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Water Availability Analysis
Duckhorn Vineyards Winery Major Modification
P19-00097-MOD

BARTELT ENGINEERING

TIER 1
WATER AVAILABILITY ANALYSIS FOR DUCKHORN VINEYARDS WINERY
1000 LODI LANE & 1098 LODI LANE, ST. HELENA, CA 94574
APNs 022-130-010 (SFAP) & 022-100-033 (SFAP)

As required by Napa County Planning, Building, and Environmental Services (PBES), this analysis outlines the existing and proposed water use for the expansion of an existing winery located at 1000 and 1098 Lodi Lane, St. Helena, CA 94574.

PROJECT DESCRIPTION

The 30.34± acre parcel is currently developed with an existing winery (fermentation buildings, barrel buildings, a hospitality building, and covered outdoor work areas), vineyards, access roads, parking lots, wells, agricultural buildings, and a residence. The existing winery is located on APN 022-130-010 (SFAP)[1], is 10.67± acres, and is planted with 4.06± acres of vineyard while the existing residence is on APN 022-100-033 (SFAP)[1], is 19.67± acres, and is planted with 10.15± acres of vineyard. The project proposes the demolition of four (4) winery buildings and the residence, construction of a new production facility and an addition to the existing hospitality building, and to increase the annual wine production. While the existing winery on APN 022-130-010 (SFAP) will remain and continue producing wine, the construction of a new production facility on APN 022-100-033 (SFAP) is proposed because it is the intent of this project to increase the total production capability from 160,000 to 300,000 gallons of wine per year. A reduction in vineyard area is anticipated as a result of the project. Refer to the Use Permit Drawings prepared by Bartelt Engineering for the details of the existing and proposed development conditions.

The approved number of 56 employees, which includes 45 full-time employees, five (5) part-time employees, and six (6) harvest/seasonal employees is proposed to remain constant; however, along with the proposed physical improvements and production increase described previously, the project proposes a modification to the winery's current visitation plan. The project proposes to increase both private tour and tasting without food and private tour and tasting with food appointments to a maximum number of 110 and 109 guests per day, respectively, with an average of 770 guests per week. The project also proposes to adjust the current marketing plan to offer 40 small private wine and food pairings each year for parties up to 25 guests with two (2) additional event staff and 200 small private tastings per year for groups of up to 20 guests. In addition, the marketing plan will be adjusted to accommodate 40 medium events per year for groups of up to 60 guests, one (1) auction event per year for groups of up to 250 guests, and three (3) large events per year for groups of up to 400 guests with additional staff for each event type of up to two (2), five (5), and eight (8), respectively.

[1] Separated for Assessment Purposes (SFAP).

EXHIBITS

The USGS "Topographic Site Location Information" exhibit shows the project site, approximate property line locations, and topographic features while information regarding existing structures and the wells on the parcel are shown on the Use Permit Drawings provided in the Use Permit Modification application package. A "Well Location Exhibit" is provided with this analysis that displays approximate parcel lines and the location of existing wells and structures on and around the subject parcel. All exhibits and drawings mentioned above were prepared by Bartelt Engineering.

WATER USE CRITERIA

TABLE 1: SCREENING CRITERIA	
Parcel Zoning	Agricultural Preserve (AP)
Project Parcel Location	Napa Valley Floor
Parcel Size	APN 022-130-010 (SFAP)[1] 10.67± acres APN 022-100-033 (SFAP)[1] 19.67± acres Combined 30.34± acres
Water Use Criteria (Pre-Executive Order)	1.0 acre-feet per acre per year
Water Use Criteria (Post-Executive Order)	0.3 acre-feet per acre per year
Well and Spring Interference	None Anticipated
Groundwater/Surface Water Interaction	None Anticipated
Screening Tier	Tier 1

As summarized in Table 1, the subject parcel is located within the Agricultural Preserve (AP) Zoning District on the Napa Valley Floor. Per the PBES Water Availability Analysis (WAA)-Guidance Document dated May 12, 2015, the water use criteria for a parcel located in the Napa Valley Floor and/or All Other Areas that are not designated as a groundwater deficient area without any well or spring interference must follow Tier 1 requirements. Furthermore, a Tier 2 well interference analysis need only be conducted when "substantial evidence in the record indicates the need to do so under California Environmental Quality Act (CEQA)."[2]. At the request of Napa County Planning, Building, and Environmental Services Division, a Tier 2 and Tier 3 Water Availability Analysis was prepared by Wagner & Bonsignore and has subsequently been submitted to Napa County.

[1] Separated for Assessment Purposes (SFAP).
[2] From Table 2A from the Napa County *Water Availability (WAA) - Design, Construction and Guidance Document.*

SOURCE WATER INFORMATION

There are five (5) existing onsite wells maintained on the Duckhorn Vineyards Winery parcel. A description of each water source is summarized below:

- Water Well "Domestic Well #1" (Public Water System ID# CA2800024) is the well for domestic water use. "Domestic Well #1" is located on APN 022-130-010 (SFAP) north of Chai 7.
- Water "Well #4" is the primary well for irrigation water use on APN 022-130-010 (SFAP). "Well #4" is in the southwest corner of APN 022-130-010 (SFAP) near Lodi Lane.
- Water "Well #1" and "Well #3" are currently out of service and are planned to be destroyed under the proposed project. These two (2) wells are located on APN 022-100-033 (SFAP) east of the existing pond and approximately in the middle of the parcel.
- Water "Well #2" is currently used for domestic (residential) water use and vineyard irrigation on APN 022-100-033 (SFAP). This well is located on APN 022-100-033 (SFAP) and in-between "Well #1" and "Well #3".

Refer to the Technical, Managerial, and Financial (TMF) Capacity worksheet for additional information on the existing public water system (PWS) and proposed modifications included with the Use Permit Modification Application.

Well Description

According to the Well Completion Report (No. 462651) signed and dated on January 1, 1995, Pulliam Well Drilling completed "Domestic Well #1" on December 12, 1994. "Domestic Well #1" is reported to be constructed of five (5) inch diameter 200 gage plastic pipe to a completed depth of 460 feet with a 56 foot grout annular seal. Refer to the attached Water Completion Report for more information. Under the proposed conditions, "Domestic Well #1" will continue to supply water to the public water system.

According to the Water Well Drillers Report (No. 122286) dated June 17, 1975, work was completed on "Well #4" on June 16, 1975. "Well #4" is reported to be constructed of eight (8) inch diameter 250 gage steel pipe to a completed depth of 200 feet with a 20 foot grout annular seal. Refer to the attached Water Well Drillers Report for more information. Under the proposed conditions, "Well #4" will continue to supply water to the landscaping and vineyards on APN 022-130-010 (SFAP).

Three (3) Applications & Permits to Construct a Water Well were obtained for "Well #1", "Well #2", and 'Well #3" drilled on APN 022-100-033 (SFAP) but it is unclear at this time which report is associated with which well. The documents show that all three (3) wells were drilled within a three month period but do not provide enough information to discern one well from another. It is not proposed that any of these wells will supply water to the PWS. Refer to the attached Water Completion Reports for more information.

Well Yield Test

"Domestic Well #1" is rated at 115± gallons per minute (gpm), discharges to the potable water treatment equipment, and into a 32,000 combined domestic and fire water storage tank. Refer to the attached Water Well Drillers Report for more information.

"Well #2" supplies water to the existing residence, landscaping, and vineyards on APN 022-100-033 (SFAP). The existing residence is proposed to be demolished under the proposed project. "Well #2" will continue to supply water to the existing vineyards on APN 022-100-033 (SFAP).

"Well #4" currently supplies water to the existing landscaping and vineyards on APN 022-130-010 (SFAP). "Well #4" will remain as the exclusive source of irrigation water on APN 022-130-010 (SFAP).

The remaining two (2) existing wells, "Well #1" and "Well #3" located on APN 022-100-033 (SFAP) are currently out of service and are planned to be destroyed under the proposed project.

Water System Classification

The existing water system on APN 022-130-010 (SFAP) is permitted as a state regulated Public Water System (PWS)[3] that is classified as "noncommunity" because it does not serve 25 or more yearlong residents[4] with less than 15 service connections[5]. Furthermore, the water system is also classified as "non-transient" because is serves 25 or more of the same people at least six (6) month of the year. The water system classification of nontransient noncommunity water system (NTNCWS) will not change as part of this Use Permit Modification Application.

Based on staffing needs, all hospitality employees and some of the winery employees will continue to work at the existing winery on APN 022-130-010 (SFAP) with the remaining number of production employees working at the proposed production facility on APN 022-100-033 (SFAP). It is our understanding that the existing PWS will be expanded to include the proposed production facility on APN 022-100-033 (SFAP) and to provide domestic water to the facility via a directional bore under the Napa River.

Neighboring Water Source(s)

Based on a review of neighboring property records at Napa County PBES, an existing neighboring well located on APN 021-351-001 is located on the edge of a 500 foot radius relative to the project well. It is not anticipated that the project well will have any influence on the neighboring well.

Refer to the attached "Well Location Exhibit" prepared by Bartelt Engineering for the locations of the existing onsite and neighboring water well sources.

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[3] The public water system source code number is CA2800024; refer to the public water system permit for additional information

[4] A yearlong resident must be served by the water system for at least 183 day per year

[5] Service connection means the point of connection between the user's piping or constructed conveyance, and the water system's meter, service pipe, or constructed conveyance.

Water Quality

Water quality results were not available for the irrigation wells prior to completion of this WAA. Water quality results for the "Domestic Well #1" that provides water to the NTNCWS were not reviewed by Bartelt Engineering because it is assumed the water system complies with all Federal, State, and local laws governing public water systems. Annual Consumer Confidence Reports (CCRs) have been submitted to the State and/or County and can be reviewed by either contacting the California State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) District Office or the Local Primacy Agency (LPA), which in this case is the Napa County Environmental Health Division Consumer Protection Team.

GROUNDWATER SUBAREA

According to the Napa County Watershed Information & Conservation Council (WICC), the subject parcel is located within the Napa Valley Floor – Calistoga groundwater subarea which resides within the Napa River Watershed. The Calistoga groundwater subarea of the Napa Valley Floor consists of 8,950± acres.

WATERSHED INFORMATION

The subject parcel is located within the Upper St. Helena Reach of the Napa River Watershed which is not considered a municipal watershed or a water deficient area. The Napa River - Upper St. Helena Reach consists of 1,984± acres.

GEOLOGICAL FEATURES

According to the WICC Soil and Geology Map, the subject parcel and surrounding areas' geology appears to be Surficial Deposits. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Custom Soil Resource Report identifies the following (map unit symbol) soil names (103) Bale loam, 0-2 percent slopes, (104) Bale clay loam, 0-2 percent slopes, (140) Forward silt loam, 12-57 percent slopes, and (141) Forward-Kidd complex, 11-60 percent slopes, being present on and around the parcel.

WATER DEMAND

Estimated Water Usage

This project proposes to beneficially reuse treated winery process wastewater for vineyard irrigation and heat protection on parcel APN 022-100-033 (SFAP)[6]. This beneficial reuse would potentially reduce the proposed water demand by 4.65 ac-ft per year.

The total estimated water usage for the existing and proposed uses for the project is calculated based on the *Guidelines for Estimating Residential and Non-residential Water Use* from the WAA Guidance Document (2015) and are summarized in Table 2: Existing Water Demand and Table 3: Proposed Water Demand below.

[6] Refer to the Onsite Wastewater Dispersal Feasibility Study for Duckhorn Vineyards Winery prepared by Bartelt Engineering and submitted in conjunction with the Use Permit Modification application.

TABLE 2: EXISTING WATER DEMAND	
Category	**Estimated Water Usage (acre-feet/year)**
Primary Residence	0.75
Vineyard (15.67 ± acres)	7.84
Winery (Production and Hospitality)	5.45
Total Existing Demand =	14.04±

TABLE 3: PROPOSED WATER DEMAND	
Category	**Estimated Water Usage (acre-feet/year)**
Vineyards (12.12 ± acres)	4.19
Winery (Production and Hospitality)	9.81
Total Proposed Demand =	14.0±

As shown in Table 2 and Table 3, the proposed water demand is estimated to remain the same or be less than existing. Refer to attached Table I Existing Water Demand and Table III Proposed Water Demand-TPW Reuse for a detailed accounting of the existing and proposed water demand calculations.

Allowable Water Allotment (Pre-Executive Order)

Per *Table 2A: Water Use Criteria* from the WAA Guidance Document (2015), the water use criteria for a parcel located within the "Napa Valley Floor" area is defined as 1.0 acre-feet per acre per year. The allowable groundwater allotment based on Napa County Requirements for the subject parcel is calculated below.

Allowable Water Allotment (acre-feet per year)	=	Napa Valley Floor parcel area (acres)	x	Water Use Criteria (acre-feet per acre per year)
	=	32.34± acres	x	1.0 acre-feet per acre per year
	=	32.34± acre feet per year		

The allowable pre-executive order water allotment for the subject parcel is estimated to be 32.34± acre-feet per year.

Allowable Water Allotment (Post-Executive Order)

Post-Executive Order, the water use criteria for a parcel located within the "Napa Valley Floor" area is defined as 0.3 acre-feet per acre per year. The allowable groundwater allotment based on Napa County *Executive Order* for the subject parcel is calculated below.

Allowable Water Allotment (acre-feet per year)	=	Napa Valley Floor parcel area (acres)	x	Water Use Criteria (acre-feet per acre per year)
	=	32.34± acres	x	0.3 acre-feet per acre per year
	=	9.7± acre feet per year		

The allowable post-executive order water allotment for the subject parcel is estimated to be 9.7± acre-feet per year.

SUMMARY

The groundwater demand generated as a result of the proposed winery expansion, that includes an increase in production and marketing, is estimated to remain the same when the benefits of reusing treated process wastewater as irrigation and heat protection is utilized. The volume of groundwater used to satisfy irrigation demand for the onsite vineyards will decrease while the volume used to satisfy domestic water demand will increase. Vineyard irrigation will be sourced from the many existing onsite wells which have various reported yield rates in addition to utilizing beneficial reuse of reclaimed treated winery process wastewater. "Domestic Well #1" will supply the existing NTNCWS and satisfy the domestic water demands of the proposed uses at the existing production facility and hospitality (Estate House and addition) buildings and will be expanded to include APN 022-100-033 (SFAP) where the new production facility is proposed. The proposed project estimates water demand to be 14.0± acre-feet per year which is less than or equal to the existing water demand.

CONCLUSION

The preceding analysis shows that there is no net increase in groundwater demand from the proposed project and satisfies the Tier 1 Water Use Criterion of the Napa County Water Availability Analysis.

ATTACHMENTS

USGS Map

Well Location Exhibit

Table I – Existing Water Demand

Table III – Proposed Water Demand- TPW Reuse

(3) Application & Permits to Construct A Water Well

Water Well Drillers Report

Well Completion Report

REFERENCES

Luhdhorff & Scalmanini Consulting Engineers and MBK Engineers. January 2013. Updated Hydrogeological Conceptualization and Characterization of Conditions Prepared for Napa County.

Luhdhorff & Scalmanini Consulting Engineers. 2017, March. Napa County Comprehensive Groundwater Monitoring Program 2016 Annual Report and CASGEM Update. Prepared for Napa County.

Napa County. 2015, May 12. Water Availability Analysis (WAA) - Design, Construction and Guidance Document.

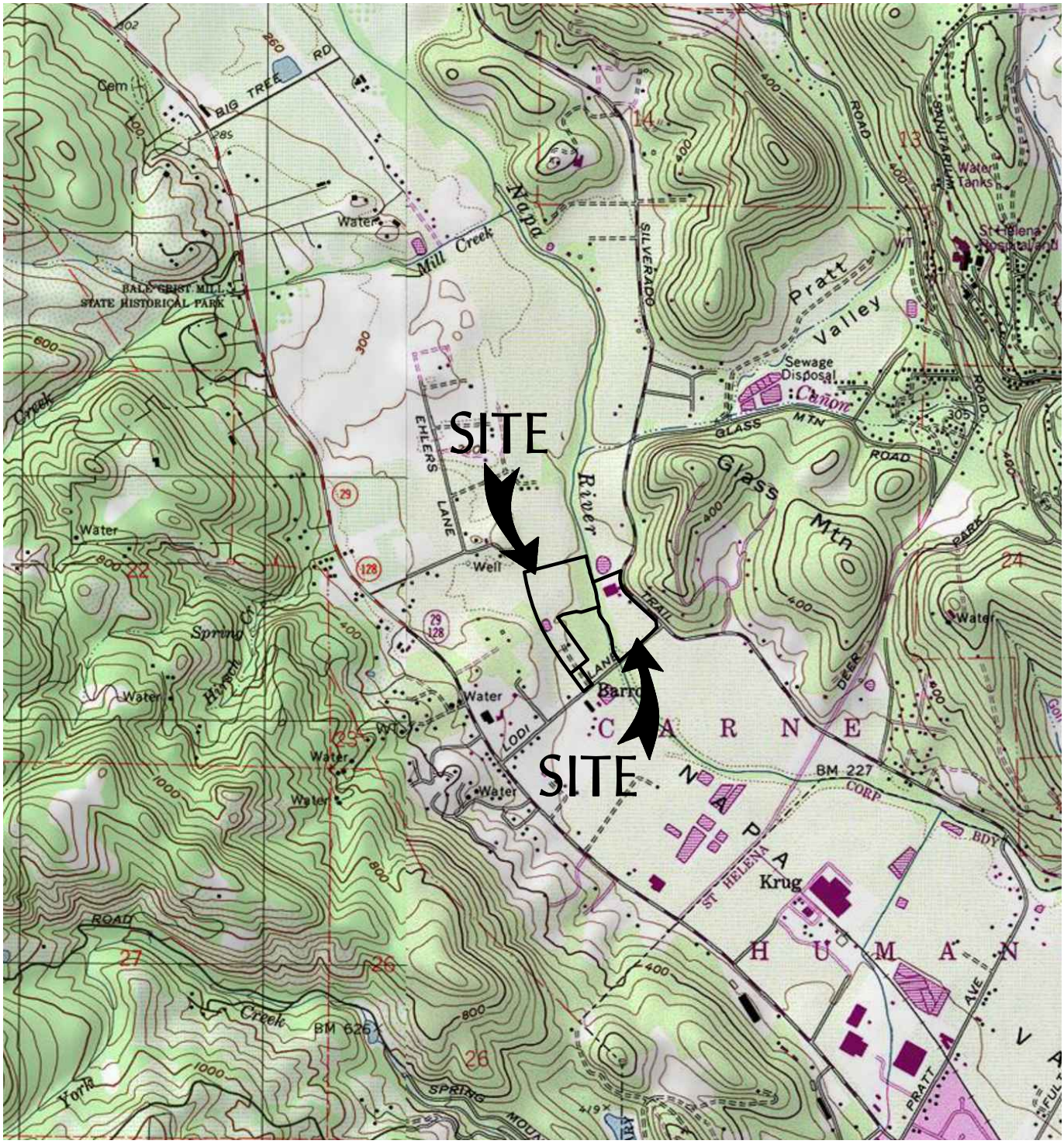
Napa County Watershed Information & Conservation Council (WICC). (n.d.). Retrieved from www.napawatershed.org

USDA NRCS Custom Soil Resource Report for Napa County, California Duckhorn Vineyards.

TOPOGRAPHIC SITE LOCATION INFORMATION

USGS 7.5 MINUTE QUADRANGLE "SAINT HELENA"

Scale: 1" = 2000'



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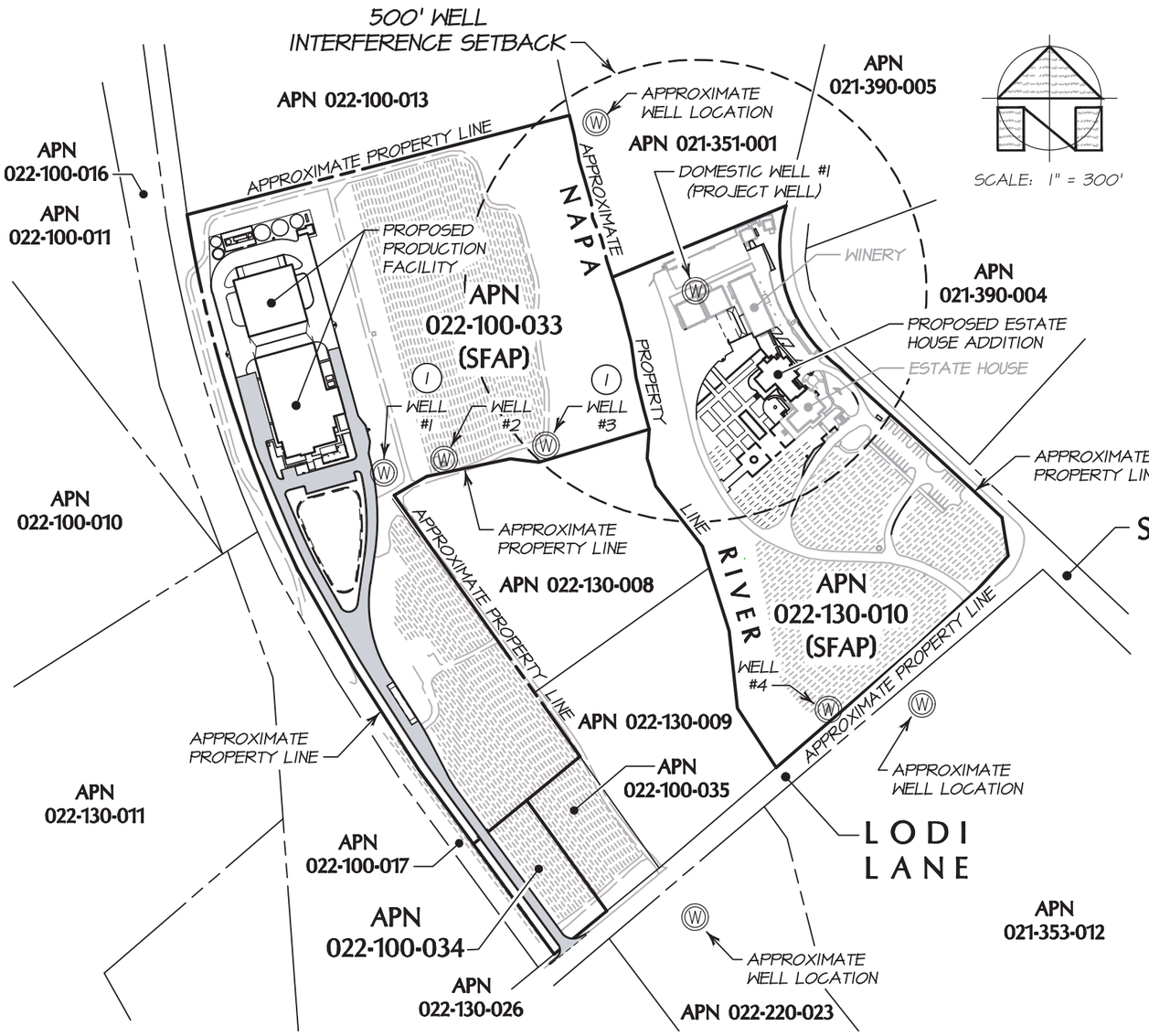
· Telephone: 707-258-1301 ·

Duckhorn Vineyards Winery
1000 & 1098 Lodi Lane
St. Helena, California
APNs 022-130-010, 022-100-033 & -034
Job No. 13-14



SCALE: 1" = 300'

WELL LOCATION EXHIBIT
PROPOSED CONDITIONS

SCALE: 1" = 300'

NO SCALE

LOCATION MAP

NO SCALE

NOTE:

(1) WELLS #1 AND #3 TO BE DESTROYED UNDER THE PROPOSED PROJECT.

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Duckhorn Vineyards Winery
1000 & 1098 Lodi Lane
St. Helena, CA 94574
APNs 022-130-010, 022-100-033 & -034
Job No. 1314
August 2022
Sheet 1 of 1

4/18/2022 - 1:51 PM, KellyP, S:\LAND PROJECTS\2013-2017\1314\2017 USE PERMIT\ACAD\EXHIBITS\1314-WELL.DWG

BARTELT ENGINEERING

TABLE I - EXISTING WATER DEMAND		
Description	**Water Usage Rate[1]**	**Water Demand (acre-feet/year)**
Residential		
Primary Residence	0.75 acre-feet/acre-year	0.75
Secondary Residence or Farm Labor Dwelling	acre-feet/acre-year	-
Agricultural		
Vineyards		
Irrigation Only	0.50 acre-feet/acre-year	7.84
Heat Protection	0.25 acre-feet/acre-year	0.00
Frost Protection	0.25 acre-feet/acre-year	0.00
Irrigated Pastures	4 acre-feet/acre-year	0.00
Orchards	4 acre-feet/acre-year	0.00
Livestock (sheep or cows)	0.01 acre-feet/acre-year	0.00
Winery		
Process Water	2.15 acre-feet/100,000 gallon of wine	3.44
Domestic & Landscaping	0.50 acre-feet/100,000 gallon of wine	0.80
Employees	15 gallons per shift	0.70
Tasting Room Visitation	3 gallons per visitor	0.27
Events and Marketing, with onsite catering	15 gallons per visitor/event staff	0.24
Industrial		
Food Processing	31.00 acre-feet/employee-year	0.00
Printing/Publishing	0.60 acre-feet/employee-year	0.00
Commercial		-
Office Space	0.01 acre-feet/employee-year	0.00
Warehouse	0.05 acre-feet/employee-year	0.00

Estimated Existing Water Demand (acre-feet/year): 14.04
Estimated Existing Water Demand (gallons/year): 4,574,948

1) Water usage rates referenced from *Appendix B: Estimated Water Use of Specified Land Use* from Napa County WAA-Guidance Document (2015) unless noted otherwise

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TABLE III - PROPOSED WATER DEMAND-TPW REUSE		
Description	**Water Usage Rate[1]**	**Water Demand (acre-feet/year)**
Residential		
Primary Residence	0.75 acre-feet/acre-year	0.00
Secondary Residence or Farm Labor Dwelling	acre-feet/acre-year	-
Agricultural		
Vineyards		
Irrigation Only[2]	0.50 acre-feet/acre-year	2.32
Heat Protection[2]	0.25 acre-feet/acre-year	1.87
Frost Protection	0.25 acre-feet/acre-year	0.00
Irrigated Pastures	4 acre-feet/acre-year	0.00
Orchards	4 acre-feet/acre-year	0.00
Livestock (sheep or cows)	0.01 acre-feet/acre-year	0.00
Winery		
Process Water	2.15 acre-feet/100,000 gallon of wine	6.45
Domestic & Landscaping	0.50 acre-feet/100,000 gallon of wine	1.50
Employees	15 gallons per shift	0.70
Tasting Room Visitation	3 gallons per visitor	0.74
Events and Marketing, with onsite catering	15 gallons per visitor/event staff	0.42
Industrial		
Food Processing	31.00 acre-feet/employee-year	0.00
Printing/Publishing	0.60 acre-feet/employee-year	0.00
Commercial		0.00
Office Space	0.01 acre-feet/employee-year	0.00
Warehouse	0.05 acre-feet/employee-year	0.00

Estimated Proposed Water Demand-TPW Reuse (acre-feet/year): 14.00
Estimated Proposed Water Demand-TPW Reuse (gallons/year): 4,561,914

1) Water usage rates referenced from *Appendix B: Estimated Water Use of Specified Land Use* from Napa County WAA-Guidance Document (2015)
2) Includes 4.65 ac-ft of Treated Process Wastewater (TPW) as irrigaiton and heat protection reuse reduction.

HEALTH DEPT. USE ONLY
FEE: 12.00
DATE: 6-5-74
RECEIPT NO: 1165
BY: Paula Mayer

A.P. # 22-100-14

RECEIVED
JUL 15 1974
DIVISION OF ENVIRONMENTAL HEALTH

NAPA COUNTY HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH

APPLICATION & PERMIT TO CONSTRUCT
A WATER WELL
(ORDINANCE #)

NAME [redacted] (Owner) ADDRESS [redacted] (Job Location) DATE 6-5-74

NAME Hoshier & Gregory (Well Driller) ADDRESS Napa Valley Hwy.

TYPE OF WORK
NEW WELL ✓ RECONDITIONING ___ DEEPENING ___
TEST HOLES ___ DESTROYING ___ OTHER ___
TYPE I PERMIT ✓ TYPE II PERMIT ___ FEE ___

PROPOSED USE
DOMESTIC ___ IRRIGATION ✓ INDUSTRIAL ___ MUNICIPAL ___
TEST WELL ___ OTHER ___

Sewage Disposal On Site (Existing or Proposed) Public___ Individual___ Private___
Distance from well to any part of nearest sewage disposal system ___ feet.
(Sketch of site to accompany application. None

TYPE OF EQUIPMENT TO BE USED
Rotary ✓ Cable ___ Hand Dug ___ Other ___

CONSTRUCTION PROPOSED
Diameter of casing 12" Material Steel Annular Space: Size 2"
Sealed with: Concrete___ Grout ___ Neat Cement ✓ Puddled Clay ___ Other___
Conductor Casing: Yes___ No ✓ Material ___
Chlorination By: Owner ✓ Pump Co___ Driller ___

Ruby Gregory (SIGNATURE OF APPLICANT) 6/5/74 (DATE)

NOTICE TO DRILLER: COMPLETE THIS PORTION AND PROVIDE OWNER WITH THIS COPY.

CASING

CONSTRUCTION
Total Depth 335' Ft. Completed
Surface Seal to 20' Ft.
Any Stratas sealed: Yes___ No x
If yes, depth of Stratas
From___ Ft. to ___ Feet
From___ Ft. to ___ Feet
Perforations
From 30 Ft. to 335' Feet
From___ Ft. to ___ Feet
From___ Ft. to ___ Feet

WATER LEVELS
First water at 42' Feet
Static level at 4' Feet

WELL TESTS
How performed Air Compressor
Yield 100 GPM with 80' Feet
Drawdown___ Ft. after 6 Hrs.

WELL LOG
(Formation; describe by color, size of material, structure)

Ft.	to Ft/	
0	18	Top Soil
18	42	Brown Clay
42	236	Clay w/Imbedded Gravel
236	340	Clay w/Imbedded Gravel & Boulders

Signed: J. D. Hoshier
License # 294001

HEALTH DEPT. USE ONLY
FEE: 12.00
DATE: 9-12-74
RECEIPT NO: 1283
BY: Paula Emeyer

NAPA COUNTY HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH

RECEIVED
OCT 7 1974
DIVISION OF ENVIRONMENTAL HEALTH

A.P. #22-100-14

APPLICATION & PERMIT TO CONSTRUCT
A WATER WELL
(ORDINANCE #)

#8

NAME [redacted] ADDRESS [redacted] 9-12-74
(Owner) (Job Location)
NAME Doshier Gregson ADDRESS 5365 N-V Hy.
(Well Driller)

TYPE OF WORK
NEW WELL ✓ RECONDITIONING ___ DEEPENING ___
TEST HOLES ___ DESTROYING ___ OTHER ___
TYPE I PERMIT ✓ TYPE II PERMIT ___ FEE ___

PROPOSED USE
DOMESTIC ___ IRRIGATION ✓ INDUSTRIAL ___ MUNICIPAL ___
TEST WELL ___ OTHER ___

Sewage Disposal On Site (Existing or Proposed) Public ___ Individual ✓ Private ___
Distance from well to any part of nearest sewage disposal system 300+ feet.
(Sketch of site to accompany application.

TYPE OF EQUIPMENT TO BE USED
Rotary ✓ Cable ___ Hand Dug ___ Other ___

CONSTRUCTION PROPOSED
Diameter of casing 8" Material Steel Annular Space: Size 2"
Sealed with: Concrete ___ Grout ___ Neat Cement ✓ Puddled Clay ___ Other ___
Conductor Casing: Yes ___ No ✓ Material ___
Chlorination By: Owner ✓ Pump Co ___ Driller ___

Ruby Gregson 9/12/74
(SIGNATURE OF APPLICANT) (DATE)

NOTICE TO DRILLER: COMPLETE THIS PORTION AND PROVIDE OWNER WITH THIS COPY.

CASING

CONSTRUCTION
Total Depth 335 Ft.
Surface Seal to 20 Ft.
Any Stratas sealed: Yes ___ No x
If yes, depth of Stratas
From ___ Ft. to ___ Feet
From ___ Ft. to ___ Feet
Perforations
From 30 Ft. to 335 Feet
From ___ Ft. to ___ Feet
From ___ Ft. to ___ Feet

WATER LEVELS
First water at 24 Feet
Static level at 15 Feet

WELL TESTS
How performed Bailing & Air Compressor
Yield 35 GPM with ___ Feet
Drawdown ___ Ft. after 4 Hrs.

WELL LOG
(Formation; describe by color, size of material, structure)

Ft.	to Ft/	
0	5	Top Soil
5	24	Clay Imbedded Gravel
24	48	Large Gravel & Sand
48	66	Large Gravel & Boulders
66	261	Clay Imbedded Gravel & Boulders
261	335	Blue Gray Clay & Imbedded Boulders

Signed: J. D. Doshier
License # 294001

HEALTH DEPT. USE ONLY
FEE: [redacted] 12.00
DATE: 9-12-74
RECEIPT NO: 1283
BY: Paula Emmeyer

RECEIVED
OCT 7 1974
DIVISION OF ENVIRONMENTAL HEALTH

A.P. # 22-100-14

NAPA COUNTY HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH

APPLICATION & PERMIT TO CONSTRUCT
A WATER WELL
(ORDINANCE #)

#B3

NAME [redacted] ADDRESS [redacted] TE 9-12
(Owner) (Job Location)
NAME Doshier Gregson ADDRESS 5365 Napa-V Hy.
(Well Driller)

TYPE OF WORK
NEW WELL ✓ RECONDITIONING ___ DEEPENING ___
TEST HOLES ___ DESTROYING ___ OTHER ___
TYPE I PERMIT ✓ TYPE II PERMIT ___ FEE ___

PROPOSED USE
DOMESTIC ___ IRRIGATION ✓ INDUSTRIAL ___ MUNICIPAL ___
TEST WELL ___ OTHER ___

Sewage Disposal On Site (Existing or Proposed) Public___ Individual___ Private___
Distance from well to any part of nearest sewage disposal system 300 feet.
(Sketch of site to accompany application.

TYPE OF EQUIPMENT TO BE USED
Rotary ✓ Cable ___ Hand Dug ___ Other ___

CONSTRUCTION PROPOSED
Diameter of casing 8" Material Steel Annular Space: Size 2"
Sealed with: Concrete___ Grout ___ Neat Cement ✓ Puddled Clay ___ Other___
Conductor Casing: Yes___ No ✓ Material ___
Chlorination By: Owner ✓ Pump Co___ Driller ___

Rudy Gregson 9/12/74
(SIGNATURE OF APPLICANT) (DATE)

NOTICE TO DRILLER: COMPLETE THIS PORTION AND PROVIDE OWNER WITH THIS COPY.

CASING

CONSTRUCTION
Total Depth 335 Ft.
Surface Seal to 20 Ft.
Any Stratas sealed: Yes___ No x
If yes, depth of Stratas
From___ Ft. to ___ Feet
From___ Ft. to ___ Feet
Perforations
From 35 Ft. to 335 Feet
From___ Ft. to ___ Feet
From___ Ft. to ___ Feet

WATER LEVELS
First water at 60 Feet
Static level at 45 Feet

WELL TESTS
How performed___
Yield___ GPM with___ Feet
Drawdown___ Ft. after___ Hrs.

WELL LOG
(Formation; describe by color, size of material, structure)

Ft.	to Ft/	
0	5	Topsoil
5	67	Coarse Gravel & Bldrs
67	78	Brown Clay
78	139	Boulders & Gravel
139	147	Blue Clay
147	213	Boulders & Clay
213	243	Boulders & Gravel
243	320	Boulders & Clay
320	335	Grey Clay & Boulders

Signed: J. D. Doshier
License # 294001

DUPLICATE
Retain this copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

№ 122286

State Well No.
Other Well No.

(1) OWNER:

Name [illegible]
Address P. O. Box 10[illegible]
[illegible], Calif. 94574

(2) LOCATION OF WELL:

County Owner's number, if any
Township, Range, and Section
Distance from cities, roads, railroads, etc.

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☒
Other ☐

(6) CASING INSTALLED:

STEEL: OTHER:
SINGLE ☒ DOUBLE ☐

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	If gravel packed From ft.	To ft.
0	200	8	250			

Size of shoe or well ring: Size of gravel:
Describe joint welded

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
30	175	6	1	1/4 x 3 mills knife
180	200	8	2	3/16 x 6

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 20 ft.
Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing

(9) WATER LEVELS:

Depth at which water was first found, if known ft. 14
Standing level before perforating, if known ft. 8
Standing level after perforating and developing ft. 8

(10) WELL TESTS:

Was pump test made? Yes ☒ No ☐ If yes, by whom?
Yield: gal./min. with 1 ft. drawdown after 30 hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No ☐
Was electric log made of well? Yes ☐ No ☐ If yes, attach copy

(11) WELL LOG:

Total depth 200 ft. Depth of completed well 200 ft.
Formation: *Describe by color, character, size of material, and structure*
ft. to ft.

~~0 to 3 top soil~~
~~3 to 14 brown clay and gravel~~
~~14 to 35 cemented gravel with boulders~~
~~35 to 105 cemented gravel with boulders~~
~~105 to 189 blue cemented gravel~~
~~189 to 200 blue clay with some gravel~~

0 - 3' TOP SOIL
3 - 14 BROWN CLAY + GRAVEL
14 - 35 CEMENTED GRAVEL WITH BOULDERS
35 - 105 " " " "
105 - 189 BLUE CEMENTED GRAVEL
189 - 200 BLUE CLAY WITH SOME GRAVEL

Work started 6/4/75 19 , Completed 6/16/75 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME [illegible] Well Drilling
(Person, firm, or corporation) (Typed or printed)
Address 605 W. Sierra Ave.
Colati, Calif.
[SIGNED] Robert E. Bartlett, Sr.
(Well Driller)

License No. 200068 Dated 6/17/75, 19

SKETCH LOCATION OF WELL ON REVERSE SIDE

DWR 188 (REV. 9-66)

87139-750 9-72 20M TRIP OSP

DUPLICATE
Driller's Copy

Page ____ of ____
Owner's Well No. ____
Date Work Began ____, Ended ____
Local Permit Agency ____
Permit No. ____ Permit Date ____

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 462651

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER UK (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	5	brown clay
5	20	brown sand
20	40	gravel & sand
40	65	gray black/black rock
65	80	brown ash
80	155	gray ash
155	158	brown up gray ash
158	225	hard gray ash
225	250	soft gray ash
250	300	hard gray ash
300	330	gray ash/black serpentine
330	340	black serpentine (soft)
340	370	red ash, black serpentine
370	400	brown red ash
400	410	black ash
410	460	brown red ash
		well test 180 ft. at 75 g.p.m.
		240 ft. 100 g.p.m.
		320 ft. 115 g.p.m.

TOTAL DEPTH OF BORING 460 (Feet)
TOTAL DEPTH OF COMPLETED WELL 460 (Feet)

WELL OWNER

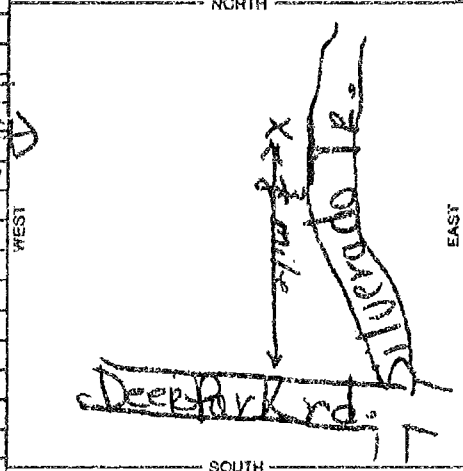
Name Duckhorn Vineyards
Mailing Address 3027 Silverado Tr. No.
Napa Ca. 94558
CITY STATE ZIP

WELL LOCATION

Address Same
City St. Helena
County Napa
APN Book ____ Page ____ Parcel 22-130-10
or Township ____ Range ____ Section ____
or Latitude ____ DEG. MIN. SEC. NORTH Longitude ____ DEG. MIN. SEC. WEST

LOCATION SKETCH

NORTH
WEST
EAST
SOUTH



Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
___ Domestic
___ Public
✓ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Mud FLUID Mud

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 60 (Ft.) & DATE MEASURED 12-22-94
ESTIMATED YIELD* 115 (GPM) & TEST TYPE Air lift
TEST LENGTH 6 (Hrs.) TOTAL DRAWDOWN 320 (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	56	11 3/4	✓				Plastic	5	200	
56	460	8 3/4		✓			"	"	"	Factory

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	56	✓			
56	460			✓	Pea gravel

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ____

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME Pulliam Well Drilling
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
2877 Piedmont Ave. Napa Ca. 94558
ADDRESS CITY STATE ZIP
Signed Tom Pulliam 1-6-95 248617
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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

Duckhorn Vineyards

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: 1:4,070 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 11, Sep 12, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Oct 31, 2017

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
103	Bale loam, 0 to 2 percent slopes	8.2	26.9%
104	Bale clay loam, 0 to 2 percent slopes	19.8	64.4%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	0.0	0.1%
141	Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15	2.6	8.6%
Totals for Area of Interest		**30.7**	**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

103—Bale loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hdk3
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: Alluvial fans, flood plains
Landform position (two-dimensional): Footslope, toeslope
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: 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
Natural 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
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Clear lake

Percent of map unit: 3 percent

Landform: Alluvial fans
Hydric soil rating: Yes

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
Natural 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
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Clear lake

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

140—Forward silt loam, 12 to 57 percent slopes, MLRA 15

Map Unit Setting

National map unit symbol: 2xc9y
Elevation: 310 to 2,370 feet
Mean annual precipitation: 33 to 56 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 260 to 338 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Forward

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Rhyolitic residuum weathered from volcanic rock

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 6 inches: silt loam
BA - 6 to 12 inches: silt loam
Bw1 - 12 to 19 inches: silt loam
Bw2 - 19 to 28 inches: silt loam
Bw3 - 28 to 37 inches: gravelly silt loam
Cr - 37 to 51 inches: bedrock

Properties and qualities

Slope: 12 to 57 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 2.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.2 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): 7e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Aiken

Percent of map unit: 5 percent

Boomer

Percent of map unit: 5 percent

Kidd

Percent of map unit: 3 percent

Sobrante

Percent of map unit: 2 percent

141—Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15

Map Unit Setting

National map unit symbol: 2y0fr
Elevation: 240 to 2,410 feet
Mean annual precipitation: 27 to 49 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 262 to 343 days
Farmland classification: Not prime farmland

Map Unit Composition

Forward and similar soils: 50 percent
Kidd and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Forward

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Rhyolitic residuum weathered from volcanic rock

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 6 inches: silt loam
BA - 6 to 12 inches: silt loam
Bw1 - 12 to 19 inches: silt loam
Bw2 - 19 to 28 inches: silt loam
Bw3 - 28 to 37 inches: gravelly silt loam
Cr - 37 to 51 inches: bedrock

Properties and qualities

Slope: 11 to 60 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.2 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: STEEP SHALLOW LOAMY UPLANDS (R015XD130CA)
Hydric soil rating: No

Description of Kidd

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from rhyolite

Typical profile

A - 0 to 4 inches: gravelly loam
Bw1 - 4 to 10 inches: loam
Bw2 - 10 to 14 inches: loam
R - 14 to 25 inches: bedrock

Properties and qualities

Slope: 11 to 60 percent
Depth to restrictive feature: 5 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.2 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: VERY SHALLOW (R015XD131CA)
Hydric soil rating: No

Minor Components

Aiken

Percent of map unit: 5 percent
Hydric soil rating: No

Toomes

Percent of map unit: 3 percent

Rock outcrop

Percent of map unit: 2 percent

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.

Soil Erosion Factors

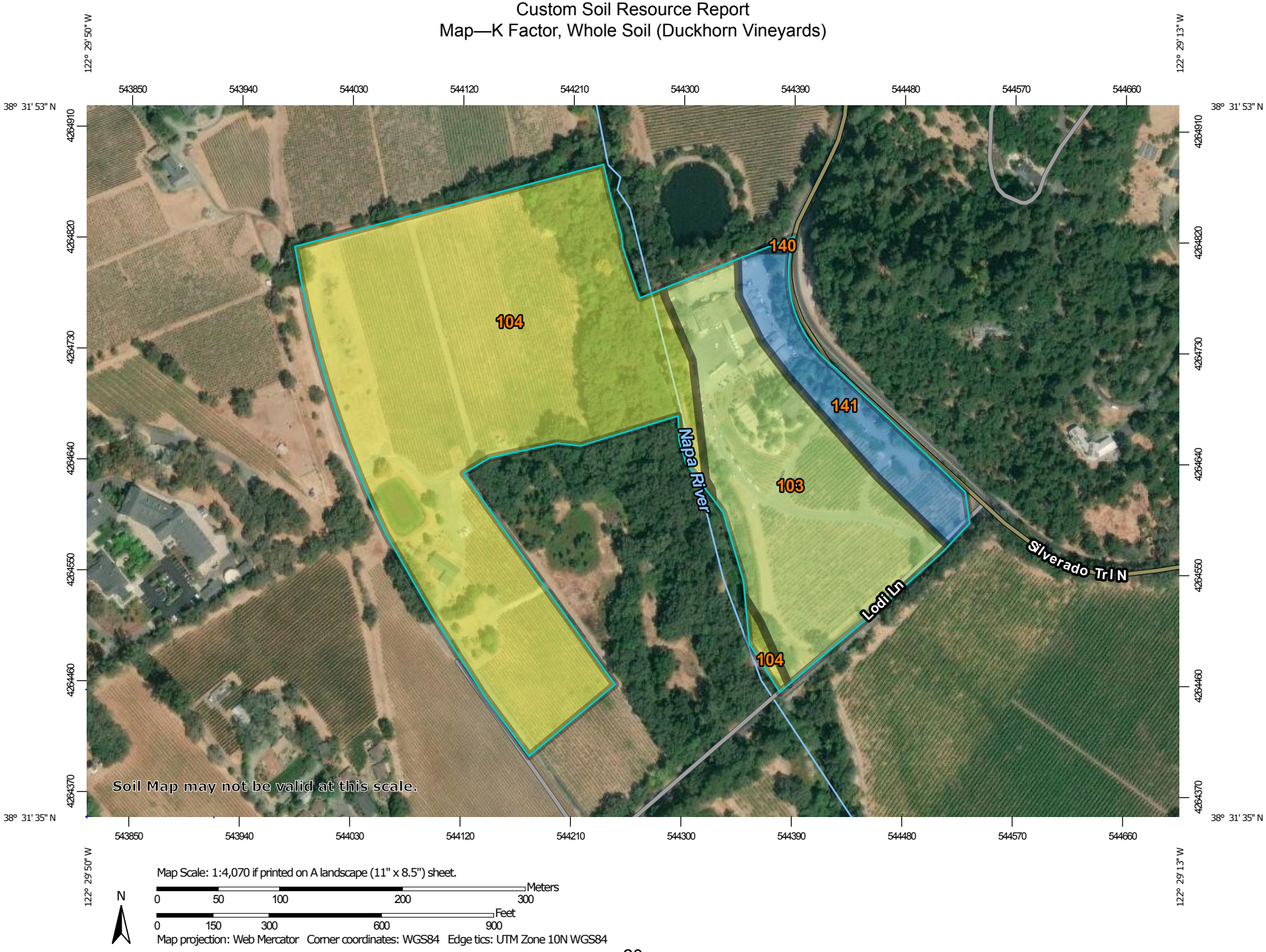
Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

K Factor, Whole Soil (Duckhorn Vineyards)

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Map—K Factor, Whole Soil (Duckhorn Vineyards)



Map Scale: 1:4,070 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

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
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)

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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 11, Sep 12, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Oct 31, 2017

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Table—K Factor, Whole Soil (Duckhorn Vineyards)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103	Bale loam, 0 to 2 percent slopes	.24	8.2	26.9%
104	Bale clay loam, 0 to 2 percent slopes	.20	19.8	64.4%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	.43	0.0	0.1%
141	Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15	.43	2.6	8.6%
Totals for Area of Interest			**30.7**	**100.0%**

Rating Options—K Factor, Whole Soil (Duckhorn Vineyards)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

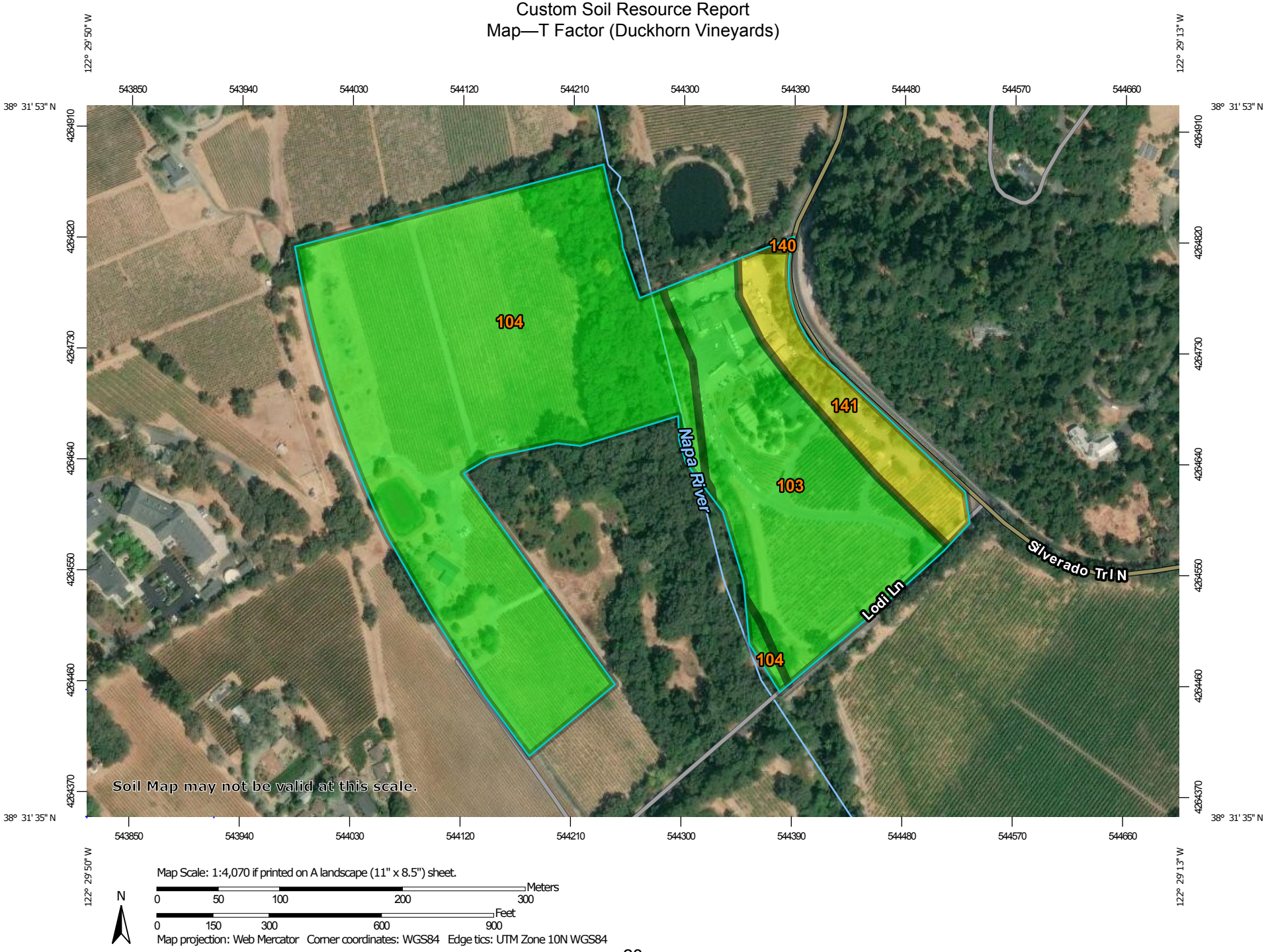
Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

T Factor (Duckhorn Vineyards)

The T factor is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Map—T Factor (Duckhorn Vineyards)



Map Scale: 1:4,070 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

1

2

3

4

5

Not rated or not available

Soil Rating Lines

1

2

3

4

5

Not rated or not available

Soil Rating Points

1

2

3

4

5

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.

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

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Date(s) aerial images were photographed: Dec 31, 2009—Oct 31, 2017

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Table—T Factor (Duckhorn Vineyards)

Map unit symbol	Map unit name	Rating (tons per acre per year)	Acres in AOI	Percent of AOI
103	Bale loam, 0 to 2 percent slopes	5	8.2	26.9%
104	Bale clay loam, 0 to 2 percent slopes	5	19.8	64.4%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	3	0.0	0.1%
141	Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15	3	2.6	8.6%
Totals for Area of Interest			**30.7**	**100.0%**

Rating Options—T Factor (Duckhorn Vineyards)

Units of Measure: tons per acre per year

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Duckhorn Vineyards)

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 soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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.

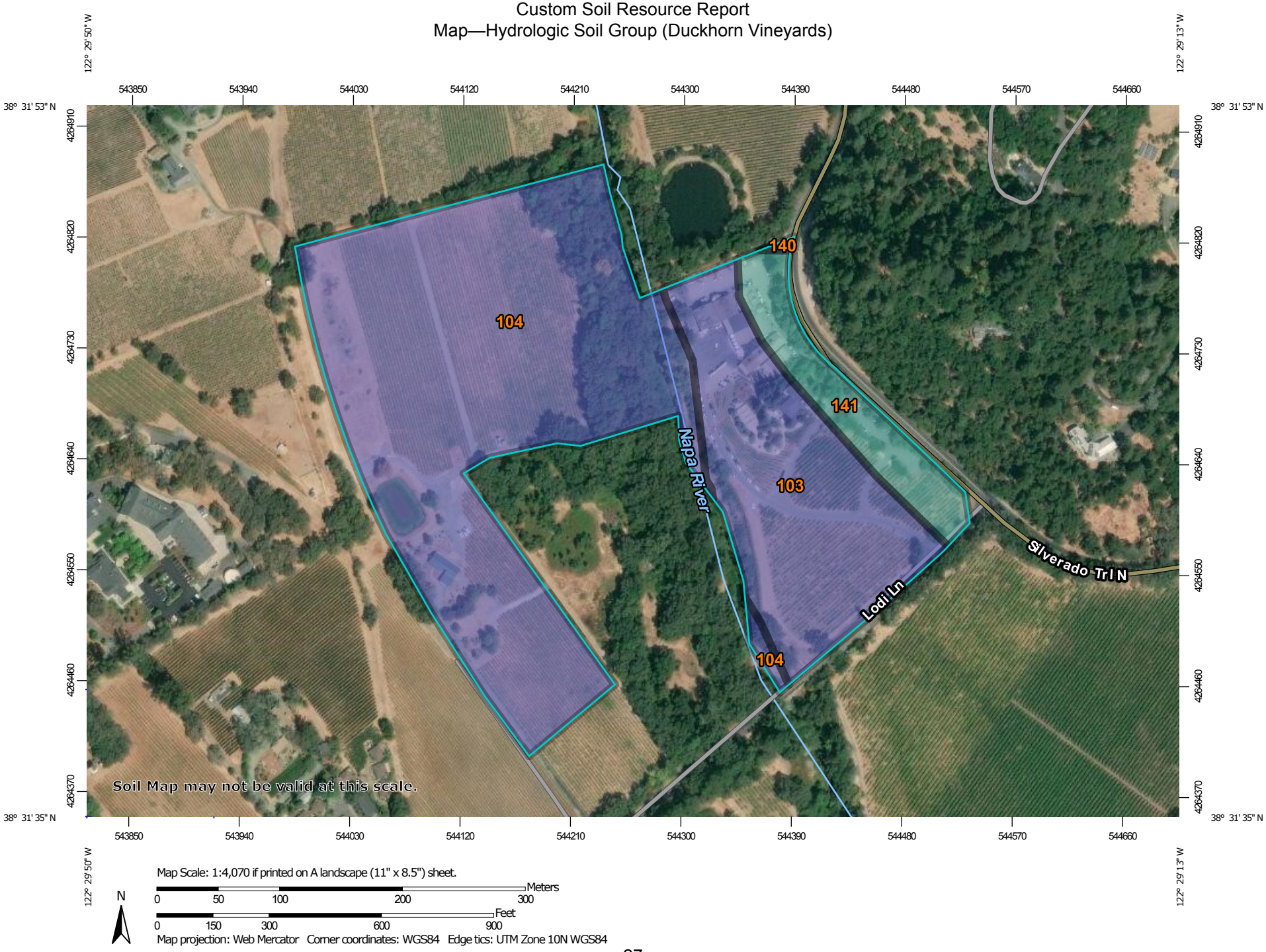
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group (Duckhorn Vineyards)



Map Scale: 1:4,070 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

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- 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

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Hydrologic Soil Group (Duckhorn Vineyards)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103	Bale loam, 0 to 2 percent slopes	B	8.2	26.9%
104	Bale clay loam, 0 to 2 percent slopes	B	19.8	64.4%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	C	0.0	0.1%
141	Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15	C	2.6	8.6%
Totals for Area of Interest			**30.7**	**100.0%**

Rating Options—Hydrologic Soil Group (Duckhorn Vineyards)

Aggregation Method: Dominant Condition

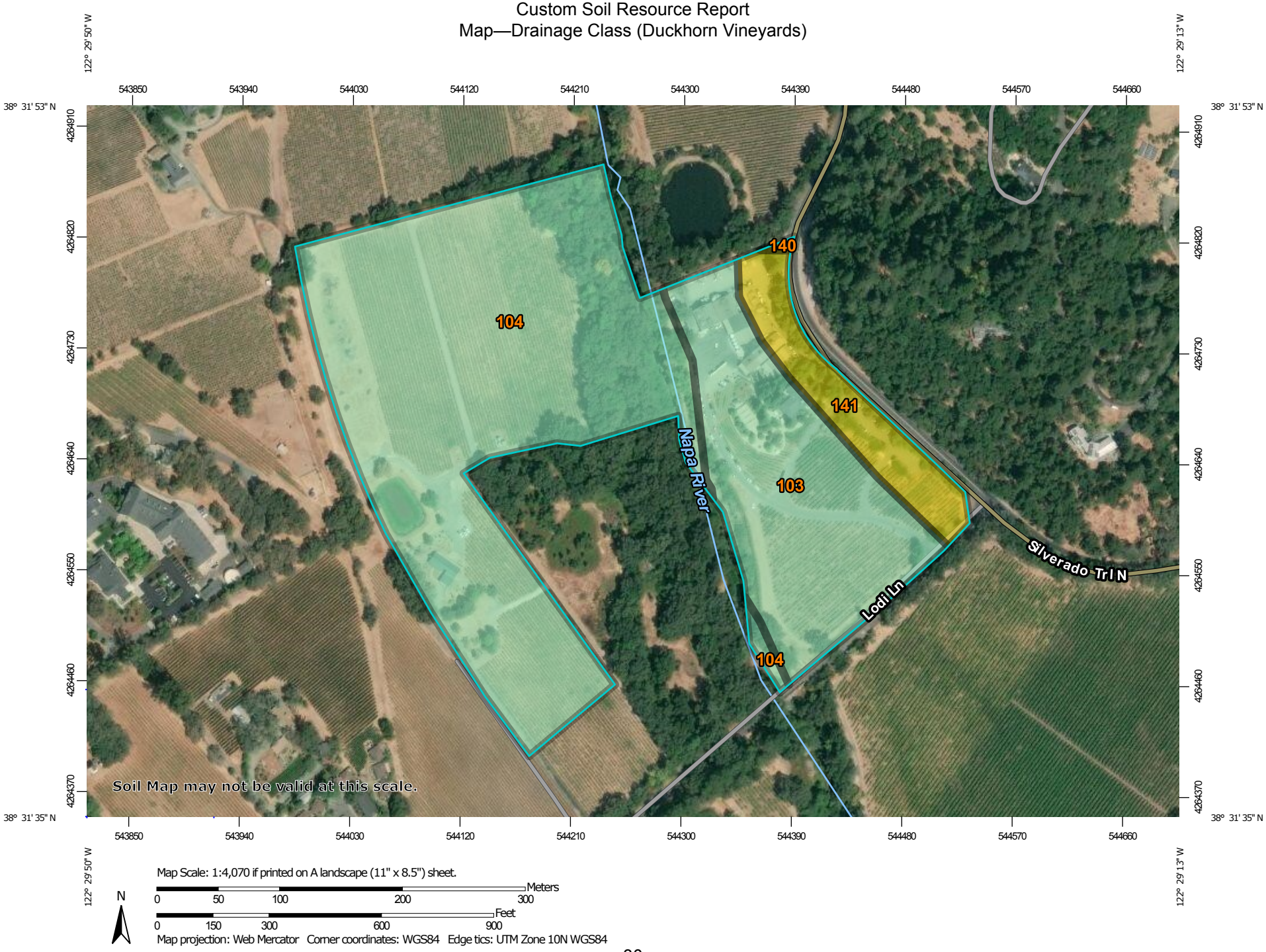
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Drainage Class (Duckhorn Vineyards)

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Map—Drainage Class (Duckhorn Vineyards)



Map Scale: 1:4,070 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

Excessively drained

Somewhat excessively drained

Well drained

Moderately well drained

Somewhat poorly drained

Poorly drained

Very poorly drained

Subaqueous

Not rated or not available

Soil Rating Lines

Excessively drained

Somewhat excessively drained

Well drained

Moderately well drained

Somewhat poorly drained

Poorly drained

Very poorly drained

Subaqueous

Not rated or not available

Soil Rating Points

Excessively drained

Somewhat excessively drained

Well drained

Moderately well drained

Somewhat poorly drained

Poorly drained

Very poorly drained

Subaqueous

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

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Drainage Class (Duckhorn Vineyards)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103	Bale loam, 0 to 2 percent slopes	Somewhat poorly drained	8.2	26.9%
104	Bale clay loam, 0 to 2 percent slopes	Somewhat poorly drained	19.8	64.4%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	Well drained	0.0	0.1%
141	Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15	Well drained	2.6	8.6%
Totals for Area of Interest			**30.7**	**100.0%**

Rating Options—Drainage Class (Duckhorn Vineyards)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

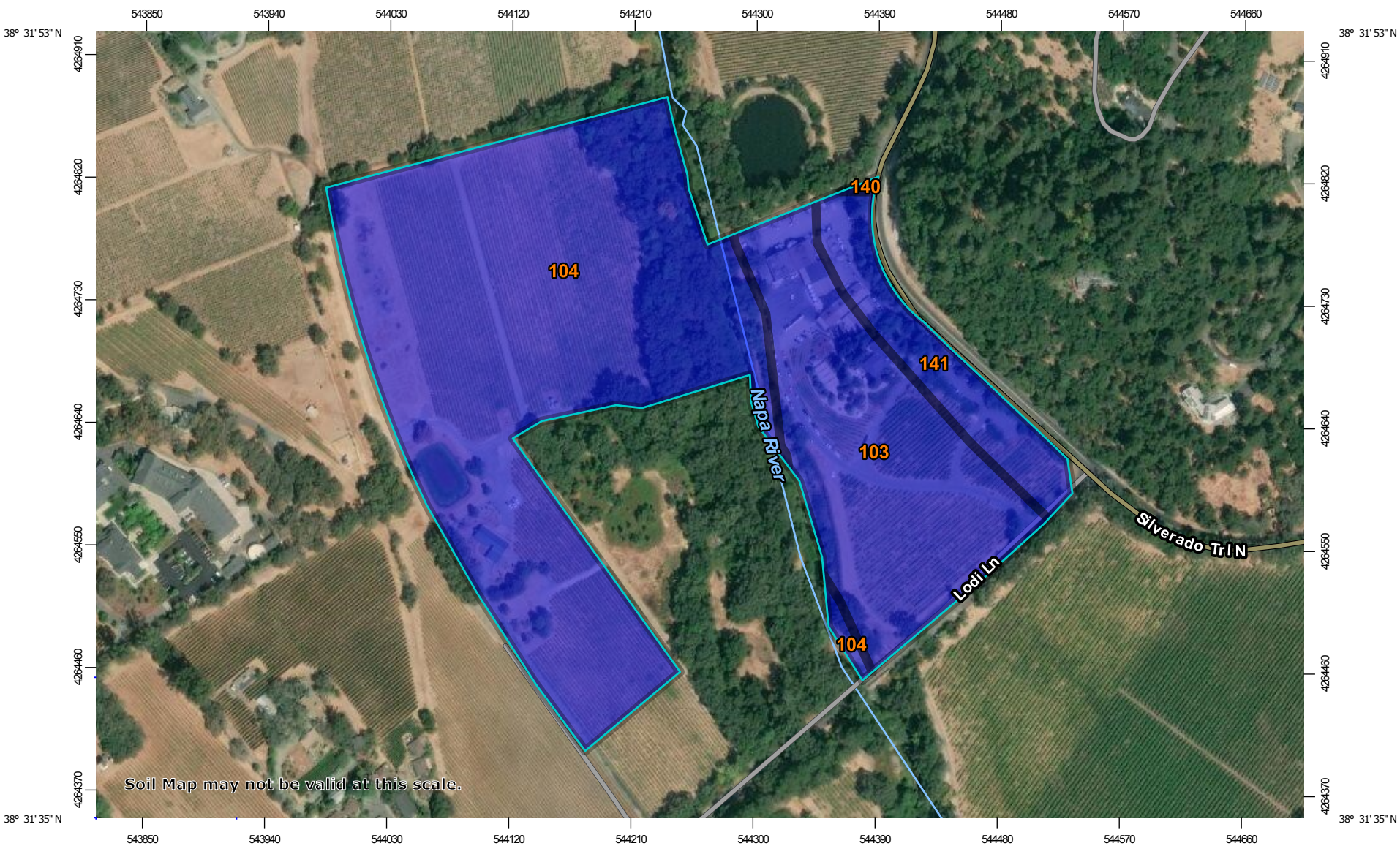
Depth to a Selected Soil Restrictive Layer: Lithic bedrock (Duckhorn Vineyards)

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to the user selected type of restrictive layer as described in for each map unit. If no restrictive layer is described in a map unit, it is represented by the "> 200" depth class.

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.

Map—Depth to a Selected Soil Restrictive Layer: Lithic bedrock (Duckhorn Vineyards)



Map Scale: 1:4,070 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.

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

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Table—Depth to a Selected Soil Restrictive Layer: Lithic bedrock (Duckhorn Vineyards)

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
103	Bale loam, 0 to 2 percent slopes	>200	8.2	26.9%
104	Bale clay loam, 0 to 2 percent slopes	>200	19.8	64.4%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	>200	0.0	0.1%
141	Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15	>200	2.6	8.6%
Totals for Area of Interest			**30.7**	**100.0%**

Rating Options—Depth to a Selected Soil Restrictive Layer: Lithic bedrock (Duckhorn Vineyards)

Units of Measure: centimeters

Restriction Kind: Lithic bedrock

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Water Features

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

Flooding Frequency Class (Duckhorn Vineyards)

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

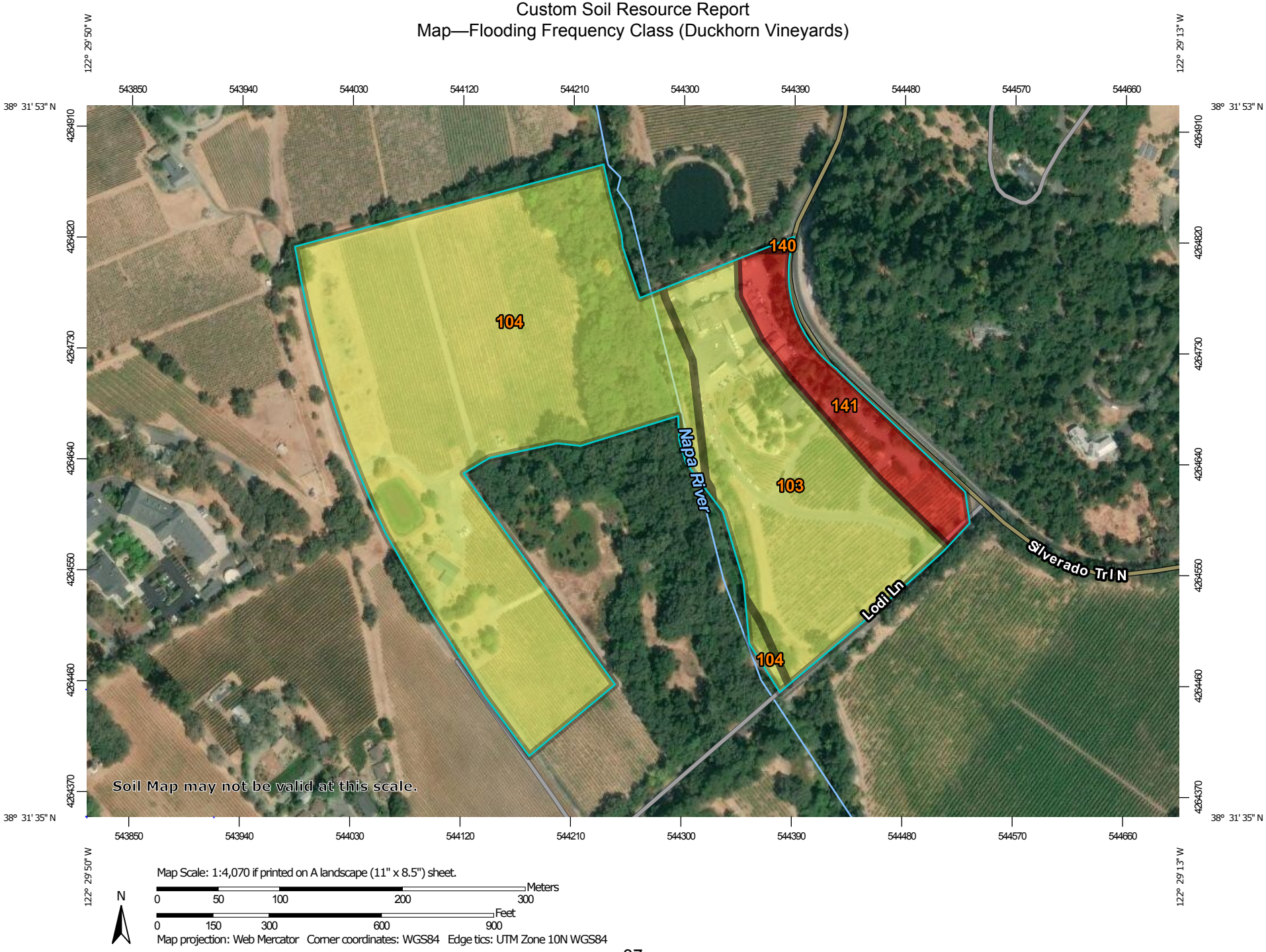
"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Map—Flooding Frequency Class (Duckhorn Vineyards)



Map Scale: 1:4,070 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

- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Lines

- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Points

- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- 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 11, Sep 12, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Oct 31, 2017

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—Flooding Frequency Class (Duckhorn Vineyards)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103	Bale loam, 0 to 2 percent slopes	Rare	8.2	26.9%
104	Bale clay loam, 0 to 2 percent slopes	Rare	19.8	64.4%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	None	0.0	0.1%
141	Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15	None	2.6	8.6%
Totals for Area of Interest			**30.7**	**100.0%**

Rating Options—Flooding Frequency Class (Duckhorn Vineyards)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

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