Consideration of the Napa-Sonoma Lowlands Subbasin

6.7 Groundwater Level Change in Groundwater Storage Analysis

Graph showing estimates in the change in groundwater storage, demonstrating the annual and cumulative change in groundwater storage volume between seasonal high groundwater conditions, including the annual groundwater use and water year type.

6.7.1 Groundwater Contours and Potentiometric Surfaces for Key Base Period Years

Includes a presentation of data from unconfined and semi-confined aquifers, based on best available data.

6.8 Sensitivity Analysis

Identify sources of uncertainty in the water budget analysis and groundwater level change in storage analysis.

6.9 Sustainable Yield

7.0 NAPA VALLEY SUBBASIN SUSTAINABILITY GOAL (354.24)

Establishment of a sustainability goal for the Napa Valley Subbasin that includes the absence of undesirable results, established based on subbasin conditions as of January 1, 2015.

7.1 SGMA Requirement to Develop a Sustainability Goal (354.24)

7.2 Sustainability Indicators and Undesirable Results (354.26)

Establishes undesirable results for applicable sustainability indicators, including a description of the process and criteria used to define undesirable results for the Napa Valley Subbasin.

7.3 Representative Monitoring Sites

7.4 Minimum Thresholds (354.28)

Establishes preliminary minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at identified monitoring sites or representative monitoring sites. Includes justification for thresholds set based on best available data and existing monitoring networks. Thresholds for multiple sustainability indicators may be lumped according to data availability, provided sufficient technical justification.

7.5 Measureable Objectives (354.30)

Establishes measurable objectives that maintain or improve groundwater conditions. Preliminary measurable objectives are established for each sustainability indicator.

7.6 Management Area

8.0 MONITORING NETWORK EVALUATION AND REPORTING

8.1 Data Reporting Schedule (354.40, 356.2)

In part from County Groundwater Monitoring Plan (2013). Monitoring data stored in the data management system are to be submitted to the Department electronically.

8.2 Data Management and Disclosure

Incorporate County document developed during GRAC process to be incorporated as appendix.

9.0 SUSTAINABLE GROUNDWATER MANAGEMENT (354.44)

A description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin.

9.1 Groundwater Ordinance (354.20)

9.2 Water Availability Analysis and Discretionary Use Permits

9.3 Monitoring Network Refinement and Expansion

9.4 Education and Collaboration

9.4.1 Watershed Information Conservation Council

9.4.2 Well Owner Outreach and Self-Directed Well Monitoring Education

Napa County's Wellbeing Project

9.5 Other Groundwater Management Strategies

9.5.1 Potential Changes in Land Use Controls to Consider

- A. Zoning
- B. Building Code
- C. Landscaping
- D. Limits on new or major changes to existing projects

9.5.2 Potential Changes to Well Regulations to Consider

- A. Taxes and Fees
- B. Metering
- C. Withdrawal Limits
- D. Restrictions on new wells

9.5.3 Recycled Water

9.5.4 Groundwater Ordinances

9.5.5 Other Actions in Cooperation with Cities and Other Stakeholders

9.6 Best Management Practices

Describe the County's process for review of BMPs and refinement of monitoring protocols, Subbasin data analysis, and management actions.

9.7 Annual Report

9.8 Five-Year Subbasin Conditions Reporting and Evaluation (356.4)

Describes the process to be used by Napa County to evaluate its groundwater management efforts, includes monitoring network description, evaluation of the subbasin setting in light of any new information or changes in water use, consideration of changes in subbasin groundwater conditions, description of management actions implemented and their effect on subbasin conditions, and additional management tools or actions needed to maintain subbasin sustainability.

10.0 SUMMARY

Appendices

Appendix A. Basin Analysis Report and Groundwater Sustainability Plan Emergency Regulations Comparison Table

Appendix B. Napa County Groundwater Resources Advisory Committee, Groundwater Sustainability Objectives (February 27, 2014)

Appendix C. Napa County Groundwater Resources Advisory Committee, Data Management and Disclosure

Preliminary List of Figures

Figure 2-1 (354.8 (a) (1-3)) *Basin Map(s); Area covered by Plan, areas managed by Agency. Adjudicated areas, other agencies. Jurisdictional boundaries.*

Figure 2-2 (354.8 (a) (4)) *Existing land use designations and the identification of water use sector and water source type*

Figure 2-3 (354.8 (a) (5)) *General distribution of wells, location and extent of communities dependent upon groundwater*

Figure 2-4 (354.14 (c)) *Hydrogeologic conceptual model; At least two scaled cross-sections*

Figure 2-5 (354.14 (d)(1)) *Topographic Map*

Figure 2-6 (354.14 (d)(2)) *Surficial geology including locations of cross sections*

Figure 2-7 (354.14 (d)(3)) *NRCS Soil Map*

Figure 2-8 (354.14 (d)(4)) *Recharge and discharge areas*

Figure 2-9 (354.14 (d)(5)) *Surface water bodies*

Figure 2-10 (354.14 (d)(6)) *The source and point of delivery for imported water supplies.*

Figure 3-1 (354.32, 34) *Map of groundwater level monitoring sites*

Figure 3-2 (354.32, 34) *Map of groundwater quality monitoring sites*

Figure 3-3 (354.32, 34) *Map of surface water monitoring sites*

Figure 4-1 (354.16 (a)(1)) *Groundwater elevation contour maps ... associated with the current seasonal high and seasonal low for each principal aquifer within the basin.*

Figure 4-2 (354.16 (a)(2)) *Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.*

Figure 4-3 (354.16 (b)) *A graph depicting estimates of the change in groundwater in storage... annual and cumulative change ...*

Figure 4-4 (354.16 (c)) *Freshwater/Seawater Interface... incl maps and cross sections ... for each principal aquifer*

Figure 4-5 (354.16 (d)) *Map of the location of known groundwater contamination sites and plumes*

Figure 4-6 (354.16 (e)) *Map depicting measurements of land surface and potential compaction*

Figure 4-7 (354.16 (f)) *Identification of interconnected surface water systems. **Map not explicitly required***

Figure 4-8 (354.16 (g)) *Identification of groundwater dependent ecosystems within the basin.*

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- Figure 6-1** Precipitation and Streamgauge Sites Reviewed for Base Period Selection
- Figure 6-2** Napa State Hospital Gage Water Year Precipitation (1950-2015) and Cumulative Departure
- Figure 6-3** Calistoga Gage Water Year Precipitation (1950-2015) and Cumulative Departure
- Figure 6-4** Napa Valley Major Land Use Survey Classes by Year
- Figure 6-5** Napa Valley Subbasin Agricultural Land Use Survey Vineyard Class by Year – Irrigated Acreage Only
- Figure 6-6** Napa Valley Subbasin Agricultural Land Use Survey Non-Vineyard Classes by Year – Irrigated Acreage Only
- Figure 6-7** Napa Valley Subbasin and Subbasin Watershed
- Figure 6-8 (354.18 (a),(b))** Schematic of Water Budget Components in the Napa Valley Subbasin
- Figure 6-9** 1987 Land Use Categories
- Figure 6-10** 2011 Land Use Categories
- Figure 6-11** Root Zone Model - Available Water Capacity
- Figure 6-12** Root Zone Model total annual groundwater storage change and average precipitation for Subbasin from 1988 to 2025
- Figure 6-13** Net Annual Subbasin Storage Change, 1988 – 2015
- Figure 6-14** Groundwater Level Change in Storage - Data Locations
- Figure 6-15** Depth to Base of Aquifer
- Figure 6-16** Depth to Groundwater - Spring 2015
- Figure 6-17** Groundwater Level Change in Storage

- Figure 7-1** Napa Valley Subbasin Representative Monitoring Sites
- Figure 7-2** Northeast Napa Subarea Study Area

<i>GSP Regulations Reference</i>	Article 5. Plan Contents - GSP Subarticle 1. Administrative Information	Plan Contents - Basin Analysis Report Administrative Information
354.4(a)	General Information	Executive Summary
354.4(b)	General Information	1.1 Background
354.6	Agency Information	1.4 Agency Information
354.8	Description of Plan Area	2.1.1 Napa Valley Subbasin Setting and Boundary
354.10	Notice and Communication	1.3 Beneficial Uses and Public Participation
	Subarticle 2. Basin Setting	Basin Setting
354.14	Hydrogeologic Conceptual Model	2.2 Hydrogeologic Conceptual Model
354.16	Groundwater Conditions	4.0 Groundwater Conditions
354.18	Water Budget	6.0 Sustainable Yield Analysis, 5.0 Historical, Current, and Projected Water Supply and Demand
354.20	Management Areas	9.1 Management Areas and Groundwater Ordinances
	Subarticle 3. Sustainable Management Criteria	Sustainable Management Criteria
354.24	Sustainability Goal	7.0 Napa Valley Subbasin Sustainability Goal
354.26	Undesirable Results	7.1 Undesirable Results
354.28	Minimum Thresholds	7.2 Minimum Thresholds
354.30	Measurable Objectives	7.3 Measurable Objectives
	Subarticle 4. Monitoring Networks	Monitoring Network/Programs
354.34	Monitoring Network	3.1 Napa Valley Subbasin Groundwater and Surface Water Monitoring Network and Program Summary
354.36	Representative Monitoring	3.2 Monitoring Program Summary
354.38	Assessment and Improvement of Monitoring Network	4.1.6 Data Gaps
354.40	Reporting Monitoring Data to the Department	8.1 Reporting Schedule
	Subarticle 5. Projects and Management Actions	Projects and Management Actions
354.44	Projects and Management Actions	9.0 Sustainable Groundwater Management
	Article 6. Department Evaluation and Assessment	Appendix
355.2	Department Review of Adopted Plan	Napa County submits plan by January 1, 2017
355.4	Criteria for Plan Evaluation	Basin Report covers entire basin and prepared in accordance with other requirements
355.6	Periodic Review of Plan by Department	County will respond to Department requests as needed
355.8	Department Review of Annual Reports	County will provide the Department with an Annual Report by April 1 of each year following the adoption of the Basin Analysis Report
355.10	Plan Amendments	County will provide Department with substantive updates to Basin Analysis Report, if such occur prior to 5-year updates
	Article 7. Annual Reports and Periodic Evaluations by the Agency	Reporting and Evaluation
356.2	Annual Reports	8.1 Data Reporting Schedule, 9.7 Annual Report
356.4	Periodic Evaluation by Agency	9.8 Five-Year Subbasin Conditions Reporting and Evaluation