

**Draft Annotated Outline to Serve as a General GSP Roadmap  
(changes will occur as the GSP is developed)**

# **Napa Valley Subbasin Groundwater Sustainability Plan**

June 30, 2020

*NOTE: Parenthetical section (§) references in this document refer to sections of the Groundwater Sustainability Plan (GSP) Regulations developed by the California Department of Water Resources.*

## **TABLE OF CONTENTS**

## **ABBREVIATIONS AND ACRONYMS**

## **EXECUTIVE SUMMARY (§ 354.4 (a))**

- Plain language high level summary of GSP sections, findings and recommendations
- GSP Regulations/Department of Water Resources (DWR) Checklist summary (This will be a summary table that lists the various components of the Sustainable Groundwater Management Act (SGMA) and references sections of the GSP that address each SGMA component.
- A more detailed cross walk table that compares the GSP Regulations to the Napa Valley Subbasin GSP will be included in **Appendix A**

## **1 INTRODUCTION TO THE NAPA VALLEY SUBBASIN GROUNDWATER SUSTAINABILITY PLAN**

### **1.1 Background**

#### **1.1.1 Purpose of the Groundwater Sustainability Plan**

- Summary of general principles for Plan implementation (§ 350.4)

#### **1.1.2 Definitions Related to Sustainable Groundwater Management: Key Terms (§ 351)**

- Selected key terms with a more comprehensive list of terms included in an appendix

#### **1.1.3 Description of the Napa Valley Subbasin**

- Include description of Napa River Watershed

#### **1.1.4 Sustainability Goal**

- Provides an introduction to the role of the sustainability goal, as defined by SGMA, in meeting the objective of the Act.
- Multi-benefit watershed and basin management objectives to maintain/improve watershed and ecosystem conditions

## **1.2 Beneficial Uses, Groundwater Users and Public Participation (§ 354.10)**

### **1.2.1 Communication and Engagement Plan (update to 2012 Outreach Plan)**

### **1.2.2 Outreach Implementation**

### **1.2.3 Education**

## **1.3 Agency Information (§ 354.6 and § 353.6)**

This section presents information contained in the Napa County GSA Formation Notice submitted to DWR in December 2019 and the GSP Initial Notification, anticipated to be submitted to DWR in January 2020.

### **1.3.1 Agency Names and Mailing Addresses (§ 354.6a)**

- Describe that the Napa County Board of Supervisors formed the Napa County GSA, consistent with water code sections 10723.8 and 10724 in 2019
- Appendix B with Napa County GSA Formation Notice and GSP Initial Notification

### **1.3.2 Agency Organization and Management Structure (§ 354.6b)**

- Describe the responsibility and authorities of the Napa County GSA
- **Figure 1.1** Organizational Structure of Napa County GSA

### **1.3.3 Contact Information for the Plan Manager (§ 354.6c)**

### **1.3.4 Agency Authorities (§ 354.6d)**

- This section will describe the legal authority of the GSA, with specific reference to citations setting forth the duties, powers, and responsibilities of the GSA, demonstrating that the GSA has the legal authority to implement the Plan

### **1.3.5 Plan Implementation Cost Estimate (§ 354.6e)**

- This section will provide an estimate of the cost of implementing the Plan and a general description of how the GSA plans to meet those costs

### **1.3.6 Description of Initial Notification (§ 353.6)**

## **1.4 Report Organization**

## **2 PLAN AREA (§ 354.8)**

## **2.1 Summary of Jurisdictional Areas and Other Features (§ 354.8 a and b)**

- **Figure 2.1** Plan Area map, delineating areas managed by the GSA and the name and location of adjacent basins
- **Figure 2.2** Jurisdictional Boundary map, showing the jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans
- Written description of the Plan Area, including a summary of the jurisdictional areas and other features depicted on the map

## **3 WATER RESOURCE AND LAND USE MONITORING AND MANAGEMENT PROGRAMS**

### **3.1 Historical Napa Valley Landscape**

- Pre-1960s summary of Napa Valley landscape features, hydrology, hydrological function, drainage management (surface and subsurface)

### **3.2 Historical Land Use and Water Resource Management**

- Provides background on the decades-long effort to sustainably manage groundwater resources in the Subbasin including studies of safe yield in 1975 (USGS) and 1991 (Montgomery)
- History of commitment to watershed stewardship, including action by the County to enact policies and procedures consistent with prior studies, defining a sustainability goal in 2014 prior to SGMA passage, revising the sustainability goal in 2016 based on additional requirements applied by SGMA.

### **3.3 Water Resources Monitoring and Management Programs (10727.2G) (§ 354.8c, d, and e)**

- Identification and description of water resource monitoring and management programs within the Plan Area (§ 354.8c)
- Include description of previous Annual Groundwater Monitoring and CASGEM Reports
- Description of any plans by the GSA to incorporate, adopt, or coordinate with these other monitoring programs into the Plan
- Description of how any of the existing water resource monitoring or management programs described in this section may limit the operational flexibility in the basin, and how the Plan has been developed to adapt to those limits (§ 354.8d)
- Description of conjunctive use programs in basin (§354.8e)

### **3.4 Land Use Elements or Topic Categories of Applicable General Plans (§ 354.8a and f)**

#### **3.4.1 Summary of General Plans and Other Land Use Plans**

- Summary of general plans and other land use plans governing the Subbasin

- Description of how implementation of existing land use plans may change water demands within the subbasin or affect the ability of the GSA to achieve sustainable groundwater management over the planning and implementation horizon, and how the GSP addresses those potential effects.
- General description of how implementation of the Plan may affect water supply assumptions of relevant land use plans over the planning and implementation horizon.
- Any land use implementation plans outside the Napa Valley Subbasin that might affect the ability of the GSA to achieve sustainable groundwater management.
- **Figure 2.3** Existing Plan Area Land Use, showing the existing land use designations and the identification of water use sector and water source type
- **Figure 2.4** Map of Planned Land Use
- Summary of the Well Permitting Process
- Summary of the process for permitting new and replacement wells, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.
- **Figure 2.6** Well Density of the Plan Area map, showing the density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data from DWR (§ 353.2) or the best available information

### 3.5 Additional GSP Elements (§ 354.8 e and g)

#### 3.5.1 Description of Other GSP-Related Elements (§ 354.8g)

A brief description of additional Plan elements listed in water code section 10727.4 that the GSA determines to be appropriate and where those elements occur in the GSP.

**Table 3.1** Additional Plan Elements (per Water Code Section 10727.4) Addressed in the Napa Valley Subbasin GSP. A cross-walk table identifying where the GSP addresses “additional” elements specified in the water code.

- Control of saline water intrusion
- Wellhead protection
- Recharge areas
- Migration of contaminated groundwater
- Well construction, abandonment, and well destruction program
- Replenishment of groundwater extractions
- Conjunctive use and underground storage
- Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects
- Efficient water management practices
- Relationships with State and federal regulatory agencies
- Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity

- Impacts on groundwater dependent ecosystems (GDEs)

### 3.6 Notice and Communication (§ 354.10, 10723.4)

#### 3.6.1 Public Notices and Beneficial Uses and Users (§ 354.10 a, b, and c)

- Summary of information related to notification and communication by the GSA with other agencies and interested parties.
- Description of the beneficial uses and users of groundwater in the Napa Valley Subbasin, including 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 the GSA had with those parties (§ 354.10a)
- A list of the public meetings at which the GSP was discussed or considered by the GSA (§ 354.10b)
- Comments regarding the Plan received by the GSA and a summary of any responses by the GSA (§ 354.10c)

#### 3.6.2 GSA Communications and Decision-Making Process (§ 354.10d)

- Decision-Making Process of the Napa County GSA
- Communication and Engagement Plan (update to Outreach Plan, including identification of public engagement opportunities and description of how public input and responses will be used
- Description of how the GSA encourages the active involvement of diverse social, cultural, and economic elements of the population within the Napa Valley Subbasin
- Description of the method the GSA uses to inform the public about progress of implementation of the Plan, including the status of projects and actions
- Description of the meetings held and input received leading to formation of the Northeast Napa Management Area in the Napa Valley Subbasin
- **Appendix C** Napa County GSA Communication and Engagement Plan

## 4 BASIN SETTING (§354.12, §354.14, §354.16, §354.18, § 354.34, § 354.38, AND § 352.2)

The Basin Setting will be prepared under the direction of a professional geologist or engineer, including the Hydrogeological Conceptual Model, groundwater conditions, water budget and description of the management areas, as applicable.

### 4.1 Geologic Setting

Description of geologic setting for Napa Valley Subbasin and surrounding watersheds. Also, reference to prior work including the prior Napa Valley Updated Hydrogeologic Conceptualization and Characterization of Conditions Report and subsequent geologic cross sections (**Appendix D**). Subbasin Topography, Soil, and Surface Water Features

- **Figure 4.1** Napa Valley Subbasin Topography with Surface Water Features and point source of delivery for imported water
- **Figure 4.1a** Major Surficial Rocks and Deposits of Napa Valley

- **Figure 4.1b** Napa Valley Surficial Geology
- **Figure 4.2** Geologic Cross Section Location Map

#### 4.1.1 Mesozoic Rock

#### 4.1.2 Cenozoic Rocks and Unconsolidated Deposits

- Eight cross valley geologic sections shown in **Figures 4.3 to Figure 4.10**

#### 4.1.3 Lower Valley Cross Sections

- Cross Section D-D' **Figure 4.3**
- Cross Section E-E' **Figure 4.4**
- Cross Section F-F' **Figure 4.5**
- Cross Section G-G' **Figure 4.6**
- Cross Section H-H' **Figure 4.7**

#### 4.1.4 Yountville Narrows Area – Cross-Section C

- Cross Section C-C' **Figure 4.8**

#### 4.1.5 Middle Valley- Cross-Sections A and B

- Cross Section A-A' **Figure 4.9**
- Cross Section B-B' **Figure 4.10**

### 4.2 Hydrogeologic Conceptual Model (§ 354.14 a through d)

This section will synthesize existing studies into a comprehensive Hydrogeologic Conceptual Model, increasing the understanding of aquifer units that are beneficially used, increasing the conceptualization of the shallower part of the subsurface, and expanding upon aquifer properties and extents of major stratigraphic/structural features in the subbasin.

The text will describe the hydrogeologic conceptual model of the Napa Valley Subbasin based on technical studies and qualified maps that characterize the physical components and interaction of surface water and groundwater systems (§ 354.14a).

The Hydrogeologic Conceptual Model will account for the overall Napa River Watershed as the setting for the Napa Valley Subbasin and the physical processes whereby conditions in the Napa River Watershed influence the Napa Valley Subbasin.

**Appendix D** will include the Update Hydrogeologic Conceptualization and Characterization of Conditions.

#### 4.2.1 Basin Boundaries (§ 354.14 b and d)

- Lateral basin boundaries
- Definable bottom of the basin
- **Figure 4.11** 3D Subbasin depiction

- **Figure 4.12** Napa Valley Floor Isopach and Facies Map of Alluvium

#### 4.2.1.1 Structural Geology/Barriers to Groundwater Flow

#### 4.2.2 Principal Aquifers and Aquitards (§ 354.14 b-4)

- **Figure 4.13** Napa Valley Floor Structure Contours and Pre-Alluvium Subcrop Geology
- Formation names; physical properties of the alluvial aquifer, other water bearing formations, and aquitards, including the vertical and lateral extent, hydraulic conductivity and storativity
- Structural properties of the basin that restrict groundwater flow within the varying water bearing formations including information on stratigraphic changes, truncation of units, or other features like faults
- General water quality of the principal alluvial aquifer
- Identification of the primary use or uses (e.g. domestic, irrigation, or municipal water supply)

#### 4.2.2.1 Other Water Bearing Geologic Deposits

- **Figure 4.13** Napa Valley Floor Structure Contours and Pre-Alluvium Subcrop Geology

#### 4.2.3 Soil Characteristics and Recharge Areas (§ 354.14 b-3 and 4)

- This section will include a description of the soil characteristics, with particular focus on recharge ability (delineation of existing recharge areas that substantially contribute to the replenishment of the basin; potential recharge areas and discharge areas)
- **Figure 4.14** Soil Characteristics (source likely SSURGO)
- **Figure 4.15** Map of Geologic Units of Greatest Recharge Potential

#### 4.2.4 Data Gaps in the Hydrogeologic Conceptual Model

- Identify data gaps and uncertainty within the hydrogeologic conceptual model (§ 354.14b-5)

### **5 MONITORING NETWORK AND PROGRAM (§ 354.34, § 354.38, AND § 352.2)**

Development of monitoring network to show short-term, seasonal and long-term groundwater trends.

#### **5.1 Description of Monitoring Networks and Programs**

- Existing monitoring programs and those programs relevant to/associated with the GSP
- **Appendix E** Napa County's Existing Groundwater Monitoring Plan
- **Appendix F** Napa County's most recent Annual Monitoring Report
- **Table 5.1** Summary of Groundwater Level Monitoring Locations

#### **5.2 Monitoring Network Objectives**

- Describe how the network will be developed and implemented to monitor: 1) groundwater and related land surface conditions; and 2) interconnection of surface water and groundwater



### 5.3 Assessment of the Monitoring Network and Recommendations for Expansion/Improvement

- Synthesize surface water, groundwater level, groundwater quality, and subsidence monitoring networks in the Subbasin
- Recommendations for expansion/improvement (including surface water/groundwater monitoring site installation at the planned Technical Support Services (TSS) locations)

### 5.4 Description of Monitoring Network and Protocols

- Developed based on best management practices
- Density and monitoring frequency
- Scientific rationale
- Reporting standards

### 5.5 Ongoing Monitoring Network Evaluation

- Review every five years and modify as needed
- Identify data gaps, and rationale for the existence
- **Figure 5.1** GSP Monitoring Network

## 6 GROUNDWATER AND SURFACE WATER CONDITIONS (§ 354.16)

Update the existing Napa County Data Management System (DMS) with most recent data (including groundwater elevations, groundwater quality, and land subsidence).

Description of historical to current groundwater conditions based on historical monitoring records and including January 1, 2015 to present conditions.

Identify interconnected surface water systems within the basin and provide an estimate of the quantity and timing of depletions of those systems. documented sensitivity to groundwater conditions.

Identify groundwater dependent ecosystems (GDEs) within the basin and describe their documented sensitivity to groundwater conditions, using guidance from DWR, The Nature Conservancy, and others.

**Appendix D** will include the Update Hydrogeologic Conceptualization and Characterization of Conditions Report, and **Appendix F** will include the most recent Annual Monitoring Report of Groundwater Conditions.

### 6.1 Current and Historical Groundwater Conditions

#### 6.1.1 Groundwater Elevations (§ 354.16a)

- Groundwater elevation data demonstrating flow directions within and along the boundaries of the subbasin
- Discussion and calculation of lateral and vertical gradients
- Regional pumping patterns
- **Figure 6.1a** through **6.1xx** Groundwater Elevation Contour Maps showing current seasonal high and seasonal low conditions for the Napa Valley alluvium.



- **Figure 6.2a through 6.2d** Representative Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients for the Napa Valley alluvium (separate figures for geographical areas).
- Appendix G Groundwater Level Hydrographs

#### 6.1.1.1 Historical Groundwater Elevations

- **Figure 6.2a through 6.2d** Representative Hydrographs

#### 6.1.1.2 Recent Groundwater Elevations

- **Figure 6.1a through 6.1xx**
- **Figure 6.2a through 6.2d** Representative Hydrographs

#### 6.1.1.3 Summary of Groundwater Elevation Trends

### **6.1.2 Groundwater Storage (§ 354.16b)**

- Discussion of how changes in groundwater storage are estimated for current conditions, the base period, dry/wet/normal years
  - Brief description of development of base period, reference to cumulative departure from mean annual precipitation curve and **Figure 6.3** Cumulative Departure from Mean Annual Precipitation
- **Figure 6.4** Change in Groundwater Storage Time Series Plot depicting estimates of the change in groundwater storage demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type
- **Figure 6.5** Map showing the Change in Groundwater Storage

### **6.1.3 Groundwater Quality Conditions (§ 354.16d)**

- Description of groundwater quality in the subbasin and how any groundwater quality issues affect the supply and beneficial uses of groundwater (including Disadvantaged Communities).
- **Table 6.1** Groundwater Quality Overview (Number of wells by source and aquifer, number of samples, range of dates of measurements, average concentrations, range of concentrations, etc.; aquifer specific statistics; possible delineation of spatial areas for summarizing data; etc.)
- **Figure 6.6a through 6.6xx** Groundwater Quality Maps (e.g. TDS, Nitrate, Arsenic, etc.; e.g., Maximum Reported Concentrations, Average Well Concentration; etc.)
- Overview of known groundwater contamination sites and plumes
- **Figure 6.7** Groundwater Contamination Sites and Plumes
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#### 6.1.3.1 Historical Groundwater Quality

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- **Figure 6.8** Napa County Sites with available Historical Groundwater Quality Data

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### 6.2 Surface Water Conditions

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#### 6.2.1 Historical Surface Water Conditions

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- **Figure 6.13** USGS Surface Water and DWR Groundwater Monitoring Sites
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#### 6.4 Land Subsidence (§ 354.16e)

- Extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence
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#### 6.5 Interconnected Surface Water (§ 354.16f)

- Discussion and identification of interconnected surface water systems within the subbasin and an estimate of the quantity and timing of depletions/contributions of those systems
- **Figure 6.52** Interconnected Surface Water Systems
- **Figure 6.27** Napa County Surface Water-Groundwater Monitoring Sites

#### 6.6 Groundwater Dependent Ecosystems (§ 354.16g)

- Discussion and identification of groundwater dependent ecosystems (GDEs), utilizing data and guidance developed by The Nature Conservancy, DWR, California Department of Fish and Wildlife, NOAA Fisheries, UC-Davis California Environmental Flows Framework, and also other relevant local data
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## 6.8 Data Gaps (Section 354.38)

Describe the extent of current monitoring networks used to inform groundwater management and GSP implementation in the Napa Valley Subbasin, including a determination of uncertainty and description of any data gaps. Data gaps may include areas that lack sufficient monitoring network coverage or frequency of measurements and areas where Agency-adopted standards for the monitoring network are not being met.

The GSP will describes steps to be taken before the next five-year assessment to fill or otherwise address data gaps, including through adjustments in the frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions where minimum thresholds are exceeded or highly variable spatial or temporal conditions exist, or where adverse impacts to beneficial uses and users of groundwater occur.

## 7 HISTORICAL, CURRENT, AND PROJECTED WATER SUPPLIES (§ 354.18c)

### 7.1 Land Uses and Population Trends

- Summary of acreage of land use categories, historical, current, and projected
- **Table 7.1** Land Use Summary
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### 7.2 Water Supplies and Utilization by Sector (§354.18c3 and c2A)

- Description and tabular presentation of water demands, water supplies, and water use by sector.
- Historical, Current, and Projected water demands
- Historical, Current, and Projected water supplies (groundwater, surface water)
- Surface water bodies, including source and point of delivery for local and imported water supplies (**Figure 7.2** 354.14 (d)(6))
- Discussion of historical and current surface water availability and reliability: a quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten (10) years of surface water supply information.
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#### 7.2.2.3 [The City of Calistoga](#)

#### 7.2.2.4 [The Town of Yountville](#)

### 7.2.3 Unincorporated Areas Water Supply and Utilization

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### 7.2.4 Groundwater Dependent Ecosystem Water Use

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## 7.3 Total Napa Valley Subbasin Water Use

- Basin-wide summary of the water use in the Napa Valley Subbasin
- **Figure 7.5** Napa Valley Subbasin Total Water Use, by Source of Supply
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## 8 WATER BUDGET (§ 354.18)

Water budgets developed for the GSP will be products of an open-source modeling tool capable of analyzing the impacts of water use and management actions on groundwater conditions, including impacts to interconnected surface waters and Groundwater Dependent Ecosystems (GDEs). Historical, current, and future water budgets presented in the GSP will provide an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the Napa Valley Subbasin and changes in the volume of water stored.

GSP outreach and stakeholder engagement efforts will provide a venue for understanding water use by beneficial uses and users of groundwater in the Napa Valley Subbasin, including GDEs, and inform the development of sustainability criteria to avoid undesirable results.

## 8.1 Watershed and Ecosystem Water Budgets in the Context of SGMA

- Consideration of regional watershed management and water budgets related to major tributaries to the Napa River and the Napa River watershed as a whole. Emphasis for the GSP will focus on the Napa Valley Subbasin with attention to data gaps, data needs, future monitoring that relates to sustainability of water resources and ecologic systems in the Subbasin as supported by overall watershed health.
- Consideration of ecosystem water budgets, including best available understanding (i.e., existing studies and published works) of spatial/temporal water requirements to maintain/improve overall ecosystem conditions. This is a long-term consideration recognizing likely data gaps and other data that will need to be developed to inform appropriate approaches to enhance and support the ecological complexity of the Napa River ecosystem.
- Consideration of adaptive management approaches that recognize the Napa Valley Subbasin has a two-century history of landscape modification, manipulation of valley wide surface and subsurface drainage prior to the 1930s and changed river system hydrological function along with river ecosystem simplification. Historical land use practices (since the 1800s), including drainage water management and flood control, have contributed to other unintended effects such as stream channel incision and habitat degradation.

## 8.2 Napa Valley Subbasin Hydrologic Base Period

- Description and methodology for selecting an appropriate hydrologic base period
- Discuss base period selection relative to water budget components and available data
- **Figure 6.3** Cumulative Departure from Mean Annual Precipitation
- **Table 8.1** Summary of Overall Subbasin Water Budget Components

### 8.2.1 Long-term Mean Water Supply

### 8.2.2 Antecedent Dry Conditions

### 8.2.3 Cultural Conditions

### 8.2.4 Water Management Conditions

## 8.3 Summary of Current Water Budget Year (§354.18)

- Hydrologic conditions, including precipitation, evapotranspiration, groundwater levels, surface water flows.

## 8.4 Summary of Water Budget Approach

- Description and methodology for water budget approach (high level overview)

## 8.5 Projected 50-Year Hydrology (§354.18c3)



- Establish 50-Year future hydrologic period including climate change considerations and uncertainty
- Utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology.
  - Determine hydrologic uncertainty associated with projections of climate change and sea level rise.
- Determine projected water demand using most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand.
  - Determine the water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.
- Determine projected surface water supply using the most recent water supply information as the baseline condition for estimating future surface water supply
  - Determine the surface water supply availability and reliability as a function of the historical surface water supply

## 8.6 Water Budget Framework (high level explanation of a water budget)

Discussion of how a water budget for the basin provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored.

- **Table 8.1** Summary of Overall Subbasin Water Budget Components

### 8.6.1 Surface Water Inflows and Outflows

- Surface water inflows into the subbasin as streamflow
- Surface water inflows to the subbasin from municipal reservoirs
- Surface water inflows to the subbasin from outside through conveyance facilities
- Surface water outflows from the subbasin as runoff and groundwater discharge to surface water bodies

### 8.6.2 Groundwater Inflows and Outflows

- Groundwater inflows to the subbasin from groundwater recharge and subsurface inflows along subbasin boundaries
- Groundwater outflows from the subbasin that leave the subbasin via subsurface lateral flow
- Groundwater outflows due to evapotranspiration and groundwater pumping in the subbasin

### 8.6.3 Change in Storage

- Changes in annual groundwater storage in the subbasin
- **Table 8.1** Summary of Overall Subbasin Water Budget Components

## 8.7 Napa Valley Integrated Hydrologic Model (NV-IHM)

Describe development of the NV-IHM to provide an open-source tool for quantifying and understanding inflows and outflows of water to the Napa Valley Subbasin, with an emphasis on accurately representing how conditions in the overall Napa River Watershed influence the Napa Valley Subbasin water budget and how conditions vary spatially and temporally within the Subbasin in ways that are relevant to the needs of beneficial uses and users of groundwater including GDEs, municipal and domestic uses, and agriculture.

NV-IHM structure will be described including the model platform used to represent conditions in the Napa River Watershed above the Subbasin (likely by the U.S. Geological Survey's California Basin Characterization Model, or similar) and the model platform used to represent conditions in the Napa Valley Subbasin and adjacent areas through the U.S. Geological Survey's MODFLOW-One Water Hydrologic Model.

Describe efforts to coordinate model development with related efforts including the Napa Valley Drought Contingency Plan and City of Napa/County of Napa Municipal Reservoir Watershed Model

**Appendix J** will be prepared in support of the GSP and will include the technical information relating to the NV-IHM Development, Evaluation, Model Application, and Model Results.

### 8.7.1 Evaluation of Existing Integrated Hydrologic Models

- City of Napa/County of Napa Municipal Reservoir Watershed Model WARMF Model

### 8.7.2 Selection of Integrated Hydrologic Flow Model

- Selection of model platform – MODFLOW One Water Hydrologic Model
- Summary of historical, current and projected (50-year) water budget periods
- Overview of model development and objectives

### 8.7.3 Projected (Future) model scenario(s)

- Describe scenarios used to evaluate effects of climate change (including sea level rise), potential land use changes consistent with local land use policies and projections, and water supply changes
- Results

## 8.8 Subbasin Water Budget (§354.18)

Description of accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored.

### 8.8.1 Historical Water Budget

- Quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years (or as is sufficient to calibrate and reduce uncertainty of the model and therefore reduce the uncertainty of

the future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon)

- Description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the GSA to operate the basin within the sustainable yield
- Characterize the historical water budget using water year types
- Describe historical water budgets for Water Balance Regions (areas with the overall Subbasin including the Napa River corridor, unincorporated areas, and areas within water service boundaries of municipal water systems)

#### 8.8.1.1 [Subbasin Inflows Description](#)

#### 8.8.1.2 [Subbasin Outflows Description](#)

### 8.8.2 Change in Groundwater Storage

- Quantification of the change in the annual volume of groundwater in storage between seasonal high conditions. If no overdraft occurs, state and provide justification.

### 8.8.3 Water Year Types

- Quantification of water year types associated with the annual supply, demand, and change in groundwater stored

### 8.8.4 Summary of Current Water Budget Year

### 8.8.5 Projected 50-Year Water Budget

- Utilize 50-year projected hydrology, projected water demand, and projected surface water supply developed above to characterize the projected water budget using water year types.

### 8.8.6 Water Budget Summary

- Additional analyses and individual water budgets for the Napa Valley Subbasin and Water Balance Regions (WBRs; groupings of Subregions including the Napa River corridor)
- Summary of quantification of water budget for historical, current, and projected conditions
- Preliminary consideration of ecosystem water budget relative to different water year types and discussion of data gaps/needs/future information to improve accounting for the environment
- Quantification of all inflows and outflows to the Subbasin and WBRs
- Historical and projected water budgets for the Subbasin and WBRs
- **Figure 8.1 to Figure 8.4**, Subbasin Inflows, Outflows, and Net Annual Storage Change
- **Table 8.2 and Table 8.3** Napa Valley Subbasin Annual Water Budget Results and Napa Valley Subbasin Calculated Annual Groundwater Pumping

- **Table 8.4** Historical, Current, and Projected Water Budget
- **Figures 8.5a** through **8.5xx** Water Budget Graphs/Pie Charts/other Figures

## 8.9 Groundwater Level Change in Storage Analysis

- Groundwater contours and potentiometric surfaces for key base period years
- **Figure 8.6** Groundwater Level Change in Storage; Cumulative Groundwater Level Change in Storage

### 8.9.1.1 Groundwater Contours and Potentiometric Surfaces for Key Base Period Years

## 8.10 Sensitivity Analysis

Addressing water budget uncertainty through sensitivity analysis to quantify how water budget results change as parameter values in the model are varied across a range of potential values.

### 8.10.1 Groundwater Level Change in Storage Sensitivity Analysis

### 8.10.2 NV-IHM Sensitivity Analysis

- Development and explanation of model sensitivity runs for integrated hydrologic model, and the groundwater level change in storage analysis, in order to help determine sustainable yield
- Results of sensitivity runs
- **Table 8.5** Summary of Model Sensitivity Results
- **Figure 8.7** Model Sensitivity Results

## 8.11 Napa Valley Subbasin Sustainable Yield

- Description and quantification of the sustainable yield for the subbasin
- **Figure 8.1** to **Figure 8.4** Subbasin Inflows, Outflows, and Net Annual Storage Change
- **Table 8.2** and **Table 8.3** Napa Valley Subbasin Annual Water Budget Results and Napa Valley Subbasin Calculated Annual Groundwater Pumping
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## 9 NAPA VALLEY SUBBASIN SUSTAINABILITY GOAL

### 9.1 Sustainability Goal (§ 354.24)

Establishment of a sustainability goal that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline.

### 9.1.1 Napa Valley Subbasin Sustainability Goal

- Information from the basin setting used to establish the sustainability goal,
- Discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield (including measures to avoid undesirable results), and
- Explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon
- **Appendix K** detailing sustainability goals and groundwater sustainability objectives developed by the Napa County Groundwater Resources Advisory Committee

## 9.2 Sustainability Indicators and Undesirable Results (§ 354.26)

### 9.2.1 Undesirable Results for the Napa Valley Subbasin

- Cause of groundwater conditions that would lead to or could result in undesirable results
- Criteria used to define undesirable groundwater conditions for each sustainability indicator
  - If it is determined that there is a sustainability indicator not present within the basin, then no criteria need be established for that indicator

### 9.2.2 Determination of Significant and Unreasonable Effects Occurring Throughout the Basin

- Present the definitions of significant and unreasonable effects most recently revised by the County in the report establishing the Northeast Napa Management Area.
- **Appendix L** Northeast Napa Management Area Amendment to 2016 Basin Analysis Report

## 9.3 Representative Monitoring Sites (§ 354.36)

Subset of monitoring locations that are representative of the subbasin or an area of the subbasin, where sustainability indicators are monitored, and minimum thresholds and measurable objectives are defined.

### 9.3.1 Demonstration of Short-Term, Seasonal and Long-Term Trends

- Description of how the representative monitoring network provides sufficient data to demonstrate short-term, seasonal, and long-term trends
- Support the designation of a representative monitoring site with adequate evidence demonstrating that the site reflects general conditions in the area.

### 9.3.2 Sustainability Indicators Applicable to Representative Sites

- Provide sustainability indicators applicable for each representative monitoring site
- **Table 9.1** Representative Monitoring sites, Napa Valley Subbasin

- **Figure 9.1** Representative Monitoring sites, Napa Valley Subbasin

#### 9.4 Minimum Thresholds (§ 354.28)

- Description of each minimum threshold and how they were established for each sustainability indicator
- Thresholds will be supported by historical groundwater trends, water year type, projected water use, sustainable yield, effect on other indicators, current and projected sea level, and regulatory standards
- Description of information and criteria used to establish the minimum threshold and how it relates to other regulatory standards
- Relationship for each sustainability indicator
- Description of how minimum threshold have been selected to avoid undesirable results in adjacent basins and how they will be measured
- Description of how selection of the minimum threshold may affect beneficial uses and users of groundwater
- **Table 9.2** Representative Monitoring Sites and Sustainability Indicators

##### 9.4.1 Minimum Thresholds for Chronic Lowering of Groundwater Levels

- **Table 9.3** Minimum Thresholds to Avoid Chronic Lowering of Groundwater Levels

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##### 9.4.4 Minimum Thresholds for Degraded Groundwater Quality

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##### 9.4.5 Minimum Thresholds for Land Subsidence

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##### 9.4.6 Minimum Thresholds for Streamflow Depletion

- **Table 9.8** Minimum Thresholds to Avoid Streamflow Depletion

## 9.5 Measurable Objectives (§ 354.30)

- Description of establishment of the measurable objectives for each sustainability indicator and how to reach the sustainability goal
- Description of how a reasonable margin of safety/flexibility was established for each measurable objective
- Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones

### 9.5.1 Measurable Objectives for Chronic Lowering of Groundwater Levels

- **Table 9.9** Measurable Objectives to Avoid Chronic Lowering of Groundwater Levels

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- **Table 9.10** Measurable Objectives to Avoid Reduced Groundwater Storage

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## 9.6 Summary of GSP Groundwater Monitoring Network

## 9.7 Northeast Napa Management Area

### 9.7.1 Rationale for Management Area Delineation

- Reason for creation of each management area that demonstrates the MA will facilitate implementation of the Plan (see also Appendix M Northeast Napa Area Special Study Report)
- **Figure 9.5** Northeast Napa Management Area Map

### 9.7.2 Sustainability Criteria for Management Area

- Define minimum thresholds and measurable objectives for the management area(s) and explain rationale for selecting those values, if different from the subbasin at large



- Explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area
- **Table 9.14** Minimum Thresholds and Measurable Objectives to Avoid Chronic Lowering of Groundwater Levels
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#### 9.7.3 Representative Monitoring Sites for Northeast Napa Management Area

- Describe the level of monitoring and analysis appropriate for management area
- **Figure 9.6** Representative Monitoring Sites for management area

## 10 MONITORING DATA MANAGEMENT AND REPORTING (§ 352.4)

### 10.1 Groundwater Data Management

- Description of how groundwater data is obtained, managed, used, and shared.
- Description of well construction, well use, CASGEM ID number, location, principle aquifers, or other well construction information that is relevant
- If well construction information is missing a description of how the GSA will acquire the information or why it is not needed.

### 10.2 Data Management Overview

- Description of how data is collected, different monitoring programs' reporting guidelines, and established guidelines to ensure that data are managed according to the well owner's permission and/or as it relates to applicable permit conditions.
- Reporting standards, Map, Hydrograph and model Standards as detailed by the Department of Water Resources

### 10.3 Data Management System (DMS) (§ 352.6 and § 354.4)

- The Napa Valley DMS has been constructed to incorporate existing and new data for groundwater resources in the Napa Valley Subbasin.
- Site-specific information stored for various types of monitoring (surface water; groundwater; land subsidence) (e.g., reference point description, methods of measurements, etc.)
- The DMS is used to evaluate basin-wide groundwater supply and quality conditions and functions as a secure data storage location

- DMS platform (e.g. MS Access or SQL)

## 10.4 Data Use and Disclosure

Discussion of confidentiality issues.

### 10.4.1 Protected Data

### 10.4.2 Data Sharing and Disclosures

#### 10.4.2.1 [Napa County Program](#)

#### 10.4.2.2 [Water Data Library](#)

#### 10.4.2.3 [CASGEM Program](#)

### 10.4.3 Data from Other Sources

## 10.5 Data Submittals (§ 354.40 and § 356.2)

Data submitted to DWR will include electronic submittal of data contained in the DMS and monitoring data submitted electronically on forms provided by DWR through the SGMA Portal.

## 10.6 Reporting (§ 356.2)

### 10.6.1 SGMA Annual Report

### 10.6.2 SGMA GSP Five-Year Update and Evaluation of Management Efforts

## 11 SUSTAINABLE GROUNDWATER MANAGEMENT: PROJECTS AND MANAGEMENT ACTIONS (§ 354.44)

### 11.1 Goals, Policies, and Ordinances

#### 11.1.1 Achieving/Maintaining Sustainability

- Descriptions of how to achieve Basin Sustainability and benefits from each project and management action.

#### 11.1.2 Benefits of Projects and Management Actions

- Description of the measurable objectives that are expected to benefit from the project, how or why they will be implemented

#### 11.1.3 Preliminary Evaluation of Projects and Management Actions

- Status of each project and action including cost, funding, expected initiation and completion
  - **Table 11.1** Expected Initiation and completion Table for Projects and Management Actions
  - Description of how the GSA plan to meet the costs

#### 11.1.4 Projects and Management Actions: Public Noticing, Permitting, and Authorities

- Summary for Public noticing and Permitting, Regulatory process, and legal authority required for each project and management action.

#### 11.1.5 Evaluation of Projects/Management Actions Effectiveness

- Summary of the expected benefits and how they will be evaluated

#### 11.1.6 Approach to Groundwater Management During Droughts

- Description of groundwater management for extraction and recharge during droughts

#### 11.1.7 Planned Response to Minimum Threshold Exceedances/Undesirable Results

- Description of response to minimum threshold exceedances and potential undesirable results

### 11.2 Education and Collaboration

#### 11.2.1 GSA Collaboration

- Description of how the Napa County GSA collaborates with other local agencies to share information and assessments

#### 11.2.2 GSP Advisory Committee

#### 11.2.3 Watershed Information and Conservation Council (WICC)

#### 11.2.4 Well Owner Outreach and Education

- Description of Well Owner outreach and self-directed monitoring education

#### 11.2.5 Participation in IRWMPs/GMPs/SNMPs/etc.

- San Francisco Bay Area IRWMP
- Westside IRWMP

### 11.3 Other Groundwater Management Strategies (Projects and Management Actions and Cost Feasibility)

- Potential changes in land use controls to consider
- Potential changes to well regulations to consider
- Role of recycled water
- Groundwater ordinances
- Other actions in cooperation with cities and other stakeholders
- Description of groundwater management for extraction and recharge during droughts
- Potential for requiring additional well monitoring and reporting for all users in the basin
- Potential for generating revenue to fund the agency via taxes and fees on well owners

#### **11.4 Ongoing Evaluation of Groundwater Management Efforts**

Conduct ongoing assessments (annual and five-year updates) of groundwater conditions, new information or changes in water use, consideration of changes in subbasin and management area groundwater conditions, management actions implemented and their effect on subbasin conditions, and additional management tools or actions needed to maintain subbasin sustainability.

#### **11.5 Best Management Practices (BMPs)**

Description of applicable BMPs as documented by DWR.

### **12 PLAN IMPLEMENTATION**

#### **12.1 Summary**

Summary of findings for each major section of the GSP.

#### **12.2 Recommendations**

Summary of recommendations for such things as the monitoring network, coordination efforts, reducing uncertainty in water budget components, etc.

#### **12.3 Annual Reports (§ 353.2 and § 355.4)**

Summarize plans and formats for creating and submitting annual reports.

#### **12.4 Periodic Evaluation by GSA (§ 355.4 and § 356.4)**

Summarize and provide details of how the GSA will perform periodic evaluations of the GSP implementation.

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