

March 5, 2026

Mr. Dwayne Wilson
3683 Brookside Drive
Bishop, California 93514

Re: Hydrogeologic Assessment Letter Report
250 Panorama Drive, Wilkerson Subdivision, Bishop, California

Dear Mr. Wilson,

Roux Associates Inc. (Roux) is pleased to submit this Hydrogeologic Assessment Letter Report (Letter Report) evaluating the impacts of pumping related to the proposed subdivision of a 3-acre lot at 250 Panorama Drive in the Wilkerson Subdivision of Bishop, California (Site; Figure 1). This hydrogeologic assessment addresses the following key elements:

- 1) Evaluation of the potential effects of additional pumping that would occur as a result of subdivision of your 3-acre lot to four lots; and
- 2) General water availability.

Roux conducted the following assessment without gathering any new data from the Site. All information used to make our assessment, and conclusions are referenced throughout the text of this Letter Report. The following sections summarize the regional and local geology and hydrogeology of the Site, hydrogeologic assumptions and calculations used to determine the impacts of additional groundwater pumping at the Site, and on the surrounding hydrogeologic system. Additionally, an assessment of general water availability in the Wilkerson Subdivision is provided.

INTRODUCTION

The Wilkerson Subdivision is located approximately 5 miles south of Bishop, California, along the eastern edge of the Sierra Nevada. This small community with a population of approximately 598 residents, as of 2023, sits along the western boundary of the Owens Valley. The subdivision in the immediate vicinity of the Site consists of approximately 130 single family residential structures based on a review of aerial imagery. Groundwater consumption within the immediate vicinity of the Wilkerson Subdivision is predominantly for residential indoor and outdoor use and limited agricultural consumption.

GEOLOGY AND HYDROGEOLOGY

The Owens Valley is a classic fault-bounded graben formed by east-west extension between the Sierra Nevada on the west and the Inyo–White Mountains on the east (Danskin, 1988). The valley is filled with thousands of feet of Quaternary alluvial fan, fluvial, lacustrine, and volcanic deposits, which collectively make up a highly heterogeneous aquifer system. The Sierra Nevada supplies enormous quantities of sediment—coarse, permeable gravels dominate the west-side fans, while finer lacustrine and floodplain deposits accumulate more toward the valley center. The valley is divided into two major sub-basins: the Bishop Basin in the north and the deeper Owens Lake Basin in the south, separated by subtle bedrock highs, Pleistocene volcanic flows, and structural steps. Numerous faults—most importantly the Owens Valley Fault—control the subsurface geometry, influence groundwater flow paths, and locally act as barriers or conduits depending on their internal structure (Danskin, 1988).

Wilkerson, California sits on the western alluvial fan complex between Bishop and Big Pine, positioned directly downslope of the Sierra Nevada. The geology here is dominated by very coarse, well-sorted

granitic gravels and sands, deposited by high-energy mountain streams such as Birch, McGee, Big Pine, and Rawson Creeks (Danskin, 1988). These deposits yield high-permeability aquifer conditions, with relatively thin or absent fine-grained confining layers compared to the valley center. Beneath the surface, saturated thickness can exceed several hundred feet, and the region transitions downgradient into more mixed alluvial/lacustrine sediments as flow approaches the valley axis. Volcanic units from the Big Pine volcanic field are present to the south and southeast, but in Wilkerson the aquifer is primarily alluvial.

Hydrogeologically, the depositional complexity creates a multilayer aquifer system composed of (1) an upper unconfined aquifer, (2) discontinuous confining units of silts and clays, and (3) a lower semi-confined to confined aquifer consisting of coarse sands, gravels, and permeable volcanic deposits (Danskin, 1988). Groundwater recharge originates primarily from Sierra Nevada tributary streams, which lose water as they traverse the alluvial fans and percolate into the aquifer system. Additional recharge comes from mountain-front infiltration, canal seepage, and occasional overbank or spillgate flows during wet years. Because transmissivity in many parts of the basin is extremely high—commonly 10,000–40,000 ft²/day, and even higher in volcanic zones—groundwater levels respond broadly but with relatively muted drawdown near pumping centers, regulated by “hydrologic buffers” such as springs, evapotranspiration zones, and perennial reaches of the Owens River. Overall, flow is directed from the west-side fans toward the valley axis and then southward along the structural trough (Danskin, 1988).

Wilkerson occupies one of the most productive and hydraulically responsive parts of the northern Owens Valley aquifer system. Mountain-front recharge from the west is significant, and because the sediments are so coarse, the alluvial fan acts as a broad infiltration and transmission zone. Groundwater flow beneath Wilkerson trends east to southeast, feeding into the Bishop Basin aquifer system. Transmissivity values are high enough that typical domestic pumping produces minimal drawdown, and the water table—typically 190 to 230 ft below ground surface in the Wilkerson Area based on available well logs (California Department of Water Resources, 2026)—tends to remain stable year-to-year despite regional pumping elsewhere (Danskin, 1988). The combination of thick saturated alluvium, high hydraulic conductivity, and steady recharge makes Wilkerson one of the most favorable areas in the Owens Valley for groundwater supply reliability.

DRAWDOWN CALCULATIONS

To estimate the anticipated impacts from the additional of a new pumping well at the Site, Roux used hydrogeologic parameters presented in Daskins report¹. The Daskin report provides ranges of hydrogeologic parameters throughout the Owens Valley gathered from historic aquifer testing results. Based on these hydrogeologic parameter ranges we have estimated a high and low range for each applicable parameter to perform a desktop analysis of anticipated groundwater drawdown associated with the proposed wells. The following table summarizes the parameters extracted from Daskin that were used to estimate drawdown from the proposed pumping well at the Site. These hydraulic characteristics of the aquifer system were estimated from pumped-well and aquifer tests, drill-hole data, and geophysical data (Danskin, 1988). Additionally, Groundwater consumption was estimated based on data provided by the Los Angeles Department of Water and Power (LADWP, 2025). In a letter dated August 11, 2025, the LADWP estimated that the median single-dwelling unit residential customer monthly usage in the Owens Valley was 8.5 hundred cubic feet (hcf) per month during the 2024/2025 water year (102 hcf per year; 209 gallons per day [gpd]; 0.23-acre feet per year [AFY]). However, industry standard consumption assumptions for single-dwelling homes are approximately 1 AFY (3,600 gpd). Based on the size of the lots in Wilkerson relative to the lot sizes within the more densely populated cities in the Owens Valley, we have assumed the more conservative pumping rate of 1 AFY for our calculations of drawdown at the Site. If it is assumed that there are four single-dwelling structures proposed for the Site and that a well will be pumping continuously to supply groundwater to each

¹ Danskin, 1988. Evaluation of the Hydrologic System and Selected Water-Management Alternatives in the Owens Valley, California.

dwelling, well discharge would need to be equal to a constant pumping rate of approximately 2.5 gallons per minute (gpm).

The hydrogeologic characteristics of the Wilkerson area were then included in calculating anticipated drawdown using the Theis solution. The Theis solution is an analytical solution that describes transient (nonequilibrium) drawdown in a confined aquifer caused by pumping at a constant rate. It relates drawdown to time and distance from the pumping well using the aquifer transmissivity (T) and storage coefficient (Sc) and is widely used for interpreting pumping tests and estimating aquifer properties. The solution is based on an analogy between groundwater flow and heat conduction, with drawdown expressed through the Theis well function (Fetter, 2014).

The Theis solution relies on several key assumptions: the aquifer is confined, homogeneous, isotropic, and of infinite areal extent; it has uniform thickness; flow to the well is horizontal and radial; and the pumping well has a negligible diameter with no wellbore storage effects. It also assumes constant pumping rate, instantaneous release of water from storage with declining head, and no recharge or boundary effects during the period of analysis. The Theis solution is appropriate for a residential well with a low pumping rate and high transmissivity such as the subject of this study.

Based on the calculation of drawdown using the Theis equation, it is estimated that a single well installed at the Site pumping at a rate of 3,600 gpd (2.5 gpm) will have the following drawdown effect at select distances from the proposed well:

Transmissivity of 1,000 ft²/day Scenario

Parameter	Distance from Pumping Well (feet)			
	10	100	1,000	10,000
Q	3,600	3,600	3,600	3,600
T	1,000	1,000	1,000	1,000
S	7.30E-04	7.30E-04	7.30E-04	7.30E-04
t	365	365	365	365
γ	0.58	0.58	0.58	0.58
u	5.00E-08	5.00E-06	5.00E-04	5.00E-02
W(u)	16.23	11.63	7.02	2.42
s	4.65	3.33	2.01	0.69

Transmissivity of 10,000 ft²/day Scenario

Parameter	Distance from Pumping Well (feet)			
	10	100	1,000	10,000
Q	3,600	3,600	3,600	3,600
T	10,000	10,000	10,000	10,000
S	7.30E-04	7.30E-04	7.30E-04	7.30E-04
t	365	365	365	365
γ	0.58	0.58	0.58	0.58
u	5.00E-09	5.00E-07	5.00E-05	5.00E-03
W(u)	18.54	13.93	9.33	4.72
s	0.53	0.40	0.27	0.14

Notes:

ft²/day = Square feet per day
Italicized = Calculated variables
 Q = Pumping rate (gallons per day)
 S = Storage coefficient
 s = Drawdown

t = time (days)
 T = Transmissivity (square feet per day)
 W(u) = Well function
 γ = Eulers number

The results of the Theis solution indicate that a single residential well supplying groundwater to four single-dwelling homes at the Site will have a hydrostatic drawdown effect of approximately 0.53 to 4.65 feet in the immediate vicinity of the well and approximately 0.14 to 0.69 feet at a distance of 10,000 feet from the well. These results suggest that relative impacts from this well will be muted and insignificant in the context of the greater hydrogeologic system of the Ownes Valley. Additionally, the localized hydrostatic drawdown will likely not have any significant impact on nearby wells supplying groundwater to other residential or agricultural users.

GROUNDWATER AVAILABILITY

To assess the availability of groundwater in the Wilkerson Area, recharge and current groundwater pumping estimates were evaluated. In addition to the assessment of local recharge and pumping, a regional evaluation of conditions of the Owens Valley groundwater basin was completed to confirm overall stability of the groundwater basin.

Groundwater in the Wilkerson area is recharged predominantly by runoff from the Sierra Nevada mountains to the west. Recharge estimates from tributary streams in the immediate vicinity of Wilkerson (Rawson Creek) and ungaged mountain front recharge were estimated by Danskin (1988). Tributary stream recharges estimates range between zero and 1,085 AFY. Ungaged mountain front recharge ranges from 434 to 724 AFY. Total recharge from these two sources ranges between 434 and 1,799 AFY.

Total pumping for the Wilkerson Area was estimated based on the count of single-dwelling homes and their estimated annual groundwater usage as reported by LADWP. A total estimated dwelling count of 130 homes with individual annual groundwater demands of approximately 1 AFY results in a total groundwater demand of 130 AFY. This estimated groundwater demand is significantly less than the lower estimate of recharge in the Wilkerson Area of 434 AFY.

Owens Valley groundwater resources are managed under a Water Agreement between Inyo County and the LADWP. The Inyo–Los Angeles (LADWP) Long-Term Water Agreement is a legally binding groundwater management agreement between Inyo County and the City of Los Angeles/LADWP that governs groundwater pumping and water exports from the Owens Valley². The agreement was adopted to resolve long-standing litigation over environmental impacts from LADWP's groundwater pumping and to comply with California Environmental Quality Act (CEQA) requirements following construction of the second Los Angeles Aqueduct.

At its core, the agreement establishes a cooperative, adaptive management framework intended to allow continued water exports to Los Angeles while avoiding or mitigating significant adverse effects to groundwater-dependent vegetation, soil, and surface waters in Inyo County. It sets pumping limits and management rules based on defined management areas, baseline environmental conditions, and ongoing monitoring, with provisions for mitigation and well shut-offs if impacts exceed agreed thresholds.

The latest iteration of the annual groundwater operations plan was reviewed as part of this hydrogeologic evaluation to determine the general availability of groundwater in the Wilkerson Area. Based on the 2025 Annual Owens Valley Report (LADWP, 2025a), groundwater conditions in the Owens Valley are generally stable with approximately 1.5 feet in groundwater decline during the 2024/2025 water year. Groundwater pumping annual totals for the past four water years have been significantly below the average pumping rate since implementation of the Water Agreement. The average groundwater consumption and depth to water in the Owens Valley between 1991 and 2024 water years is 69,722 AFY and 12.6 feet below ground surface (bgs), respectively, with groundwater levels remaining generally stable between 7 and 17 feet bgs throughout this time period.

Based on the available records of groundwater availability in the Owens Valley and the limited pumping volume from the proposed four single-dwelling pumping well at the Site, it is determined that water availability will not be significantly impacted by the proposed well.

² County of Inyo, Agreement Between the County of Inyo and the City of Los Angeles and its Department of Water and Power on a Long Term Groundwater Management Plan for Owens Valley and Inyo County. Accessed online at: inyowater.org

CONCLUSIONS AND RECOMMENDATIONS

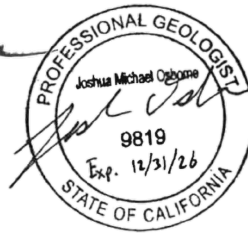
Roux has reviewed available records referenced throughout this report to address concerns regarding the availability of groundwater in the Wilkerson area of the Owens Valley and adverse impacts (i.e., groundwater drawdown) related to a proposed four single-dwelling groundwater well in Wilkerson. Calculated drawdown effects of the proposed well are dependent on the transmissivity of the aquifer from which the well draws from, however, ***even with conservative assumptions applied to the calculations, drawdown is not expected to significantly impact local or regional hydrogeologic conditions.*** Additionally, the Owens Valley groundwater basin is generally in a stable state with little change in groundwater levels over the past 35 years. It is not anticipated that the addition of the proposed pumping well will have any measurable effect on the availability of groundwater to the region.

If you have any questions or comments concerning the findings of this report, please call our Oakland office at (415) 967-6000.

Sincerely,

ROUX ASSOCIATES, INC.


Joshua Osborne, P.G.
Senior Geologist I



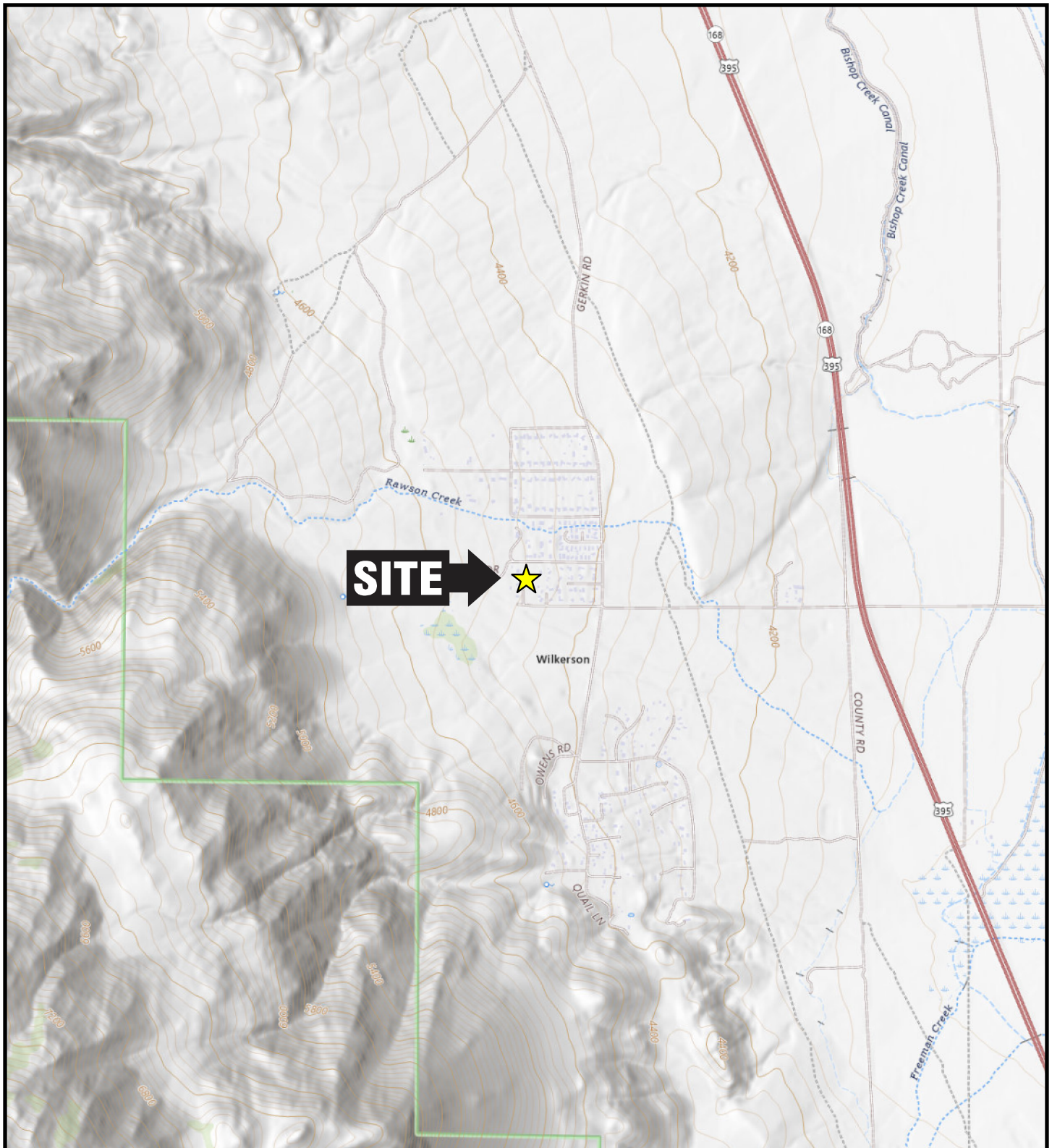

Andrew Zdon, P.G., CHg, CEG
Technical Director

Figures

Figure 1 – Site Location Map

References

- California Department of Water Resources, 2026. Well Completion Reports. Access online at <https://water.ca.gov/Programs/Groundwater-Management/Wells/Well-Completion-Reports> on February 23, 2026.
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- Fetter, 2014. *Applied Hydrogeology*. Harlow, Pearson.
- Los Angeles Department of Water & Power (LADWP), 2025a. *2025 Annual Owens Valley Report*. May.
- Los Angeles Department of Water & Power, 2025b. Estimated Water Supply Cost, Water Quality Improvement, and Owens Valley Regulatory for January 1, 2026, Through December 31, 2026. August 11. [Accessed online](#).

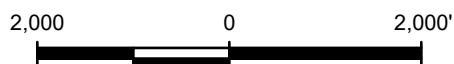


QUADRANGLE LOCATION



NOTES

EASTING (X): 739293.51
NORTHING (Y): 3017844.17



Title:

SITE LOCATION MAP

250 PANORAMA DRIVE, BISHOP, CA

Prepared for:

WILKERSON



Compiled by: J.O.	Date: 02/24/26	FIGURE 1
Prepared by: D.S.M.	Scale: AS SHOWN	
Project Mgr: J.O.	Project: 5176.0001S000	
File: F1(AP)		