HYDROLOGIC ANALYSIS
REAL THOREVILOS, LLC
ECOTONE NORTH AND SOUTH BLOCKS
PROPOSED NEW VINEYARD
180 MUND ROAD
ST. HELENA, CA 95476
APN 021-320-022, -026, -028
MARCH 22, 2021

The following analysis evaluates the proposed development of two new vineyard blocks totaling approximately 22.2 acres, on parts of three parcels totaling approximately 390 acres, located in Napa County, California, northeast of the city of St. Helena, to determine the project's potential to increase runoff or peak flow. This analysis was prepared by David Steiner, CPESC, CPSWQ, at the request of, and in consultation with, Mr. Mike Muelrath, PE, of Applied Civil Engineering. The analysis employs the basic methodology of USDA Technical Release 55, as modeled in Version 1.00.10 of WinTR-55 "Small Watershed Hydrology", a Windows-based application. The reader's attention is drawn to accompanying printouts of the analysis—both pre-project and post-project—including storm data, runoff curve number analyses, times of concentration, and summaries of hydrograph peaks and peak times. The accompanying maps were drawn on aerial/topographic base maps provided by Applied Civil Engineering.

The precipitation data for the modeled **24-hour storms** of 2, 5, 10, 25, 50, and 100-year return intervals were taken from the median of each event's range of likely depths, as per NOAA Atlas 14. Printouts of the NOAA website's database page for each block also accompany this analysis. (Predicted precipitation depths are slightly higher in the north block.) Peak flow calculations for these locations were derived from these values, using the appropriate "CA-1" distribution curve, implicit in the 2013 updates of the Atlas.

The **South Block** is divided into two separate but adjacent watersheds: **Watershed A** (46.9 acres) drains southward across the proposed vineyard block to its outlet, to a complex of unnamed streams, ultimately running southwest along Howell Mountain Road, outletting to the Napa River near the Pope Street bridge. **Watershed B** (19.3) acres lies northeast of a low ridgeline separating it from Watershed A, draining to its outlet on the east side of the block, from which it runs south in unnamed streams, eventually to a confluence with Watershed A's runoff, again along Howell Mountain Road to the Napa River. Land use in the two watersheds includes existing vineyard, woods, brushland, grassland, a complex of agricultural and residential buildings (farmstead), with access via asphalt driveways. Modeled, pre-project conditions are based on evaluations performed during a site visit on September 4, 2020 (prior to the Glass Fire), and on examination of photographic imagery from Google Earth and OnxHunt. Noteworthy in Watershed A is an approximately 8-9-acre band of sparsely-vegetated ground, with many rock outcrops, along the southern portion of the block, straddling the ridge that divides the two watersheds. While this area's soils appear to have the characteristics of Rock Outcrop-Kidd Complex, M.U. 177, HSG D, rather than as mapped in the Soil Survey (Forward Gravelly Loam, M.U. 138 and 140, HSG C) we have nonetheless stuck with the Soil Survey's designations, assigning this area pre-project Curve Number 79, as "Range, fair condition."

All but two very small areas of the **North Block** are encompassed by the 23.2-acre **Watershed C**, near the northeastern headwaters of Cañon Creek, which drains northwesterly, then westerly along Deer Park and Glass Mountain Roads to the Napa River. The entire site was

burned in the Glass Fire, but modeled pre-project conditions are based on evaluations performed during site visits on September 4, and October 16, 2020, prior to the fire. The predominant land use in the watershed is "Woods" (parts of which are designated timberland) which we determined to be in only "fair" hydrologic condition, because of the high proportion of rock outcrops, and limited ground cover—due in part, perhaps, to past wildfires. Included in the proposed vineyard area is clearing in the southwestern corner of the watershed, designated "Woods-Grass Combination", in fair hydrologic condition. Along the northern edge of the proposed vineyard is a little over an acre of an area designated as "Brush-Weeds-Grass" in poor hydrologic condition (with surface cover less than 50%). There is a small area of existing vineyard on a neighboring parcel, near the northeastern corner of the watershed.

Post-Project Curve Numbers: As vineyards are not included among WinTR-55's land use alternatives, the application's "custom CN" field is used to enter selections from a California-specific table found in the NRCS Engineering Field Handbook. This table's guidance calls for vineyard Curve Numbers equivalent to those of "annual grass."[1] To reflect the specifications of the Erosion Control Plan, data for proposed vineyard are entered into the post-project modeling to indicate "good" hydrologic condition. CN printouts have been edited as pdf documents, where necessary, to reflect and clarify the actual land uses.

The **Time of Concentration** (Tc) for the watershed was determined by plotting a flowpath from the hydrologically most remote point to a designated outlet, or point of interest. Each component's data is entered into the model as slope length, gradient, and Manning's "N" roughness factor. Additional characteristics—cross-sectional area and wetted perimeter, or a known velocity— are required for channel flow. There is no change anticipated between pre-project and post-project Times of Concentration, for any of the three watersheds.

Results:

- **Watershed A:**
  - Pre-project 100-year peak flow: 37.48 cfs
  - Post-project 100-year peak flow: 37.48 cfs
  - Increase (Decrease): 0
- **Watershed B:**
  - Pre-project 100-year peak flow: 14.99 cfs
  - Post-project 100-year peak flow: 14.99 cfs
  - Increase (Decrease): 0
- **Watershed C (North):**
  - Pre-project 100-year peak flow: 20.45 cfs
  - Post-project 100-year peak flow: 20.45 cfs
  - Increase (Decrease): 0

[1]Engineering Field Handbook, Part 650, Chapter 2, Supplement 1, USDA/NRCS, Oct 2008.

Conclusion: As shown in the accompanying printouts of pre- and post-project runs of the WinTR-55 model, **none of the three watersheds on either site is projected to experience an increase** in post-project peak flow. As shown in the accompanying WinTR-55 printouts, commensurate results of **no increase in peak flow/runoff** are also predicted by modeling of storms of 2-, 5-, 10-, 25-, and 50-year return intervals.

Lying just outside the modeled Watershed C, but inside the proposed vineyard footprint, are two small areas, totaling less than an acre. Inclusion of these areas in a full, WinTR-55 analysis would have required plotting a much larger watershed basin, which would in our opinion present the hazard of buffering or "losing" the potential hydrologic impacts of a small project within a large basin. This analysis, therefore, instead subjects these areas to separate Curve Number evaluations, showing reduced Runoff Curve Numbers as follows:

- North area, pre-project: Weighted **CN 77** (76.5)
    - .34 acres Brush-Weeds-Grass, Poor, HSG C **(CN 77)**
    - .32 acres Woods-Grass Combination, Fair, HSG C **(CN 76)**
- North area, post-project: Vineyard-Annual Grass, Good, HSG C **(CN 75)**

- South area, .23 acres, pre-project: Woods-Grass Combination, Fair, HSG C (**CN 76**)
- South area, .23 acres, post-project: Vineyard-Annual Grass, Good, HSG C (**CN 75**)

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Watershed A pre-project, rev
Napa County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs)	(hr)	5-Yr (cfs)	(hr)	10-Yr (cfs)	(hr)	25-Yr (cfs)	(hr)	50-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS												
Main	10.85	12.23	16.48	12.23	21.21	12.22	27.68	12.22	32.59	12.22	37.48	12.22
REACHES												
OUTLET	10.85		16.48		21.21		27.68		32.59		37.48	

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Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	-Yr (in)
3.94	4.94	5.74	6.8	7.59	8.37	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type CA-1
Dimensionless Unit Hydrograph: <standard>

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Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Main							
SHEET	100	0.0100	0.150				0.194
SHALLOW	737	0.0270	0.050				0.077
CHANNEL	1404	0.1320	0.050	6.00	5.00	12.188	0.032
					Time of Concentration		.303

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Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Open space; grass cover 50% to 75%	(fair)	C	2.3	79
	Paved; open ditches (w/right-of-way)		C	.1	92
	Residential districts (1/4 acre)		B	4	75
	User defined urban (Click button or		C	7.6	75
	Pasture, grassland or range	(fair)	C	6.6	79
	Woods	(good)	C	24.2	70
	Woods	(good)	D	.1	77
	Farmsteads		C	2	82
	Total Area / Weighted Curve Number			46.9	74

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Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Annual grass (tilled)	(fair)	C	2.3	79
	Paved; open ditches (w/right-of-way)		C	.1	92
	Annual grass	(good)	C	4	75
	Vineyard (Annual grass)	(good)	C	7.6	75
	Pasture, grassland or range	(fair)	C	6.6	79
	Woods	(good)	C	24.2	70
	Woods	(good)	D	.1	77
	Farmsteads		C	2	82
	Total Area / Weighted Curve Number			46.9	74

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Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs)	(hr)	5-Yr (cfs)	(hr)	10-Yr (cfs)	(hr)	25-Yr (cfs)	(hr)	50-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS												
Main	10.85	12.23	16.48	12.23	21.21	12.22	27.68	12.22	32.59	12.22	37.48	12.22
REACHES												
OUTLET	10.85		16.48		21.21		27.68		32.59		37.48	

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Napa County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	-Yr (in)
3.94	4.94	5.74	6.8	7.59	8.37	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type CA-1
Dimensionless Unit Hydrograph: <standard>

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Napa County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Main							
SHEET	100	0.0100	0.150				0.194
SHALLOW	737	0.0270	0.050				0.077
CHANNEL	1404	0.1320	0.050	6.00	5.00	12.188	0.032
					Time of Concentration		.303

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Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Open space; grass cover 50% to 75%	(fair)	C	2.3	79
	Paved; open ditches (w/right-of-way)		C	.1	92
	Residential districts (1/4 acre)		B	4	75
	User defined urban (Click button or		C	7.6	75
	Pasture, grassland or range	(fair)	C	6.6	79
	Woods	(good)	C	24.2	70
	Woods	(good)	D	.1	77
	Farmsteads		C	2	82
	Total Area / Weighted Curve Number			46.9	74

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Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Annual grass	(fair)	C	2.3	79
	Paved; open ditches (w/right-of-way)		C	.1	92
	Annual grass	(good)	C	4	75
	Vineyard (Annual grass)	(good)	C	7.6	75
	Pasture, grassland or range	(fair)	C	6.6	79
	Woods	(good)	C	24.2	70
	Woods	(good)	D	.1	77
	Farmsteads		C	2	82
	Total Area / Weighted Curve Number			46.9	74

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Watershed B pre-project, rev2
Napa County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs)	(hr)	5-Yr (cfs)	(hr)	10-Yr (cfs)	(hr)	25-Yr (cfs)	(hr)	50-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS												
Main	4.08	12.22	6.36	12.21	8.29	12.21	10.94	12.21	12.97	12.20	14.99	12.21
REACHES												
OUTLET	4.08		6.36		8.29		10.94		12.97		14.99	

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Watershed B pre-project, rev2
Napa County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	-Yr (in)
3.94	4.94	5.74	6.8	7.59	8.37	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type CA-1
Dimensionless Unit Hydrograph: <standard>

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Watershed B pre-project, rev2
Napa County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Main							
SHEET	100	0.1400	0.400				0.148
SHALLOW	759	0.2230	0.050				0.028
SHALLOW	529	0.0410	0.050				0.045
CHANNEL	1254	0.0270	0.045	6.00	5.00	6.111	0.057
					Time of Concentration		.278

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Watershed B pre-project, rev2
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Paved; open ditches (w/right-of-way)		C	.1	92
	Residential districts (1/4 acre)		B	.7	75
	Pasture, grassland or range	(fair)	C	1.3	79
	Brush - brush, weed, grass mix	(good)	D	1.6	73
	Woods - grass combination	(good)	C	.9	72
	Woods	(good)	C	14.2	70
	Farmsteads		C	.5	82
	Total Area / Weighted Curve Number			19.3	72

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Watershed B pre-project, rev2
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Paved; open ditches (w/right-of-way)		C	.1	92
	Annual grass	(good)	C	.7	75
	Pasture, grassland or range	(fair)	C	1.3	79
	Brush - brush, weed, grass mix	(good)	D	1.6	73
	Woods - grass combination	(good)	C	.9	72
	Woods	(good)	C	14.2	70
	Farmsteads		C	.5	82
	Total Area / Weighted Curve Number			19.3	72

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Watershed B post-project, rev2
Napa County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
	(cfs) (hr)	(cfs) (hr)	(cfs) (hr)	(cfs) (hr)	(cfs) (hr)	(cfs) (hr)
SUBAREAS						
Main	4.08 12.22	6.36 12.21	8.29 12.21	10.94 12.21	12.97 12.20	14.99 12.21
REACHES						
OUTLET	4.08	6.36	8.29	10.94	12.97	14.99

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Watershed B post-project, rev2
Napa County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	-Yr (in)
3.94	4.94	5.74	6.8	7.59	8.37	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type CA-1
Dimensionless Unit Hydrograph: <standard>

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Watershed B post-project, rev2
Napa County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Main							
SHEET	100	0.1400	0.400				0.148
SHALLOW	759	0.2230	0.050				0.028
SHALLOW	529	0.0410	0.050				0.045
CHANNEL	1254	0.0270	0.045	6.00	5.00	6.111	0.057
					Time of Concentration		.278

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Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Paved; open ditches (w/right-of-way)		C	.1	92
	User defined urban (Click button or		C	2.9	75
	Pasture, grassland or range	(fair)	C	.9	79
	Brush - brush, weed, grass mix	(good)	D	1.6	73
	Woods - grass combination	(good)	C	.2	72
	Woods	(good)	C	13.1	70
	Farmsteads		C	.5	82
	Total Area / Weighted Curve Number			19.3	72

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Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Main	Paved; open ditches (w/right-of-way)		C	.1	92
	Vineyard (Annual grass)	(good)	C	2.9	75
	Brush - brush, weed, grass mix	(fair)	C	.9	79
	Woods - grass combination	(good)	D	1.6	73
	Woods	(good)	C	.2	72
	Farmsteads	(good)	C	13.1	70
			C	.5	82
	Total Area / Weighted Curve Number			19.3	72

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Ecotone North
WS C Pre-Project
Napa County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
	(hr)	(hr)	(hr)	(hr)	(hr)	(hr)
SUBAREAS						
North	6.02	9.09	11.66	15.15	17.78	20.45
	12.16	12.16	12.16	12.15	12.16	12.15
REACHES						
OUTLET	6.02	9.09	11.66	15.15	17.78	20.45

Ecotone North
WS C Pre-Project
Napa County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	-Yr (in)
4.01	5.02	5.83	6.9	7.69	8.49	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type CA-1
Dimensionless Unit Hydrograph: <standard>

DAS

Ecotone North
WS C Pre-Project
Napa County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
North							
SHEET	100	0.1000	0.150				0.077
SHALLOW	1000	0.1550	0.050				0.044
SHALLOW	800	0.0440	0.050				0.066
						Time of Concentration	.187

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Ecotone North
WS C Pre-Project
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
North	User defined urban (Click button or		C	.4	75
	Brush - brush, weed, grass mix	(poor)	C	1.2	77
	Woods - grass combination	(fair)	C	2.8	76
	Woods	(fair)	C	18.8	73
	Total Area / Weighted Curve Number			23.2	74

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Ecotone North
WS C Pre-Project
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
North	Vineyard (Annual grass)	(good)	C	.4	75
	Brush - brush, weed, grass mix	(poor)	C	1.2	77
	Woods - grass combination	(fair)	C	2.8	76
	Woods	(fair)	C	18.8	73
	Total Area / Weighted Curve Number			23.2	74

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Ecotone North
WS C Post-Project
Napa County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period					
	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
	(hr)	(hr)	(hr)	(hr)	(hr)	(hr)
SUBAREAS						
North	6.02	9.09	11.66	15.15	17.78	20.45
	12.16	12.16	12.16	12.15	12.16	12.15
REACHES						
OUTLET	6.02	9.09	11.66	15.15	17.78	20.45

DAS

Ecotone North
WS C Post-Project
Napa County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	-Yr (in)
4.01	5.02	5.83	6.9	7.69	8.49	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type CA-1
Dimensionless Unit Hydrograph: <standard>

DAS

Ecotone North
WS C Post-Project
Napa County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
North							
SHEET	100	0.1000	0.150				0.077
SHALLOW	1000	0.1550	0.050				0.044
SHALLOW	800	0.0440	0.050				0.066
						Time of Concentration	0.187

DAS

Ecotone North
WS C Post-Project
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
North	User defined urban (Click button or	C	8.4	75
	Woods (fair)	C	14.8	73
	Total Area / Weighted Curve Number		23.2	74

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Ecotone North
WS C Post-Project
Napa County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
North	Vineyard (Annual grass)	(good)	C	8.4	75
	Woods	(fair)	C	14.8	73
	Total Area / Weighted Curve Number			23.2	74

www.nws.noaa.gov

NOAA's National Weather Service
Hydrometeorological Design Studies Center
Precipitation Frequency Data Server (PFDS)

General Information
Homepage
Progress Reports
FAQ
Glossary

Precipitation Frequency
Data Server
GIS Grids
Maps
Time Series
Temporals
Documents

Probable Maximum Precipitation
Documents

Miscellaneous
Publications
Storm Analysis
Record Precipitation

Contact Us
Inquiries

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

Data description

Data type: Precipitation depth **Units:** English **Time series type:** Partial duration

Select location

1) Manually:

a) By location (decimal degrees, use "-" for S and W): Latitude: 38.533 Longitude: -122.460 Submit

b) By station (list of CA stations): Select station

c) By address Search

2) Use map (if ESRI interactive map is not loading, try adding the host: **https://is.arcgis.com/** to the firewall, or contact us at hdsc.questions@noaa.gov):

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

PF tabular | PF graphical | Supplementary information | Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.133** (0.119-0.152)	**0.162** (0.144-0.184)	**0.201** (0.178-0.229)	**0.234** (0.205-0.269)	**0.279** (0.236-0.334)	**0.316** (0.260-0.387)	**0.354** (0.284-0.447)	**0.396** (0.307-0.515)	**0.454** (0.337-0.620)	**0.503** (0.358-0.713)
10-min	**0.191** (0.170-0.217)	**0.233** (0.207-0.264)	**0.288** (0.255-0.329)	**0.335** (0.294-0.385)	**0.400** (0.338-0.479)	**0.453** (0.373-0.555)	**0.508** (0.407-0.640)	**0.567** (0.440-0.738)	**0.651** (0.482-0.888)	**0.720** (0.513-1.02)
15-min	**0.231** (0.206-0.263)	**0.281** (0.250-0.320)	**0.348** (0.309-0.397)	**0.405** (0.355-0.466)	**0.484** (0.409-0.579)	**0.548** (0.451-0.671)	**0.614** (0.492-0.774)	**0.686** (0.533-0.892)	**0.788** (0.584-1.07)	**0.871** (0.621-1.24)
30-min	**0.350** (0.311-0.397)	**0.425** (0.378-0.483)	**0.527** (0.466-0.601)	**0.612** (0.537-0.705)	**0.732** (0.618-0.876)	**0.828** (0.682-1.01)	**0.929** (0.744-1.17)	**1.04** (0.805-1.35)	**1.19** (0.882-1.62)	**1.32** (0.938-1.87)
60-min	**0.529** (0.470-0.600)	**0.643** (0.571-0.731)	**0.796** (0.705-0.908)	**0.925** (0.812-1.07)	**1.11** (0.934-1.32)	**1.25** (1.03-1.53)	**1.40** (1.13-1.77)	**1.57** (1.22-2.04)	**1.80** (1.33-2.46)	**1.99** (1.42-2.82)
2-hr	**0.803** (0.715-0.912)	**0.976** (0.867-1.11)	**1.20** (1.06-1.37)	**1.38** (1.21-1.59)	**1.63** (1.38-1.95)	**1.82** (1.50-2.23)	**2.02** (1.62-2.54)	**2.21** (1.72-2.88)	**2.48** (1.84-3.39)	**2.69** (1.92-3.82)
3-hr	**1.04** (0.922-1.18)	**1.26** (1.12-1.43)	**1.55** (1.37-1.76)	**1.77** (1.56-2.04)	**2.08** (1.76-2.49)	**2.31** (1.90-2.83)	**2.54** (2.04-3.20)	**2.78** (2.16-3.61)	**3.09** (2.29-4.22)	**3.33** (2.37-4.72)
6-hr	**1.59** (1.41-1.80)	**1.93** (1.71-2.19)	**2.36** (2.09-2.70)	**2.71** (2.37-3.12)	**3.16** (2.67-3.78)	**3.49** (2.88-4.28)	**3.82** (3.06-4.82)	**4.15** (3.23-5.41)	**4.59** (3.40-6.26)	**4.91** (3.50-6.97)
12-hr	**2.28**	**2.80**	**3.46**	**3.99**	**4.67**	**5.18**	**5.68**	**6.19**	**6.85**	**7.34**

	(2.03-2.59)	(2.49-3.19)	(3.07-3.95)	(3.50-4.59)	(3.94-5.59)	(4.27-6.35)	(4.56-7.16)	(4.80-8.05)	(5.07-9.34)	(5.23-10.4)
24-hr	**3.21** (2.88-3.64)	**4.01** (3.60-4.55)	**5.02** (4.50-5.72)	**5.83** (5.19-6.68)	**6.90** (5.97-8.12)	**7.69** (6.55-9.22)	**8.49** (7.08-10.4)	**9.28** (7.57-11.6)	**10.3** (8.14-13.4)	**11.1** (8.51-14.9)
2-day	**4.22** (3.79-4.79)	**5.37** (4.82-6.10)	**6.84** (6.13-7.79)	**8.01** (7.13-9.18)	**9.54** (8.26-11.2)	**10.7** (9.10-12.8)	**11.8** (9.87-14.5)	**13.0** (10.6-16.2)	**14.5** (11.4-18.8)	**15.6** (11.9-20.8)
3-day	**4.85** (4.36-5.51)	**6.25** (5.61-7.10)	**8.02** (7.18-9.13)	**9.42** (8.39-10.8)	**11.3** (9.76-13.3)	**12.7** (10.8-15.2)	**14.0** (11.7-17.2)	**15.4** (12.6-19.3)	**17.2** (13.6-22.3)	**18.6** (14.2-24.6)
4-day	**5.39** (4.84-6.12)	**6.96** (6.25-7.91)	**8.95** (8.02-10.2)	**10.5** (9.37-12.1)	**12.6** (10.9-14.9)	**14.2** (12.1-17.0)	**15.7** (13.1-19.2)	**17.3** (14.1-21.6)	**19.3** (15.2-25.0)	**20.9** (15.9-27.8)
7-day	**6.72** (6.04-7.62)	**8.60** (7.72-9.77)	**11.0** (9.86-12.5)	**12.9** (11.5-14.8)	**15.4** (13.4-18.2)	**17.3** (14.7-20.8)	**19.2** (16.0-23.5)	**21.1** (17.2-26.4)	**23.6** (18.6-30.6)	**25.5** (19.5-34.0)
10-day	**7.65** (6.88-8.68)	**9.74** (8.75-11.1)	**12.4** (11.1-14.1)	**14.5** (12.9-16.7)	**17.3** (15.0-20.4)	**19.4** (16.5-23.3)	**21.5** (17.9-26.3)	**23.6** (19.2-29.5)	**26.4** (20.8-34.2)	**28.5** (21.8-38.0)
20-day	**10.1** (9.11-11.5)	**12.9** (11.6-14.6)	**16.3** (14.6-18.6)	**19.1** (17.0-21.9)	**22.6** (19.6-26.6)	**25.2** (21.5-30.2)	**27.8** (23.2-34.0)	**30.3** (24.7-38.0)	**33.6** (26.5-43.6)	**36.1** (27.6-48.2)
30-day	**12.1** (10.8-13.7)	**15.3** (13.8-17.4)	**19.4** (17.4-22.1)	**22.5** (20.1-25.8)	**26.6** (23.0-31.3)	**29.5** (25.1-35.4)	**32.4** (27.0-39.6)	**35.2** (28.7-44.1)	**38.8** (30.6-50.4)	**41.5** (31.8-55.4)
45-day	**14.7** (13.2-16.7)	**18.6** (16.7-21.1)	**23.4** (20.9-26.6)	**27.0** (24.1-31.0)	**31.7** (27.4-37.3)	**35.0** (29.8-42.0)	**38.2** (31.9-46.7)	**41.3** (33.7-51.7)	**45.3** (35.6-58.7)	**48.1** (36.8-64.2)
60-day	**17.4** (15.6-19.7)	**21.9** (19.7-24.9)	**27.4** (24.5-31.2)	**31.5** (28.0-36.1)	**36.7** (31.8-43.2)	**40.4** (34.4-48.4)	**43.9** (36.6-53.6)	**47.2** (38.5-59.1)	**51.4** (40.5-66.6)	**54.4** (41.6-72.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

Data description

Data type: Precipitation depth **Units:** English **Time series type:** Partial duration

Select location

1) Manually:

a) By location (decimal degrees, use "-" for S and W): Latitude: 38.5276 Longitude: -122.4558 Submit

b) By station (list of CA stations): Select station

c) By address 180 Mund Rd, Saint Helena, CA, 945

2) Use map (if ESRI interactive map is not loading, try adding the host: **https://is.arcgis.com/** to the firewall, or contact us at hdsc.questions@noaa.gov):

a) Select location
Move crosshair or double click

b) Click on station icon
Show stations on map

Location information:
Name: Saint Helena, California, US
Latitude: 38.5276°
Longitude: -122.4558°
Elevation: 735.34 ft **

* Source: ESRI Maps
** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

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PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.133** (0.118-0.151)	**0.162** (0.144-0.184)	**0.201** (0.178-0.230)	**0.234** (0.205-0.269)	**0.279** (0.235-0.333)	**0.314** (0.258-0.384)	**0.350** (0.280-0.441)	**0.388** (0.301-0.505)	**0.441** (0.327-0.601)	**0.483** (0.344-0.685)
10-min	**0.190** (0.169-0.216)	**0.233** (0.207-0.264)	**0.289** (0.256-0.329)	**0.335** (0.294-0.386)	**0.399** (0.337-0.478)	**0.450** (0.370-0.551)	**0.502** (0.402-0.632)	**0.556** (0.432-0.724)	**0.632** (0.468-0.862)	**0.692** (0.493-0.982)
15-min	**0.230** (0.205-0.261)	**0.281** (0.250-0.320)	**0.349** (0.309-0.398)	**0.405** (0.355-0.467)	**0.483** (0.408-0.578)	**0.544** (0.448-0.666)	**0.607** (0.486-0.764)	**0.673** (0.522-0.875)	**0.764** (0.566-1.04)	**0.837** (0.597-1.19)
30-min	**0.348** (0.309-0.395)	**0.425** (0.377-0.483)	**0.527** (0.467-0.601)	**0.612** (0.537-0.705)	**0.729** (0.616-0.873)	**0.821** (0.677-1.01)	**0.916** (0.734-1.16)	**1.02** (0.789-1.32)	**1.16** (0.855-1.58)	**1.26** (0.901-1.79)
60-min	**0.522** (0.464-0.593)	**0.638** (0.566-0.725)	**0.791** (0.701-0.902)	**0.918** (0.806-1.06)	**1.09** (0.924-1.31)	**1.23** (1.02-1.51)	**1.38** (1.10-1.73)	**1.53** (1.18-1.98)	**1.73** (1.28-2.36)	**1.90** (1.35-2.69)
2-hr	**0.797** (0.709-0.905)	**0.968** (0.860-1.10)	**1.19** (1.05-1.36)	**1.37** (1.20-1.57)	**1.60** (1.35-1.92)	**1.78** (1.47-2.18)	**1.96** (1.57-2.47)	**2.15** (1.67-2.79)	**2.39** (1.77-3.26)	**2.58** (1.84-3.66)
3-hr	**1.03** (0.915-1.17)	**1.25** (1.11-1.42)	**1.52** (1.35-1.74)	**1.74** (1.53-2.01)	**2.03** (1.72-2.43)	**2.25** (1.86-2.76)	**2.47** (1.98-3.11)	**2.69** (2.09-3.50)	**2.97** (2.20-4.06)	**3.19** (2.27-4.53)
6-hr	**1.57** (1.39-1.78)	**1.90** (1.69-2.16)	**2.32** (2.05-2.64)	**2.65** (2.32-3.05)	**3.08** (2.60-3.68)	**3.39** (2.80-4.16)	**3.71** (2.97-4.67)	**4.02** (3.12-5.23)	**4.42** (3.27-6.03)	**4.72** (3.36-6.69)
12-hr	**2.25**	**2.76**	**3.40**	**3.91**	**4.57**	**5.07**	**5.55**	**6.04**	**6.67**	**7.15**

	(2.00-2.55)	(2.45-3.13)	(3.01-3.88)	(3.43-4.50)	(3.86-5.47)	(4.18-6.21)	(4.45-7.00)	(4.69-7.86)	(4.94-9.10)	(5.09-10.1)
24-hr	**3.15** (2.84-3.58)	**3.94** (3.54-4.48)	**4.94** (4.43-5.63)	**5.74** (5.11-6.58)	**6.80** (5.89-8.01)	**7.59** (6.46-9.09)	**8.37** (6.98-10.2)	**9.16** (7.47-11.5)	**10.2** (8.03-13.2)	**11.0** (8.40-14.7)
2-day	**4.14** (3.72-4.70)	**5.30** (4.76-6.02)	**6.76** (6.06-7.70)	**7.92** (7.05-9.08)	**9.45** (8.19-11.1)	**10.6** (9.01-12.7)	**11.7** (9.77-14.3)	**12.8** (10.5-16.1)	**14.3** (11.3-18.6)	**15.4** (11.8-20.6)
3-day	**4.76** (4.28-5.41)	**6.17** (5.54-7.01)	**7.94** (7.12-9.04)	**9.34** (8.32-10.7)	**11.2** (9.68-13.2)	**12.5** (10.7-15.0)	**13.9** (11.6-17.0)	**15.2** (12.4-19.1)	**17.0** (13.4-22.0)	**18.3** (14.0-24.5)
4-day	**5.29** (4.75-6.00)	**6.86** (6.16-7.80)	**8.86** (7.94-10.1)	**10.4** (9.28-12.0)	**12.5** (10.8-14.7)	**14.0** (11.9-16.8)	**15.5** (13.0-19.0)	**17.1** (13.9-21.4)	**19.0** (15.0-24.7)	**20.5** (15.7-27.4)
7-day	**6.60** (5.94-7.50)	**8.47** (7.61-9.63)	**10.9** (9.73-12.4)	**12.8** (11.4-14.6)	**15.3** (13.2-18.0)	**17.1** (14.6-20.5)	**19.0** (15.9-23.3)	**20.9** (17.0-26.2)	**23.4** (18.4-30.3)	**25.3** (19.3-33.7)
10-day	**7.53** (6.77-8.55)	**9.60** (8.62-10.9)	**12.2** (11.0-13.9)	**14.3** (12.8-16.4)	**17.1** (14.8-20.2)	**19.2** (16.4-23.0)	**21.3** (17.8-26.1)	**23.4** (19.1-29.3)	**26.2** (20.6-33.9)	**28.3** (21.6-37.7)
20-day	**9.98** (8.97-11.3)	**12.7** (11.4-14.4)	**16.1** (14.4-18.4)	**18.8** (16.8-21.6)	**22.4** (19.4-26.3)	**25.0** (21.3-29.9)	**27.5** (23.0-33.7)	**30.1** (24.6-37.7)	**33.5** (26.4-43.4)	**36.0** (27.6-48.1)
30-day	**11.9** (10.7-13.5)	**15.1** (13.5-17.1)	**19.1** (17.1-21.7)	**22.2** (19.8-25.5)	**26.2** (22.7-30.9)	**29.2** (24.9-35.0)	**32.1** (26.8-39.2)	**34.9** (28.5-43.7)	**38.6** (30.4-50.0)	**41.3** (31.6-55.2)
45-day	**14.4** (13.0-16.4)	**18.3** (16.4-20.8)	**23.0** (20.6-26.2)	**26.7** (23.8-30.6)	**31.3** (27.1-36.9)	**34.7** (29.5-41.6)	**37.9** (31.6-46.3)	**41.0** (33.4-51.3)	**45.0** (35.4-58.3)	**47.9** (36.6-63.9)
60-day	**17.0** (15.3-19.3)	**21.6** (19.4-24.5)	**27.0** (24.2-30.8)	**31.2** (27.7-35.7)	**36.3** (31.5-42.8)	**40.0** (34.1-48.0)	**43.5** (36.3-53.2)	**46.9** (38.2-58.7)	**51.1** (40.2-66.2)	**54.1** (41.4-72.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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- **Soil Erosion Factors**
  - K Factor, Rock Free
  - K Factor, Whole Soil
  - T Factor
  - Wind Erodibility Group
  - Wind Erodibility Index
- Soil Health Properties
- Soil Physical Properties
- **Soil Qualities and Features**
  - AASHTO Group Classification (Surface)
  - AASHTO Group Index
  - Depth to a Selected Soil Restrictive Layer
  - Depth to Any Soil Restrictive Layer
  - Drainage Class
  - Frost Action
  - Frost-Free Days
  - Hydrologic Soil Group

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Description of Rating ☑

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Detailed Description ☐

Advanced Options

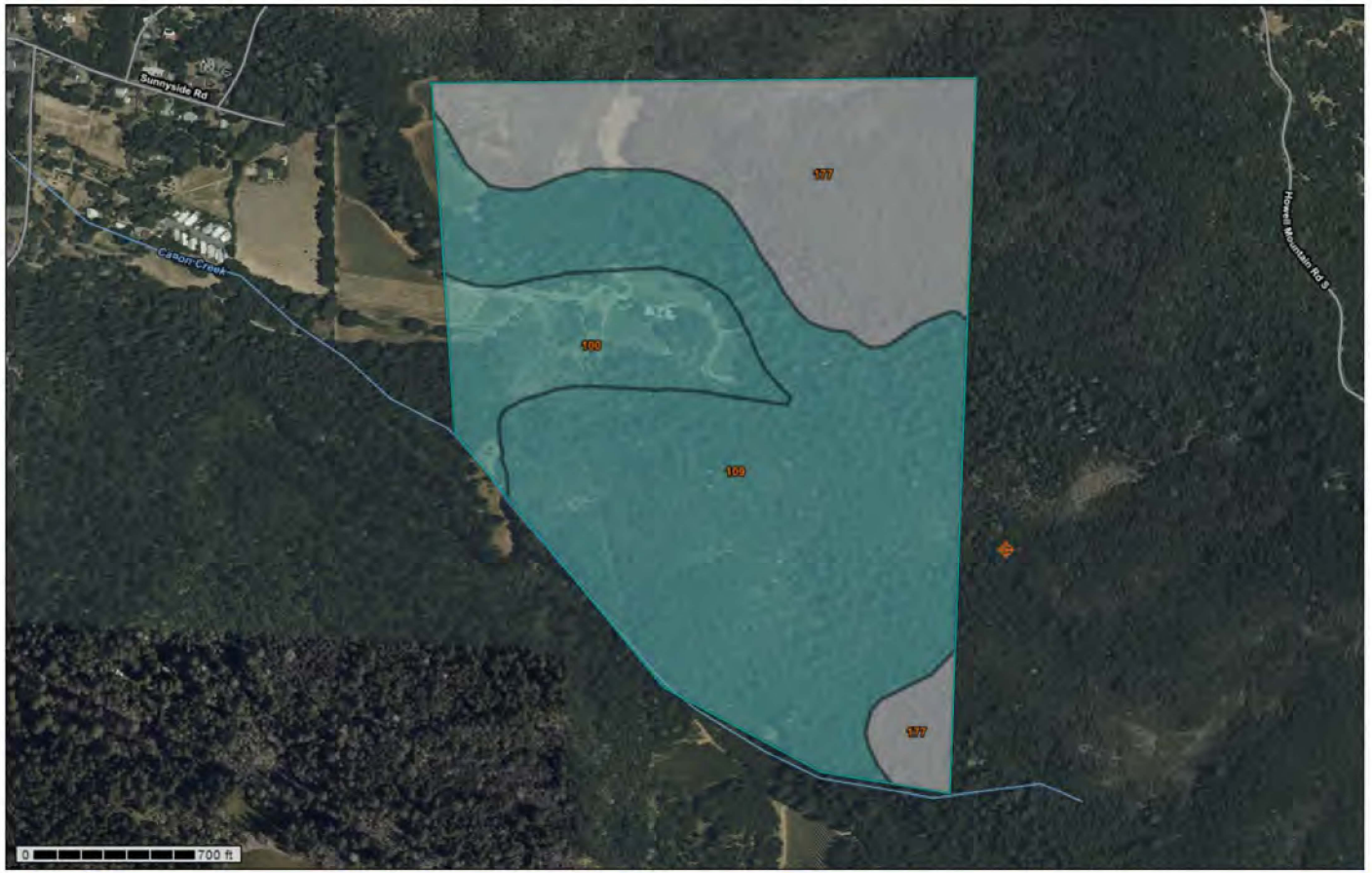
Aggregation Method: Dominant Condition

Component Percent Cutoff:

Tie-break Rule: ○ Lower ◉ Higher

Map — Hydrologic Soil Group

Scale (not to scale)



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

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent o that map 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.

Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Napa County, California (CA055)

View Description | View Rating

- Map Unit Name
- Parent Material Name
- Representative Slope
- Soil Slippage Potential
- Unified Soil Classification (Surface)
- Water Features

Summary by Map Unit — Napa County, California (CA055)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
100	Aiken loam, 2 to 15 percent slopes	C	16.7	12.5%
109	Boomer gravelly loam, volcanic bedrock, 14 to 60 percent slopes, MLRA 15	C	76.5	57.6%
177	Rock outcrop-Kidd complex, 50 to 75 percent slopes		39.6	29.9%
Totals for Area of Interest			**132.8**	**100.0%**

Description — Hydrologic Soil Group

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.

Rating Options — Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Search

Properties and Qualities Ratings

Open All | Close All

- Soil Chemical Properties
- **Soil Erosion Factors**
  - K Factor, Rock Free
  - K Factor, Whole Soil
  - T Factor
  - Wind Erodibility Group
  - Wind Erodibility Index
- Soil Health Properties
- Soil Physical Properties
- **Soil Qualities and Features**
  - AASHTO Group Classification (Surface)
  - AASHTO Group Index
  - Depth to a Selected Soil Restrictive Layer
  - Depth to Any Soil Restrictive Layer
  - Drainage Class
  - Frost Action
  - Frost-Free Days
  - Hydrologic Soil Group

View Description | View Rating

View Options

Map ☑

Table ☑

Description of Rating ☑

Rating Options ☐

☐ Detailed Description

Advanced Options

Aggregation Method: Dominant Condition

Component Percent Cutoff:

Tie-break Rule: ○ Lower ◉ Higher

Map — Hydrologic Soil Group

Scale (not to scale)

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

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent o that map 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.

Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Napa County, California (CA055)

View Description | View Rating

- Map Unit Name
- Parent Material Name
- Representative Slope
- Soil Slippage Potential
- Unified Soil Classification (Surface)

Water Features

Summary by Map Unit — Napa County, California (CA055)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
109	Boomer gravelly loam, volcanic bedrock, 14 to 60 percent slopes, MLRA 15	C	28.6	12.7%
138	Forward silt loam, 3 to 26 percent slopes, MLRA 15	C	17.2	7.6%
140	Forward silt loam, 12 to 57 percent slopes, MLRA 15	C	150.5	66.9%
141	Forward-Kidd complex, 11 to 60 percent slopes, MLRA 15	C	0.0	0.0%
177	Rock outcrop-Kidd complex, 50 to 75 percent slopes		28.8	12.8%
Totals for Area of Interest			**225.0**	**100.0%**

Description — Hydrologic Soil Group

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.

Rating Options — Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1/]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2/]	Hydrologic condition [3/]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition, and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

NRCS
from EFH, Part 650 Oct 2008
Chapter 2, Supplement A
Est. 1960 in Cal

Cover			Hydrologic Soil Groups			
Land Use	Treatment or Practice	Hydrologic 1/ Condition	A	B	C	D
Orchards, deciduous		(See accompanying land-use description)				
Orchards, Evergreen		Poor	55	72	81	86
		Fair	42	64	76	82
		Good	33	58	72	79
Vineyards (next page)		(See accompanying land-use description)				
NON-CULTIVATED AGRICULTURAL LAND (Grassland, Woodland, Brushland)						
Annual grass		Poor	65	78	86	89
		Fair	49	69	79	84
		Good	38	61	75	81
Broadleaf chaparral		Poor	53	70	80	85
		Fair	40	63	75	81
		Good	31	57	71	78
Meadow		Poor	63	77	84	90
		Fair	58	70	78	84
		Good	30	58	72	78
Narrowleaf chaparral		Poor	70	82	88	90
		Fair	55	72	81	86
Open brush		Poor	61	76	84	88
		Fair	46	66	77	83
		Good	41	63	75	81

Exhibit 2.1-3

Close-seeded legumes or rotation meadow, contour - Close-seeded legumes or rotation meadow planted on the contour or in straight rows on land with 2 percent slopes or less.

Irrigated pasture - Irrigated land that is planted to perennial grasses and legumes for production of forage and which is cultivated only to establish or renew the stand of plants. For hydrologic purposes, dryland pasture is considered as annual grass.

Orchards, Deciduous - Land planted to such deciduous trees as apples, apricots, pears, walnuts, and almonds. Soil protection during the rainy season is dependent on ground cover. This ground cover may be annual grass or perennial grass cover crops with or without legumes, occasionally legumes alone.

Use curve numbers that apply to the land use or the kind and condition of cover during storm periods; for example, Annual grass curve numbers for annual grass or grass-legume cover. Where orchards are kept bare by disking or the use of herbicides, use Fallow curve numbers.

Because of management practices, ground cover in orchards is seldom continous. Only orchards untilled with more than 75 percent of the ground surface continuously protected by cover are in Good Hydrologic Condition, others are Fair or Poor.

Orchards, Evergreen - Land planted to evergreen trees which include citrus, avocado, and Christmas tree plantations. Soil protection is dependent on ground cover or litter. This ground cover may be annual grass or perennial grass cover crops with or without legumes alone; or the ground protection may be litter where tree canopy is sufficiently dense to produce an effective amount of fallen leaves.

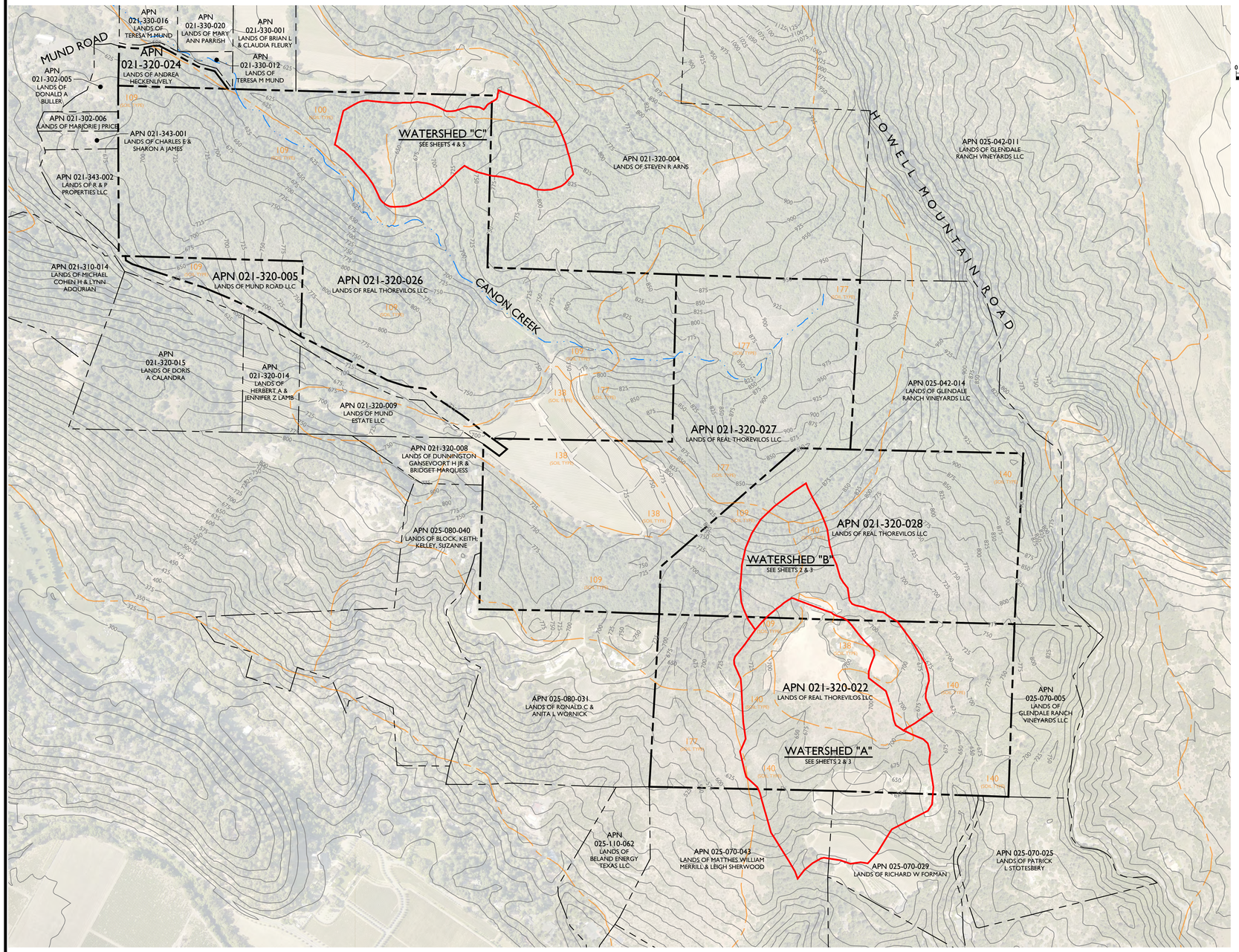
Because of management practices, ground cover in orchards is seldom continous. Only untilled orchards with more than 75 percent of the ground surface continuously protected by litter or plant cover are in Good Hydrologic Condition, others are Fair or Poor.

Vineyards - Land planted to grapes. Soil protection during the rainy season is dependent on ground cover. This ground cover may be annual grass or perennial grass cover crops with or without legumes, occasionally legumes alone.

Use curve numbers that apply to the land use or the kind and condition of cover during the storm periods; for example, Annual grass curve numbers for annual grass or grass legume cover. Where vineyards are kept bare by disking or the use of herbicides, use Fallow curve numbers.

REAL THOREVILOS LLC

WATERSHED EXHIBIT

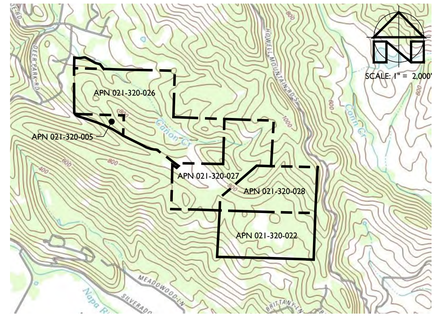


SCALE: 1" = 400'

0 400' 800'

OVERALL SITE PLAN

SCALE: 1" = 400'



LOCATION MAP

SCALE: 1" = 2,000'

PROJECT INFORMATION:

PROPERTY OWNER & APPLICANT:
REAL THOREVILOS LLC
180 MUND ROAD
SAINT HELENA, CA 94574

SITE ADDRESS:
MUND ROAD
SAINT HELENA, CA 94574

ASSESSOR'S PARCEL NUMBERS:
021-320-005, -022, -024, -026, -027 & -028

PARCEL SIZES:
13.5 ±, 80 ±, 5.4 ±, 144.21 ±, 90 ± & 70 ± ACRES

ZONING:
AGRICULTURAL WATERSHED (AW)

SHEET INDEX:

FLOOD HAZARD NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0264E & 06055C0265E, EFFECTIVE SEPTEMBER 26, 2008, THE PROJECT SITE IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA.

NOTES:

1. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION WAS TAKEN FROM THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATABASE. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
2. AERIAL PHOTOGRAPHS WERE OBTAINED FROM THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM (GIS) DATABASE, TAKEN APRIL TO JUNE 2018 AND MAY NOT REPRESENT CURRENT CONDITIONS.
3. CONTOUR INTERVAL:
   SHEET 1: TWENTY FIVE (25) FEET.
   REMAINING SHEETS: FIVE (5) FEET, HIGHLIGHTED EVERY TWENTY FIVE (25) FEET.
4. BENCHMARK: NAVD 88
5. THE PROPERTY LINES SHOWN ON THESE PLANS DO NOT REPRESENT A BOUNDARY SURVEY. THEY ARE APPROXIMATE AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

SOIL TYPE LEGEND:

100	AIKEN LOAM, 2 TO 15 PERCENT SLOPES
109	BOOMER GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES
138	FORWARD GRAVELLY LOAM, 2 TO 9 PERCENT SLOPES
140	FORWARD GRAVELLY LOAM, 30 TO 75 PERCENT SLOPES
177	ROCK OUTCROP-KIDD COMPLEX, 50 TO 75 PERCENT SLOPES

SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

LEGEND:

- APPROXIMATE PROPERTY LINE
- SOIL TYPE BOUNDARY
- BLUELINE STREAM
- WATERSHED AREA

APPLIED CIVIL ENGINEERING INCORPORATED
2074 West Lincoln Avenue
Napa, CA 94558
(707) 320-4968 (707) 320-2395 Fax
www.appliedcivil.com

REAL THOREVILOS LLC

OVERALL SITE PLAN

PREPARED UNDER THE DIRECTION OF:

REGISTERED PROFESSIONAL ENGINEER MICHAEL R MRM 63312 CIVIL STATE OF CALIFORNIA

PRELIMINARY NOT FOR CONSTRUCTION

DRAWN BY: BT DRAFTING

CHECKED BY: MRM

DATE: MARCH 2021

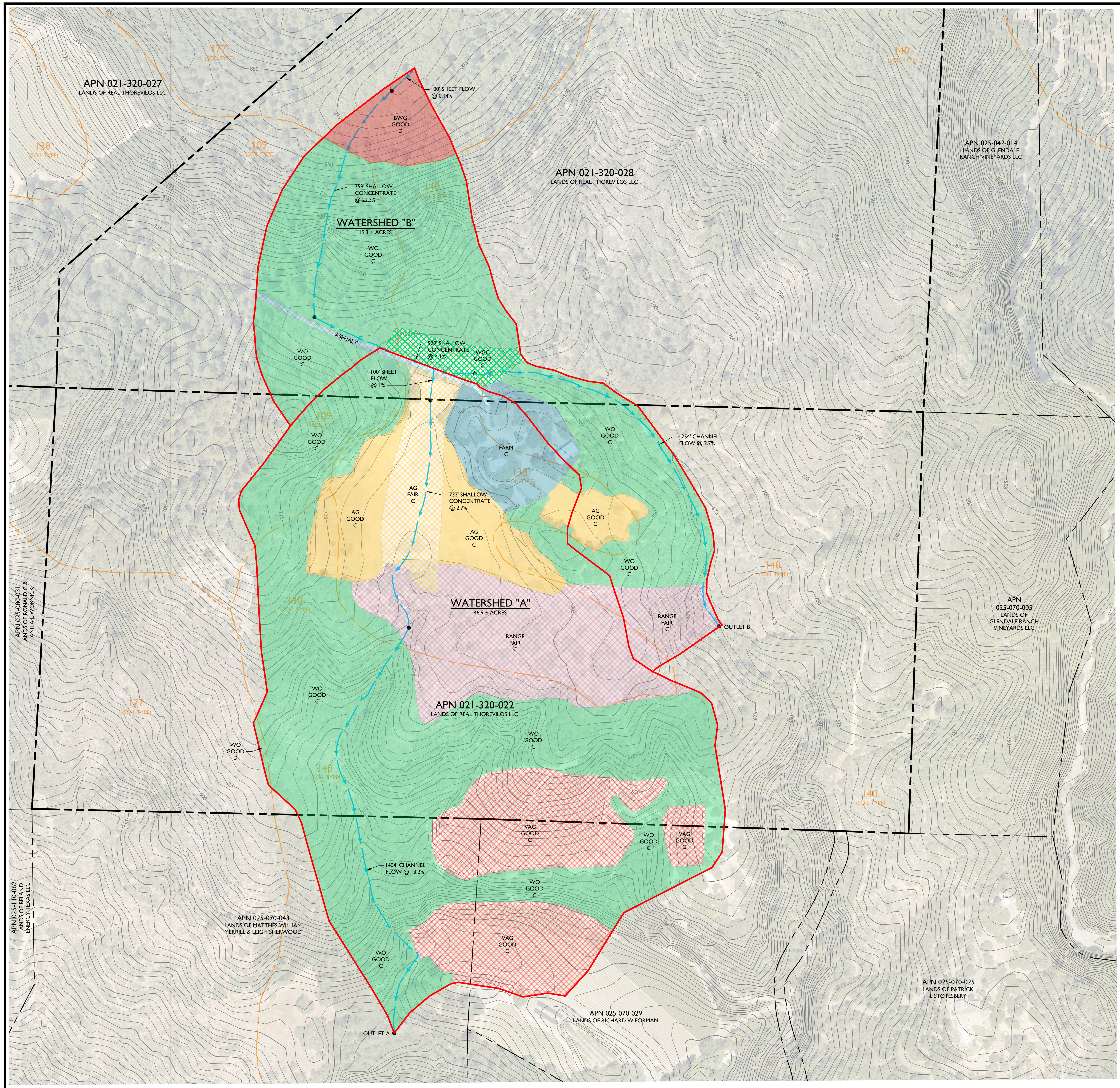
REVISIONS: BY:

JOB NUMBER: 19-133

FILE: 19-133EXH-OSP.DWG

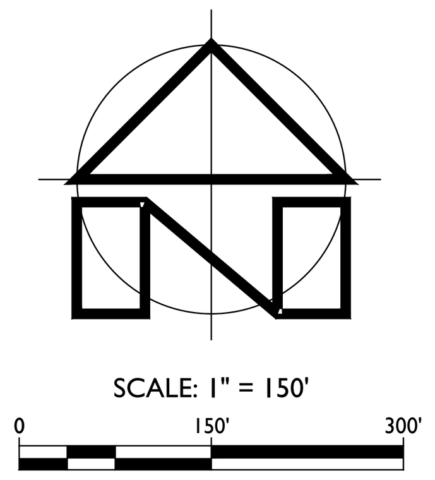
ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: 1 OF 5



WATERSHED A & B PRE-PROJECT SITE CONDITIONS

SCALE: 1" = 150'



LEGEND:

- APPROXIMATE PROPERTY LINE
- SOIL TYPE BOUNDARY
- WATERSHED AREA
- TIME OF CONCENTRATION FLOW PATH

SOILS TYPE LEGEND:

TYPE	HSG	DESCRIPTION
109	C	BOOMER GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES
138	C	FORWARD GRAVELLY LOAM, 2 TO 9 PERCENT SLOPES
140	C	FORWARD GRAVELLY LOAM, 30 TO 75 PERCENT SLOPES
177	D	ROCK OUTCROP-KIDD COMPLEX, 50 TO 75 PERCENT SLOPES

SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

WATERSHED "A" PRE-PROJECT AREA SUMMARY

PLAN SYMBOL	LAND USE DESCRIPTION	HYDROLOGIC CONDITION	HYDROLOGIC SOIL GROUP	CURVE NUMBER (CN)	PRE-PROJECT (ACRES)
AG-GOOD-C	ANNUAL GRASS	GOOD	C	75	4.0 ± AC
AG-FAIR-C	ANNUAL GRASS	FAIR	C	79	2.3 ± AC
VAG-GOOD-C	VINEYARD - ANNUAL GRASS	GOOD	C	75	7.6 ± AC
WO-GOOD-C	WOODS	GOOD	C	70	24.2 ± AC
WO-GOOD-D	WOODS	GOOD	D	77	0.1 ± AC
RANGE-FAIR-C	RANGE	FAIR	C	79	6.6 ± AC
ASPHALT	PAVED ROAD	N/A	C	92	0.1 ± AC
FARM-C	FARMSTEAD	N/A	C	82	2.0 ± AC
				TOTAL	46.9 ± AC

WATERSHED "B" PRE-PROJECT AREA SUMMARY

PLAN SYMBOL	LAND USE DESCRIPTION	HYDROLOGIC CONDITION	HYDROLOGIC SOIL GROUP	CURVE NUMBER (CN)	PRE-PROJECT (ACRES)
AG-GOOD-C	ANNUAL GRASS	GOOD	C	75	0.7 ± AC
BWG-GOOD-D	BRUSH - WEED - GRASS	GOOD	D	73	1.6 ± AC
WGC-GOOD-C	WOODS - GRASS COMBINATION	GOOD	C	72	0.9 ± AC
WO-GOOD-C	WOODS	GOOD	C	70	14.2 ± AC
RANGE-FAIR-C	RANGE	FAIR	C	79	1.3 ± AC
ASPHALT	PAVED ROAD	N/A	C	92	0.1 ± AC
FARM-C	FARMSTEAD	N/A	C	82	0.5 ± AC
				TOTAL	19.3 ± AC

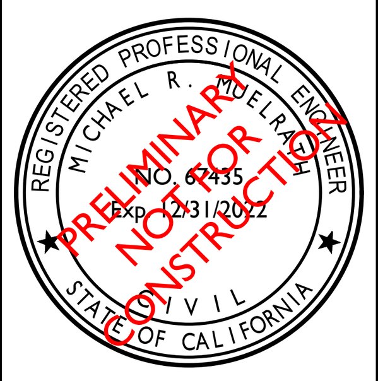
APPLIED CIVIL ENGINEERING INCORPORATED
2074 West Lincoln Avenue
Napa, CA 94558
(707) 320-4968 (707) 320-2395 Fax
www.appliedcivil.com

REAL THOREVILOS LLC

WATERSHED EXHIBIT

WATERSHED A & B PRE-PROJECT SITE CONDITIONS

PREPARED UNDER THE DIRECTION OF:



DRAWN BY: BT DRAFTING

CHECKED BY: MRM

DATE: MARCH 2021

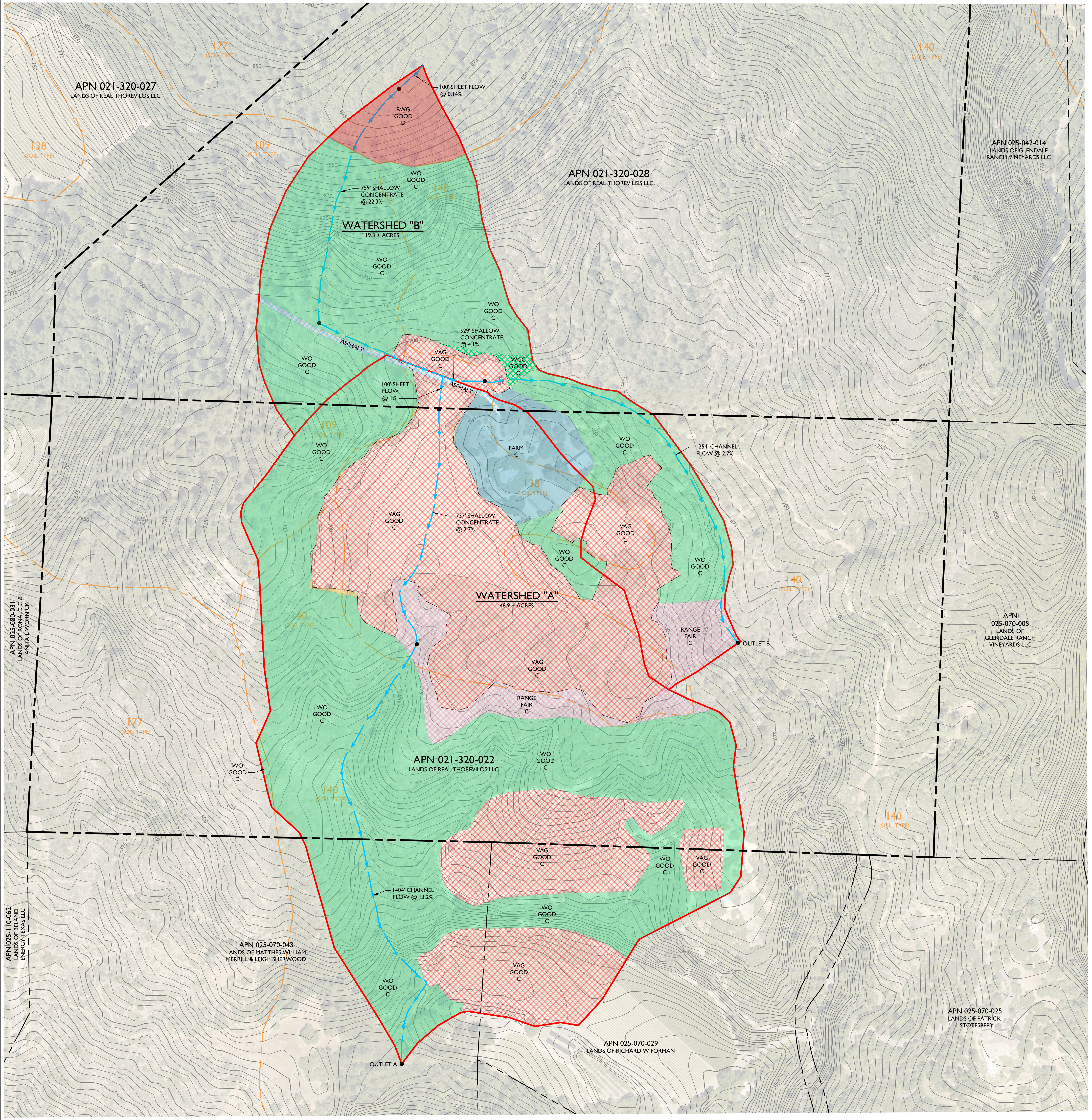
REVISIONS: BY:

JOB NUMBER: 19-133

FILE: 19-133EXH-ES-WTRSHED-PRE.DWG

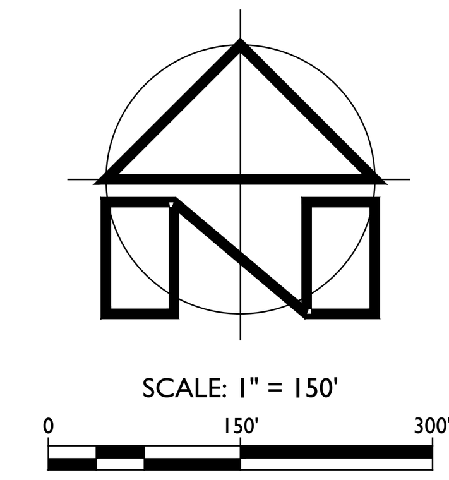
ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: 2 OF 5



WATERSHED A & B POST PROJECT SITE CONDITIONS

SCALE: 1" = 150'



LEGEND:

- APPROXIMATE PROPERTY LINE
- SOIL TYPE BOUNDARY
- CLEARING LIMITS
- WATERSHED AREA
- TIME OF CONCENTRATION FLOW PATH

SOILS TYPE LEGEND:

TYPE	HSG	DESCRIPTION
109	C	BOOMER GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES
138	C	FORWARD GRAVELLY LOAM, 2 TO 9 PERCENT SLOPES
140	C	FORWARD GRAVELLY LOAM, 30 TO 75 PERCENT SLOPES
177	D	ROCK OUTCROP-KIDD COMPLEX, 50 TO 75 PERCENT SLOPES

SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

WATERSHED "A" POST PROJECT AREA SUMMARY

PLAN SYMBOL	LAND USE DESCRIPTION	HYDROLOGIC CONDITION	HYDROLOGIC SOIL GROUP	CURVE NUMBER (CN)	PRE-PROJECT (ACRES)	REMOVED (ACRES)	POST-PROJECT
AG-GOOD-C	ANNUAL GRASS	GOOD	C	75	4.0 ± AC	4.0 ± AC	0.0 ± AC
AG-FAIR-C	ANNUAL GRASS	FAIR	C	79	2.3 ± AC	2.3 ± AC	0.0 ± AC
VAG-GOOD-C	VINEYARD - ANNUAL GRASS	GOOD	C	75	7.6 ± AC	-	18.9 ± AC
WO-GOOD-C	WOODS	GOOD	C	70	24.2 ± AC	0.4 ± AC	23.8 ± AC
WO-GOOD-D	WOODS	GOOD	D	77	0.1 ± AC	-	0.1 ± AC
RANGE-FAIR-C	RANGE	FAIR	C	79	6.6 ± AC	4.6 ± AC	2.0 ± AC
ASPHALT	PAVED ROAD	N/A	C	92	0.1 ± AC	-	0.1 ± AC
FARM-C	FARMSTEAD	N/A	C	82	2.0 ± AC	-	2.0 ± AC
				TOTAL	46.9 ± AC	11.3 ± AC	46.9 ± AC

WATERSHED "B" POST PROJECT AREA SUMMARY

PLAN SYMBOL	LAND USE DESCRIPTION	HYDROLOGIC CONDITION	HYDROLOGIC SOIL GROUP	CURVE NUMBER (CN)	PRE-PROJECT (ACRES)	REMOVED (ACRES)	POST-PROJECT
AG-GOOD-C	ANNUAL GRASS	GOOD	C	75	0.7 ± AC	0.7 ± AC	0.0 ± AC
VAG-GOOD-C	VINEYARD - ANNUAL GRASS	GOOD	C	75	-	-	2.9 ± AC
BWG-GOOD-D	BRUSH - WEED - GRASS	GOOD	D	73	1.6 ± AC	-	1.6 ± AC
WGC-GOOD-C	WOODS - GRASS COMBINATION	GOOD	C	72	0.9 ± AC	0.7 ± AC	0.2 ± AC
WO-GOOD-C	WOODS	GOOD	C	70	14.2 ± AC	1.1 ± AC	13.1 ± AC
RANGE-FAIR-C	RANGE	FAIR	C	79	1.3 ± AC	0.4 ± AC	0.9 ± AC
ASPHALT	PAVED ROAD	N/A	C	92	0.1 ± AC	-	0.1 ± AC
FARM-C	FARMSTEAD	N/A	C	82	0.5 ± AC	-	0.5 ± AC
				TOTAL	19.3 ± AC	2.9 ± AC	19.3 ± AC

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(707) 320-4968 (707) 320-2395 Fax
www.appliedcivil.com

REAL THOREVILOS LLC

WATERSHED EXHIBIT

WATERSHED A & B POST PROJECT SITE CONDITIONS

PREPARED UNDER THE DIRECTION OF:

PRELIMINARY NOT FOR CONSTRUCTION

DRAWN BY: BT DRAFTING

CHECKED BY: MRM

DATE: MARCH 2021

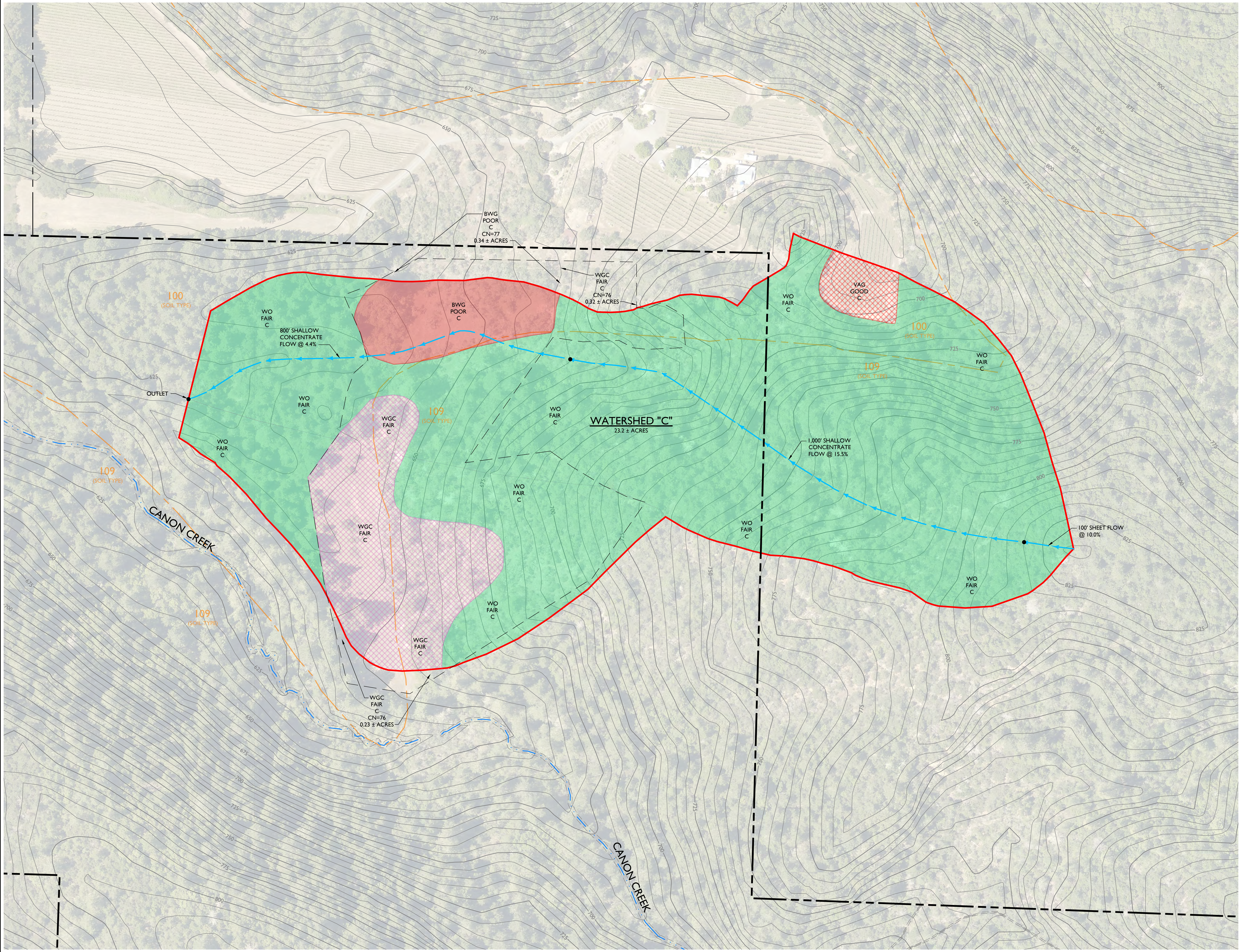
REVISIONS: BY:

JOB NUMBER: 19-133

FILE: 19-133EXH-ES-WTRSHED-POST.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: 3 OF 5



SCALE: 1" = 100'

WATERSHED C PRE-PROJECT SITE CONDITIONS

SCALE: 1" = 100'

LEGEND:

- APPROXIMATE PROPERTY LINE
- SOIL TYPE BOUNDARY
- BLUELINE STREAM
- CLEARING LIMITS
- WATERSHED AREA
- TIME OF CONCENTRATION FLOW PATH

SOILS TYPE LEGEND:

TYPE	HSG	DESCRIPTION
109	C	BOOMER GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES
100	C	AIKEN LOAM, 2 TO 15 PERCENT SLOPES

SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

WATERSHED "C" PRE-PROJECT AREA SUMMARY

PLAN SYMBOL	LAND USE DESCRIPTION	HYDROLOGIC CONDITION	HYDROLOGIC SOIL GROUP	CURVE NUMBER (CN)	PRE-PROJECT (ACRES)
BWG-POOR-C	BRUSH - WEED - GRASS	POOR	C	77	1.2 ± AC
VAG-GOOD-C	VINEYARD - ANNUAL GRASS	GOOD	C	75	0.4 ± AC
WO-FAIR-C	WOODS	FAIR	C	73	18.8 ± AC
WGC-FAIR-C	WOODS GRASS COMBINATION	FAIR	C	76	2.8 ± AC
				TOTAL	23.2 ± AC

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REAL THOREVILOS LLC

WATERSHED EXHIBIT

WATERSHED C PRE-PROJECT SITE CONDITIONS

PREPARED UNDER THE DIRECTION OF:

DRAWN BY: BT DRAFTING

CHECKED BY: MRM

DATE: MARCH 2021

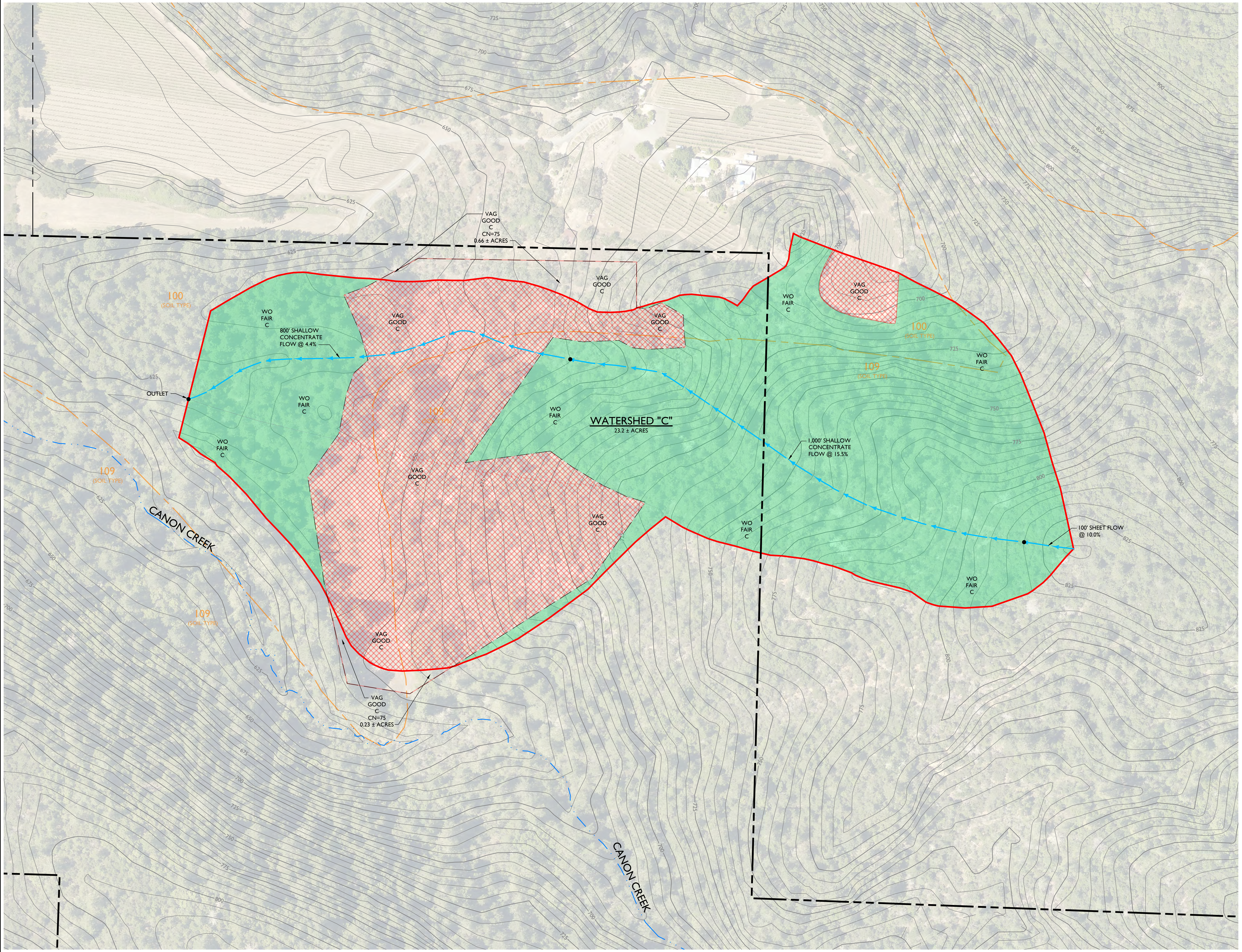
REVISIONS: BY:

JOB NUMBER: 19-133

FILE: 19-133EXH-EN-WTRSHED-PRE.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: 4 OF 5



SCALE: 1" = 100'

0 100' 200'

LEGEND:

- APPROXIMATE PROPERTY LINE
- SOIL TYPE BOUNDARY
- BLUELINE STREAM
- CLEARING LIMITS
- WATERSHED AREA
- TIME OF CONCENTRATION FLOW PATH

SOILS TYPE LEGEND:

TYPE	HSG	DESCRIPTION
109	C	BOOMER GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES
100	C	AIKEN LOAM, 2 TO 15 PERCENT SLOPES

SOIL TYPE BOUNDARIES SHOWN ON THIS MAP ARE BASED ON THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATA AND SHOULD BE CONSIDERED APPROXIMATE.

WATERSHED "C" POST PROJECT AREA SUMMARY

PLAN SYMBOL	LAND USE DESCRIPTION	HYDROLOGIC CONDITION	HYDROLOGIC SOIL GROUP	CURVE NUMBER (CN)	POST PROJECT (ACRES)
VAG-GOOD-C	VINEYARD - ANNUAL GRASS	GOOD	C	75	8.4 ± AC
WO-FAIR-C	WOODS	FAIR	C	73	14.8 ± AC
				TOTAL	23.2 ± AC

WATERSHED C POST PROJECT SITE CONDITIONS

SCALE: 1" = 100'

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REAL THOREVILOS LLC

WATERSHED EXHIBIT

WATERSHED C POST PROJECT SITE CONDITIONS

PREPARED UNDER THE DIRECTION OF:

PRELIMINARY NOT FOR CONSTRUCTION

DRAWN BY: BT DRAFTING

CHECKED BY: MRM

DATE: MARCH 2021

REVISIONS: BY:

JOB NUMBER: 19-133

FILE: 9-133EXH-EN-WTRSHED-POST.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: 5 OF 5