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| **Docket Number:** | 24-OPT-04 |
| **Project Title:** | Potentia-Viridi Battery Energy Storage System |
| **TN #:** | 258255 |
| **Document Title:** | Geotechnical Considerations Report |
| **Description:** | This plan provides a summary of geological constraints identified for the site |
| **Filer:** | Jennifer Dorgan |
| **Organization:** | Allen Matkins Leck Gamble Mallory & Nats |
| **Submitter Role:** | Applicant Representative |
| **Submission Date:** | 7/31/2024 6:03:10 PM |
| **Docketed Date:** | 8/1/2024 |

# Appendix 3.4A

Geotechnical Considerations Report

## Potentia - Virdi BESS

17257 Patterson Pass Road
Tracy, California

## Levy Alameda, LLC

Toronto, Ontario, Canada

## Terracon Project No. GR235C74

December 20, 2023

## Your Stage1 Representative:


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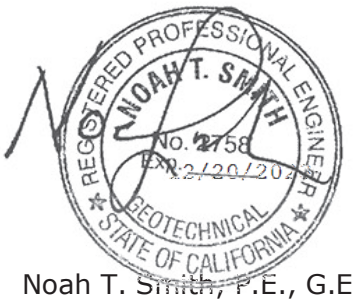
Geotechnical Considerations and corresponding Next Steps prepared by Christopher B. Congrave and reviewed by:





Noah T. Smith, P.E., G.E.
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For review only

# Summary Of Potential Constraints and Next Steps

The following is a summary of constraints identified for the site. Please refer to the respective considerations sections of the report for more details.

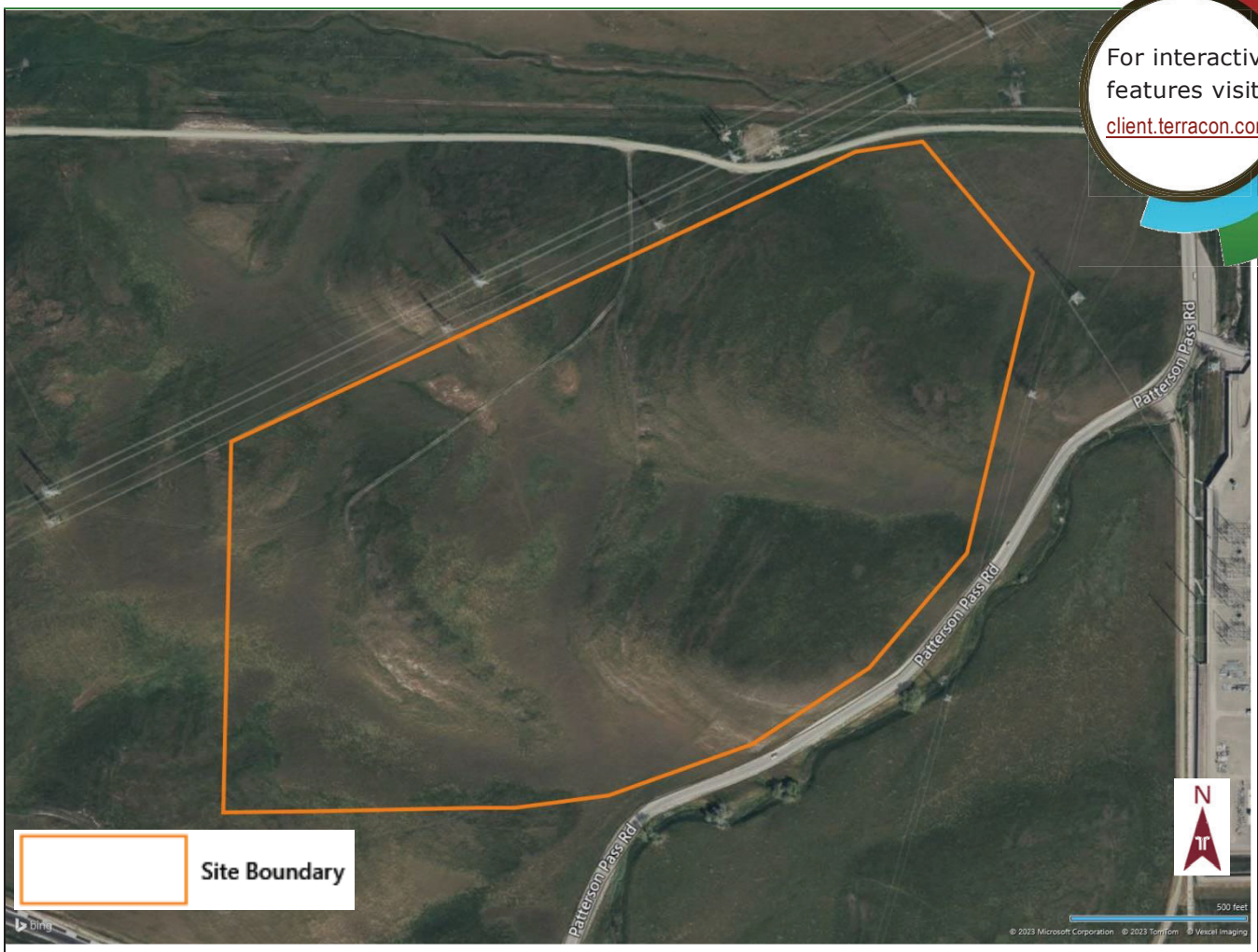
## Geotechnical

- Due to anticipated shallow bedrock, heavy duty excavators for bedrock removal will likely be required. Next Steps should include seismic refraction testing to determine rippability of bedrock.
- Cut/fill operations greater than 30 feet are anticipated. Next Steps should include settlement monitoring of deep fills.
- Expansive soils are anticipated and may not be suitable for reuse as structural fill. Next Steps should include shrink-swell testing.
- On-site soils are anticipated to be corrosive to steel. Next Steps should include laboratory corrosion testing.
- Difficult pile driving / drilled hole excavation is anticipated to be encountered on weathered bedrock across the site and refusal may be encountered in some areas. Next Steps should include borings to determine the depth to and condition of bedrock and pile load tests to help assess the drivability of piles.

# Your Site

## Project Description

The site covers approximately 68 acres and is planned to be developed as a battery energy storage system (BESS). Site plans were not provided at the time of this report.




See **Information Sources** for a detailed list of sources used to generate this figure.

# Geotechnical Considerations

See Information Sources for a more detailed list of sources reviewed in determining the Geotechnical Considerations for the site. Potential constraints are addressed in this section.

| Topic | Comments |
|---|---|
| Anticipated foundation systems | If foundations are bearing on dense to very dense residual soils or weathered bedrock, shallow foundations may be used. Deep foundations such as driven piles or drilled shafts may be considered for use at the site but could be more difficult to install. |
| Anticipated excavation equipment | For excavations extending into partially weathered bedrock and potentially unweathered bedrock, heavy duty equipment will likely be required. We do not anticipate the need for blasting. |
| Pavement | Typical pavement sections will likely be acceptable. |
| Anticipated seismic site class | Site Class D |
| Anticipated frost depth | Less than 12 inches |
| Bedrock | NRCS mapping indicates bedrock may be encountered at 3 feet to 4 feet below the existing ground surface (bgs). Our experience indicates bedrock may be encountered as shallow as 1-foot bgs.<br>Bedrock with varying degrees of weathering have been encountered as shallow as 1½ feet bgs in the project vicinity. Bedrock elevations can vary greatly over short distances.<br>Partially weathered bedrock (PWR) is anticipated. PWR is defined, for engineering purposes, as residual material exhibiting Standard Penetration Resistances in excess of 100 blows per foot. Weathering is often uneven. Consequently, the profile of the PWR and bedrock is often quite irregular and erratic, even over short horizontal distances. |
| Blasting anticipated | Not anticipated |

| | |
|---|---|
| Groundwater | NRCS mapping indicates seasonal high groundwater is not mapped on-site.<br>Perched groundwater may be encountered within existing fill, at the existing fill and natural soil interface, and/or at the soil and bedrock interface. |
| Dewatering anticipated | Due to the possibility of relatively shallow rock, perched groundwater may be encountered and may require temporary dewatering during construction. |
| Karst constraints | USGS does not map the site in karst. |
| Sinkholes | Not anticipated |
| Seismic liquefaction | Not anticipated |
| Settlement monitoring likely required | Settlement monitoring is anticipated at the site due to fill depths of up to 30 feet. |
| Site usage | Historical images indicated that the site has primarily been undeveloped. |

## Notes on Geotechnical Considerations

- NRCS mapping indicates some on-site soils have a moderate to high shrink-swell potential. These soils may not be suitable for reuse as structural fill where deep fills are required. Depending on planned fill quantities required for earthwork, the import of fill meeting specifications for structural fill may be required.
- Seasonal perched groundwater is anticipated at relatively shallow depths in portions of the site. Water seepage in excavations is possible and dewatering of excavations should be considered in project development.
- In localized areas, excavations for foundations and utilities may encounter very dense soil and/or bedrock. Contractors, especially those digging utilities and working in planned cut areas, should consider "hard dig" conditions may exist in some areas of the site and should satisfy themselves as to the hardness of the soil deposits and equipment required. Excavations advanced within the bedrock may require the use of pneumatic breakers to excavate to the desired depth. We do not anticipate blasting to be required.
- We anticipate BESS structures may be supported on piles. Due to the anticipated shallow bedrock, pre-drilling may be required to achieve embedment depth.

## Foundation Design Soil Parameters Guide of Estimates

A guide of estimates of the design engineering parameters for driven steel piles, for generalized subsurface conditions provided in tabular form below. These values should be used for general informational purposes only. They should not be used for project design.

| Material Description *(Consistency)* | Cohesion *(PSF)* | Friction Angle *(Degrees)* | Strain At 50% *(IN/IN)* | Ultimate End Bearing Pressure *(PSF)* |
|---|---|---|---|---|
| Clay | 2,500-4,500 | --- | 0.020 – 0.005 | 4,000-20,000 |
| Sand and silts | - | 30-36 | - | 2,500-20,000 |
| Claystone/Sandstone | - | 36-42 | - | 15,000-25,000 |

For W-sections and other similar pile shapes, the box perimeter should be used to compute the actual area providing skin resistance to the applied loads, which will be less than the actual surface area of the pile.

# Next Steps

Below are our recommended next steps that will likely be needed to proceed with site development. To complete any of the Next Steps described below please contact Christopher B. Congrave at Chrisopher.Congrave@terracon.com.

## Geotechnical

In order to characterize the subsurface conditions and provide design parameters, we recommend the following:

| Topic | Comments |
|---|---|
| Field exploration | Yes: Standard Penetration Test (SPT) Borings as follows:<br>▪ SPT borings advanced to depths of 15 feet to 25 feet in building pad areas.<br>▪ SPT borings advanced to depths of 5 feet to 10 feet in pavement areas.<br>▪ SPT borings advanced to depths of 50 feet in substation and Gen-Tie areas.<br>▪ 1 SPT boring may be advanced to 100 feet to better evaluate the Seismic Site Class or surface geophysics such as Multi-channel Analysis of Surface Waves (MASW) extending to 100 feet may be used to more accurately evaluate Seismic Site Class. The same geophysical equipment may also be used to perform seismic refraction on the east half of the site to determine rippability of any bedrock.<br>Note that anticipated exploration depths are from anticipated final subgrades. Deeper borings may be required due to the relatively large cuts planned for the site.<br>The locations of our planned geotechnical will be determined when a site plan is available. |
| Shear wave velocity testing to determine the seismic site class | Yes |

| Topic | Comments |
|---|---|
| Ground Penetrating Radar (GPR) | Yes, for private utility locating. |
| Infiltration testing | Yes, in accordance with local code specifications. |
| Laboratory testing | Yes |
| Field electrical resistivity testing | Yes, once site grading has been completed. |
| Pile load testing | Yes, if piles are utilized instead of concrete pads. |
| Site clearing | Yes |
| ASTM E1527-21 Phase I Environmental Site Assessment | Yes |

# Information Sources

| | |
|---|---|
| Publicly Available GIS Data | Seismic Hazards Program<br>California Geological Survey<br>California Department of Conservation |
| Aerial Imagery | Terracon reviewed the following readily available historical aerial images and street view images available on December 8, 2023, to develop a limited history of previous site usage:<br><br>**Aerial Images**<br>Google Earth Pro™<br><br>**Street View Images**<br>Google Maps, Google Earth Pro™<br><br>The use of available aerial imagery resources is intended to help understand previous site usage. These images are widely spaced in time. They should not be considered appropriate for identifying all site activities which may have impacted subsurface conditions. A more comprehensive review of aerial imagery and/or site interviews would be required to further evaluate previous site usage. |
| Other Sources | Historical Terracon Data |

# Methods and Limitations

## Methods

### Virtual Soil Profile Process

The VSP is a spatial dataset that combines the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) Gridded Soil Survey Geographic (gSSURGO) Database, the NRCS Digital General Soil Map of the United States (STATSGO2) Database, and Terracon project borehole data collected since 2014. The VSP is provided as a polygon geometry spatial layer with the polygons derived from gSSURGO's Map Unit Polygon geometry. The VSP is reviewed and occasionally revised by the local professional, based upon their knowledge in the project area. Additionally, the VSP is utilized to develop the geotechnical considerations provided in the Stage1.

### General Note About Data Availability

The sources of publicly available information as provided in this Stage1 are identified on Compass. Terracon makes no warranty as to accuracy of any public information, as displayed in the map viewer.

## Limitations

This report provides very preliminary opinions of siting and construction challenges that may be associated with the stated project plans for the stated property. Confirmation of opinions stated in this document is essential. Absence of a mapped resource does not mean that it is not present. Confirmation should include performing a site-specific evaluation consistent with the guidelines set forth in Next Steps.

All parties are advised that any decisions or actions taken by any party based on the information contained herein, including decisions with financial implications are done solely at the risk of that party. By providing this information in this preliminary form, Terracon expressly disclaims any duties or obligations associated with the usage of this information for decision-making or design purposes.

In the event that changes to the nature, design, or location of the project, as outlined in this report, are planned, the preliminary conclusions and recommendations contained in this report shall not be used unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing. As the project moves into the design phase, Terracon should be retained to develop and complete a scope of work that includes site-specific explorations as noted in Next Steps.

Terracon and Levy Alameda, LLC recognize we have entered into an agreement that may contain certain confidential or non-disclosure obligations relating to our services. Levy Alameda, LLC recognizes, however, that although such confidentiality obligations may be in place, those obligations do not create an exclusive relationship between the parties nor do those obligations create an exclusive ownership right to Levy Alameda, LLC relating to the data in question. Terracon has the unfettered ability to provide similar services to any other party and use any public or previously available data for the service of others, even if included as part of this report, but Terracon will refrain from disclosing confidential information of Levy Alameda, LLC which is provided by Levy Alameda, LLC to the extent required by any applicable non-disclosure agreement.

Terracon does not represent the imagery reviewed to be a complete historical record of previous site usage, nor does Terracon validate the accuracy and sufficiency of the public domain sources that have been utilized.

## Virtual Soil Profiles

The Virtual Soil Profile (VSP) provides an aggregation of public and private historical data and is meant to inform preliminary geotechnical engineering and geological understanding at a given location. It is anticipated the user will employ the VSP in considering preliminary concepts for site development. It is also intended to provide a basis for a subsequent exploration program to confirm the expected conditions as necessary to develop plans for site preparation and construction. Predictions presented in the VSP regarding expected geotechnical conditions are based upon algorithmic aggregation of public soil maps and Terracon's historical soil boring information from within the SSURGO soil map units. Therefore, any opinions regarding the subsurface conditions presented by this dataset may not represent actual conditions encountered during site-specific project exploration or construction. In no case should the information or predictions provided as part of the VSP be utilized for final design. Anyone using the contents of the VSP in-whole, or in-part, is cautioned to understand the preliminary nature of the predictions that are presented. Confirmation of the predictions stated in the VSP is essential and should include site-specific geotechnical exploration consisting of exploratory soil borings and/or related exploration methods. Terracon should be retained to develop a scope of work that would be necessary to confirm these preliminary predictions. The VSP addresses a preliminary prediction of geotechnical and geologic conditions only and does not include either specifically or by implication any environmental assessment of the site or identification or prevention of pollutants, hazardous materials or conditions.

The VSP has been prepared for the exclusive use of our client to represent preliminary predictions of geotechnical conditions. No warranties, either express or implied, will be intended or made. Furthermore, given the limitations described above and based on the preliminary nature of this data, all parties are advised that any decisions or actions taken by any party based on the information contained in the VSP(s), including decisions with financial implications are done solely at the risk of that party. By providing these prediction(s), Terracon expressly disclaims any duties or obligations associated with the usage of the information for decision-making purposes.

Terracon and our client recognize that we have entered into an agreement that may contain certain confidential or non-disclosure obligations relating to our services. Client recognizes however that while Terracon will not violate any such terms or obligations, none of these obligations create an exclusivity obligation to Terracon relating to the service or data in question and that Terracon has the unfettered ability to provide similar services to any other party and use any public or previously available data or information for the service of others even if included as part of the VSP.

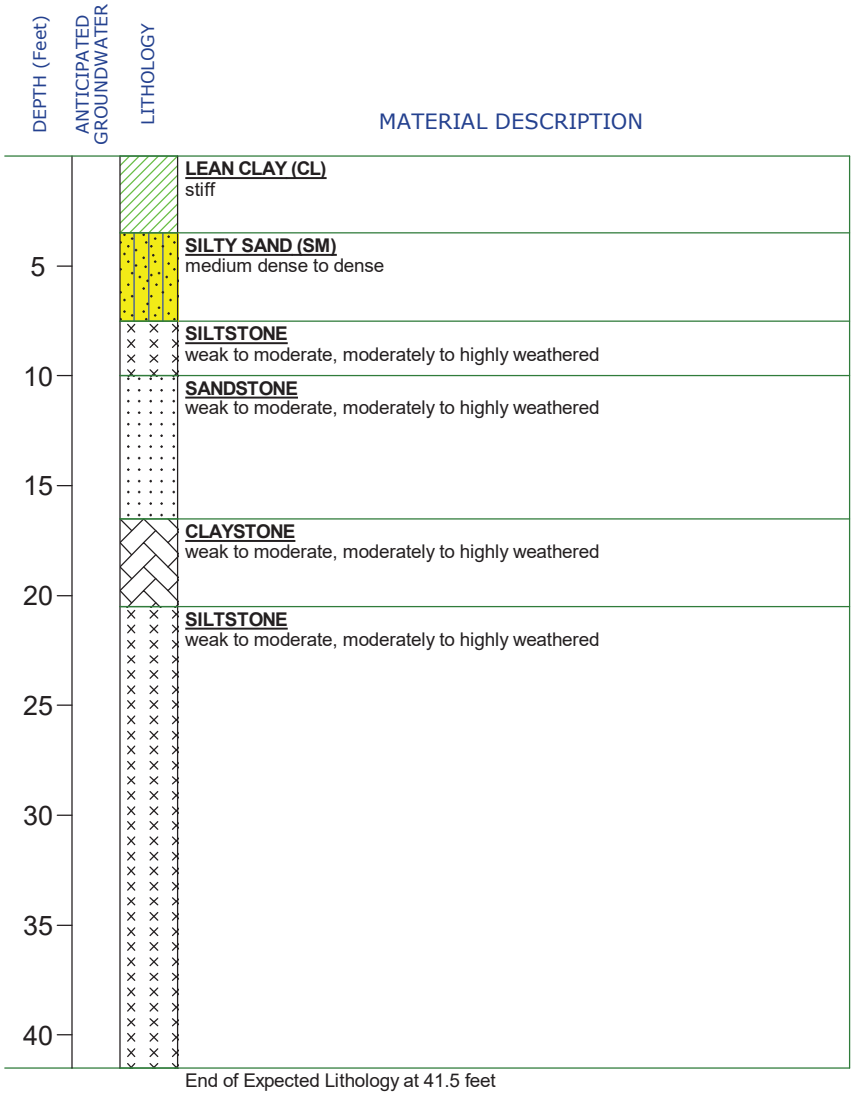
# ATTACHMENTS: Expected Lithology

# EXPECTED LITHOLOGY

The opinions of subsurface conditions are very preliminary in nature. These opinions must be validated with site-specific exploration and testing. Each Soil Series is a geographic area defined by the Natural Resources Conservation Service (NRCS) and is anticipated to have similar soil properties.

See Methods and Limitations for information on how the Soil Series was used to prepare this Expected Lithology as well as clarification regarding the limitations to the following opinions and methods used to derive these opinions. For a lateral extent of this soil series please refer to Compass.

## Area Represented: SSURGO Soil Series Linne




COMMENTS ON POTENTIAL VARIABILITY

- Bedrock could be as shallow as 1 foot below ground surface (bgs).

*The expected lithology was prepared using Terracon's Virtual Soil Profile (VSP) model as a part of this Stage1 report. It should not be utilized or distributed outside of this report. Refer to the Geotechnical Considerations section in the Stage1 for more information regarding potential variability on the site. See Methods and Limitations for more information regarding how the VSP is utilized.*

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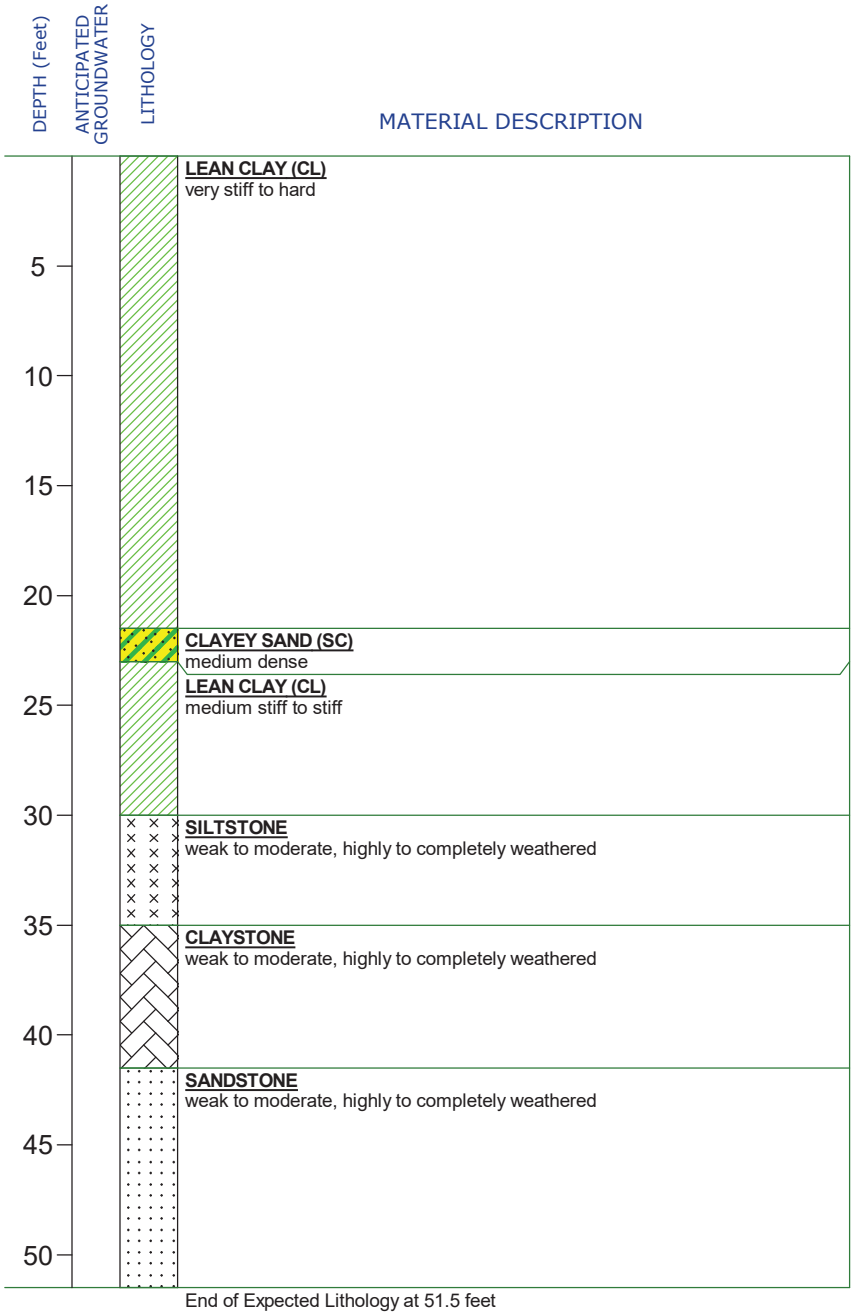
## Area Represented: SSURGO Soil Series Rincon

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