

Addendum  
Hydrologic Analysis  
Kenzo Vineyard Proposal  
November 24, 2022

In response to comments from Napa County Planning and Engineering Staff, David Steiner, CPESC, CPWSC, offers the following Addendum to the original Hydrologic Analysis. There appears to have been some confusion on the part of County staff as to the function of the proposed rock-filled retention bench, to be installed at the outlet of Sub-watershed A-1. In particular, it is important to bear in mind that, although the bench is designed for the 100-year/24 hour storm, its performance during lesser storms needs to be evaluated in light of those storms' lower flows. Clearly, it will take longer to fill the structure during a smaller storm—as expressed in the TR-55 model as (1) a reduced peak flow prediction from the sub-watershed and (2) an increased Time of Concentration for the main watershed. The performance of the bench for each storm is a function of the sub-watershed's peak flow *for that storm*, and not of the peak flow for the bench's (100-year) design storm.

- The bench's storage capacity is increased from 875 cubic feet to 925 cubic feet.
- A printout from a two-sheet Excel spreadsheet accompanies this addendum. Sheet 1 shows the increase to the Time of Concentration, provided by the proposed bench, to 24-hour storms of 2-, 10-, 50-, and 100-year return intervals, per the requirements of Napa County Planning staff.
- Sheet 2 is an Excel adaptation of the table cited by County Planner Pamela Arifian in her email of November 21, 2022 to Mike Muelrath. This sheet deletes the original table's rows that purport to evaluate 2-year storm peaks, and summarizes the WinTR-55 calculations that show the effects of the proposed (100-year) bench on each of the relevant storms. Modified cells are shaded in yellow.
- Also accompanying this narrative are the WinTR-55 printouts of the Peak Flows, and the (edited and unedited) Times of Concentration, as referenced in the previous bullet point. (As the "storms" and "Curve Numbers" sheets are unchanged from the original submittal, they are not included here.)

**Conclusion:** The proposed retention bench, designed for the 100-year storm, will bring the project watershed's post-project peak to parity with pre-project conditions, with no predicted increase in peak flow or runoff for the 2-, 10-, 50-, or 100-year/24-hour storms.

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Time of Concentration Increase Provided by Specified Retention Bench

Storm Return interval	Storage volume provided (cf)	$Q_{peak}$ Sub-watershed A-1 (cfs)	Tc increase (seconds)	Tc increase (hours)
100 year	925	10.3	89.8	<b>0.025</b>
50 year	925	8.91	103.8	<b>0.029</b>
10 year	925	5.67	163.1	<b>0.045</b>
2 year	925	2.68	345.1	<b>0.096</b>

Formula for above calculations:

Storage volume (cf)/ $Q_{peak}$  (cfs)/3600 seconds/hr

See WinTR-55 printouts for results (impact of Tc increase on post-project peak flow of the main watershed), summarized on Sheet 2.

	Runoff (cfs)			
	2-year	10-year	50-year	100-year
<b>Main Watershed - Peak Flow</b>				
Pre-project conditions	15.23	32.29	50.84	58.77
Post-project conditions	15.95	33.23	51.82	59.76
Change (cfs)	0.72	0.94	0.98	0.99
Change (%)	4.70%	2.90%	1.90%	1.70%
<b>Sub-Area 1-A - Peak Flow – Tc Extended</b>				
Post-project conditions: Retention Bench Designed for 100 year storm	14.94	32.20	50.77	58.76
Change (cfs)	-0.29	-0.09	-0.07	-0.01
Change (%)	-1.90%	-0.28%	-0.14%	-0.02%

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Post-Project, Addendum, 2-yr storm  
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)
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SUBAREAS

Main	14.94 12.22
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REACHES

OUTLET	14.94
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Post-Project, with bench, 10-yr storm  
County, California

Hydrograph Peak/Peak Time Table

Sub-Area            Peak Flow and Peak Time (hr) by Rainfall Return Period  
or Reach            10-Yr  
Identifier           (cfs)  
                      (hr)

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SUBAREAS

Main                32.20  
                      12.19

REACHES

OUTLET             32.20







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Post-Project, with bench, 50-yr storm  
County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 50-Yr (cfs) (hr)
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SUBAREAS

Main	50.77 12.17
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REACHES

OUTLET	50.77
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Post-Project, with bench, 100-yr storm  
Napa County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 100-Yr (cfs) (hr)
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SUBAREAS

Main	58.76 12.18
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REACHES

OUTLET	58.76
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Post-Project, with bench, 100-yr storm  
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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)
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Main							
SHEET	100	0.3000	0.240				0.072
SHALLOW	555	0.2880	0.050				0.018
SHALLOW	1610	0.0710	0.050				0.104
CHANNEL	40					7.350	0.002
CHANNEL	265	0.0100	0.040	5.00	7.00	2.944	0.025
Time of Concentration							.221
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