
Appendix E2

Supplemental Geotechnical Investigation Services - Lassen Facility

November 16, 2023

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Supplemental Geotechnical Engineering Investigation Services

GOLDEN STATE NATURAL RESOURCES LASSEN COUNTY PERCOLATION TEST

551000 Roosevelt Avenue
Nubieber, Lassen County, California
UES No. 4630.2200118.0000

As requested, we have prepared this proposal to provide percolation testing of the near-surface soils at the site. We understand that supplemental soil investigation is desired at two locations across the site to assess septic/leach field potential. The project team had requested an evaluation of the percolation characteristics of the soils at the proposed infiltration system locations (see Figure 2).

We previously prepared a *Geotechnical Engineering Report* (WKA No. 4630.2200118.0000) for the project dated September 13, 2022. Since preparation of the Geotechnical Engineering Report, the project team has requested percolation characteristics of the near-surface soils. That information was not previously requested or included in the Geotechnical Engineering Report. This Addendum addresses those requests.

Scope of Services

Our scope of services included the following tasks:

1. a site reconnaissance;
2. the performance of two percolation tests extending to a depth of about 3 feet below existing surface grades at each location;
3. a discussion regarding the soil and groundwater conditions;
4. a summary of the percolation test results; and,
5. preparation of this letter containing our findings and conclusions regarding the soil percolation rate.



Figures and Attachments

This report contains a Vicinity Map as Figure 1, a Site Plan showing percolation test locations, as Figure 2.

Field Explorations

On November 13, 2023 two percolation tests (P1 and P2) were drilling at the approximate locations shown in Figure 2. The percolation tests were hand-augered to depths of about 3 feet below existing site grades. The percolation test locations were selected by Rural County Representatives of California. At the completion of drilling, the boreholes were set up for percolation testing using two-inch-diameter, machine-slotted perforated plastic pipes, with the top of pipe located near the existing ground surface. The surrounding annular space around the casings was filled with pea gravel. The percolation test holes were pre-soaked by filling the holes with clean potable water and allowing the test holes to soak overnight. At the completion of the percolation testing the borings were backfilled with soil cuttings.

Soil Conditions and Groundwater Conditions

The soil at the percolation testing locations (P1 and P2), generally consisted of loose organic sandy clay in the upper 1 to 1 ½ feet, underlain by very stiff to hard fat clay to the explored depth of 3 feet below existing site grade. For specific information regarding the soil conditions at site, please refer to the Logs of Soil Borings (Figures 3 through 10) from the *Geotechnical Engineering Report* (WKA No. 4630.2200118.0000) for the project dated September 13, 2022.

Groundwater was not encountered our investigation on November 1, 2023. Groundwater was encountered during the field exploration on July 14, 2022, as described in the Groundwater section of the *Geotechnical Engineering Report* (WKA No. 4630.2200118.0000) for the project dated September 13, 2022, with depths ranging from 7 to 10 feet below existing grades.

Percolation Tests

On November 1, 2023, two percolation tests (P1 and P2) were performed at the approximate locations indicated in Figure 2. The percolation test pipe extended to a depth of about 3 feet below the existing ground surface.

After a 24 hour period following drilling activities, and after soaking the holes overnight, the holes were re-filled with water and the percolation tests were performed by taking water level readings at discrete time intervals. The readings were measured as a distance from the top of the percolation pipe to water surface. The drop in water was measured every 30 minutes at the percolation locations. Percolation rates were calculated for each time interval.



The results of the tests are provided in the table below. These field test results are not intended to be design rates. They represent the results of our tests, at the depth and location indicated. The design rate should be determined by the design engineer who should apply an appropriate factor of safety.

PERCOLATION TEST LOCATION P1 DEPTH 3'					
Time Interval (minutes)	Initial Reading (feet)	Final Reading (feet)	Incremental Water Drop (feet)	Incremental Percolation Rate (inch/hour)	Correlated Infiltration Rate (inch/hour)**
0	0.1*	--	--	--	--
30	0.1	1.5	1.40	34	1.81
30	1.5	1.8	0.30	7	0.61
30	1.8	1.8	0.00	0	0.00
30	1.8	2.1	0.30	7	0.77
30	2.1	2.1	0.00	0	0.00
30	2.1	2.1	0.00	0	0.00
30	0.1	1.5	1.40	34	1.81
30	1.5	1.6	0.10	2	0.19

* Water added to percolation test hole prior to reading.

** Correlated Infiltration Rate calculated using the Porchet Method.

PERCOLATION TEST LOCATION P2 DEPTH 3'					
Time Interval (minutes)	Initial Reading (feet)	Final Reading (feet)	Incremental Water Drop (feet)	Incremental Percolation Rate (inch/hour)	Correlated infiltration Rate (inch/hour)**
0	0.5*	--	--	--	--
30	0.5	1.4	0.90	22	1.24
30	1.4	1.4	0.00	0	0.00
30	1.4	1.6	0.20	5	0.37
30	1.6	1.6	0.00	0	0.00
30	1.6	1.7	0.10	2	0.20
30	1.7	1.7	0.00	0	0.00
30	1.7	1.7	0.00	0	0.00
30	1.7	1.7	0.00	0	0.00

* Water added to percolation test hole prior to reading.

** Correlated Infiltration Rate calculated using the Porchet Method.



Percolation Characteristics of the Subgrade Soils and Conclusions

Based on the percolation testing, our experience, and the soil conditions encountered at the geotechnical borings and the percolation test locations, it is our opinion that the site may not be suitable for infiltration. Based on the tests performed and the results of the percolation tests, the infiltration at the site will be very low to non-existent. The high depth of existing groundwater for the site brings concerns for the distance between the bottom of the system and groundwater.

The drainage system should be designed by an experienced and qualified engineer familiar with the applicable regulatory agencies requirements. An appropriate factor of safety should be included in the overall design.

Limitations

Our conclusions and recommendations are based upon the information provided regarding the proposed project, combined with our analysis of site conditions revealed by the field exploration and percolation testing. We have used our engineering judgment based upon the information provided and the data generated from our investigation. This letter has been prepared in substantial compliance with generally accepted geotechnical engineering practices that exist in the area of the project at the time the letter was prepared. No warranty, either express or implied, is provided.

We emphasize that this study is applicable only to the proposed construction at the investigated site, and should not be utilized for construction on any other site. If the proposed construction is re-sited, we should be afforded the opportunity to review the new information or changed conditions to determine if our conclusions and recommendations must be modified.

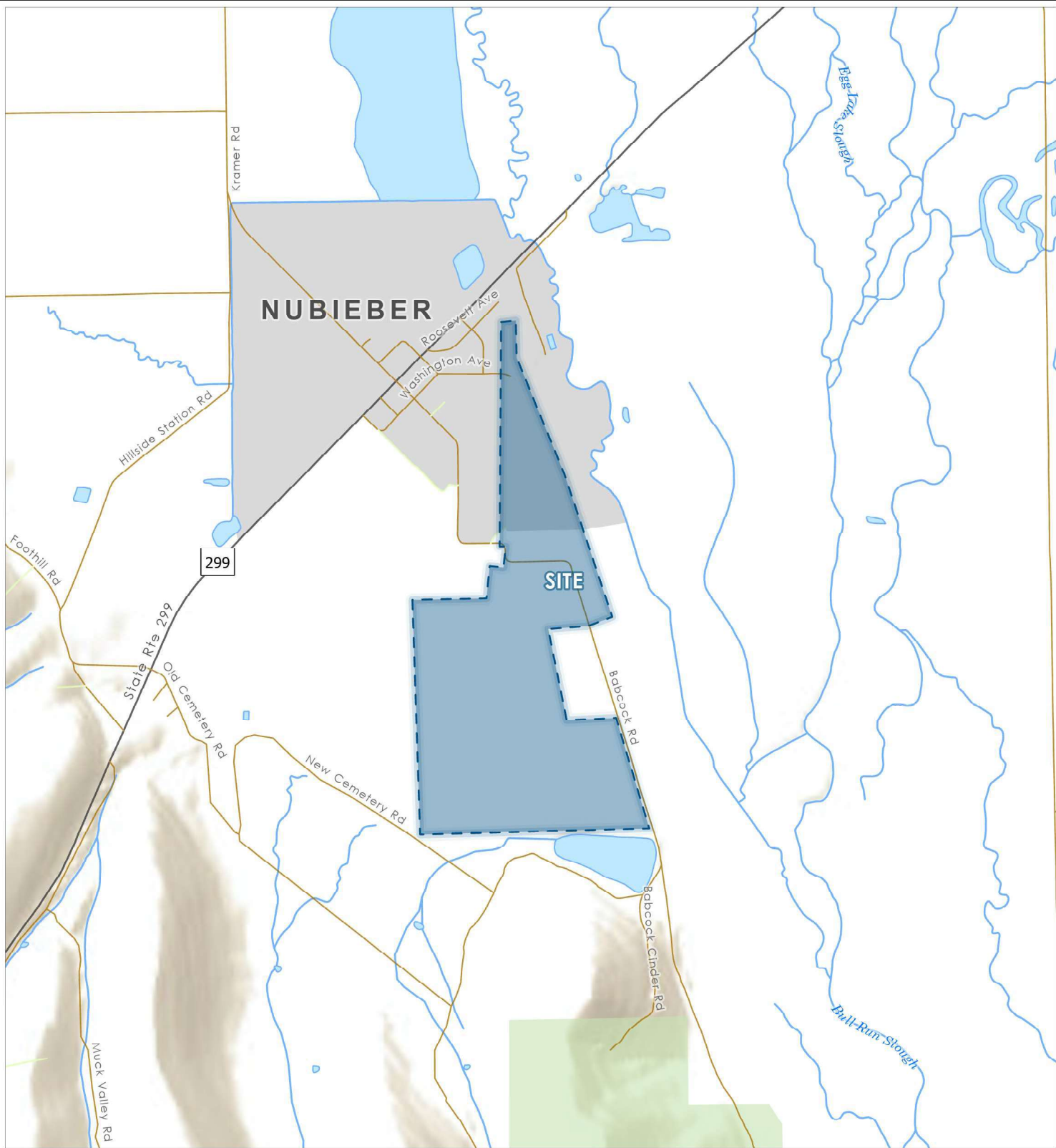
Thank you for this opportunity to be of service. If you have any questions regarding this letter, please contact our office.

Universal Engineering Sciences

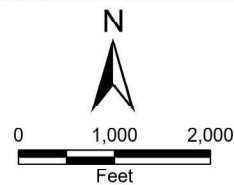
James R. Sweeney
Staff Engineer

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Attachments: Figure 1 – Vicinity Map
Figure 2 – Site Plan



Spatial Data provided by Esri, NOAA, and USGS.
 Projection: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US



VICINITY MAP
GOLDEN STATE NATURAL RESOURCES - LASSEN COUNTY
 Nubieber, California

FIGURE	1
DRAWN BY	JRS
CHECKED BY	JRY
PROJECT MGR	DS
DATE	11/2023
4630.2200118.0000	

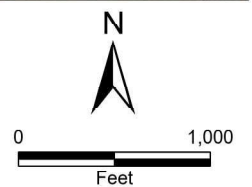


Approximate Site Boundary



Approximate Percolation Test Location

Aerial imagery provided by Esri.
Projection: NAD 1983 2011 StatePlane California II FIPS 0402 Ft US



SITE PLAN
GOLDEN STATE NATURAL RESOURCES - LASSEN COUNTY
Nubieber, California

FIGURE	2
DRAWN BY	JRS
CHECKED BY	JRY
PROJECT MGR	DS
DATE	11/2023
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