Appendix F:
Civil Engineering Report

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2548 MISSION STREET, SAN FRANCISCO, CA 94110
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REPORT

Date:	May 7, 2024
Report Subject:	**Civil Engineering Project Description**
Project # - Name:	22-251 – Charles Krug Noble House Hotel
Recipient:	Jamie Colee, Sophia Yen (Noble House Hotels)
Copies to:	Kevin Teague (HTRA Law), Jason Brandman (FCS)

1.0 EXECUTIVE SUMMARY

Noble House Hotels intends to develop a hospitality facility with lodging, amenities, and associated landscaping and infrastructure on fallow ground adjacent to the existing Charles Krug Winery (Krug) land located at 2800 Main Street in St Helena, California. This report describes the Civil Engineering approach for developing sustainable infrastructure to serve the long term needs of the project and is intended for Noble House to use in discussions with the City of St Helena.

2.0 PROJECT DESCRIPTION

The project will develop 8.5 acres of site plus a one-acre landscape buffer, as shown in Figure 1, within an approximately 140-acre parcel. The existing parcel, owned by Charles Krug Winery (Krug), is located off of California Highway 29 located in the City of St Helena within Napa County. It is bounded by Deer Park Road to the northwest, the Napa River to the northeast, and York Creek and the Beringer Winery facilities to the southeast. It is bisected by the Napa Valley Wine Train rail line running southeast to northwest through the site. The land is currently zoned for agricultural winery and production. Two wastewater treatment ponds are located at the northeast of the site to treat winery process water. The footprint of the future hotel facilities falls within land currently used as vineyards, fallow land (used for staging during the Glass Fire), and a culinary garden at the west corner of the parcel.



Figure 1. Site plan by SB Architects and VITA Landscape Architecture showing the 8.5-acre site and one-acre landscape buffer.

3.0 WATER

The Project is located in a California Statewide Groundwater Elevation Monitoring (CASGEM) High Priority Basin which requires a local Groundwater Sustainability Agency (GSA). Napa County's Groundwater Management Ordinance (GMO) implements these GSA requirements, which generally cover approval of water supply systems, wells, and conservation. In accordance with the GMO, the Project will be a steward of local water resources by demonstrating a water use scheme with no net impact to the aquifer.

The Project has determined a feasible water use scheme to achieve no impact to the aquifer, as described below. Additional pathways to no net aquifer impact are available which may be studied as the project advances.

3.1 Water Demands

The Project proposes development of a new 56-key hotel on the existing Charles Krug Winery. The development program provides for an onsite restaurant, kitchen and cooking classes, bar, spa, and irrigation of grounds landscaping. Interior building plumbing demands have been estimated using the Napa County *Design, Construction, and Installation of Alternative Sewage Treatment Systems* based on the architectural program. A summary of the water demands is presented in Table 1, below, with detailed calculations broken out in Appendix A.

The Gross Project Water Use is projected at 35,200 GPD, with 15,000 GPD of that required to be potable quality and 20,200 GPD able to be served by non-potable water. See Table 1, below.

Table 1. Water Demand Summary

Program Element	Gross Water Use (GPD)	Potable Water (GPD)	Non-Potable Water (GPD)
Guest Rooms	5,525	5,525	0
Employees	1,165	1,165	0
Multipurpose*	2,660	2,660	0
Laundry	2,790	-	2,790
Cooling	1,515	-	1,515
Fitness/Spa	3,720	3,720	-
Pools	1,919	1,919	-
Irrigation	15,879	-	15,879
TOTAL	**35,200**	**15,000**	**20,200**

*Multipurpose includes the Event Barn, on-site restaurant, breakfast buffet, area for cooking classes, retail spaces, bar, lounge areas, meeting rooms, and administrative areas.

3.2 Water Supply

In collaboration with the Krug Winery, the Project intends to leverage one of three existing groundwater wells onsite for water supply. Well #1 is located in the northern portion of the parcel, close to the proposed primary access to the hotel through the vineyards and is documented to provide a 250 gallon per minute (GPM) flow rate (see Appendix B for Well Reports). 250 GPM equates to a 360,000 gallon per day (GPD) or 131.4 MGY available supply to the Project.

With a reliable onsite water source which far exceeds the anticipated demands of the Project, no public connection to the City water distribution is anticipated. As such, the Project will not burden the municipal supply system, which has limited capacity for additional connections.

Although the existing Well #1 is demonstrated to be capable of pumping 360,000 GPD, the Project's water supply is also constrained by permitted availability. Under the County's obligations to show no net increase in groundwater extraction by basin, projects are allocated either a set amount of new groundwater withdrawals or must show no net increase in groundwater use if the existing groundwater use exceeds that allocation.

The Project is located in the Napa Valley Floor groundwater area which is allocated 0.3 acre-feet per acre per year of new groundwater withdrawals. One acre-foot is equivalent to 325,851 gallons. Because the Noble House Hotel will repurpose previously permitted groundwater extraction, the 140-acre parcel will demonstrate a net water usage not exceeding 13.7 MGY (37,500 GPD) for no net increase in groundwater use.

4.0 WASTEWATER

The wastewater generated by the Project is calculated as 100% of the in-building water demand. That Project wastewater flow is projected as 15,900 GPD (see Table 1, excluding demand for cooling, pools, and irrigation).

Existing wastewater flows from Krug have been measured and noted as 2.2 MGY (6,030 GPD on average) of process water and 3,630 GPD of domestic water. Daily process wastewater rates vary with the winery production cycle. For the purposes of this analysis a daily average is used. This combined daily water use equates to Krug's wastewater generation for a total Krug wastewater flow of 9,700 GPD.

Under current State and County code, domestic wastewater generated onsite from sinks, showers, toilet flushing, and winery process water can be treated to high quality, tertiary standards onsite with a packaged treatment system operated

by the facility. A new package plant sized for both Project and Krug wastewater flows of 25,500 GPD will be provided in the form of a membrane bioreactor (MBR) or similar system, providing tertiary level water quality treatment. The reclaimed water yielded from this process is typically 80% of the wastewater influent due to filtration efficiencies. This yields 20,400 GPD of total reclaimed water – 12,700 GPD from the project and 7,700 GPD from Krug. This high-quality effluent will be reused for non-potable demands within the Project, consisting of outdoor drip or spray irrigation and indoor flush fixtures. Excess treated water will be available for the Krug Winery, which anticipates conducting upgrades to their process area plumbing systems to use reclaimed water for washdown and tank cleaning or application to vineyards in keeping with State and County requirements to return to the aquifer.

With the use of onsite treatment, no connection to the public sewer system is anticipated. As such, the Project will not burden the municipal treatment system, which has limited capacity for additional flows.

5.0 WATER REUSE

As described in Sections 3.0 and 4.0 above, the Project will neither connect to the public potable water distribution system nor to the public sewer system. This approach naturally leads to an onsite water reuse scheme as described herein.

5.1 Reclaimed Water

In an effort to responsibly manage water resources, the Project will provide onsite treatment and reuse of reclaimed wastewater for non-potable demands. The Project will partner with the existing Krug Winery to improve water usage at a larger, parcel-based scale to increase the benefits of onsite reclaimed water. See Figure 2, below, for a Project Water Reuse Flowchart.

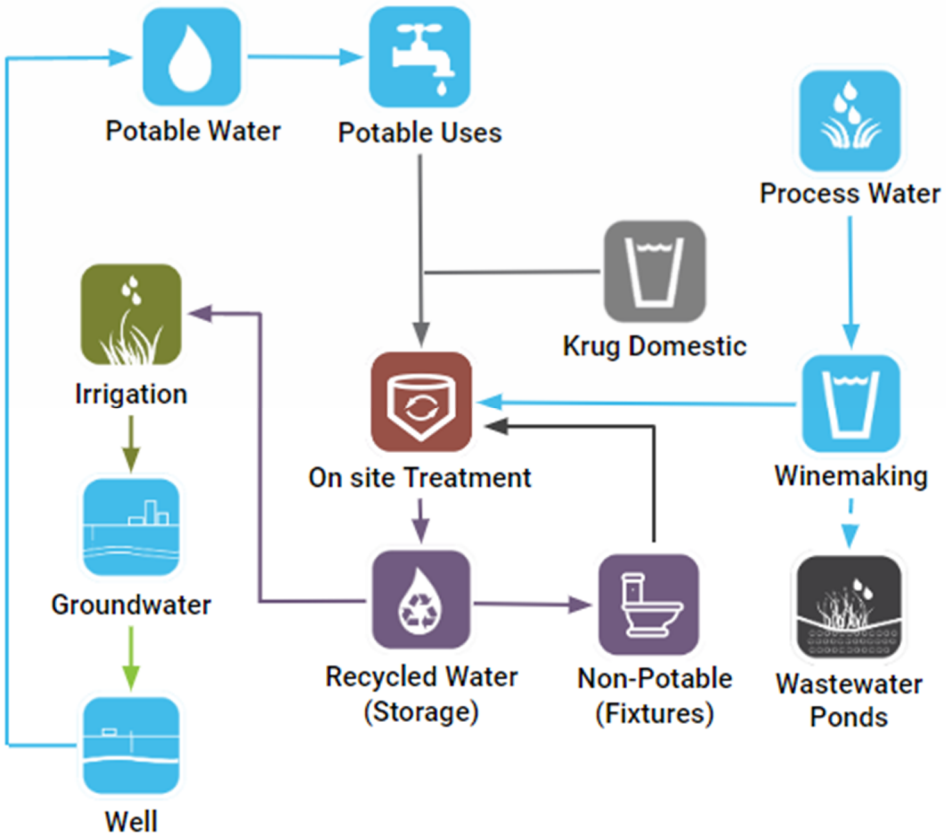


Figure 2. Project Water Reuse Flowchart

The Project potable and non-potable water demands less the reclaimed water available yields a groundwater extraction per Table 2, below.

Table 2. Net Project Water Use

Project Potable Water Demand	+ 15,000 GPD
Project Non-Potable Water Demand	+ 20,200 GPD
(Project Reclaimed Water)	- 12,700 GPD
(Krug Reclaimed Water)	- 7,700 GPD
Net Project Water Use	**14,800 GPD**

The 14,800 GPD net project water use will be offset through Krug Winery operational changes to reduce overall water use. Due to the Project placement partially within existing vineyards and their subsequent removal, decreased vineyard irrigation will provide a substantial reduction in water use. The exact means of achieving these savings requires input by the Krug Winery Vineyard Manager, however will achieve a minimum of the 14,800 GPD savings required to demonstrate an adequate offset in groundwater extraction. Additional savings may be realized through retrofits to Krug's plumbing and process operations which enables reclaimed water to be used for process water or applied to vineyards.

5.2 Extraction Rates

The water reuse scheme proposed also allows the Project to demonstrate no net increase in acceptable use. As calculated in Section 3.2, an allowable water supply of 37,500 GPD is granted to the Project parcel.

Taking into account the various uses that will draw from this allowance, the groundwater extraction allowance will be in excess of the groundwater demands as shown in Table 3. Irrigation and process water uses both have seasonal variations, however, an average daily rate is reported for consistency. Additionally, although Krug connects to the City municipal potable system for their domestic use, it is included below to reflect a conservative burden on the regional groundwater resources.

Table 3. Groundwater Extraction Allowance Minus Demands on Groundwater

Groundwater Extraction Allowance	- 37,500 GPD
Net Project Water Demands	+ 14,760 GPD
Krug Domestic Demands	+ 3,630 GPD
Krug Process Demands	+ 6,030 GPD
Krug Irrigation Demands	+ 5,891 GPD
Net Acceptable Use	**- 7,200 GPD**

5.3 Net Water Use Change

On a net parcel scale, the Project will increase water use from existing conditions. The Krug Winery's current average daily water usage rate is 15,500 GPD. With a proposed final conditions that include Krug, Project, and water reuse, the future average daily water usage rate is 30,300 GPD. This yields a net increase of 14,700 GPD across the 140-acre parcel.

6.0 WATER STORAGE

Water for potable, non-potable, and fire protection systems will be stored on-site per code requirements and project demands. Given the flat nature of the site, water will be pressurized as required to serve each system.

As discussed in Section 9.0, the project will import fill soil to bring the development out of the floodplain. To minimize the fill required and effectively screen the infrastructure underpinnings, it is anticipated that much of the storage for recycled water may occur below grade with other basement facilities.

7.0 FIRE ACCESS AND CIRCULATION

7.1 Circulation

Primary vehicular access to the hotel is planned off of Deer Park Road, requiring no modifications in the Highway 29 Caltrans Right-of-Way (ROW). It is anticipated that hotel guests may also arrive via the Wine Train, decreasing trip demands on Hwy 29 and Silverado Trail. The 50-foot-wide Wine Train ROW is not anticipated to require any modifications.

The primary project entrance will use an existing driveway connection to Deer Park Road which will be expanded to meeting City/County requirements for geometry and site distance. The existing drainage crossing will be assessed and improved if required through the appropriate governing agencies. Secondary project access will use an existing 20-foot-wide driveway connection from Krug to Highway 29.

Internal Emergency Vehicle Access (EVA) circulation through the site will be provided in accordance with the St. Helena Municipal Code Title 15, which has adopted the 2019 California Fire Code, and the Napa County Fire Marshal Office in conjunction with the California Department of Forestry & Fire Protection (CalFire). Two-way roads will be a minimum of 20-ft wide with 50-ft internal radii and 13'-6" unobstructed vertical clearance, as shown in Figure 4. One-way and dead-end roads will not exceed half a mile in length, and turnouts and turnarounds will be provided in accordance with CalFire. EVA roads will not exceed 16% longitudinal grades. Fire hydrants will be provided in accordance with the California Fire Code.

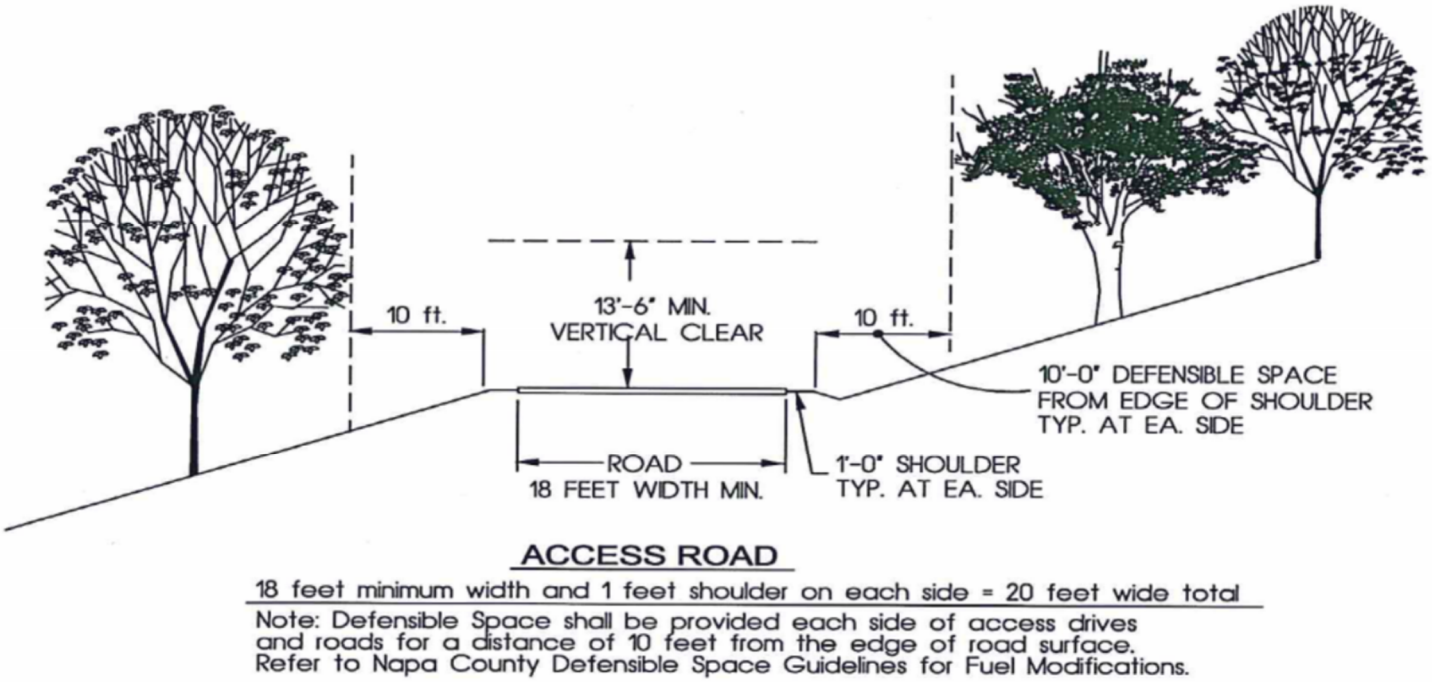


Figure 3. Conceptual road section from the CalFire and Napa County Fire Marshal Office *Commercial Guidelines* depicting the minimum required road width, vertical clearance, and defensible space for two-way access roads.

Secondary circulation is anticipated for non-EVA purposes to support guest golf-cart use after checking personal vehicles with valet, pedestrian trails, etc.

Section 5 of the St. Helena General Plan Update 2040 calls for a Class II bicycle pathway along Highway 29. The Project anticipates contributing to this trail as part of development.

7.2 Fire Suppression

Because the Project does not intend to connect to the City water distribution network, firewater storage will be provided via tanks onsite. Storage will be provided in accordance with California Fire Code 2019, Appendix B, Section B105.1, *Fire-Flow Requirements for Buildings*[1] based on the construction type and square footage. Krug's existing parcel includes two fire hydrants due west of the Project at the existing Winery facilities. An additional hydrant is located in the ROW at the intersection of Highway 29 and Deer Park. Although not proposed as new by the Project, these three existing hydrants will provide additional protection.

Due to the relatively flat topography of the site, pumps are anticipated to be required to provide adequate pressure and flow to extinguish fires and will be engineered in tandem with the storage tanks per code requirements.

A firewater suppression system will be constructed with distribution lines from the storage tanks, hydrants, fire department connections, and interior building sprinklers. Hydrant spacing will accommodate 150 ft hose-pull lengths for full building coverage, with EVA access as outlined in Section 5.1, above. See Appendix C Utility Plan for schematic layout depicting tank storage and water line distribution.

8.0 STORMWATER MANAGEMENT

Stormwater management for the site will be provided in accordance with the Bay Area Stormwater Management Agencies Association (BASMAA) requirements. BASMAA provides guidance for low-impact development in implementing Provision E.12 of the Phase II Small Municipal Separate Storm Sewer System (MS4) General Permit which applies to Napa County and St Helena. Code seeks to limit post-construction runoff to pre-construction rates for the 10-year storm event. Treatment measures will include collecting runoff from building roofs and impervious pavements and routing to localized bioretention facilities.

Utilizing a landscape based approach to stormwater management, a minimum of 4% of the site's impervious areas will be required as bioretention facilities, as shown in Figure 4. These engineered landscape interventions accept stormwater runoff and percolate water through their soil, removing contaminants and allowing runoff to return to the water table. Coordination with the landscape architect will ensure these facilities are thoughtfully integrated into the site with appropriate plantings to withstand wet and dry conditions.

[1] https://codes.iccsafe.org/s/CFC2019P4/part-vii-appendices/CFC2019P4-Pt07-AppxB-SecB105

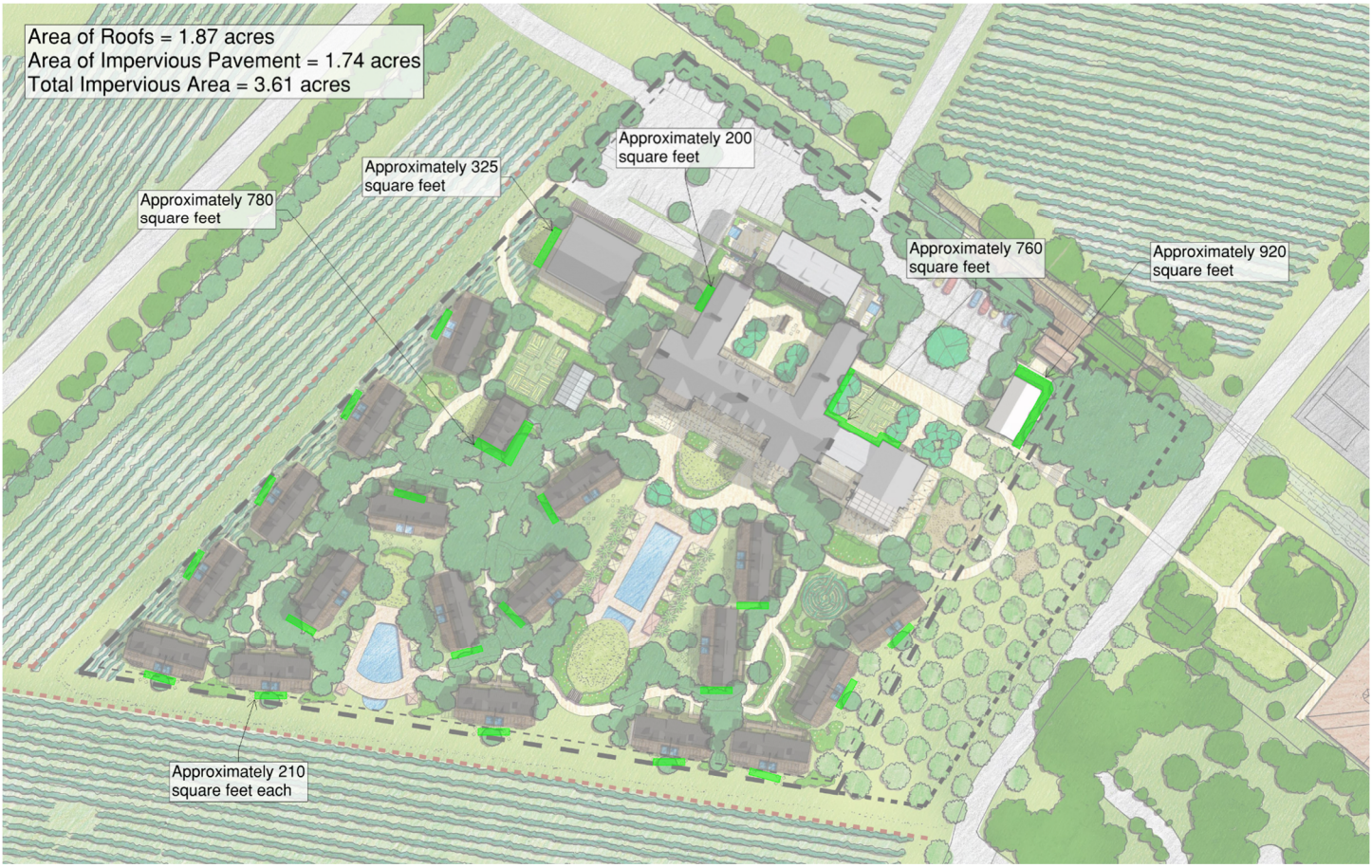


Figure 4. Stormwater management plan depicting roof and pavement impervious areas with distributed bioretention facilities for treatment.

9.0 GRADING AND FEMA REQUIREMENTS

9.1 Existing Site Topography

The existing site is relatively low-lying and flat, typical for the Valley Floor. New topographic and boundary survey documentation is currently underway by a licensed surveyor. Prior to receipt of this survey, topographic data based on a local benchmark from 2002-2008 was able to be converted into the North American Vertical Datum of 1988 (NAVD88) for project ordinance level planning. The site elevations range from approximately 228 feet to 234 feet in the footprint of future Hotel development, with an existing elevation of 229 feet at the future entrance to the site (see Architectural Plans). The site has relatively high groundwater with an average depth of less than 5 feet to the water table (see Appendix D for USGS Soil Map and Resource Report), consistent with the nearby Napa River.

9.2 FEMA Floodplain

The Project falls within Zone AE of the Federal Emergency Management Association (FEMA) floodplain mapping (see Appendix E for FEMA Flood Insurance Rate Map (FIRM)), with a small wedge at the northern corner falling within the Floodway. Project development will remain outside of the floodway. Base Flood Elevation (BFE) for the site varies along the length of the Napa River, with mapped BFEs of 234 feet and 235 feet crossing the site as the river flows eastward.

The City of St Helena Municipal Code Section 15.52.150 calls for non-residential new construction projects to accommodate a Design Flood Elevation (DFE) of 18 inches above the BFE. The Project will conservatively assign a BFE of 234.5 feet to the buildings, yielding a DFE of 236 feet. Any building structure below this elevation will be watertight with walls substantially impermeable to the passage of water, having structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy, and be certified by a registered civil engineer.

9.3 Proposed Site Grading

To accommodate the FEMA Floodplain Development requirements while minimizing site fill and keeping with the character of the neighborhood, gentle berming of the site is proposed. The grading strategy will gradually raise grades beginning at the north edge of the development of 229 feet, adjacent to the Wine Train end-of-line, and increasing as it heads south. To minimize excavation into the groundwater table, the Estate House basement level will be set at existing grade of approximately 231 feet. The partial basement will be backfilled to support the new Level 1 arrival level at 241 feet, well above the DFE of 236 feet as described in Section 7.2, above. See Figure 5 for a schematic section showing Napa River at the left and the new Estate house at the right, with regulatory and proposed elevations marked.

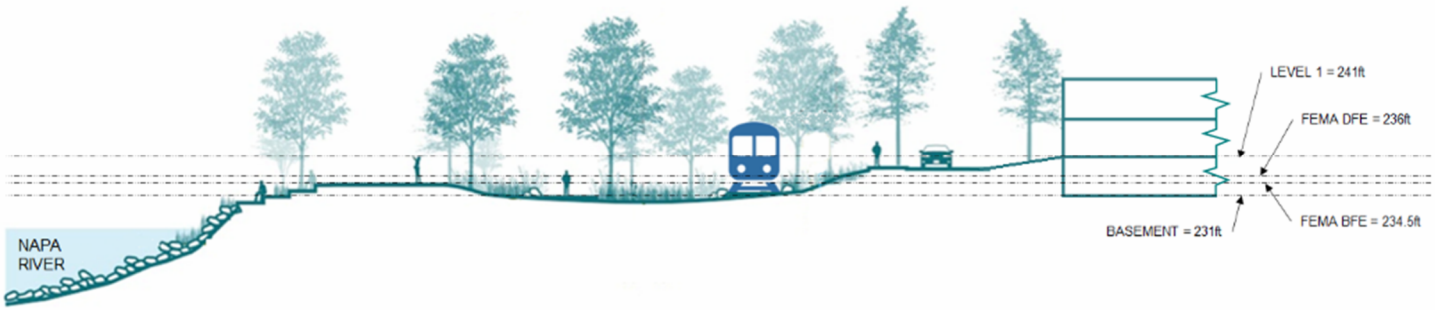


Figure 5. Site section showing proposed grading to bring the project above the FEMA DFE.

Portions of structure which fall below 236 feet, such as the basement level provided in the main Estate House and the below grade portions of the Event Barn, will be waterproofed in accordance with code.

South of the Estate House, the proposed site elevations will slowly decrease back down to existing grades. This will be accomplished through terraced or sloped landscaping to minimize the need for engineered retaining walls, while still matching existing grade as closely as possible to minimize import soils.

Preliminary earthwork calculations show an estimated 16,700 cubic yards (CY) of import soil will be required to meet this site grading scheme and bring the occupied building floors out of the floodplain. Assuming an average truckload of 12 CY, the import operations will require 1,392 trucks coming to site. Thoughtful site grading which seeks to minimize impact while keeping development safe from flood risk, providing ADA access, and maintaining and protecting viewsheds will strive to decrease this number as design progresses. Additional mitigation of this transportation need may be provided through use of the rail already serving the site. Future feasibility studies will be conducted to determine what decrease to the truck trips might be realized.

Appendices:

- Appendix A - Water Usage Calculations
- Appendix B - Well Information and Reports
- Appendix C - Utility Plan
- Appendix D - USGS Soil Map and Resource Report
- Appendix E - FEMA Flood Insurance Rate Map (FIRM)

APPENDIX A:
WATER USAGE CALCULATIONS

Table 1. Number of Keys and Beds

Key Type	Villa	2nd Floor Villa	Estate House Suite	Estate House Junior Suite	Estate House Room	Train Car	**TOTAL**
Number of Keys	36	6	4	1	7	2	**56**
Beds per Key	1	2	1	1	1	1	
Total Beds	**36**	**12**	**4**	**1**	**7**	**2**	**62**

Table 2. Total Water Use for Guest Rooms

Fixture	**Number of Beds**	**People per Bed**	**Flow**	**Unit**	**Duration (min)**	**Daily uses per Person**	**Total water use (gal/day)**
Toilet	62	2	1.28	gal	N/A	7	1,111
Lavatory Faucet	62	2	0.8	gpm	1	7	694
Showerhead	62	2	1.5	gpm	10	1	1,860
Tub Faucet	62	2	30	gal	N/A	0.5	1,860
Subtotal							**5,525**

Table 3. Total Water Use for Employees

Fixture	**Number of Employees (FTE)***	**Flow**	**Unit**	**Duration (min)**	**Daily uses per Person**	**Total water use (gal/day)**
Toilet	112	1.28	gal	N/A	5	717
Lavatory Faucet	112	0.8	gpm	1	5	448
Subtotal						**1,165**

*Full-time Equivalent (FTE) number of employees is based on a ratio of 2 employees per key.

Table 4. Total Water Use for Multi-Purpose

Meal	Percentage of Keys Dining	Average Number of Covers per Day	Water Usage (gal) per Meal with Multiuse Utensils	Water Usage (gal) per Short-Order Meal	Water Usage (gal) per Sit-Down Meal	Water Use per Cover (gal)	Total Water Use (gal/day)
Buffet Breakfast	100%	56	5	8	N/A	13	728
Chef's Table	100%	56	5	N/A	10	15	840
Room/Pool Service	100%	56	5	8	N/A	13	728
Culinary Classes	50%	28	5	8	N/A	13	364
Subtotal							**2,660**

*Multi-purpose includes the Event Barn, on-site restaurant, breakfast buffet, area for cooking classes, retail spaces, bar, lounge areas, meeting rooms, and administrative areas.

Table 5. Total Water Use for Laundry

Number of Beds	lbs of Laundry per Bed per Day	Percentage of Laundry Done Onsite	Water Use (gal) per lb of Laundry	Total Water Use (gal/day)
62	15	100%	3.0	2,790
Subtotal				**2,790**

Table 6. Total Water Use for Cooling

Beds*	Number of Cooling Degree Days per Year	Number of Cooling Degree Days per Day	Water Usage (gal) per Cooling Degree Day per Bed	Total Water Use (gal/day)
12	652	1.79	5.6	120
Sq Ft		**Gal/Day/SF**		**Total Water Use (gal/day)**
47,048.12		0.01		638
Factor of Safety				2
Subtotal				**1,515**

*Only beds in the estate house will use water for evaporative cooling.

Table 7. Total Water Use for Fitness/Spa

Users per Day*	**Water Use per Person (gal)**	**Total Water Use (gal/day)**
124	30	3,720
Subtotal		**3,720**

*Fitness/spa users per day is based on three-quarters of maximum occupancy.

Table 8. Total Water Use for Pools

Number of Pools*	**Acre-feet per Year per Pool**	**Total Acre-feet per Year**	**Gallons per Year**	**Gallons per Day**
43	0.05	2.15	700,515	1,919
Subtotal				**1,919**

*All pools are considered regardless of size. 100% of pools are assumed to be covered.

Table 9. Total Water Use for Irrigation

Reference Evapotranspiration Rate (in/year)	**Area (sq ft)***	**Total Annual Precipitation (in/year)**	**Effective Precipitation (in/year)**	**Total MGY****	**Total Gallons per Day**
44.1	264,402	35	8.75	5.80	15,879
Subtotal					**15,879**

*Assuming 100% of the landscaped area qualifies as Special Landscape Area due to the reuse of water.
**Calculated using the Model Water Efficient Landscape Ordinance “Water Budget Workbook for New and Rehabilitated Non-Residential Landscapes”, dated June 13, 2017, from the California Department of Water Resources.

Table 10. Compilation of Total Water Use for all Programming

Water Usage Type	**Water Use (gal/day)**	**Potable Water (GPD)**	**Non-Potable Water (GPD)**
Guest Rooms	5,525	5,525	0
Employees	1,165	1,165	0
Multipurpose*	2,660	2,660	0
Laundry	2,790	-	2,790
Cooling	1,515	-	1,515
Fitness/Spa	3,720	3,720	-
Pools	1,919	1,919	-
Irrigation	15,879	-	15,879
TOTAL	**36,339**	**15,930**	**20,409**

*Multipurpose includes the Event Barn, on-site restaurant, breakfast buffet, area for cooking classes, retail spaces, bar, lounge areas, meeting rooms, and administrative areas.

Table 11. Total Groundwater Extraction Allowance

Area (acres)	**Groundwater Extraction Allowance (acre-feet per acre)***	**Total Groundwater Extraction Allowance (MGY)**	**Total Groundwater Extraction Allowance (GPD)**
140	0.3	13.7	37,500

*Allowable groundwater extraction in acre-feet per acre is per the Napa County Engineering & Conservation Division Water Availability Analysis, Phase I Study, Attachment A: Estimated Water Use Guidelines.

Table 12. Krug Wastewater

Type	**MGY**	**GPD**
Process	2.2	6,027
Domestic	1.3	3,630
TOTAL	**3.5**	**9,657**

*Annual usage as provided by Krug Winery. Process water experiences significant seasonal variation, however is reported as an average daily for simplicity.

Table 13. Reclaimed Water

Source	Wastewater Flow* (GPD)	Reclaimed Percentage	Reclaimed Flow (GPD)
Project	15,860	80%	12,688
Krug	9,657	80%	7,726
TOTAL	**25,518**		**20,414**

*Assumed to be 100% of Water Demand minus irrigation.

Table 14. Net Project Water Use

Demand Type	GPD
Project Potable Water	+ 14,989
Project Non-Potable Water	+ 20,184
(Project Reclaimed Water)	- 12,688
(Krug Reclaimed Water)	- 7,726
Net Project Water Use	**14,759**

Table 15. Groundwater Extraction Allowance Minus Demands on Groundwater

Total Groundwater Extraction Allowance (GPD)	Net Project Water Use (GPD)	Krug Domestic Use (GPD)	Krug Process Use (GPD)	Krug Irrigation Use (GPD)	Groundwater Extraction Allowance Minus Demands (GPD)
37,495	14,759	3,630	6,027	5,891	7,187

APPENDIX B:
WELL INFORMATION AND REPORTS

Redacted

APPENDIX C:
UTILITY PLAN

Domestic/Fire Water
Recycled Water
Wastewater

Well Connection

Fire Suppression Tanks

Membrane Bioreactor (MBR)
Located in basement

ARCHITECTS | VITA PLANNING | LANDSCAPE ARCHITECTURE | ARCHITECTURE | SHERWOOD DESIGN ENGINEERS | TLEE SPAS + WELLNESS

APPENDIX E - UTILITY PLAN

1"= 40' 0 20 40 80

APPENDIX D:
USGS SOIL MAP AND RESOURCE REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Napa County, California



December 16, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Napa County, California
Survey Area Data: Version 15, Sep 1, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2022—Apr 25, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	Bale clay loam, 0 to 2 percent slopes	15.9	76.7%
118	Cole silt loam, 0 to 2 percent slopes, MLRA 14	0.8	3.9%
170	Pleasanton loam, 0 to 2 percent slopes, MLRA 14	4.0	19.4%
Totals for Area of Interest		**20.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Napa County, California

104—Bale clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hdk4
Elevation: 20 to 400 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 220 to 270 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Bale and similar soils: 85 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bale

Setting

Landform: Flood plains, alluvial fans
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from rhyolite and/or alluvium derived from igneous rock

Typical profile

H1 - 0 to 24 inches: clay loam
H2 - 24 to 60 inches: stratified gravelly sandy loam to loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Rare
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B
Ecological site: R014XG907CA - Loamy Bottom
Hydric soil rating: No

Minor Components

Clear lake

Percent of map unit: 3 percent

Landform: Depressions
Hydric soil rating: Yes

118—Cole silt loam, 0 to 2 percent slopes, MLRA 14

Map Unit Setting

National map unit symbol: 2xc92
Elevation: 20 to 420 feet
Mean annual precipitation: 24 to 43 inches
Mean annual air temperature: 58 to 61 degrees F
Frost-free period: 296 to 319 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Cole and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cole

Setting

Landform: Alluvial fans, flood-plain steps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Alluvium derived from volcanic and sedimentary rock

Typical profile

Ap - 0 to 8 inches: silt loam
BAt - 8 to 18 inches: silty clay loam
Bt1 - 18 to 32 inches: silty clay loam
Bt2 - 32 to 41 inches: silty clay loam
Bt3 - 41 to 48 inches: clay loam
Bt4 - 48 to 60 inches: clay
BCt - 60 to 64 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 60 inches
Frequency of flooding: RareNone
Frequency of ponding: Rare
Maximum salinity: Nonsaline (0.2 to 0.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: R014XG918CA - Loamy Fan
Hydric soil rating: No

Minor Components

Bale

Percent of map unit: 4 percent

Cortina

Percent of map unit: 4 percent

Yolo

Percent of map unit: 4 percent

Clear lake

Percent of map unit: 3 percent
Landform: Basin floors
Hydric soil rating: Yes

170—Pleasanton loam, 0 to 2 percent slopes, MLRA 14

Map Unit Setting

National map unit symbol: 2x52s
Elevation: 60 to 2,070 feet
Mean annual precipitation: 19 to 44 inches
Mean annual air temperature: 58 to 60 degrees F
Frost-free period: 240 to 320 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pleasanton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pleasanton

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

Ap - 0 to 5 inches: loam
A - 5 to 18 inches: loam
Bt1 - 18 to 23 inches: clay loam

Bt2 - 23 to 44 inches: fine gravelly clay loam
Bt3 - 44 to 66 inches: fine gravelly sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.0 mmhos/cm)
Sodium adsorption ratio, maximum: 2.0
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: C
Ecological site: R014XG918CA - Loamy Fan
Hydric soil rating: No

Minor Components

San ysidro

Percent of map unit: 3 percent
Landform: Valley floors, alluvial fans, terraces
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Arbuckle

Percent of map unit: 3 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hillgate

Percent of map unit: 3 percent
Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Yolo

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Cortina

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Water Features

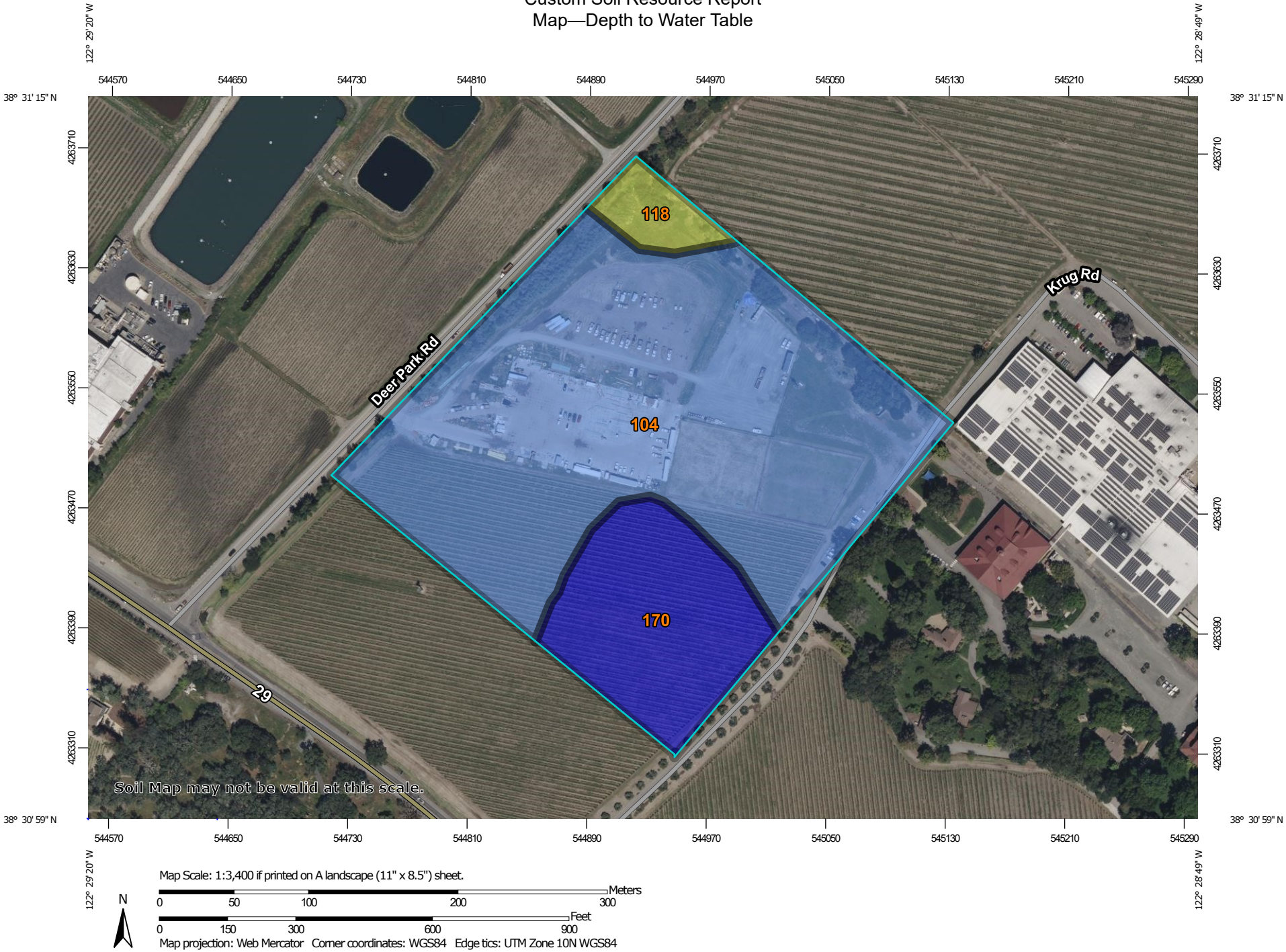
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Depth to Water Table



Map Scale: 1:3,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Napa County, California
Survey Area Data: Version 15, Sep 1, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 26, 2022—Apr 25, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
104	Bale clay loam, 0 to 2 percent slopes	153	15.9	76.7%
118	Cole silt loam, 0 to 2 percent slopes, MLRA 14	91	0.8	3.9%
170	Pleasanton loam, 0 to 2 percent slopes, MLRA 14	>200	4.0	19.4%
Totals for Area of Interest			**20.8**	**100.0%**

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Weighted Average

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Napa County, California			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
104—Bale clay loam, 0 to 2 percent slopes			
Bale	85	Low	B
118—Cole silt loam, 0 to 2 percent slopes, MLRA 14			
Cole	85	Low	C
170—Pleasanton loam, 0 to 2 percent slopes, MLRA 14			
Pleasanton	85	—	C

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APPENDIX E:
FEMA FLOOD INSURANCE RATE MAP (FIRM)

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was California State Plane II zone. The **horizontal datum** was NAD 83, GRS80. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Napa County Information Technology Services Department. This information was derived from digital orthophotos produced at a scale of 1:4,800 with 1-foot ground sample distance from photography dated April 2002.

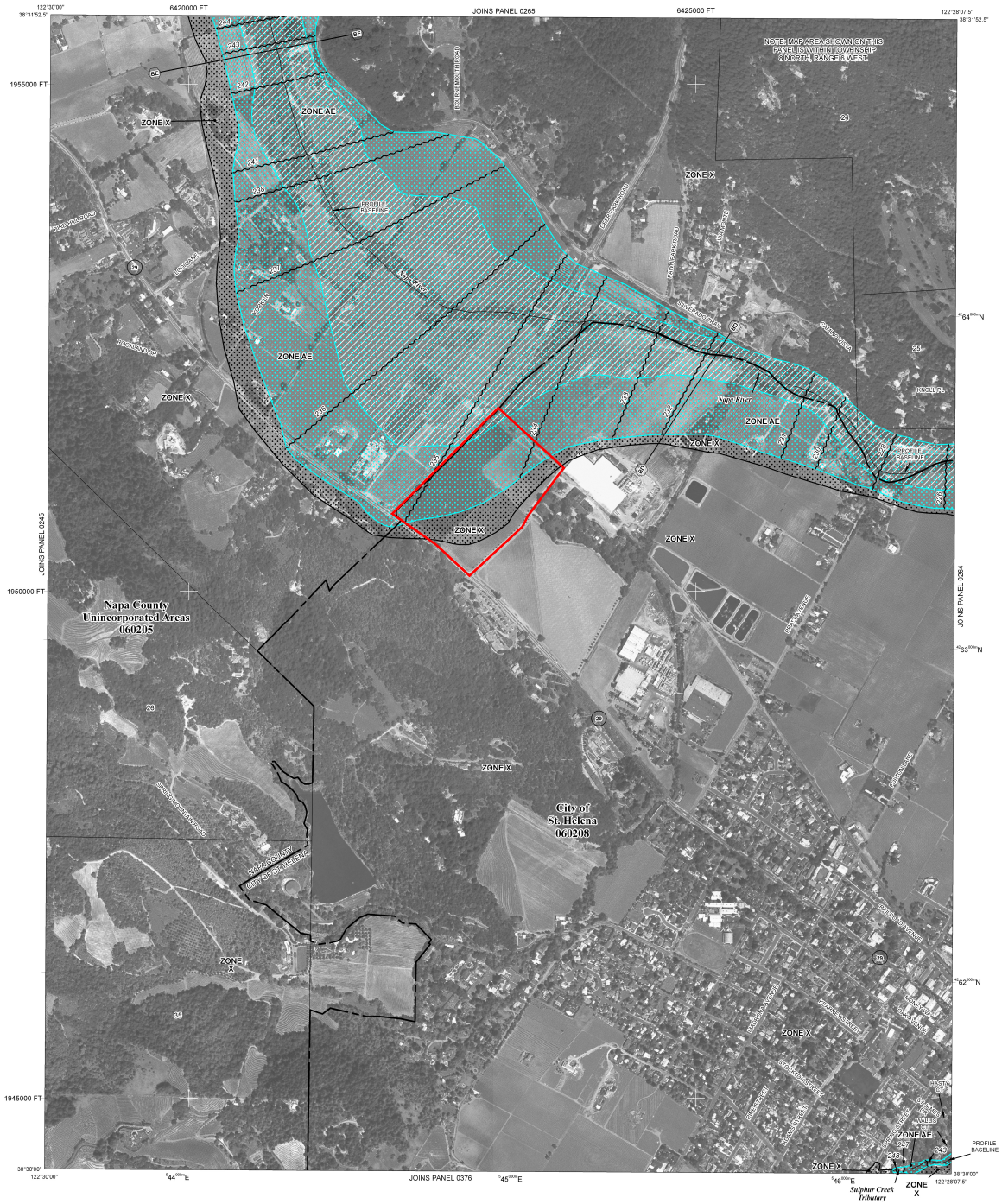
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

23 — 23 — Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

4376000mN — 1000-meter Universal Transverse Mercator grid values, zone 10

600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone II (FIPSZONE 0402), Lambert Conformal Conic projection

DX5510 X — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

Project Site

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
September 26, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0263E

FIRM

FLOOD INSURANCE RATE MAP

NAPA COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 263 OF 650

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NAPA COUNTY	060205	0263	E
ST. HELENA, CITY OF	060206	0263	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06055C0263E

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

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