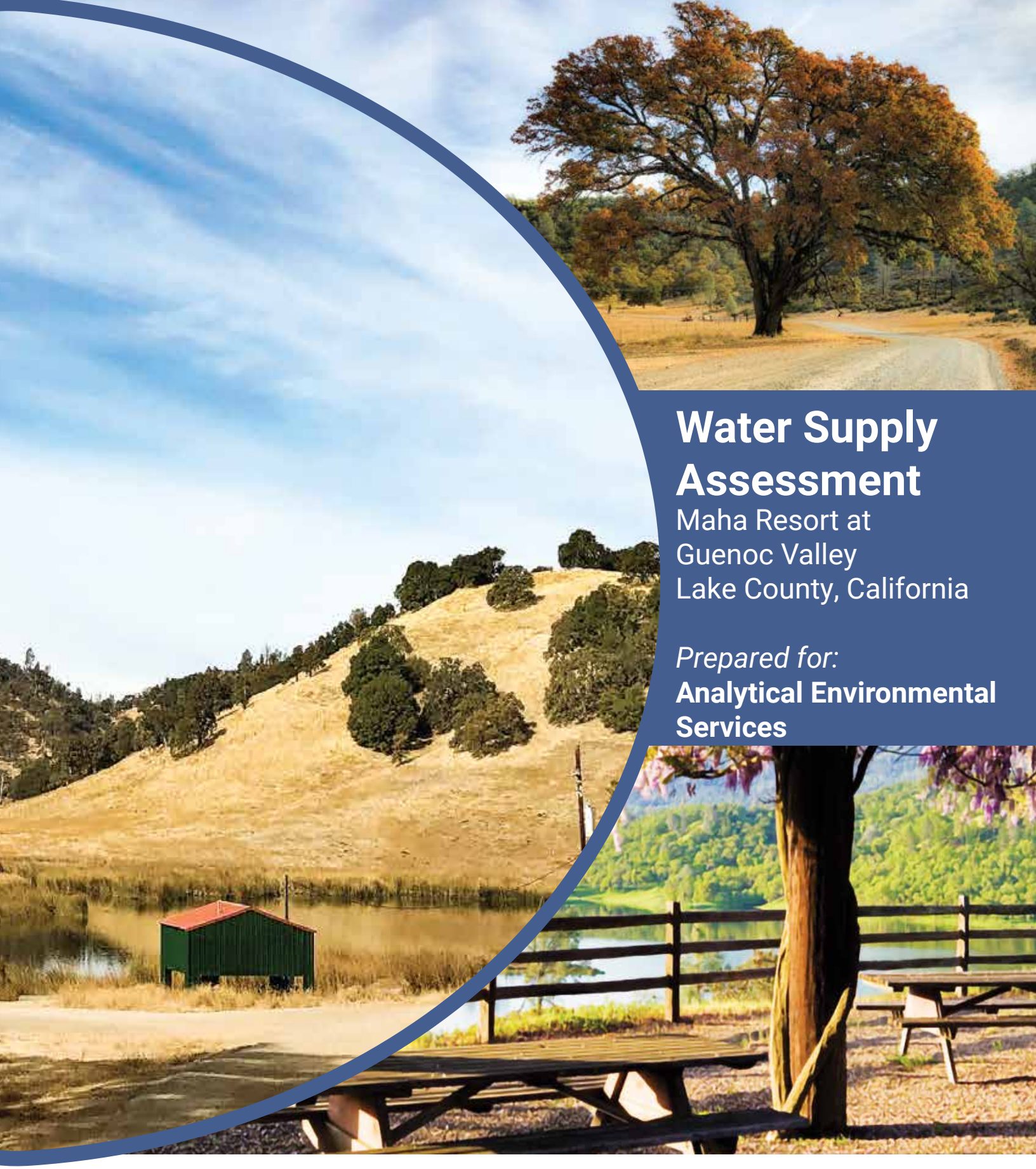
# *APPENDIX WSA*

*WATER SUPPLY ASSESSMENT*



# Water Supply Assessment

Maha Resort at
Guenoc Valley
Lake County, California

*Prepared for:*
**Analytical Environmental Services**

*February 2020*

Luhdorff & Scalmanini
Consulting Engineers

# Water Supply Assessment
# Maha Resort at Guenoc Valley
# Lake County, California

Prepared for

Analytical Environmental Services

Prepared by

Luhdorff & Scalmanini

Consulting Engineers

February 4, 2020

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## APPENDICES

Appendix A Records of Surface Water Diversion and Use 2009 to 2018

## LIST OF ABBREVIATIONS & ACRONYMS

| | |
|---|---|
| AF | Acre-feet |
| AFD | Acre-feet per day |
| AFY | Acre-feet per year |
| AOI | Area(s) of Interest |
| AWC | Available Water Capacity |
| BCM | U.S. Geological Survey California Basin Characterization Model |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| CDPH | California Department of Public Health |
| CEQA | California Environmental Quality Act |
| CFS | Cubic feet per second |
| CFWS | California Fish and Wildlife Service (formerly California Department of Fish and Game) |
| CGPS | Continuous Global Positioning System |
| CGS | California Geological Survey |
| DWR | California Department of Water Resources |
| DFW | California Department of Fish and Wildlife |
| EC | Electrical conductivity |
| EIR | Environmental Impact Report |
| ET | Evapotranspiration |
| eWRIMS | State Water Resources Control Board Electronic Water Rights Information Management System |
| ft | Feet |
| ft/d | Feet per day |
| $ft^3/d$ | Cubic feet per day |
| GAMA | Groundwater Ambient Monitoring Assessment Program |
| GCM | Global Climate Model |
| GDE | Groundwater Dependent Ecosystems |
| GPD | Gallons per day |
| GPM | Gallons per minute |

| | |
|---|---|
| GPY | Gallons per year |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| GVD | Guenoc Valley District |
| GWE | Groundwater Elevation |
| GWL | Groundwater Level |
| GWQ | Groundwater Quality |
| MCL | Maximum Contaminant Level |
| mg/L | Milligrams per liter |
| m.y. | Million years |
| NOAA | National Oceanic and Atmospheric Administration |
| POD | Points of Diversion |
| S | Storativity |
| SB 610 | California Senate Bill 610 |
| SGMA | Sustainable Groundwater Management Act |
| SPOD | Specific Plan of Development |
| SWN | State Well Number |
| SWP | State Water Project |
| SWRCB | California State Water Resources Control Board |
| SWRCB - DDW | California State Water Resources Control Board – Division of Drinking Water |
| T | Transmissivity |
| TDS | total dissolved solids |
| µg/L | Micrograms Per Liter |
| USGS | United States Geological Survey |
| UWMP | Urban Water Management Plan |
| WSA | Water Supply Assessment |
| WDL | Water Data Library |
| WQ | Water Quality |
| WY | Water Year |

## GEOLOGIC NOTATIONS

| | |
|---|---|
| Jv | Volcanic Rocks, mainly basalt |
| KJf | Franciscan Formation<br>(ss-sandstone, shale, conglomerate, ch-chert, gs-greenstone, mg-metagraywacke) |
| KJu | Lower Cretaceous and Upper Jurassic Rocks<br>(undifferentiated marine mudstone, sandstone, and conglomerate (includes "Knoxville Formation") |
| Ku | Upper Cretaceous<br>(undifferentiated marine rocks) |
| Q\Qa\Qb | Alluvium<br>(Quaternary period, poorly sorted stream and basin deposits, clay to boulder size) |
| Qt | Terrace deposits |
| QTc | Cache Formation<br>(Includes Pleistocene Kelsyville and Lower Lake Formations of Rymer, 1980. Pebbly sandstone, conglomerate, siltstone, and tuff; nonmarine) |
| QTcv | Clear Lake Volcanics<br>(d-dacite, a-andesite to basaltic rock, b-basalt, r-rhyolite, t-tuff and other pyroclastic rocks) |
| um | Ultramafic Rocks (Peridotite)<br>(partly to complete serpentinized) |

Note: geologic notations and descriptions from California Geological Survey, Regional Geologic Map, Santa Rosa Quadrangle (1982)

## EXECUTIVE SUMMARY

This Water Supply Assessment (WSA) analyzes the existing and planned future water demands and available water supplies for the proposed Maha Resort at Guenoc Valley (Project), including Phase One and a future phase of development. The report demonstrates that the Project has existing available water supplies from two sources, local surface water and groundwater, and a planned future supply of recycled (non-potable) water. In both normal and dry year conditions, for the year 2020 the Project site is expected to have a range of 9,163 to 16,223 acre-feet of water available annually. Projecting out to the year 2040 (and full build-out of the first phase and future phase), in both normal and dry year conditions the Project site will have a range of approximately 9,266 to 13,886 acre-feet of water available annually. For both potable and non-potable water needs, this available water supply significantly exceeds projected water demands, as analyzed from 2020 through 2040. More specifically, even with full build-out of the first phase and the Future Phase in 2040, an annual water surplus of at least 3,380 acre-feet of water is projected. Based on the analysis presented in this WSA, available sources of supply are anticipated to exceed Project and non-Project water demands in normal and dry years through 2040, consistent with the requirements of California Senate Bill 610.

## 1 INTRODUCTION

The proposed Maha Resort at Guenoc Valley (Project) would occur on a 16,000 acres site in southeastern Lake County (Project Area). The Project Area is located approximately three miles southeast of Middletown and currently supports agricultural land uses along with tourism-focused uses, including a hunting lodge and camp. The Project has applied to the County of Lake to rezone the Project Site to a new zoning designation the "Guenoc Valley District (GVD)". Pursuant to the California Environmental Quality Act (CEQA) the application will include an Environmental Impact Report (EIR). The EIR will include a programmatic analysis of the impacts to rezone the Project Site, the EIR will include a detailed, project level analysis of the impacts at a project level review of the first phase of development, submitted as the Specific Plan of Development (SPOD). The Project Level review EIR will analyze the environmental changes caused by a development including the construction and operation, whereas the programmatic EIR will evaluate impacts resulting from the rezone classification rather than a project specific analysis. Future phases of the project will require additional CEQA review. This Water Supply Assessment (WSA) analyzes both the first phase (Phase One) project level impacts and the potential future phase development within the new GVD zoning classification.

### 1.1 Purpose

California Senate Bill 610 (SB 610), which amended Part 2.10, Division 6 of the California Water Code in 2001, requires an evaluation of the sufficiency of water supplies to meet existing and planned future demands for water when proposed development projects meet certain minimum criteria (see Section 1.5). This Water Supply Assessment (WSA), provides an SB 610 evaluation, including existing and proposed water demands, for the Project Area. Water demands evaluated by this WSA include those planned to occur as part of the Project and other planned future uses in the Project Area and Adjacent Non-Project Areas with shared sources of supply (**Figure 1-1**). This WSA evaluates existing and planned

water supplies for the Project Area including surface water, groundwater, and recycled water. This WSA addresses the sufficiency of available water supplies to meet projected demands during normal, single-dry, and multiple-dry years over a twenty-year planning horizon, through 2040. Lake County is the Lead Agency for the Project.

## 1.2 Proposed Maha Resort at Guenoc Valley Project

The Maha Resort at Guenoc Valley is a proposed rezoning and development project located in southern Lake County. The Project includes luxury resorts and master planned residential community to be sited in clusters across the approximately 16,000-acre Project Area. The Project incorporates low impact designs that prioritize low density and clustered development, preserving surrounding open space and agricultural cultivation.

Phase One includes the construction of the roads and the utility infrastructure, approximately 225 hotel rooms, 144 resort residential units, 411 Residential villas, workforce and staff housing, and resort accessory commercial structures. The allowable uses within Future Phases evaluated as part of this WSA, include similar resort, resort accessory, and residential land uses, consistent with the development density presented in the Middletown Area Plan.

Each resort community or cluster will include a mixture of hotel units, resort residential and residential villas. The Project commercial elements will include small boutique hotels, commercial shops, and small artisanal food and winery production facilities, small farm and integrative animal husbandry elements and spa and restaurants. The key recreational facilities will include an equestrian center, an 18-hole golf course, rural recreation, and camping facilities.

The Project will also include essential operational facilities including workforce housing, central back-of-the-house operations, and emergency response center. Workforce housing is planned to be developed in Middletown, at a currently undeveloped parcel within the Collayomi County Water District Service Area.

The Project will likely form a privately held public utility company that will operate and maintain the water and sewer facilities at the property. Regulated water utilities are considered to be professional water service providers that own water and wastewater utilities, partner with municipalities to form public-private partnerships, or operate and maintain water and wastewater systems as contracted services providers. The new water system will likely be a Class B system that will serve between 2,000 to 10,000 service connections. New water supply infrastructure is being planned for the Project that will include both a potable and non-potable water systems.

### 1.2.1 Potable Water System

The potable water system will include three water systems serving separate parts of the Project Area: the Guenoc Valley area, the Upper Bohn Lake area, and the Camping area. The Guenoc Valley system will be designed to serve the Central Back of House area, the Equestrian Center and the Bohn Ridge

Resort. The Upper Bohn Lake system will serve the Maha Farm/Sales Center area, the Spa, Emergency Center and Support Services, the Red Hill Estates and Renaissance Golf Course, and the Resort at Trout Flat. A small water system will serve the remotely located Camping area.

Each water system will likely include a series of deep, water supply wells that will pump water to strategically placed water storage tanks.[1] Each tank will have a multi-pump booster station to maintain system pressures throughout the water distribution system. Each water system will include a water distribution system that will consist of a series of branched and looped water lines, where required to serve all commercial and residential parcels.

A series of potable water storage tanks will be installed at each water system. The domestic water storage tanks will be sized to satisfy the maximum day demand requirements for each area.

For the Guenoc Valley water system the total amount of water storage is estimated to be approximately 170,000 gallons. This will serve the Central Back of House area, the Equestrian Center and the Bohn Ridge Resort.

For the Upper Bohn Lake water system, a total of approximately 260,000 gallons of potable water storage capacity will be needed. For this system approximately 125,000 gallons of storage capacity will be needed at Maha Farms area and 135,000 gallons of storage capacity to serve the Red Hill Estate, the golf course, the Resort at Trout Flat, the Emergency Center and short-term staff accommodations and the Spa area.

The water storage tanks will likely be placed in elevated locations to provide gravity flow to the parcels served in the event of a power outage. The tanks will likely be placed on graded pads that will also be bermed with the cut material so that the grading cut and fill volume are closely balanced to avoid the transport of soils from these sites. In some locations, underground cisterns may be used to avoid impacts associated with aboveground tanks. The location of the tank and cistern sites can be selected and planned so that their installation and operation does not impact sensitive cultural, historic, and biotic resources at the site.

A system of booster pump systems located at the water storage tanks and possibly within the distribution system will be used to maintain a uniform operating pressure in each water system. It is anticipated that each booster pump system will include at least three (3) booster pumps plumbed in parallel that will be operated by a variable frequency drive controller to determine how many pumps are in operation at a given time to maintain the pressure requirements for the system. Under low or normal flow conditions it is likely that a single booster pump will be operating and, as the water demand increases, the additional standby pumps will turn on to maintain a constant flow and pressure throughout the distribution system.

[1] Water storage tanks may include both aboveground and underground facilities.

The booster pump systems will typically be installed in close proximity to the water storage tanks and will be placed in areas that are graded as a result of the storage tanks. The booster pump systems will be installed in small enclosures.

The water systems will consist of both branched in in some locations looped water distribution systems. The water distribution systems will consist primarily of 4-inch diameter water mains and 3- and 2-inch water laterals to supply the commercial building and residential parcels. The majority of the water mains and laterals will be installed in the planned roadways and driveways and will not be installed in undisturbed areas on the site, unless requested as part of the permitting process, and therefore should not result in any additional impacts to cultural, historic or biotic resources related to the installation of the new roads.

### 1.2.2 Non-Potable Water System

Two non-potable water system are also planned to be installed: one to serve development in the Guenoc Valley and a second system to serve the development in the Upper Bohn Lake area.

In general, both non-potable systems will include a new non-potable water distribution network, new surface water pumping systems, and wastewater recycling systems.

The non-potable water distribution will be constructed to supply fire and irrigation water demands for the site. The non-potable water distribution system will be a “purple pipe” system so that it can convey recycled water, as well as other sources of non-potable through the distribution system. The non-potable water distribution system will serve fire hydrants and external and internal fire sprinkler systems for commercial and residential buildings. The non-potable water distribution system will consist primarily of 8-inch and 6-inch water mains and 3-inch and 2-inch diameter laterals to serve fire sprinkler systems and residential properties to provide the required pressure. The majority of the non-potable water distribution system will be installed in planned roadways and driveways and should not result additional land disturbance and impacts to cultural, historic and biotic resources beyond impacts resulting from the construction of the new roads.

Both non-potable water systems will include new pumping systems located in the vicinity of the existing pumping systems at Detert, McCreary and Upper Bohn Lake. A new pump station will be installed in the vicinity of the flashboard dam installed across Bucksnort Creek downstream of McCreary Reservoir and this pump station will house two pumping systems: one pump station will convey water to Lower Bohn Lake and the second will pump water up to the new Renaissance Golf Course in the Red Hill area.

The new surface water pump stations on Detert and McCreary Reservoirs will be connected to the Guenoc Valley non-potable water system and will be used to supply irrigation, fire protection and make up water for water features and ponds in this area. The surface water pump stations placed on Bucksnort Lake and Upper Bohn Lake will be used to pump water to the non-potable water system in the Upper Bohn Lake Region for irrigation, fire protection and make up water for evaporative losses in water features and ponds.

The new surface water pump stations at the reservoirs will be installed adjacent to the existing pumping plants and will be placed in areas that have been graded and should not result in substantial ground disturbance during their construction and installation. The new pumping plant at Bucksnort Creek will be placed in a small area above the normal highwater mark and outside of the immediate riparian zone of the creek. It will likely be within 50 feet of the creek and with the riparian zone; however, it will be constructed in a location that will minimize impacts to sensitive cultural, historic and biotic resources in this area.

### 1.2.3 Recycled Water Facilities

Based on the remote locations of the clustered development plan, several small package type water recycling plants will be installed to treat wastewater from the development areas. Seven small package plants are currently planned to serve the Phase I project and will include small treatment works at the Maha Farm, Redhill/Renaissance Golf Course, Resort at Trout Flat, Central Back of the House, Equestrian Center and a small system at the Camping area.

The treatment systems will be designed to meet California Title 22 recycled water regulations for tertiary level disinfected recycled water that can be used for unrestricted irrigation and recreational use of the water.

At each water reclamation facility there will be a 100,000-gallon recycled water tank and booster pump system that will pump recycled water into the non-potable water distribution system for landscape irrigation, fire protection and make up water to ornamental water features and ponds.

Each water reclamation plant will cover a relatively small area ranging from less than 1,000 square feet at the Camping area to the largest area of 12,500 square feet for the largest system that will serve the Maha Farms area. The installation of all the water reclamation plants will require approximately two (2) acres of land.

The water reclamation plants will be placed in areas that are set back from the cluster developments to avoid potential odor and noise issues. The plants will be located close to planned roads to provide easy access to them and to avoid the need to construct long driveways or access roads to serve them. The plants will also be placed in areas that will minimize grading and ground disturbance to the extent practical and to avoid impacts to sensitive flora and fauna.

## 1.3 Report Organization

This report is structured to facilitate the presentation of information required by the Water Code including the analyses necessary to evaluate the sufficiency of the water supply to meet projected future demands. The WSA includes the following sections:

Section 1 provides an overview of the legal requirements for the WSA and describes the Project. Definitions of key terms are provided, and water resource management plans relevant to the Project are described.

Section 2 describes the Project Area and includes a summary of projected population growth, local climate, and existing and planned sources of water supply for the Project Area.

Section 3 describes the hydrogeology of the Project Area, including the geology, well, and aquifer characteristics for groundwater basins and non-basin areas.

Section 4 describes regional and local groundwater conditions including groundwater levels and groundwater quality. The section also presents data on historical and current water use and information on the availability of groundwater, surface water, and recycled water in the Project Area.

Section 5 describes future water demands based for both Phase One and a future phase of the Maha Resort at Guenoc Valley.

Section 6 addresses water supply sufficiency by comparing projected water demands in the Project Area to available supplies for normal, dry, and multiple-dry water year[2] conditions. This section includes a discussion of the permits and financing necessary to make the water supply available to the Project.

## 1.4 Scope of Analysis

This WSA includes a review of water resources and water supplies as well as existing and future planned water demands the Project Area to the year 2040, consistent with the requirements of SB 610.

Although not within the Project Area, areas covering approximately 505 acres along Bucksnort Creek and approximately 720 acres in Napa County are included in the WSA analysis, due to the inter-related nature of the existing water supply for those areas with the rest of the Project Area. These areas are referenced in this WSA as Adjacent Non-Project Areas; existing and planned land uses in these areas include vineyards, the Lillie Langtry House, and the Langtry Estate Winery. The WSA is intended to fulfill the requirements of SB 610, as described below.

## 1.5 SB 610 Requirements for Groundwater Sources

SB 610 became effective on January 1, 2002 with the intent to strengthen the process by which local agencies determine the adequacy and sufficiency of current and future water supplies to meet current and future demands. SB 610 amended the California Public Resources Code to incorporate Water Code findings within the CEQA process for certain types of projects. SB 610 amended the Water Code to expand the types of information included in Urban Water Management Plans (UWMP) from Water Code Section 10620 *et seq.* and to amend Water Code Part 2.10 Water Supply Planning to Support Existing and Planned Future Uses (Section 10910 *et seq*.). The latter Part 2.10 describes the roles and

[2] Water year is the period from October 1 to September 30, named for the calendar year on September 30.

responsibilities of the Lead Agency under CEQA and the public water system (water supplier) with respect to comparing current and future water supplies with current and projected future water demands. A project requiring a WSA, as defined in SB 610, includes 1) a proposed residential development having more than 500 dwelling units; 2) a proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space; 3) a proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space; 4) a proposed hotel or motel, or both, having more than 500 rooms; 5) a proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area; 6) a mixed-use development that includes one or more of the uses described above; 7) a development that would demand an amount of water equivalent to or greater than the amount of water required by a 500-dwelling-unit project; and 8) for Lead Agencies with under 5,000 water service connections, any new development that will increase the number of water service connections in the service area by ten percent or more.

If the water supplier has already completed an UWMP, it must identify whether the new demands are included in the UWMP. If the UWMP includes the demands, it may be incorporated by reference. In this case, there is no UWMP covering the Project Area; therefore, Water Code Section 10910 requires the preparation of a WSA. To comply with the SB 610 requirements, this WSA includes the following information:

- A description of the water service area including climate and population. Population information include current and projected population reflecting existing and planned future populations.
- A description and quantification of the existing and planned water sources (surface water, groundwater, and recycled water).
- A description of the water source availability during normal, single-dry, and multiple-dry water year types.
- A description of current and projected water demands among all user classes in the future public water system service area in five-year increments.
- A discussion of the total projected water supplies determined to be available to the Maha Resort water system during normal, single-dry, and multiple-dry water years for a 20-year horizon that will meet the projected water demand associated with the proposed project, in addition to continuation of existing uses and planned future uses.

WSA requirements are specified when groundwater is identified as a source. For the Project Area, groundwater is planned to serve as the sole source of potable drinking water and delivered surface water will provide agricultural and landscaping water demands. Due to the inclusion of groundwater as a source of water, the WSA must include the following additional information:

- A review of any information contained in an UWMP relevant to the identified water supply for the proposed project. Where an area does not have an UWMP, a guidance document prepared

by the California Department of Water Resources (DWR) suggests that the WSA include discussion of any existing groundwater management plan and how it would affect the water supplier's use of the basin (DWR, 2003).

- A description of any groundwater basin from which the proposed project would be supplied with groundwater, including information obtained from the most current DWR bulletin that characterizes the condition of the groundwater basin (i.e., whether DWR has identified the basin as overdrafted, or projected that the basin will become overdrafted if present management conditions continue, and what measures are being taken to prevent overdraft conditions from occurring). As suggested in the DWR guidance document relating to the implementation of SB 610, if the basin has not been (or recently been) evaluated by DWR, data that indicate historical and recent groundwater level trends should be evaluated.
- A detailed description and analysis of the amount and location of groundwater pumped by the public water system for the past five years from any groundwater basin from which the proposed project will be supplied.
- A detailed description and analysis of the amount and location of groundwater that is projected to be pumped (for at least a twenty-year horizon) by the public water system from any basin from which the proposed project will be supplied.
- An analysis of the sufficiency of the groundwater that will be supplied from the basin or basins to meet the projected water demand of the proposed project.

## 1.6 Definition of Terms

### 1.6.1 Project Area

The Project Area covers approximately 16,000 acres of unincorporated land in southern Lake County and includes the lands to be rezoned and developed as part of the Project (**Figure 1-1**).

### 1.6.2 Adjacent Non-Project Areas

Adjacent Non-Project Areas are lands that rely on surface water and groundwater water supplies available to meet Project demands. Due to the shared sources of supply these areas are included in the analysis presented in this WSA. These areas include approximately 505 acres along Bucksnort Creek in Guenoc Valley, including an existing commercial winery, and approximately 720 acres in Napa County (**Figure 1-1**).

### 1.6.3 Sufficiency

Water Code Section 10910(f)(5) requires inclusion of "an analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project."

Water Code Section 10910(c)(3) states:

> "If … the public water system has no urban water management plan, the water supply assessment for the project shall include a discussion with regard to whether the public water system's total projected water supplies available during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses."

The Water Code Sections (Water Code 10910 *et seq*.) above are understood to mean that the analysis of the sufficiency of groundwater from the basin applies to the availability of water supplies to meet the projected water demands during normal, dry, and multiple-dry years within a 20-year projection.

### 1.6.4 Overdraft

SB 610 requirements discussed above include evaluation of the condition of the groundwater basin, including whether DWR has identified the basin to be in overdraft or projected to become overdrafted. The word "overdraft" is defined by DWR as follows (DWR, 2003a):

> "[T]he condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions (DWR, 1998)."

Bulletin 118 also reports that "overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. If overdraft is determined and continues for a number of years, "significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts" (DWR, 2003a).

## 1.7 Water Management Plans

This section includes a review of existing Water Management Plans that are in the vicinity of the Maha Resort Project area and how they pertain to groundwater resources in the area. This includes the Lake County Groundwater Management Plan (CDM, 2006).

There are no Urban Water Management Plans or Agricultural Water Management Plans for areas intersection of overlapping with the Project area.

Lake County manages groundwater resources through the Lake County Watershed Protection District (District). In 2006, the District finalized the Lake County Groundwater Management Plan (GMP) (CDM, 2006). The GMP was developed to "(support) the long-term maintenance of high quality groundwater resources within the 13 groundwater basins of the county" (p. 1-3), including the Coyote Valley Basin and Collayomi Valley Basin. The GMP includes the following management objectives:

- Improve the understanding of groundwater hydrology and quality in Lake County;

- Maintain a sustainable, high quality water supply for agricultural, environmental, and urban uses;
- Minimize the long-term drawdown of groundwater levels;
- Protect groundwater quality;
- Minimize changes to surface water flows and quality that directly affect groundwater levels or quality;
- Minimize the effect of groundwater pumping on surface water flows and quality;
- Facilitate groundwater replenishment and cooperative management projects; and
- Prevent inelastic land surface subsidence from occurring as a result of groundwater pumping.

The GMP presents information summarizing groundwater conditions in each basin including hydrographs of depth to groundwater in the northern portion of the Coyote Valley which established historical groundwater levels. The GMP also includes the following "Best Management Objectives" (BMOs), developed with stakeholder input, to guide groundwater management in the Coyote Valley Basin and Collayomi Valley Groundwater Basin:

- Prevent long-term declines in groundwater levels
- Maintain groundwater levels to assure an adequate and affordable irrigation and domestic water supply
- Develop an understanding of groundwater within the basin
- Maintain a sustainable water supply now and into the future
- Understand geothermal water occurrence
- Reduce nitrate concentrations
- Increase groundwater quality monitoring
- Increase monitoring and understanding of groundwater levels, groundwater quality, land subsidence, and connections between these elements
- Monitor and understand iron, manganese, boron and chromium water quality issues Understand well depths consistent with basin pumping or available yield
- Increase subsidence monitoring
- Prevent inelastic land subsidence

Both the Coyote Valley Groundwater Basin and the Collayomi Valley Groundwater Basin are designated as very low priority basins by the California Department of Water Resources as of 2019. Based on their priority designation, the basins are not required to be managed by a Groundwater Sustainability Plans (GSPs), under the Sustainable Groundwater Management Act. No Groundwater Sustainability Agencies (GSAs) have formed within either basin.

## 1.8 Water System Permits, Regulatory Requirements, and Approvals

The Project will be required to obtain permits and regulatory approvals from design to construction and including ongoing operations. Permits and regulatory approvals related to the Project water system are listed below, along with the corresponding regulatory agency:

- Water Wells Permits – Issued by Lake County or State Water Resources Control Board – Division of Drinking Water(SWRCB-DDW)
- Water System Plan and Technical Reports - Approved by Lake County and SWRCB-DDW
- Operation and Maintenance Plan - Approved by Lake County and SWRCB-DDW
- Water System Permit - Issued by SWRCB-DDW
- Public Water Utility Formation - Approved by the CPUC, Lake County Local Agency Formation Commission, and SWRCB-DDW
- Water Recycling Permit -Issued by the Central Valley Regional Water Quality Control Board (with review by the SWRCB-DDW)

# 2 MAHA RESORT AT GUENOC VALLEY SETTING

Guenoc Valley is a small inland valley set on an alluvial fan, isolated from surrounding areas by rocky ridges and volcanic outcroppings and rock. As part of the inner coastal range of Northern California, the site is characterized by varied topography, with rolling hills, native vegetation including chaparral and oak woodlands, irrigated vineyards, grazing corridors, open meadows and lakes. Ground elevations across the Project Area range from 600 to over 1,200 feet above sea level.

The Project Area is approximately 95 miles northeast of San Francisco, 85 miles southwest of Sacramento, 40 miles east of Santa Rosa, and 25 miles southeast of Clearlake.

## 2.1 Project Area Characteristics

The Project Area covers approximately 16,000 acres of unincorporated land in southern Lake County. Adjacent Non-Project Areas include an additional 1,225 acres in unincorporated Lake and Napa Counties that share existing water supplies with the Project Area, including surface water diversions and groundwater, described in more detail in the following sections. The Project Area and Adjacent Non-Project Areas support agricultural land uses along with a winery and tourism-focused uses, including a hunting lodge and camp. A golf course was also in use on the Project Area until approximately 2016.

The surrounding area is predominately rural and characterized by some agricultural uses and scattered small communities, with native vegetation predominating. Two communities located near the Project Area include Middletown, located approximately three miles west via Butts Canyon Road and Highway 29 (**Figure 1-1**).

## 2.2 Climate and Precipitation

The Project Area experiences a Mediterranean climate, characterized by a wet season occurring during cool winters and dry season during the warm to hot summers (**Figure 2-1**). Monthly average high temperatures range from 58 °F in December to 88 °F in July. Monthly average low temperatures range from 35 °F in December to 64 °F in July. Precipitation measured at a long-term station in Middletown has averaged 41 inches annually for the most recent 30-year period, from 1989. The distribution of annual precipitation, evaluated by a frequency analysis, includes a range of normal year precipitation from 35 inches to almost 54 inches (**Table 2-1**).

**Table 2-1: Middletown Precipitation Frequency Analysis**

| Class | Lower Bound (inches) | Upper Bound (inches) | Number of Years | Exceedance Probability | Likelihood |
|---|---|---|---|---|---|
| **Very Dry** | | <=29.37 | 5 | 89.80% | 10.4% |
| **Dry** | 29.38 | 34.98 | 11 | 67.35% | 22.9% |
| **Normal** | 34.99 | 53.61 | 17 | 32.7% | 35.4% |
| **Wet** | 53.62 | 75.45 | 11 | 10.2% | 22.9% |
| **Very Wet** | | >75.45 | 4 | *<10.2%* | 8.3% |

Station ID: USC00045598, 1941 to 2017, n=48, excludes years with incomplete data

## 2.3 Current and Projected Population

There are currently no permanent residences in the Project Area and no residences at the Off-site Workforce Housing site location in Middletown, as a result the population of both areas is zero. The estimated project area population is expected to reach 1,059, including resort residential and hotel units and workforce housing. Future Phases are expected to add a population of 2,790. Off-site workforce housing, planned to be located in Middletown, is projected to reach a population of 221. In total, after full build-out the Project is estimated to account for a population of 4,070 (**Table 2-2**).

**Table 2-2: Estimated Project Population**

| Location | Residential Units | Workforce Bedroom Units | Population Generated |
|---|---|---|---|
| **Project Area Phase One** | 401 | 100 | 1,059 |
| **Project Area Future Phases** | 1,000 | 400 | 2,790 |
| **Off-site Workforce Housing** | - | 221 | 221 |
| **Total** | **1,401** | **721** | **4,070** |

Adapted from AES (2019). Population estimated based on proposed residential units.

## 2.4 Existing and Planned Water Sources

### 2.4.1 Groundwater

Fourteen springs and production wells are currently in use in the Project Area and Adjacent Non-Project Areas (**Table 2-3**). Wells supply irrigation water outside of approved Places of Use and domestic water for existing uses. At least eight springs, not shown in **Table 2-3**, were formerly used for stock watering. Two springs are currently used to supply domestic uses, though none are proposed to supply Project water demands. Two wells shown in **Table 2-3** (McCreary Production Well 1 and Red Hills Production Well 1) are proposed wells planned to be constructed, under and existing contract for drilling services.

In the Project Area, three wells are currently used to meet existing uses and are not planned to supply Project demands. These include the Lodge Well, Tephra Ridge #1 Well, and Tephra Ridge #2 Well (**Table 2-3**). The Lodge Well supplies domestic uses at the Gebhard Lodge with production rate of about 10 gallons per minute (GPM) (AES, 2006). The two Tephra Ridge wells supply groundwater to meet irrigation demands at the Tephra Ridge vineyards located approximately 2 miles southeast of Detert Reservoir and outside of surface water Places of Use. The Tephra Ridge irrigation wells have approximate production rates of 50 GPM and 25 GPM, respectively (**Table 2-3)** (AES, 2006).

In preparation for the Project, new water supply wells have been constructed in the Project Area to eventually supply groundwater to the two planned potable water systems. Work related to the installation of the water supply wells began in August of 2019. A total of four potable water supply wells are currently planned to be installed (**Figure 2-3**). As of November 2019, two wells (Camping Area Production Well 1 and Farmstead Production Well 1) have been installed and a third well is under construction. New wells have been constructed and tested to municipal standards and will be able to be permitted domestic supply wells. Initially, the wells will be used to supply water for construction activities.

**Camping Area Production Well 1 (CA PW-1)[3]**

Construction and testing of CA PW-1 began in September 2019 and was completed in October 2019. A conductor consisting of 24-inch diameter by 5/16-inch wall mild steel was installed from 50 feet below ground surface (bgs) to ground surface within a 30-inch diameter borehole. A sanitary seal consisting of a 10.3 sack sand/cement grout was placed in the annulus between the borehole and the casing. The 17-inch diameter borehole was drilled from 50 feet bgs to 290 feet bgs. The materials encountered during the drilling of CA PW-1 included sand and gravel and fractured volcanic rock. The well structure consists of 8-inch diameter by ¼-inch wall mild steel blank and triple mill slotted steel casing. The width of slots is 0.080-inch. Slotted intervals were installed from 110-170, 180-240, and 250-270 feet bgs. A well sump was installed from 270-280 feet bgs. A gravel pack consisting of pea gravel was installed from 290 to 100

[3] Camping Area Production Well 1 (CA PW-1) was previously designated Wilderness Area Production Well 1 (WA PW-1). The well has been renamed to more closely align with the proposed Project elements. The latter name still appears in some earlier Project documents including water quality sampling documentation.

feet bgs. An annular seal consisting of 10.3 sack sand/cement grout was installed from 100 feet bgs to ground surface.

Testing of WA PA-1 consisted of three, 2-hour constant rate tests, followed by a 10-day constant rate test. The short-term constant rate tests (i.e., step tests) were used to select a pumping rate for the 10-day constant rate test. During short-term testing the well was pumped at 160 GPM, 240, GPM, and 377 GPM, respectively (**Figure 2-4**). Afterwards, the well was pumped at an average rate 346 gallons per minute (GPM) for 10-days (**Figure 2-5**). Total drawdown during the constant rate test was approximately 28 feet at the maximum pumping rate allowed by the test pump. At the end of the test, the well's specific capacity was 12.7 gallons per minute/foot of drawdown (GPM/foot). Water level measurements were collected for 10 days after pumping ceased. The water level within the well recovered to within 95% of the static water level within 8 days. Based on the pumping rate and rate of water level recovery, per DDW regulations (CCR Section 64554), the permitted yield of the well is anticipated to be 178 GPM. The pumping rate used during the test was limited by the size of the installed pump. A higher well yield could be demonstrated with additional testing with a larger pump. Water quality samples were collected during the constant rate test for Title 22 drinking water analysis. For the constituents analyzed, the water meets all current Title 22 water quality standards (**Table 2-4).**

**Farmstead Production Well 1 (FS PW-1)**

Construction and testing of FS PW-1 began in October 2019. A conductor consisting of 24-inch diameter by 5/16-inch wall mild steel was installed from 50 feet bgs to ground surface within a 30-inch diameter borehole. A sanitary seal consisting of a 10.3 sack sand/cement grout was placed in the annulus between the borehole and the casing. The 17-inch diameter borehole was drilled from 50 feet bgs to 430 feet bgs. The material encountered during the drilling of FS PW-1 was fractured volcanic rock. The completed well depth is 430 feet below ground surface bgs, with screened intervals of 200-300 and 330-420 feet bgs. The well casing consists of 8-inch diameter by ¼-inch wall mild steel installed within a 17-inch diameter borehole. The well screen is triple mill slot with 0.080-inch slot size. The gravel pack consisting of pea gravel is installed from 430 to 100 feet bgs. An annular seal consisting of 10.3 sack sand/cement grout is installed from 100 feet to ground surface.

Testing of FS PW-1 began in November 2019. The initial phase of yield testing consisted of three, 2-hour constant rate tests, followed by a 10-day constant rate test. The short constant rate tests were used to select a pumping rate for the 10-day constant rate test. The well was pumped at an average rate of 305 GPM during the 10-day test. Water quality samples were collected during the constant rate test for Title 22 drinking water analysis. For the constituents analyzed, the water meets all current Title 22 water quality standards (**Table 2-4**). Water level and pumping rate data are being evaluated to quantify the anticipated permitted well yield for FS PW-1.

Four production wells and springs are located in Adjacent Non-Project Areas and are not proposed to supply the Project; they include the Headquarters West #1 and #2 springs, Langtry Estates Well, and the Upper Bohn Well (**Table 2-3**). The Headquarters West #1 and #2 springs supply domestic uses at the

Lillie Langtry House and nearby buildings. The Langtry Estates Well supplies the existing winery and tasting room located near the intersection of Guenoc Road and Butts Canyon Road. The Upper Bohn Well is located outside of the Project Area, in Napa County, and supplies existing agricultural water demands in the Project Area and adjacent non-project areas. The Upper Bohn Well is located approximately one-half mile southeast of Upper Bohn Lake. Constructed in 2002, the Upper Bohn Well is pumped into Upper Bohn Lake to augment the primary supply of surface water to the lake, as needed to supply irrigation demands for vineyards located outside of Places of Use in the Upper Bohn Lake service area. The Upper Bohn Well is not proposed to supply the Project and no changes to the use or volume of pumpage are anticipated as a result of the Project.

**Crossroads Well (W-1)**

The Crossroads Well was constructed in 2002 and tested soon afterwards at a rate of 295 GPM for 24-hours (GSi/water, 2002). In their report describing that testing, GSi/water described that an average pumping rate of 300 GPM could be used, but that a long-term production rate may need to be set lower to allow for more complete water level recovery between pumping cycles. As shown in **Table 2-3**, the long-term pumping rate is estimated to be 200 GPM.

**Table 2-3: Well and Spring Inventory**

| Well or Spring Name | Approximate Production Rate (Gallons per Minute)[1] | Purpose/Use | Planned to Supply Project |
|---|---|---|---|
| **Crossroads Well (W-1)[2]** | 200 | Upper Bohn Area Non-Potable Supply | Yes |
| **Camping Area Production Well 1 (CA PW-1)** | 178 | Guenoc Valley and Camping Area Potable Supply | Yes |
| **Farmstead Production Well 1 (FS PW-1)** | Analysis pending | Upper Bohn Area Potable Supply | Yes |
| **McCreary Production Well 1 (McCreary PW-1)** | Well construction and testing pending | Guenoc Valley Area Potable Supply, not yet constructed | Yes |
| **Red Hills Production Well 1 (RH PW-1)** | Well construction and testing pending | Upper Bohn Area Potable Supply, not yet constructed | Yes |
| **Lodge Well** | 10 | Gebhard Lodge domestic use | No |
| **Tephra Ridge #1 Well** | 50 | Tephra Ridge vineyard irrigation | No |
| **Tephra Ridge #2 Well** | 25 | Tephra Ridge vineyard irrigation | No |
| **Langtry Estates Well** | unknown | Langtry Estates Winery | No |
| **Headquarters West #1 Spring** | 15 | Langtry House and nearby buildings domestic use | No |
| **Headquarters East #1 Spring** | 5 | Langtry House and nearby buildings domestic use | No |
| **Upper Bohn Well (W-2)[2]** | 540 | Upper Bohn Area Non-Potable Supply | No |
| **Langtry Vineyard #1 Spring** | 5 | Langtry Vineyard irrigation use | No |
| **Lodge Well** | 10 | Gebhard Lodge domestic uses | No |
| **Black Oak Villa Spring** | 1 | Domestic uses | No |
| **Ink Ranch Spring** | 2 | Existing hunting camp supply | No |

[1] Table adapted from (AES, 2006, p.4.5-5). Spring and well production rates may vary seasonally and annually. Production rates are estimates unless stated otherwise.
[2] Alternate names as designated by GSi/water (2002).

**Table 2-4: Maha Resort Production Well Water Quality Results**

| ANALYTE | UNITS | REPORTING LIMIT | ANALYTICAL METHOD | MCL | Camping Area Production Well 1 Sample Date: 10/8/2019 | Farmstead Production Well 1 Sample Date: 11/25/2019 |
|---|---|---|---|---|---|---|
| **CATIONS** | | | | | | |
| Calcium | mg/L | 1.0 | 200.7 | | 17 | 6.3 |
| Magnesium | mg/L | 1.0 | 200.7 | | 25 | 90 |
| Potassium | mg/L | 1.0 | 200.7 | | 2.3 | ND |
| Sodium | mg/L | 1.0 | 200.7 | | 18 | 5.5 |
| Total Hardness | mg/L | 1.0 | 200.7 | | 150 | 390 |
| **ANIONS** | | | | | | |
| Bicarbonate Alkalinity | mg/L | 5.0 | SM 2320B | | 150 | 460 |
| Carbonate Alkalinity | mg/L | 5.0 | SM 2320B | | ND | ND |
| Chloride (Cl) | mg/L | 0.50 | 300.0 | 250/500[2] | 26 | 5.1 |
| Cyanide | mg/L | 0.1 | SM20-4500-CN | 0.15 | ND | ND |
| Fluoride | mg/L | 0.10 | 300.0 | 2 | 0.11 | ND |
| Hydroxide Alkalinity | mg/L | 5.0 | SM 2320B | | ND | ND |
| Nitrate (as N) | mg/L | 0.40 | 300.0 | 10 | ND | ND |
| Nitrate/Nitrite (as N) | mg/L | 0.40 | 300.0 | 10 | ND | ND |
| Nitrite (as N) | mg/L | 0.40 | 300.0 | 0.4 | ND | ND |
| Sulfate (as SO4) | mg/L | 0.50 | 300.0 | 250/500[2] | 3.1 | 4.7 |
| Sulfide | mg/L | 1.0 | SM4500-S F | | ND | ND |
| Total Alkalinity | mg/L | 5.0 | SM 2320B | | 150 | 460 |
| Perchlorate | mg/L | 0.0040 | 314.0 | 0.006 | ND | ND |

**Table 2-4: Maha Resort Production Well Water Quality Results**

| ANALYTE | UNITS | REPORTING LIMIT | ANALYTICAL METHOD | MCL | Camping Area Production Well 1 Sample Date: 10/8/2019 | Farmstead Production Well 1 Sample Date: 11/25/2019 |
|---|---|---|---|---|---|---|
| **PHYSICAL PARAMETERS** | | | | | | |
| Color (A.P.H.A) | Color Units | 1 | SM 2120B | 15[2] | ND | ND |
| pH | pH units | 0.01 | SM 4500-H B | 6.5/8.5[4] | 8.01 | 7.74 |
| Methylene Blue Active Substance | mg/L | 0.10 | SM 5540C | 0.5[2] | ND | ND |
| Specific Conductivity | µmhos/cm | 1.0 | 120.1 | 900/1,600[2] | 360 | 740 |
| Total Dissolved Solids (TDS) | mg/L | 10 | SM 2540C | 500/1,000[2] | 240 | 480 |
| Odor | TON | 1 | 140.1 | | ND | 1 |
| Turbidity | NTU | 0.10 | 180.1 | 5[2] | 0.22 | 0.18 |
| **INORGANICS** | | | | | | |
| Aluminum | mg/L | 0.05 | 200.7 | 1[1]/0.2[3] | ND | ND |
| Antimony | mg/L | 0.0040 | 200.8 | 0.006 | ND | ND |
| Arsenic | mg/L | 0.0020 | 200.8 | 0.010 | 0.0034 | 0.0021 |
| Barium | mg/L | 0.1 | 200.7 | 1 | ND | ND |
| Beryllium | mg/L | 0.001 | 200.7 | 0.004 | ND | ND |
| Boron | mg/L | 0.1 | 200.7 | 1[3] | ND | ND |
| Cadmium | mg/L | 0.0010 | 200.8 | 0.005 | ND | ND |
| Chromium (Total) | mg/L | 0.01 | 200.7 | 0.05 | ND | ND |
| Hexavalent Chromium | mg/L | 0.001 | 218.6 | | ND | ND |
| Copper | mg/L | 0.050 | 200.7 | 1.3[2] | ND | ND |
| Iron | mg/L | 0.10 | 200.7 | 0.3[2] | ND | 0.110 |
| Lead | mg/L | 0.0050 | 200.8 | 0.015[3] | ND | ND |

**Table 2-4: Maha Resort Production Well Water Quality Results**

| ANALYTE | UNITS | REPORTING LIMIT | ANALYTICAL METHOD | MCL | Camping Area Production Well 1 Sample Date: 10/8/2019 | Farmstead Production Well 1 Sample Date: 11/25/2019 |
|---|---|---|---|---|---|---|
| Manganese | mg/L | 0.02 | 200.7 | 0.05[2] | 0.037 | ND |
| Mercury | mg/L | 0.0010 | 245.1 | 0.002 | ND | ND |
| Nickel | mg/L | 0.01 | 200.8 | 0.1 | ND | ND |
| Selenium | mg/L | 0.0050 | 200.8 | 0.05 | ND | ND |
| Silver | mg/L | 0.01 | 200.7 | 0.1[2] | ND | ND |
| Thallium | mg/L | 0.001 | 200.8 | 0.002 | ND | ND |
| Vanadium | mg/L | 0.003 | 200.8 | 0.05[3] | ND | ND |
| Zinc | mg/L | 0.05 | 200.7 | 5[2] | ND | ND |
| **RADIO CHEMISTRY** | | | | | | |
| Gross Alpha | pCi/L | 0.971 | 900 | 15/5[3] | 7.77 ± 1.26 | 1.42 ± 1.58 |
| Gross Beta | pCi/L | 0.702 | 900 | 50 | 9.16 ± 1.43 | 12.8 ± 2.24 |
| Total Alpha Radium (226) | pCi/L | 0.304 | 903 | 3 | 0.084 ± 0.116 | 0.038 ± 0.130 |
| Ra 228 | pCi/L | 0.400 | Ra-05 | 2 | 0.405 ± 0.826 | 1.69 ± 1.19 |
| Uranium | pCi/L | 0.342 | 908 | 20 | 0.00 ± 0.400 | 0.101 ± 0.521 |
| **OTHER ANALYSES** | | | | | | |
| Purgeable Organic Compounds (VOCs) | µg/L | * | 524.2 | | ND | ND |
| Benzo(a)pyrene | µg/L | 0.10 | 550 | | ND | ND |
| Nitrogen/Phosphorus Pesticides | µg/L | * | 507 | | ND | ND |
| Semi-Volatile Organic Compounds (SVOCs) | mg/L | * | 525.2 | | ND | ND |
| Trihalomethanes | µg/L | 0.50 | 524.2 | | ND | ND |

**Table 2-4: Maha Resort Production Well Water Quality Results**

| ANALYTE | UNITS | REPORTING LIMIT | ANALYTICAL METHOD | MCL | Camping Area Production Well 1 Sample Date: 10/8/2019 | Farmstead Production Well 1 Sample Date: 11/25/2019 |
|---|---|---|---|---|---|---|
| EDB and DBCP | µg/L | * | 504.1 | | ND | ND |
| Haloacetic Acids | µg/L | * | 552.2 | | ND | ND |
| Chlorinated Herbicides | µg/L | * | 515.3 | | ND | ND |
| Chlorinated Pesticides and PCB's | µg/L | * | 508 | | ND | ND |
| Asbestos | MFL | 0.21 | 600/R-94/134 | 7 | ND | ND |
| Endothall | µg/L | 20 | 548.1 | | ND | ND |
| 2,3,7,8-TCDD Dioxin | pg/L | 10.8 | 1613B | | ND | ND |
| 1,2,3-Trichloropropane | µg/L | 0.0050 | SRL524M-TCP | | ND | ND |
| Glyphosate | µg/L | 5.0 | 547 | | ND | ND |
| Carbamates | µg/L | 2.0 | 531.2 | | ND | ND |
| Diquat | µg/L | 4.0 | 549.2 | | ND | ND |

[1] - Primary MCL
[2] - Secondary MCL (recommended/upper range)
[3] - Notification Level
[4] - Suggested lower/upper acceptable range
* - Various Reporting Limits
ND = Non-Detect

### 2.4.2 Surface Water

A number of intermittent streams run through the Project Area and one perennial stream, Putah Creek, crosses the northeast part of the Project Area. Bucksnort Creek enters the property near the southwest corner of the property and lows in a southeast to northwest direction approximately 7 miles through the property before discharging into Putah Creek. Bucksnort Creek is an important stream on the property and is used to convey water from one reservoir to another on a periodic basis. Putah Creek runs approximately 6.7 miles through the property and drains into Lake Berryessa, southeast of the Project Area. Several of the intermittent streams have been dammed to create reservoirs for water storage used pursuant to existing surface water rights.

The Project has existing riparian and appropriate water rights that allow for the diversion and use of surface water resources. Riparian water rights permit the landowner to use water on riparian land for domestic, stock watering, irrigation, power and other beneficial purposes. The riparian right is not based on the amount of use and is not lost by non-use. Riparian rights only allow for the direct diversion of water and do not allow for storage of water typically greater than 30-days. The long-term irrigation and frost protection of lands on the property require the reliability of seasonal water storage allowed by appropriative rights.

Appropriative rights allow a specific amount of water to be diverted and used for reasonable, beneficial use in a specific place (defined as a "place of use" (POU). Appropriative rights allow for direct diversion and/or storage of water for use on lands regardless of their proximity to streams. The appropriative right relates to the particular amount of water, and failure to make use of the right over five consecutive years can results in the forfeit of the right. It is also important to note that appropriative water can be applied to non-POU lands within a water year, as long as the water used is replenished from an alternative water supply, such as from a groundwater source.

The appropriative water rights for the Project Area and Adjacent Non-Project Areas allow for the diversion to storage of 10,394.5 acre-feet per year (AFY) and withdrawals from storage of up to 8,599.5 AFY (**Table 2-5**). The current storage capacity of reservoirs is 9,390 acre-feet (**Table 2-6**). The Project has the capacity, using existing infrastructure, to transfer water from storage in reservoirs in the Bucksnort Creek watershed (i.e., Langtry, Detert, Bordeaux, Burgundy, and McCreary) to Upper Bohn Reservoir outside of the Bucksnort Creek watershed. These transfers allow greater flexibility in the use of available surface water, consistent with appropriative rights. Previously permitted modifications to Upper Bohn Lake, scheduled for completion in 2020, are planned to increase the net storage capacity of that reservoir by 1,000 acre-feet and facilitate increased diversions to storage in Upper Bohn Lake from Putah Creek by up to 1,600 acre-feet per year. As a result of these modifications, the planned future storage capacity of Project Area reservoirs will be 10,390 acre-feet.

**Table 2-5: Langtry Farms/Maha Resort at Guenoc Valley Appropriative Water Rights Summary**

| Water Right | Reservoir | Authorized Diversion to Storage Amount (AFY) | Authorized Withdrawal from Storage Amount (AFY) |
|---|---|---|---|
| **Reservoirs Serving the Project Area** | | | |
| License 2141 (Application 3069)[1] | Detert, McCreary, Lake Bordeaux (Foley No. 1), Lake Burgundy (Foley No, 2) & Bucksnort Creek Diversion Dam | 6,074.5 | 5,089.5 |
| License 2142 (Application 4889) | | | |
| License 6334 (Application 15706) | | | |
| License 10421 (Application 19890) | | | |
| License 10422 (Application 20877) | | | |
| Pending License under Permit 16861 (Application 24297)[2] | | | |
| Pending License under Permit 16861 (Application 24297)[3] | Langtry Lake | 560 | 480 |
| License 9939 (Application 20876) | Upper Bohn Lake | 3,760 | 3,030 |
| Pending License under Permit 16860A (Application 24296A)[4] | | | |
| Permit 16860C (Application 24296C) | | | |
| | **Totals** | **10,394.5** | **8,599.5** |
| **Storage Reservoirs Supplying Other Areas** | | | |
| License 13414 (Application 24296B) | Big Basin Reservoir (Napa Valley Lake) | 200 | 192 |

Adapted from Wagner & Bonsignore (2019)
[1] Water right License 2141 (Application 3069) also authorizes direct diversion of 5.35 cfs from Bucksnort Creek.
[2] Diversion and storage of 985 ac-ft of water was perfected prior to the end of the beneficial use period of Permit 16861 and was inspected for license by the SWRCB. No withdrawal from storage was made prior to the end of the beneficial use period of Permit 16861 therefore no withdrawal from storage of this 985 ac-ft of water will be authorized by the pending license.
[3] The storage and withdrawal amounts stated for Permits 16861 are amounts which were perfected prior to the end of the beneficial use period of the Permit and were inspected for license by the SWRCB. (*Continued)*

[4] The diversion to storage and withdrawal amounts stated for Permits 16860A are amounts which were perfected prior to the end of the beneficial use period of Permit 16860A and were inspected for license by the SWRCB.

Riparian rights allow for the direct diversion of 5.35 cubic feet per second (cfs) for use on lands along Bucksnort Creek in Guenoc Valley. Between 1999 and 2018 the average annual estimate of riparian water use by existing Project Area and Adjacent Non-Project Areas has been 560 AFY (Wagner & Bonsignore, 2019).

**Table 2-6: Langtry Farms/Maha Ranch at Guenoc Valley Storage Reservoirs**

| Reservoir Name | Stream | Storage Capacity (Acre-feet) |
|---|---|---|
| **Storage Reservoirs Serving the Project Area** | | |
| Detert Lake (Guenoc Lake) | Bucksnort Creek | 3,220 |
| McCreary Lake | Bucksnort Creek | 1,725/2,098[1] |
| Lake Bordeaux (Foley No. 1) | Unnamed | 540 |
| Lake Burgundy (Foley No. 2) | Unnamed | 212 |
| Cassidy Lake (Langtry Lake) | Unnamed | 560 |
| Upper Bohn Lake | Routan Creek and Unnamed | 2,760[2] |
| | **Total Storage Capacity** | 9,017/9,390 |
| **Storage Reservoirs Supplying Other Areas** | | |
| Big Basin Reservoir (Napa Valley Lake) | Unnamed | 200 |

Adapted from Hanson (1999)
[1] The capacity of McCreary Lake is increased to 2,098 acre-feet with flashboards installed.
[2] Previously permitted modifications to Upper Bohn Lake, scheduled for completion in 2020, are planned to increase the net storage capacity by 1,000 acre-feet.

### 2.4.3 Recycled Water (Non-potable)

Recycled water is a planned source of supply to the Project. The Project proposes that new development clusters will be connected to new sanitary sewer systems and conveyed to new wastewater treatment facilities designed to produce non-potable recycled water suitable for reuse as landscaping irrigation and make up water for ornamental ponds and water features (Sherwood Design Engineers, 2019b).

## 2.5 Current Land Use

The Project Area and Adjacent Non-Project Areas support agricultural land uses along with a winery and tourism-focused uses, including a hunting lodge and camp. Agricultural and hunting uses have been a feature of the Project Area for over a hundred years and represent the most extensive of currently developed land uses in the Project Area. Since 2016 agricultural acreage consists of approximately 1,660 acres of vineyards, though prior to 2015 several hundred acres of pasture were also irrigated. Agricultural acreage currently includes minor areas within and outside of Places of Use associated with existing surface water rights (**Table 2-7).** Most of the existing agricultural uses rely on a combination of groundwater and surface water (through appropriative and riparian rights) described in Section 4 of this WSA.

Although a few rural residential properties are present in the Project Area and Adjacent Non-Project Areas, current domestic uses are limited. Residences are present in the main ranch center, located along Guenoc Road near Bucksknort Creek, includes the 19th century home of Lillie Langtry, and a guest house, both of which are in the Adjacent Non-Project Areas. An older ranch home located of the northeast of the ranch center, and within the Project Area, is used infrequently as a guesthouse and hunting lodge. The Adjacent Non-Project Areas also include the Langtry Estates Winery and tasting room facility.

**Table 2-7: Current Agricultural Land Use**

| Use | In Places of Use (Acres) | Outside Places of Use (Acres) |
|---|---|---|
| **Project Area - Vineyard** | 860 | 105 |
| **Adjacent Non-Project Areas -Vineyard** | 745 | - |
| **Total** | 1,605 | 105 |

# 3 HYDROGEOLOGIC SETTING

## 3.1 Geologic Setting

Lake and County is located within the California Coast Range geomorphic province. This province is a geologically complex and seismically active region characterized by sub-parallel northwest-trending faults, mountain ranges and valleys. The oldest bedrock units are the Jurassic- Cretaceous Franciscan Complex and Great Valley sequence sediments originally deposited in a marine environment. Subsequently, younger rocks such as the Tertiary-age Sonoma Volcanics group, the Plio-Pleistocene-age Clear Lake Volcanics and sedimentary rocks such as the Guinda, Domengine, Petaluma, Wilson Grove, Cache, Huichica and Glen Ellen formations were deposited throughout the province. Extensive folding and thrust faulting during late Cretaceous through the early Tertiary period created complex geologic conditions that underlie the modern topography (**Figure 3-1**). In valleys, the bedrock is covered by alluvial soil of variable thickness.

The Project Area is underlain by Quaternary terrace deposits and olivine basalt, as well as older units such as Cretaceous-Jurassic Franciscan sandstone, shale, mélange, serpentinite, and greenstone. There are also localized outcrops of Cretaceous-Jurassic Great Valley Sequence and Jurassic Knoxville Formation.

Alluvial deposits occur along Bucksnort Creek, Putah Creek and in some smaller drainages in the Project Area. Alluvial deposits, including sands and gravels, occur at thicknesses of 5-15 feet along Bucksnort Creek and in other larger drainages in the Project Area. Groundwater Basin Description

While 91% of the Project Area acreage is outside of groundwater basins designated by the California Department of Water Resources (DWR), the Project Area does include approximately 1,340 acres within the Coyote Valley Groundwater Basin (8% of the total Project Area) and approximately 90 acres within the Collayomi Valley Groundwater Basin (less than 1% of the total Project Area) (**Figure 1-1**).

DWR identifies the alluvial plain of the Coyote Valley Basin as bounded on the west and northwest by Franciscan and undifferentiated rocks (DWR, 2004). The south and southwest part of the valley is bounded by low hills of basalt outcrops. North of the Basin there are outcrops of Cache Formation, to the northeast there is more basalt. The Basin's primary water bearing formation are alluvial deposits comprised of floodplain and channel deposits from Putah Creek and alluvial fan deposits. DWR reports that water bearing alluvium ranges in thickness from 100 to 300 feet. Volcanics, including the Cache Formation on the north, may be water bearing. Major recharge to the Coyote Valley Groundwater Basin is from Putah Creek, with lesser recharge from direct precipitation onto the alluvium and from smaller streams.

## 3.2 Well Yields and Aquifer Characteristics

DWR reports that well yields for municipal and irrigation wells in the Coyote Valley Basin range from 75 to 800 gallons per minute (GPM), with an average of 446 GPM recorded on six well completion reports.

Well yield information available from the Project Area indicates somewhat more permeable formations, including the Clear Lake Volcanics Formation are present in the northern and eastern Project Area, including areas adjacent to Upper Bohn Lake extending northward to Amel Lake (**Figure 3-1**). These areas include existing wells planned to be among the wells suppling the Project including the Crossroads well, Camping Area Production Well 1, and Farmstead Production Well 1. Additional supply wells planned to be constructed to supply the Project, including Red Hills Production Well 1 and McCreary Production Well1, are also proposed to be located within the Clear Lake Volcanics Formation. As described in Section 2.4.1, yields at the two presently constructed and tested wells planned to supply the Project are between 178 GPM and 200 GPM.

# 4 CURRENT AND HISTORICAL WATER DEMANDS AND PROJECTED AVAILABILITY

This section summarizes available data and to describe current and historical water demands and availability by source of supply. This section also describes anticipated availability of water supplies by source using a variety of data including historical records of surface water availability, mathematical modeling of groundwater availability, and planned recycled water availability.

## 4.1 Groundwater Use and Availability

### 4.1.1 Groundwater Levels

Long-term groundwater level data in the Project Area is limited, at present. The nearest well with notable water level history is located at the border of the Project Area, where it overlaps the Collayomi Valley Basin. Additional information on groundwater trends within the area can be inferred from the surrounding groundwater basins which have long monitoring histories. These basins are the Coyote Valley Basin and the Collayomi Valley Basin (which extends into the study area) along Bucksnort Creek (**Figure 1-1**).

Groundwater levels in the Coyote Valley Basin are shallow in the spring, decrease over the summer, and recover during the winter. Water levels in the basin are generally between 10 to 15 feet below ground surface in the spring. Spring to summer drawdown in the western areas ranges from 20 to 25 feet, and drawdown on the eastern side of the valley ranges from 5 to 10 feet. Groundwater levels have been generally stable throughout the Basin.

Groundwater levels in the Collayomi Valley Basin follow similar trends as the Coyote Valley Basin. Water levels in the basin are shallow in the spring ranging from 3 to 15 feet below the ground surface and fluctuate in the growing season, drawing down 5 to 20 feet.

The groundwater levels monitored by a well on the southwest border of the study area are largely consistent over the period of record. Water levels remain around 5 to 10 feet below ground surface in the spring and dip to 20 to 25 feet in the summer.

### 4.1.2 Groundwater Quality

The groundwater quality data are also somewhat limited in the Project Area, although samples collected in 2019 during test well drilling and production well construction activities have shown generally good water quality in the areas under consideration for production wells to supply the Project. Samples from a few test well, drilled to inform siting of production wells, have contained elevated levels of barium, boron, iron and zinc, which can be easily treated for potable water. Four of the six test wells had good quality water, which met the drinking water criteria for inorganics and physical parameters. One well had high concentrations of iron and zinc, which will require treatment prior to domestic use. One well had high barium and boron, which will require treatment prior to domestic use. As noted in Section 2.4.1, water quality tested at the newly constructed Camping Area Production Well 1 and Farmstead Production Well 1 met all current Title 22 water quality standards (see **Section 2.4.1**).

### 4.1.3 Historical Pumpage

Groundwater has been in use in the Project Area and Adjacent Non-Project Areas for many decades. Records of pumping volumes were not made in the past, but the production capacities of wells supplying vineyards in the Tephra Ridge area and the Upper Bohn Lake service area, described in Section 2.4.1, have been tested in the past. The Tephra Ridge irrigation wells have approximate production rates of 50 GPM and 25 GPM, respectively (**Table 2-3)** (AES, 2006). The Crossroads Well was tested in 2002 at a rate of 295 GPM for 24-hours (GSi/water, 2002). In their report describing that testing, GSi/water described that an average pumping rate of 300 GPM could be used, but that a long-term production rate may need to be set lower to allow for more complete water level recovery between pumping cycles. As shown in Table 2-3, the long-term pumping rate is estimated to be 200 GPM.

DWR previously estimated the groundwater storage capacity of the entire 3,000-acre Coyote Valley Basin to be 29,000 acre-feet (AF), with usable storage capacity of 7,000 AF. DWR estimated groundwater extraction for agriculture and municipal/industrial uses in about 1995 at 1,400 AF and 290 AF, respectively, for a total use of 1,690 AF. DWR also estimated that deep percolation from applied water to be 1,100 acre-feet. In 2019, DWR finalized a groundwater use estimate as part of a statewide groundwater basin prioritization review. That 2018 basin prioritization estimate of groundwater use was 3,250 acre-feet and did not include an estimate of deep percolation of applied water (DWR, 2019).

### 4.1.4 Current Pumpage

Current use of groundwater in the Project Area supports domestic uses at an older ranch home used as a guest house and hunting lodge and agricultural production in areas outside of Places of Use. Use of groundwater in Adjacent Non-Project Areas supports an existing winery and domestic uses at the Langtry House (**Table 4-1**). Domestic uses, including landscape irrigation, are estimated to be 1 acre-foot per year for the existing ranch home in the Project Area and 2 acre-feet per year at the Langtry House. Winery uses are reported to range from 3,000 to 5,000 gallons per day during nine non-harvest months and 5,000 to 7,000 gallons per day during three harvest months (R. Sternberg, pers. comm.), resulting in an estimate of 6 acre-feet per year. Agricultural irrigation includes approximately 42 acres of vineyard in the Tephra Ridge area southeast of Detert Reservoir and approximately 63 of vineyard west and north of Upper Bohn Reservoir located adjacent to but outside of Places of Use. Average annual vineyard irrigation and frost protection amounts are 1 acre-foot per acre based on surface water uses for irrigation and frost protection recorded for existing uses in the Project Area (**Appendix A**).

**Table 4-1: Existing Average Annual Groundwater Use**

| Use Type | Average Annual Use by Year (Acre-feet) | |
|---|---|---|
| | 2009 - 2013 | 2014- 2019 |
| **Potable** | | |
| Project Area – Guest house/hunting lodge (occasional domestic use and landscape irrigation) | 1 | 1 |
| Adjacent Non-Project Areas – Langtry House (domestic uses and landscaping) | 2 | 2 |
| Adjacent Non-Project Areas - Langtry Estates Winery | 6 | 6 |
| **Potable Groundwater Use Subtotal** | 9 | 9 |
| **Non-Potable** | | |
| Project Area: Tephra Ridge Vineyard Irrigation and frost protection (42 acres) | 42 | 42 |
| Adjacent Non-Project Areas – Upper Bohn area vineyard outside Places of Use (63 acres) | - | 63 |
| **Non-Potable Groundwater Use Subtotal** | **42** | **105** |
| **Existing Groundwater Use** | **50** | **113** |

Domestic uses include landscaping demands.

Winery use is as reported by Randy Sternberg, Lotusland Investment Holdings VP, personal communication 10/3/2019.

Vineyard irrigation uses are 1 AF/acre consistent with reported deliveries of surface water metered in Project reservoirs.

Groundwater use for vineyard irrigation in the Adjacent Non-Project Areas is due to new vineyard acreage planted in those areas that are also outside of approved Places of Use for surface water.

### 4.1.5 Current and Projected Groundwater Availability

Current and projected future groundwater availability were evaluated for this WSA using the Basin Characterization Model (BCM) of California developed by the U.S. Geological Survey (USGS) (Flint et al., 2013). The BCM simulates watershed hydrologic processes from 1900 to 2016 for monthly time steps based on observed precipitation, potential evapotranspiration, soil survey data, and geologic conditions. The BCM is parameterized and run for a continuous state-wide model grid with cell sizes of 270 m by 270 m, or approximately five acres. The hydrologic processes simulated by the BCM are described by

Flint et al. (2013) and summarized in **Figure 4-1**. BCM outputs include surface water runoff and groundwater recharge[4] for each month for each model grid cell.

BCM model grid cell outputs for long-term average annual results are presented in **Figure 4-2** and **Figure 4-3** to depict how the outputs vary across the Project Area.

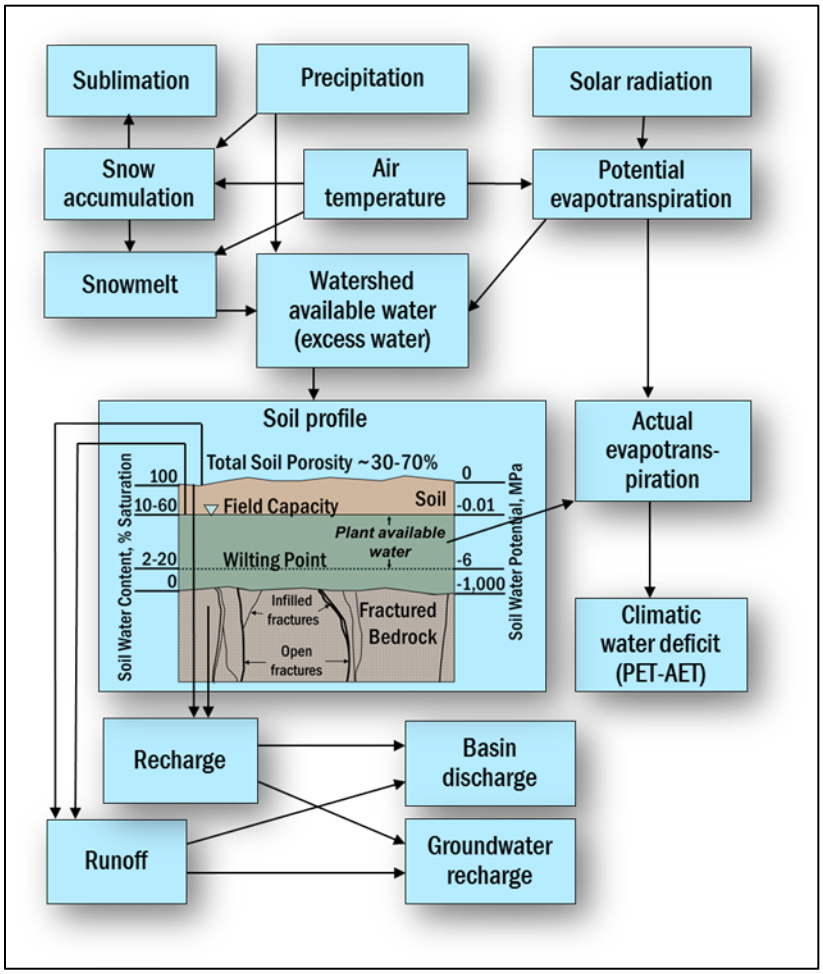
BCM results for groundwater recharge and runoff were post-processed to calculate the availability of groundwater across the Project Area for both observed current conditions and projected future conditions. The post-processing routine requires aggregating both BCM output datasets, for model cell groundwater recharge and surface runoff, and applying a series of equations that account for hydrologic processes occurring across the landscape scale that influence how streamflow is generated and how groundwater is retained in the subsurface. The conceptual model for those landscape scale process is depicted in **Figure 4-4**.

The BCM conceptual model includes three zones[5], depicted in **Figure 4-4 (**Flint et al., 2013):

1. Surface zone – "surface and near surface processes that hold and direct water toward the stream and that are event driven"
2. Shallow zone – "the shallow transient saturated zone that rises and falls seasonally providing much of the baseflow, but can sometimes also be event driven, and provides some recession flow"
3. Deep zone – "the regional aquifer but can also provide some flow to the shallow groundwater (zone) over long time frames

[4] The BCM output for groundwater recharge is consistent with the concept of deep percolation below the root zone and at a depth where evapotranspiration would not occur.
[5] The text by Flint et al. (2013) uses the term "reservoirs" to describe the three conceptual partitions of the surface water and groundwater system. This report refers instead to "zones" or "groundwater zones" to avoid confusion with discussion about surface reservoirs elsewhere in the report.

**Figure 4-1: Schematic of hydrologic processes simulated by the Basin Characterization Model (adapted from Flint et al. 2013)**




Post-processing BCM outputs occurs by applying a series of equations developed by the BCM authors. These equations use the model cell outputs for runoff and recharge to account for how water that becomes runoff or recharge at the model cell level eventually contribute to streamflow generated at the watershed scale, both by direct surface runoff and by contributions to streamflow by groundwater. The BCM is calibrated through this procedure to match observed streamflow at gauging stations and subsequently compared to observed streamflow at other gauging stations to validate the BCM performance. In the Project vicinity, the BCM authors utilized long-term stream gauge data from the USGS gauge Putah Creek near Guenoc, CA (USGS Station ID: 11453500) as one such validation gauge, where BCM model outputs were post-processed and compared to observed streamflow to evaluate the ability of the model and post-processing procedure to reflect observed streamflow.

The BCM post-processing equation are shown below (see Equations 1 – 7). They include quantification of monthly flows into each of the three groundwater zones (Surface, GWshallow, and GWdeep) by way of flowpaths defined as Surfaceflow, Shallowflow, and Deepflow.

1. $$GW_{surface(i)} = GW_{surface(i-1)} + BCM_{run(i)} - Surfaceflow_{(i-1)}$$

2. $$Surfaceflow_{(i)} = (SurfaceScaler * GW_{surface(i)})^{SurfaceExp}$$

3. $$GW_{shallow(i)} = GW_{shallow(i-1)} + BCM_{rch(i)} - shallowflow_{(i)} - deepflow_{(i)}$$

4. $$Shallowflow_{(i)} = (ShallowScaler * GW_{shallow(i-1)})^{ShallowExp}$$

5. $$Deepflow_{(i)} = (DeepScaler * GW_{shallow(i-1)})^{DeepExp}$$

6. $$Stream_{(i)} = Surfaceflow_{(i)} + Shallowflow_{(i)}$$

7. $$Discharge_{(i)} = WatBal * Stream_{(i)}$$

The equations also include seven parameters to influence the rate of flow between groundwater zones and ultimately simulate the total watershed scale of discharge observed at a gauging station. The values for each of the seven parameters are published by the USGS (Flint et al., 2013) for individual stream gauging stations selected by the USGS for evaluation. The parameter values vary from between gauging sites to reflect different watershed processes that vary with geologic settings, climatic patterns, and other watershed-scale processes that influence the movement of runoff of recharge. The analysis performed for this WSA applied the parameter values developed by the USGS for the nearest stream gauging station, Putah Creek near Guenoc, CA (USGS Station ID: 11453500) (see **Table 4-2**).

**Table 4-2: Basin Characterization Model Post-Processing Parameters, Putah Creek near Guenoc, CA (USGS Station ID: 11453500) (source: Flint et al., 2013)**

| Parameter | Value |
|---|---|
| **SurfaceScaler** | 1.00 |
| **SurfaceExp** | 0.97 |
| **ShallowScaler** | 1.00 |
| **ShallowExp** | 0.45 |
| **DeepScaler** | 1.00 |
| **DeepExp** | 0.60 |
| **WatBal** | 1.93 |

**Figure 4-4: Schematic of watershed scale streamflow and groundwater process evaluated by the Basin Characterization Model (adapted from Flint et al. 2013)**

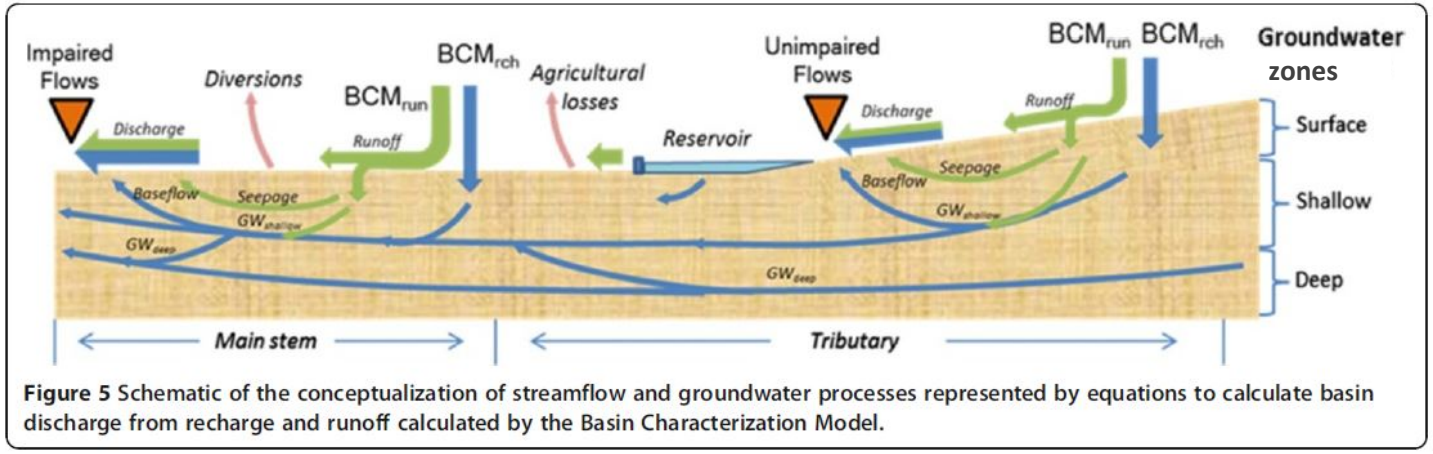



**Figure 5** Schematic of the conceptualization of streamflow and groundwater processes represented by equations to calculate basin discharge from recharge and runoff calculated by the Basin Characterization Model.

Groundwater availability for the Project is represented in the post-processed BCM output for the Deepflow variable. The Deepflow reflects "water subtracted from the shallow (zone) to simulate deep groundwater recharge" (Flint et al, 2013 p. 9). This represents groundwater that moves over time through the Surface and Shallow groundwater zones simulated by the BCM and into the deep groundwater zone after accounting for flows of groundwater that contribute to streamflow as hillslope seepage (leaving the surface zone) and baseflow (leaving the shallow zone). The accumulation of water in the deep zone is therefore a subset of the overall recharge output calculated at the model grid scale and reflects an amount which is not subject to discharge through natural processes (including evapotranspiration, contributions to streamflow, and subsurface groundwater flow).

Recognizing that climate change presents the potential to alter water availability in the future, the analysis performed for this WSA incorporates a range of possible groundwater availabilities reflecting the potential for variation due to climate change. The BCM outputs provided by the USGS include projected future runoff and recharge at the model cell level developed by running the BCM with inputs for future meteorological conditions, including precipitation and air temperature, provided by global climate models (GCMs). The future conditions represented by the GCMs incorporate "global socio-economic scenarios… developed by the (United Nation's) Intergovernmental Panel on Climate Change to provide climate scenarios that take into account estimates of possible magnitudes of greenhouse gas emissions that are responsible for much of the climate change" (Flint and Flint, 2012, p 1).

The future water availability analysis performed for this WSA uses BCM outputs for a "hot and low rainfall" scenario (MIROC_esm_rcp85) developed in a recent study of climate change vulnerability in northern San Francisco Bay Area counties (Micheli et al., 2016). BCM outputs resulting from the "hot and low rainfall" scenario represents the largest departure from recent, observed climate conditions out of six future scenarios evaluated for the northern Bay Area counties. For the "hot and low rainfall" scenario mid-century averages (i.e., 2040 to 2069) include a 21% reduction in average annual precipitation, an 11% increase in minimum monthly winter temperatures, and an 8% increase in the maximum monthly summer temperatures. The monthly time scale climate scenario data and corresponding BCM outputs for runoff and recharge that the BCM simulates do not constitute "predictions of precisely when climatic events will occur" instead they represent simulated future conditions considered "physically possible given the state of the science" (Micheli et al. 2016). For this reason, the evaluation of future groundwater availability incorporates long-term average annual conditions simulated by the BCM for the Project Area.

Results of the groundwater availability analysis for current and projected future conditions in the Project Area are presented in **Table 4-3**. The results reflect the variability in groundwater flowing into the deep groundwater zone described by the BCM on an annual basis based on post-processed BCM outputs for current conditions (water years 1988 to 2016[6]) and projected future conditions (water years 2020 to

[6] The period considered to reflect current conditions reflects a recent period of balanced wet and dry water year types. BCM outputs through 2016 are the most current provided by the U.S. Geological Survey based on observed meteorological data used as inputs to the BCM. It is common for large hydrologic models, such as the BCM, to

2040) by the BCM. Current availability shown in **Table 4-3** is based on recent, observed conditions; future availability reflects projected changes resulting from the modeled climate change scenario. For the purposes of this WSA, the future groundwater supply availability is accounted for beginning in 2030, the midpoint in the 20-year period of analysis.

The amount of groundwater varies with water year conditions. Although the flow is reduced in years with reduced rainfall, one benefit of using groundwater as a source of supply is the ability to manage the use of groundwater in conjunction with other available supplies. For the proposed Project, the availability of existing surface water and future recycled water supplies provides for some flexibility in the use of groundwater for non-potable uses.

**Table 4-3: Current and Projected Groundwater Supply Availability**

| Year Type | Normal Year | Dry Year | Very Dry Year |
|---|---|---|---|
| **Current Availability (2020 – 2029)** | 8,700 | 6,570 | 4,800 |
| **Projected Future Availability (2030 – 2040)** | 6,200 | 4,950 | 3,740 |
| Values reflect average annual inflows to the deep groundwater zone calculated by post-processing BCM model outputs for current conditions and for future conditions. | | | |

## 4.2 Surface Water Use and Availability

As described in Section 2.4.2, the Project has both riparian and appropriative rights to use surface water for beneficial uses along with a series of interconnected storage reservoirs and related facilities to convey water from points of diversion to the reservoirs and then on to Places of Use. Riparian and appropriative water have been used on the property for decades and will continue to be used for beneficial uses including irrigation, frost protection, agricultural production related activities (dust control, limited construction activities), fire protection, and other acceptable uses.

Agricultural acreage includes areas within and outside of Places of Use (see Section 2.4.2). Acreage within Places of Use account for the majority of current water use and all current surface water use in the Project Area and Adjacent Non-Project Areas. Current irrigated acreage within Places of Use is approximately 1,605 acres (**Table 2-6**).[7] Total irrigated acreage outside of Places of Use is approximately

experience delays on the order of years between the time that input data become available and the time when model outputs are published.

[7] Includes areas in Adjacent Non-Project Areas of approximately 415 vineyard acres in Guenoc Valley and approximately 330 acres of existing vineyards in the Napa County in the Upper Bohn Lake service area.

105 acres in the Project Area and Adjacent Non-Project Areas (**Table 2-6**). Currently, the total irrigated acreage includes only vineyard acreage.

Prior to 2016, surface water was also used as a source of supply to irrigate a golf course, covering approximately 90 acres, and pastures covering approximately 340 acres.

Average annual surface water use in the Project Area and Adjacent Non-Project Areas was 1,400 acre-feet between water years 2009 and 2013 when the uses included irrigation for vineyard, pasture, and golf course (**Table 4-4**). Average annual surface water use was 1,060 acre-feet between water years 2014 and 2018 as the uses of irrigation transitioned to vineyard only.

**Table 4-4: Existing Project Area Average Annual Surface Water Use**

| Use Type | Average Annual Use by Year (Acre-feet) | |
|---|---|---|
| | 2009 - 2013 | 2014- 2018 |
| **Non-Potable** | | |
| Irrigation Use (Agriculture and Golf Course) | 1,400 | 1,060 |
| Reservoir Losses (evaporation and seepage) | 2,320 | 2,770 |
| Average Annual Surface Water Use and Losses | 3,720 | 3,830 |
| Irrigation uses and reservoir losses reported through 2018 by Wagner and Bonsignore Consulting Civil Engineers and include reservoir losses to evapotranspiration and seepage. | | |

In dry years, including dry and very dry years, the Project can experience reduced surface water availability, although carryover of water stored in Project reservoirs in prior years can allow the project to beneficially use more water than is diverted in a given dry or very dry year. Water use and reservoir storage records, as available, for the recent period from water year 2011 through water year 2018 were reviewed to understand how the availability of water changes under dry and very dry year conditions (**Table 4-5**). The volume of carryover storage is represented by the sum of water stored in reservoirs proposed to supply the Project as of October 1. Metered use and October 1 storage volumes are used here to represent how surface water availability changes in dry and very dry years.

In 2013, a Very Dry year according to the precipitation frequency analysis presented in Section 2.2, metered use from the project reservoirs was 879 acre-feet and the amount of water remaining in storage at the end of the water year was 3,380 acre-feet. The sum of these two volumes, 4,260 acre-feet, represents the total surface water availability under Very Dry year conditions (**Table 4-6**). Dry year surface water availability is represented by the average of the sum of metered use and end of year reservoir storage for water years 2013 to 2016. The Dry year surface water availability, indicated by data

collected during recent drought conditions, is 4,600 acre-feet (**Table 4-6**).[8] The Dry year and Very Dry year surface water availability considered here assumes that no water is available for diversion under the riparian rights, due to more limited timing and duration of flow during the growing season in Dry and Very Dry years.

**Table 4-5: Project Area Water Use from Reservoirs and Carryover Storage**

| Water Year[1] | Middletown Precipitation[2] (inches) | Reservoir Depletions[3] (Acre-feet) | End of Water Year Reservoir Storage[4] (Acre-feet) | Metered Use from Reservoirs[5] (Acre-feet) | Sum of End of Water Year Storage and Metered Use (Acre-feet) |
|---|---|---|---|---|---|
| 2011 | 49.59 | 3,275 | 4,249 | 1,156 | **5,405** |
| 2012 | 34.24 | 4,527 | 4,654 | 1,171 | **5,825** |
| 2013 | 22.64 | 3,699 | 3,380 | 879 | **4,260** |
| 2014 | 19.69 | 3,277 | 3,814 | 1,215 | **5,030** |
| 2015 | 30.93 | 3,828 | 2,998 | 1,463 | **4,461** |
| 2016 | 40.6 | 3,345 | 3,816 | 916 | **4,732** |
| 2017 | 84.53 | 3,346 | 4,784 | 1,061 | **5,845** |
| 2018 | 18.02[6] | 6,043 | 5,764 | 861 | **6,625** |

[1] Water year is the period from October 1 to September 30, named for the calendar year on September 30.
[2] Middletown precipitation as reported at NOAA Station ID: USC00045598.
[3] Reservoir depletions reflect total changes in reservoir storage over the year and include evaporation and seepage losses and all uses.
[4] End of Water Year Reservoir Storage is the sum of water remaining in the reservoirs that would serve the proposed Project as measured on October 1, excepting 2011 when November 1 data were used because October 1 data are unavailable.
[5] Metered use reflects water applied to developed areas based on meter recordings.
[6] Water year 2018 precipitation data from NOAA Station ID: USC0004559 are incomplete, missing records from February and March.

[8] Although the precipitation record reflects an increase in precipitation received in water year 2016, the combined volume of metered use and end of year storage in 2016 was more comparable to the Dry years from 2013 to 2015 than 2012.

Records of surface use in recent years demonstrate the capacity of existing facilities to meet demands that occurred in those years but do necessarily reflect the total supply that could have been diverted and used to meet different demands. Wagner & Bonsignore (2019) estimated the amount of surface water available for use by existing and proposed uses, include the Project and other proposed vineyard expansions (see Section 5). Their analysis accounts for the total amount permitted to be withdrawn from storage in a given year and reductions due to annual evaporative losses from storage. Those results, when excluding the Big Basin Reservoir (Napa Valley Lake), indicate that permitted withdrawals from storage of about 8,600 AFY may be reduced by 1,770 AFY due to evaporative losses. The net amount of 6,800 AFY available to withdraw from storage would be augmented by direct diversion under riparian rights. Riparian right diversions have averaged 560 AFY between 1999 and 2018. Combing the net amount available for withdrawal from storage and the average annual riparian diversions results in an estimated total available supply of approximately (6,800 AFY + 560 AFY) 7,360 AFY. This amount reflects the anticipated availability of surface water under normal year conditions (**Table 4-6**).

**Table 4-6: Current and Future Surface Water Supply Availability**

| Year Type | Normal Year | Dry Year | Very Dry Year |
|---|---|---|---|
| **Current Availability (2020 – 2029)** | 7,360 | 4,600 | 4,200 |
| **Projected Future Availability (2030 – 2040)** | 7,360 | 5,600 | 5,200 |

Normal year availability is represented by the amount that the Project could generate under approved water rights, including appropriative and riparian, accounting for reservoir evaporation losses.

Dry and very dry year availability is represented by amounts of metered use during recent drought conditions (water years 2013 – 2016) and the amount of water remaining in storage at the end of those same water years.

Projected future availability is increased by 1,000 acre-feet in dry and very dry years consistent with the net increase in storage capacity at Upper Bohn Lake planned as a result of work planned to be completed in 2020.

## 4.3 Anticipated Recycled Water Availability

The Project proposes that new development clusters will be connected to new sanitary sewer systems and conveyed to new wastewater treatment facilities designed to produce recycled water suitable for reuse as landscaping irrigation and make up water for ornamental ponds and water features (Sherwood Design Engineers, 2019b). The estimates for recycled water availability show that 163 acre-feet of water would be available annually with the completion of Phase One of the Project (**Table 4-7**). The Future Phase of development is projected to include similar resort, resort accessory, and residential land uses, consistent with the proposed Guenoc Valley District zoning classification, that will generate additional wastewater for treatment by sanitary sewer systems. Based similarities in land uses between Phase One

and the Future Phase, it is assumed that the Future Phase of development will result in an additional recycled water supply increment of at least 163 acre-feet at full build-out.

**Table 4-7: Current and Future Recycled Water Supply Availability**

| Year Type | Normal Year | Dry Year | Very Dry Year |
|---|---|---|---|
| **Current Availability** | 0 | 0 | 0 |
| **Projected Future Availability: Phase One (2020 – 2029)** | 163 | 163 | 163 |
| **Projected Future Availability: Phase One and Future Phase (2030 – 2040)** | 326 | 326 | 326 |
| Recycled water availability will vary based on system build-out, which will coincide with build-out of Project amenities that will generate wastewater flows for treatment.<br><br>For the purposes of this WSA, it is assumed that the Project will achieve full build-out conditions of Phase One within the first five years and that Future Phase build-out will occur by 2030. The projected timing to build-out of the Future Phase used for this WSA is intended to provide a conservative estimate of future demands, within the required 20-year period of analysis. | | | |

## 4.4 Summary of Existing Water Use

Existing potable and non-potable uses are summarized in **Table 4-8**. Amounts reflect average annual uses of surface water and groundwater in recent years, as described above. Reductions in surface water use in the period from 2014 to 2018 reflect the transition from irrigated pasture and golf course irrigation to irrigation of vineyards only.

**Table 4-8: Existing Water Use Summary**

| Use Type | Average Annual Use by Year (Acre-feet) | |
|---|---|---|
| | 2009 - 2013 | 2014- 2019 |
| **Potable Uses** | | |
| Project Area – Guest house/hunting lodge (occasional domestic use and landscape irrigation) | 1 | 1 |
| Adjacent Non-Project Areas – Langtry House (domestic uses and landscaping) | 2 | 2 |
| Adjacent Non-Project Areas - Langtry Estates Winery | 6 | 6 |
| **Potable Water Use Subtotal** | 9 | 9 |
| **Non-Potable Uses** | | |
| Project Area: Tephra Ridge Vineyard Irrigation and frost protection outside Places of Use | 42 | 42 |
| Project Area: Irrigation, within Places of Use | 1,400 | 1,060 |
| Adjacent Non-Project Areas – Upper Bohn area vineyard outside Places of Use | - | 63 |
| Adjacent Non-Project Areas – Irrigation, within Places of Use | 330 | 330 |
| **Non-Potable Water Use Subtotal** | 1,772 | 1,495 |
| **Total Existing Use** | **1,781** | **1,504** |

Domestic uses include landscaping demands.

Winery use is as reported by Randy Sternberg, Lotusland Investment Holdings VP, personal communication 10/3/2019.

Vineyard irrigation uses are 1 AF/acre consistent with reported deliveries of surface water metered in Project reservoirs.

Irrigation uses are as reported through 2018 by Wagner and Bonsignore Consulting Civil Engineers and include reservoir losses to evapotranspiration and seepage. Project Area irrigation within Places of Use included pasture and golf course irrigation prior to 2016.

# 5 PLANNED FUTURE WATER DEMANDS

This section summarizes the projected future demands for both phases of the Project and other changes to water demands anticipated to occur in the Project Area and Adjacent Non-Project Areas. Planned future water demands for the Project Area include both potable and non-potable components. Future Project demands are based on information developed for the Project. Additional non-potable demands expected to occur due to new vineyard acreage planned to be developed as part of existing leases and separate land use approvals.

## 5.1 Project Area Potable Water Demands

Projected potable water demands include new uses to be developed as part of the Maha Resort. The demands include resort facilities (temporary lodging), residential development (including workforce co-housing), resort amenities, agricultural production facilities, and essential accessory uses (Sherwood Design Engineers, 2019a). Total new average annual potable water demands anticipated for Phase One are 249 acre-feet per year (AFY), of which 18 AFY would occur in Middletown within the service area of the Collayomi County Water District (**Table 5-1**). Allowable uses within future phases result in additional potential demands of 436 acre-feet per year at full build-out, of which 12 AFY would occur in Middletown within the service area of the Collayomi County Water District (**Table 5-2**).

**Table 5-1: Maha Resort Phase One Average Annual Potable Water Demand**

| Use | Unit | Quantity | Water Demand (gallons) | Average Occupancy Rate (percent) | Average Annual Water Demand (GPY) | Average Annual Water Demand (AFY) |
|---|---|---|---|---|---|---|
| **1. Resort Facilities** | | | | | | |
| 1.1. Hotel Rooms | EA | 225 | 277.5 | 60% | 13,673,813 | 41.96 |
| 1.2. Resort Residential units | EA | 144 | 427.5 | 60% | 13,481,640 | 41.37 |
| | | | | | | |
| **2. Residential Development** | | | | | | |
| 2.1. Residential Estate Villas | EA | 411 | 674.4 | 40% | 40,468,046 | 124.17 |
| 2.2. Workforce Co-Housing | EA | 300 | 75 | 70% | 5,748,750 | 17.64 |
| | | | | | | |
| **3. Resort Amenities** | | | | | | |
| 3.1. Outdoor Entertainment | Seats | 500 | 5.5 | 60% | 39600 | 0.122 |
| 3.2. Spa and Wellness Area | Visitors | 70 | 25 | 60% | 383,250 | 1.18 |
| 3.3. Sports and Recreation | Visitors | 0 | | | | |
| 3.4. Equestrian Area | Visitors | 105 | 18 | 60% | 413,910 | 1.27 |
| 3.5. Golf | Visitors | 85 | 21 | 60% | 390,915 | 1.20 |
| 3.6. Camping Area | EA | 42 | 64 | 60% | 588,672 | 1.81 |
| 3.7. Commercial & Retail | Visitors | 120 | 23 | 60% | 604,440 | 1.85 |
| | | | | | | |
| **4. Agricultural Production Facilities** | | | | | | |
| 4.1. Wineries | Cases | 62,500 | 16 | 60% | 600000 | 1.841 |
| 4.2. Diversified Agricultural Production | Visitors | 8 | 35 | 60% | 61,320 | 0.188 |
| 4.3. Livestock and Farm Management | Visitors | 8 | 35 | 60% | 61,320 | 0.188 |
| | | | | | | |
| **5. Essential Accessory Uses** | | | | | | |
| 5.1. Back of House Facilities | EA | 1 | 17100 | 60% | 3744900 | 11.491 |
| 5.2. Emergency Response Center | EA | 1 | 4140 | 60% | 906660 | 2.782 |
| 5.3. Alternative Energy Production | EA | 1 | 280 | 100% | 102200 | 0.314 |
| 5.4. Float Plane Dock | EA | 1 | 60 | 25% | 5475 | 0.017 |
| 5.5. Helipads | EA | 1 | 30 | 25% | 2737.5 | 0.008 |
| | | | | | | |
| **Total Estimated Phase One Potable Water Demand** | | | | | **81,277,648** | **249** |

Source: Sherwood Design Engineers, 2019a

**Table 5-2: Maha Resort Future Phase Estimated Average Annual Potable Water Demand**

| Use | Unit | Quantity | Water Demand (gallons) | Average Occupancy Rate (percent) | Average Annual Water Demand (GPY) | Average Annual Water Demand (AFY) |
|---|---|---|---|---|---|---|
| **1. Resort Facilities** | | | | | | |
| 1.1. Hotel Rooms | EA | 155 | 277.5 | 60% | 9,419,738 | 28.90 |
| 1.2. Resort Residential units | EA | 260 | 427.5 | 60% | 24,341,850 | 74.69 |
| | | | | | | |
| **2. Residential Development** | | | | | | |
| 2.1. Residential Estate Villas* | EA | 986 | 674.4 | 40% | 97,083,926 | 297.89 |
| 2.2. Workforce Co-Housing | EA | 200 | 75.0 | 70% | 3,832,500 | 11.76 |
| | | | | | | |
| **3. Resort Amenities** | | | | | | |
| 3.1. Outdoor Entertainment | Seats | 200 | 5.5 | 60% | 15840 | 0.05 |
| 3.2. Spa and Wellness Area | Visitors | 70 | 25.0 | 60% | 383250 | 1.18 |
| 3.3. Sports and Recreation | Visitors | 100 | 30.0 | 60% | 657000 | 2.02 |
| 3.4. Equestrian Area | Visitors | 105 | 18.0 | 60% | 413910 | 1.27 |
| 3.5. Golf | Visitors | 44 | 21.0 | 60% | 202356 | 0.62 |
| 3.6. Camping Area | | | | | | |
| 3.7. Commercial & Retail | Visitors | 60 | 23.0 | 60% | 302220 | 0.93 |
| | | | | | | |
| **4. Agricultural Production Facilities** | | | | | | |
| 4.1. Wineries | Cases | 292,000 | 16.0 | 60% | 2803200 | 8.60 |
| 4.2. Diversified Agricultural Production | Visitors | 8 | 35.0 | 60% | 61320 | 0.19 |
| 4.3. Livestock and Farm Management | Visitors | 8 | 35.0 | 60% | 61320 | 0.19 |
| | | | | | | |
| **5. Essential Accessory Uses** | | | | | | |
| 5.1. Back of House Facilities | EA | 1 | 8550.0 | 60% | 1872450 | 5.75 |
| 5.2. Emergency Response Center | EA | 1 | 2070.0 | 60% | 453330 | 1.39 |
| 5.3. Alternative Energy Production | EA | 1 | 168.0 | 100% | 61320 | 0.19 |
| 5.4. Float Plane Dock | EA | 1 | 20.0 | 25% | 1825 | 0.01 |
| 5.5. Helipads | EA | 1 | 20.0 | 25% | 1825 | 0.01 |
| | | | | | | |
| **Total Estimated Future Phase Potable Water Demand** | | | | | **141,969,180** | **436** |

Estimated Future Phase potable demands reflect maximum build-out of proposed zoning.
Source: Sherwood Design Engineers, 2019a

**Table 5-3: Summary of Daily and Annual Maha Resort Potable Water Demands**

| Use | Average Daily Water Demand (GDP) | Average Daily Water Demand (AFD) | Maximum Day Water Demand (GPD) | Maximum Annual Water Demand (AFD) | Average Annual Water Demand (GPY) | Average Annual Water Demand (AFY) |
|---|---|---|---|---|---|---|
| **Phase One** | 224,436 | 0.7 | 462,425 | 1.4 | 81,277,648 | 249 |
| **Future Phase** | 211,894 | 0.7 | 406,669 | 1.2 | 141,969,180 | 436 |
| **Total Estimated Potable Water Demand** | **436,330** | **1.3** | **869,093** | **2.7** | **223,246,828** | **685** |

## 5.2 Project Area Non-Potable Water Demands

Projected non-potable water demands include new uses to be developed as part of the Maha Resort and new uses associated with additional vineyard lands not yet planted. Non-potable demands associated with the Maha Resort are planned to occur in two phases, consistent with the potable water demands(**Table 5-4** and **Table 5-5**). Resort-related non-potable demands include "landscape irrigation demands for the commercial and residential properties, new vineyard and farm areas, recreational areas including the Renaissance Golf Course and the Equestrian Center, roadway landscaping and greenroofs" (Sherwood Design Engineers, 2019a).Non-potable water demands will also include "make up water for non-recreational water features (fountains and reflection pools)" (Sherwood Design Engineers, 2019a). Non-potable water is planned to be supplied by three sources: recycled water, existing entitled surface water rights and groundwater. As described in Section 2, approved Places of Use are part of the surface water rights and limit the areas where surface water may be used. Tables in this section report the planned demands for water within and outside Places of Use in order to help understand what source or sources of supply may be used to meet the planned demands.

## Table 5-4: Maha Resort Phase One Annual Non-Potable Water Demand Estimates

| Use | Unit | Total Acres | POU Acres | Non-POU Acres | Water Demand (AF/ac) | POU Water Demand (AFY) | Non-POU Water Demand (AFY) |
|---|---|---|---|---|---|---|---|
| **1. Resort Facilities** | | | | | | | |
| 1.1. Hotel Rooms | Acres | 88.5 | 36.9 | 51.6 | 2 | 73.8 | 103.2 |
| 1.2. Resort Residential units | Acres | 16.5 | 1.8 | 14.7 | 2 | 3.6 | 29.4 |
| | | | | | | | |
| **2. Residential Development** | | | | | | | |
| 2.1. Residential Estate Villas | Acres | 87.7 | 40.3 | 47.4 | 2 | 80.6 | 94.8 |
| 2.2. Workforce Co-Housing | Acres | 3.8 | 3.8 | 0 | 2 | 7.6 | 0 |
| | | | | | | | |
| **3. Resort Amenities** | | | | | | | |
| 3.1. Outdoor Entertainment | Acres | 2 | 0 | 2 | 2 | 0.0 | 4 |
| 3.2. Spa and Wellness Area | Acres | 6.2 | 0 | 6.2 | 2 | 0.0 | 12.4 |
| 3.3. Sports and Recreation | Acres | 0 | | | | | |
| 3.4. Equestrian Area | Acres | 46 | 46 | 0 | 2 | 92.0 | 0 |
| 3.5. Golf | Acres | 83.8 | 48.2 | 35.6 | 4 | 192.8 | 142.4 |
| 3.6. Camping Area | Acres | 2 | 0 | 2 | 1 | 0.0 | 2 |
| 3.7. Commercial & Retail | Acres | 2 | 0 | 2 | 2 | 0.0 | 4 |
| | | | | | | | |
| **4. Agricultural Production Facilities** | | | | | | | |
| 4.1. Wineries (landscape) | Acres | 5.7 | 5.7 | 0 | 2 | 11.4 | 0 |
| 4.2. Diversified Agricultural Production | Acres | 6 | 0 | 6 | 3 | 0.0 | 18 |
| | | | | | | | |
| **5. Essential Accessory Uses** | | | | | | | |
| 5.1. Back of House Facilities | Acres | 6.2 | 6.2 | 0 | 1 | 6.2 | 0 |
| 5.2. Emergency Response Center | Acres | 1.3 | 1.3 | 0 | 2 | 2.6 | 0 |
| 5.3. Float Plane Dock | Acres | 0.3 | 0 | 0.3 | 1 | 0.0 | 0.3 |
| 5.4. Hellipads | Acres | 0.3 | 0 | 0.3 | 1 | 0.0 | 0.3 |
| | | | | | | | |
| **6. Other Non-Potable Demands** | | | | | | | |
| 6.1. Greenroofs | Acres | 22.4 | 5.2 | 17.2 | 2 | 10.4 | 34.4 |
| 6.2. Entry Roads | Acres | 61 | 23.8 | 37.2 | 1 | 23.8 | 37.2 |
| 6.3. Equestrian Lake | Acres | 8 | 8 | 0 | 5 | 40.0 | 0 |
| **Total Estimated Phase One Non-Potable Water Demand (AFY)** | | | | | | **544.8** | **482.4** |
| Source: Sherwood Design Engineers, 2019a | | | | | | | |

## Table 5-4: Maha Resort Future Phase Estimated Annual Non-Potable Water Demand

| Use | Unit | Quantity | POU Acres | Non-POU Acres | Water Demand (ac-ft/ac) | POU Water Demand (AFY) | Non-POU Water Demand (AFY) |
|---|---|---|---|---|---|---|---|
| **1. Resort Facilities** | | | | | | | |
| 1.1. Hotel Rooms | Acres | 36 | 7.2 | 28.8 | 2 | 14.4 | 57.6 |
| 1.2. Resort Residential units | Acres | 30 | 6 | 24 | 2 | 12.0 | 48.0 |
| | | | | | | | |
| **2. Residential Development** | | | | | | | |
| 2.1. Residential Estate Villas | Acres | 227 | 113.5 | 113.5 | 2 | 227.0 | 227.0 |
| 2.2. Workforce Co-Housing | Acres | 1.5 | 1.5 | 0 | 2 | 3.0 | 0.0 |
| | | | | | | | |
| **3. Resort Amenities** | | | | | | | |
| 3.1. Outdoor Entertainment | Acres | 2 | 0 | 2 | 2 | 0.0 | 4.0 |
| 3.2. Spa and Wellness Area | Acres | 6.2 | 0 | 6.2 | 2 | 0.0 | 12.4 |
| 3.3. Sports and Recreation | Acres | 300 | 300 | 0 | 1.5 | 450.0 | 0.0 |
| 3.4. Equestrian Area | Acres | 46 | 46 | 0 | 2 | 92.0 | 0.0 |
| 3.5. Golf | Acres | 175 | 87.5 | 87.5 | 4 | 350.0 | 350.0 |
| 3.6. Camping Area | Acres | 0 | | 0 | 1 | 0.0 | 0.0 |
| 3.7. Commercial & Retail | Acres | 1.5 | 0 | 1.5 | 2 | 0.0 | 3.0 |
| | | | | | | | |
| **4. Agricultural Production Facilities** | | | | | | | |
| 4.1. Wineries (landscaping) | Acres | 11 | 0 | 11 | 2 | 0.0 | 22.0 |
| 4.2. Diversified Agricultural Production | Acres | 3 | 1.5 | 1.5 | 3 | 4.5 | 4.5 |
| 4.3. Livestock and Farm Management | Acres | 3 | 1.5 | 1.5 | 3 | 4.5 | 4.5 |
| | | | | | | | |
| **5. Essential Accessory Uses** | | | | | | | |
| 5.1. Back of House Facilities | Acres | 3.2 | 3.2 | 0 | 1 | 3.2 | 0.0 |
| 5.2. Emergency Response Center | Acres | 0.25 | 0.25 | 0 | 2 | 0.5 | 0.0 |
| | | | | | | | |
| **6. Other Non-Potable Demands** | | | | | | | |
| 6.1. Greenroofs | Acres | 11.2 | 5.6 | 5.6 | 2 | 11.2 | 11.2 |
| 6.2. Entry Roads | Acres | 30 | 15 | 15 | 1 | 15.0 | 15.0 |
| | | | | | | | |
| **Total Estimated Future Phase Non-Potable Water Demand (AFY)** | | | | | | **1187.3** | **759.2** |

Source: Sherwood Design Engineers, 2019a

In addition to the planned landscaping and other non-potable water uses associated with the Maha Resort, the Project Area includes approximately 1,132 acres of land previously leased for vineyard installation (**Table 5-6**). The additional leased acreage, not currently planted, includes approximately 1,115 acres within Places of Use, which will rely on existing surface water right entitlements, and approximately 18 acres outside of Places of Use, to be supplied by groundwater. Sources of supply for these planned demands include existing entitled surface water and groundwater.

**Table 5-6: Previously Approved Project Area Vineyard Lease Water Demand Estimates**

| | Within Places of Use | | Outside Places of Use | | | |
|---|---|---|---|---|---|---|
| | Acres | Annual Water Use Estimate (AFY) | Acres | Annual Water Use Estimate (AFY) | Total Acres | Total Avg. Annual Non-Potable Demand (AF) |
| **Amended Lease Lands (Future Project Area Vineyards not part of Project)** | 1,115 | 1,1115 | 18 | 18 | 1,132 | 1,132 |

## 5.3 Adjacent Non-Project Area Water Demands

Adjacent Non-Project Areas (ANPA) include approximately 505 acres near Bucksnort Creek in Guenoc Valley and approximately 720 acres in Napa County. Existing water demands are planned to continue in both areas, with additional vineyard expansion likely in the Napa County portion of the ANPA. As described in Section 2.4, the Napa County ANPA includes approximately 330 acres currently planted with vineyards. Napa County has previously approved an approximately 390 acres of additional vineyard plantings in the areas (**Table 5-7**). While not a part of the Project, for the purposes of this WSA, it is assumed that all 390 acres will be established, consistent with Napa County approvals. Sources of supply for these planned demands include existing entitled surface water and groundwater.

**Table 5-7: Previously Approved Adjacent Non-Project Area Vineyard Water Demand Estimates**

| | Within Places of Use (POU) | | Outside POU | | | |
|---|---|---|---|---|---|---|
| | Acres | Annual Water Use Estimate (AFY) | Acres | Annual Water Use Estimate (AFY) | Total Acres | Total Avg. Annual Non-Potable Demand (AF) |
| **Previously Approved Additional Vineyards in Napa County (not part of Project)** | 390 | 390 | 0 | 0 | 390 | 390 |

## 5.4 Summary of Planned Future Water Demands

Planned future potable water demands are summarized in **Table 5-8** and represent uses planned to occur in addition to existing potable uses described in Section 4. Future potable water demands are anticipated to occur as a result the Project during both Phase One and through Future Phase developments. As noted in Section 5.1, Workforce co-housing demands of 18 AFY in Phase One and 12 AFY in the Future Phase would occur in Middletown within the service area of the Collayomi County Water District and are not considered a demand to be met by Project Area sources of supply.

**Table 5-8: Planned Future Potable Water Demand Summary**

| Planned Future Use | Project Area (AFY) | Colloyami County Water District (AFY) | Average Annual Demand (AFY) |
|---|---|---|---|
| **Potable Demands** | | | |
| **Maha Resort Phase One**[1] | 231 | 18 | 249 |
| **Maha Resort Future Phase**[1] | 424 | 12 | 436 |
| **Planned Potable Demand Total** | **655** | **30** | **685** |

[1] Potable Demands for the Maha Resort Project, Phase One and Future Phase include 18 AFY and 12 AFY, respectively (see Section 5.1). Those demands are planned to occur in Middletown within the service area of the Collayomi County Water District. They area reported separately here and are not considered a demand to be met by Project Area sources of supply.

Planned future non-potable water demands are summarized in **Table 5-9** and represent uses planned to occur in addition to existing non-potable uses described in Section 4. Future non-potable water demands are anticipated to occur as a result the Project during both Phase One and through Future Phase developments.

**Table 5-9: Planned Future Non-Potable Water Demand Summary**

| Planned Future Use | Non-Potable Demands In Places of Use (AFY) | Non-Potable Demands Outside Places of Use (AFY) | Average Annual Demand (AFY) |
|---|---|---|---|
| **Non-Potable Demands** | | | |
| **Maha Resort Phase One** | 545 | 482 | 1,027 |
| **Maha Resort Future Phase** | 1,187 | 759 | 1,946 |
| **Project Area Vineyard Lease** | 1,115 | 18 | 1,133 |
| **Adjacent Non-Project Area Vineyard** | 390 | - | 390 |
| **Planned Non-Potable Demand Subtotal** | **3,237** | **1,259** | **4,496** |

# 6 WATER SUPPLY SUFFICIENCY

SB 610 requires that a WSA report findings regarding water supply sufficiency to meet projected water demands, including existing demands planned to continue, under the normal, single-dry, and multiple-dry year planning scenarios. Sufficiency is addressed in this section by comparing the projected water demands presented in Section 5 with the available supply and current water uses presented in Section 4. For the purposes of this analysis, it is assumed that the Project will achieve full build-out conditions of Phase One within the first five years and that Future Phase build-out will occur by 2030. The projected timing to build-out of the Future Phase used for this WSA is intended to provide a conservative estimate of future demands, within the required 20-year period of analysis.

## 6.1 Summary of Water Supply Availability to 2040 (Normal, Dry, and Multiple-Dry Years)

The Project Area includes existing supplies of surface water and groundwater and a planned future supply of recycled water to meet potable and non-potable demands, both existing and proposed. Current and future water rights, entitlements, and contracts, are summarized in **Table 6-1**, as presented in Section 4. Supply types are designated here for consistency with Water Code Section 10910. As described in Section 2.4.3 and Section 4.3 the recycled water supply for the project is planned to be developed as part of the Project itself and used to meet Project demands.

**Table 6-1: Sources of Supply**

| Source | Annual Amount (acre-feet) | Type[1] | Used Previously |
|---|---|---|---|
| **Local Surface Water**[2] | 10,394.5 | Entitlement | Yes |
| **Groundwater**[3] | 8,700 – 4,950 | Right | Yes |
| **Recycled Water**[4] | 163- 326 | Contract | No |

[1] Supply types are designated here for consistency with Water Code Section 10910, the planned future recycled water supply is referenced here a "contract" though the supplier would be the Project's own planned water system.
[2] See Section 2.4.2, permitted total appropriative surface water authorized diversion to storage (excluding Big Basin Reservoir outside of the Project Area, plus 560 acre-feet of estimated riparian water use, 1999 – 2018.
[3] See Section 4.1.5
[4] See Section 4.3

Projected availability of groundwater in future years, through 2040, reflects the range of groundwater availability determined through the analysis of current and projected future hydrologic conditions processes, including hydrologic impacts due to climate change (see Section 4.3.3) (**Tables 6-2 and 6-3**). Specifically, the availability of groundwater projected for years from 2020 through 2040 account for the volume of groundwater recharge not subject to discharge through natural processes (including evapotranspiration, contributions to streamflow, and subsurface groundwater flow).

Projected surface water availability in future years, through 2040, reflects the range of surface water availability determined through review of the variability of diversions and use of surface water occurring in the Project Area since 2011 and the permitted capacity for the project to divert and use surface water with consideration for reservoir evaporation losses and the limited availability of riparian right diversion in Dry and Very Dry years (see Section 4.2). The projected surface water availability also reflects the net increase of 1,000 acre-feet available from Upper Bohn Reservoir as a result of dam reconstruction and diversion upgrades previously approved by the 2006 Water Right Modification and scheduled for completion in 2020.

Recycled water is shown as a source of supply beginning in 2020 to coincide with the initiation of Project Phase One demands, also shown to begin in 2020 for the purpose of this sufficiency assessment. The actual timing of both recycled water supply availability and Project Phase One demands will likely be somewhat different and subject to the progress of Project construction.

The amounts represented as single dry year supplies in **Table 6-2** and **Table 6-3** correspond to the supplies described under Very Dry year conditions presented in Sections 4.1.5 (groundwater), 4.2 (surface water), and 4.3 (recycled water).

Projected recycled water availability in future years, through 2040, is consistent with projections of project build-out, including build-out of recycled water facilities (Sherwood Design Engineers, 2019b).

**Table 6-2: Water Supply Availability for 2020 (Normal, Dry, and Multiple-Dry Years)**

| Source of Supply | Annual Water Supply (acre-feet) | | | | |
|---|---|---|---|---|---|
| | Normal Year | Single Dry Year[1] | Multiple Dry Years[2] | | |
| | | | 2 | 3 | 4 |
| Groundwater | 8,700 | 4,800 | 6,570 | 6,570 | 6,570 |
| Local Surface Water | 7,360 | 4,200 | 4,600 | 4,600 | 4,600 |
| Recycled Water | **163** | **163** | **163** | **163** | **163** |
| **Total Supply** | **16,223** | **9,163** | **11,333** | **11,333** | **11,333** |

[1] Single dry year supplies correspond to the Very Dry year supply availability described in Section 4.
[2] Multiple dry year supplies correspond to the multiple Dry year supply availability described in Section 4.

**Table 6-3: Projected Water Supply Availability for 2040(Normal, Dry, and Multiple-Dry Years)**

| Source of Supply | Annual Water Supply (acre-feet) | | | | |
|---|---|---|---|---|---|
| | Normal Year | Single Dry Year[1] | Multiple Dry Years[2] | | |
| | | | 2 | 3 | 4 |
| Groundwater | 6,200 | 3,740 | 4,950 | 4,950 | 4,950 |
| Local Surface Water | 7,360 | 5,200 | 5,600 | 5,600 | 5,600 |
| Recycled Water | **326** | **326** | **326** | **326** | **326** |
| **Total Supply** | **13,886** | **9,266** | **10,876** | **10,876** | **10,876** |

[1] Single dry year supplies correspond to the Very Dry year supply availability described in Section 4.
[2] Multiple dry year supplies correspond to the multiple Dry year supply availability described in Section 4.

## 6.2 Summary of Water Supply Sufficiency to 2040 (Normal, Dry, and Multiple-Dry Years)

For the purposes of this analysis, it is assumed that the Project will achieve full build-out conditions of Phase One within the first five years and that Future Phase build-out will occur by 2030 (**Table 6-4** and **Table 6-5**). The projected timing to build-out of the Future Phase used for this WSA is intended to provide a conservative estimate of future demands, within the required 20-year period of analysis. Demands associated with all planned future uses of water in the Project Area are reported here as average annual demands, which reflect a level of demand expected to occur over a period of years. Demands may fluctuate from year to year according to resort occupancy and staffing levels or due to water year type and meteorological conditions but are expected to remain consistent with the average annual demand projections over periods of five years or more.

**Table 6-4: Normal Water Year Potable Water Supplies and Demands Through 2040**

| | 2020 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|
| Potable Supply[1] | | | | | |
| Groundwater[1] | 800 | 800 | 800 | 800 | 800 |
| **Total Supply** | **800** | **800** | **800** | **800** | **800** |
| | | | | | |
| Potable Demand[2] | | | | | |
| Existing Uses | 9 | 9 | 9 | 9 | 9 |
| Maha Resort Phase One | 249 | 249 | 249 | 249 | 249 |
| Maha Resort Future Phase | 0 | 0 | 436 | 436 | 436 |
| **Total Demand** | **258** | **258** | **694** | **694** | **694** |
| **Potable Surplus or Deficiency** | **542** | **542** | **106** | **106** | **106** |

[1] Groundwater will be supplied by wells in the Project Area (see Section 2.4.1).
[2] Existing uses are described in Section 4. Proposed future demands are described in Section 5.

**Table 6-5: Normal Water Year Non-Potable Water Supplies and Demands Through 2040**

| | 2020 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|
| Non-Potable Supply[1] | | | | | |
| Local Surface Water | 7,360 | 7,360 | 7,360 | 7,360 | 7,360 |
| Groundwater | 7,900 | 7,900 | 5,400 | 5,400 | 5,400 |
| Recycled Water | 163 | 163 | 326 | 326 | 326 |
| **Total Supply** | **15,423** | **15,423** | **13,086** | **13,086** | **13,086** |
| | | | | | |
| Non-Potable Demand in Places of Use (POU)[2] | | | | | |
| Existing Uses | 1,390 | 1,390 | 1,390 | 1,390 | 1,390 |
| Expanded Vineyard Lease | 1,115 | 1,115 | 1,115 | 1,115 | 1,115 |
| Adjacent Non-Project Area Vineyard | 390 | 390 | 390 | 390 | 390 |
| Maha Resort Phase One | 545 | 545 | 545 | 545 | 545 |
| Maha Resort Future Phase | 0 | 0 | 1,187 | 1,187 | 1,187 |
| **Total Demand** | **3,440** | **3,440** | **4,627** | **4,627** | **4,627** |
| **Non-Potable Surplus or Deficiency in POU** | **3,920** | **3,920** | **2,733** | **2,733** | **2,733** |
| | | | | | |
| Non-Potable Demand outside POU | | | | | |
| Existing Uses | 105 | 105 | 105 | 105 | 105 |
| Expanded Vineyard Lease | 9 | 18 | 18 | 18 | 18 |
| Maha Resort Phase One | 482 | 482 | 482 | 482 | 482 |
| Maha Resort Future Phase | 0 | 0 | 759 | 759 | 759 |
| **Total Demand** | **596** | **605** | **1,364** | **1,364** | **1,364** |
| **Non-Potable Surplus or Deficiency outside POU** | **7,467** | **7,458** | **4,362** | **4,362** | **4,362** |

[1] Groundwater demands generated by the Project will be supplied by wells in the Project Area (see Section 2.4.1). The groundwater supply shown for non-potable uses is equal to the total available supply described in Section 4.1.5 less the supply shown for potable uses in Table 6-4.
[2] Existing uses are described in Section 4. Proposed future demands are described in Section 5.

Water supply sufficiency is considered for normal, single dry, and multiple dry year types in 2020 (**Table 6-6)** and 2040 (**Table 6-7**) to reflect the anticipated changes in demand anticipated to occur over time. Surface water supplies are projected to remain stable during sequential dry years based on the ability of Project reservoirs to receive diverted water in dry years (see Section 4.2). Groundwater supplies are projected to remain stable during sequential dry years based on the analysis of groundwater recharge showing that groundwater recharge continues to occur in dry year. Recycled water supplies are projected to remain stable in sequential dry years because the supply is linked to the generation of wastewater by the Project's potable water system, which will continue in dry years.

The availability of water supplies is projected to exceed projected water demands, including both Phase One and the Future Phase of development as well as other planned future demands and continuation of existing demands. The supply sufficiency is projected to result in surpluses through 2040 without causing overdraft of groundwater supplies and without exceeding the surface water supplies available to the Project (**Table 6-6** and **Table 6-7**).

**Table 6-6: Comparison of Water Supply Sufficiency for 2020 (Normal, Dry, and Multiple-Dry Years)**

| | Annual Water Supply and Demand (acre-feet) | | | | |
|---|---|---|---|---|---|
| | Normal Year | Single Dry Year | Multiple Dry Years | | |
| | | | 2 | 3 | 4 |
| Potable Supply Total[1] | 800 | 800 | 800 | 800 | 800 |
| Potable Demand Total[2] | 258 | 258 | 258 | 258 | 258 |
| **Potable Surplus or Deficiency** | **542** | **542** | **542** | **542** | **542** |
| | | | | | |
| Non-Potable Supply in Places of Use (POU)[1] | 7,360 | 4,200 | 4,600 | 4,600 | 4,600 |
| Non-Potable Demand Total, in POU[2] | 3,440 | 3,440 | 3,440 | 3,440 | 3,440 |
| **Non-Potable Surplus or Deficiency in POU** | **3,920** | **760** | **1,160** | **1,160** | **1,160** |
| | | | | | |
| Non-Potable Supply outside POU[1] | 7,900 | 4,000 | 5,770 | 5,770 | 5,770 |
| Non-Potable Demand Total outside POU[2] | 596 | 596 | 596 | 596 | 596 |
| **Non-Potable Surplus or Deficiency outside POU** | **7,304** | **3,404** | **5,174** | **5,174** | **5,174** |

[1] Reflects groundwater, surface water, and recycled water supplies, as applicable, and water year supply variability (see Sections 4.1.5, 4.2, 4.3).
[2] Includes existing demands planned to continue and all planned future demands, expecting the Future Phase Maha Resort development assumed to reach build-out by 2030 (see Section 4.4 and Section 5).
[3] Places of Use (POU).

**Table 6-7: Comparison of Projected Water Supply Sufficiency for 2040 (Normal, Dry, and Multiple-Dry Years)**

| | Annual Water Supply and Demand (acre-feet) | | | | |
|---|---|---|---|---|---|
| | Normal Year | Single Dry Year | Multiple Dry Years | | |
| | | | 2 | 3 | 4 |
| Potable Supply Total[1] | 800 | 800 | 800 | 800 | 800 |
| Potable Demand Total[2] | 694 | 694 | 694 | 694 | 694 |
| **Potable Surplus or Deficiency** | **106** | **106** | **106** | **106** | **106** |
| | | | | | |
| Non-Potable Supply in Places of Use (POU)[1] | 7,360 | 5,200 | 5,600 | 5,600 | 5,600 |
| Non-Potable Demand Total, in POU[2] | 4,627 | 4,627 | 4,627 | 4,627 | 4,627 |
| **Non-Potable Surplus or Deficiency - POU** | **2,733** | **573** | **973** | **973** | **973** |
| | | | | | |
| Non-Potable Supply outside POU[1] | 6,526 | 4,066 | 5,276 | 5,276 | 5,276 |
| Non-Potable Demand Total outside POU[2] | 1,364 | 1,364 | 1,364 | 1,364 | 1,364 |
| **Non-Potable Surplus or Deficiency - outside POU** | **5,162** | **2,702** | **3,912** | **3,912** | **3,912** |

[1] Includes projected supplies of groundwater, surface water, and recycled water, as applicable (see Sections 4.1.5, 4.2, and 4.3).
[2] Includes existing demands planned to continue, all planned future demands (Section 4.4 and Section 5).

# 7 RECOMMENDATIONS

## 7.1 Groundwater Monitoring Program

While the information presented in this WSA reflect considerable groundwater resources available to the Project, it is recommended that the Project implement a groundwater monitoring program to routinely collect groundwater level and quality data in the vicinity of Project water supply wells and wells supplying Adjacent Non-Project Areas. The monitoring program should be developed consistent with the Lake County Groundwater Management Plan (CDM, 2006). Objectives of the monitoring program should include ensuring that groundwater supplies remain sustainable for the Project and Adjacent Non-Project Areas.

## 7.2 Continued Groundwater Exploration to Verify New Well Capacity

It is recommended that new supply wells for planned Project water system continue to be constructed and tested in order to demonstrate, consistent with State and County codes and regulations, that hydrogeologic conditions will support the planned production rates from Project wells. This recommendation is consistent with the activities already underway to permit, construct, and test new production wells including Camping Area Production Well 1 and Farmstead Production Well 1, constructed and tested in 2019. Although the Project production wells constructed and tested have, as of this report, shown a capacity for sustained production at rates consistent with levels likely to be needed for water system operations, it is recommended that the Project move forward with future well construction and testing to fully demonstrate the capacity to produce groundwater at rates that will be required for Phase One water system operations.

# 8 REFERENCES

AES. 2006. *Guenoc Water Rights Modification Project Draft Environmental Impact Report*. Analytical Environmental Services. Lead Agency: State Water Resources Control Board. July 2006. 558 pp.

AES. 2019. Draft Environmental Impact Report – Maha Resort at Guenoc Valley. Analytical Environmental Services. Lead Agency: Lake County.

CDM. 2006. *Lake County Groundwater Management Plan*. Prepared by CDM in cooperation with the California Department of Water Resources, Northern District. Prepared for the Lake County Watershed Protection District. March 31, 2006.

DWR. 2003. *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001* (http://www.water.ca.gov/pubs/use/sb_610_sb_221_guidebook/guidebook.pdf). California Department of Water Resources. October 8, 2003. 81 pp.

DWR. 2004. Bulletin 118 – California's Groundwater, Coyote Valley Basin Description. Updated February 27, 2004. 4pp.

DWR. 2019. Sustainable Groundwater Management Act, Basin Prioritizations, 2019 Release (Phase 1). https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization

Flint, L.E and A.L. Flint. 2012. *Downscaling future climate scenarios to fine scales for hydrologic and ecological modeling and analysis*. Ecological Processes, 1(1). 15 pp.

Flint, L.E., A.L. Flint, J.H. Thorne, R. Boynton, 2013. *Fine-scale hydrologic modeling for regional landscape applications: the California Basin Characterization Model development and performance*. Ecological Processes, 2(25). 21 pp.

GSi/water. 2002. *Results of Testhole Drilling, Well Construction and Testing Guenoc Ranch Magoon Estate, Limited, Middletown, California*. Prepared for James C. Hanson Consulting Civil Engineer and Magoon Estate, Limited. July 24, 2002. 28 pp.

Hanson. 1999. *Magoon Estate Limited – Guenoc Ranch Development, Report on Water Resources*. James Hanson Consulting Civil Engineer. March 1999.

Langtry Farms. 2019. www.langtryfarms.com. accessed December 1, 2019.

Micheli E., L. Flint, S. Veloz, K. Johnson (Higgason), and N. Heller. 2016. *Climate Ready North Bay Vulnerability Assessment Data Products: 3. Napa County User Group (*technical memorandum). Dwight Center for Conservation Science at Pepperwood, Santa Rosa, CA. prepared for the California Coastal Conservancy and Regional Climate Protection Authority, 46 pp.

Sherwood Design Engineers. 2019a. *Water Demand Analysis for Maha Resort at Guenoc*. Technical Memorandum. Revised October 4, 2019. 13 pp.

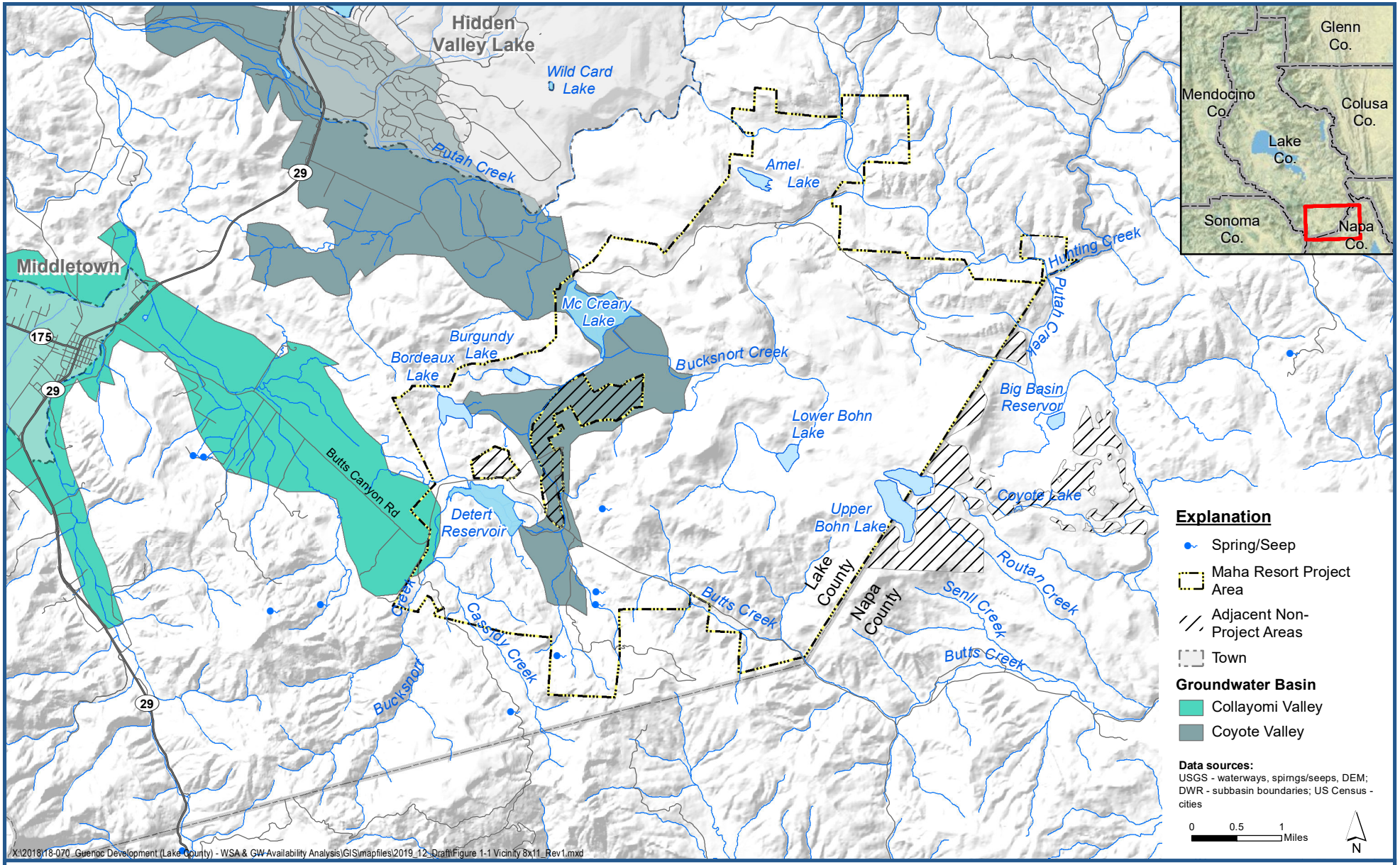
Sherwood Design Engineers. 2019b. *Wastewater Feasibility Study for Maha Resort at Guenoc Valley*. Prepared for Lotusland Investment Holdings. October 15, 2019. 25 pp.

Randy Sternberg, Lotusland Investment Holdings VP. personal communication. October 3, 2019.

Wagner, D.L and E.J. Bortugno. 1982. Geologic map of the Santa Rosa Quadrangle: California Division of Mines and Geology Regional Geologic Map Series, Map 2A, scale 1:250,000.

Wagner & Bonsignore . 2019. Estimate of Water Availability for Proposed Vineyard and Maha Resort Developments on the Langtry Farms Property in Guenoc Valley. Wagner & Bonsignore Consulting Civil Engineers. Draft Memorandum. July 18, 2019.5 pp.

# FIGURES

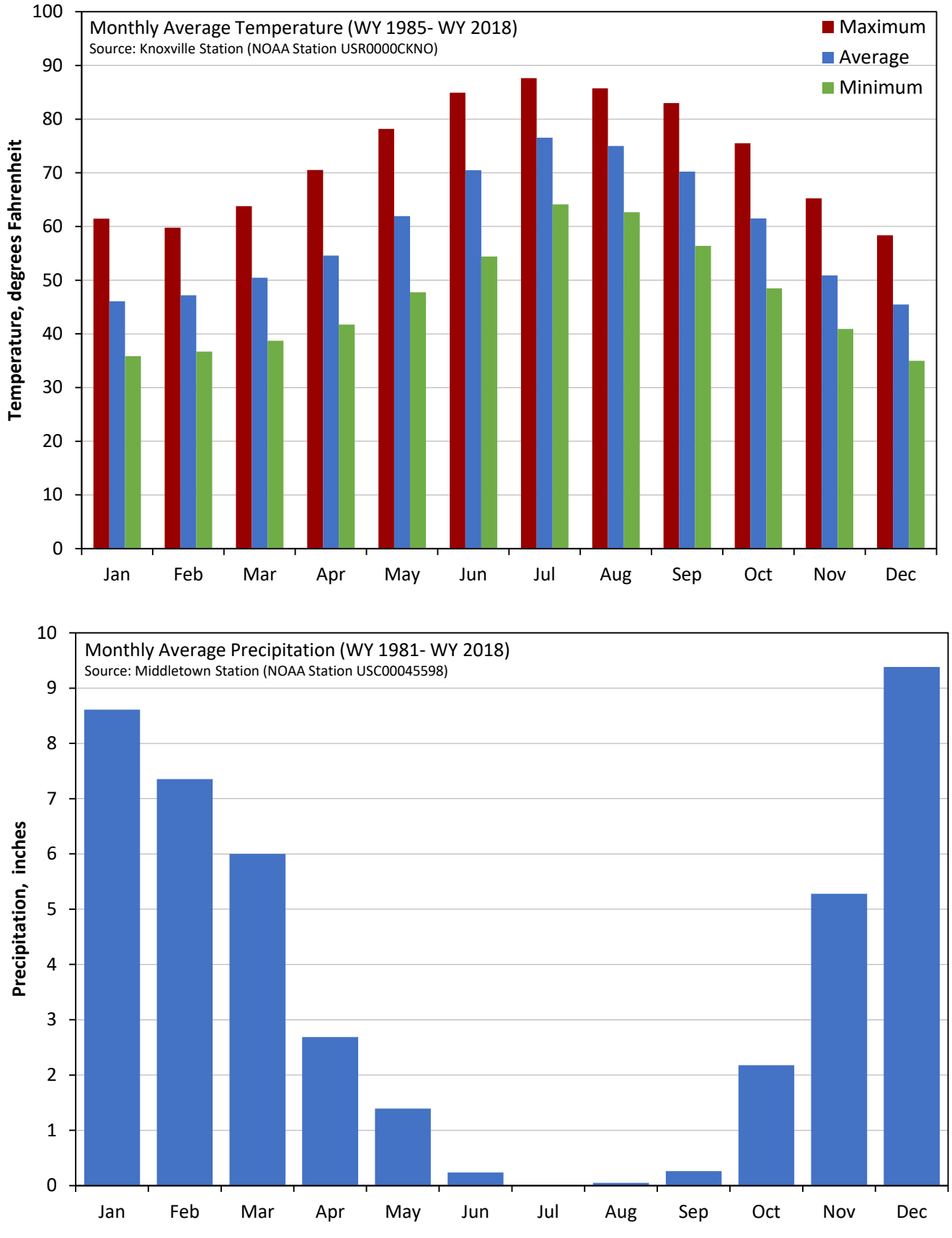



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**Maha Resort at Guenoc Valley Project Area and Vicinity**

**Figure 1-1**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*



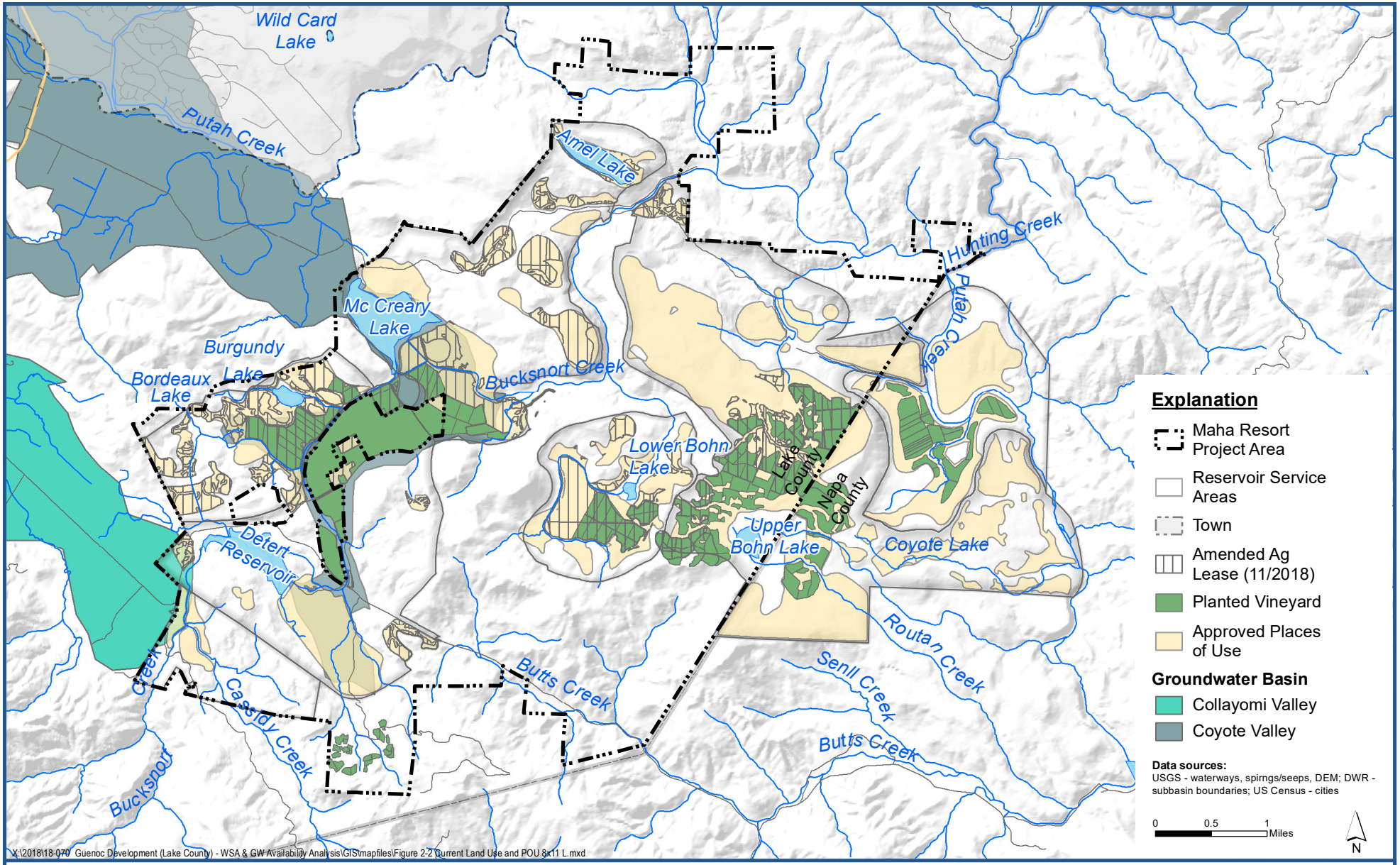

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**Average Monthly Temperature and Precipitation, Middletown and Knoxville Stations**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*

**Figure 2-1**

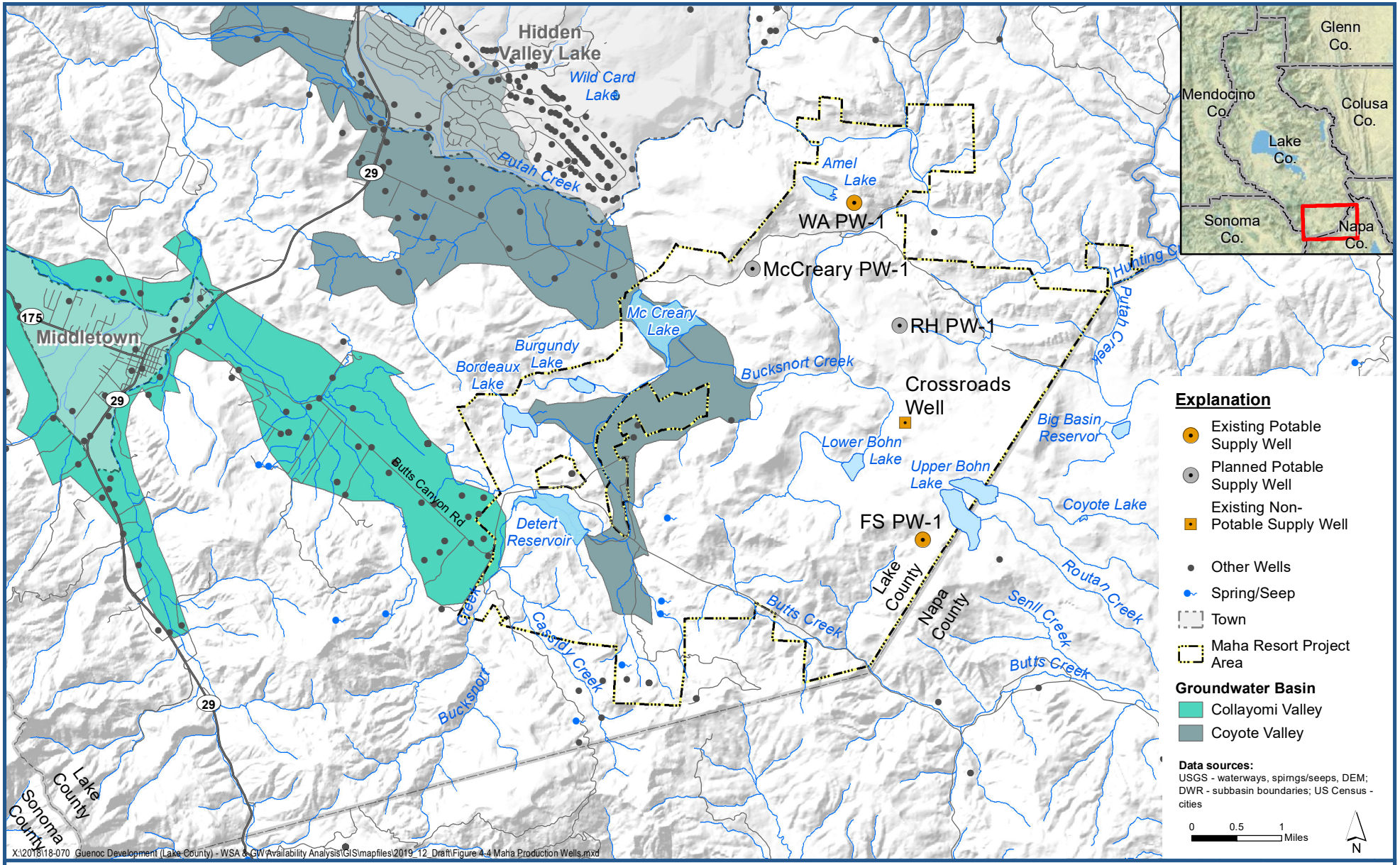



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**Current Land Use and Approved Places of Use**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*

**Figure 2-2**

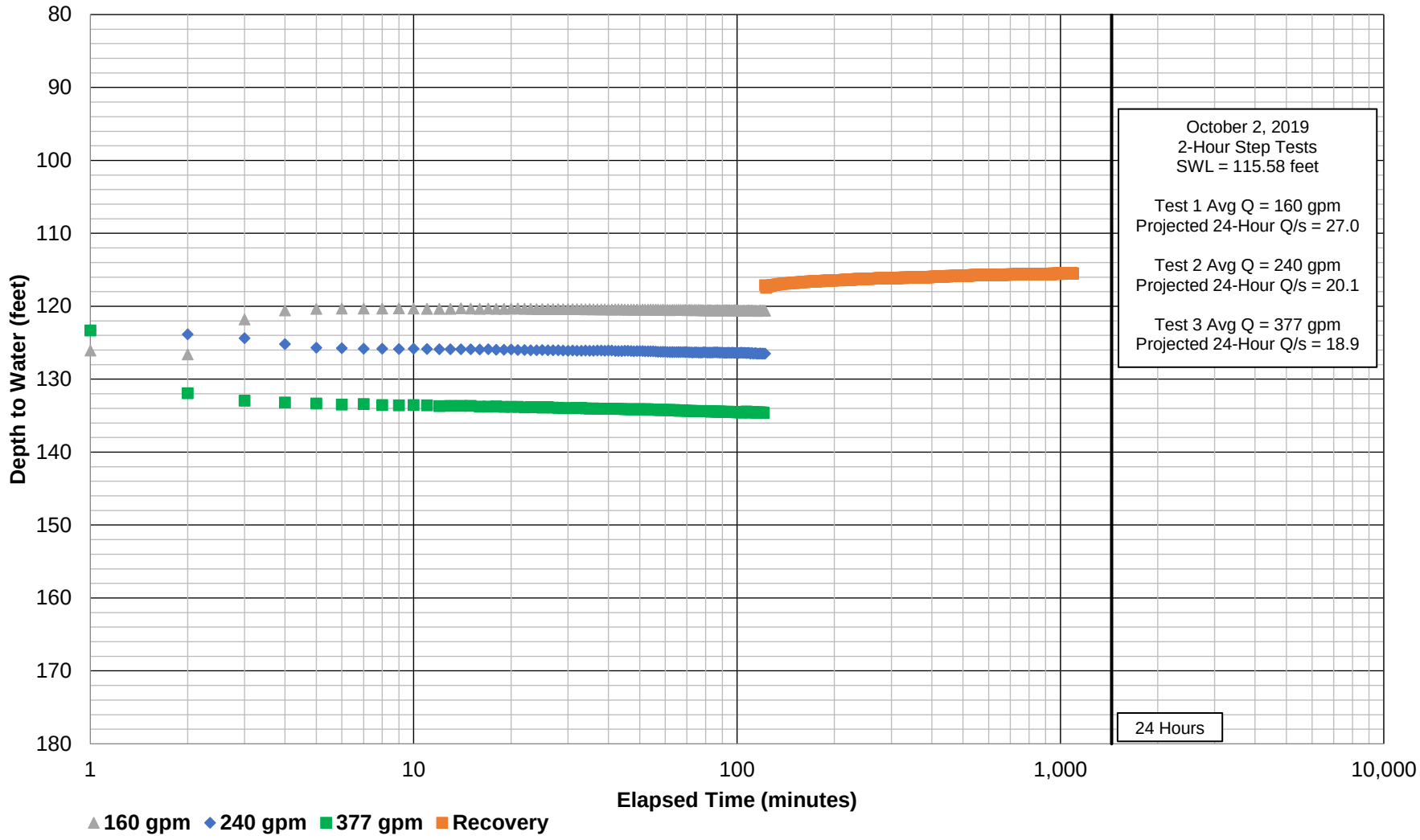



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**Existing and Planned Maha Resort at Guenoc Valley Production Wells**

**Figure 2-3**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*

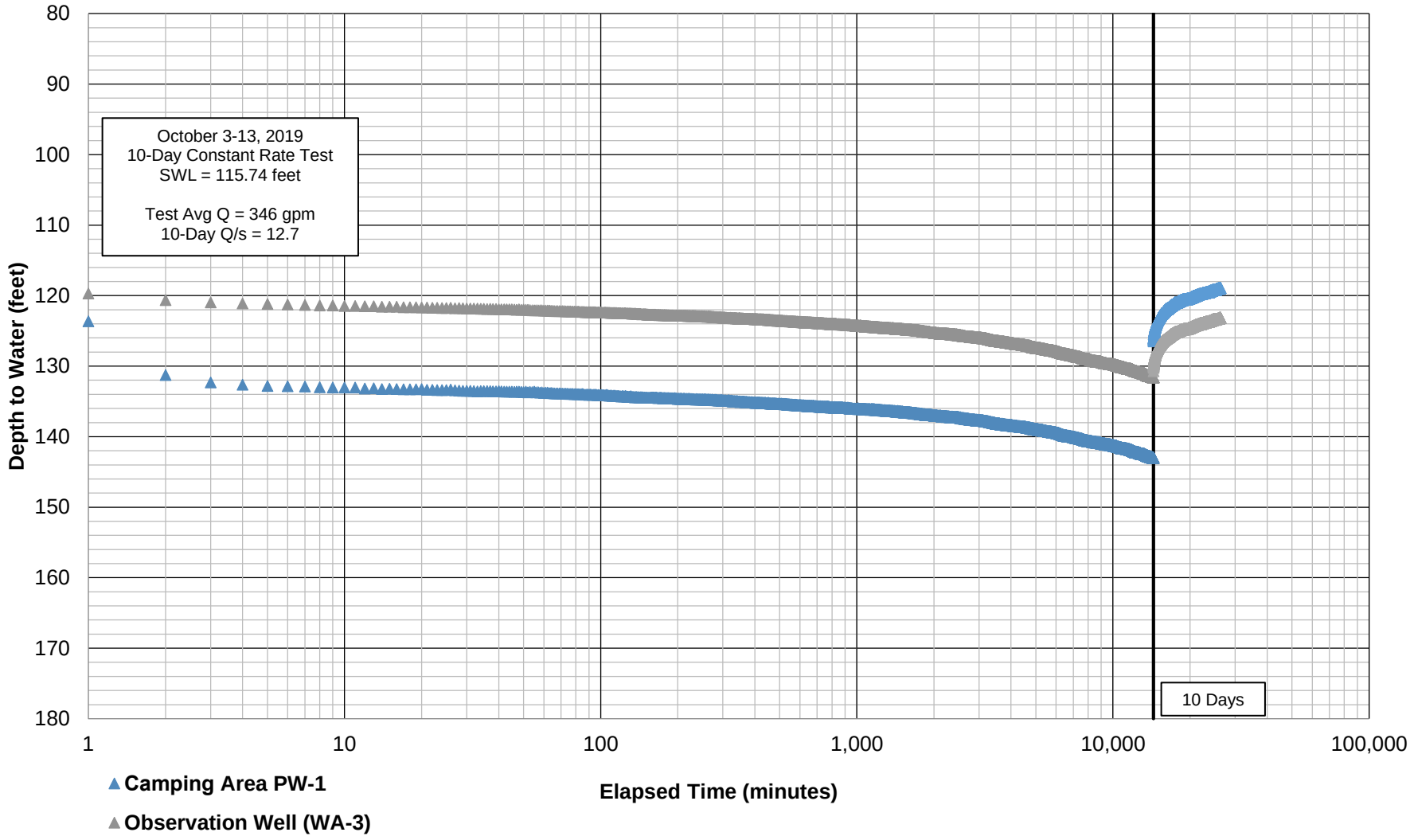



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**Camping Area Production Well-1 (PW-1)**
**Step Test**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*

**Figure 2-4**

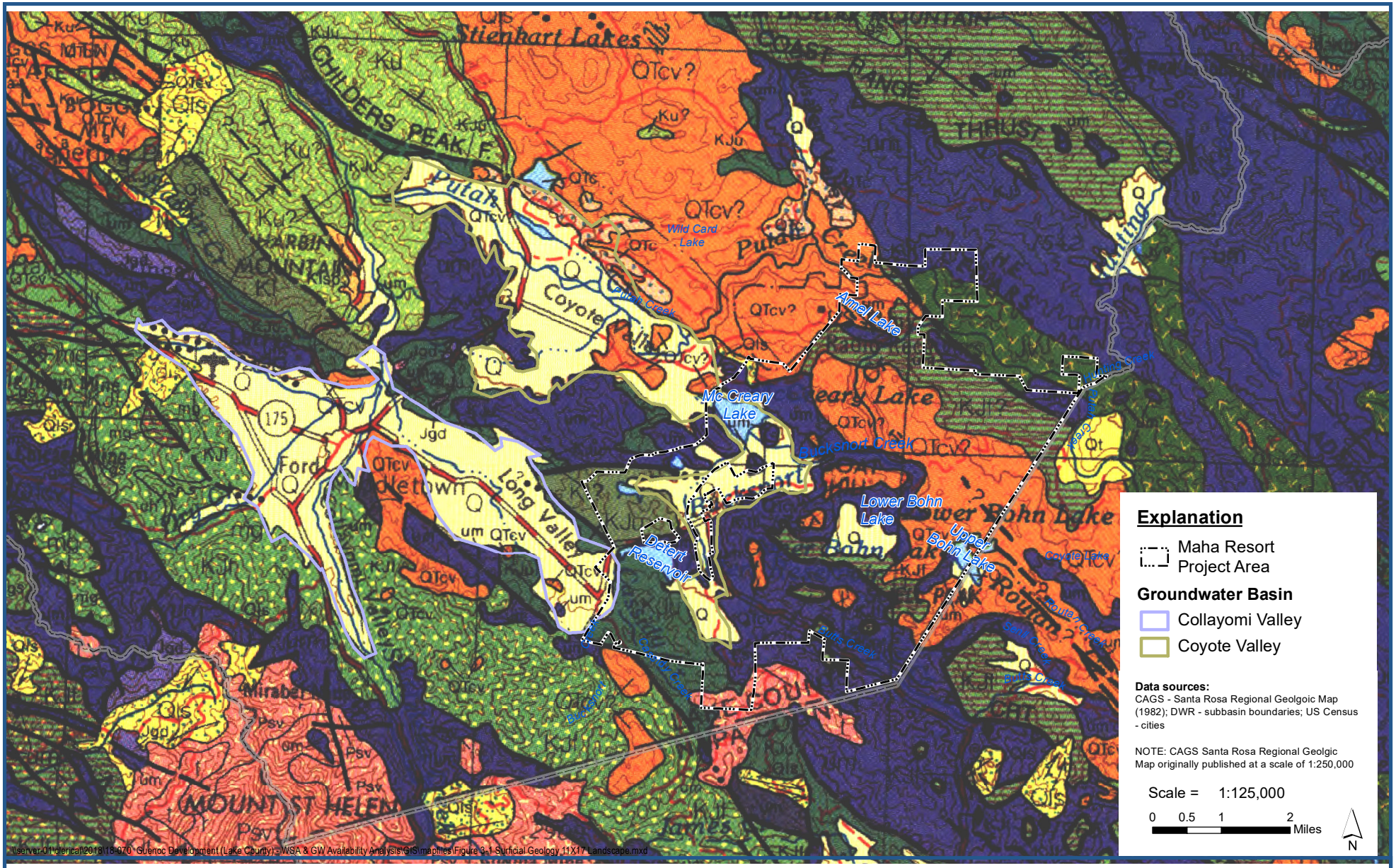



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**Camping Area Production Well-1 (PW-1)**
**Constant Rate Test**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*

**Figure 2-5**

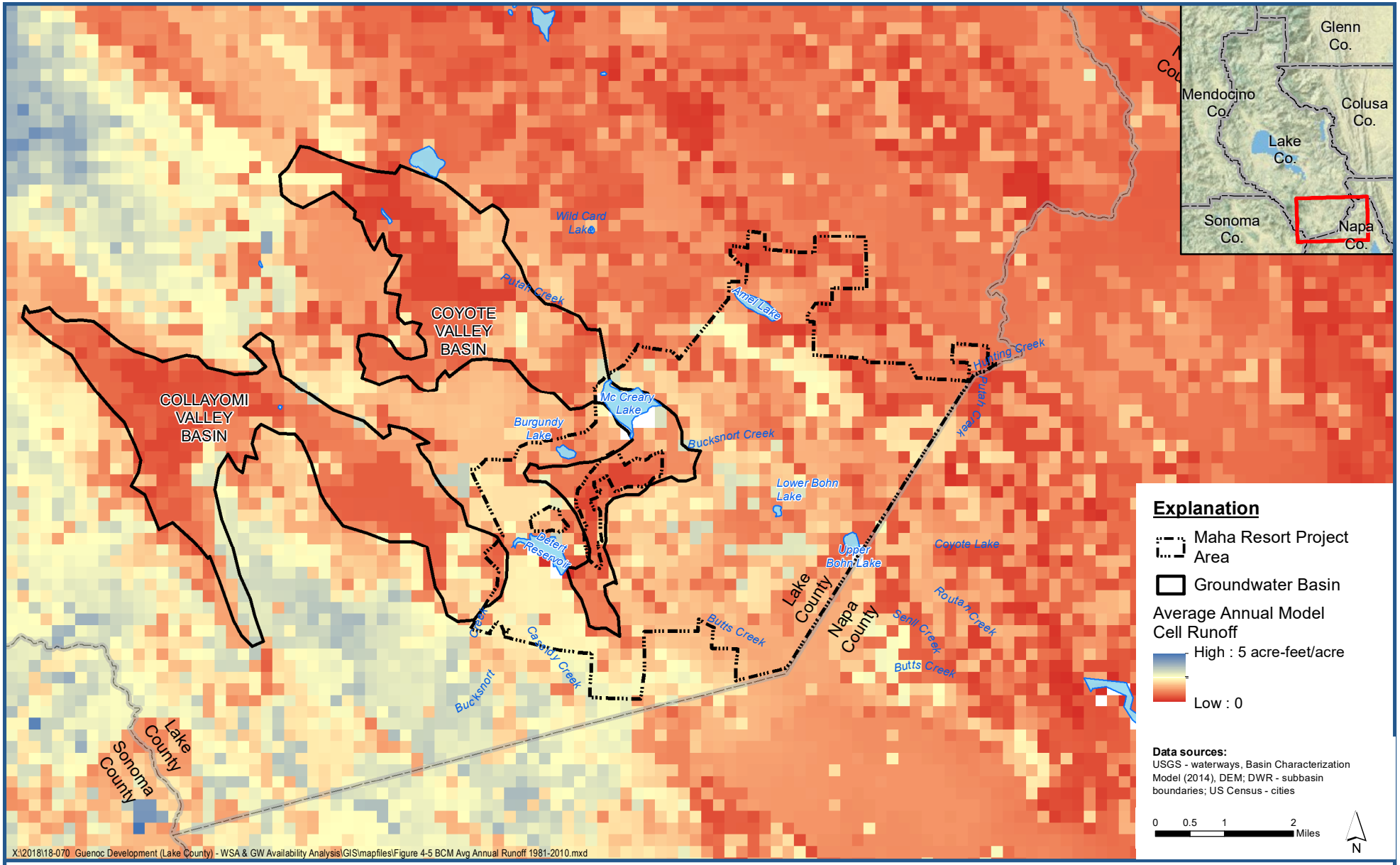



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**Surficial Geology**

**Figure 3-1**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*

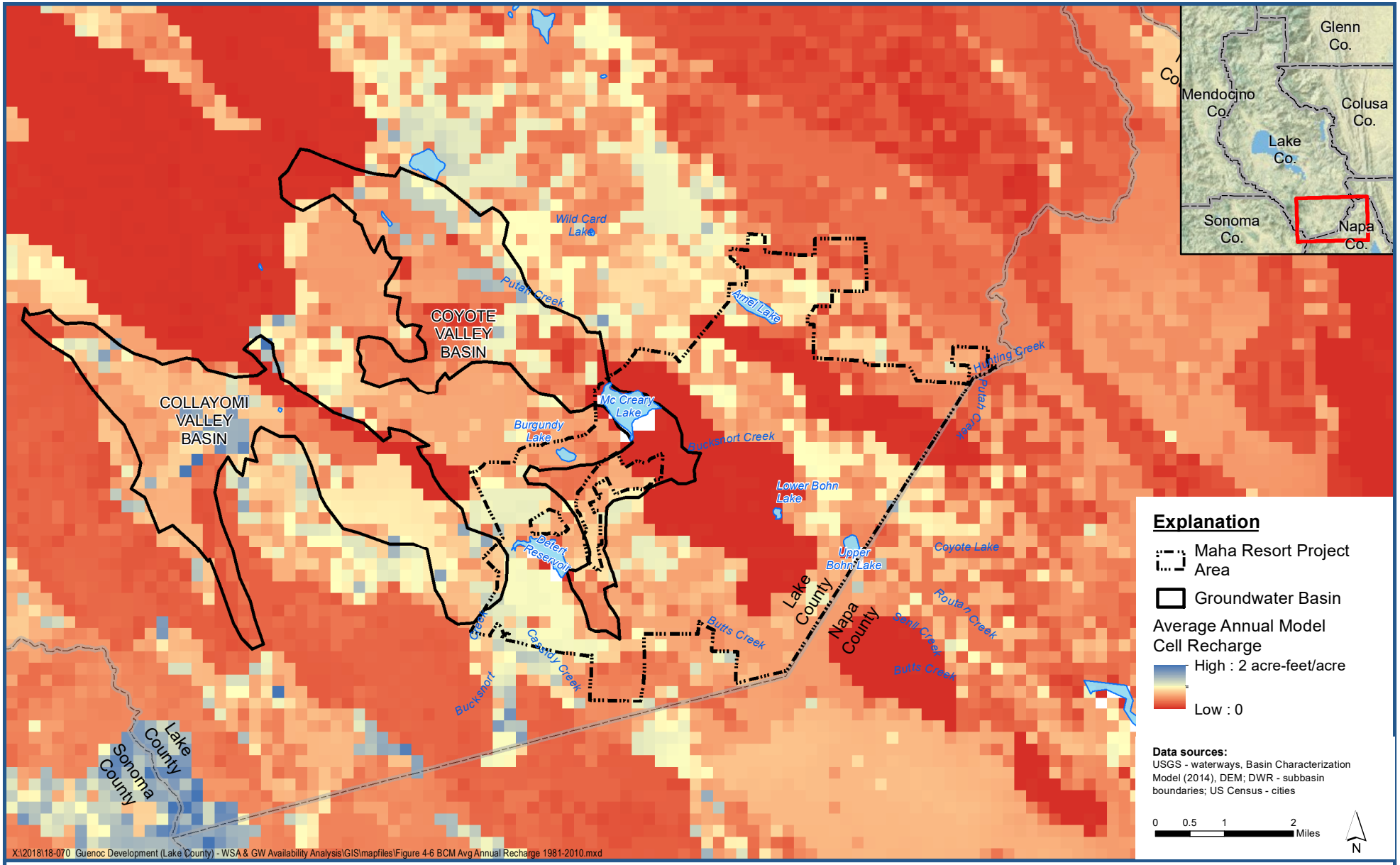



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**Basin Characterization Model Average Annual Runoff, 1981 – 2010**

**Figure 4-2**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*




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**Basin Characterization Model Average Annual Recharge, 1981 – 2010**

**Figure 4-3**

*Maha Resort at Guenoc Valley Water Supply Assessment*
*Lake County, California*

# APPENDIX A

**LANGTRY FARMS**
**SUMMARY OF 5 YEAR AVERAGE WATER DIVERSION**
**WATER YEAR 2009 TO 2013**

| Reservoir | Storage Capacity (af) | 2009 to 2013 Average Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 85 | 291 | 728 | 136 | 133 | 205 | 30 | 35 | 0 | -- | -- | -- | 1,642 |
| McCreary | 2098 | 41 | 129 | 405 | 147 | 98 | 117 | 70 | 22 | 0 | -- | -- | -- | 1,029 |
| Foley #1 | 540 | 3 | 20 | 95 | 7 | 60 | 110 | 30 | 8 | 0 | -- | -- | -- | 333 |
| Foley #2 | 212 | 2 | 8 | 37 | 6 | 18 | 43 | 12 | 2 | 0 | -- | -- | -- | 128 |
| Langtry (Cassidy) | 560 | 6 | 28 | 80 | 12 | 66 | 23 | 6 | -- | -- | -- | -- | -- | 220 |
| Upper Bohn (Natural Inflow) [3] | 2760 | 6 | 42 | 144 | 41 | 48 | 148 | 16 | 0 | 0 | -- | -- | -- | 446 |
| Lower Bohn Diversion to Upper Bohn Storage | | 4 | 7 | 114 | 27 | 66 | 76 | 13 | -- | -- | -- | -- | -- | 307 |
| Napa Valley Lake (Big Basin) | 200 | 2 | 4 | 20 | 35 | 86 | 34 | 24 | -- | -- | -- | -- | -- | 204 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 0 | 2 | 19 | 1 | -- | -- | -- | -- | -- | 23 |
| **Total** | **9,590** | **150** | **530** | **1,622** | **411** | **577** | **774** | **202** | **66** | **1** | **0** | **0** | **0** | **4,333** |

| Region | 2009 to 2013 Average Direct Diversions to Use (ac/ft) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 1 | 15 | 55 | 45 | 27 | 30 | | | | | | | 173 |
| Upper Bohn | | | | | | | | | | | | | 0 |
| Napa Valley Lake | 0 | 0 | 34 | 26 | 20 | 18 | | | | | | | 97 |
| **Total Average Direct Water Diversions** | **1** | **15** | **89** | **71** | **46** | | | | | | | | **222** |
| **Total Average Water Diversions** | **150** | **530** | **1622** | **412** | **592** | **863** | **273** | **113** | **48** | **0** | **0** | **0** | **4,603** |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.
(3) Includes groundwater pumped into Upper Bohn

**LANGTRY FARMS**
**SUMMARY OF 5 YEAR AVERAGE WATER USE BY REGION**
**WATER YEAR 2009 TO 2013**

| Reservoir | Storage Capacity (af) | 2009 to 2013 Average Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 87 | 11 | 42 | 0 | 1 | 22 | 141 | 247 | 226 | 276 | 259 | 173 | 1,484 |
| McCreary | 2098 | 33 | 0 | 6 | 0 | 7 | 3 | 57 | 87 | 126 | 270 | 217 | 130 | 937 |
| Foley #1 | 540 | 55 | 0 | 0 | 0 | 0 | 8 | 4 | 22 | 40 | 53 | 87 | 107 | 376 |
| Foley #2 | 212 | 56 | 0 | 0 | 0 | 0 | 0 | 3 | 14 | 20 | 22 | 19 | 17 | 152 |
| Langtry (Cassidy) | 560 | 6 | 0 | 1 | 0 | 0 | 0 | 8 | 14 | 23 | 24 | 21 | 14 | 111 |
| Upper Bohn | 2760 | 52 | 4 | 9 | 2 | 18 | 7 | 54 | 82 | 126 | 114 | 102 | 90 | 660 |
| Napa Valley Lake (Big Basin) | 200 | 14 | 2 | 2 | 0 | 0 | 0 | 5 | 15 | 24 | 39 | 42 | 29 | 173 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 18 | 12 | 6 | 9 | 0 | 0 | 0 | 0 | 0 | 45 |
| **Total** | **9,590** | **304** | **17** | **60** | **20** | **38** | **46** | **281** | **482** | **585** | **798** | **747** | **559** | **3,936** |

| Region | 2009 to 2013 Average Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 115 | 10 | 2 | 1 | 15 | 45 | 117 | 198 | 219 | 245 | 240 | 196 | 1,404 |
| Upper Bohn [4] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Napa Valley Lake | 1 | 0 | 0 | 0 | 0 | 2 | 4 | 5 | 9 | 16 | 15 | 7 | 61 |
| **Total Applied Water** | **116** | **10** | **2** | **1** | **15** | **47** | **121** | **204** | **228** | **261** | **255** | **204** | **1,465** |
| **Evaporation and Seepage (af)** [3] | 187 | 6 | 58 | 1 | 11 | -7 | 151 | 279 | 356 | 537 | 492 | 355 | 2,426 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) Water lost to evaporation or seepage based on reservoir elevation measurements and corresponding metered use. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(4) Meter data incomplete, Some outlet and irrigation meters were installed in 2014 and 2015

**LANGTRY FARMS**
**SUMMARY OF 5 YEAR AVERAGE WATER USE BY REGION**
**WATER YEAR 2009 TO 2013**

| Region | Developed Acreages | 2009 to 2013 Average Reservoir Depletion Water Duty (af/ac) [1] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley [3] | 986 | 0.24 | 0.01 | 0.05 | 0.00 | 0.01 | 0.03 | 0.22 | 0.39 | 0.44 | 0.65 | 0.61 | 0.45 | 3.10 |
| Upper Bohn [4] [6] | 281 | 0.18 | 0.01 | 0.03 | 0.01 | 0.06 | 0.02 | 0.19 | 0.29 | 0.45 | 0.40 | 0.36 | 0.32 | 2.35 |
| Napa Valley Lake [5] | 314 | 0.05 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.05 | 0.08 | 0.12 | 0.13 | 0.09 | 0.55 |

| Region | Developed Acreages | 2009 to 2013 Average Metered Applied Water Duty (af/ac) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 986 | 0.12 | 0.01 | 0.00 | 0.00 | 0.02 | 0.05 | 0.12 | 0.20 | 0.22 | 0.25 | 0.24 | 0.20 | 1.42 |
| Upper Bohn [4] [6] | 281 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Napa Valley Lake [5] | 314 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.02 | 0.03 | 0.05 | 0.05 | 0.02 | 0.19 |

| Frost Protection | 2009 to 2013 Average Metered Applied Frost Protection (af) | | | |
|---|---|---|---|---|
| Guenoc Valley [3] | 0 | 36 | 91 | 16 |
| Upper Bohn [4] [6] | 0 | 0 | 0 | |
| Napa Valley Lake [5] | 0 | 12 | 51 | |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evaporation and seepage.
(3) 663 Acres of Vineyard, 222 acres of Pasture, 90 Acres of Golf Course
(4) 246 Acres of Vineyard, 281 Acres of Pasture
(5) All Vineyard
(6) Meter data incomplete, Some outlet and irrigation meters were installed in 2014 and 2015

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2013**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 142 | 0 | 0 | 0 | 4 | 0 | 215 | 254 | 222 | 306 | 278 | 42 | 1,463 |
| McCreary | 2098 | 10 | 0 | 0 | 0 | 33 | 16 | 44 | 85 | 122 | 151 | 103 | 88 | 652 |
| Foley #1 | 540 | 56 | 0 | 0 | 0 | 0 | 39 | 13 | 89 | 53 | 83 | 45 | 90 | 468 |
| Foley #2 | 212 | 17 | 0 | 0 | 0 | 2 | 0 | 0 | 15 | 40 | 31 | 18 | 21 | 143 |
| Langtry (Cassidy) | 560 | 9 | 0 | 0 | 0 | 2 | 0 | 13 | 22 | 21 | 33 | 24 | 10 | 134 |
| Upper Bohn | 2760 | 62 | 0 | 0 | 11 | 54 | 34 | 87 | 95 | 126 | 162 | 103 | 105 | 838 |
| Napa Valley Lake (Big Basin) | 200 | 16 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 46 | 62 | 47 | 23 | 200 |
| Pump #2 to Napa Valley Lake [5] | | 0 | 0 | 0 | 88 | 60 | 31 | 44 | | | | | | 224 |
| **Total** | **9,590** | **312** | **3** | **0** | **99** | **154** | **120** | **419** | **559** | **630** | **829** | **618** | **379** | **4,123** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 99 | 2 | 0 | 0 | 0 | 19 | 79 | 131 | 117 | 184 | 162 | 86 | 879 |
| Upper Bohn [3] | | | | | | | | | | | | | |
| Napa Valley Lake | 7 | 2 | 0 | 0 | 0 | 9 | 16 | 11 | 23 | 45 | 38 | 16 | 167 |
| **Total Applied Water** | **106** | **3** | **0** | **0** | **0** | **29** | **94** | **142** | **140** | **229** | **200** | **102** | **1,046** |
| **Evaporation and Seepage (af)** [4] | 144 | -1 | 0 | 0 | 40 | 26 | 194 | 322 | 364 | 438 | 315 | 172 | 2,014 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) No meters installed.
(4) Water lost to evaporation or seepage based on reservoir elevation measurements and corresponding metered use. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(5) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is measured at Napa Valley Lake Metered Applied Water.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2013**

| Region | Developed Acreages | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 986 | 0.24 | 0.00 | 0.00 | 0.00 | 0.04 | 0.06 | 0.29 | 0.47 | 0.46 | 0.61 | 0.47 | 0.25 | 2.90 |
| Upper Bohn [4] | 281 | 0.22 | 0.00 | 0.00 | 0.04 | 0.19 | 0.12 | 0.31 | 0.34 | 0.45 | 0.58 | 0.37 | 0.37 | 2.98 |
| Napa Valley Lake [5] | 314 | 0.05 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.15 | 0.20 | 0.15 | 0.07 | 0.64 |

| Region | Developed Acreages | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 986 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.08 | 0.13 | 0.12 | 0.19 | 0.16 | 0.09 | 0.89 |
| Upper Bohn [6] | 281 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Napa Valley Lake | 314 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.05 | 0.03 | 0.07 | 0.14 | 0.12 | 0.05 | 0.53 |

| Frost Protection | Metered Applied Frost Protection (af) | |
|---|---|---|
| Guenoc Valley | 54 | 13 |
| Upper Bohn | | |
| Napa Valley Lake | 9 | 16 |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evapoaration and seepage.
(3) 302 acres vineyard, 596 acres pasture, 88 acre golf course.
(4) All pasture
(5) 122 acre vineyard, 192 acre pasture
(6) No meters installed

**LANGTRY FARMS**
**SUMMARY OF WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2013**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 0 | 849 | 877 | 0 | 0 | 4 | 0 | 0 | 0 | -- | -- | -- | 1,730 |
| McCreary | 2098 | 0 | 418 | 757 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 1,175 |
| Foley #1 | 540 | 0 | 70 | 242 | 4 | 9 | 0 | 0 | 0 | 0 | -- | -- | -- | 325 |
| Foley #2 | 212 | 0 | 25 | 88 | 7 | 0 | 22 | 9 | 0 | 0 | -- | -- | -- | 151 |
| Langtry (Cassidy) | 560 | 0 | 90 | 33 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | -- | 123 |
| Upper Bohn (Natural Inflow) | 2760 | 0 | 148 | 298 | 18 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 463 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 0 | 275 | 78 | 0 | 3 | 0 | -- | -- | -- | -- | -- | 356 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 35 | 88 | 60 | 17 | 0 | -- | -- | -- | -- | -- | 200 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 0 | 0 | 14 | 0 | -- | -- | -- | -- | -- | 14 |
| **Total** | **9,590** | **0** | **1,599** | **2,604** | **194** | **69** | **61** | **9** | **0** | **0** | **0** | **0** | **0** | **4,536** |

| Region | Direct Diversions to Use (ac/ft) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | | | | | | 19 | | | | | | | 19 |
| Upper Bohn | | | | | | | | | | | | | 0 |
| Napa Valley Lake | | | | | | 9 | 16 | 45 | | | | | 70 |
| **Total Direct Water Diversions** | | | | | **0** | **29** | **16** | **45** | | | | | **89** |
| **Total Water Diversions** | **0** | **1599** | **2604** | **194** | **69** | **90** | **25** | **45** | **0** | **0** | **0** | **0** | **4,625** |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2012**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 102 | 15 | 209 | 0 | 0 | 0 | 29 | 300 | 313 | 356 | 306 | 281 | 1,909 |
| McCreary | 2098 | 47 | 0 | 31 | 0 | 0 | 0 | 171 | 145 | 121 | 301 | 272 | 194 | 1,282 |
| Foley #1 | 540 | 19 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 34 | 64 | 88 | 70 | 276 |
| Foley #2 | 212 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 32 | 22 | 34 | 25 | 150 |
| Langtry (Cassidy) | 560 | 3 | 0 | 3 | 0 | 0 | 0 | 4 | 18 | 32 | 17 | 26 | 16 | 120 |
| Upper Bohn | 2760 | 36 | 20 | 46 | 0 | 36 | 0 | 54 | 103 | 170 | 114 | 119 | 93 | 790 |
| Napa Valley Lake (Big Basin) | 200 | 10 | 8 | 8 | 0 | 0 | 0 | 19 | 0 | 0 | 47 | 55 | 31 | 178 |
| Pump #2 to Napa Valley Lake [6] | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| **Total** | **9,590** | **224** | **43** | **299** | **0** | **36** | **0** | **276** | **596** | **702** | **921** | **899** | **709** | **4,705** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 50 | 11 | 11 | 0 | 0 | 31 | 80 | 178 | 184 | 203 | 210 | 214 | 1,171 |
| Upper Bohn [3] | | | | | | | | | | | | | |
| Napa Valley Lake [4] | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 15 | 22 | 36 | 39 | 21 | 138 |
| **Total Applied Water** | **50** | **11** | **11** | **0** | **0** | **31** | **85** | **193** | **206** | **239** | **249** | **234** | **1,310** |
| **Evaporation and Seepage (af)** [5] | 139 | 12 | 242 | 0 | 0 | -31 | 137 | 300 | 327 | 568 | 531 | 382 | 2,605 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) No meters installed.
(4) Outlet meter installed in March.
(5) Water lost to evaporation or seepage based on reservoir elevation measurements and corresponding metered use. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(6) 'Water released from Guenoc Valley and picked up at Pump #2 for irrigation is measured at Napa Valley Lake Metered Applied Water.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2012**

| Region | Developed Acreages | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 986 | 0.18 | 0.01 | 0.25 | 0.00 | 0.00 | 0.00 | 0.21 | 0.50 | 0.54 | 0.77 | 0.74 | 0.59 | 3.79 |
| Upper Bohn [4] | 281 | 0.13 | 0.07 | 0.16 | 0.00 | 0.13 | 0.00 | 0.19 | 0.37 | 0.60 | 0.41 | 0.42 | 0.33 | 2.81 |
| Napa Valley Lake [5] | 314 | 0.03 | 0.03 | 0.02 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.15 | 0.17 | 0.10 | 0.57 |

| Region | Developed Acreages | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 986 | 0.05 | 0.01 | 0.01 | 0.00 | 0.00 | 0.03 | 0.08 | 0.18 | 0.19 | 0.21 | 0.21 | 0.22 | 1.19 |
| Upper Bohn [4] [6] | 281 | | | | | | | | | | | | | |
| Napa Valley Lake [7] | 314 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.05 | 0.07 | 0.12 | 0.13 | 0.07 | 0.44 |

| Frost Protection | Metered Applied Frost Protection (af) | |
|---|---|---|
| Guenoc Valley | 0 | 74 |
| Upper Bohn | | |
| Napa Valley Lake [8] | 0 | 31 |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evapoaration and seepage.
(3) 302 acres vineyard, 596 acres pasture, 88 acre golf course.
(4) All pasture.
(5) 122 acre vineyard, 192 acre pasture.
(6) No meters installed.
(7) Outlet meter installed in March.
(8) Frost protection amounts estimated based on ((1475 min x 55 gpm x 122 acres)/325/851 gal/acre).

**LANGTRY FARMS**
**SUMMARY OF WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2012**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 0 | 0 | 0 | 649 | 55 | 708 | 0 | 0 | 0 | -- | -- | -- | 1,412 |
| McCreary | 2098 | 0 | 0 | 0 | 279 | 17 | 351 | 0 | 0 | 0 | -- | -- | -- | 647 |
| Foley #1 | 540 | 0 | 2 | 0 | 26 | 2 | 190 | 109 | 14 | 0 | -- | -- | -- | 342 |
| Foley #2 | 212 | 0 | 0 | 0 | 8 | 0 | 86 | 41 | 0 | 0 | -- | -- | -- | 135 |
| Langtry (Cassidy) | 560 | 0 | 0 | 0 | 50 | 0 | 50 | 0 | -- | -- | -- | -- | -- | 100 |
| Upper Bohn (Natural Inflow) | 2760 | 0 | 0 | 0 | 77 | 0 | 112 | 80 | 0 | 0 | -- | -- | -- | 269 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 0 | 0 | 0 | 0 | 310 | 38 | -- | -- | -- | -- | -- | 348 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 0 | 0 | 108 | 56 | 27 | -- | -- | -- | -- | -- | 191 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | -- | 0 |
| **Total** | **9,590** | **0** | **2** | **0** | **1,088** | **183** | **1,863** | **295** | **14** | **0** | **0** | **0** | **0** | **3,444** |

| Region | Direct Diversions to Use (ac/ft) [2] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | | | | | | | 31 | 51 | | | | | | 82 |
| Upper Bohn | | | | | | | | | | | | | | 0 |
| Napa Valley Lake | | | | | | | | 19 | 53 | 89 | | | | 161 |
| **Total Direct Water Diversions** | | | | | | | **31** | **70** | **53** | **89** | | | | **243** |
| **Total Water Diversions** | **0** | **2** | **0** | **1088** | **183** | **1894** | **364** | **67** | **89** | **0** | **0** | **0** | **3,688** | |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2011**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 56 | 10 | 0 | 0 | 0 | 0 | 72 | 53 | 17 | 318 | 356 | 271 | 1,153 |
| McCreary | 2098 | 40 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 59 | 208 | 229 | 132 | 767 |
| Foley #1 | 540 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 93 | 92 | 113 | 86 | 409 |
| Foley #2 | 212 | 74 | 0 | 0 | 0 | 0 | 0 | 11 | 14 | 13 | 42 | 25 | 25 | 203 |
| Langtry (Cassidy) | 560 | 7 | 0 | 0 | 0 | 0 | 0 | 9 | 7 | 11 | 28 | 24 | 16 | 102 |
| Upper Bohn | 2760 | 44 | 0 | 0 | 0 | 0 | 0 | 80 | 80 | 157 | 86 | 97 | 97 | 641 |
| Napa Valley Lake (Big Basin) | 200 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 7 | 10 | 41 | 40 | 134 |
| Pump #2 to Napa Valley Lake [6] | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| **Total** | **9,590** | **254** | **10** | **0** | **0** | **0** | **0** | **171** | **283** | **357** | **783** | **885** | **666** | **3,409** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 21 | 10 | 0 | 6 | 76 | 67 | 109 | 156 | 177 | 130 | 196 | 207 | 1,156 |
| Upper Bohn [3] | | | | | | | | | | | | | |
| Napa Valley Lake [4] | | | | | | | | | | | | | |
| **Total Applied Water** | **21** | **10** | **0** | **6** | **76** | **67** | **109** | **156** | **177** | **130** | **196** | **207** | **1,156** |
| **Evaporation and Seepage (af)** [5] | 173 | 0 | 0 | -6 | -76 | -67 | -18 | 27 | 16 | 558 | 549 | 322 | 1,478 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses. October and November values are estimated based on end of 2010 irrigation season reservoir elevation measurements.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) No meters installed
(4) No Meters installed
(5) Water lost to evaporation or seepage based on reservoir elevation measurements and corresponding metered use. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(6) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is counted within Guenoc Valley reservoir depletions.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2011**

| Region | Developed Acreages | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 986 | 0.20 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.19 | 0.20 | 0.70 | 0.76 | 0.54 | 2.67 |
| Upper Bohn [4] | 281 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.28 | 0.28 | 0.56 | 0.30 | 0.35 | 0.35 | 2.28 |
| Napa Valley Lake [5] | 314 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.02 | 0.03 | 0.13 | 0.13 | 0.43 |

| Region | Developed Acreages | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 986 | 0.02 | 0.01 | 0.00 | 0.01 | 0.08 | 0.07 | 0.11 | 0.16 | 0.18 | 0.13 | 0.20 | 0.21 | 1.17 |
| Upper Bohn [6] | 281 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Napa Valley Lake [7] | 314 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Frost Protection | Metered and Estimated Applied Frost Protection (af) | |
|---|---|---|
| Guenoc Valley | 123 | 30 |
| Upper Bohn | | |
| Napa Valley Lake [8] | 44 | |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evapoaration and seepage.
(3) 302 acres vineyard, 596 acres pasture, 88 acre golf course.
(4) All pasture
(5) 122 acre vineyard, 192 acre pasture.
(6) No meters installed.
(7) No meters installed.
(8) Estimate based on ((2145 min. x 55gpm x 122 acres)/325,851 gal/af).

**LANGTRY FARMS**
**SUMMARY OF WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2011**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 325 | 217 | 724 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 1,266 |
| McCreary | 2098 | 121 | 81 | 270 | 439 | 74 | 38 | 256 | 0 | 0 | -- | -- | -- | 1,277 |
| Foley #1 | 540 | 3 | 2 | 7 | 3 | 92 | 318 | 19 | 0 | 0 | -- | -- | -- | 444 |
| Foley #2 | 212 | 3 | 2 | 6 | 12 | 10 | 88 | 0 | 0 | 0 | -- | -- | -- | 121 |
| Langtry (Cassidy) | 560 | 8 | 6 | 19 | 3 | 65 | 0 | 0 | -- | -- | -- | -- | -- | 102 |
| Upper Bohn (Natural Inflow) | 2760 | 32 | 22 | 72 | 26 | 134 | 428 | 0 | 0 | 0 | -- | -- | -- | 714 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 0 | 0 | 26 | 57 | 0 | 0 | -- | -- | -- | -- | -- | 84 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 0 | 28 | 101 | 65 | 64 | -- | -- | -- | -- | -- | 258 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | -- | 0 |
| **Total** | **9,590** | **492** | **329** | **1,099** | **537** | **533** | **937** | **339** | **0** | **0** | **0** | **0** | **0** | **4,265** |

| Region | Direct Diversions to Use (ac/ft) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | | | | 6 | 76 | 67 | 37 | 94 | 149 | | | | 429 |
| Upper Bohn | | | | | | | | | | | | | 0 |
| Napa Valley Lake [3] | | | | | | | 44 | | | | | | 44 |
| **Total Direct Water Diversions** | | | | **6** | **76** | **67** | **81** | **94** | **149** | | | | **473** |
| **Total Water Diversions** | **492** | **329** | **1099** | **544** | **609** | **1004** | **420** | **94** | **149** | **0** | **0** | **0** | **4,738** |

(1) Water diversion to storage amounts based on reservoir elevation measurements. October, November and December values are estimated based on end of 2010 irrigation season reservoir elevation measurements and precipitation ratio to measured reservoir elevations in January 2011.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.
(3) Direct diversion estimate based on frost use ((2145 min. x 55gpm x 122 acres)/325,851 gal/af).

**LANGTRY FARMS**
**SUMMARY OF ESTIMATED WATER USE by RESERVOIR**
**for WATER YEAR 2010**

| Reservoir | Storage Capacity (af) | Estimated Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 53 | 29 | 0 | 0 | 0 | 83 | 177 | 279 | 153 | 178 | 180 | 139 | 1,271 |
| McCreary | 2098 | 29 | 0 | 0 | 0 | 0 | 0 | 32 | 56 | 265 | 314 | 121 | 80 | 898 |
| Foley #1 | 540 | 91 | 0 | 0 | 0 | 0 | 0 | 4 | 7 | 11 | 13 | 179 | 153 | 458 |
| Foley #2 | 212 | 50 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 8 | 9 | 9 | 7 | 90 |
| Langtry (Cassidy) | 560 | 6 | 0 | 0 | 0 | 0 | 0 | 5 | 14 | 38 | 17 | 16 | 13 | 109 |
| Upper Bohn | 2760 | 35 | 0 | 0 | 0 | 0 | 0 | 25 | 69 | 101 | 113 | 108 | 85 | 536 |
| Napa Valley Lake (Big Basin) | 200 | 14 | 0 | 0 | 0 | 0 | 0 | 2 | 29 | 37 | 40 | 36 | 27 | 184 |
| Pump #2 to Napa Valley Lake [6] | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| **Total** | **9,590** | **278** | **29** | **0** | **0** | **0** | **83** | **249** | **459** | **613** | **684** | **648** | **504** | **3,546** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 152 | 28 | 0 | 0 | 0 | 82 | 148 | 237 | 276 | 302 | 280 | 211 | 1,715 |
| Upper Bohn [3] | | | | | | | | | | | | | |
| Napa Valley Lake [4] | | | | | | | | | | | | | |
| **Total Applied Water** | **152** | **28** | **0** | **0** | **0** | **82** | **148** | **237** | **276** | **302** | **280** | **211** | **1,715** |
| **Evaporation and Seepage (af)** [5] | 77 | 1 | 0 | 0 | 0 | 1 | 74 | 124 | 199 | 229 | 226 | 181 | 1,112 |

(1) Reservoir estimated depletions based on beginning and ending of irrigation season reservoir elevation measurements and includes evaporation, seepage and all uses. Monthly values are estimated based on seasonal reservoir elevation measurements and rationed monthly based on published evaporation data from Markly Cove.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) No meters installed
(4) No Meters installed
(5) Water lost to evaporation or seepage based on reservoir elevation measurements and corresponding metered use. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(6) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is counted within Guenoc Valley reservoir depletions.

**LANGTRY FARMS**
**SUMMARY OF ESTIMATED WATER USE by RESERVOIR**
**for WATER YEAR 2010**

| Region | Developed Acreages | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 986 | 0.23 | 0.03 | 0.00 | 0.00 | 0.00 | 0.08 | 0.22 | 0.37 | 0.48 | 0.54 | 0.51 | 0.40 | 2.87 |
| Upper Bohn [4] | 281 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.25 | 0.36 | 0.40 | 0.38 | 0.30 | 1.91 |
| Napa Valley Lake [5] | 314 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.09 | 0.12 | 0.13 | 0.11 | 0.09 | 0.59 |

| Region | Developed Acreages | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 986 | 0.15 | 0.03 | 0.00 | 0.00 | 0.00 | 0.08 | 0.15 | 0.24 | 0.28 | 0.31 | 0.28 | 0.21 | 1.74 |
| Upper Bohn [6] | 281 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Napa Valley Lake [7] | 314 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Frost Protection | Metered Applied Frost Protection (af) | | |
|---|---|---|---|
| Guenoc Valley | 76 | 137 | 40 |
| Upper Bohn | | | |
| Napa Valley Lake [8] | 50 | 51 | |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evapoaration and seepage.
(3) 302 acres vineyard, 596 acres pasture, 88 acre golf course.
(4) All pasture
(5) 122 acre vineyard, 192 acre pasture.
(6) No meters installed.
(7) No meter installed.
(8) Based on Napa Valley Lake frost pond report.

**LANGTRY FARMS**
**SUMMARY OF ESTIMATED WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2010**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 0 | 193 | 1,810 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 2,003 |
| McCreary | 2098 | 23 | 23 | 856 | 0 | 14 | 0 | 0 | 0 | 0 | -- | -- | -- | 916 |
| Foley #1 | 540 | 0 | 2 | 193 | 0 | 115 | 0 | 0 | 0 | 0 | -- | -- | -- | 309 |
| Foley #2 | 212 | 0 | 0 | 74 | 0 | 41 | 0 | 0 | 0 | 0 | -- | -- | -- | 116 |
| Langtry (Cassidy) | 560 | 0 | 8 | 302 | 0 | 143 | 0 | 0 | -- | -- | -- | -- | -- | 453 |
| Upper Bohn (Natural Inflow) | 2760 | 0 | 42 | 351 | 0 | 32 | 0 | 0 | 0 | 0 | -- | -- | -- | 425 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 0 | 254 | 26 | 163 | 7 | 0 | -- | -- | -- | -- | -- | 451 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 45 | 55 | 81 | 0 | 13 | -- | -- | -- | -- | -- | 194 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 0 | 12 | 11 | 7 | -- | -- | -- | -- | -- | 30 |
| **Total** | **9,590** | **23** | **268** | **3,885** | **81** | **602** | **18** | **21** | **0** | **0** | **0** | **0** | **0** | **4,897** |

| Region | Direct Diversions to Use (ac/ft) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | | | | | | 76 | 137 | 40 | | | | | 253 |
| Upper Bohn | | | | | | | | | | | | | 0 |
| Napa Valley Lake | | | | | | 50 | 51 | | | | | | 101 |
| **Total Direct Water Diversions** | | | | | | **126** | **188** | **40** | | | | | **354** |
| **Total Water Diversions** | **23** | **268** | **3885** | **81** | **602** | **144** | **209** | **40** | **0** | **0** | **0** | **0** | **5,251** |

(1) Water diversion to storage amounts based on ending and beginning of irrigation season reservoir elevation measurements. Monthly values are estimated based on seasonal reservoir elevation measurements and rationed monthly based on published precipitation data from Middletown.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.

**LANGTRY FARMS**
**SUMMARY OF ESTIMATED WATER USE by RESERVOIR**
**for WATER YEAR 2009**

| Reservoir | Storage Capacity (af) | Estimated Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 81 | 0 | 0 | 0 | 0 | 25 | 211 | 349 | 424 | 222 | 177 | 133 | 1,623 |
| McCreary | 2098 | 39 | 0 | 0 | 0 | 0 | 0 | 37 | 51 | 65 | 378 | 359 | 153 | 1,084 |
| Foley #1 | 540 | 93 | 0 | 0 | 0 | 0 | 0 | 4 | 6 | 8 | 10 | 10 | 137 | 268 |
| Foley #2 | 212 | 132 | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 6 | 9 | 8 | 7 | 171 |
| Langtry (Cassidy) | 560 | 7 | 0 | 0 | 0 | 0 | 0 | 8 | 10 | 13 | 24 | 17 | 14 | 93 |
| Upper Bohn | 2760 | 83 | 0 | 0 | 0 | 0 | 0 | 22 | 65 | 75 | 93 | 85 | 68 | 492 |
| Napa Valley Lake (Big Basin) | 200 | 15 | 0 | 0 | 0 | 0 | 0 | 3 | 28 | 30 | 35 | 31 | 24 | 167 |
| Pump #2 to Napa Valley Lake [6] | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| **Total** | **9,590** | **451** | **0** | **0** | **0** | **0** | **25** | **289** | **515** | **622** | **772** | **687** | **537** | **3,899** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 253 | 0 | 0 | 0 | 0 | 25 | 168 | 290 | 342 | 406 | 352 | 265 | 2,101 |
| Upper Bohn [3] | | | | | | | | | | | | | |
| Napa Valley Lake [4] | | | | | | | | | | | | | |
| **Total Applied Water** | **253** | **0** | **0** | **0** | **0** | **25** | **168** | **290** | **342** | **406** | **352** | **265** | **2,101** |
| **Evaporation and Seepage (af)** [5] | 199 | 0 | 0 | 0 | 0 | 0 | 121 | 225 | 280 | 366 | 335 | 272 | 1,798 |

(1) Reservoir estimated depletions based on beginning and ending of irrigation season reservoir elevation measurements and includes evaporation, seepage and all uses. Monthly values are estimated based on seasonal reservoir elevation measurements and rationed monthly based on published evaporation data from Markly Cove.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) No meters installed
(4) No Meters installed
(5) Water lost to evaporation or seepage based on reservoir elevation measurements and corresponding metered use. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(6) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is counted within Guenoc Valley reservoir depletions.

**LANGTRY FARMS**
**SUMMARY OF ESTIMATED WATER USE by RESERVOIR**
**for WATER YEAR 2009**

| Region | Developed Acreages | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 986 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.27 | 0.43 | 0.52 | 0.65 | 0.58 | 0.45 | 3.28 |
| Upper Bohn [4] | 281 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | 0.23 | 0.27 | 0.33 | 0.30 | 0.24 | 1.75 |
| Napa Valley Lake [5] | 314 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.09 | 0.10 | 0.11 | 0.10 | 0.08 | 0.53 |

| Region | Developed Acreages | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 986 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.17 | 0.29 | 0.35 | 0.41 | 0.36 | 0.27 | 2.13 |
| Upper Bohn [6] | 281 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Napa Valley Lake [7] | 314 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Frost Protection | Metered Applied Frost Protection (af) | |
|---|---|---|
| Guenoc Valley [8] | 106 | 65 |
| Upper Bohn | | |
| Napa Valley Lake [8] | | 114 |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evapoaration and seepage.
(3) 302 acres vineyard, 596 acres pasture, 88 acre golf course.
(4) All pasture
(5) 122 acre vineyard, 192 acre pasture.
(6) No meters installed.
(7) No meter installed.
(8) Based on Guenoc Valley and Napa Valley Lake frost pond report.

**LANGTRY FARMS**
**SUMMARY OF ESTIMATED WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2009**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 101 | 195 | 227 | 29 | 609 | 313 | 150 | 174 | 2 | -- | -- | -- | 1,800 |
| McCreary | 2098 | 63 | 123 | 143 | 18 | 383 | 196 | 94 | 109 | 1 | -- | -- | -- | 1,130 |
| Foley #1 | 540 | 14 | 27 | 31 | 4 | 83 | 42 | 20 | 24 | 0 | -- | -- | -- | 244 |
| Foley #2 | 212 | 7 | 13 | 15 | 2 | 41 | 21 | 10 | 12 | 0 | -- | -- | -- | 120 |
| Langtry (Cassidy) | 560 | 20 | 39 | 45 | 6 | 121 | 62 | 30 | -- | -- | -- | -- | -- | 322 |
| Upper Bohn (Natural Inflow) | 2760 | 0 | 0 | 0 | 86 | 74 | 201 | 0 | 0 | 0 | -- | -- | -- | 360 |
| Lower Bohn Diversion to Upper Bohn Storage | | 18 | 36 | 41 | 5 | 111 | 57 | 27 | 32 | 0 | -- | -- | -- | 328 |
| Napa Valley Lake (Big Basin) | 200 | 10 | 19 | 22 | 3 | 79 | 31 | 15 | -- | -- | -- | -- | -- | 178 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 0 | 0 | 70 | 0 | -- | -- | -- | -- | -- | 70 |
| **Total** | **9,590** | **233** | **451** | **524** | **153** | **1,499** | **992** | **346** | **350** | **3** | **0** | **0** | **0** | **4,552** |

| Region | Direct Diversions to Use (ac/ft) [2] | |
|---|---|---|
| Guenoc Valley | 81 | 81 |
| Upper Bohn | | 0 |
| Napa Valley Lake | 109 | 109 |
| **Total Direct Water Diversions** | **190** | **190** |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Water Diversions** | **233** | **451** | **524** | **153** | **1499** | **1182** | **346** | **350** | **3** | **0** | **0** | **0** | **4,742** |

(1) Water diversion to storage amounts based on ending and beginning of irrigation season reservoir elevation measurements. Monthly values are estimated based on seasonal reservoir elevation measurements and rationed monthly based on published precipitation data from Middletown.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.

**LANGTRY FARMS**
**SUMMARY OF 5 YEAR AVERAGE WATER DIVERSION**
**WATER YEAR 2014 TO 2018**

| Reservoir | Storage Capacity (af) | 2014 to 2018 Average Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 32 | 107 | 490 | 364 | 125 | 90 | 99 | 0 | 0 | -- | -- | -- | 1,306 |
| McCreary | 2098 | 10 | 17 | 279 | 222 | 53 | 96 | 101 | 0 | 0 | -- | -- | -- | 778 |
| Foley #1 | 540 | 3 | 3 | 61 | 43 | 31 | 54 | 25 | 5 | 0 | -- | -- | -- | 226 |
| Foley #2 | 212 | 1 | 0 | 22 | 21 | 11 | 22 | 0 | 5 | 0 | -- | -- | -- | 82 |
| Langtry (Cassidy) | 560 | 4 | 2 | 85 | 33 | 40 | 34 | 6 | -- | -- | -- | -- | -- | 204 |
| Upper Bohn (Natural Inflow) [3] | 2760 | 7 | 11 | 126 | 267 | 80 | 114 | 0 | 0 | 0 | -- | -- | -- | 604 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 8 | 93 | 153 | 39 | 95 | 16 | -- | -- | -- | -- | -- | 403 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 1 | 22 | 54 | 71 | 0 | 21 | -- | -- | -- | -- | -- | 170 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 10 | 27 | 17 | 33 | -- | -- | -- | -- | -- | 87 |
| **Total** | **9,590** | **57** | **150** | **1,177** | **1,165** | **477** | **523** | **301** | **10** | **0** | **0** | **0** | **0** | **3,861** |

| Region | 2014 to 2018 Average Direct Diversions to Use (ac/ft) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 5 | 6 | 0 | 0 | 2 | 24 | 28 | 4 | | | | | 69 |
| Upper Bohn | | | | | | 1 | 4 | 0 | | | | | 5 |
| Napa Valley Lake | | | | | | 25 | 45 | 0 | | | | | 71 |
| **Total Average Direct Water Diversions** | **5** | **6** | **0** | **0** | **2** | **51** | **77** | **4** | | | | | **145** |
| **Total Average Water Diversions** | **62** | **156** | **1177** | **1165** | **479** | **574** | **378** | **14** | **0** | **0** | **0** | **0** | **4,006** |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.
(3) Includes groundwater pumped into Upper Bohn

**LANGTRY FARMS**
**SUMMARY OF 5 YEAR AVERAGE WATER USE**
**WATER YEAR 2014 TO 2018**

| Reservoir | Storage Capacity (af) | 2014 to 2018 Average Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 112 | 22 | 10 | 4 | 22 | 22 | 41 | 170 | 349 | 437 | 306 | 189 | 1,683 |
| McCreary | 2098 | 20 | 14 | 9 | 12 | 10 | 8 | 63 | 73 | 111 | 130 | 209 | 155 | 815 |
| Foley #1 | 540 | 11 | 3 | 6 | 2 | 1 | 2 | 11 | 19 | 23 | 53 | 39 | 31 | 199 |
| Foley #2 | 212 | 8 | 5 | 2 | 0 | 1 | 3 | 13 | 7 | 9 | 10 | 13 | 10 | 80 |
| Langtry (Cassidy) | 560 | 75 | 5 | 1 | 1 | 0 | 2 | 4 | 20 | 24 | 29 | 23 | 17 | 202 |
| Upper Bohn | 2760 | 67 | 19 | 11 | 10 | 31 | 28 | 48 | 116 | 164 | 196 | 194 | 104 | 988 |
| Napa Valley Lake (Big Basin) | 200 | 6 | 0 | 0 | 0 | 0 | 8 | 1 | 3 | 13 | 33 | 28 | 34 | 128 |
| Pump #2 to Napa Valley Lake [5] | | 0 | 0 | 0 | 5 | 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 32 |
| **Total** | **9,590** | **299** | **68** | **38** | **35** | **91** | **73** | **180** | **408** | **695** | **889** | **812** | **541** | **4,127** |

| Region | 2014 to 2018 Average Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 76 | 11 | 2 | 3 | 2 | 51 | 68 | 68 | 90 | 106 | 118 | 135 | 731 |
| Upper Bohn [4] | 25 | 3 | 0 | 0 | 1 | 5 | 8 | 28 | 54 | 80 | 92 | 78 | 372 |
| Napa Valley Lake | 16 | 0 | 0 | 0 | 0 | 22 | 41 | 14 | 28 | 56 | 41 | 25 | 242 |
| **Total Applied Water** | **117** | **14** | **2** | **3** | **4** | **77** | **117** | **109** | **173** | **242** | **251** | **238** | **1,345** |
| **Evaporation and Seepage (af)** [3] | 182 | 54 | 36 | 27 | 60 | -5 | 64 | 298 | 522 | 647 | 561 | 303 | 2,750 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) Water lost to evaporation or seepage based on reservoir elevation measurements. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(4) Meter data incomplete, Some outlet and irrigation meters were installed in 2014 and 2015
(5) 'Water released from Guenoc Valley and picked up at Pump #2 for irrigation is measured at Napa Valley Lake Metered

**LANGTRY FARMS**
**SUMMARY OF 5 YEAR AVERAGE WATER USE**
**WATER YEAR 2014 TO 2018**

| Region | Developed Acreages | 2014 to 2018 Average Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 941 | 0.24 | 0.05 | 0.03 | 0.02 | 0.04 | 0.04 | 0.14 | 0.31 | 0.55 | 0.70 | 0.63 | 0.43 | 3.17 |
| Upper Bohn [4] [6] | 714 | 0.09 | 0.03 | 0.02 | 0.01 | 0.04 | 0.04 | 0.07 | 0.16 | 0.23 | 0.27 | 0.27 | 0.15 | 1.38 |
| Napa Valley Lake [5] | 204 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.01 | 0.02 | 0.07 | 0.16 | 0.14 | 0.17 | 0.63 |

| Region | Developed Acreages | 2014 to 2018 Average Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 941 | 0.08 | 0.01 | 0.00 | 0.00 | 0.00 | 0.05 | 0.07 | 0.07 | 0.10 | 0.11 | 0.13 | 0.14 | 0.78 |
| Upper Bohn [4] [6] | 714 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.04 | 0.08 | 0.11 | 0.13 | 0.11 | 0.52 |
| Napa Valley Lake [5] | 204 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.20 | 0.07 | 0.14 | 0.27 | 0.20 | 0.12 | 1.19 |

| Frost Protection | 2014 to 2018 Average Metered Applied Frost Protection (af) | | |
|---|---|---|---|
| Guenoc Valley [3] | 0 | 38 | 48 |
| Upper Bohn [4] [6] | 0 | 5 | 7 |
| Napa Valley Lake [5] | 0 | 20 | 40 |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evaporation and seepage.
(3) 663 Acres of Vineyard, 222 acres of Pasture, 90 Acres of Golf Course. Golf course irrigation ended 9/2015, pastures converted to vineyard in 2016
(4) 246 Acres of Vineyard, 281 Acres of Pasture. Pastures converted to vineyard in 2016
(5) All Vineyard
(6) Meter data incomplete, Some outlet and irrigation meters were installed in 2014 and 2015

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2018**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 72 | 0 | 16 | 0 | 108 | 0 | 0 | 276 | 957 | 1,343 | 636 | 0 | 3,408 [2] |
| McCreary | 2098 | 0 | 6 | 19 | 0 | 10 | 0 | 253 | 0 | 0 | 0 | 308 | 353 | 949 |
| Foley #1 | 540 | 16 | 5 | 28 | 0 | 4 | 0 | 13 | 0 | 0 | 57 | 36 | 28 | 186 |
| Foley #2 | 212 | 8 | 16 | 6 | 0 | 3 | 0 | 16 | 6 | 10 | 1 | 23 | 6 | 95 |
| Langtry (Cassidy) | 560 | 3 | 18 | 0 | 0 | 2 | 0 | 6 | 20 | 21 | 31 | 23 | 17 | 140 |
| Upper Bohn | 2760 | 152 | 12 | 21 | 0 | 94 | 6 | 19 | 173 | 231 | 203 | 165 | 186 | 1,264 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 24 | 26 | 59 | 118 |
| Pump #2 to Napa Valley Lake [5] | | 0 | 0 | 0 | 26 | 133 | | | | | | | | 159 |
| **Total** | **9,590** | **251** | **57** | **90** | **26** | **354** | **6** | **307** | **485** | **1,219** | **1,659** | **1,216** | **650** | **6,321** |

| Region | Metered Applied Water (af) [3] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 22 | 0 | 0 | 2 | 0 | 13 | 53 | 31 | 62 | 77 | 50 | 52 | 363 |
| Upper Bohn [6] | 44 | 10 | 0 | 0 | 0 | 6 | 19 | 29 | 73 | 106 | 99 | 111 | 498 |
| Napa Valley Lake | 13 | 0 | 1 | 0 | 0 | 9 | 67 | 14 | 19 | 43 | 49 | 39 | 253 |
| **Total Applied Water** | **80** | **11** | **1** | **2** | **0** | **29** | **139** | **74** | **154** | **225** | **198** | **202** | **1,114** |
| **Evaporation and Seepage (af)** [4] | 171 | 47 | 89 | -2 | 221 | -22 | 168 | 412 | 1,065 | 1,433 | 1,018 | 448 | 5,047 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Detert Reservoir was drained in 2018 to facilitate outlet repairs.
(3) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(4) Water lost to evaporation or seepage based on reservoir elevation measurements. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(5) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is measured at Napa Valley Lake Metered
(6) Includes water transferred from Guenoc Valley to Upper Bohn. Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2018**

| Region | Developed Acreages [3] | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 919 | 0.11 | 0.05 | 0.08 | 0.00 | 0.14 | 0.00 | 0.31 | 0.33 | 1.08 | 1.56 | 1.12 | 0.44 | 5.20 |
| Upper Bohn | 744 | 0.20 | 0.02 | 0.03 | 0.00 | 0.13 | 0.01 | 0.03 | 0.23 | 0.31 | 0.27 | 0.22 | 0.25 | 1.70 |
| Napa Valley Lake | 204 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.12 | 0.13 | 0.29 | 0.58 |

| Region | Developed Acreages [3] | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 919 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.06 | 0.03 | 0.07 | 0.08 | 0.05 | 0.06 | 0.39 |
| Upper Bohn [4] [5] | 744 | 0.06 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.04 | 0.10 | 0.14 | 0.13 | 0.15 | 0.67 |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evaporation and seepage.
(3) Unless Stated, all irrigated acreages developed as vineyard.
(4) Includes groundwater pumped into Upper Bohn.
(5) Includes water transferred from Guenoc Valley to Upper Bohn

**LANGTRY FARMS**
**SUMMARY OF WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2018**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 0 | 64 | 0 | 616 | 0 | 0 | 198 | 0 | 0 | -- | -- | -- | 877 |
| McCreary | 2098 | 0 | 0 | 0 | 163 | 0 | 338 | 0 | 0 | 0 | -- | -- | -- | 501 |
| Foley #1 | 540 | 0 | 0 | 0 | 26 | 0 | 69 | 0 | 0 | 0 | -- | -- | -- | 96 |
| Foley #2 | 212 | 0 | 0 | 0 | 9 | 0 | 18 | 0 | 0 | 0 | -- | -- | -- | 28 |
| Langtry (Cassidy) | 560 | 0 | 0 | 0 | 27 | 0 | 118 | 0 | -- | -- | -- | -- | -- | 145 |
| Upper Bohn (Natural Inflow) [3] | 2760 | 0 | 0 | 0 | 89 | 0 | 89 | 0 | 0 | 0 | -- | -- | -- | 178 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 1 | 0 | 88 | 0 | 99 | 68 | -- | -- | -- | -- | -- | 255 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 2 | 63 | 70 | 2 | 5 | -- | -- | -- | -- | -- | 142 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 26 | 133 | 7 | 82 | -- | -- | -- | -- | -- | 248 |
| **Total** | **9,590** | **0** | **64** | **2** | **1,107** | **203** | **740** | **352** | **0** | **0** | **0** | **0** | **0** | **2,469** |

| Region | Direct Diversions to Use (ac/ft) [2] | | |
|---|---|---|---|
| Guenoc Valley | 13 | 53 | 66 |
| Upper Bohn | 6 | 19 | 25 |
| Napa Valley Lake | 9 | 67 | 76 |
| **Total Direct Water Diversions** | **29** | **139** | **167** |
| **Total Water Diversions** | **769** | **491** | **2,637** |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.
(3) Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2017**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 143 | 205 | 186 | 115 | 683 |
| McCreary | 2098 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 85 | 161 | 179 | 150 | 212 | 800 |
| Foley #1 | 540 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 47 | 63 | 49 | 50 | 247 |
| Foley #2 | 212 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 10 | 12 | 14 | 12 | 11 | 62 |
| Langtry (Cassidy) | 560 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 28 | 31 | 20 | 25 | 122 |
| Upper Bohn | 2760 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 226 | 262 | 336 | 368 | 208 | 1,432 |
| Napa Valley Lake (Big Basin) | 200 | 25 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 0 | 21 | 35 | 43 | 128 |
| Pump #2 to Napa Valley Lake [4] | | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 |
| **Total** | **9,590** | **25** | **0** | **0** | **0** | **0** | **16** | **35** | **414** | **653** | **849** | **820** | **664** | **3,475** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 27 | 29 | 0 | 0 | 0 | 4 | 56 | 55 | 62 | 106 | 95 | 44 | 479 |
| Upper Bohn | 30 | 1 | 0 | 0 | 4 | 1 | 7 | 59 | 100 | 137 | 139 | 104 | 582 |
| Napa Valley Lake | 6 | 0 | 0 | 0 | 0 | 14 | 41 | 14 | 17 | 58 | 41 | 27 | 218 |
| **Total Applied Water** | **63** | **30** | **0** | **0** | **4** | **18** | **104** | **129** | **179** | **302** | **276** | **175** | **1,279** |
| **Evaporation and Seepage (af) [3]** | -39 | -30 | 0 | 0 | -4 | -3 | -68 | 285 | 474 | 547 | 544 | 489 | 2,196 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) Water lost to evaporation or seepage based on reservoir elevation measurements. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(4) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is measured at Napa Valley Lake Metered Applied Water.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2017**

| Region | Developed Acreages [3] | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 919 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.20 | 0.43 | 0.53 | 0.45 | 0.45 | 2.08 |
| Upper Bohn | 744 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.30 | 0.35 | 0.45 | 0.49 | 0.28 | 1.92 |
| Napa Valley Lake | 204 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.10 | 0.17 | 0.21 | 0.63 |

| Region | Developed Acreages [3] | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 919 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.06 | 0.07 | 0.12 | 0.10 | 0.05 | 0.52 |
| Upper Bohn [4] | 744 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.08 | 0.13 | 0.18 | 0.19 | 0.14 | 0.78 |
| Napa Valley Lake | 204 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.20 | 0.07 | 0.08 | 0.29 | 0.20 | 0.13 | 1.07 |

**Frost Protection** — **Metered Applied Frost Protection (af)**

(3) Unless stated, all irrigated acreages developed as vineyard.
(4) Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2017**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 159 | 277 | 365 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 801 |
| McCreary | 2098 | 26 | 63 | 507 | 66 | 11 | 0 | 278 | 0 | 0 | -- | -- | -- | 952 |
| Foley #1 | 540 | 16 | 13 | 104 | 81 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 214 |
| Foley #2 | 212 | 6 | 1 | 32 | 52 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 91 |
| Langtry (Cassidy) | 560 | 22 | 3 | 97 | 0 | 0 | 0 | 0 | -- | -- | -- | -- | -- | 122 |
| Upper Bohn (Natural Inflow) [3] | 2760 | 36 | 15 | 242 | 835 | 289 | 0 | 0 | 0 | 0 | -- | -- | -- | 1,416 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 40 | 209 | 460 | 20 | 0 | 0 | -- | -- | -- | -- | -- | 729 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 6 | 21 | 83 | 11 | 0 | 37 | -- | -- | -- | -- | -- | 158 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 0 | 0 | 0 | 78 | -- | -- | -- | -- | -- | 78 |
| **Total** | **9,590** | **264** | **419** | **1,576** | **1,577** | **332** | **0** | **393** | **0** | **0** | **0** | **0** | **0** | **4,561** |

| Region | Direct Diversions to Use (ac/ft) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 23 | 29 | 0 | 0 | 1 | 3 | 64 | 20 | | | | | 142 |
| Upper Bohn | | | | | | | | | | | | | 0 |
| Napa Valley Lake | | | | | | 14 | 41 | | | | | | 54 |
| **Total Direct Water Diversions** | **23** | **29** | **0** | **0** | **1** | **17** | **105** | **20** | | | | | **196** |
| **Total Water Diversions** | **287** | **448** | **1577** | **1577** | **333** | **17** | **498** | **20** | **0** | **0** | **0** | **0** | **4,758** |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.
(3) Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2016**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 65 | 28 | 0 | 0 | 0 | 0 | 20 | 85 | 172 | 199 | 181 | 142 | 894 |
| McCreary | 2098 | 40 | 19 | 0 | 0 | 40 | 0 | 0 | 96 | 140 | 194 | 147 | 120 | 798 |
| Foley #1 | 540 | 21 | 5 | 0 | 0 | 0 | 0 | 2 | 26 | 28 | 50 | 42 | 33 | 207 |
| Foley #2 | 212 | 26 | 2 | 0 | 0 | 0 | 0 | 10 | 6 | 11 | 14 | 11 | 9 | 90 |
| Langtry (Cassidy) | 560 | 7 | 1 | 0 | 0 | 0 | 0 | 7 | 18 | 25 | 30 | 26 | 16 | 131 |
| Upper Bohn | 2760 | 108 | 36 | 0 | 0 | 0 | 0 | 87 | 117 | 227 | 317 | 271 | 62 | 1,224 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 0 | 0 | 0 | 27 | 0 | 0 | 12 | 0 | 40 | 42 | 121 |
| Pump #2 to Napa Valley Lake [4] | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| **Total** | **9,590** | **267** | **91** | **0** | **0** | **40** | **27** | **126** | **350** | **616** | **805** | **719** | **424** | **3,465** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 19 | 2 | 1 | 0 | 10 | 46 | 11 | 42 | 68 | 97 | 113 | 68 | 478 |
| Upper Bohn | 39 | 3 | 0 | 0 | 0 | 5 | 3 | 39 | 69 | 95 | 92 | 93 | 438 |
| Napa Valley Lake | 29 | 0 | 0 | 0 | 2 | 46 | 3 | 22 | 36 | 67 | 39 | 28 | 272 |
| **Total Applied Water** | **87** | **5** | **1** | **0** | **12** | **96** | **18** | **103** | **174** | **259** | **243** | **190** | **1,188** |
| **Evaporation and Seepage (af)** [3] | 181 | 87 | -1 | 0 | 28 | -69 | 108 | 247 | 442 | 546 | 476 | 234 | 2,277 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) Water lost to evaporation or seepage based on reservoir elevation measurements. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(4) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is measured at Napa Valley Lake Metered Applied Water.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2016**

| Region | Developed Acreages [3] | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 919 | 0.17 | 0.06 | 0.00 | 0.00 | 0.04 | 0.00 | 0.04 | 0.25 | 0.41 | 0.53 | 0.44 | 0.35 | 2.31 |
| Upper Bohn | 744 | 0.14 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.16 | 0.30 | 0.43 | 0.36 | 0.08 | 1.65 |
| Napa Valley Lake | 204 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.06 | 0.00 | 0.20 | 0.20 | 0.59 |

| Region | Developed Acreages [3] | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 919 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 | 0.05 | 0.01 | 0.05 | 0.07 | 0.11 | 0.12 | 0.07 | 0.52 |
| Upper Bohn [4] | 744 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.05 | 0.09 | 0.13 | 0.12 | 0.13 | 0.59 |
| Napa Valley Lake | 204 | 0.14 | 0.00 | 0.00 | 0.00 | 0.01 | 0.22 | 0.02 | 0.11 | 0.18 | 0.33 | 0.19 | 0.14 | 1.34 |

(2) Applied water per developed acre based on meter recordings and does not include evaporation and seepage.
(3) Unless Stated, all irrigated acreages developed as vineyard.
(4) Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2016**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 0 | 0 | 277 | 1,203 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 1,480 |
| McCreary | 2098 | 0 | 0 | 30 | 882 | 0 | 55 | 119 | 0 | 0 | -- | -- | -- | 1,086 |
| Foley #1 | 540 | 0 | 0 | 8 | 106 | 7 | 180 | 0 | 0 | 0 | -- | -- | -- | 302 |
| Foley #2 | 212 | 0 | 0 | 3 | 45 | 1 | 72 | 0 | 0 | 0 | -- | -- | -- | 121 |
| Langtry (Cassidy) | 560 | 0 | 0 | 24 | 136 | 0 | 0 | 0 | -- | -- | -- | -- | -- | 160 |
| Upper Bohn (Natural Inflow) [3] | 2760 | 0 | 0 | 35 | 323 | 4 | 279 | 0 | 0 | 0 | -- | -- | -- | 641 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 0 | 0 | 189 | 6 | 302 | 0 | -- | -- | -- | -- | -- | 498 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 0 | 13 | 114 | 0 | 34 | -- | -- | -- | -- | -- | 161 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 0 | 2 | 46 | 3 | -- | -- | -- | -- | -- | 51 |
| **Total** | **9,590** | **0** | **0** | **376** | **2,897** | **134** | **934** | **156** | **0** | **0** | **0** | **0** | **0** | **4,499** |

| Region | Direct Diversions to Use (ac/ft) [2] | | | Totals |
|---|---|---|---|---|
| Guenoc Valley | 7 | 29 | | 36 |
| Upper Bohn | | | | 0 |
| Napa Valley Lake | 2 | 46 | 3 | 51 |
| **Total Direct Water Diversions** | **9** | **74** | **3** | **87** |
| **Total Water Diversions** | **144** | **1009** | **160** | **4,586** |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.
(3) Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2015**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 181 | 0 | 0 | 0 | 0 | 112 | 184 | 173 | 231 | 224 | 331 | 133 | 1,568 |
| McCreary | 2098 | 0 | 0 | 0 | 43 | 0 | 27 | 62 | 91 | 124 | 167 | 242 | 78 | 835 |
| Foley #1 | 540 | 13 | 0 | 0 | 0 | 0 | 9 | 38 | 29 | 37 | 38 | 39 | 30 | 233 |
| Foley #2 | 212 | 5 | 2 | 0 | 0 | 0 | 11 | 34 | 11 | 10 | 11 | 11 | 19 | 114 |
| Langtry (Cassidy) | 560 | 357 | 0 | 0 | 0 | 0 | 9 | 9 | 19 | 23 | 27 | 20 | 16 | 480 |
| Upper Bohn | 2760 | 0 | 0 | 0 | 0 | 0 | 36 | 42 | 64 | 100 | 124 | 167 | 65 | 598 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 1 | 23 | 41 | 0 | 28 | 107 |
| Pump #2 to Napa Valley Lake [5] | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | 0 |
| **Total** | **9,590** | **556** | **2** | **0** | **43** | **0** | **216** | **369** | **388** | **549** | **633** | **809** | **369** | **3,935** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 264 | 2 | 0 | 0 | 0 | 116 | 198 | 74 | 128 | 135 | 196 | 52 | 1,165 |
| Upper Bohn [4] | 12 | 0 | 0 | 0 | 0 | 11 | 8 | 11 | 26 | 53 | 113 | 64 | 298 |
| Napa Valley Lake | 29 | 0 | 0 | 0 | 0 | 22 | 90 | 8 | 37 | 40 | 42 | 31 | 298 |
| **Total Applied Water** | **305** | **2** | **0** | **0** | **0** | **149** | **296** | **93** | **191** | **228** | **350** | **146** | **1,761** |
| **Evaporation and Seepage (af) [3]** | 251 | 0 | 0 | 43 | 0 | 68 | 73 | 295 | 358 | 405 | 459 | 223 | 2,174 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) Water lost to evaporation or seepage based on reservoir elevation measurements. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(4) Meter data incomplete, Some meters were installed August 2015. Includes groundwater pumped into Upper Bohn.
(5) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is measured at Napa Valley Lake Metered Applied Water.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2015**

| Region | Developed Acreages | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 975 | 0.57 | 0.00 | 0.00 | 0.04 | 0.00 | 0.17 | 0.34 | 0.33 | 0.44 | 0.48 | 0.66 | 0.28 | 0.00 |
| Upper Bohn [4] [6] | 811 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.05 | 0.08 | 0.12 | 0.15 | 0.21 | 0.08 | 3.31 |
| Napa Valley Lake [5] | 204 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.01 | 0.12 | 0.20 | 0.00 | 0.14 | 0.74 |

| Region | Developed Acreages | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 975 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.20 | 0.08 | 0.13 | 0.14 | 0.20 | 0.05 | 0.00 |
| Upper Bohn [4] [6] | 811 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.03 | 0.07 | 0.14 | 0.08 | 1.19 |
| Napa Valley Lake [5] | 204 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.44 | 0.04 | 0.18 | 0.20 | 0.20 | 0.15 | 0.37 |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evaporation and seepage.
(3) 663 Acres of Vineyard, 222 acres of Pasture, 90 Acres of Golf Course
(4) Includes groundwater pumped into Upper Bohn. 692 Acres of Vineyard, 119 Acres of Pasture
(5) All Vineyard
(6) Meter data incomplete, Additional meters were installed August 2015

**LANGTRY FARMS**
**SUMMARY OF WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2015**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 0 | 193 | 1,810 | 0 | 0 | 0 | 0 | 0 | 0 | -- | -- | -- | 2,003 |
| McCreary | 2098 | 23 | 23 | 856 | 0 | 14 | 0 | 0 | 0 | 0 | -- | -- | -- | 916 |
| Foley #1 | 540 | 0 | 2 | 193 | 0 | 115 | 0 | 0 | 0 | 0 | -- | -- | -- | 309 |
| Foley #2 | 212 | 0 | 0 | 74 | 0 | 41 | 0 | 0 | 0 | 0 | -- | -- | -- | 116 |
| Langtry (Cassidy) | 560 | 0 | 8 | 302 | 0 | 143 | 0 | 0 | -- | -- | -- | -- | -- | 453 |
| Upper Bohn (Natural Inflow) [3] | 2760 | 0 | 42 | 351 | 0 | 32 | 0 | 0 | 0 | 0 | -- | -- | -- | 425 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 0 | 254 | 26 | 163 | 7 | 0 | -- | -- | -- | -- | -- | 451 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 45 | 55 | 81 | 0 | 13 | -- | -- | -- | -- | -- | 194 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 11 | 0 | 17 | 2 | -- | -- | -- | -- | -- | 30 |
| **Total** | **9,590** | **23** | **268** | **3,885** | **92** | **590** | **24** | **15** | **0** | **0** | **0** | **0** | **0** | **4,897** |

| Region | Direct Diversions to Use (ac/ft) [2] | |
|---|---|---|
| Guenoc Valley | | 0 |
| Upper Bohn | | 0 |
| Napa Valley Lake | 22 | 90 | | | | | | | | | 112 |
| **Total Direct Water Diversions** | **22** | **90** | | | | | | | | | **112** |
| **Total Water Diversions** | **23** | **268** | **3885** | **92** | **590** | **47** | **105** | **0** | **0** | **0** | **0** | **0** | **5,009** |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.
(3) Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2014**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Depletions [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 240 | 79 | 33 | 21 | 0 | 0 | 0 | 279 | 245 | 217 | 197 | 554 | 1,864 |
| McCreary | 2098 | 59 | 45 | 25 | 19 | 0 | 0 | 0 | 93 | 132 | 110 | 197 | 11 | 691 |
| Foley #1 | 540 | 5 | 3 | 2 | 10 | 0 | 0 | 0 | 0 | 3 | 58 | 29 | 15 | 123 |
| Foley #2 | 212 | 3 | 3 | 1 | 2 | 0 | 0 | 1 | 0 | 3 | 11 | 10 | 6 | 41 |
| Langtry (Cassidy) | 560 | 9 | 8 | 3 | 3 | 0 | 0 | 0 | 25 | 25 | 27 | 26 | 12 | 137 |
| Upper Bohn | 2760 | 74 | 48 | 33 | 49 | 59 | 98 | 60 | 0 | 0 | 0 | 0 | 0 | 420 |
| Napa Valley Lake (Big Basin) | 200 | 7 | 2 | 1 | 0 | 0 | 0 | 3 | 5 | 32 | 77 | 38 | 0 | 165 |
| Pump #2 to Napa Valley Lake [5] | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **9,590** | **396** | **188** | **99** | **104** | **59** | **98** | **64** | **403** | **438** | **498** | **497** | **599** | **3,442** |

| Region | Metered Applied Water (af) [2] Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | 48 | 22 | 6 | 11 | 2 | 76 | 24 | 138 | 132 | 116 | 137 | 459 | 1,171 |
| Upper Bohn [4] [6] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 17 | 17 | 44 |
| Napa Valley Lake | 3 | 0 | 0 | 0 | 0 | 18 | 3 | 11 | 33 | 69 | 33 | 0 | 170 |
| **Total Applied Water** | **51** | **22** | **7** | **11** | **2** | **94** | **27** | **149** | **165** | **195** | **186** | **476** | **1,385** |
| **Evaporation and Seepage (af) [3]** | 345 | 165 | 92 | 92 | 57 | 4 | 37 | 253 | 273 | 303 | 311 | 123 | 2,056 |

(1) Reservoir depletions based on reservoir elevation measurements includes evaporation, seepage and all uses.
(2) Water applied to developed areas based on meter recordings and does not include evaporation and seepage.
(3) Water lost to evaporation or seepage based on reservoir elevation measurements. Negative values are the results of inflows coinciding with metered use or transfer of water to satellite reservoirs.
(4) Meter data incomeplete, Some outlet and irrigation meters were installed June 2014
(5) Water released from Guenoc Valley and picked up at Pump #2 for irrigation is measured at Napa Valley Lake Metered
(6) Includes water transferred from Guenoc Valley to Upper Bohn. Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER USE by RESERVOIR**
**for WATER YEAR 2014**

| Region | Developed Acreages | Reservoir Depletion Water Duty (af/ac) [1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley [3] | 975 | 0.32 | 0.14 | 0.07 | 0.06 | 0.00 | 0.00 | 0.00 | 0.41 | 0.42 | 0.43 | 0.47 | 0.61 | 2.93 |
| Upper Bohn [4] [6] [7] | 527 | 0.14 | 0.09 | 0.06 | 0.09 | 0.11 | 0.19 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 |
| Napa Valley Lake [5] | 204 | 0.03 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.03 | 0.16 | 0.38 | 0.19 | 0.00 | 0.81 |

| Region | Developed Acreages | Metered Applied Water Duty (af/ac) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Totals |
| Guenoc Valley | 975 | 0.05 | 0.02 | 0.01 | 0.01 | 0.00 | 0.08 | 0.02 | 0.14 | 0.14 | 0.12 | 0.14 | 0.47 | 1.20 |
| Upper Bohn [4] [6] [7] | 527 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.03 | 0.03 | 0.08 |

(1) Reservoir depletion per developed acre based on reservoir elevation measurements and includes evaporation, seepage and all uses.
(2) Applied water per developed acre based on meter recordings and does not include evapoaration and seepage.
(3) 663 Acres of Vineyard, 222 acres of Pasture, 90 Acres of Golf Course
(4) 246 Acres of Vineyard, 281 Acres of Pasture
(5) All Vineyard
(6) Meter data incomeplete, Some outlet and irrigation meters were installed June 2014
(7) Includes water transferred from Guenoc Valley to Upper Bohn. Includes groundwater pumped into Upper Bohn.

**LANGTRY FARMS**
**SUMMARY OF WATER DIVERSION by RESERVOIR**
**for WATER YEAR 2014**

| Reservoir | Storage Capacity (af) | Water Year Reservoir Diversions to Storage (ac/ft) [1] Oct (af) | Nov (af) | Dec (af) | Jan (af) | Feb (af) | Mar (af) | Apr (af) | May (af) | Jun (af) | Jul (af) | Aug (af) | Sept (af) | Totals (af) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detert | 3220 | 0 | 0 | 0 | 0 | 623 | 452 | 295 | 0 | 0 | -- | -- | -- | 1,370 |
| McCreary | 2098 | 0 | 0 | 0 | 0 | 241 | 89 | 108 | 0 | 0 | -- | -- | -- | 438 |
| Foley #1 | 540 | 0 | 0 | 0 | 0 | 36 | 22 | 127 | 27 | 0 | -- | -- | -- | 211 |
| Foley #2 | 212 | 0 | 0 | 0 | 0 | 12 | 19 | 0 | 23 | 0 | -- | -- | -- | 54 |
| Langtry (Cassidy) | 560 | 0 | 0 | 0 | 0 | 56 | 54 | 29 | -- | -- | -- | -- | -- | 139 |
| Upper Bohn (Natural Inflow) [3] | 2760 | 0 | 0 | 0 | 86 | 74 | 201 | 0 | 0 | 0 | -- | -- | -- | 360 |
| Lower Bohn Diversion to Upper Bohn Storage | | 0 | 0 | 0 | 0 | 5 | 65 | 14 | 0 | -- | -- | -- | -- | 84 |
| Napa Valley Lake (Big Basin) | 200 | 0 | 0 | 45 | 55 | 81 | 0 | 13 | -- | -- | -- | -- | -- | 194 |
| Pump #2 to Napa Valley Lake | | 0 | 0 | 0 | 11 | 0 | 17 | 2 | -- | -- | -- | -- | -- | 30 |
| **Total** | **9,590** | **0** | **0** | **45** | **152** | **1,126** | **918** | **588** | **50** | **0** | **0** | **0** | **0** | **2,879** |

| Region | Direct Diversions to Use (ac/ft) [2] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Guenoc Valley | | | | | 2 | 76 | 24 | | | | | | 101 |
| Upper Bohn | | | | | | | | | | | | | 0 |
| Napa Valley Lake | | | | | 0 | 35 | 27 | | | | | | 62 |
| **Total Direct Water Diversions** | | | | | **2** | **111** | **51** | | | | | | **163** |
| **Total Water Diversions** | **0** | **0** | **45** | **152** | **1128** | **1029** | **639** | **50** | **0** | **0** | **0** | **0** | **3,043** |

(1) Water diversion to storage amounts based on reservoir elevation measurements.
(2) Direct diversion amounts determined by meter recordings and reservoir elevation measurements.
(3) Includes groundwater pumped into Upper Bohn.

# LANGTRY FARMS

12/11/2019

## Monthly Reservoir Storage Levels by Water Year

**(ALL AMOUNTS ARE ACRE-FEET)**

### 2017-2018

| Reservoir | Storage Capacity | October Storage | November Storage | December Storage | January Storage | February Storage | March Storage | April Storage | May Storage | June Storage | July Storage | August Storage | September Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detert** | **3,220** | 2,537 | 2,465 | 2,529 | 2,512 | 3,128 | 3,020 | 3,020 | 3,218.0 | 2,941.9 | 1,985.1 | 642.2 | 6.4 |
| **Langtry** | **560** | 436.6 | 433.5 | 415.4 | 415.4 | 442.8 | 441.2 | 558.9 | 553.3 | 533.3 | 512.0 | 481.4 | 458.5 |
| **McCreary** | **2,098** | 1,017.1 | 1,036.1 | 1,029.8 | 1,010.8 | 1,173.4 | 1,163.3 | 1,501.3 | 1,248.4 | 1,419.6 | 1,795.7 | 1,824.4 | 1,516.4 |
| **Foley #1** | **540** | 293.9 | 277.8 | 272.9 | 245.2 | 271.7 | 267.8 | 337.0 | 324.1 | 324.1 | 331.8 | 275.2 | 239.7 |
| **Foley #2** | **212** | 151.2 | 143.6 | 127.7 | 121.4 | 130.8 | 127.7 | 145.9 | 129.8 | 123.3 | 113.3 | 112.0 | 89.4 |
| **Upper Bohn** | **2,760** | 1,328.2 | 1,175.8 | 1,163.7 | 1,142.9 | 1,319.6 | 1,225.1 | 1,412.6 | 1,400.9 | 1,235.2 | 1,016.6 | 838.2 | 848.6 |
| **Napa Valley Lake** | **200** | 101.5 | 72.7 | 56.3 | 58.4 | 121.0 | 191.5 | 193.7 | 198.6 | 189.6 | 196.5 | 172.7 | 146.4 |
| **Total** | **9,590** | **5,865.3** | **5,604.5** | **5,594.4** | **5,506.5** | **6,587.3** | **6,436.7** | **7,169.5** | **7,073.2** | **6,767.0** | **5,951.0** | **4,346.0** | **3,305.4** |
| **Storage as % of Total** | | **61.2%** | **58.4%** | **58.3%** | **57.4%** | **68.7%** | **67.1%** | **74.8%** | **73.8%** | **70.6%** | **62.1%** | **45.3%** | **34.5%** |

### 2016-2017

| Reservoir | Storage Capacity | October Storage | November Storage | December Storage | January Storage | February Storage | March Storage | April Storage | May Storage | June Storage | July Storage | August Storage | September Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detert** | **3,220** | 2,419 | 2,578 | 2,855 | 3,220 | 3,220 | 3,220 | 3,220 | 3,220.0 | 3,185.1 | 3,042.2 | 2,837.7 | 2,651.4 |
| **Langtry** | **560** | 436.6 | 458.5 | 461.8 | 558.9 | 558.9 | 558.9 | 558.9 | 558.9 | 540.5 | 512.0 | 481.4 | 461.8 |
| **McCreary** | **2,098** | 865.4 | 891.9 | 955.1 | 1,462.0 | 1,527.8 | 1,539.2 | 1,525.9 | 1,803.9 | 1,718.9 | 1,558.3 | 1,379.5 | 1,229.5 |
| **Foley #1** | **540** | 327.0 | 342.9 | 355.6 | 460.0 | 540.0 | 540.0 | 540.0 | 540.0 | 503.1 | 456.5 | 393.3 | 344.3 |
| **Foley #2** | **212** | 122.1 | 127.7 | 129.1 | 161.2 | 212.0 | 212.0 | 211.3 | 210.4 | 200.6 | 188.5 | 174.1 | 162.1 |
| **Upper Bohn** | **2,760** | 614.3 | 650.0 | 704.9 | 1,155.0 | 2,450.9 | 2,760.0 | 2,760.0 | 2,728.6 | 2,502.4 | 2,240.3 | 1,904.3 | 1,536.1 |
| **Napa Valley Lake** | **200** | 103.6 | 79.1 | 85.4 | 106.2 | 188.7 | 200.0 | 199.5 | 196.5 | 194.8 | 200.0 | 178.6 | 144.0 |
| **Total** | **9,590** | **4,888.1** | **5,128.0** | **5,546.9** | **7,123.4** | **8,698.3** | **9,030.1** | **9,015.6** | **9,258.4** | **8,845.4** | **8,197.8** | **7,348.8** | **6,529.2** |
| **Storage as % of Total** | | **51.0%** | **53.5%** | **57.8%** | **74.3%** | **90.7%** | **94.2%** | **94.0%** | **96.5%** | **92.2%** | **85.5%** | **76.6%** | **68.1%** |

### 2015-2016

| Reservoir | Storage Capacity | October Storage | November Storage | December Storage | January Storage | February Storage | March Storage | April Storage | May Storage | June Storage | July Storage | August Storage | September Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detert** | **3,220** | 1,833.6 | 1,768.5 | 1,740.3 | 2,017.1 | 3,220.0 | 3,220.0 | 3,220.0 | 3,199.6 | 3,114.3 | 2,941.9 | 2,742.6 | 2,561.5 |
| **Langtry** | **560** | 408.1 | 400.8 | 399.4 | 423.2 | 558.9 | 558.9 | 558.9 | 551.5 | 533.3 | 508.5 | 478.1 | 452.2 |
| **McCreary** | **2,098** | 577.1 | 536.7 | 518.1 | 548.4 | 1,430.6 | 1,390.3 | 1,445.3 | 1,564.0 | 1,467.6 | 1,327.4 | 1,133.4 | 985.9 |
| **Foley #1** | **540** | 232.4 | 211.8 | 206.8 | 215.1 | 321.3 | 328.4 | 508.6 | 506.8 | 480.5 | 452.4 | 402.2 | 359.8 |
| **Foley #2** | **212** | 91.2 | 64.8 | 62.8 | 65.3 | 110.0 | 111.3 | 183.4 | 173.4 | 166.9 | 155.8 | 141.8 | 131.2 |
| **Upper Bohn** | **2,760** | 673.5 | 566.0 | 529.9 | 590.4 | 1,103.1 | 1,113.5 | 1,695.1 | 1,608.5 | 1,491.0 | 1,264.2 | 947.2 | 675.8 |
| **Napa Valley Lake** | **200** | 135.7 | 94.5 | 85.0 | 85.0 | 98.0 | 199.0 | 172.0 | 187.9 | 189.6 | 177.5 | 185.5 | 145.4 |
| **Total** | **9,590** | **3,951.6** | **3,643.0** | **3,542.2** | **3,944.5** | **6,841.8** | **6,921.4** | **7,783.4** | **7,791.7** | **7,443.3** | **6,827.7** | **6,030.8** | **5,311.7** |
| **Storage as % of Total** | | **41.2%** | **38.0%** | **36.9%** | **41.1%** | **71.3%** | **72.2%** | **81.2%** | **81.2%** | **77.6%** | **71.2%** | **62.9%** | **55.4%** |

# LANGTRY FARMS

12/11/2019

## Monthly Reservoir Storage Levels by Water Year

**(ALL AMOUNTS ARE ACRE-FEET)**

### 2014-2015

| Reservoir | Storage Capacity | October Storage | November Storage | December Storage | January Storage | February Storage | March Storage | April Storage | May Storage | June Storage | July Storage | August Storage | September Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detert** | **3,220** | 1,398.1 | 1,216.7 | 1,409.8 | 3,220.0 | 3,220.0 | 3,220.0 | 3,108.4 | 2,924.2 | 2,751.1 | 2,520.5 | 2,296.8 | 1,966.3 |
| **Langtry** | **560** | 436.6 | 79.6 | 87.8 | 389.4 | 388.0 | 531.5 | 522.6 | 513.8 | 494.8 | 471.5 | 444.3 | 424.4 |
| **McCreary** | **2,098** | 494.3 | 517.0 | 540.2 | 1,397.6 | 1,354.2 | 1,368.6 | 1,341.7 | 1,279.8 | 1,188.6 | 1,064.9 | 897.8 | 655.5 |
| **Foley #1** | **540** | 156.6 | 144.0 | 145.7 | 338.5 | 338.5 | 453.0 | 444.4 | 406.1 | 377.6 | 340.2 | 301.9 | 262.8 |
| **Foley #2** | **212** | 90.0 | 85.3 | 83.0 | 157.4 | 157.4 | 198.5 | 187.1 | 152.7 | 142.1 | 131.9 | 120.7 | 110.0 |
| **Upper Bohn** | **2,760** | 422.4 | 487.9 | 529.6 | 1,052.9 | 1,075.6 | 1,271.1 | 1,235.3 | 1,193.6 | 1,129.2 | 1,029.1 | 905.1 | 738.2 |
| **Napa Valley Lake** | **200** | 45.3 | 25.8 | 19.2 | 63.7 | 119.1 | 200.0 | 186.9 | 200.0 | 199.0 | 175.5 | 134.3 | 163.5 |
| **Total** | **9,590** | **3,043.2** | **2,556.4** | **2,815.3** | **6,619.5** | **6,652.8** | **7,242.7** | **7,026.3** | **6,670.2** | **6,282.4** | **5,733.6** | **5,101.0** | **4,320.7** |
| **Storage as % of Total** | | **31.7%** | **26.7%** | **29.4%** | **69.0%** | **69.4%** | **75.5%** | **73.3%** | **69.6%** | **65.5%** | **59.8%** | **53.2%** | **45.1%** |

### 2013-2014

| Reservoir | Storage Capacity | October Storage | November Storage | December Storage | January Storage | February Storage | March Storage | April Storage | May Storage | June Storage | July Storage | August Storage | September Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detert** | **3,220** | 1,902.4 | 1,662.9 | 1,583.5 | 1,539.8 | 1,519.3 | 2,142.1 | 2,594.2 | 2,889.4 | 2,610.6 | 2,365.9 | 2,149.4 | 1,952.0 |
| **Langtry** | **560** | 434.7 | 426.2 | 418.4 | 415.4 | 412.5 | 468.2 | 522.6 | 551.5 | 526.1 | 501.6 | 474.8 | 449.0 |
| **McCreary** | **2,098** | 748.2 | 689.3 | 644.0 | 618.8 | 600.2 | 840.8 | 929.3 | 1,037.7 | 944.4 | 812.2 | 702.5 | 505.6 |
| **Foley #1** | **540** | 68.3 | 63.6 | 60.9 | 59.3 | 49.0 | 84.7 | 106.8 | 233.8 | 260.3 | 257.8 | 200.3 | 171.8 |
| **Foley #2** | **212** | 77.3 | 73.9 | 70.6 | 69.2 | 66.8 | 78.5 | 97.3 | 96.1 | 119.3 | 116.6 | 106.1 | 96.1 |
| **Upper Bohn** | **2,760** | 583.5 | 509.4 | 461.9 | 429.0 | 278.1 | 356.8 | 622.1 | 573.3 | 514.2 | 416.4 | 356.8 | 416.4 |
| **Napa Valley Lake** | **200** | 18.9 | 12.3 | 10.5 | 9.3 | 13.8 | 119.9 | 200.0 | 196.9 | 191.7 | 159.8 | 82.9 | 44.5 |
| **Total** | **9,590** | **3,833.4** | **3,437.7** | **3,249.8** | **3,140.9** | **2,939.8** | **4,091.0** | **5,072.4** | **5,578.6** | **5,166.6** | **4,630.3** | **4,072.8** | **3,635.4** |
| **Storage as % of Total** | | **40.0%** | **35.8%** | **33.9%** | **32.8%** | **30.7%** | **42.7%** | **52.9%** | **58.2%** | **53.9%** | **48.3%** | **42.5%** | **37.9%** |

### 2012-2013

| Reservoir | Storage Capacity | October Storage | November Storage | December Storage | January Storage | February Storage | March Storage | April Storage | May Storage | June Storage | July Storage | August Storage | September Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detert** | **3,220** | 1,635.9 | 1,494.1 | 2,342.9 | 3220.0 | 3220.0 | 3,215.9 | 3,220.0 | 3,005.3 | 2,751.1 | 2,528.7 | 2,222.3 | 1,944.8 |
| **Langtry** | **560** | 445.9 | 436.6 | 526.1 | 558.9 | 558.9 | 556.7 | 557.0 | 544.1 | 522.6 | 501.6 | 468.2 | 444.3 |
| **McCreary** | **2,098** | 418.6 | 408.3 | 826.4 | 1,583.3 | 1,390.3 | 1,357.8 | 1,341.7 | 1,297.3 | 1,212.4 | 1,090.7 | 939.9 | 836.4 |
| **Foley #1** | **540** | 211.1 | 154.7 | 224.6 | 467.0 | 470.6 | 479.5 | 440.7 | 427.5 | 338.5 | 285.9 | 202.5 | 157.9 |
| **Foley #2** | **212** | 68.9 | 52.3 | 77.4 | 165.3 | 173.1 | 171.4 | 193.3 | 202.4 | 187.6 | 147.5 | 116.5 | 98.1 |
| **Upper Bohn** | **2,760** | 599.8 | 538.0 | 685.5 | 1,264.5 | 1,349.3 | 1,295.5 | 1,261.5 | 1,175.0 | 1,080.3 | 954.3 | 792.1 | 688.7 |
| **Napa Valley Lake** | **200** | 63.1 | 47.1 | 44.5 | 78.6 | 149.8 | 191.3 | 194.4 | 191.3 | 197.2 | 151.3 | 89.5 | 42.4 |
| **Total** | **9,590** | **3,443.3** | **3,131.1** | **4,727.4** | **7,337.6** | **7,311.9** | **7,268.1** | **7,208.6** | **6,843.0** | **6,289.7** | **5,660.1** | **4,830.9** | **4,212.7** |
| **Storage as % of Total** | | **35.9%** | **32.6%** | **49.3%** | **76.5%** | **76.2%** | **75.8%** | **75.2%** | **71.4%** | **65.6%** | **59.0%** | **50.4%** | **43.9%** |

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# LANGTRY FARMS

## Monthly Reservoir Storage Levels by Water Year

**(ALL AMOUNTS ARE ACRE-FEET)**

### 2011-2012

| Reservoir | Storage Capacity | October Storage | November Storage | December Storage | January Storage | February Storage | March Storage | April Storage | May Storage | June Storage | July Storage | August Storage | September Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detert** | **3,220** | 2,133.3 | 2,031.8 | 2,017.1 | 1808.4 | 2457.2 | 2,512.4 | 3220.0 | 3,191.3 | 2,891.1 | 2,577.9 | 2,222.3 | 1,916.5 |
| **Langtry** | **560** | 465.0 | 461.8 | 461.8 | 458.5 | 508.5 | 508.5 | 558.9 | 555.2 | 536.9 | 505.1 | 488.1 | 461.8 |
| **McCreary** | **2,098** | 1,053.6 | 1,006.1 | 1,006.1 | 975.1 | 1,253.6 | 1271.0 | 1622.0 | 1,450.9 | 1,306.1 | 1,185.2 | 884.5 | 612.6 |
| **Foley #1** | **540** | 145.7 | 127.0 | 128.7 | 127.0 | 152.9 | 154.7 | 344.3 | 453.0 | 467.0 | 432.6 | 368.3 | 280.7 |
| **Foley #2** | **212** | 84.2 | 76.3 | 76.3 | 76.3 | 84.2 | 84.2 | 170.1 | 211.3 | 181.7 | 149.7 | 127.7 | 93.6 |
| **Upper Bohn** | **2,760** | 772.2 | 736.7 | 716.5 | 670.2 | 747.4 | 711.8 | 1,134.4 | 1,198.5 | 1,095.1 | 925.3 | 811.2 | 692.4 |
| **Napa Valley Lake** | **200** | 80.2 | 70.3 | 62.1 | 54.4 | 54.4 | 141.6 | 196.5 | 177.8 | 182.8 | 196.5 | 149.1 | 94.3 |
| **Total** | **9,590** | **4,734.2** | **4,510.0** | **4,468.6** | **4,169.9** | **5,258.2** | **5,384.2** | **7,246.2** | **7,238.0** | **6,660.7** | **5,972.3** | **5,051.2** | **4,151.9** |
| **Storage as % of Total** | | **49.4%** | **47.0%** | **46.6%** | **43.5%** | **54.8%** | **56.1%** | **75.6%** | **75.5%** | **69.5%** | **62.3%** | **52.7%** | **43.3%** |

### 2010-2011

| Reservoir | Storage Capacity | October Storage | November Storage | December Storage | January Storage | February Storage | March Storage | April Storage | May Storage | June Storage | July Storage | August Storage | September Storage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Detert** | **3,220** | | 1,964.9 | | 3220.0 | 3220.0 | 3,220.0 | 3220.0 | 3,148.2 | 3,094.9 | 3,077.7 | 2,759.6 | 2,403.9 |
| **Langtry** | **560** | | 458.5 | | 491.4 | 494.8 | 560.0 | 560.0 | 551.5 | 544.1 | 533.3 | 505.1 | 481.4 |
| **McCreary** | **2,098** | | 1,158.3 | | 975.1 | 1,414.1 | 1488.2 | 1525.9 | 1,781.4 | 1,681.0 | 1,622.0 | 1,414.1 | 1,185.2 |
| **Foley #1** | **540** | | 92.2 | | 105.3 | 108.3 | 200.3 | 518.0 | 537.0 | 529.3 | 435.9 | 344.3 | 231.5 |
| **Foley #2** | **212** | | 92.1 | | 103.5 | 115.3 | 124.9 | 212.0 | 202.4 | 188.5 | 175.1 | 133.4 | 108.7 |
| **Upper Bohn** | **2,760** | | 483.0 | | 697.8 | 750.4 | 941.4 | 1,369.4 | 1,289.4 | 1,209.4 | 1,052.7 | 967.0 | 869.6 |
| **Napa Valley Lake** | **200** | | 15.3 | | 15.3 | 42.8 | 134.3 | 198.3 | 198.3 | 177.8 | 171.2 | 161.6 | 120.2 |
| **Total** | **9,590** | **0.0** | **4,264.3** | **0.0** | **5,608.4** | **6,145.7** | **6,669.1** | **7,603.6** | **7,708.2** | **7,425.0** | **7,067.9** | **6,285.1** | **5,400.5** |
| **Storage as % of Total** | | **0.0%** | **44.5%** | **0.0%** | **58.5%** | **64.1%** | **69.5%** | **79.3%** | **80.4%** | **77.4%** | **73.7%** | **65.5%** | **56.3%** |

Note: Storage amounts as recorded at the 1st of each month.