RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

MEMORANDUM

April 29, 2022

To: Pamela Arifian
Napa County Planning, Building, & Environmental Services Department (PBES)
Sent via email (pamela.arifian@countyofnapa.org)

Job No. 729-NPA01

From: Edward Linden, GIT; Anthony Hicke, CHG
Richard C. Slade & Associates LLC (RCS)

Re: Response to Napa County PBES Inquiry
Regarding Current Applicability of the RCS-Prepared Water Availability Analysis
Silver Oak Carmelite WAA P21-00064-ECPA

Ref: "Results of Napa County Tier 1 and Tier 2 Water Availability Analyses (WAA)
Vineyard Development Project at Carmelite House of Prayer Property
20 Mount Carmel Drive
Vicinity Oakville, Napa County, California"
Dated March 10, 2021
Prepared by RCS

Napa County PBES inquired whether the opinions and analyses expressed by RCS in the Referenced WAA document for the Vineyard Development Project at the Carmelite House of Prayer Property, published March 10, 2021, remain the same when considering the drought conditions the State of California continues to experience in April 2022. To address this question, RCS has recently reviewed the precipitation data for the project region that was relied upon for the referenced WAA and compared those data to current conditions and totals.

Two values in the referenced March 2021 WAA rely on rainfall data: the average annual groundwater recharge, and the drought year groundwater recharge calculated for the subject property. In the WAA, average annual onsite rainfall was derived from the 1981-2010 PRISM 30-year normal dataset. The average annual onsite rainfall value derived from that dataset was 35.3 inches, and the average annual groundwater recharge to the property calculated using that average rainfall value was 11.6 AF/yr. In addition, the reduced recharge that may be experienced during a theoretical, prolonged drought period was defined in the refrenced WAA based on the long-term dataset for the WRCC St. Helena rainfall gage, in which only 40% of average annual rainfall was recorded for this gage during Water Years 1975-76 to 1976-77.

To demonstrate that the estimates provided in the WAA remain reasonable, RCS has reviewed the updated rainfall datasets used for the recharge and drought period calculations, and compared those datasets to the current precipitation databases. The 1981-2010 PRISM dataset was replaced by the 1991-2020 PRISM dataset, whereas the WRCC St. Helena dataset was extended forward more than 1 year, through February 2022.

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For the subject property, the 30-year normal rainfall in the 1991-2020 PRISM dataset was calculated to be 36.0 inches, or 0.7 inches higher than that calculated for the 30-year normal derived using the 1981-2010 PRISM dataset. Based on this increase and the parameters listed in the RCS 2021 report, the average annual onsite groundwater recharge from rainfall is calculated to increase slightly, from 11.6 AF/yr to 11.8 AF/yr. This updated value is several times greater than the estimated project groundwater demand of 2.33 AF.

For comparison, RCS attempted to consider the current ongoing drought period that began in Water Year 2019-20. Attached hereto is an updated version of Table 4 that was originally provided in the referenced WAA. Data from each of the rain gages were updated with available data. In the original WAA, drought conditions from the 1975-76 to 1976-77 drought period recorded at the WRCC St. Helena age were used to estimate potential prolonged drought impacts on groundwater recharge at the subject property. As shown on Updated Table 4 for the WRCC St. Helena rainfall gage, inclusion of more recent data (through February 2022) in the dataset results in an annual average rainfall value of 32.8 inches, which is 0.5 inches less than the 33.3 inches for this gage shown in the existing WAA. Based on this lower annual average, the calculated "prolonged drought" period annual average for this gage would increase to 41% of average.

Unfortunately, the WRCC St. Helena gage is completely missing data during the current drought period for the months of November 2020, February 2021, December 2021, and January 2022. On average, these months are four of the five wettest months at this gage, according to the WRCC website. In particular, December 2021 was an extremely wet month in the region according to multiple nearby, but shorter-term-record rain gages. Hence, using data from the WRCC St. Helena gage to provide a representative estimate for the current drought period would likely represent a significant underestimate of the actual rainfall.

Because of this likely underestimation of rainfall at the St. Helena gage during the current drought period, the use of 40% of average annual rainfall (derived from the Water Years 1975-76 to 1976-77 drought period, shown on the original Table 4) remains a reasonable estimate of drought period conditions during a "prolonged" drought.

As demonstrated above, the differences between the rainfall values used in the WAA and the updated values result in slight changes to the annual recharge and drought period recharge values calculated for the proposed project. It is the opinion of RCS that the estimates in the referenced WAA remain valid in light of the current drought conditions in Napa County, and RCS continues to support the conclusions expressed in the March 2021 WAA.

UPDATED Table 4
Drought Period Rainfall as Percentage of Average
Carmelite House of Prayer Property

Statewide Drought Period as Defined by DWR/NDMC	Drought Duration (years)	Average Rainfall by Raingage								
		St Helena WRCC Period of Record - WY 1907-08 to WY 2021-22			Hopper Creek at Highway 29 Napa OneRain Period of Record - WY 2003-04 to WY 2021-22			Dry Creek Fire Station Napa OneRain Period of Record - WY 2006-07 to WY 2021-22		
		[A] Total Gage Average (in)	[B] Drought Period Ave. (in)	[B/A] Drought Period Rainfall as % of Average	[A] Total Gage Average (in)	[B] Drought Period Ave. (in)	[B/A] Drought Period Rainfall as % of Average	[E] Total Gage Average (in)	[F] Drought Period Ave. (in)	[F/E] Drought Period Rainfall as % of Average
WY 1928-29 to WY 1933-34	6	32.8	23.9	73%	ND	ND	ND	ND	ND	ND
WY 1975-76 to WY 1976-77	2	32.8	13.4	41%	ND	ND	ND	ND	ND	ND
WY 1986-87 to WY 1991-92	6	32.8	18.3*	56%*	ND	ND	ND	ND	ND	ND
WY 2006-07 to WY 2008-09	3	32.8	24.8*	76%*	26.7	17.5	66%	30.0	26.4	88%
WY 2011-12 to WY 2015-16	5	32.8	21.7*	66%*	26.7	23.0	86%	30.0	26.3	88%
WY 2019-20 to WY 2021-22†	3	32.8	8.0*	24%*	26.7	17.6*	66%*	30.0	18.1*	60%*

Notes:

ND = No rainfall data for corresponding drought period.

*Raingage data do not extend through entire drought period and/or are missing rainfall data within drought period.

† = Rainfall totals for WY 2021-22 are current through February 2022