HYDROGEOLOGIC ASSESSMENT REPORT: LUCK SALUDA

NEAR INTERSECTION OF DOUBLE BRIDGES ROAD
AND HEATHER LANE
SALUDA COUNTY, SOUTH CAROLINA

LUCK STONE

BUNNELL-
LAMMONS
ENGINEERING,
INC.
No. C01452

Prepared For:
Luck Stone Corporation
P.O. Box 29682
Richmond, Virginia 23242

BLE Project Number J23-18886-01

September 7, 2023

No. 2844
09/07/23
TIMOTHY JOHN DANIEL

No. 27867
09/07/23
DAVID R. LOFTIS

BLE | BUNNELL LAMMONS ENGINEERING
6004 Ponders Court I Greenville, SC 29615
☎ 864.288.1265 864.288.4330 ✉ info@blecorp.com
BLECORP.COM

BLE | BUNNELL LAMMONS ENGINEERING

September 7, 2023

Luck Stone Corporation
P.O. Box 29682
Richmond, Virginia 23242

Attention: Mr. Bruce Smith
Greenfield Development Manager

Subject: **Hydrogeologic Assessment: Luck Saluda**
Parcel Identification Number #174-00-00-006
Saluda County, South Carolina
BLE Project Number J23-18886-01

Dear Mr. Smith:

As authorized through our proposal dated January 27, 2023, Bunnell Lammons Engineering, Inc. (BLE) has prepared this Hydrogeologic Assessment Report (HAR) in association with the proposed Luck Companies aggregate quarry in Saluda County, South Carolina herein called *Luck Saluda*. The report herein provides information on local and regional hydrogeologic characteristics and potential impacts to groundwater elevations in the vicinity of Luck Saluda during the quarry operations.

If you have any questions concerning this report, please contact Timothy J. Daniel at (864) 288-1265.

Sincerely,
BUNNELL LAMMONS ENGINEERING INC.

Timothy J. Daniel, P.G.
Project Geologist
Registered, South Carolina #2385

No. 2844
09/07/23
TIMOTHY JOHN DANIEL

David R. Loftis, P.E.
Senior Engineer
Registered, South Carolina #27867

No. 27867
09/07/23
DAVID R. LOFTIS

George Losonsky, PhD
Groundwater Modeler
Losonsky & Associates, Inc.

cc: Jeremy Eddy, P.G. - South Carolina DHEC, Mining Reclamation
Clint Courson, CHMM – Hodges, Harbin, Newberry & Tribble
Brant Lane, P.E. – Hodges, Harbin, Newberry & Tribble

6004 Ponders Court, Greenville, SC 29615 ☎ 864.288.1265 864.288.4430 info@blecorp.com
BLECORP.COM

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1.0 INTRODUCTION

1.1 Background Information and Purpose

BLE has prepared this Hydrogeologic Assessment Report (HAR) on behalf of Luck Companies in association with the proposed aggregate quarry located approximately 5 miles northwest of Batesburg-Leesville in Saluda County, South Carolina (see **Figure 1**). BLE understands that Luck is considering the purchase of a portion of the property identified as Saluda County Parcel Identification Number #174-00-00-006 located west of the intersection of Double Bridges Rd (SR-41-26) and Heather Lane in Saluda County, South Carolina (herein referred to as the "Site") for the purpose of developing the undeveloped tract of land or "greenfield" as an aggregate quarry. Parcel Identification Number #174-00-00-006 encompasses a total of approximately 478 acres while the Site of interest is an approximately 330-acre subdivided parcel of the aforementioned property. Approximately 95 acres of the proposed 330-acre Site is anticipated to comprise the extraction area of the proposed quarry.

The purpose of this HAR was to provide information on groundwater flow into the proposed mine pit area during dewatering and to simulate potential impacts on neighboring wells.

1.2 Completed Scope of Work

This HAR began with the development of a preliminary site conceptual model based on known or expected main features of geology, hydrogeology, mine pit location and development, and site-specific relationships between structural geology and groundwater flow. The preliminary site conceptual model was then utilized to develop field data collection needs for this assessment which included geologic, geophysical, and hydrogeologic information. Site specific data were then collected to further characterize the hydrogeologic system and the resultant data analyzed to refine the site conceptual model. A computer aided mathematical model prepared by Mr. George Losonsky with Losonsky & Associates, Inc. (L&A) using MODFLOW was employed to provide predictive simulations of future mine dewatering scenarios.

The subject field work was performed between March 2023 and July 2023. The scope of work performed, including site exploration and testing, consists of the following:

- Geophysical testing was performed across the proposed 95-acre extraction area to characterize discontinuities (i.e., fractures, joints, faults) in the underlying bedrock which may represent high-conductivity groundwater conduits. THG Geophysics, Ltd. (THG) collected six (6) 2-dimensional Electrical Resistivity Imaging (ERI) profiles and eight (8) Very Low Frequency (VLF) profiles across the proposed extraction area (**Appendix C**).

- A DHEC 3736 Monitoring Well application was submitted by BLE on June 13, 2023 and approved by SCDHEC on June 16, 2023 (**Appendix D**)

- Rock core drilling was performed by others at ten (10) locations within or very close to the proposed extraction area in January and February 2023.

- Six (6) permanent groundwater wells (air rotary drilling) were installed within the proposed extraction area by BLE in June and July 2023 (**Figure 2**).

- A literature review and vehicular reconnaissance of the surrounding area within an approximately 0.5-mile radius of the Site was conducted in June and July 2023 to observe and evaluate topographic fracture traces and lineaments, bedrock fracture orientations, public and private drinking water wells, and public surface water intakes (**Figures 4** and **5**).

- A Freedom of Information Act (FOIA) Request was submitted to identify public and private drinking water wells and surface water intakes within an approximately 0.5-mile radius of the Site.

- A variable rate drawdown test was performed in which a single well was pumped at rates ranging from 5 to 40 gallons per minute (GPM) for eight (8) hours (**Appendix E**).

- A constant rate drawdown test was performed in which a single well was pumped at 40 GPM for twenty-four (24) hours (**Appendix E**).

- A transient groundwater model was constructed by Losonsky & Associates, Inc. (L&A) for the Site to provide predictive simulations of effects of future mine dewatering scenarios (**Figures 7** through **9** and **Appendix F**).

2.0 DESCRIPTION OF SITE

The Site is located in Saluda County, South Carolina off of Double Bridges Rd (SR-41-26), approximately 5 miles northwest of the town of Batesburg-Leesville, South Carolina (**Figure 1**). The Site consists of a portion of a parcel of land identified by Saluda County PIN #174-00-00-006. The parent parcel is approximately 485 acres while the subdivided portion of the parent parcel identified as the Site totals approximately 330 acres. Conceptual site drawings indicate the extraction area will occupy approximately 95 acres.

The Site is mostly undeveloped and has been used primarily for timber harvesting. A barn and a residential structure were developed on the property as late as 1951 and still exist on Site. Additionally, a network of unimproved dirt roads has been established.

2.1 Planned Quarry Operations

The planned mining operations will take place in the central portion of the Site, east of the 100-foot wetlands buffer that bisects the site delineated by Hodges, Harbin, Newberry & Tribble (HHNT) in a Delineation Concurrence Request (DCR) submitted to the US Army Corps of Engineers (USACOE) on May 23, 2023 (**Appendix A**). Current design plans for the site provided by Kennedy Consulting Services, LLC (KCS) indicate that the extraction area will be split into Phase 1 and Phase 2 and land to the west of the bisecting wetland will be used for overburden storage (**Appendix B**). The mine facilities and process plant will be located east of the proposed extraction area. A 50-foot undisturbed buffer will be maintained along the perimeter of the property boundary. . Vegetated berms will be constructed to the north, west, and the south of the proposed extraction area, and to the east of the mine facilities and process plant. The road entrance to the mine facility will be from the east, off Double Bridges Rd (SR-41-26) and will extend westward to the final process plant area east of the proposed extraction area.

The planned mining operations will begin with the excavation and removal of overburden and rock from the Phase 1 extraction area located in the central portion of the Site. Current site plans include quarry operations moving into Phase 2 of the site approximately 25 years after the opening of Phase 1.

2.2 Geology

The subject property is located within the Batesburg USGS Quadrangle and is in the Piedmont physiographic province. The Piedmont is characterized by rolling relief that generally slopes from northwest to the southeast, toward the Atlantic Coastal Plain physiographic province. Generally, soils in the Piedmont formed by the in-situ chemical weathering of the underlying bedrock. The typical residual soil profile consists of silty and clayey soils near the surface, where soil weathering is more advanced, underlain by micaceous sandy silts and silty sands. Residual soil zones are commonly referred to as "saprolite." Saprolite is usually sandy with large rock fragments and lesser amounts of silt and clay. The thickness of the saprolite in the Piedmont ranges from a few feet to more than 100 feet (*Hack, 1989*).

The site's natural topography consists of a series of northeast-trending, low relief hills and series of drainage features that slope gently towards Flat Rock Branch which bisects the Site, west of the proposed extraction area and ultimately flows into Clouds Creek west of the Site (**Figure 1**).

The Site is underlain by the Late Paleozoic-aged Clouds Creek pluton, bound to the north by the Asbill Pond Synclinorium and to the south by the Modoc Shear Zone, which follows the boundary between the Piedmont and Atlantic Coastal Plain physiographic provinces (**Figure 3**) (*Secor and others, 1986a*). The

Clouds Creek pluton was described by *Speer (1981)* as a composite body consisting of biotite and cordierite-biotite monzogranite and granodiorite. Texture and color vary within the pluton however, it is distinctly porphyritic throughout its western half and its northern end, with distinctive subhedral or round, blue-gray alkali feldspar megacrysts (*Overstreet, 1965*; *Speer 1981*).

Bedrock coring was performed by Subhorizon Geologic Resources, LLC (SGR) under contract with Luck Companies, LLC (Luck) at ten (10) locations selected by Luck within or very close to the proposed extraction area in January and February 2023. The depth to bedrock can vary even over short horizontal distances due to boulders, fractures, and joints. Therefore, the actual depth to continuous bedrock will vary across the site. The SGR coring locations are indicated on **Figure 2**. Survey data and drilling depths are summarized on **Tables 1** and **2**.

Jurassic aged diabase dikes intercepting the ground surface have been mapped by others within 20 miles of the Site (*Sutter, 1985*; *Bell, 1988*). No diabase dikes were identified at the surface of the Site; however, biotite- and chlorite-rich diabase dikes were identified by SGR at several coring locations and by BLE at five (5) of the six (6) groundwater well locations drilled in June and July of 2023.

Rock outcrops were observed along the drainage features and upland elevations at the Site. On the upland elevations, large boulders in excess of five (5) to ten (10) feet in diameter are also common. Rock outcrops which appeared undisturbed were used for the fracture trace analysis

2.3 Hydrogeology

Groundwater in the Piedmont usually occurs as unconfined, water-table aquifers in four primary geologic zones: 1) alluvial soils deposited in flood plains of streams and rivers; 2) residual soil (saprolite); 3) partially weathered rock; and 4) fractured bedrock. These zones are typically interconnected through open fractures and pore spaces. The configuration of the water-table aquifer generally resembles the local topography.

In the alluvial/residual soil and partially weathered rock zones, groundwater is stored within the pore spaces and is released to the underlying bedrock through gravity drainage. Plutonic rocks, such as the Clouds Creek granite, are composed of interlocking minerals and have little or no pore space to transmit groundwater. Therefore, groundwater within the bedrock zone occurs primarily in fracture voids. Generally, fractures within the bedrock are very small, but may extend to several hundred feet and may intersect other fractures forming complex, interconnected fracture networks.

Groundwater within the Piedmont generally moves from topographically high areas (recharge zones) to topographically low areas within and along stream valleys (discharge areas) (*Fetter, 2001*; *Freeze and Cherry, 1979; Feaster and Guimaraes, 2017*). Flat Rock Branch, and the other smaller, unnamed perennial and ephemeral tributaries that bisect portions of the site, are the expected discharge zones for the shallow aquifer.

2.4 Site Conceptual Model

The materials that comprise the unconfined Piedmont aquifer consists of the residual saprolitic soil, partially weathered rock, and fractured granitic bedrock. In the lower elevation areas, the thin alluvial sediments in the drainages also makeup a small portion of the water-table aquifer. These units are hydraulically connected and thus comprise a single unconfined aquifer, although recharge rates, flow rates and specific storage differ between the units based on the unique geologic conditions of each zone.

The generally accepted model for the Piedmont aquifers is a two layered system, built on the premise of an unconsolidated layer of soil and saprolite containing an unconfined aquifer that has a relatively high storage capacity supplying water to an underlying variably fractured crystalline bedrock aquifer that has low overall porosity and storage (*Heath, 1989*). The low overall porosity and storage are due to the dense, somewhat impermeable bedrock that yields water primarily from secondary porosity and permeability provided by fractures, faults, joints and foliations. The saprolite aquifer and bedrock fractures zone are common targets for private, public, industrial and irrigation water wells. It is important to emphasize that crystalline bedrock aquifers are irregular and heterogeneous in distribution, often highly localized, and exhibit discontinuous water bearing zones.

In summary, the local aquifer system can be conceptually simplified and viewed as a two-layered system consisting of a shallow, unconsolidated, unconfined, porous regolith water aquifer that can supply water to surface water features and to the second layer, the underlying fractured bedrock aquifer.

Infiltration of precipitation to recharge the water-table aquifer is primarily affected by rainfall intensity and duration, soil characteristics (lithology), pre-existing soil moisture conditions, temperature (evaporation), plant uptake (transpiration), and separation between ground surface and the unconfined water-table. Soil samples logged in the field were typically silty fine to coarse sands that graded coarser with depth. These soils indicate favorable recharge areas due to their typically high permeability.

Widespread groundwater elevation data was not available for the site during the duration of field activities. From our experience with similar geology, it is assumed that the configuration of the water-table surface is a subdued replica of the ground surface. Groundwater is assumed to discharge from the irregular saprolite to bedrock interface into the perennial Flat Rock Branch Creek. During heavy rainfall events or in months where recharge exceeds evapotranspiration, groundwater may discharge into ephemeral tributaries to Flat Rock Branch Creek.

3.0 WATER WELL INVENTORY

3.1 Freedom of Information Request

On Thursday, July 6, 2023, BLE submitted a Freedom of Information (FOI) request to the South Carolina Department of Health and Environmental Control (SCDHEC) via the FOI Office to review all available well records for Saluda County. On July 18, 2023, BLE received two (2) spreadsheets from FOI Assistant Director Kristen Keller saluda 1.xlsx, herein referred to as the legacy database, and saluda 2.xlsx, herein referred to as the active well database. The legacy database contained information containing well completion information between 1990 and 2005. SCDHEC did not require well permits prior to 2000; therefore, older nonpermitted wells installed between 1990 and 1999 were only given a log number.

The active well database has been in use since 2005. We understand the active well database only includes wells that have been reported to SCDHEC and should not be considered a complete inventory of all wells in Saluda County. Due to the size of the inventory provided by SCDHEC in the FOI request, the databases have not been included in this report however, they can be submitted electronically upon request.

Neither database identified any wells located within a 0.5-mile radius of the proposed extraction area when imported into Google Earth® via geocoding.

3.2 Regulatory Resources

A review of the SC Watershed Atlas website (https://gis.dhec.sc.gov/watersheds/) did not identify the presence of Public Water Supply Wells (PWSW) or PWSW Protection Zones within a 0.5-mile radius from the proposed extraction area. The closest PWSW Protection zone is approximately 1.75 miles southwest of the extraction area and is attributed to Amicks Poultry (System 4130802). A public geodatabase published by Saluda County (https://saludacountysc.net/SaludaCountyViewer/) showed water line infrastructure present along Spann Rd approximately 1.25 miles west of the proposed extraction area.

3.3 Site Reconnaissance

On July 17, 2023, BLE performed a vehicular reconnaissance of the neighboring properties adjacent to public rights-of-way that were within 0.5 mile of the proposed extraction area. Seven (7) suspected private drinking water wells were identified and are depicted on **Figure 4**. The closest well identified is approximately 1,750-feet east of the extraction area and is used by a private residence on Double Bridges Road (SR-41-26). Evidence of municipal water lines was observed (i.e., fire hydrants) along Spann Rd (SR-41-25).

4.0 FIELD METHODS

4.1 Geophysical Survey

While the Clouds Creek Granite is mentioned in several research papers (*Watson, 1909; Overstreet and Bell, 1965; Speer, 1981; Secor et., al. 1986a)*, significant fracture mapping had not been conducted within the granitic pluton. Due to the lack of historic information and the need to identify significant production wells, it was determined that geophysics would be helpful to identify the fractures which dominate the presumed dual porosity flow regime at the Site. For this project, BLE subcontracted THG Geophysics, Ltd. (THG) to collect eight (8) Very Low Frequency (VLF) profiles and six (6) 2-dimensional 2-D Electrical Resistivity Imaging (ERI) profiles across the approximately 95-acre proposed extraction area. Evaluation of the Site by THG was performed under the project name of "Confidential Site #1". The VLF survey was employed for imaging discrete fractures that propagate to the bedrock surface fractures in the immediate vicinity of the proposed extraction area, and ERI was utilized to further characterize fractures identified in the VLF data and provide estimates of bedrock resistivity.

The VLF survey utilizes very low frequency radio signals to measure electrical properties of near surface soil and shallow bedrock. Features such as fractures, joints, or fault zones are generally more electrically conductive than the surrounding crystalline bedrock (*Hutchinson et al., 2001*). Analysis of the contrasting electrical conductivity data collected via VLF can be used to characterize the subsurface and identify zones which may represent high-conductivity groundwater conduits.

THG collected data along eight (8) VLF profiles covering approximately 20,000 linear feet in a rectangular grid, as depicted on **Figure 2** within **Appendix C**. The profile locations and orientations were selected based on regional and local geologic information, information contained in boring logs prepared by SGR, as well as inferences made from field observations made by BLE in March and April 2023.

The VLF data were collected by walking a series of lines (i.e., profiles) with a backpack VLF receiver and stopping to collect data at points at consistent intervals along each line. The location of each data point along the profile is determined and recorded using a non-survey grade GPS. The VLF method is sensitive to cultural interference from items such as pipelines, utilities, fences, and other conductive objects. No such features were observed at the time of data collection. One, approximately 200-foot section of VLF data in profile 6 was corrupted during acquisition and was omitted from the report. According to the geophysics company THG, the data quality was suitable for use in subsurface characterization.

The ERI profiles were collected with a 3-meter step-out Schlumberger array, in which four (4) stainless steel electrodes are placed in a line around a common midpoint. The lines were designed to image approximately 300 feet below ground surface (**Figure 5** within **Appendix C**).

Following field data collection, the VLF and ERI data were post-processed. **Appendix C** contains the THG Geophysics report which includes figures illustrating the VLF and ERI profiles and the points along each profile where factures were imaged. The post-processed data are presented in both plan and cross-section view to illustrate the interpreted dip of the imaged fractures. The data were examined and utilized to make interpretations of the subsurface fracture patterns within the study area. The black lines depicted on **Figure 7, Appendix C** illustrate the interpreted location and orientation of the imaged fractures based on VLF data, with arrows depicting the dip direction of these features; the black points indicate interpreted fractures based on the ERI data.

Although the lines shown are straight and continuous, actual fracture patterns are not always linear and/or as laterally continuous as shown. Interpretations of fracture zones by THG may differ from those interpreted by BLE and L&A when identifying the placement of groundwater monitoring wells.

4.2 Geologic Field Mapping

Plutonic rocks, such as the Clouds Creek granite, are composed of interlocking minerals and have little to no pore space to transmit groundwater. Therefore, fractures are often the primary sources of permeability in crystalline bedrock aquifers. Locating bedrock fractures is one step towards identifying zones in the bedrock that may yield high quantities of groundwater (*Clark et. al, 1996*).

BLE geologists conducted two (2) days of geologic field mapping at the Site in June and July 2023 to collect fracture strike and dip measurements to support groundwater modeling efforts as well as overall trends in the structural geology. The fractures observed at the site typically occur as joints with rough planar surfaces and no discernable offset parallel to the fracture surfaces. Joints appear to be more closely spaced and more variably oriented within the proposed extraction area than in other areas of the Site. The dominant orientation of joints observed at the Site strike southeast and dip steeply to the southwest (**Figure 5**).

4.3 Well Installations

The locations of the observation and dewatering wells were selected based on the VLF and ERI geophysical survey findings, borings performed by SGR, and geologic field observations. The aforementioned well locations were selected with the purpose of intersecting communicative primary fractures and developing an observation well network to be used during pump tests for monitoring aquifer responses and estimating aquifer parameters. In selecting drilling locations, consideration was given to anticipated mining infrastructure placement and to the option of using one or more of the drilled wells as production wells for temporary mining operations. The location of pumping well *D-1* was selected based on conditions encountered in boring *IW-2* performed by SGR in January of 2023 and verbal communication from Luck personnel that IW-2 was observed to have artesian flow after drilling.

Well drilling targeted installation of the pumping well in primary fracture zones and installation of observation wells intersecting the same apparent fracture zone, but at some distance from the pumping well. Additional observation wells were installed to examine the influences of pumping in the aquifer system away from the fracture zone intersected by the pumping well. Given the dipping orientation of the fractures, this arrangement allowed for the possibility of a single fracture being intersected by two wells located along a line perpendicular to the trace of the fracture. This approach would provide an opportunity to measure hydraulic conductivity along the same fracture, the degree of hydraulic connection between parallel fractures, and test the conceptual site model.

On behalf of Luck, BLE obtained a well installation permit (Permit) from the SCDHEC Mining and Reclamation Program. The permit is included in **Appendix D**. BLE notified SCDHEC of the schedule for these field activities, as required by the Permit.

Drilling and well installation activities were performed between June 19 and July 3, 2023. Austin Drilling & Well Repair, Inc., South Carolina licensed well drillers, performed the well installations. BLE provided the services of a South Carolina licensed geologist to observe the field activities. A registered land surveyor from Wellston Associates Land Surveyors, LLC of Warner Robins, Georgia performed the approximate as-built surveying after completion of the drilling activities. The approximate as-built survey data can be found in **Table 1**.

One (1) pumping well (D-1) and five (5) observation wells (O-1, O-2, O-3, O-4 and O-5) were installed in bedrock at the site, with depths ranging from approximately 301.8 feet to 405.0 feet below ground surface (bgs). The borings were performed using a Schramm T450WS truck-mounted drill rig, employing a combination of mud- and air-rotary drilling techniques in soil and bedrock. Where competent rock was encountered, a 7.5-inch OD down-hole pneumatic drill-hammer was used to advance the borehole into bedrock. The pneumatic drill-hammer advanced through the subsurface materials by rapidly striking the rock while the drill pipe was slowly rotated. The drill hammer was constructed of alloy steel with tungsten-carbide inserts that provide the chipping or cutting surfaces. An in-line oil coalescing filter was attached to the air compressor on the rig to prevent oil contamination in the borehole.

Bedrock was encountered at a range of depths from 26 to 67 feet below ground surface (average 48 feet). In general, the bedrock encountered became more competent with depth. The depth to bedrock will vary over short horizontal distances due to boulders, fractures, and joints. Therefore, the actual depth to continuous bedrock will vary across the site. Based on the drill cuttings, the bedrock encountered consisted primarily of severely weathered to fresh, medium to coarse-grained, granite. Diabase dike(s) were encountered at all but one (1) groundwater well location (O-5). In contrast to the thin diabase dike(s) encountered by SGR, those encountered during well installation activities ranged from 13 to 29 feet thick at O-1 and O-2, respectively. Individual boring logs which contain more detailed descriptions are presented in **Appendix D**.

The wells consist of 6.25-inch internal diameter polyvinyl chloride (PVC; Johnson Schedule 40, NSF-rated) casing with welded joints that extended from less than three feet above grade to the top of bedrock. A hydrated bentonite seal was installed at the soil-bedrock interface to prevent surface water infiltration. The well annulus was grouted with a high solids bentonite grout to the ground surface. A 4-inch diameter PVC inner well casing was installed into bedrock to prevent formation material from falling into the well, the bottom 20-foot section of which is a manufactured well screen with 0.010-inch-wide machined slots. The surface completion of each well consisted of an approximately 2-foot tall, yellow-painted PVC stickup and a locking, expandable well cap. Gravel was spread at the ground surface to at least the width of the annular space to increase footing and structural stability of each well, per SCDHEC R.61-71 Well Standards. Each well was constructed with a vent hole in the PVC casing near the top of the well. A well identification tag was secured to each stick up with its corresponding well number and construction details.

The locations of the wells are indicated on **Figure 2**. Survey data and drilling depths are summarized on **Tables 1** and **2**. **Table 3** summarizes the dominant water bearing fracture zones recognized during drilling of monitoring wells.

Water Well Records (SCDHEC Form 1903) are included in **Appendix D**.

4.4 Aquifer Pump Testing

4.4.1 Variable Rate (Step) Test

BLE conducted a variable flow rate pump test (step test) on the pumping well (D-1) on July 6, 2023 to estimate the target flow rate for the constant rate aquifer pumping test. A FloWise P55S75 4-inch diameter, 7.5-horsepower submersible electric pump rated at a maximum flow rate of 75 gallons per minute (gpm) was installed on a 2.0-inch internal diameter NPT galvanized pipe and positioned at a depth of approximately 235 feet bgs. A 2-inch diameter flow meter and flow control valve were installed on the discharge line. BLE installed a Seametrics PT2X® pressure transducer/datalogger into the pumping well at a depth of 200 feet bgs to collect height of water column data during the step test, from which drawdown levels were calculated. A Seametrics BaroSCOUT2X® barometric pressure sensor was deployed in a shaded area near the pumping well to barometrically compensate the absolute pressure sensor for water level measurements.

The pumping rates selected for the step test were 5, 10, 25, 35, and 40 gpm based on field observations and approximate water yields estimated during well installations. The step test began with an initial pumping rate of 5 gpm, which was maintained using the flow control valves. The pump was operated at 5 gpm for fifteen minutes, during which the change in drawdown in the pumping well became asymptotic. Approximately fifteen minutes after starting the test, the pumping rate was increased to 10 gpm and maintained at this rate for thirty minutes, during which the change in drawdown in the pumping well became asymptotic. After thirty minutes of pumping at 10 gpm, the pumping rate was increased to 25 gpm and maintained at this rate for approximately seventy-five minutes. Approximately two hours after starting the test, the pumping rate was increased to 35 gpm and maintained at this rate for seventy-five minutes, during which the change in drawdown in the pumping well became asymptotic. During this step, changes to the pumping well drawdown once again became asymptotic. After seventy-five minutes of pumping at 35 gpm, the pumping rate was further increased to 40 gpm. After approximately 5 minutes, drawdown increased significantly. After approximately 10 minutes, the changes in drawdown had leveled out. The pumping rate was maintained at 40 gpm for forty-five minutes, during which the change in drawdown in the pumping well became asymptotic and therefore the pump was deactivated and the step test was terminated.

The drawdown data collected and recorded by the transducers was analyzed following the test. Based on an analysis of the flow rate employed and drawdown data obtained, a target flow rate of 40 gallons per minute was selected for the constant rate pumping test.

A chart depicting the pressure transducer data collected at pumping well D-1 during the step test is included in **Appendix E** and maximum drawdown is reflected in **Table 5**.

4.4.2 Constant Rate Pumping Test

From July 7 through July 8, 2023, a constant rate pumping test was performed using well D-1 as the pumping well and wells O-1, O-2, O-3, O-4, and O-5 as observation wells. This test was configured and conducted in a similar manner to the step test, though the pumping rate would be constant at 40 gpm. The same FloWise P55S75 4-inch diameter, 7.5-horsepower submersible electric pump was installed on a 2.0-inch internal diameter NPT galvanized pipe and positioned at a depth of approximately 235 feet bgs was used for the constant rate pump test. The flow control device and flow meter utilized during the step test were employed during the constant rate test.

Prior to beginning the pump test, BLE deployed Seametrics PT2X® pressure transducers in the pumping well (D-1) and the five (5) observation wells (O-1, O-2, O-3, O-4, and O-5). These transducers were set to record height of water column data during the pump test, from which drawdown levels were calculated. A Seametrics BaroSCOUT2X barometer was again deployed to barometrically compensate the absolute pressure sensors for water level measurements. In addition to transducer data, manual water level readings were collected from each of the three observation wells during the test. **Table 4** provides a summary of the transducer types, locations deployed, and logging intervals utilized.

The pumping phase of the constant rate pumping test lasted approximately 24 hours. The pump rate was held generally constant throughout the test at 40 gpm, with a total of approximately 56,990 gallons pumped from the well during the pumping portion of the test.

After the test was completed and the pump was deactivated, the transducers in each of the wells continued to record data during the aquifer recovery phase, to monitor post-pumping water levels responses at the pumping and observation wells. On July 10, 2023, the transducer logging was terminated and the transducers were removed from the wells. No rainfall events occurred within 24-hours prior to or during the constant rate pump test. Charts depicting pump test drawdown data collected are included in **Appendix E**.

5.0 PUMP TEST ANALYSIS AND MODEL CONSTRUCTION AND CALIBRATION

5.1 Conceptual Model Design

The planned mining activities will be comprised of two phases of mine pit development: Phase I and Phase II (**Figure 2**). In Phase I, approximately 25 percent of the mine pit area will reach a depth of 250 feet after 25 years (+/- 5 years) when accounting for a series of 50-foot lifts and 90-foot wide travel ways. After approximately 25 years, mining will expand north into Phase II for an additional 48 years (+/- 5 years) until approximately 50 percent of the combined Phase I and Phase II area will be at a depth of 250 feet. The mine will have reached approximately 250 ft depth approximately 73 years (+/- 5 years) after the start of mining. The final step of the conceptual model occurs after approximately 105 (+/- 5 years) when the bottom of the pit reaches approximately 400 feet in depth.

5.2 Numerical Modeling of Pump Test

The analysis of drawdown curves obtained during the constant rate pumping test accounted for the discrepancies in distance-drawdown relationships among the observation wells. Complete simulation of the entire test in a single numerical model is not feasible for two reasons:

- VLF fracture data was not verifiable at depth. Dip angles and, at some locations, dip directions were ambiguous.
- Rose diagrams of hundreds of fractures measured in and around the pumping test area suggested the presence of multiple generations of major and minor fracture sets with orientations ranging from northwest-southeast to essentially east-west.

Instead, two (2) sets of hydraulically related wells were calibrated separately in single-layer numerical models using MODFLOW. The first set focused on observation wells installed roughly following in an east-to-west alignment relative to pumping well D-1 (O-2, O-3, and O-5). The second set of hydraulically related wells comprises the two (2) far-field wells, O-4, and O-5.

Results of the numerical model can be found in **Appendix F**.

5.3 Analytical Modeling of Pump Test and Aquifer Parameters

Analytical curve matching of drawdown in each individual test well provided a representative range of values for aquifer parameters because the analytical drawdown curves simulated the magnitude and shape of the observed drawdown curves relatively well. The Theis solution for non-leaky unconfined aquifers was used to confidently select hydraulic conductivity and storativity values for the region (**Appendix F**).

Table 6 summarizes horizontal hydraulic conductivity, vertical hydraulic conductivity, and storativity values derived from the analytical and numerical simulations applied to the pumping test data. Notably, a unique anisotropy in the horizontal plane did not emerge from the pumping test evaluation. This reflects the wide range of fracture directions observed in field measurements, combined with the geophysical data. Assigning a preferred direction of horizontal anisotropy based on one set of fracture data is not justified, and the resulting drawdown ellipse would be non-conservative in the direction of the minor axis of the anisotropy ellipse. The horizontal conductivity in the east-west direction (Kx) therefore equals the horizontal conductivity in the north-south direction (Ky) in the regional model.

5.4 Groundwater Flow Model Design

5.4.1 MODFLOW

The groundwater modeling was performed using Groundwater Vistas MODFLOW Version 6.96. Groundwater Vistas MODFLOW is pre- and post-processor graphical interface program employing the United States Geologic Survey's (USGS) MODFLOW-2005 Version 1.11.00 code. The model code is based on the finite difference method of solving partial differential equations describing groundwater flow, as described in McDonald and Harbaugh (1988). MODFLOW-2000 is an update to the model code, described in Harbaugh et al. (2000) and Hill et al. (2000).

MODFLOW solves the groundwater flow equation by dividing the model domain into blocks, or cells, within which aquifer properties are assumed to be uniform. Vertically, the model can be subdivided into layers with variable thickness. Each cell is assigned a unique flow equation, and the resulting matrix of equations describing the model domain are calculated with a solver program over a series of time steps. The solver computes flow rate and cumulative volume balances for inflow and outflow at each cell at each time step.

In preparation for development of a regional model for the simulation of site and regional effects of the proposed mine dewatering, a three-dimensional groundwater flow model was developed and calibrated to the site-specific aquifer pumping test data. Use of a discretized model to evaluate site-specific variables was essential where specific fracture zones and pit configurations were be mapped. The pumping test calibration model simulated specific fractures over a domain limited to the area of the geophysical profiles and pumping test well locations. The purpose of the pumping test calibration model was to derive input parameters for the regional model simulations.

Following pump test calibration, an equivalent porous media (EPM) model was developed for the purpose of simulating specific phases of the proposed mining operations, over time. The EPM model applied aquifer parameters derived from the pumping test to a larger, more regional domain.

5.4.2 Model Domain, Layers, and Boundary Conditions

The model uses an approximately 23,000-foot (east-west) by 29,000-foot (north -south) rectangular grid with 100-foot by 100-foot cells in the x and y direction. The model uses two layers in the z direction interpreted as Layer 1 and Layer 2. Layer 1 extends from 0 to 60 feet below ground surface to simulate weathered residuum and rock based on the approximate casing depths in **Table 2**. Layer 2 extends from 60 to 500 feet below ground surface and simulates more competent rock with fractures. The hydraulic conductivity, storativity, specific storage (Ss), and specific yield (Sy) used in the model are shown in **Table 7.**

The model domain provided sufficient distance between the mine and the edges of the model to avoid significant impact of the boundaries on the mining simulations. General head boundaries were therefore applied at the edges of the model, with conductance values based on the horizontal component of hydraulic conductivity in each respective model layer. The model bottom was set as a no-flow boundary, below 500 feet depth.

Figure 6 depicts the grid, model domain, and perennial and ephemeral streams documented in HHNT's DCR and HUC-12 stream data obtained from the USGS for the HUC-12 Lower Clouds Creek sub-watershed. The perennial streams identified in HHNT's DCR and the HUC-12 stream data are used as constant head boundaries in the model. The perennial stream hydraulic conductivity was 0.1 feet per day and the model cells are 1 foot thick and 10 feet wide. Creeks have a threshold of 50 feet, which is the distance below the bottom of the creek at which the leakage rate becomes independent of the position of the water-table.

At the time of this report, the Site has not selected a discharge area for water extracted during pit dewatering. For this evaluation two (2) separate models were prepared. Model *D1* indicates no discharge of water from the quarry pit to surface streams and model *P4* indicates discharge to Sediment Pond SP-4 and the ephemeral stream detailed in HHNT's DCR (**Appendix A**) and the preliminary site layout prepared by KCS (**Appendix B)**.

A time-varying constant head boundary condition was applied to Phase 1 and Phase 2. This boundary condition allows a specified head to change gradually over time during a model stress period.

5.5 MODFLOW Model Results

The results of MODFLOW models *D1* and *P4* are shown for the three (3) time steps in **Figure 7** (25 years), **Figure 8** (73 years), and **Figure 9** (105 years). Contour intervals of 5 feet, 20 feet, 50 feet, 100 feet are visible where present.

The drawdown curves for the three (3) groundwater monitoring wells (MW-1, MW-2, and MW-3) outlined in BLE's August 17, 2023 report titled *Groundwater Monitoring Plan: Luck Saluda* are included in **Appendix F**. Anticipated dewatering rates can be found in **Appendix F**.

Drawdown is anticipated to be greater in the southeastern direction due to the lack of large perennial streams similar to Cloud's Creek and Flat Rock branch present west of the proposed extraction area. The radius of the cone of influence for dewatering was smaller in model *P4* as opposed to model *D1* due to the assumed discharge of water from the extraction area to an ephemeral stream in the northeastern corner of the Site.

5.6 MODFLOW Model Limitations

Both models P4 and D1 are limited by the availability of regional groundwater elevation data. No long-term water-table elevations for any of the surrounding private drinking water wells were available nor have the significant fracture zones identified during geophysics and drilling and shown in **Table 3** been verified to exist off site.

Perennial streams in the piedmont of South Carolina are typically "gaining" streams, meaning that groundwater is discharged to the streambed while ephemeral streams are typically "losing" streams meaning that surface water recharges the underlying aquifer (*Feaster and Guimaraes, 2017*). If significant impacts to stream baseflow are proven to be a direct result of mine operations, a qualified wetlands scientist may be retained to assess potential impacts and provide possible mitigation strategies. The results of model P4 shown in **Figures 7** through **9** are likely more realistic as they account for recharge of the water removed during dewatering to the regional model. The results of model D1 are likely exaggerated due to the model not having an equal water balance as the volume of water removed during dewatering is not recharged to the aquifer.

The estimated time to reach projected quarry depths and the footprint as currently provided to BLE in **Appendix B** are considered significant parameters to the model. If the proposed Site design changes or if the USACOE dissents from the DCR for the facility (**Appendix A**) then several of the model parameters may need updating.

The activities and evaluative approaches used in this scope of work are consistent with those normally employed for services of this type. Our services have been performed based on our understanding of the Site and the observations made during our work. Natural variations in the physical composition of the soil overburden and fractured bedrock and the resolution of the data collected limit both accuracy and precision of subsurface hydrogeologic predictions. The limitations apply to groundwater elevation, flow, and other intrinsic aquifer properties which results in some variability to groundwater models. Reassessment of the aquifer parameters and assumptions made in this model may be revisited at a later date if the conditions encountered during mine development and operation are found to differ substantially from those used in our evaluation.

6.0 CONCLUSIONS

BLE has completed this HAR of the approximately 330-acre Site located in Saluda County, South Carolina. This report is intended to provide estimates of local geologic and hydrogeologic conditions and to aid in making inferences as to the impact of mining activities on the identified private drinking water wells within 0.5 mile of the extraction area and local surface water features.

The results of this this HAR and the data included herein are the product of hydrogeological field testing, data analysis, and predictive numerical modeling, consistent with industry standards, performed by BLE and its subcontractors. The completed scope of work included activities such as VLF and ERI geophysics, geologic mapping, the installation of groundwater observation and pumping wells, drawdown testing, and finite-difference numerical modeling of anticipated groundwater drawdown as a function of time. Hydrogeologic input parameters of the numerical model were based on calibration of the drawdown testing results, aided by standard analytical evaluation for additional confirmation of the numerical model calibration.

This hydrogeologic assessment relied on a process that began with the development of a preliminary site conceptual model. The preliminary model was based on known or expected main features of geology, hydrogeology, mine pit location and development, and site-specific relationships between geologic structures and groundwater flow. The preliminary site conceptual model was utilized to develop field data collection needs for this assessment. Site specific data was collected for the purpose of further characterizing the hydrogeologic system and refining the site conceptual model.

A standard computer aided three-dimensional mathematical model was then employed to provide predictive simulations of effects of future mine dewatering scenarios. The model used conservative assumptions regarding aquifer properties and was consistent with standard best practice in numerical finite-difference modeling of flow in porous and fractured media. Dr. Losonsky modeled three future mine pit development scenarios. The Phase I pit scenarios involved the expansion and gradual dewatering of the Phase I pit down to a depth of 250 feet after 25 years (Scenario #1), and both the Phase I and Phase II pits down to 250 feet after 73 years (Scenario #2) from the beginning of mining operations. For the Full Mine Pit dewatering scenario (Scenario #3), both the Phase I and Phase II pits continue to expand and are gradually dewatered down to 400 feet after 105 years from the beginning of mining operations.

The model predicts a drawdown cone with irregular distribution, reflecting both the effects of surface water recharge and hydraulic conductivity consistent with the fracture systems directly measured at the subject site and imaged using geophysical tools. The drawdown cone is asymmetric with the western extent limited by perennial creeks within and just west of the property. The drawdown cone’s eastern and northern reaches exhibit indentations reflecting perennial stream paths. Two alternative recharge conditions were modeled: model *D1* with no mining discharge water re-introduced into the subsurface, and model *P4* with Pond SP-4 kept full and discharge water allowed to infiltrate into the subsurface.

<u>25-year Drawdown</u>
After 25 years of operation of the Phase I pit, the regional model simulations predict a 50-foot drawdown cone of influence that is predominantly confined to the eastern two-thirds of the proposed mine property and extending up to one-quarter mile south of the property. The regional model simulations predict 20 feet of drawdown 0.2 mile east, 0.3 mile north, and up to 0.7 mile south of the property boundary after 25 years of operation.

<u>73-year Drawdown</u>

After 73 years of operation, the regional model simulations predict 50 feet of drawdown contained within the eastern property boundary with Pond SP-4 infiltration (P4 model) but extending up to 0.1 mile east of the property boundary if none of the discharge water is allowed to re-infiltrate. North of the property boundary, 50 feet of drawdown extends approximately as far after 73 years as 20 feet of drawdown extends after 25 years. South of the property boundary 50 feet of drawdown one third of a mile from the property boundary. After 73 years of operation, 20 feet of drawdown extends less than half a mile (approximately 0.4 mile) east and north of the property boundary, and just under one mile south of the property boundary. Drawdown after 73 years is essentially contained within the western property boundary.

105-year Drawdown

When the mine reaches 400-foot depth after 105 years of operation, 100 feet of drawdown is contained within the property boundary to the east and west and extends 0.1 and 0.2 miles north and south of the property boundary, respectively. The extent of 50 feet of drawdown after 105 years of operation depends on the presence of re-infiltration of discharge water. With re-infiltration (model *P4*) 50 feet of drawdown is contained within the northeast corner of the property but extends beyond the southeast corner of the property by approximately 0.15 mile. Without re-infiltration of discharge water, 50 feet of drawdown extends 0.2 mile beyond the eastern property boundary, up to 0.3 mile north of the boundary, and up to 0.5 mile south of the boundary after 105 years of operation. The extent of 20 feet of drawdown after 105 years of operation is similar in all directions from the property boundary to the extent after 73 years of mining.

Summary

For the scenarios analyzed, the drawdown cone is steep within the property boundary to the east and over an area extending up to 0.2 mile north and south of the property. Drawdown increases primarily in the first 25 years of operation and continues to develop within 0.2 mile from the property to the east and north of the property in the period between 25 and 73 years of operation. Beyond 73 years of operation, the drawdown cone remains essentially stable.

The steep drawdown cone at the edge of the property may limit potential impacts to surface waters and wetlands. If stream flow impacts are minimal, impacts to bed and bank wetlands should also be limited. Potential impacts to ponds and upland wetlands are estimated to be insignificant based on the results of our model. BLE understands that future mine operations will likely include reintroducing a portion of the groundwater extracted by dewatering into on-site sediment ponds and stream segments, which may lessen the stream flow impacts. If significant impacts to stream baseflow are proven to be a direct result of mine operations, a qualified wetlands scientist may be retained to assess potential impacts and provide possible mitigation strategies.

The activities and evaluative approaches used in this scope of work are consistent with those normally employed for services of this type. Our services have been performed based on our understanding of the Site and the observations made during our work. Monthly monitoring of groundwater elevations within the property boundary will be conducted pursuant to the procedures outlined in the report titled *Groundwater Monitoring Plan: Luck Saluda* prepared by BLE on August 17, 2023. Reassessment of the aquifer parameters and assumptions made in this model may be revisited at a later date if the conditions encountered during mine development and operation are found to differ substantially from those used in our evaluation.

7.0 REFERENCES

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TABLES

Table 1

Groundwater Well & Core Hole Survey Information

Luck Saluda - Hydrogeologic Evaluation
Saluda County, South Carolina
BLE Project Number J22-18886-01

Station ID	**Ground Elevation (ft)**	**TOC[5] Elevation (ft)**	**Well Stickup (ft)**	**Northing (ft)**	**Easting (ft)**	**Description**	**Status as of September 2023**
D-1	480.30	482.15	1.85	778,279.61	1,820,132.57	Pumping Well	Present
O-1	479.33	482.12	2.79	778,320.44	1,820,107.25	Observation Well	Present
O-2	481.16	483.48	2.32	778,377.48	1,820,120.62	Observation Well	Present
O-3	473.07	475.32	2.25	778,218.52	1,820,053.12	Observation Well	Present
O-4	482.63	484.82	2.19	778,525.51	1,820,137.31	Observation Well	Present
O-5	463.48	465.92	2.44	778,293.88	1,819,898.30	Observation Well	Present
IW-1	487	N/A	N/A	777,795	1,820,527	Rock Coring	Abandoned
IW-2	471	N/A	N/A	777,662	1,819,828	Rock Coring	Abandoned
IW-3	438	N/A	N/A	778,318	1,818,980	Rock Coring	Abandoned
IW-4	497	N/A	N/A	777,443	1,821,014	Rock Coring	Abandoned
IW-5	477	N/A	N/A	779,090	1,820,009	Rock Coring	Abandoned
IW-6	482	N/A	N/A	778,292	1,820,143	Rock Coring	Abandoned
IW-7	484	N/A	N/A	778,899	1,820,882	Rock Coring	Abandoned
IW-8	460	N/A	N/A	777,269	1,819,351	Rock Coring	Abandoned
IW-9	453	N/A	N/A	778,824	1,819,419	Rock Coring	Abandoned
IW-10	448	N/A	N/A	778,439	1,819,518	Rock Coring	Abandoned

NOTES:

1. TOC = *Top Of Casing*
2. D-1 and O-1 through O-5 were surveyed by Wellston Associates Land Surveyors, LLC] of Warner Robbins, GA, August 18, 2023.
3. Northings and Eastings are in FEET and are referenced to the State Plane Coordinate System Zone 3900 (South Carolina) and the North American Datum of 1983 (NAD 83).
4. Elevations are in FEET and reference the North American Vertical Datum of 1988 (NAVD 88).
5. TOC elevations provided by Wellston Associates for Observation and Dewatering Wells are approximate.
6. N/A = *Not Applicable*
7. **Bold wells and core holes** are either in (or very close to) the proposed extraction area.
8. Rock coring was performed by Subhorizon Geologic Resources (SGR) in January and February of 2023.
9. Northings and eastings for core holes IW-1 through IW-10 performed by Subhorizon Geologic Resources, LLC (SGR) in January and February 2023 were collected using a handheld GPS unit (non-survey quality).
10. Approximate elevations for SGR core holes were extracted from a digital elevation model and reference NAVD88.

Table 2

Groundwater Well Construction & Core Hole Details

Luck Saluda - Hydrogeologic Evaluation
Saluda County, South Carolina
BLE Project Number J22-18886-01

Station ID	Ground Elev.	TOC[2] Elev.	Description	Depth to Competent Rock	Top of Bedrock Elev.	Total Depth	6.25-in I.D. PVC of September 2023	4-in I.D. PVC Liner Depth	Screened Interval Depth	Screened Interval Elevation
D-1	480.30	482.15	Pumping Well	53.0	427.3	405.0	55.0	0 - 140	140 - 160	340 - 320
O-1	479.33	482.12	Observation Well	54.0	425.3	301.8	54.0	0 - 180	180 - 200	299 - 279
O-2	481.16	483.48	Observation Well	67.0	414.2	302.3	67.0	0 - 180	180 - 200	301 - 281
O-3	473.07	475.32	Observation Well	30.0	443.1	302.0	34.0	0 - 140	140 - 160	333 - 313
O-4	482.63	484.82	Observation Well	58.0	424.6	302.2	58.0	0 - 140	140 - 160	343 - 323
O-5	463.48	465.92	Observation Well	26.0	437.5	301.5	26.0	0 - 40	40 - 60	423 - 403
IW-1	487.00	N/A	Rock Coring	N/A	N/A	215	N/A	N/A	N/A	N/A
IW-2	471.00	N/A	Rock Coring	N/A	N/A	261	N/A	N/A	N/A	N/A
IW-3	438.00	N/A	Rock Coring	N/A	N/A	242	N/A	N/A	N/A	N/A
IW-4	497.00	N/A	Rock Coring	N/A	N/A	167	N/A	N/A	N/A	N/A
IW-5	477.00	N/A	Rock Coring	N/A	N/A	179	N/A	N/A	N/A	N/A
IW-6	482.00	N/A	Rock Coring	N/A	N/A	137	N/A	N/A	N/A	N/A
IW-7	484.00	N/A	Rock Coring	N/A	N/A	152	N/A	N/A	N/A	N/A
IW-8	460.00	N/A	Rock Coring	N/A	N/A	226	N/A	N/A	N/A	N/A
IW-9	453.00	N/A	Rock Coring	N/A	N/A	205	N/A	N/A	N/A	N/A
IW-10	448.00	N/A	Rock Coring	N/A	N/A	105	N/A	N/A	N/A	N/A

NOTES:

1. Measurements are in FEET; elevations reference the North American Vertical Datum of 1988 (NAVD 88).
2. TOC = *Top Of Casing*
3. N/A = *Not Applicable*
4. I.D. = *Internal Diameter*
5. **Bold wells and core holes** are either in (or very close to) the proposed extraction area.
6. Rock coring was performed by Subhorizon Geologic Resources (SGR) in January and February of 2023.

Prepared By: TAO
Checked By: TJD

Table 3

Dominant Fracture Zones Encountered

Luck Saluda - Hydrogeologic Evaluation
Saluda County, South Carolina
BLE Project Number J22-18886-01

Well ID	Ground Surface Elevation	TOC[5] Fracture Zones	Driller Estimate of Well Yield At Time of Drilling
D-1	480.30	92 - 94, 114 - 115, 130, 160-163	38 GPM
O-1	479.33	59, 120	12 GPM
O-2	481.16	90 - 94	6 GPM
O-3	473.07	76 - 77, 104 -107, 137 - 139	20 GPM
O-4	482.63	146 - 155	24 GPM
O-5	463.48	21 , 36, 50, 58	25 GPM

NOTES:

1. Measurements are in feet; elevations reference the North American Vertical Datum of 1988 (NAVD 88).
2. Depths are in feet below ground surface.
3. GPM = *Gallons Per Minute*

Prepared By: TAO
Checked By: TJD

Table 4

Summary of Pressure Transducer Deployment During Constant Rate Pump Test

Luck Saluda - Hydrogeologic Evaluation
Saluda County, South Carolina
BLE Project Number J22-18886-01

Well ID	Top of Casing Elevation	TOC[5] Transducer (BTOC)	Pressure Transducer Elevation	Device Type	Logging Interval
D-1	480.30	180.0	300.30	Seametrics PT2X 100 psia	30 seconds
O-1	479.33	90.0	389.33	Seametrics PT2X 50 psia	30 seconds
O-2	481.16	100.0	381.16		30 seconds
O-3	473.07	90.0	383.07		30 seconds
O-4	482.63	100.0	382.63		30 seconds
O-5	463.48	80.0	383.48		30 seconds
N/A (ambient atmospheric pressure monitoring)	N/A	N/A	N/A	Seametrics BaroSCOUT2X 30 psia	15 minutes

NOTES:

1. Measurements are in feet; elevations reference the North American Vertical Datum of 1988 (NAVD 88).
2. BTOC = *Below Top of Casing*

Prepared By: TAO
Checked By: TJD

Table 5

Summary of Maximum Drawdown

Luck Saluda - Hydrogeologic Evaluation
Saluda County, South Carolina
BLE Project Number J22-18886-01

Well ID	Maximum Drawdown (ft)
D-1	84.6
O-1	20.3
O-2	50.8
O-3	64.9
O-4	63.9
O-5	52.8

NOTES:

1. Maximum drawdown observed during the steady state pumping test at a rate of 40 gallons per minute.

Table 6

Summary of Aquifer Parameters from Pumping Test Analyses and Simulation

Luck Saluda - Hydrogeologic Evaluation
Saluda County, South Carolina
BLE Project Number J22-18886-01

Interpretation Method	Description		Kx (ft/day)	Ky (unitless)	S (unitless)	b (feet)	T (ft^2/day)
1	MODFLOW, 1-layer, East-West Anisotropy, No Creeks, Focus on O-2, O-3, and O-5		0.25	0.125	5.0 x 10^{-5}	300	75 (Tx) 37.5 (Ty)
2	Analytical Fits to Individual Wells (Theis Solution)						
	D-1	Pumping Well	0.52	(isotropic)	6.0 x 10^{-4}	300	157
	O-1	Observation Well	0.22	(isotropic)	1.0 x 10^{-4}	300	65
	O-2	Observation Well	0.18	(isotropic)	7.4 x 10^{-5}	300	54
	O-3	Observation Well	0.17	(isotropic)	1.4 x 10^{-5}	300	51
	O-4	Observation Well	0.17	(isotropic)	1.7 x 10^{-5}	300	51
	O-5	Observation Well	0.31	(isotropic)	0.10	300	93
3	MODFLOW, 1-layer, Isotropic, Regional Creeks included, Focus on O-4 and O-6		0.15	0.15	1.0 x 10^{-5}	300	45

NOTES:

1. Kx = horizontal hydraulic conductivity in the east/west direction
2. Ky = horizontal hydraulic conductivity in the north/south direction
3. S = Storativity
4. b = Aquifer thickness
5. T = Transmissivity

Table 7

MODFLOW Parameters

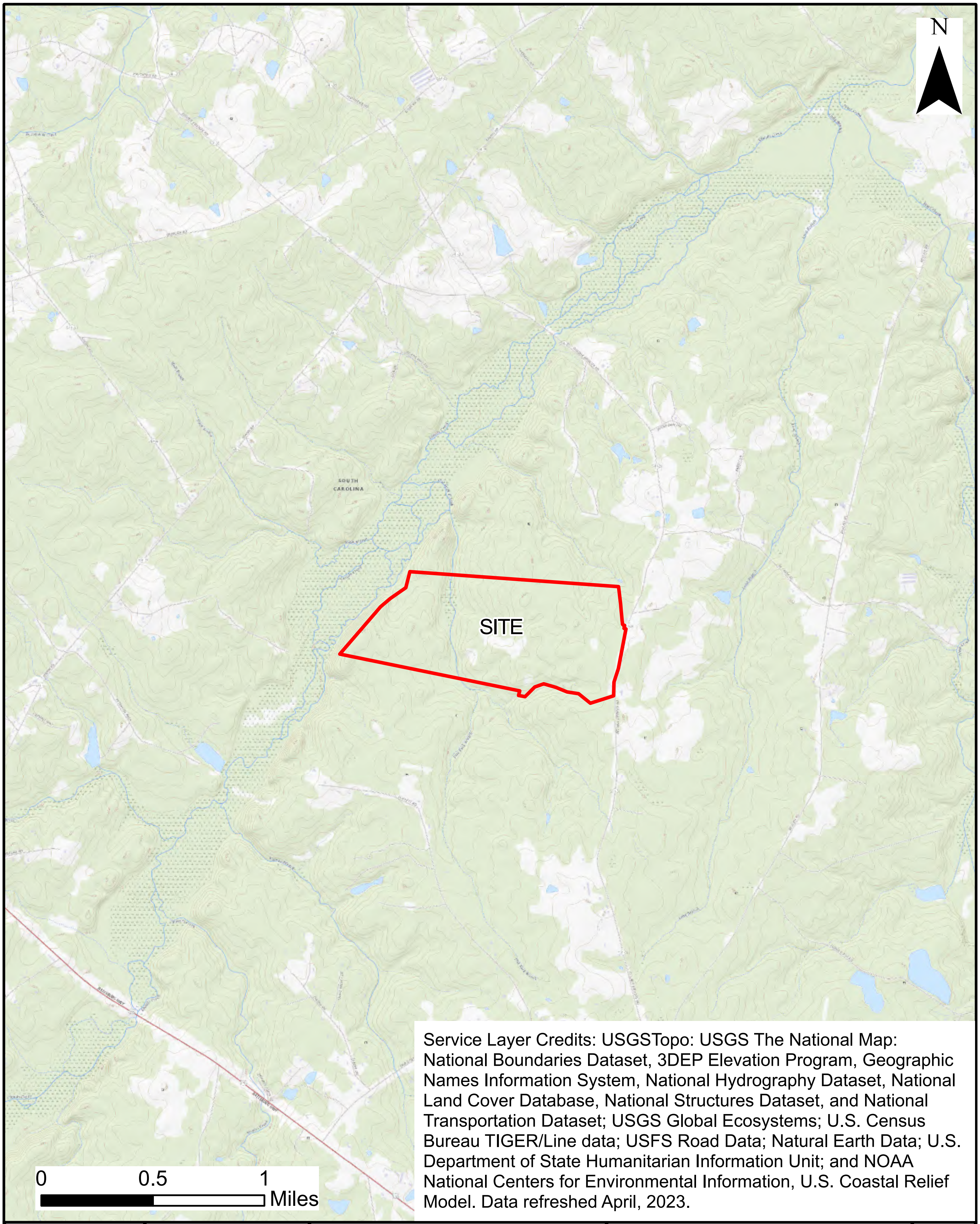
Luck Saluda - Hydrogeologic Evaluation
Saluda County, South Carolina
BLE Project Number J22-18886-01

Model Layer	Depth of Layer feet (BGS)	TOC[5] (K [cm/sec])	Storativity (S)	Specific Storage (Ss)	Specific Yield (Sy)
Layer 1	0.0 - 60.0	1.31×10^{-4}	0.0006	1.0 x 10-5	0.01
Layer 2	60.0 - 500.0	5.29×10^{-5}	N/A	1.0 x 10-7	0.0006

NOTES:

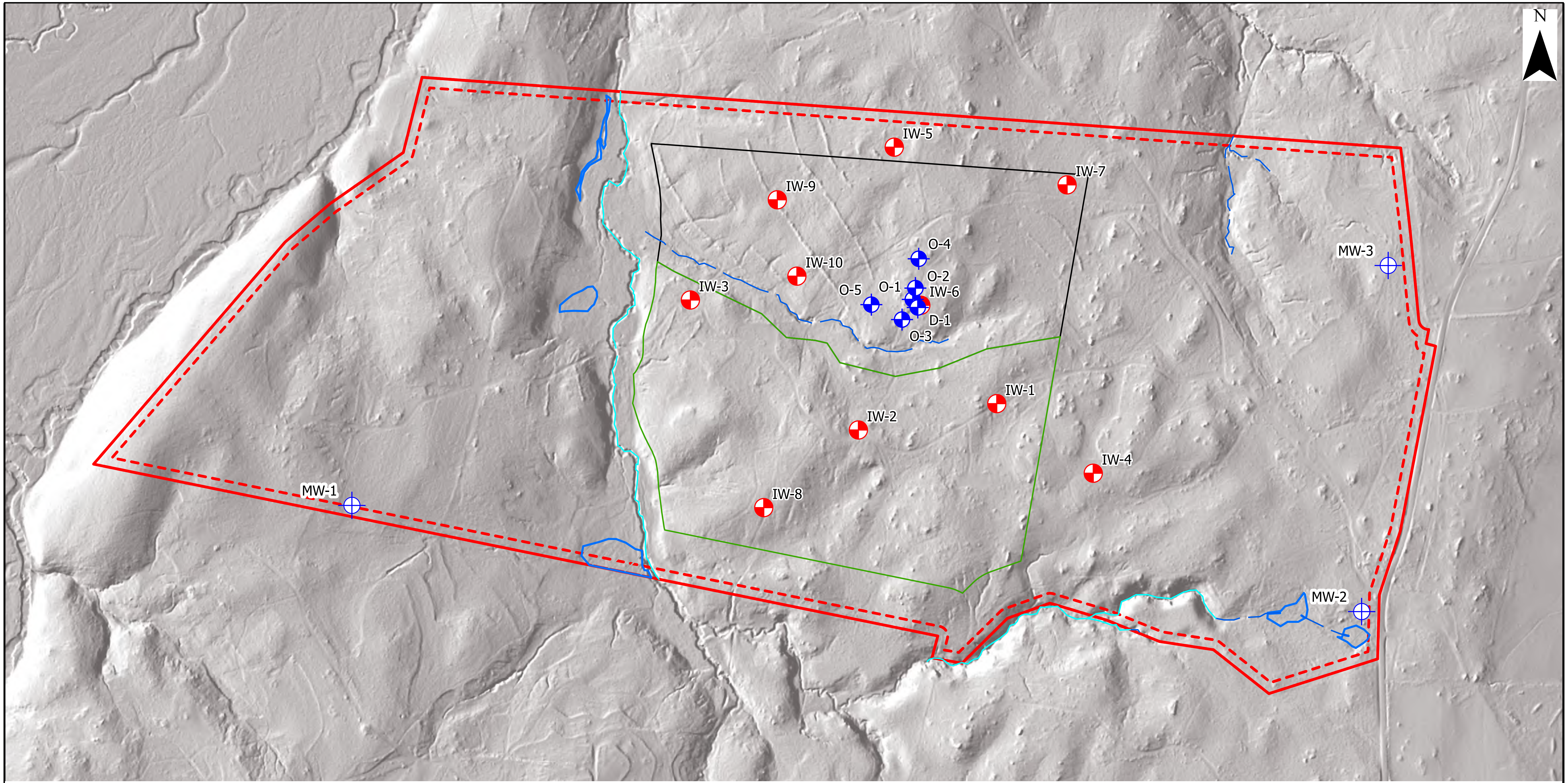
1. The specific yield of 0.0006 in Layer 2 is based on analytical interpretation of observation well O-1.

FIGURES



Service Layer Credits: USGSTopo: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed April, 2023.

DRAWN BY: TJD	DATE: 09-06-2023	BLE BUNNELL LAMMONS ENGINEERING	SITE VICINITY MAP LUCK SALUDA SALUDA, SOUTH CAROLINA	FIGURE
CHECKED BY: TAO	FILE NAME: SAL_LOC			1
APPROVED BY: TWM	JOB NO: J23-18886-01			



- ● OBSERVATION AND PUMPING WELLS
- ⊕ PROPOSED GROUNDWATER MONITORING WELL
- — JURISDICTIONAL PERENNIAL STREAMS
- — NON-JURISDICTIONAL INTERMITTENT STREAMS
- ▨ JURISDICTIONAL WETLANDS
- ● SGR CORE LOCATIONS
- ☐ 50 FOOT UNDISTURBED PROPERTY BUFFER
- ☐ PROPERTY BOUNDARY
- ☐ PHASE 1
- ☐ PHASE 2

0 500 1,000 1,500 US Feet

NOTE: PROPOSED GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED DUE TO SITE SPECIFIC CONDITIONS ENCOUNTERED DURING DRILLING.

REFERENCES:
MULTI-DIRECTIONAL HILLSHADE CREATED USING 1-METER RESOLUTION DIGITAL ELEVATION MODEL (DEM) - 2020 USGS Lidar DEM: Savannah Pee Dee, SC

WETLANDS AND STREAMS PROVIDED BY HODGES, HARBIN, NEWBERRY & TRIBBLE IN ASSOCIATION WITH THE MAY 23, 2023 "DELINEATION CONCURRENCE REQUEST" SUBMITTED TO THE US ARMY CORPS OF ENGINEERS.

DRAWN BY: TJD
CHECKED BY: TAO
APPROVED BY: DRL
DATE: 08-16-2023
FILE NAME: SAL_MW_LOC
JOB NO: J23-18886-01

REVISIONS		
No.	DESCRIPTION	BY

BLE BUNNELL LAMMONS ENGINEERING

SITE TOPOGRAPHY AND BORING LOCATION PLAN
LUCK SALUDA
SALUDA, SOUTH CAROLINA

FIGURE
2

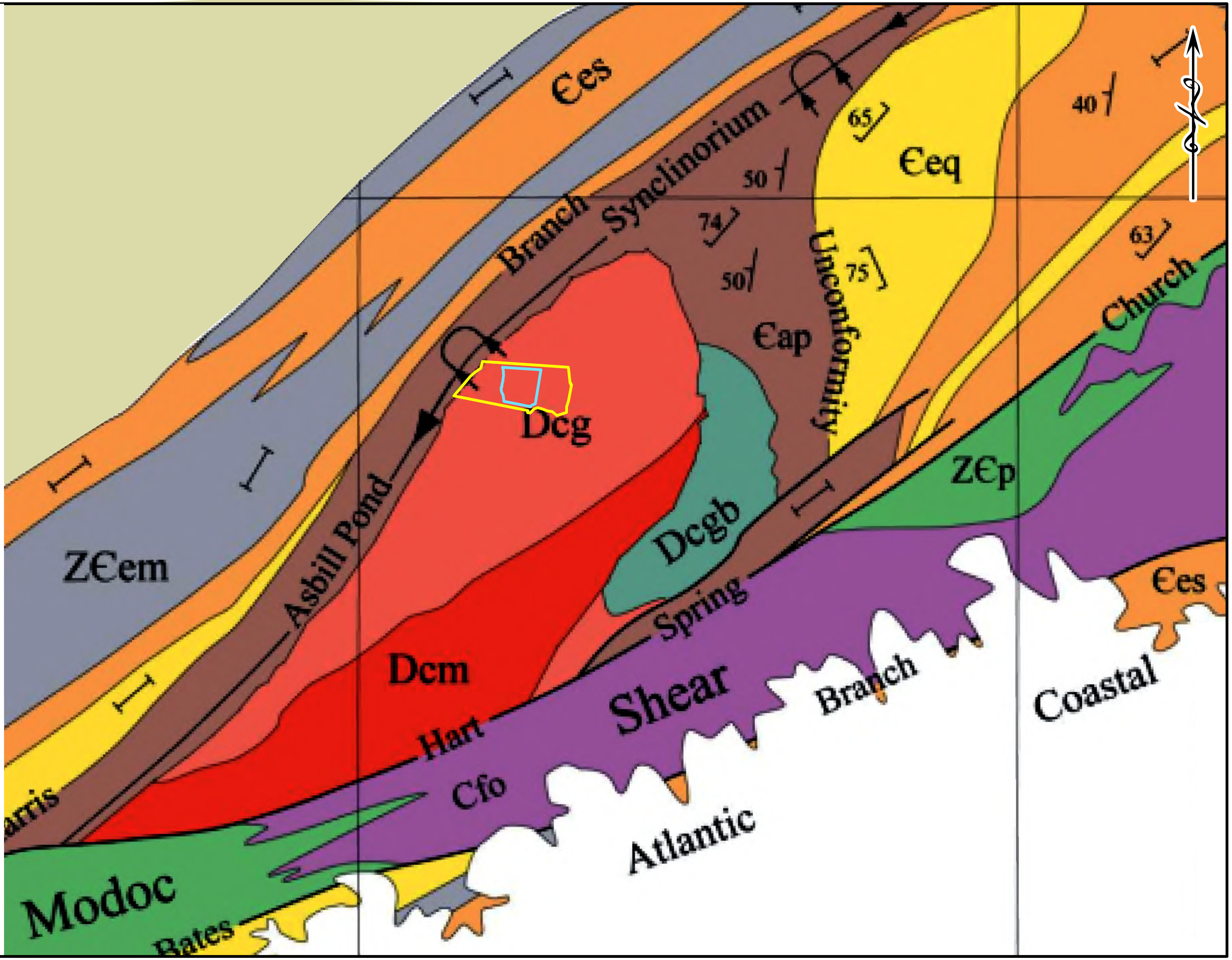
LEGEND

- ▭ PROPOSED EXTRACTION AREA
- ▭ PROPERTY BOUNDARY
- 🟪 FELSIC ORTHOGNEISS
- 🟥 CLOUDS CREEK GRANITE
- 🟥 CLOUDS CREEK METAGRANITE
- 🟩 CLOUDS CREEK METAGABBRO
- 🟫 ASBILL POND FM
- 🟨 EMORY FM, QUARTZITE
- 🟧 EMORY FM, SILTSTONE
- ⬜ EMORY FM, MUDSTONE
- 🟩 PARAGNEISS
- 🟨 PERSIMMON FORK FM, UNDIFFERENTIATED

REFERENCE:
GEOLOGIC MAP OF THE BATESBURG-EMORY-DELMAR REGION MODIFIED FROM SECOR AND OTHERS (1986a)

7,000 3,500 0 7,000 14,000

APPROXIMATE SCALE IN FEET



DRAWN BY: TAO
CHECKED BY: TJD
APPROVED BY: DRL

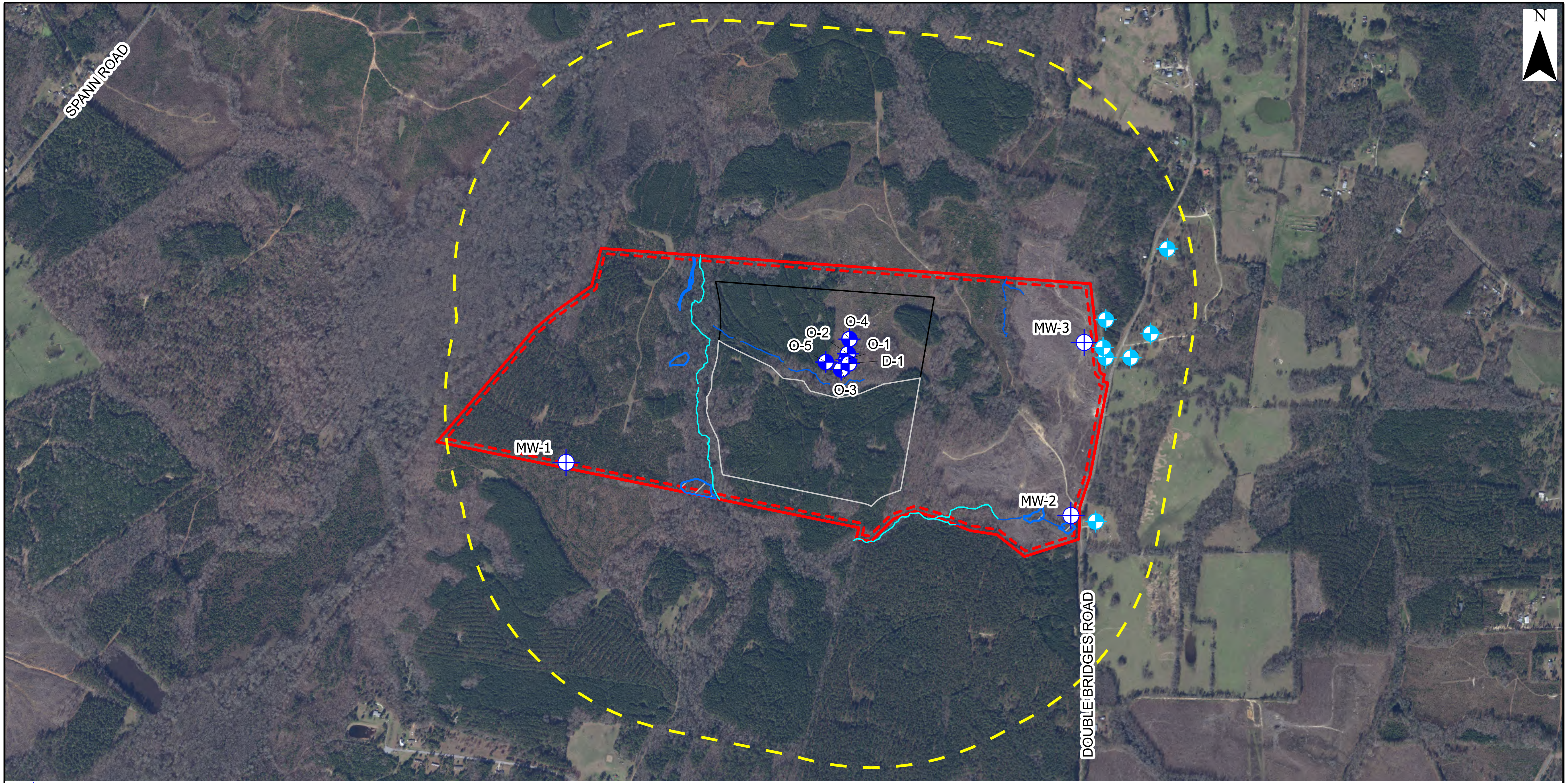
DATE: 8-11-23
FILE NAME: SALUDA-01 GEO
JOB NO: J23-18886-01

REVISIONS		
No.	DESCRIPTION	BY

BLE BUNNELL LAMMONS ENGINEERING

GEOLOGIC MAP OF THE BATESBURG-EMORY-DELMAR REGION
LUCK SALUDA
SALUDA COUNTY, SOUTH CAROLINA

FIGURE
3



- OBSERVATION AND PUMPING WELLS
- SUSPECTED PRIVATE DRINKING WATER WELL
- PROPOSED GROUNDWATER MONITORING WELL
- JURISDICTIONAL PERENNIAL STREAMS
- NON-JURISDICTIONAL INTERMITTENT STREAMS
- JURISDICTIONAL WETLANDS
- 50 FOOT UNDISTURBED PROPERTY BUFFER
- PROPERTY BOUNDARY
- 0.5-MILE RADIUS AROUND PROPOSED MINING EXTRACTION AREA
- PHASE 1
- PHASE 2

0 1,000 2,000 3,000 US Feet

NOTE: PROPOSED GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED DUE TO SITE SPECIFIC CONDITIONS ENCOUNTERED DURING DRILLING.

REFERENCES: AERIAL IMAGERY FROM SALUDA COUNTY MAP SERVICE LAYER "SALUDA 2020".

WETLANDS AND STREAMS PROVIDED BY HODGES, HARBIN, NEWBERRY & TRIBBLE IN ASSOCIATION WITH THE MAY 23, 2023 "DELINEATION CONCURRENCE REQUEST" SUBMITTED TO THE US ARMY CORPS OF ENGINEERS.

DRAWN BY: TJD
CHECKED BY: TAO
APPROVED BY: DRL

DATE: 08-16-2023
FILE NAME: SAL_MW_LOC
JOB NO: J23-18886-01

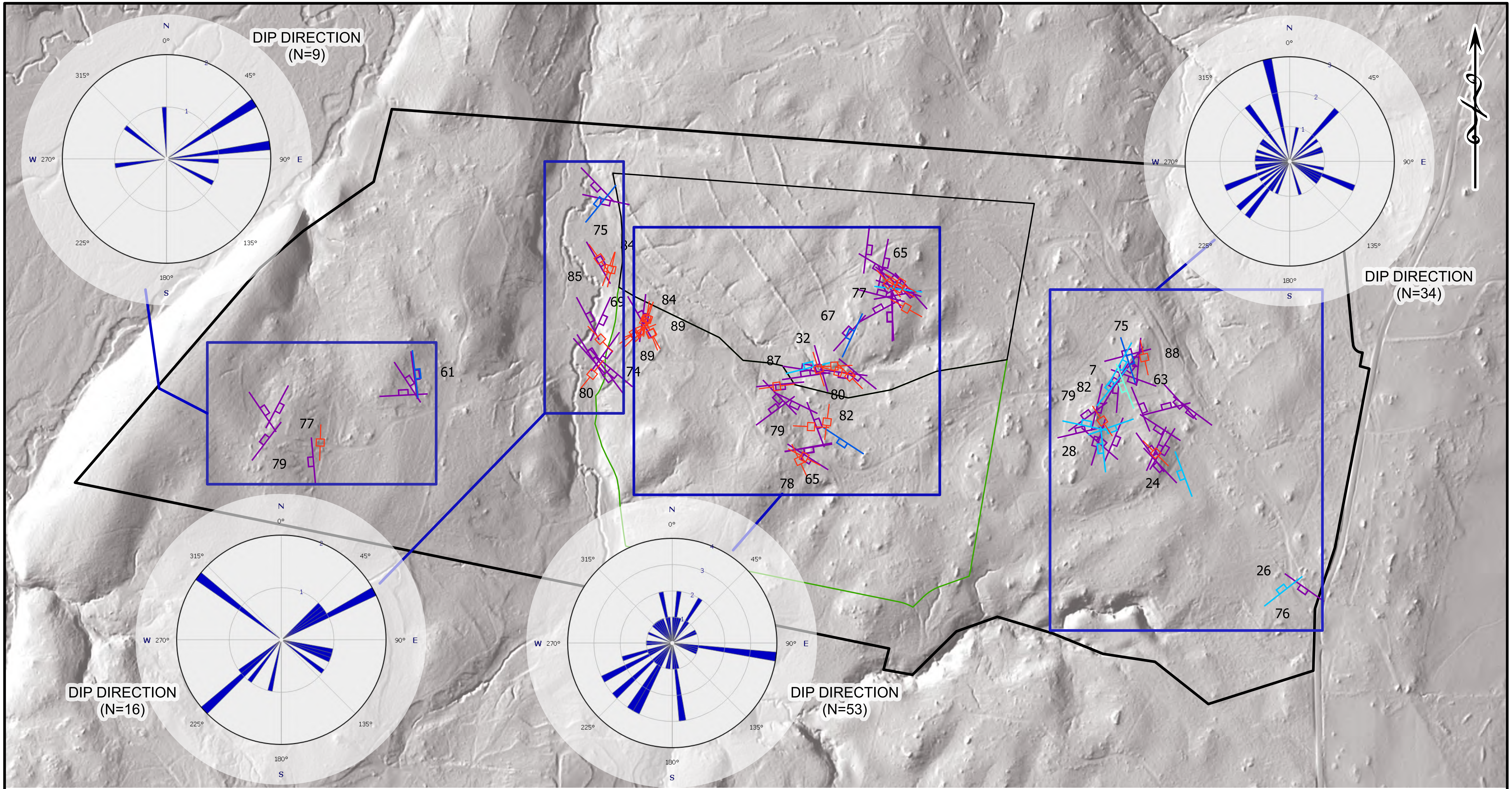
REVISIONS

No.	DESCRIPTION	BY

BLE BUNNELL LAMMONS ENGINEERING

JULY 2023 AREA RECONNAISANCE MAP
LUCK SALUDA
SALUDA, SOUTH CAROLINA

FIGURE
4



LEGEND

🟩 PHASE 1

☐ PHASE 2

☐ PROPERTY BOUNDARY

STRIKE & DIP OF JOINT

Vertical (85-90 deg)

Horizontal (0-5 deg)

Shallow (5-35 deg)

Moderate (35-55 deg)

Steep (55-85 deg)

500 250 0 500 1,000

APPROXIMATE SCALE IN FEET

REFERENCE:
MULTI-DIRECTIONAL HILLSHADE CREATED USING 1-METER RESOLUTION DIGITAL ELEVATION MODEL (DEM) - 2020 USGS Lidar DEM: Savannah Pee Dee, SC

DRAWN BY: TAO	DATE: 8-11-23	
CHECKED BY: TJD	FILE: SALUDA-01 SITE GEO	
APPROVED BY: DRL	JOB NO: J23-18886-01	

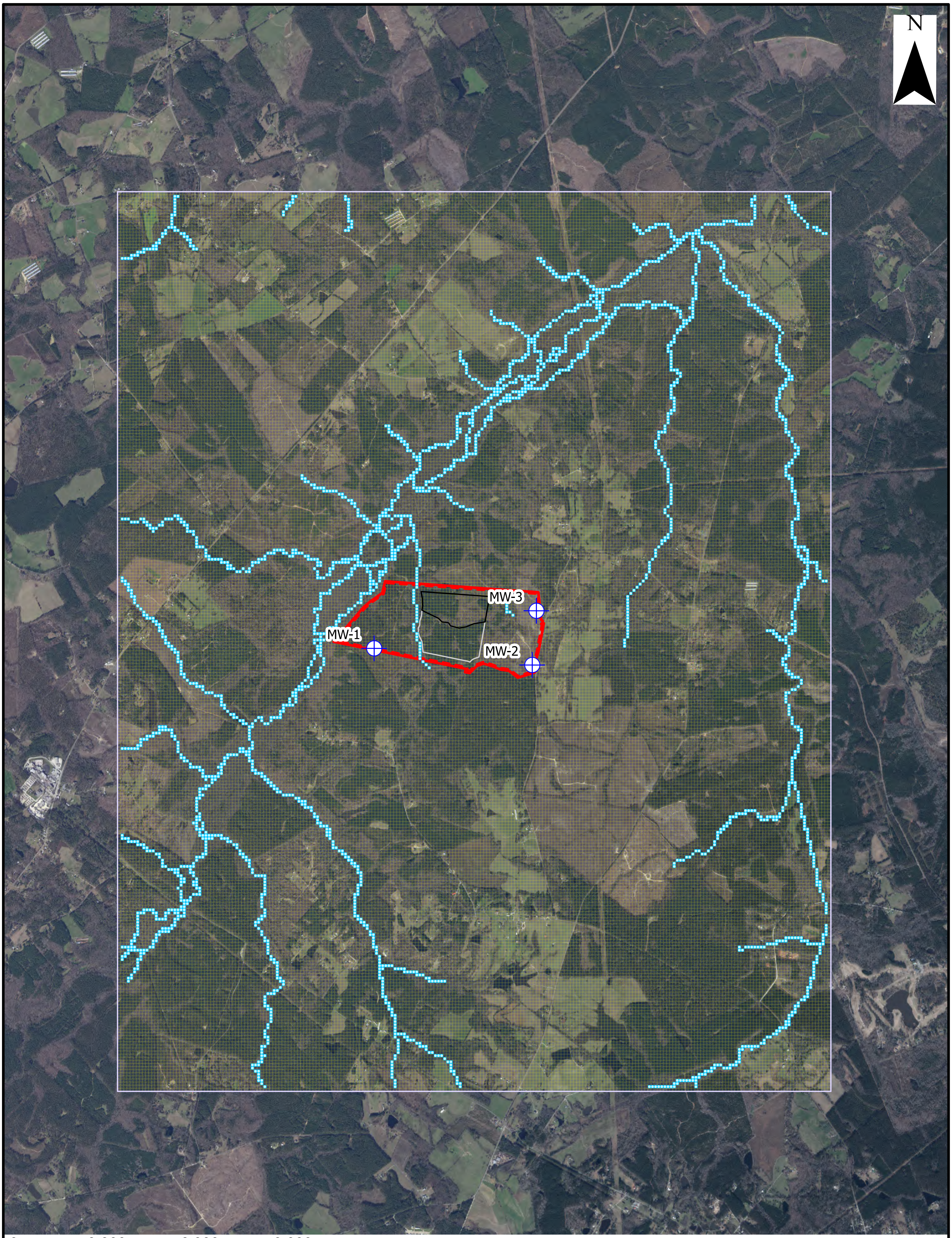
REVISIONS

No.	DESCRIPTION	BY

BLE BUNNELL LAMMONS ENGINEERING

GEOLOGIC FIELD MAPPING
LUCK SALUDA
SALUDA COUNTY, SOUTH CAROLINA

FIGURE
5



0 3,000 6,000 9,000
US Feet

REFERENCES:
AERIAL IMAGERY FROM SALUDA COUNTY MAP SERVICE LAYER "SALUDA 2020".

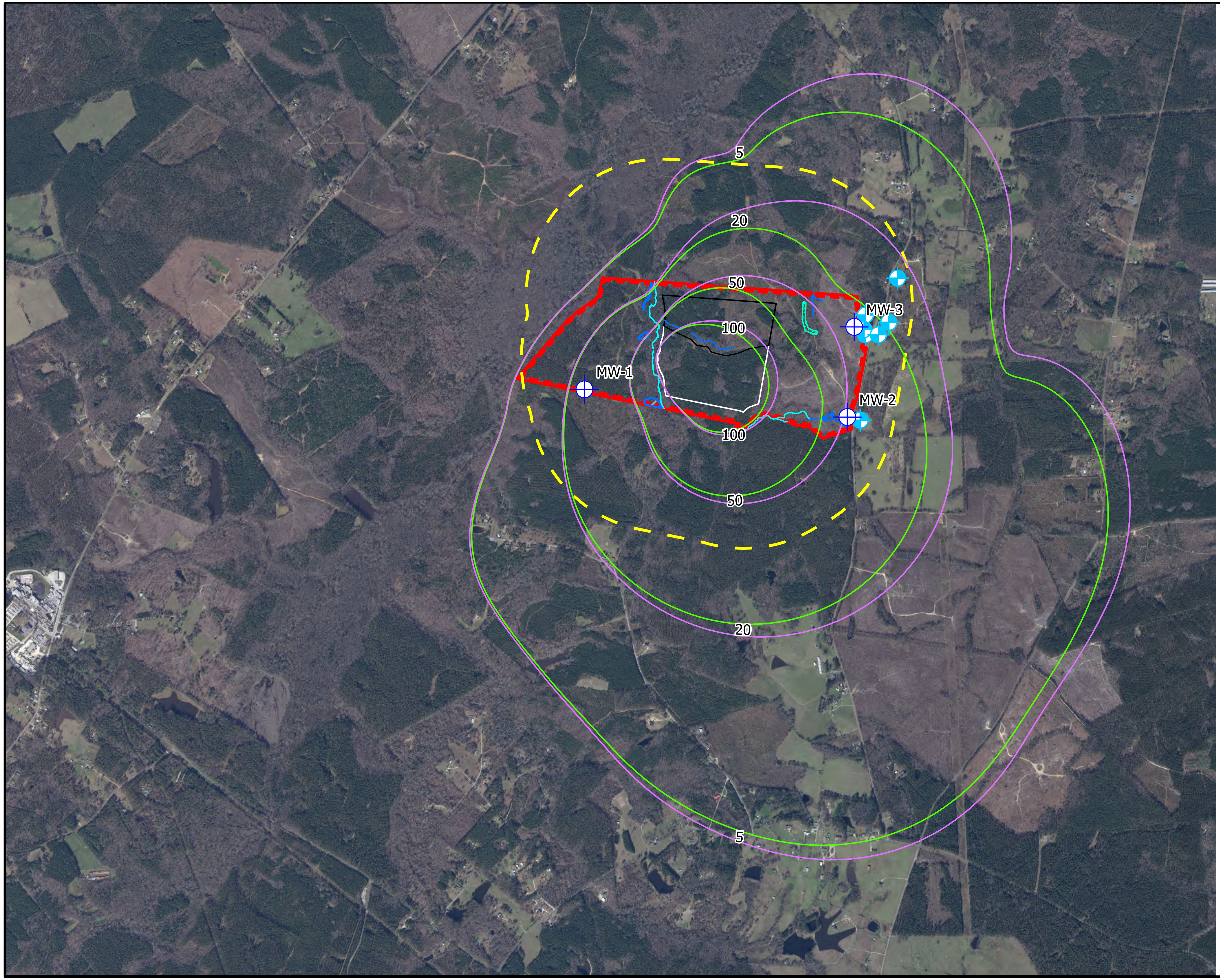
STREAMS SELECTIVELY CHOSEN BASED ON US GEOLOGIC SURVEY HUC 12 HYDROGRAPHY DATA FOR THE LOWER CLOUDS CREEK SUB-WATERSHED.

LEGEND

- ⊕ PROPOSED GROUNDWATER MONITORING WELL
- ● CELLS DEDICATED AS STREAMS IN MODEL
- — MODEL GRID
- ☐ PHASE 2
- ☐ PHASE 1
- 🟥 PROPERTY BOUNDARY

NOTE: PROPOSED GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED DUE TO SITE SPECIFIC CONDITIONS ENCOUNTERED DURING DRILLING.

DRAWN BY:	TJD	DATE:	08-30-2023	BLE BUNNELL LAMMONS ENGINEERING	GROUNDWATER MODEL DOMAIN LUCK SALUDA SALUDA, SOUTH CAROLINA
CHECKED BY:	DRL	FILE NAME:	LUCK-SAL-DOM		FIGURE 6
APPROVED BY:	TWM	JOB NO:	J23-18886-01		



LEGEND

- ⌖ SUSPECTED PRIVATE DRINKING WATER WELL
- ⌖ PROPOSED GROUNDWATER MONITORING WELL
- — JURISDICTIONAL PERENNIAL STREAMS
- — NON-JURISDICTIONAL INTERMITTENT STREAMS
- ▨ JURISDICTIONAL WETLANDS
- ⬚ 50 FOOT UNDISTURBED PROPERTY BUFFER
- ☐ PROPERTY BOUNDARY
- ▨ SEDIMENT POND SP-4
- ☐ PHASE 1
- ☐ PHASE 2
- ○ 0.5-MILE RADIUS AROUND PROPOSED MINING EXTRACTION AREA
- — D1 25 YEAR DRAWDOWN CONTOURS (FEET)
- — P4 25 YEAR DRAWDOWN CONTOURS (FEET)

NOTES: PROPOSED GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED DUE TO SITE SPECIFIC CONDITIONS ENCOUNTERED DURING DRILLING.

GROUNDWATER DRAWDOWN CONTOURS FOR MODEL D1 ASSUME NO DISCHARGE OF WATER FROM THE QUARRY PIT TO SURFACE STREAMS. GROUNDWATER DRAWDOWN CONTOURS FOR MODEL P4 ASSUME DISCHARGE TO SEDIMENT POND SP-4 AND THE ADJACENT EPHEMERAL STREAM.

REFERENCES: AERIAL IMAGERY FROM SALUDA COUNTY MAP SERVICE LAYER "SALUDA 2020".

WETLANDS AND STREAMS PROVIDED BY HODGES, HARBIN, NEWBERRY & TRIBBLE IN ASSOCIATION WITH THE MAY 23, 2023 "DELINEATION CONCURRENCE REQUEST" SUBMITTED TO THE US ARMY CORPS OF ENGINEERS.

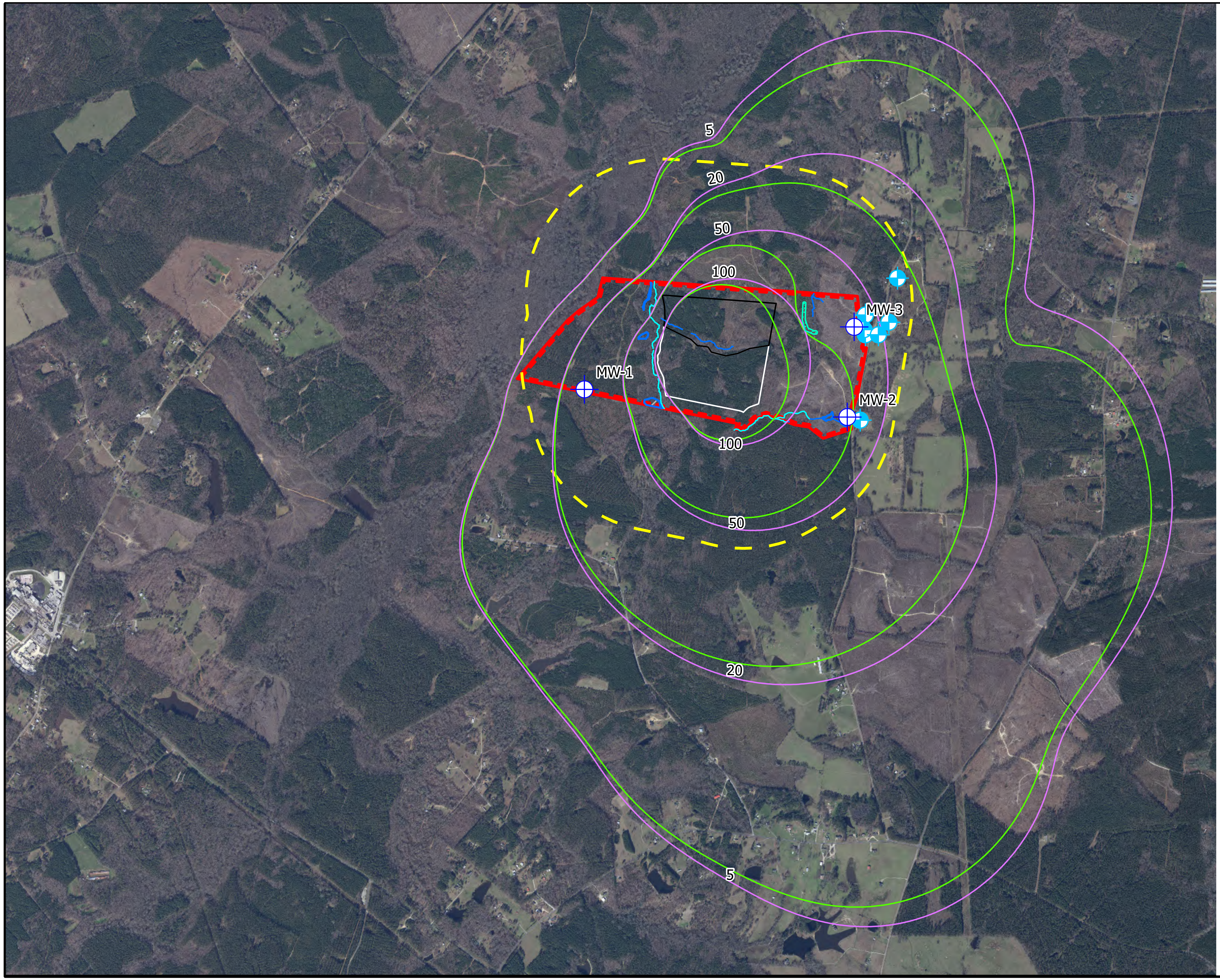
0 2,000 4,000 6,000
US Feet

DRAWN BY: TJD	DATE: 08-16-2023	REVISIONS	
CHECKED BY: TAO	FILE NAME: SAL_MOD-25	No. DESCRIPTION BY	
APPROVED BY: DRL	JOB NO: J23-18886-01		

BLE BUNNELL LAMMONS ENGINEERING

PREDICTED GROUNDWATER DRAWDOWN AFTER 25 YEARS
LUCK COMPANIES SALUDA QUARRY
SALUDA, SOUTH CAROLINA

FIGURE
7



N

LEGEND

- SUSPECTED PRIVATE DRINKING WATER WELL
- PROPOSED GROUNDWATER MONITORING WELL
- JURISDICTIONAL PERENNIAL STREAMS
- NON-JURISDICTIONAL INTERMITTENT STREAMS
- JURISDICTIONAL WETLANDS
- 50 FOOT UNDISTURBED PROPERTY BUFFER
- PROPERTY BOUNDARY
- SEDIMENT POND SP-4
- PHASE 1
- PHASE 2
- 0.5-MILE RADIUS AROUND PROPOSED MINING EXTRACTION AREA
- D1 73 YEAR DRAWDOWN CONTOURS (FEET)
- P4 73 YEAR DRAWDOWN CONTOURS (FEET)

NOTES: PROPOSED GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED DUE TO SITE SPECIFIC CONDITIONS ENCOUNTERED DURING DRILLING.

GROUNDWATER DRAWDOWN CONTOURS FOR MODEL D1 ASSUME NO DISCHARGE OF WATER FROM THE QUARRY PIT TO SURFACE STREAMS. GROUNDWATER DRAWDOWN CONTOURS FOR MODEL P4 ASSUME DISCHARGE TO SEDIMENT POND SP-4 AND THE ADJACENT EPHEMERAL STREAM.

REFERENCES: AERIAL IMAGERY FROM SALUDA COUNTY MAP SERVICE LAYER "SALUDA 2020".

WETLANDS AND STREAMS PROVIDED BY HODGES, HARBIN, NEWBERRY & TRIBBLE IN ASSOCIATION WITH THE MAY 23, 2023 "DELINEATION CONCURRENCE REQUEST" SUBMITTED TO THE US ARMY CORPS OF ENGINEERS.

0 2,000 4,000 6,000
US Feet

DRAWN BY: TJD	DATE: 08-16-2023		
CHECKED BY: TAO	FILE NAME: SAL_MOD-73		
APPROVED BY: DRL	JOB NO: J23-18886-01		

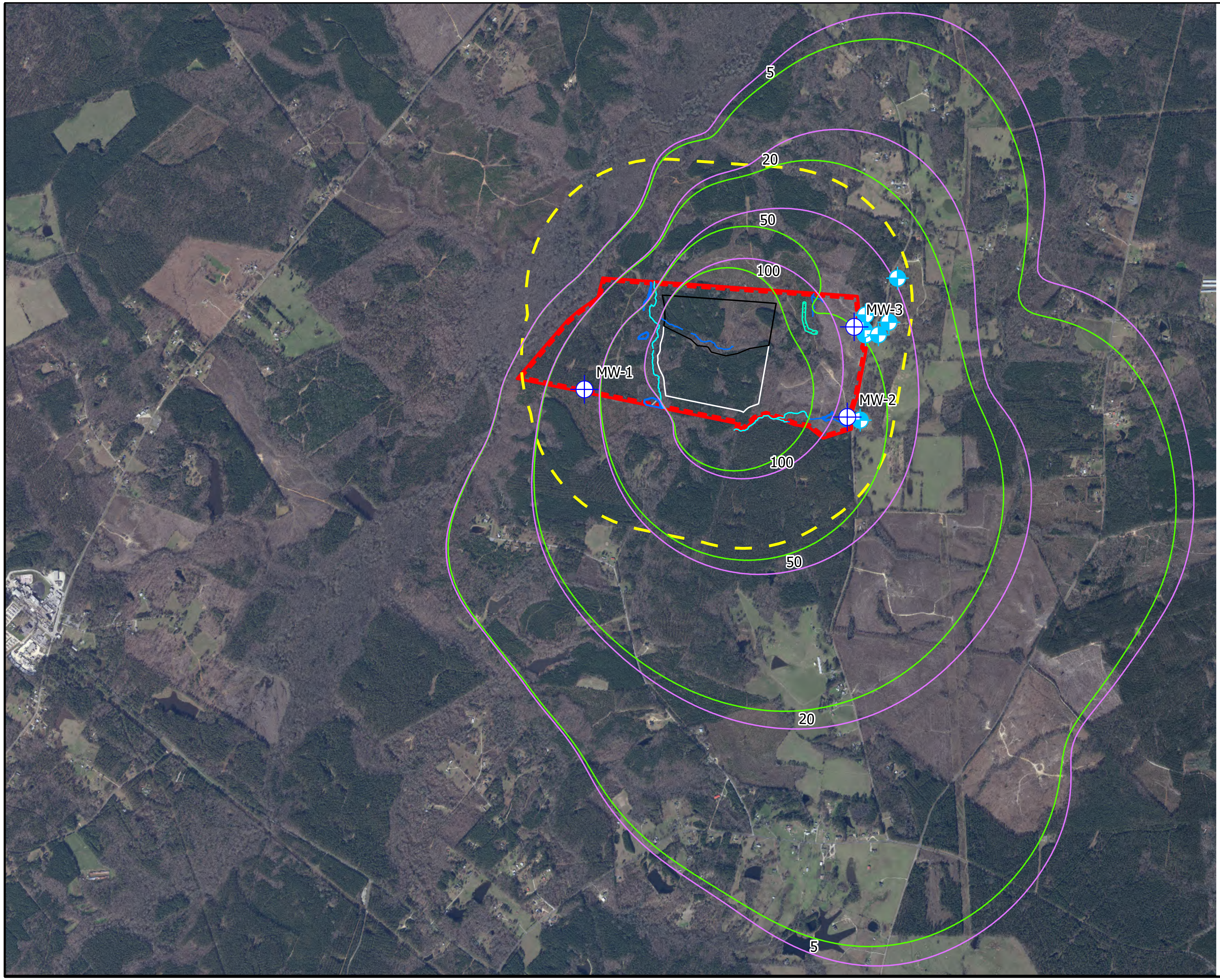
REVISIONS

No.	DESCRIPTION	BY

BLE BUNNELL LAMMONS ENGINEERING

PREDICTED GROUNDWATER DRAWDOWN AFTER 73 YEARS
LUCK COMPANIES SALUDA QUARRY
SALUDA, SOUTH CAROLINA

FIGURE
8



N

LEGEND

- ◆ SUSPECTED PRIVATE DRINKING WATER WELL
- ⊕ PROPOSED GROUNDWATER MONITORING WELL
- — JURISDICTIONAL PERENNIAL STREAMS
- — NON-JURISDICTIONAL INTERMITTENT STREAMS
- ▨ JURISDICTIONAL WETLANDS
- ☐ 50 FOOT UNDISTURBED PROPERTY BUFFER
- ☐ PROPERTY BOUNDARY
- ▨ SEDIMENT POND SP-4
- ☐ PHASE 1
- ☐ PHASE 2
- ○ 0.5-MILE RADIUS AROUND PROPOSED MINING EXTRACTION AREA
- — D1 105 YEAR DRAWDOWN CONTOURS (FEET)
- — P4 105 YEAR DRAWDOWN CONTOURS (FEET)

NOTES: PROPOSED GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED DUE TO SITE SPECIFIC CONDITIONS ENCOUNTERED DURING DRILLING.

GROUNDWATER DRAWDOWN CONTOURS FOR MODEL D1 ASSUME NO DISCHARGE OF WATER FROM THE QUARRY PIT TO SURFACE STREAMS. GROUNDWATER DRAWDOWN CONTOURS FOR MODEL P4 ASSUME DISCHARGE TO SEDIMENT POND SP-4 AND THE ADJACENT EPHEMERAL STREAM.

REFERENCES: AERIAL IMAGERY FROM SALUDA COUNTY MAP SERVICE LAYER "SALUDA 2020".

WETLANDS AND STREAMS PROVIDED BY HODGES, HARBIN, NEWBERRY & TRIBBLE IN ASSOCIATION WITH THE MAY 23, 2023 "DELINEATION CONCURRENCE REQUEST" SUBMITTED TO THE US ARMY CORPS OF ENGINEERS.

0 2,000 4,000 6,000
US Feet

DRAWN BY: TJD
CHECKED BY: TAO
APPROVED BY: DRL

DATE: 08-16-2023
FILE NAME: SAL_MOD-105
JOB NO: J23-18886-01

REVISIONS

No.	DESCRIPTION	BY

BLE BUNNELL LAMMONS ENGINEERING

PREDICTED GROUNDWATER DRAWDOWN AFTER 105 YEARS
LUCK COMPANIES SALUDA QUARRY
SALUDA, SOUTH CAROLINA

FIGURE
9

APPENDIX A
Hodges, Harbin, Newberry & Tribble – Delineation Concurrence Request

HHNT
HODGES, HARBIN,
NEWBERRY & TRIBBLE, INC.
Consulting Engineers

May 23, 2023

US Army Corps of Engineers
Columbia Regulatory Office
2567 Essayons Way
Fort Jackson, South Carolina 29207

Re: Luck Companies / Saluda Quarry
Batesburg-Leesville, Saluda County, SC
Delineation Concurrence Request
HHNT Project Number: 4780-021

To Whom It May Concern:

On behalf of Luck Companies, Hodges, Harbin, Newberry & Tribble, Inc., (HHNT) is herein submitting the enclosed Delineation Concurrence for the above-referenced site. The study area for the project, henceforth referred to as Saluda Quarry, is a ~ 331.01-acre tract of land located to the west of Double Bridges Road and to the east of State Road S-41-26 in Batesburg-Leesville, Saluda County, South Carolina (Figures 1 & 2).

Attached please find all appropriate mapping and documentation of the project area and a GPS delineation map overlaid on an aerial photograph. It is the opinion of HHNT that all the U.S. Army Corps of Engineers (USACE) Waters of the United States limits have been identified and flagged within the project study area consistent with current jurisdictional guidelines. Furthermore, in HHNT's opinion, none of the delineated features could be considered isolated wetlands.

At your earliest convenience, we respectfully request that the attached Delineation Concurrence be processed for the subject property. Please contact us to schedule a field visit and for access to the property, if necessary. In advance, we thank you for your timely review of this project and if you should have any questions or require additional information, please do not hesitate to call.

Sincerely,

HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.

Brandon F. Smith, PWS
Senior Environmental Consultant

BFS/MM/TW

cc: Bruce Smith
Encl. (6)

U.S. Army Corps of Engineers – Charleston District - Regulatory Division

REQUEST FOR CORPS JURISDICTIONAL DETERMINATION (JD) / DELINEATION

(For Jurisdictional Status and Identifying Wetlands and Other Aquatic Resources)

The Regulatory Division is now offering paperless/electronic documents as a primary means of accepting project submittals and responding to requests. While electronic submittals are preferred, we will continue to accept paper documents that meet our file requirements in order to accommodate those with limited computer access. Depending on the project location, requests should be submitted to the appropriate office below. Please visit https://www.sac.usace.army.mil/Missions/Regulatory/Electronic-Submittals/ for additional information on electronic submittals.

Charleston Office:	**Columbia Office:**	**Conway Office:**	**Greenville Office:**
69A Hagood Avenue Charleston, SC 29403 843-329-8044 **SAC.RD.Charleston@usace.army.mil**	2567 Essayons Way Fort Jackson, SC 29207 803-253-3444 **SAC.RD.Columbia@usace.army.mil**	1949 Industrial Park Road, Room 140 Conway, SC 29526 843-365-4239 **SAC.RD.Conway@usace.army.mil**	150 Executive Center Drive, Suite 205 Greenville, SC 29615 864-609-4326 **SAC.RD.Greenville@usace.army.mil**

I. PROPERTY AND AGENT INFORMATION

A. Site Details/Location:

Site Name: Luck Companies Saluda Quarry Date: 5/23/2023
City/Township/Parish: Batesburg-Leesville County: Saluda
Latitude/Longitude: 33.97183, -81.59429 Acreage: 331.01
Tax Map Sequence (TMS) #(s): 174-00-00-006
Property Address(es): East side of State Road S-41-26

An accurate depiction of the review area must be provided (survey, tax map, **OR** GPS coordinates). Tax maps may only be used if the site includes the entire tax map parcel. ***See the attached Checklist for information that should be submitted for a complete and proper submittal.***

B. Requestor of Jurisdictional Determination/Delineation *(if there are multiple property owners, please attach additional pages)*

Name: Mark Williams Company Name (*if applicable*): Luck Companies
Address: PO Box 29682, Richmond, VA, 23242
Phone: (804) 641-9458 Email: MarkDWilliams@luckcompanies.com
Check one: ☐ I currently own this property ☒ I plan to purchase this property ☐ Other: ____________________

C. Agent/Environmental Consultant Acting on Behalf of the Requestor *(if applicable)*:

Consultant/Agent Name: Brandon Smith
Company Name: Hodges, Harbin, Newberry & Tribble Inc.
Address: 17 Park of Commerce Blvd. Suite 110, Savannah GA 31405 Phone: (912) 596-3743
Email: bsmith@hhnt.com

II. REASON FOR REQUEST (check all that apply):

☐ I intend to construct/develop a project or perform activities on this site which would be designed to avoid all aquatic resources.

☐ I intend to construct/develop a project or perform activities on this site which would be designed to avoid all jurisdictional aquatic resources under Corps authority.

☒ I intend to construct/develop a project or perform activities on this site which may require authorization from the Corps, and the Jurisdictional Determination would be used to avoid and minimize impacts to jurisdictional aquatic resources and as an initial step in a future permitting process.

☐ I intend to construct/develop a project or perform activities on this site which may require authorization from the Corps; this request is accompanied by my permit application and the jurisdictional determination is to be used in the permitting process.

☐ I intend to construct/develop a project or perform activities in a navigable water of the U.S. which is subject to the ebb and flow of the tide.

☐ A Corps jurisdictional determination is required in order to obtain my local/state authorization.

☐ I intend to contest jurisdiction over a particular aquatic resource and the request the Corps to confirm that jurisdiction does/does not exist over the aquatic resource on the parcel.

☐ I believe that the site may be comprised entirely of dry land.

☐ Other:____

*Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an jurisdictional determination cannot be evaluated nor can a jurisdictional determination be issued.

III. TYPE OF REQUEST:

[1] Delineation Concurrence (DC) – A DC provides concurrence that the delineated boundaries of wetlands on a property are a reasonable representation of the aquatic resources on-site. A DC does not address the jurisdictional status of the aquatic resources. (NOTE: A DC is generally the quickest type of standalone request for the Corps to review and process.)

[2] Approved – An AJD is defined in Corps regulations at 33 CFR 331.2. As explained in further detail in RGL 16-01, an AJD is used to indicate that this office has identified the presence or absence of wetlands and/or other aquatic resources on a site, including their accurate location(s) and boundaries, as well as their jurisdictional status. AJDs are valid for 5 years.

[3] Preliminary – A PJD is defined in Corps regulations at 33 CFR 331.2. As explained in further detail in RGL 16-01, a PJD is used to indicate that this office has identified the approximate location(s) and boundaries of wetlands and/or other aquatic resources on a site that are presumed to be subject to regulatory jurisdiction of the Corps of Engineers. Unlike an AJD, a PJD does not represent a definitive, official determination that there are, or that there are not, jurisdictional aquatic resources on a site, and does not have an expiration date.

[4] "No Permit Required" (NPR) Letter- A NPR letter may be provided by the Corps to notify the requestor that an activity will not require a permit (authorization) from the Corps; this letter can only be used if the proposed activity is not a regulated activity, regardless of where the activity may occur. A NPR letter cannot be used to indicate the presence or absence of wetlands and/or other aquatic resources, nor can it be used to determine their jurisdictional status.

NOTE 1: Pre-approved Delineations and/or JDs are NOT a pre-requisite for submitting a DA permit application. Requests for JDs and/or DCs that are not associated with a DA permit application (Standalone Delineation / JD requests) will be reviewed and processed as time allows and based on available resources.

NOTE 2: Although not a requirement, it is recommended that Standalone requests be prepared and submitted by an environmental consultant to expedite the review process.

Select the Appropriate Request:

☐ **Pre-Construction Notification or Department of the Army permit application**
  - ☐ with Delineation only (no written concurrence of delineation)
  - ☐ with Delineation Concurrence[1]
  - ☐ with Preliminary Jurisdictional Determination (PJD)[3]
  - ☐ with Approved Jurisdictional Determination (AJD)[2]

☒ **Standalone Delineation / Jurisdictional Determination**

Standalone Delineation / Jurisdictional Determination requests will be reviewed and processed as time allows and based on available resources.
  - ☒ Delineation Concurrence[1]
  - ☐ Preliminary Jurisdictional Determination (PJD)[3]
  - ☐ Approved Jurisdictional Determination (AJD)[2]

☐ I request that the **Corps delineate** the wetlands and/or other aquatic resources that may be present on my property.

These requests have historically been conducted as a courtesy for private property owners for minor actions. Due to current workload and priorities, the Charleston District Regulatory Division will only provide this service on a limited basis for private individuals on small tracts of land (typically 1 acre or less).
  - ☐ with the attached Pre-Construction Notification or Department of the Army permit application

    (This may delay processing times. The review of the permit application will not start until the delineation has been completed by the Corps.)
  - ☐ with a Delineation Only, an AJD or PJD

☐ **"No Permit Required" (NPR) Letter** as I believe my proposed activity is not regulated[4]

☐ **Unclear** and require additional information to inform my decision.

IV. LEGAL RIGHT OF ENTRY

By signing below, I am indicating that I have the authority, or am acting as the duly authorized agent of a person or entity with such authority, to and do hereby grant U.S. Army Corps of Engineers personnel right of entry to legally access the property(ies) subject to this request for the purposes of conducting on-site investigations (e.g., digging and refilling shallow holes) and issuing a jurisdictional determination. I acknowledge that my signature is an affirmation that I possess the requisite property rights to request a jurisdictional determination on the properties subject to this request.

PO Box 29682, Richmond, VA, 23242
Mailing Address

174-00-00-006
Property Address / TMS #(s)

MarkDWilliams@luckcompanies.com
Email Address

(804) 476-6404
Daytime Phone Number

Mark D Williams
*Signature:

Mark Williams - May 1, 2023
Printed Name and Date

*Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an jurisdictional determination cannot be evaluated nor can a jurisdictional determination be issued.

JURISDICTIONAL DETERMINATION AND DELINEATION CHECKLIST:

This checklist is to assist prospective requesters in submitting complete and proper information. This is NOT a comprehensive list nor are all items mandatory for all projects. However, the list contains general information typically necessary for this office to confirm jurisdictional and/or wetland delineations *as part of the permitting process*. Required items are indicated by an asterisk (*). To reduce delays in verifying Jurisdictional Determinations and Delineations, it is recommended that the information provided is a complete and true representation of wetlands and other aquatic resources that may be present onsite. It is also recommended that submissions be prepared and submitted by an environmental consultant. Although this is not a requirement, it will significantly expedite the review process.

Following these standards will help to expedite our review. Flexibility of these standards may be determined by the Regulatory Division on a case-by-case basis only. Please note the Corps has the ability to reject delineation work that is incomplete or inaccurate.

■ ***Completed Request For Corps Jurisdictional Determination (JD) / Delineation AND Legal Right of Entry**

■ **Site Information:**

- ■ ***Location Maps:** large-scale and small-scale maps, including streets, intersections, cities and an accurate depiction of the site boundary shown.
  Note: Only contiguous/adjoining parcels can be submitted under one JD request. If there is an area not within the JD request that separates the areas of review (i.e., a road, utility line, etc.), a separate JD request should be submitted each area.
- ■ ***Overlay of site boundary** on aerial photo, USGS topographic map, soil survey, NWI Map, etc.
- ■ ***Site's coordinates** should be based on a standard coordinate system, i.e., Geographic (at least to the nearest tenth of a second), State Plane or UTM. Indicate the coordinate system (and zone for UTM), units (English or metric) and the corresponding geodetic datum, either NAD27 or NAD83.
- ■ ***Property lines with measurements** illustrating all existing land features, including streams, ditches, trails, etc.
- ■ **Landscape photos** of representative upland areas and aquatic resources, with the photo locations and directions of photos marked on a depiction.
- ☐ Current land use and plant communities located on and adjacent to the area under review (i.e., agricultural, industrial, residential, cropland, lawn, forested, etc.). If known, a brief history of the previous land use will be helpful.
- ☐ Proposed & existing structures clearly defined as such.
- ☐ Dimensions of proposed structures such as a driveway, house, garage, and other structures which are proposed in wetlands.
- ☐ Sewage/septic system: location, dimensions and type.
- ☐ Drainage ditches and/or berms: location and dimensions.

■ ***Wetland Determination Data Forms:** Record wetland delineation information for both the upland and wetland side of various points along the boundary. Current version from appropriate Regional Supplement found at:
https://www.sac.usace.army.mil/Missions/Regulatory.aspx

■ **Elements for Depictions of All Sites:**

- ■ *Title Block with project name, applicant, county, state, date.
- ■ *North arrow
- ■ *Solid bold line depicting project area boundary with label. The project area boundary should be accurate and may be represented by survey, tax map, or GPS coordinates with coordinates provided. **Please note that a survey is NOT required.** Tax maps may only be used if the project area includes the entire parcel(s). Include the Tax Map Parcel Numbers, Property Identification Numbers, etc., the source of the map, and date of preparation (print date).
- ■ *Clearly marked boundaries of all wetlands and/or other aquatic resources and other pertinent features that are present (Wetlands, Tributaries, Lakes, Borrow Pits, Ponds, Rivers, Drainage Features, Ditches) and have been flagged in the field. Surveyed or GPS coordinates of the boundaries should be provided. (At a minimum, potentially non-jurisdictional linear features should be included on a supplement sketch/depiction.)
- ■ *Labels of wetlands and/or other aquatic resources. Refer to the below tables for the standardized labels that should be used for AJDs, PJDs and/or Delineation Concurrence.
- ■ *Size (acres) and length (linear feet) of each individual wetlands or aquatic resource included on the depiction.
- ■ *Wetland Determination Data Form point locations with labels. (At a minimum, this should be included on a supplement sketch/depiction.)

---

*Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public, and may be made available as part of a public notice as required by federal law. Your name and property location where federal jurisdiction is to be determined will be included in the approved jurisdictional determination (AJD), which will be made available to the public on the District's website and on the Headquarters USACE website.
Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an jurisdictional determination cannot be evaluated nor can a jurisdictional determination be issued.

*Standardized Labels for Depictions of Wetlands and Aquatic Resources

Table 1: Labels for PJDs and Delineation Concurrence

Label	Description
Wetland X (tidal, non-tidal)	All wetlands, including tidal wetlands.
Non-wetlands waters X (tidal, non-tidal)	All non-wetland aquatic resources (ponds, linear features, tributaries, tidal open water.
Upland	Uplands should be labeled
Non-aquatic resource X (Optional) *	Features determined by the Corps to be non-aquatic resources.

Table 2: Labels for AJDs

Jurisdictional Feature Label	Description
TNW X	Traditionally Navigable Water, tidal wetland, or and/or OCRM Critical Area Wetland
Jurisdictional Tributary X	Tributary, relatively permanent water, or stream bed
Jurisdictional Wetland X	Meeting 3-parameters per 1987 Delineation Manual
Other Jurisdictional WOUS X	Other Waters of the United States such as ponds, lakes, ditches, impoundments, etc.
Non-jurisdictional Wetland X	Wetland determined by the Corps to be non-jurisdictional
Non-jurisdictional Feature X (Optional)*	Non-jurisdictional ponds, borrow-pits, linear features, ditches, etc.
Upland	Uplands should be labeled when wetlands or other waters, regardless of jurisdictional status, are present. When no wetlands or other waters are present, the "Upland" label is not necessary.

---

*Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Program of the U.S. Army Corps of Engineers; Final Rule for 33 CFR Parts 320-332.
Principal Purpose: The information that you provide will be used in evaluating your request to determine whether there are any aquatic resources within the project area subject to federal jurisdiction under the regulatory authorities referenced above.
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Disclosure: Submission of requested information is voluntary; however, if information is not provided, the request for an jurisdictional determination cannot be evaluated nor can a jurisdictional determination be issued.

Appendix D

Waters_Name	Cowadin_Code	HGM_Code	Measurement_Type	Amount	Units	Waters_Types	Latitude	Longitude	Local_Waterway
Non-Wetland Water SFD (Intermittent)	R4	RIVERINE	Linear	1801	FOOT	DELINEATE	33.9711	-81.5954	UT Flat Rock Branch
Non-Wetland Water SMD (Intermittent)	R4	RIVERINE	Linear	261	FOOT	DELINEATE	33.9666	-81.5865	UT Flat Rock Branch
Non-Wetland Water SMB (Intermittent)	R4	RIVERINE	Linear	54	FOOT	DELINEATE	33.9666	-81.5897	UT Flat Rock Branch
Non-Wetland Water SFA (Intermittent)	R4	RIVERINE	Linear	670	FOOT	DELINEATE	33.9723	-81.5881	UT Flat Rock Branch
Non-Wetland Water SFC (Intermittent)	R4	RIVERINE	Linear	266	FOOT	DELINEATE	33.9731	-81.5878	UT Flat Rock Branch
Non-Wetland Water SMCI (Intermittent)	R4	RIVERINE	Linear	333	FOOT	DELINEATE	33.9669	-81.5889	UT Flat Rock Branch
Non-Wetland Water STA (Perennial)	R5	RIVERINE	Linear	2861	FOOT	DELINEATE	33.9707	-81.5982	Flat Rock Branch
Non-Wetland Water SMC (Perennial)	R5	RIVERINE	Linear	805	FOOT	DELINEATE	33.9669	-81.5889	UT Flat Rock Branch
Non-Wetland Water SMA (Perennial)	R5	RIVERINE	Linear	1217	FOOT	DELINEATE	33.9665	-81.5915	UT Flat Rock Branch
Wetland FA	PFO1	RIVERINE	Area	0.2	ACRE	DELINEATE	33.9732	-81.5987	UT Flat Rock Branch
Wetland MC	PFO1	SLOPE	Area	0.35	ACRE	DELINEATE	33.9711	-81.599	UT Flat Rock Branch
Wetland TA	PFO1	SLOPE	Area	0.94	ACRE	DELINEATE	33.9675	-81.5984	UT Flat Rock Branch
Wetland MA	PFO1	SLOPE	Area	0.37	ACRE	DELINEATE	33.9668	-81.5871	UT Flat Rock Branch
Wetland MB	PFO1	SLOPE	Area	0.23	ACRE	DELINEATE	33.9665	-81.586	UT Flat Rock Branch

U.S. Army Corps of Engineers
Global Positioning Systems (GPS) Datasheet
Delineation of Wetlands and Non-Wetland Waters

USACE File Number

Date of Delineation March 9-10, 2023

Name of Delineator Present

Myles McKnight, Brandon Smith, Tabitha Williams, HHNT

Make and Model of GPS Device Used (must be capable of sub-meter accuracy)

Juniper System Archer 2

Geographic Coordinate System Used

NAD 83, South Carolina

Name of Continually Operated Reference Station Used for Post-processing

p779

Date Post-processing Performed

March 13, 2023

Percent Dilution of Position (PDOP) (6 or less is required)

1.45

Name and Coordinates of Known Property Corner and/or Monument

GPS Reading of Known Property Corner and/or Monument

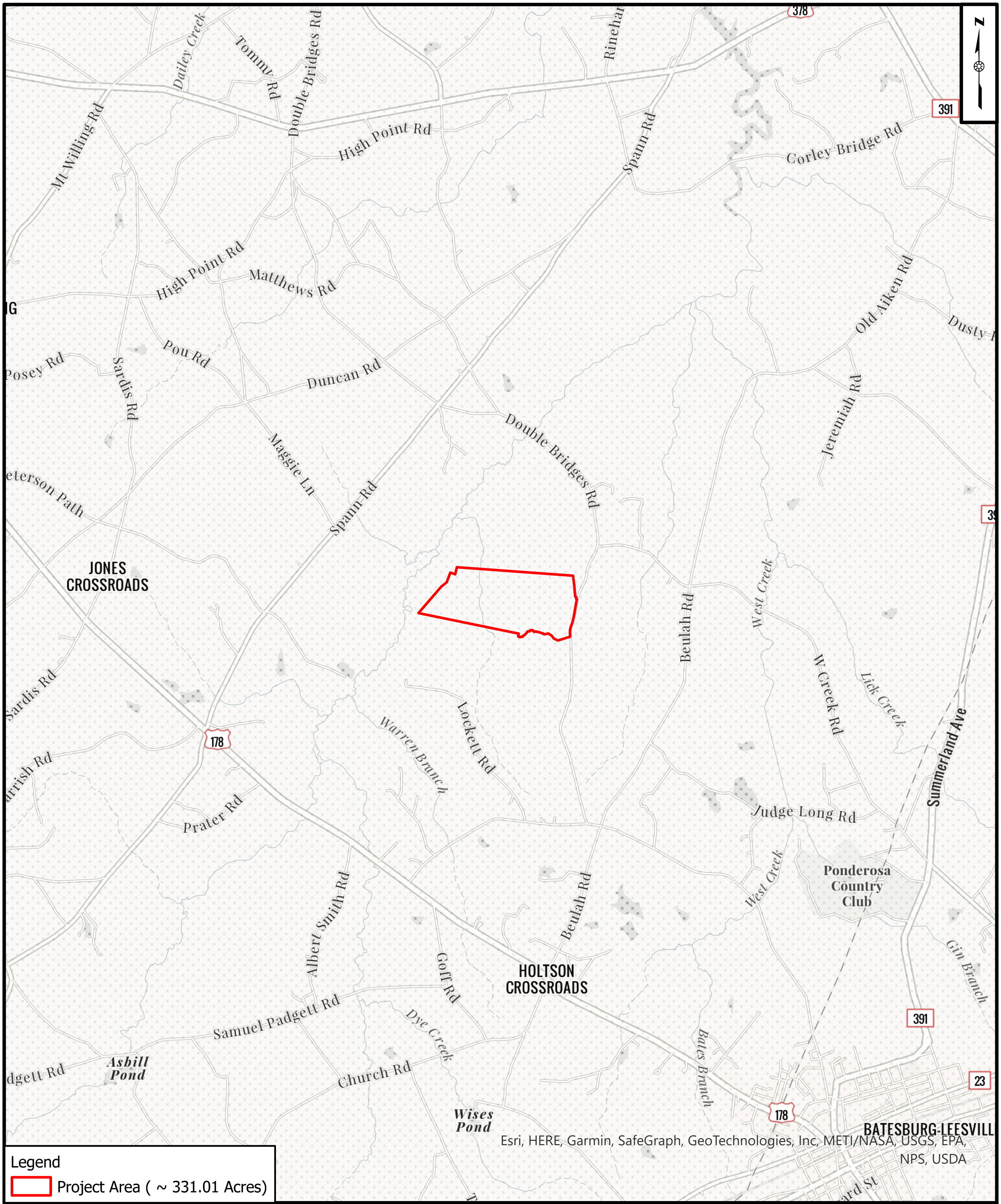
Frequency of Waypoints Taken During Survey

1 every second to 100 readings, then averaged.

Note: GPS data must be provided, if requested. If GPS data and/or GPS delineation is determined unacceptable, a survey sealed by a surveyor licensed in South Carolina will be required.

APPENDICES

APPENDIX A FIGURES



DISCLAIMER:
This drawing and the information contained herein is for general presentation purposes only and is a compilation of shapefile(s) provided by various source(s). The source and accuracy of the file(s) has not been verified by HHNT and therefore the drawing is not intended for use as a engineering drawing or for design purposes.

Figure 1

4/13/2023

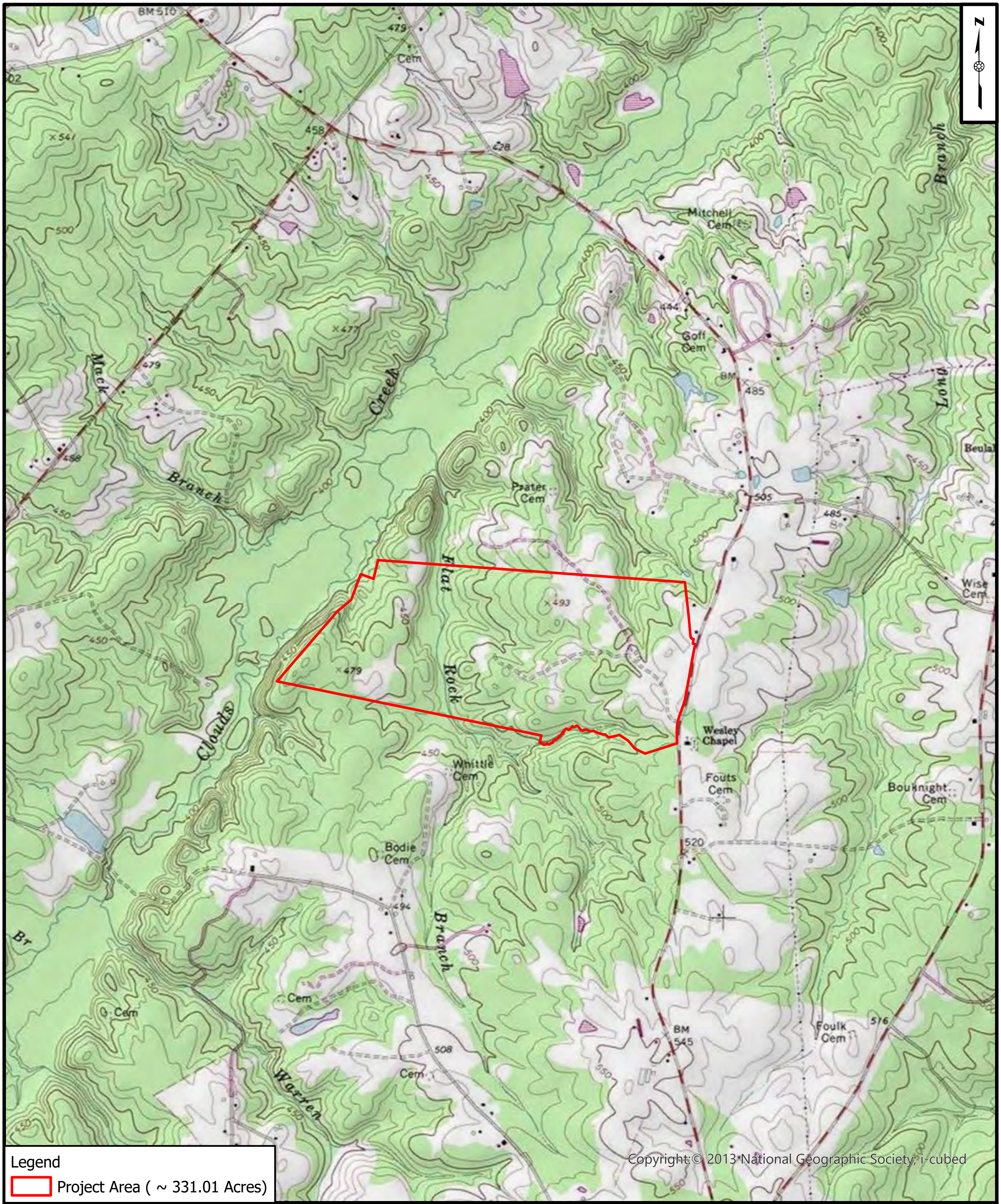
0 0.5 1

1 inch equals 1 Mile

Location Map
Luck Companies
Saluda Quarry
Saluda County, SC

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers

Path: S:\ArcGIS\Luckstone\Saluda GDP\Aquatic Resource Review\Maps\SaludaAquaticResourceReview.aprx User: tgwilliams



Legend

🟥 Project Area (~ 331.01 Acres)

Figure 2

4/7/2023

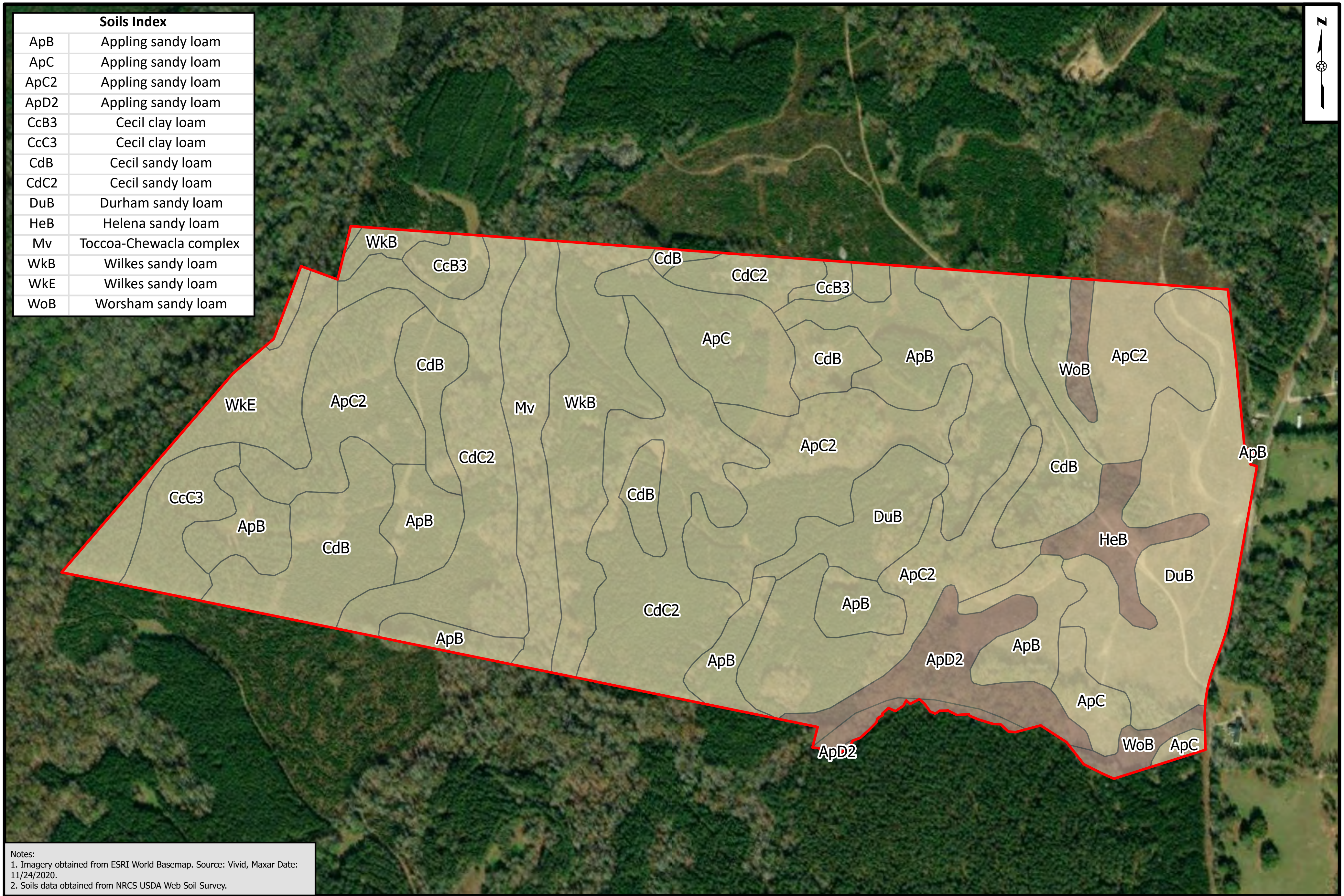
0 1,000 2,000

1 inch equals 2,000 Feet

USGS Topographic Map
Luck Companies
Saluda Quarry
Saluda County, SC

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers

Path: S:\ArcGIS\Luckstone\Saluda GDP\Aquatic Resource Review\Maps\SaludaAquaticResourceReview.aprx User: tgwilliams



Soils Index	
ApB	Appling sandy loam
ApC	Appling sandy loam
ApC2	Appling sandy loam
ApD2	Appling sandy loam
CcB3	Cecil clay loam
CcC3	Cecil clay loam
CdB	Cecil sandy loam
CdC2	Cecil sandy loam
DuB	Durham sandy loam
HeB	Helena sandy loam
Mv	Toccoa-Chewacla complex
WkB	Wilkes sandy loam
WkE	Wilkes sandy loam
WoB	Worsham sandy loam

Notes:
1. Imagery obtained from ESRI World Basemap. Source: Vivid, Maxar Date: 11/24/2020.
2. Soils data obtained from NRCS USDA Web Soil Survey.

Figure 3 - Soils Map

DISCLAIMER:
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700 350 0 700
Feet

☐ Project Area (~ 331.01 Acres)

Soils - Drainage Class

▨ Moderately well drained

▨ Well drained

Luck Companies
Saluda Quarry
Saluda County, SC
4/7/2023

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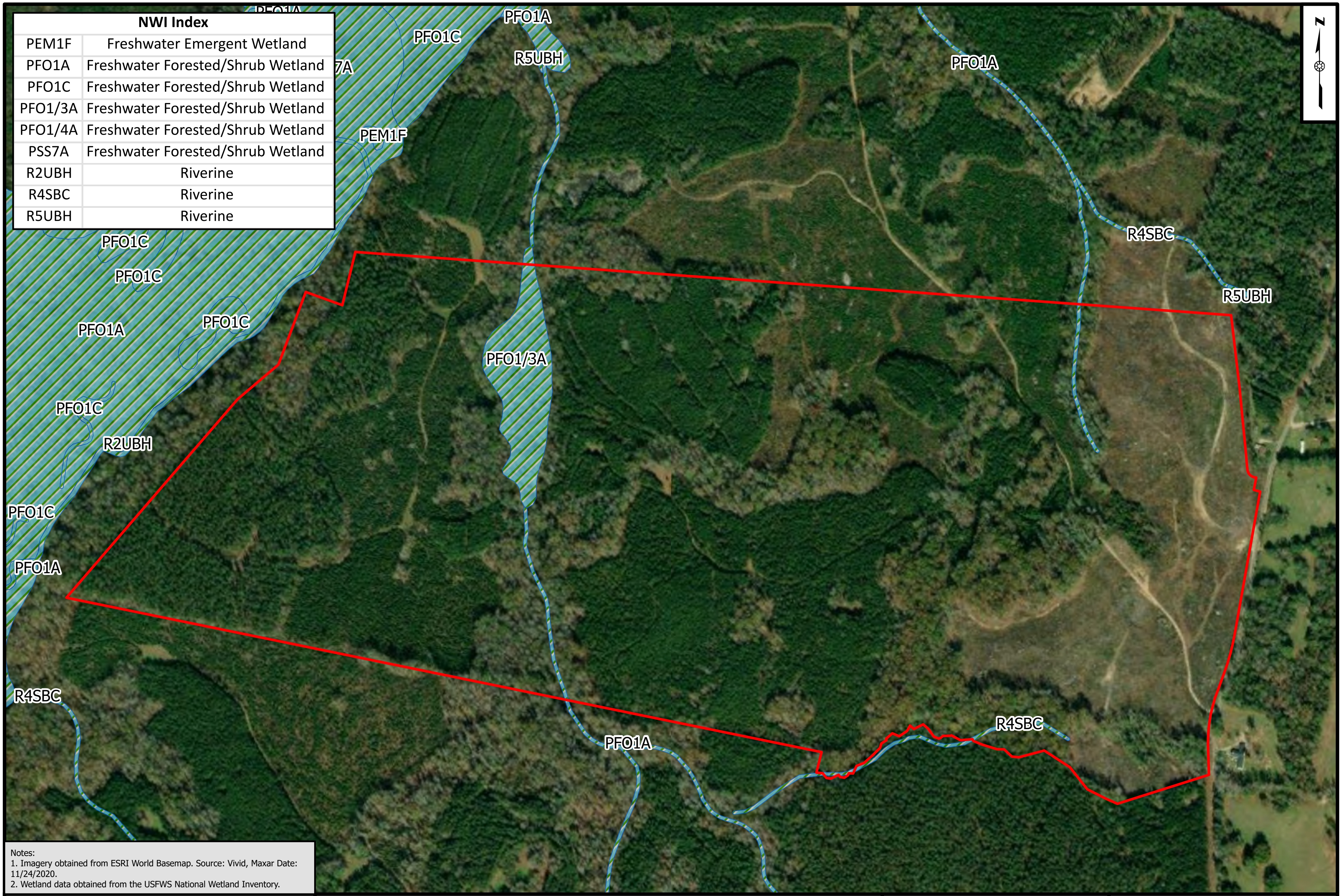

NWI Index	
PEM1F	Freshwater Emergent Wetland
PFO1A	Freshwater Forested/Shrub Wetland
PFO1C	Freshwater Forested/Shrub Wetland
PFO1/3A	Freshwater Forested/Shrub Wetland
PFO1/4A	Freshwater Forested/Shrub Wetland
PSS7A	Freshwater Forested/Shrub Wetland
R2UBH	Riverine
R4SBC	Riverine
R5UBH	Riverine

Notes:
1. Imagery obtained from ESRI World Basemap. Source: Vivid, Maxar Date: 11/24/2020.
2. Wetland data obtained from the USFWS National Wetland Inventory.

Figure 4 - NWI Map

DISCLAIMER:
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700 350 0 700
Feet

🟥 Project Area (~ 331.01 Acres)
▨ NWI Wetlands

Luck Companies
Saluda Quarry
Saluda County, SC
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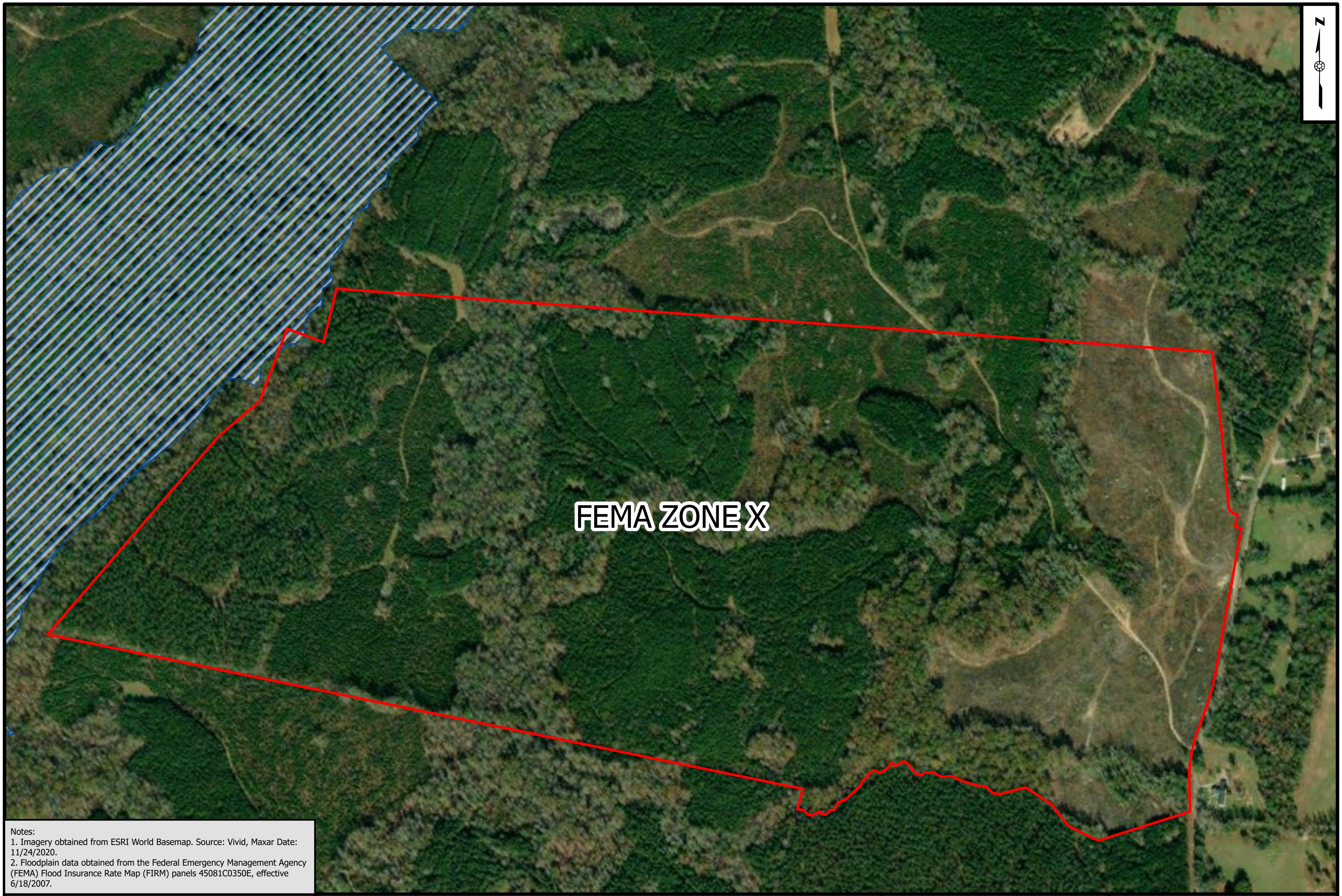

Notes:
1. Imagery obtained from ESRI World Basemap. Source: Vivid, Maxar Date: 11/24/2020.
2. Floodplain data obtained from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels 45081C0350E, effective 6/18/2007.

Figure 5 - FEMA Map

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700 350 0 700
Feet

🟥 Project Area (~ 331.01 Acres)
▨ FEMA Flood Zone A

Luck Companies
Saluda Quarry
Saluda County, SC
4/7/2023

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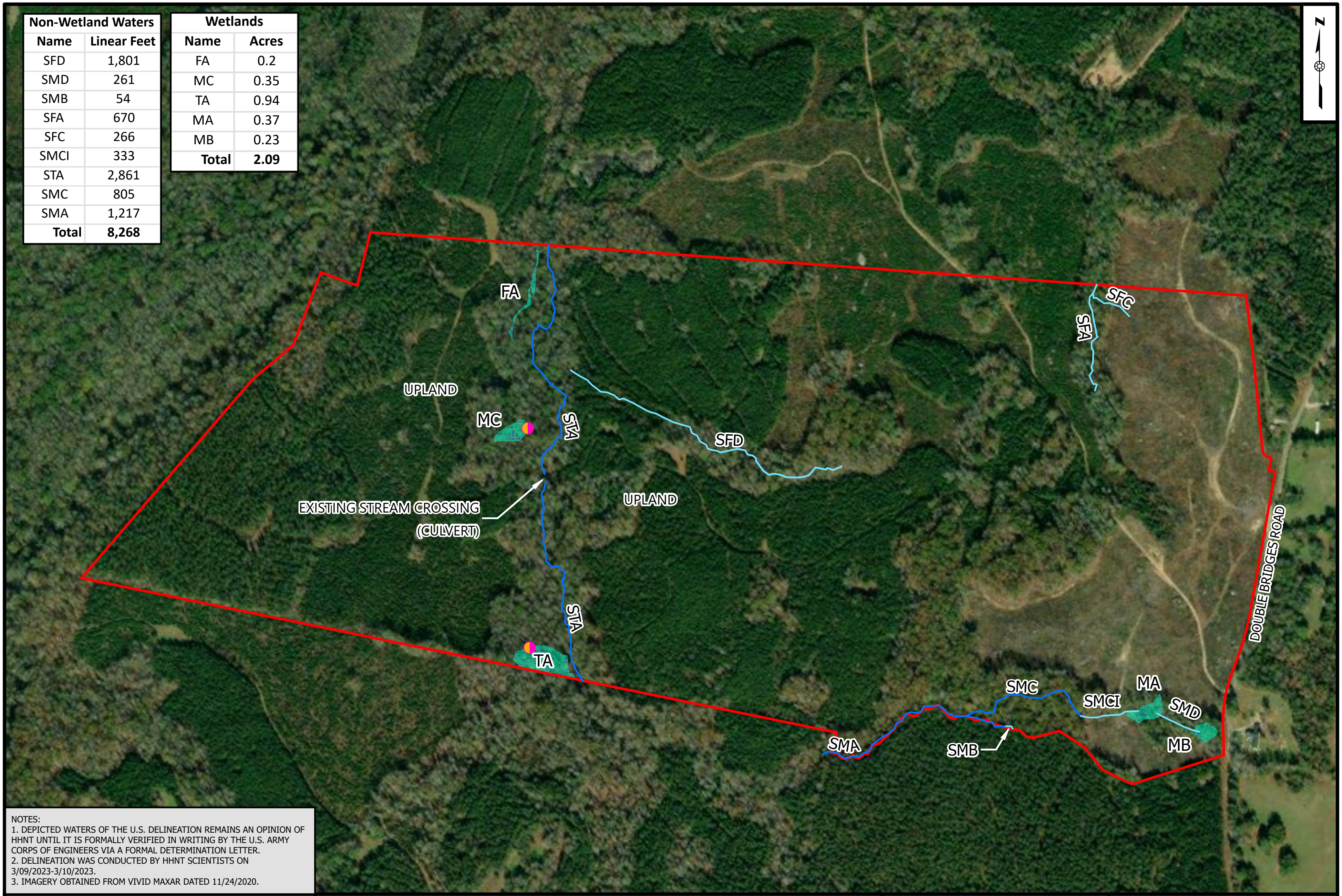
Consulting Engineers

Non-Wetland Waters	
Name	Linear Feet
SFD	1,801
SMD	261
SMB	54
SFA	670
SFC	266
SMCI	333
STA	2,861
SMC	805
SMA	1,217
Total	**8,268**

Wetlands	
Name	Acres
FA	0.2
MC	0.35
TA	0.94
MA	0.37
MB	0.23
Total	**2.09**



NOTES:
1. DEPICTED WATERS OF THE U.S. DELINEATION REMAINS AN OPINION OF HHNT UNTIL IT IS FORMALLY VERIFIED IN WRITING BY THE U.S. ARMY CORPS OF ENGINEERS VIA A FORMAL DETERMINATION LETTER.
2. DELINEATION WAS CONDUCTED BY HHNT SCIENTISTS ON 3/09/2023-3/10/2023.
3. IMAGERY OBTAINED FROM VIVID MAXAR DATED 11/24/2020.

Figure 6 - Delineation Map

DISCLAIMER:
This drawing and the information contained herein is for general presentation purposes only and is a compilation of shapefile(s) provided by various source(s). The source and accuracy of the file(s) has not been verified by HHNT and therefore the drawing is not intended for use as a engineering drawing of for design purposes.

700 350 0 700
Feet

🟥 Project Area (~ 331.01 Acres)
● Data Form Locations

Aquatic Resources
— Non-Wetland Water (Intermittent)
— Non-Wetland Water (Perennial)
▨ Wetlands

Luck Companies
Saluda Quarry
Saluda County, SC
4/13/2023

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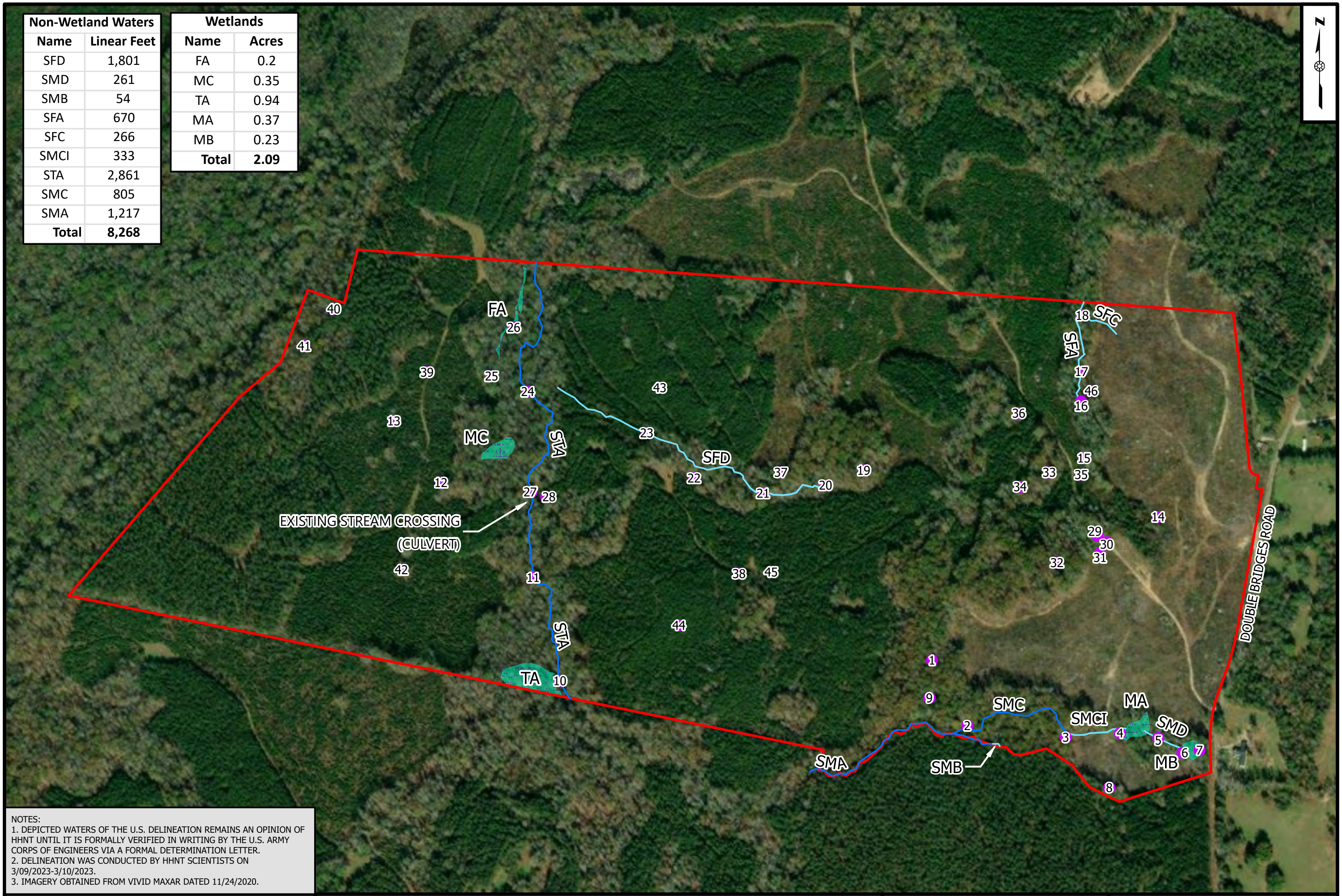
Consulting Engineers



Non-Wetland Waters	
Name	**Linear Feet**
SFD	1,801
SMD	261
SMB	54
SFA	670
SFC	266
SMCI	333
STA	2,861
SMC	805
SMA	1,217
Total	**8,268**

Wetlands	
Name	**Acres**
FA	0.2
MC	0.35
TA	0.94
MA	0.37
MB	0.23
Total	**2.09**

NOTES:
1. DEPICTED WATERS OF THE U.S. DELINEATION REMAINS AN OPINION OF HHNT UNTIL IT IS FORMALLY VERIFIED IN WRITING BY THE U.S. ARMY CORPS OF ENGINEERS VIA A FORMAL DETERMINATION LETTER.
2. DELINEATION WAS CONDUCTED BY HHNT SCIENTISTS ON 3/09/2023-3/10/2023.
3. IMAGERY OBTAINED FROM VIVID MAXAR DATED 11/24/2020.

Figure 7 - Photo Location Map

700 350 0 700
Feet

🟥 Project Area (~ 331.01 Acres)
● Photo Locations

Aquatic Resources
— Non-Wetland Water (Intermittent)
— Non-Wetland Water (Perennial)
🟩 Wetlands

Luck Companies
Saluda Quarry
Saluda County, SC
4/13/2023

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers

APPENDIX B WETLAND DATA FORMS

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp:11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Saluda Quarry   City/County: Saluda   Sampling Date: 3/10/23
Applicant/Owner: Luck Companies   State: SC   Sampling Point: MC11 Wet
Investigator(s): M. McKnight   Section, Township, Range: ______
Landform (hillside, terrace, etc.): Slope   Local relief (concave, convex, none): Concave   Slope (%): 2%
Subregion (LRR or MLRA): LRR N   Lat: 33.9712   Long: -81.5987   Datum: NAD83
Soil Map Unit Name: Mv - Toccoa-Chewacla complex   NWI classification: PFO1/3A
Are climatic / hydrologic conditions on the site typical for this time of year?   Yes X   No ___   (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed?   Are "Normal Circumstances" present?   Yes X   No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic?   (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?   Yes X   No ___
Hydric Soil Present?   Yes X   No ___
Wetland Hydrology Present?   Yes X   No ___

Is the Sampled Area within a Wetland?   **Yes** X   **No** ___

Remarks:
According to the Antecedent Precipitation Calculator, conditions were normal during the time of the delineation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- X Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?   Yes ___   No X   Depth (inches): ___
Water Table Present?   Yes ___   No X   Depth (inches): ___
Saturation Present? (includes capillary fringe)   Yes X   No ___   Depth (inches): 4

Wetland Hydrology Present?   **Yes** X   **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: MC11 Wet

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carpinus caroliniana*	10	Yes	FAC
2. *Quercus nigra*	8	Yes	FAC
3. *Liquidambar styraciflua*	5	No	FAC
4. *Ilex opaca*	3	No	FACU
5. *Quercus rubra*	1	No	FACU
6.			
7.			
	27	=Total Cover	

50% of total cover: 14 20% of total cover: 6

Sapling/Shrub Stratum (Plot size: 30')			
1. *Ligustrum sinense*	5	Yes	FACU
2. *Quercus nigra*	3	Yes	FAC
3. *Ilex opaca*	2	No	FACU
4. *Carpinus caroliniana*	3	Yes	FAC
5.			
6.			
7.			
8.			
9.			
	13	=Total Cover	

50% of total cover: 7 20% of total cover: 3

Herb Stratum (Plot size: 30')			
1. *Ligustrum sinense*	10	Yes	FACU
2. *Polystichum acrostichoides*	1	No	FACU
3. *Woodwardia areolata*	7	Yes	FACW
4. *Sagittaria calycina*	5	Yes	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	23	=Total Cover	

50% of total cover: 12 20% of total cover: 5

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	7	x 2 =	14
FAC species	29	x 3 =	87
FACU species	22	x 4 =	88
UPL species	0	x 5 =	0
Column Totals:	63 (A)		194 (B)

Prevalence Index = B/A = 3.08

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: MC11 Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/2	90	10YR 3/6	10	C	M	Loamy/Clayey	Sandy loam
6-18	10YR 3/2	80	10YR 3/6	20	C	M	Loamy/Clayey	Sandy loam

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10) **(LRR N)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)
___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
___ Thin Dark Surface (S9) **(MLRA 147, 148)**
___ Loamy Mucky Mineral (F1) **(MLRA 136)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
___ Umbric Surface (F13) **(MLRA 122, 136)**
___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(MLRA 147)**
___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp:11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Saluda Quarry City/County: Saluda Sampling Date: 3/9/2023
Applicant/Owner: Luck Companies State: SC Sampling Point: TA3 Wet
Investigator(s): T. Williams Section, Township, Range: ____
Landform (hillside, terrace, etc.): Seep Local relief (concave, convex, none): Concave Slope (%): 6%
Subregion (LRR or MLRA): LRR N Lat: 33.9678 Long: -81.5986 Datum: NAD83
Soil Map Unit Name: ApB - Appling sandy loam NWI classification: PFO1
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are “Normal Circumstances” present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? **Yes** X **No** ____

Remarks:
According to the Antecedent Precipitation Calculator, conditions were normal during the time of the delineation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 2
Water Table Present?	Yes X	No ____	Depth (inches): 2
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: TA3 Wet

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus nigra*	5	Yes	FAC
2. *Liquidambar styraciflua*	10	Yes	FAC
3. *Cornus amomum*	5	Yes	FACW
4. *Carpinus caroliniana*	3	No	FAC
5.			
6.			
7.			
	23	=Total Cover	
50% of total cover:	12	20% of total cover:	5

Sapling/Shrub Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ilex opaca*	3	Yes	FACU
2. *Quercus nigra*	5	Yes	FAC
3. *Carpinus caroliniana*	2	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
	10	=Total Cover	
50% of total cover:	5	20% of total cover:	2

Herb Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Woodwardia areolata*	20	Yes	FACW
2. *Arundinaria gigantea*	3	No	FACW
3. *Aralia spinosa*	1	No	FAC
4. *Sagittaria calycina*	10	Yes	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	34	=Total Cover	
50% of total cover:	17	20% of total cover:	7

Woody Vine Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Smilax laurifolia*	2	No	OBL
2.			
3.			
4.			
5.			
	2	=Total Cover	
50% of total cover:	1	20% of total cover:	1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	12	x 1 =	12
FACW species	28	x 2 =	56
FAC species	26	x 3 =	78
FACU species	3	x 4 =	12
UPL species	0	x 5 =	0
Column Totals:	69 (A)		158 (B)

Prevalence Index = B/A = 2.29

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: TA3 Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 6/1	90	10YR 7/8	10	C	M	Loamy/Clayey	Sandy loam
6-12	10YR 7/1	80	10YR 7/8	20	C	M	Loamy/Clayey	Sandy loam

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10) **(LRR N)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)

___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
___ Thin Dark Surface (S9) **(MLRA 147, 148)**
___ Loamy Mucky Mineral (F1) **(MLRA 136)**
___ Loamy Gleyed Matrix (F2)
_X_ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
___ Umbric Surface (F13) **(MLRA 122, 136)**
___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(MLRA 147)**
___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** _X_ **No** ___

Remarks:
Soil very dry and rocky, difficult to obtain past 14 inches.

APPENDIX C UPLAND DATA FORMS

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp:11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Saluda Quarry City/County: Saluda Sampling Date: 3/10/23
Applicant/Owner: Luck Companies State: SC Sampling Point: MC11 Up
Investigator(s): M. McKnight Section, Township, Range: ____
Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 4%
Subregion (LRR or MLRA): LRR N Lat: 33.9710781 Long: -81.5986136 Datum: NAD83
Soil Map Unit Name: Mv - Toccoa-Chewacla complex NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are “Normal Circumstances” present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? **Yes** ____ **No** X

Remarks:
According to the Antecedent Precipitation Calculator, conditions were normal during the time of the delineation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ True Aquatic Plants (B14)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____
Water Table Present? Yes ____ No X Depth (inches): ____
Saturation Present? Yes ____ No X Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: MC11 Up

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus rubra*	5	Yes	FACU
2. *Juniperus virginiana*	5	Yes	FACU
3. *Carpinus caroliniana*	3	No	FAC
4. *Ilex opaca*	10	Yes	FACU
5.			
6.			
7.			
	23	=Total Cover	

50% of total cover: 12 20% of total cover: 5

Sapling/Shrub Stratum (Plot size: 30')			
1. *Ligustrum sinense*	10	Yes	FACU
2. *Ilex opaca*	10	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	20	=Total Cover	

50% of total cover: 10 20% of total cover: 4

Herb Stratum (Plot size: 30')			
1. *Polystichum acrostichoides*	2	No	FACU
2. *Ligustrum sinense*	20	Yes	FACU
3. *Oxalis violacea*	15	Yes	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	37	=Total Cover	

50% of total cover: 19 20% of total cover: 8

Woody Vine Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	

50% of total cover: ______ 20% of total cover: ______

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	3	x 3 =	9
FACU species	62	x 4 =	248
UPL species	15	x 5 =	75
Column Totals:	80 (A)		332 (B)

Prevalence Index = B/A = 4.15

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ____ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: MC11 Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/4	100					Loamy/Clayey	
6-18	10YR 4/4	100					Loamy/Clayey	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5)
☐ 2 cm Muck (A10) **(LRR N)**
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1)
☐ Sandy Gleyed Matrix (S4)
☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Dark Surface (S7)

☐ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
☐ Thin Dark Surface (S9) **(MLRA 147, 148)**
☐ Loamy Mucky Mineral (F1) **(MLRA 136)**
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
☐ Umbric Surface (F13) **(MLRA 122, 136)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 148)**
☐ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

☐ 2 cm Muck (A10) **(MLRA 147)**
☐ Coast Prairie Redox (A16) **(MLRA 147, 148)**
☐ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
☐ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
☐ Very Shallow Dark Surface (F22)
☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type:
Depth (inches):

Hydric Soil Present? **Yes** ____ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region
See ERDC/EL TR-12-9; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp:11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Saluda Quarry City/County: Saluda Sampling Date: 3/9/2023
Applicant/Owner: Luck Companies State: SC Sampling Point: TA3 Up
Investigator(s): T. Williams Section, Township, Range: ____
Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Convex Slope (%): 7%
Subregion (LRR or MLRA): LRR N Lat: 33.9678 Long: -81.5987 Datum: NAD83
Soil Map Unit Name: ApB - Appling sandy loam NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are “Normal Circumstances” present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? **Yes** ____ **No** X

Remarks:
According to the Antecedent Precipitation Calculator, conditions were normal during the time of the delineation.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)

___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Sparsely Vegetated Concave Surface (B8)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____
Water Table Present? Yes ____ No X Depth (inches): ____
Saturation Present? Yes ____ No X Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: TA3 Up

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Quercus nigra*	5	Yes	FAC
2. *Liquidambar styraciflua*	10	Yes	FAC
3. *Fagus grandifolia*	5	Yes	FACU
4. *Carpinus caroliniana*	5	Yes	FAC
5. *Ilex opaca*	2	No	FACU
6. *Quercus rubra*	2	No	FACU
7.			
	29	=Total Cover	

50% of total cover: 15 20% of total cover: 6

Sapling/Shrub Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Ilex opaca*	3	Yes	FACU
2. *Quercus nigra*	5	Yes	FAC
3. *Carpinus caroliniana*	2	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
	10	=Total Cover	

50% of total cover: 5 20% of total cover: 2

Herb Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Trillium cuneatum*	4	Yes	UPL
2. *Salvia lyrata*	2	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	6	=Total Cover	

50% of total cover: 3 20% of total cover: 2

Woody Vine Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Vitis rotundifolia*	3	No	FAC
2.			
3.			
4.			
5.			
	3	=Total Cover	

50% of total cover: 2 20% of total cover: 1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 55.6% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	30	x 3 =	90
FACU species	14	x 4 =	56
UPL species	4	x 5 =	20
Column Totals:	48 (A)		166 (B)

Prevalence Index = B/A = 3.46

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: TA3 Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/4	100					Loamy/Clayey	Sandy loam
10-18	10YR 4/6	100					Loamy/Clayey	Sandy loam

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10) **(LRR N)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)
___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
___ Thin Dark Surface (S9) **(MLRA 147, 148)**
___ Loamy Mucky Mineral (F1) **(MLRA 136)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
___ Umbric Surface (F13) **(MLRA 122, 136)**
___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(MLRA 147)**
___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
___ Very Shallow Dark Surface (F22)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

APPENDIX D NON-WETLAND WATERS DATA FORMS

SFA

NC DWQ Stream Identification Form Version 4.11

Date: 3/9/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9723
Evaluator: B. Smith	**County:** Saluda County	**Longitude:** -81.5881
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 20.5	**Stream Determination (pick one)** Intermittent	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 11)	Absent	Weak	Moderate	Strong
1[a.] Continuity of channel bed and bank	0	1	[✓ 2]	3
2. Sinuosity of channel along thalweg	0	1	[✓ 2]	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	[✓ 1]	2	3
4. Particle size of stream substrate	0	[✓ 1]	2	3
5. Active/relict floodplain	[✓ 0]	1	2	3
6. Depositional bars or benches	[✓ 0]	1	2	3
7. Recent alluvial deposits	[✓ 0]	1	2	3
8. Headcuts	0	1	2	[✓ 3]
9. Grade control	0	0.5	[✓ 1]	1.5
10. Natural valley	0	0.5	[✓ 1]	1.5
11. Second or greater order channel	No = [✓ 0]		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3.5)				
12. Presence of Baseflow	0	1	[✓ 2]	3
13. Iron oxidizing bacteria	[✓ 0]	1	2	3
14. Leaf litter	1.5	[✓ 1]	0.5	0
15. Sediment on plants or debris	[✓ 0]	0.5	1	1.5
16. Organic debris lines or piles	0	[✓ 0.5]	1	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 6)				
18. Fibrous roots in streambed	3	2	[✓ 1]	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	[✓ 1]	2	3
21. Aquatic Mollusks	[✓ 0]	1	2	3
22. Fish	[✓ 0]	0.5	1	1.5
23. Crayfish	0	[✓ 0.5]	1	1.5
24. Amphibians	0	[✓ 0.5]	1	1.5
25. Algae	[✓ 0]	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

SFC

NC DWQ Stream Identification Form Version 4.11

Date: 3/9/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9731
Evaluator: B. Smith	**County:** Saluda County	**Longitude:** -81.5878
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 19.5	**Stream Determination (pick one)** Intermittent	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 10)

	Absent	Weak	Moderate	Strong
1[a]. Continuity of channel bed and bank	0	1	[✓ 2]	3
2. Sinuosity of channel along thalweg	0	1	[✓ 2]	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	[✓ 1]	2	3
4. Particle size of stream substrate	0	[✓ 1]	2	3
5. Active/relict floodplain	[✓ 0]	1	2	3
6. Depositional bars or benches	[✓ 0]	1	2	3
7. Recent alluvial deposits	[✓ 0]	1	2	3
8. Headcuts	0	1	[✓ 2]	3
9. Grade control	0	0.5	[✓ 1]	1.5
10. Natural valley	0	0.5	[✓ 1]	1.5
11. Second or greater order channel	No = [✓ 0]		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 2.5)

12. Presence of Baseflow	0	[✓ 1]	2	3
13. Iron oxidizing bacteria	[✓ 0]	1	2	3
14. Leaf litter	1.5	[✓ 1]	0.5	0
15. Sediment on plants or debris	[✓ 0]	0.5	1	1.5
16. Organic debris lines or piles	0	[✓ 0.5]	1	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 7)

18. Fibrous roots in streambed	3	[✓ 2]	1	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	[✓ 1]	2	3
21. Aquatic Mollusks	[✓ 0]	1	2	3
22. Fish	[✓ 0]	0.5	1	1.5
23. Crayfish	0	[✓ 0.5]	1	1.5
24. Amphibians	0	[✓ 0.5]	1	1.5
25. Algae	[✓ 0]	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

SFD

NC DWQ Stream Identification Form Version 4.11

Date: 3/9/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9711
Evaluator: B. Smith	**County:** Saluda County	**Longitude:** -81.5954
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 27.5	**Stream Determination (pick one)** Intermittent	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 15)	**Absent**	**Weak**	**Moderate**	**Strong**
1[a.] Continuity of channel bed and bank	0	1	[✓ 2]	3
2. Sinuosity of channel along thalweg	0	1	2	[✓ 3]
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	[✓ 2]	3
4. Particle size of stream substrate	0	1	[✓ 2]	3
5. Active/relict floodplain	0	[✓ 1]	2	3
6. Depositional bars or benches	0	[✓ 1]	2	3
7. Recent alluvial deposits	[✓ 0]	1	2	3
8. Headcuts	0	1	[✓ 2]	3
9. Grade control	0	[✓ 0.5]	1	1.5
10. Natural valley	0	0.5	1	[✓ 1.5]
11. Second or greater order channel	No = [✓ 0]		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 4)

12. Presence of Baseflow	0	1	[✓ 2]	3
13. Iron oxidizing bacteria	[✓ 0]	1	2	3
14. Leaf litter	[✓ 1.5]	1	0.5	0
15. Sediment on plants or debris	[✓ 0]	0.5	1	1.5
16. Organic debris lines or piles	0	[✓ 0.5]	1	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 8.5)

18. Fibrous roots in streambed	[✓ 3]	2	1	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	[✓ 1]	2	3
21. Aquatic Mollusks	[✓ 0]	1	2	3
22. Fish	0	[✓ 0.5]	1	1.5
23. Crayfish	0	[✓ 0.5]	1	1.5
24. Amphibians	0	[✓ 0.5]	1	1.5
25. Algae	[✓ 0]	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

SMA

NC DWQ Stream Identification Form Version 4.11

Date: 3/9/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9665
Evaluator: M. McKnight	**County:** Saluda County	**Longitude:** -81.5915
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 41.5	**Stream Determination (pick one)** Perennial	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 22.5)

A. Geomorphology	Absent	Weak	Moderate	Strong
1[a.] Continuity of channel bed and bank	0	1	2	[✓ 3]
2. Sinuosity of channel along thalweg	0	1	[✓ 2]	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	[✓ 2]	3
4. Particle size of stream substrate	0	1	2	[✓ 3]
5. Active/relict floodplain	0	[✓ 1]	2	3
6. Depositional bars or benches	0	1	2	[✓ 3]
7. Recent alluvial deposits	0	[✓ 1]	2	3
8. Headcuts	0	1	[✓ 2]	3
9. Grade control	0	0.5	[✓ 1]	1.5
10. Natural valley	0	0.5	1	[✓ 1.5]
11. Second or greater order channel	No = 0		Yes = [✓ 3]	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)

B. Hydrology	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0	1	2	[✓ 3]
13. Iron oxidizing bacteria	0	[✓ 1]	2	3
14. Leaf litter	[✓ 1.5]	1	0.5	0
15. Sediment on plants or debris	0	[✓ 0.5]	1	1.5
16. Organic debris lines or piles	0	0.5	[✓ 1]	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 12)

C. Biology	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	[✓ 3]	2	1	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	[✓ 2]	3
21. Aquatic Mollusks	[✓ 0]	1	2	3
22. Fish	0	[✓ 0.5]	1	1.5
23. Crayfish	0	0.5	1	[✓ 1.5]
24. Amphibians	0	0.5	1	[✓ 1.5]
25. Algae	0	[✓ 0.5]	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

SMB

NC DWQ Stream Identification Form Version 4.11

Date: 3/10/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9666
Evaluator: M. McKnight, B. Smith, T. Williams	**County:** Saluda County	**Longitude:** -81.5897
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 23	**Stream Determination (pick one)** Intermittent	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 12.5)	Absent	Weak	Moderate	Strong
1[a.] Continuity of channel bed and bank	0	1	[✓ 2]	3
2. Sinuosity of channel along thalweg	0	1	[✓ 2]	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	[✓ 1]	2	3
4. Particle size of stream substrate	0	1	[✓ 2]	3
5. Active/relict floodplain	[✓ 0]	1	2	3
6. Depositional bars or benches	[✓ 0]	1	2	3
7. Recent alluvial deposits	[✓ 0]	1	2	3
8. Headcuts	0	1	2	[✓ 3]
9. Grade control	0	0.5	[✓ 1]	1.5
10. Natural valley	0	0.5	1	[✓ 1.5]
11. Second or greater order channel	No = [✓ 0]		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 2.5)				
12. Presence of Baseflow	0	[✓ 1]	2	3
13. Iron oxidizing bacteria	[✓ 0]	1	2	3
14. Leaf litter	1.5	[✓ 1]	0.5	0
15. Sediment on plants or debris	[✓ 0]	0.5	1	1.5
16. Organic debris lines or piles	0	[✓ 0.5]	1	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 8)				
18. Fibrous roots in streambed	[✓ 3]	2	1	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	[✓ 1]	2	3
21. Aquatic Mollusks	[✓ 0]	1	2	3
22. Fish	[✓ 0]	0.5	1	1.5
23. Crayfish	0	[✓ 0.5]	1	1.5
24. Amphibians	0	[✓ 0.5]	1	1.5
25. Algae	[✓ 0]	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

SMC

NC DWQ Stream Identification Form Version 4.11

Date: 3/9/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9669
Evaluator: M. McKnight	**County:** Saluda County	**Longitude:** -81.5914
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 30	**Stream Determination (pick one)** Perennial	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 15)	**Absent**	**Weak**	**Moderate**	**Strong**
1[a.] Continuity of channel bed and bank	0	1	2	[✓ 3]
2. Sinuosity of channel along thalweg	0	1	2	[✓ 3]
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	[✓ 2]	3
4. Particle size of stream substrate	0	[✓ 1]	2	3
5. Active/relict floodplain	[✓ 0]	1	2	3
6. Depositional bars or benches	0	1	[✓ 2]	3
7. Recent alluvial deposits	[✓ 0]	1	2	3
8. Headcuts	0	1	[✓ 2]	3
9. Grade control	0	[✓ 0.5]	1	1.5
10. Natural valley	0	0.5	1	[✓ 1.5]
11. Second or greater order channel	No = [✓ 0]		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 6)

12. Presence of Baseflow	0	1	2	[✓ 3]
13. Iron oxidizing bacteria	[✓ 0]	1	2	3
14. Leaf litter	[✓ 1.5]	1	0.5	0
15. Sediment on plants or debris	0	[✓ 0.5]	1	1.5
16. Organic debris lines or piles	0	0.5	[✓ 1]	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 9)

18. Fibrous roots in streambed	[✓ 3]	2	1	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	[✓ 1]	2	3
21. Aquatic Mollusks	[✓ 0]	1	2	3
22. Fish	[✓ 0]	0.5	1	1.5
23. Crayfish	0	0.5	[✓ 1]	1.5
24. Amphibians	0	0.5	[✓ 1]	1.5
25. Algae	[✓ 0]	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

SMCI

NC DWQ Stream Identification Form Version 4.11

Date: 3/9/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9669
Evaluator: M. McKnight	**County:** Saluda County	**Longitude:** -81.5889
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 22	**Stream Determination (pick one)** Intermittent	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 10)	**Absent**	**Weak**	**Moderate**	**Strong**
1[a.] Continuity of channel bed and bank	0	1	[✓ 2]	3
2. Sinuosity of channel along thalweg	0	1	[✓ 2]	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	[✓ 1]	2	3
4. Particle size of stream substrate	0	[✓ 1]	2	3
5. Active/relict floodplain	[✓ 0]	1	2	3
6. Depositional bars or benches	[✓ 0]	1	2	3
7. Recent alluvial deposits	[✓ 0]	1	2	3
8. Headcuts	0	1	[✓ 2]	3
9. Grade control	0	[✓ 0.5]	1	1.5
10. Natural valley	0	0.5	1	[✓ 1.5]
11. Second or greater order channel	No = [✓ 0]		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 4)

12. Presence of Baseflow	0	1	[✓ 2]	3
13. Iron oxidizing bacteria	[✓ 0]	1	2	3
14. Leaf litter	1.5	[✓ 1]	0.5	0
15. Sediment on plants or debris	[✓ 0]	0.5	1	1.5
16. Organic debris lines or piles	0	0.5	[✓ 1]	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 8)

18. Fibrous roots in streambed	[✓ 3]	2	1	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	[✓ 1]	2	3
21. Aquatic Mollusks	[✓ 0]	1	2	3
22. Fish	[✓ 0]	0.5	1	1.5
23. Crayfish	0	[✓ 0.5]	1	1.5
24. Amphibians	0	[✓ 0.5]	1	1.5
25. Algae	[✓ 0]	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

SMD

NC DWQ Stream Identification Form Version 4.11

Date: 3/9/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9666
Evaluator: M. McKnight	**County:** Saluda County	**Longitude:** -81.5865
Total Points: *Stream is at least intermittent if ≥ 19 or perennial if ≥ 30** 22	**Stream Determination (pick one)** Intermittent	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 10)

	Absent	Weak	Moderate	Strong
1[a.] Continuity of channel bed and bank	0	1	[✓ 2]	3
2. Sinuosity of channel along thalweg	0	[✓ 1]	2	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	[✓ 1]	2	3
4. Particle size of stream substrate	0	[✓ 1]	2	3
5. Active/relict floodplain	0	[✓ 1]	2	3
6. Depositional bars or benches	[✓ 0]	1	2	3
7. Recent alluvial deposits	[✓ 0]	1	2	3
8. Headcuts	0	1	[✓ 2]	3
9. Grade control	0	0.5	[✓ 1]	1.5
10. Natural valley	0	0.5	[✓ 1]	1.5
11. Second or greater order channel	No = [✓ 0]		Yes = 3	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 3.5)

12. Presence of Baseflow	0	1	[✓ 2]	3
13. Iron oxidizing bacteria	[✓ 0]	1	2	3
14. Leaf litter	1.5	[✓ 1]	0.5	0
15. Sediment on plants or debris	[✓ 0]	0.5	1	1.5
16. Organic debris lines or piles	0	[✓ 0.5]	1	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 8.5)

18. Fibrous roots in streambed	[✓ 3]	2	1	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	[✓ 1]	2	3
21. Aquatic Mollusks	[✓ 0]	1	2	3
22. Fish	[✓ 0]	0.5	1	1.5
23. Crayfish	0	[✓ 0.5]	1	1.5
24. Amphibians	0	0.5	[✓ 1]	1.5
25. Algae	[✓ 0]	0.5	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

STA

NC DWQ Stream Identification Form Version 4.11

Date: 3/9/2023	**Project/Site:** Saluda Quarry	**Latitude:** 33.9707
Evaluator: T. Williams	**County:** Saluda County	**Longitude:** -81.5982
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30* 43	**Stream Determination (pick one)** Perennial	**Other** *e.g. Quad Name*: Batesburg,SC (2020)

A. Geomorphology (Subtotal = 22.5)	**Absent**	**Weak**	**Moderate**	**Strong**
1[a]. Continuity of channel bed and bank	0	1	2	[✓ 3]
2. Sinuosity of channel along thalweg	0	1	[✓ 2]	3
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0	1	[✓ 2]	3
4. Particle size of stream substrate	0	1	2	[✓ 3]
5. Active/relict floodplain	0	[✓ 1]	2	3
6. Depositional bars or benches	0	1	2	[✓ 3]
7. Recent alluvial deposits	0	[✓ 1]	2	3
8. Headcuts	0	1	[✓ 2]	3
9. Grade control	0	0.5	[✓ 1]	1.5
10. Natural valley	0	0.5	1	[✓ 1.5]
11. Second or greater order channel	No = 0		Yes = [✓ 3]	

[a] artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7.5)

12. Presence of Baseflow	0	1	2	[✓ 3]
13. Iron oxidizing bacteria	0	1	[✓ 2]	3
14. Leaf litter	1.5	[✓ 1]	0.5	0
15. Sediment on plants or debris	0	[✓ 0.5]	1	1.5
16. Organic debris lines or piles	0	0.5	[✓ 1]	1.5
17. Soil-based evidence of high water table?	No = [✓ 0]		Yes = 3	

C. Biology (Subtotal = 13)

18. Fibrous roots in streambed	[✓ 3]	2	1	0
19. Rooted upland plants in streambed	[✓ 3]	2	1	0
20. Macrobenthos (note diversity and abundance)	0	1	[✓ 2]	3
21. Aquatic Mollusks	0	[✓ 1]	2	3
22. Fish	0	[✓ 0.5]	1	1.5
23. Crayfish	0	0.5	1	[✓ 1.5]
24. Amphibians	0	0.5	1	[✓ 1.5]
25. Algae	0	[✓ 0.5]	1	1.5
26. Wetland plants in streambed	FACW = 0.75; OBL = 1.5 Other = [✓ 0]			

*perennial streams may also be identified using other methods. See p. 35 of manual.

Notes:

Sketch:

APPENDIX E SITE PHOTOGRAPHS

PHOTO 1: Typical Project Upland - Forested

PHOTO 2: Non-Wetland Water SMC (Perennial)

Project No.: 4780-021

Date: March 2023

Page 1 of 23

Site Photographs
Luck Companies
Saluda Quarry
Saluda County, SC

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers

PHOTO 3: Non-Wetland Water SMCI (Intermittent)

PHOTO 4: Wetland MA

PHOTO 5: Non-Wetland Water SMD (Intermittent)

PHOTO 6: Wetland MB

Project No.: 4780-021

Date: March 2023

Site Photographs
Luck Companies
Saluda Quarry
Saluda County, SC

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers

PHOTO 7: Wetland MB

PHOTO 8: Project Boundary

PHOTO 9: Typical Project Upland - Rock Outcrops

PHOTO 10: Non-Wetland Water STA (Perennial)

Project No.: 4780-021

Date: March 2023

Site Photographs
Luck Companies
Saluda Quarry
Saluda County, SC

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers

PHOTO 11: Non-Wetland Water STA (Perennial)

PHOTO 12: Typical Project Upland - Hardwoods and Planted Pines

PHOTO 13: Typical Project Upland - Planted Pines

PHOTO 14: Typical Project Upland - Forested

PHOTO 15: Typical Project Upland - Planted Pines

PHOTO 16: Non-Wetland Water SFA (Intermittent)

PHOTO 17: Non-Wetland Water SFA (Intermittent)

PHOTO 18: Non-Wetland Water SFC (Intermittent)

PHOTO 19: Typical Project Upland - Rock Outcrops

PHOTO 20: Non-Wetland Water SFD (Intermittent)

PHOTO 21: Non-Wetland Water SFD (Intermittent)

PHOTO 22: Typical Project Upland - Forested

PHOTO 23: Non-Wetland Water SFD (Intermittent)

PHOTO 24: Non-Wetland Water STA (Perennial)

PHOTO 25: Typical Project Upland – Flat Rock Branch Floodplain

PHOTO 26: Wetland FA

Project No.: 4780-021 **Date:** March 2023 **Page 13 of 23**	**Site Photographs** **Luck Companies** **Saluda Quarry** **Saluda County, SC**	HHNT HODGES, HARBIN, NEWBERRY & TRIBBLE, INC. *Consulting Engineers*

PHOTO 27: Culvert Associated With Non-Wetland Water STA (Perennial) Road Crossing

PHOTO 28: Road Crossing Associated With Non-Wetland Water STA (Perennial)

PHOTO 29: Typical Project Upland – Forested

PHOTO 30: Site Entrance Road

PHOTO 31: Typical Project Upland – Planted Pines

PHOTO 32: Typical Project Upland – Rock Outcrops

PHOTO 33: Typical Project Upland – Rock Outcrops

PHOTO 34: Typical Project Upland – Rock Outcrops

Project No.: 4780-021 **Date:** March 2023 **Page 17 of 23**	**Site Photographs** **Luck Companies** **Saluda Quarry** **Saluda County, SC**	HHNT Hodges, Harbin, Newberry & Tribble, Inc. *Consulting Engineers*

PHOTO 35: Typical Project Upland – Planted Pines

PHOTO 36: Typical Project Upland – Rock Outcrops

PHOTO 37: Typical Project Upland - Forested

PHOTO 38: Typical Project Upland – Planted Pines

PHOTO 39: Typical Project Upland – Planted Pines

PHOTO 40: Typical Project Upland - Forested

Project No.: 4780-021

Date: March 2023

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Site Photographs
Luck Companies
Saluda Quarry
Saluda County, SC

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers

PHOTO 41: Typical Project Upland – Rock Outcrops

PHOTO 42: Typical Project Upland – Forested

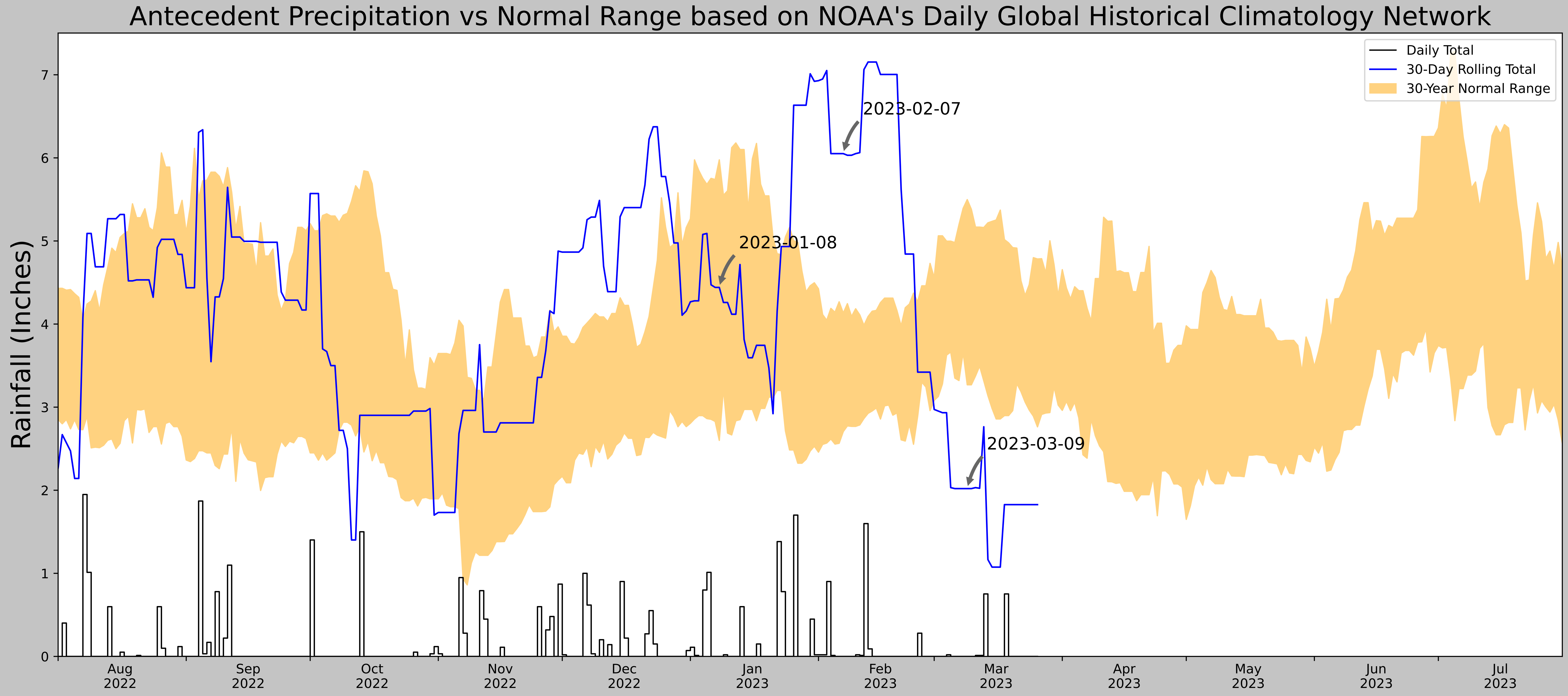
PHOTO 43: Typical Project Upland – Planted Pines

PHOTO 44: Typical Project Upland – Planted Pines

PHOTO 45: Typical Project Upland – Planted Pines

PHOTO 46: Typical Project Upland – Rock Outcrops

APPENDIX F PRECIPITATION AND DROUGHT DATA



Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network

Coordinates	33.9702, -81.5945
Observation Date	2023-03-09
Elevation (ft)	463.025
Drought Index (PDSI)	Incipient wetness (2023-02)
WebWIMP H_2O Balance	Wet Season

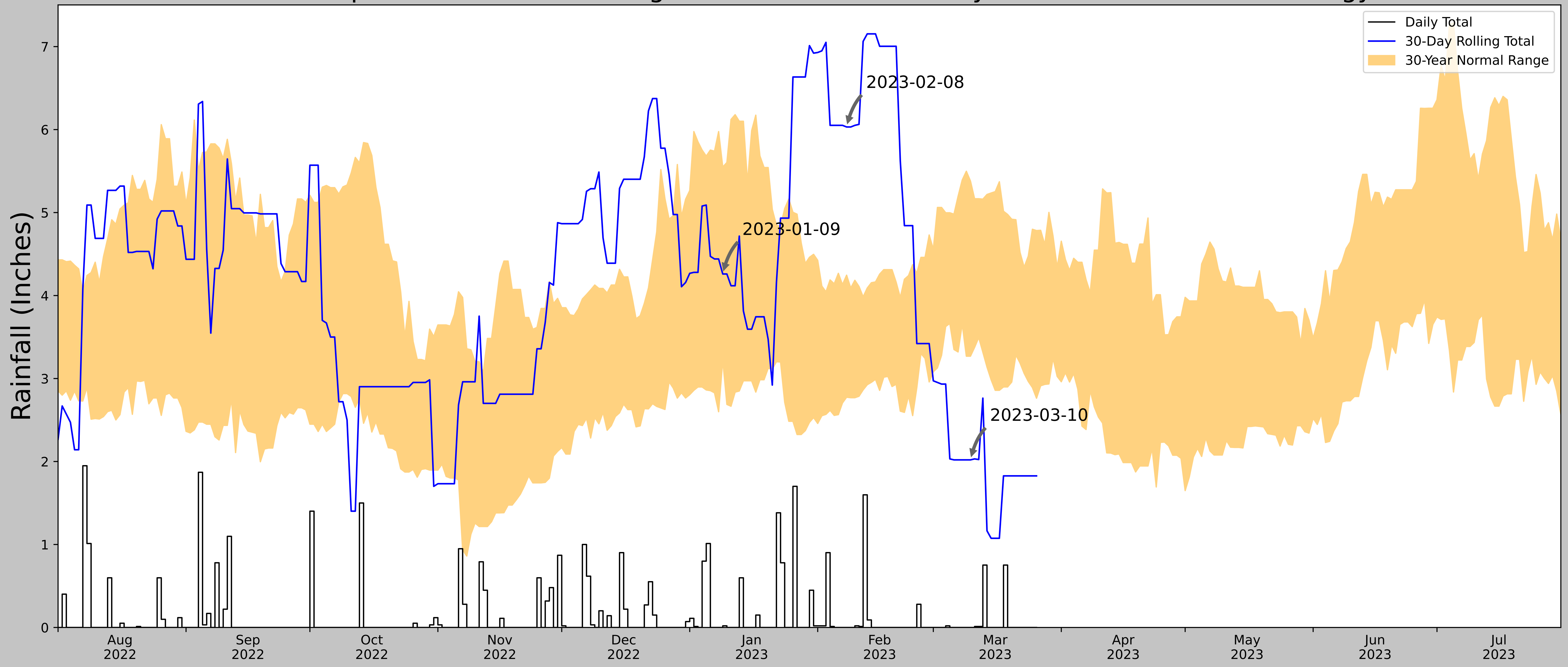
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2023-03-09	3.268898	5.498032	2.019685	Dry	1	3	3
2023-02-07	2.705906	4.13189	6.051181	Wet	3	2	6
2023-01-08	2.599606	5.976378	4.440945	Normal	2	1	2
Result							Normal Conditions - 11

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
BATESBURG	33.9, -81.5389	660.105	5.804	197.08	3.756	11061	90
BATESBURG 1.8 SSW	33.8839, -81.561	651.903	1.686	8.202	0.773	47	0
BATESBURG 3.2 NW	33.9422, -81.5838	554.134	3.89	105.971	2.163	35	0
LEESVILLE 5.2 SE	33.8703, -81.4417	520.013	5.941	140.092	3.506	3	0
RIDGE SPRING 0.4 SSW	33.84, -81.6663	632.874	8.403	27.231	4.01	59	0
GILBERT 0.0 NE	33.9244, -81.3931	533.136	8.528	126.969	4.92	1	0
GILBERT 1.2 SSW	33.9071, -81.4009	485.892	7.929	174.213	4.949	17	0
GILBERT 1.0 SE	33.915, -81.3813	493.11	9.097	166.995	5.613	1	0
SALUDA	33.9919, -81.7714	479.987	14.762	180.118	9.302	129	0

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	33.9702, -81.5945
Observation Date	2023-03-10
Elevation (ft)	463.025
Drought Index (PDSI)	Incipient wetness (2023-02)
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2023-03-10	3.268898	5.380315	2.019685	Dry	1	3	3
2023-02-08	2.77441	4.245669	6.031496	Wet	3	2	6
2023-01-09	3.222047	5.549606	4.259843	Normal	2	1	2
Result							Normal Conditions - 11

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
BATESBURG	33.9, -81.5389	660.105	5.804	197.08	3.756	11061	90
BATESBURG 1.8 SSW	33.8839, -81.561	651.903	1.686	8.202	0.773	47	0
BATESBURG 3.2 NW	33.9422, -81.5838	554.134	3.89	105.971	2.163	35	0
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RIDGE SPRING 0.4 SSW	33.84, -81.6663	632.874	8.403	27.231	4.01	59	0
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GILBERT 1.2 SSW	33.9071, -81.4009	485.892	7.929	174.213	4.949	17	0
GILBERT 1.0 SE	33.915, -81.3813	493.11	9.097	166.995	5.613	1	0
SALUDA	33.9919, -81.7714	479.987	14.762	180.118	9.302	129	0

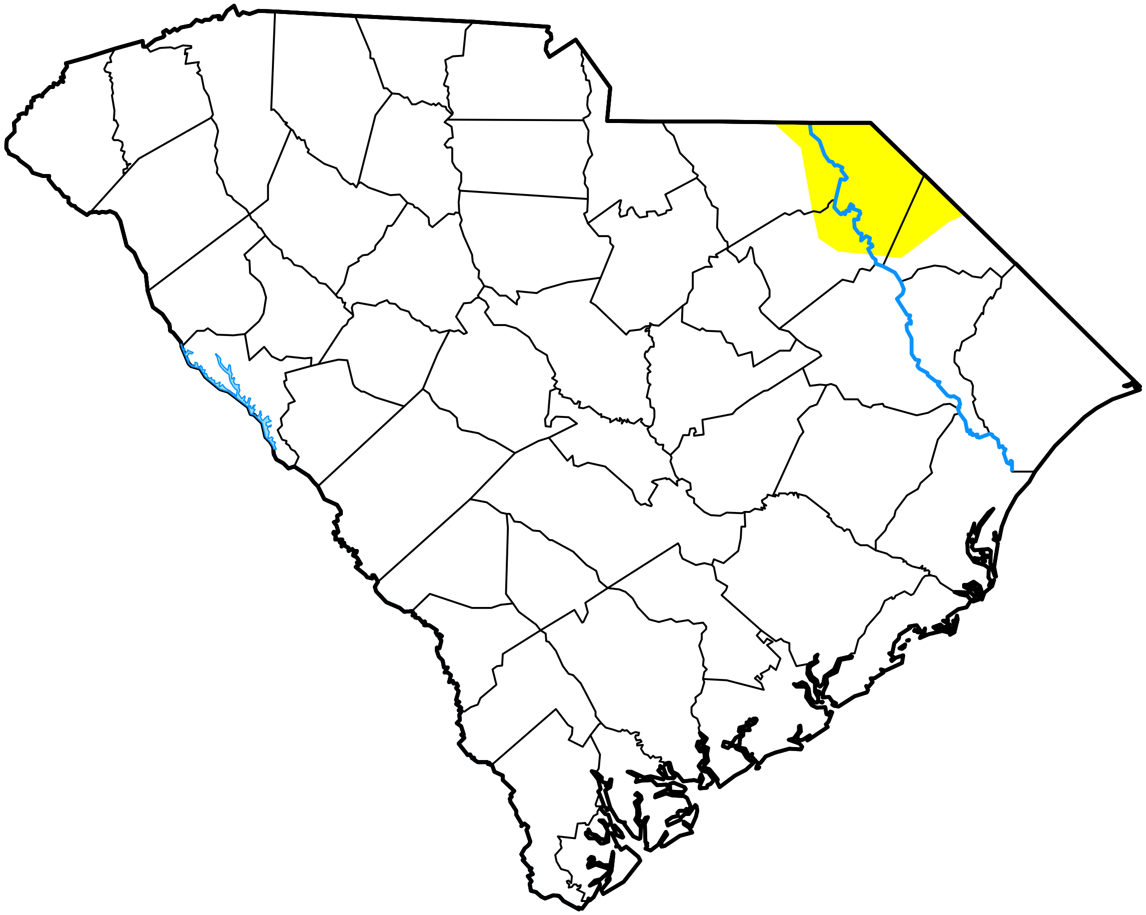
U.S. Drought Monitor

South Carolina

March 14, 2023

(Released Thursday, Mar. 16, 2023)

Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	97.12	2.88	0.00	0.00	0.00	0.00
Last Week *03-07-2023*	97.12	2.88	0.00	0.00	0.00	0.00
3 Months Ago *12-13-2022*	39.97	60.03	10.67	0.00	0.00	0.00
Start of Calendar Year *01-03-2023*	49.44	50.56	10.67	0.00	0.00	0.00
Start of Water Year *09-27-2022*	63.65	36.35	4.72	0.00	0.00	0.00
One Year Ago *03-15-2022*	26.41	73.59	37.78	0.00	0.00	0.00

Intensity:

- ☐ None
- 🟨 D0 Abnormally Dry
- 🟧 D1 Moderate Drought
- 🟧 D2 Severe Drought
- 🟥 D3 Extreme Drought
- 🟫 D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:

Brad Rippey
U.S. Department of Agriculture

droughtmonitor.unl.edu

APPENDIX B
Kennedy Consulting Services – Luck Saluda Mine Maps

LEGEND

☐	PIT
▨	BERM/OVERBURDEN STORAGE
🟪	PROCESS PLANT
▬	ACCESS/HAUL ROAD
🟦	SEDIMENT BASIN
🟩	VEGETATIVE FILTER (VF)
▨	WETLANDS
🟩	50 FEET PROPERTY LINE AND WETLAND BUFFER
— · —	PROPERTY LINE
—	PERMIT BOUNDARY
— – —	250 FEET PROPERTY LINE BLASTING SETBACK
—	STREAMS
→	STORMWATER FLOW
—250—	EXISTING GRADE CONTOUR (5 FEET)
—	EXISTING GRADE CONTOUR (2 FEET)
●→	SEDIMENT BASIN DISCHARGE OUTFALL

SUMMARY OF ACREAGE DETAILS

AFFECTED AREA	284.1 ACRES
BUFFER AREA	46.9 ACRES
FUTURE IMPACT AREA	0.0 ACRES
TOTAL PERMIT AREA	331.0 ACRES

NOTES:

1. MINE PERMIT BOUNDARY IS BASED ON SURVEY BY WELLSTON AND ASSOCIATES LAND SURVEYORS, LLC. THE MINE PERMIT AREA IS PART OF AN OVERALL TRACT (TMS# 174–00–00–006). THE MINE PERMIT AREA IS EXPECTED TO BE SUBDIVIDED.
2. TOPOGRAPHIC CONTOURS WERE SURVEYED BY WELLSTON AND ASSOCIATES, LLC.
3. AQUATIC RESOURCES SHOWN ARE FROM HHNT'S DELINEATION IN PREPARATION FOR DELINEATION CONCURRENCE REQUEST TO THE US ARMY CORPS OF ENGINEERS.
4. STORMWATER SEDIMENT BASINS AND STORMWATER DIVERSIONS ARE AS PROVIDED BY HHNT IN CONJUNCTION WITH THE EROSION AND AND EROSION SEDIMENT CONTROL PLAN.
5. SURROUNDING PARCEL DATA ARE FROM SALUDA COUNTY'S GEOGRAPHIC INFORMATION SYSTEM (GIS) DEPARTMENTS.
6. MINE DESIGN PROVIDED BY LUCK STONE CORPORATION.

GRAPHIC SCALE

300 0 150 300 600 1200

(IN FEET)
1 inch = 300 ft.

REVISIONS

Description	Date	By

Kennedy Consulting Services, LLC
Craig Kennedy, P.G.
KCS
Office:
403 Seaside court Lexington, SC 29072
Cell 803.960.2562
Mail:
P.O. Box 364 Irmo, SC 29063
craigkennedy.KCS@gmail.com

Luck Saluda
Mine Map
Prepared for
Luck Stone Corporation
Saluda County, South Carolina

Project No.: KCS 23-180
Date: 08-01-23
Approved by: RCK
Drawn by: B.C.
Scale: 1"=300'

Sheet No.
1
of
4

LEGEND

🟪	AFFECTED AREAS – BONDED
▨	AFFECTED AREAS – BONDED
☐	AFFECTED AREAS – BONDED
▬	AFFECTED AREAS – BONDED
🟨	AFFECTED AREAS – NOT BONDED
▨ 🟩	BUFFERS – NOT BONDED
— · —	PROPERTY LINE
—	PERMIT BOUNDARY
— – —	250 FEET PROPERTY LINE BLASTING SETBACK
═	STREAMS
→	STORMWATER FLOW
●→	SEDIMENT BASIN DISCHARGE OUTFALL

ACRES UNDER RECLAMATION BOND – 187.8

NOTES:

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5. MINE DESIGN PROVIDED BY LUCK STONE CORPORATION.

GRAPHIC SCALE

300 0 150 300 600 1200

(IN FEET)
1 inch = 300 ft.

REVISIONS

Description	Date	By

Kennedy Consulting Services, LLC
Craig Kennedy, P.G.
KCS

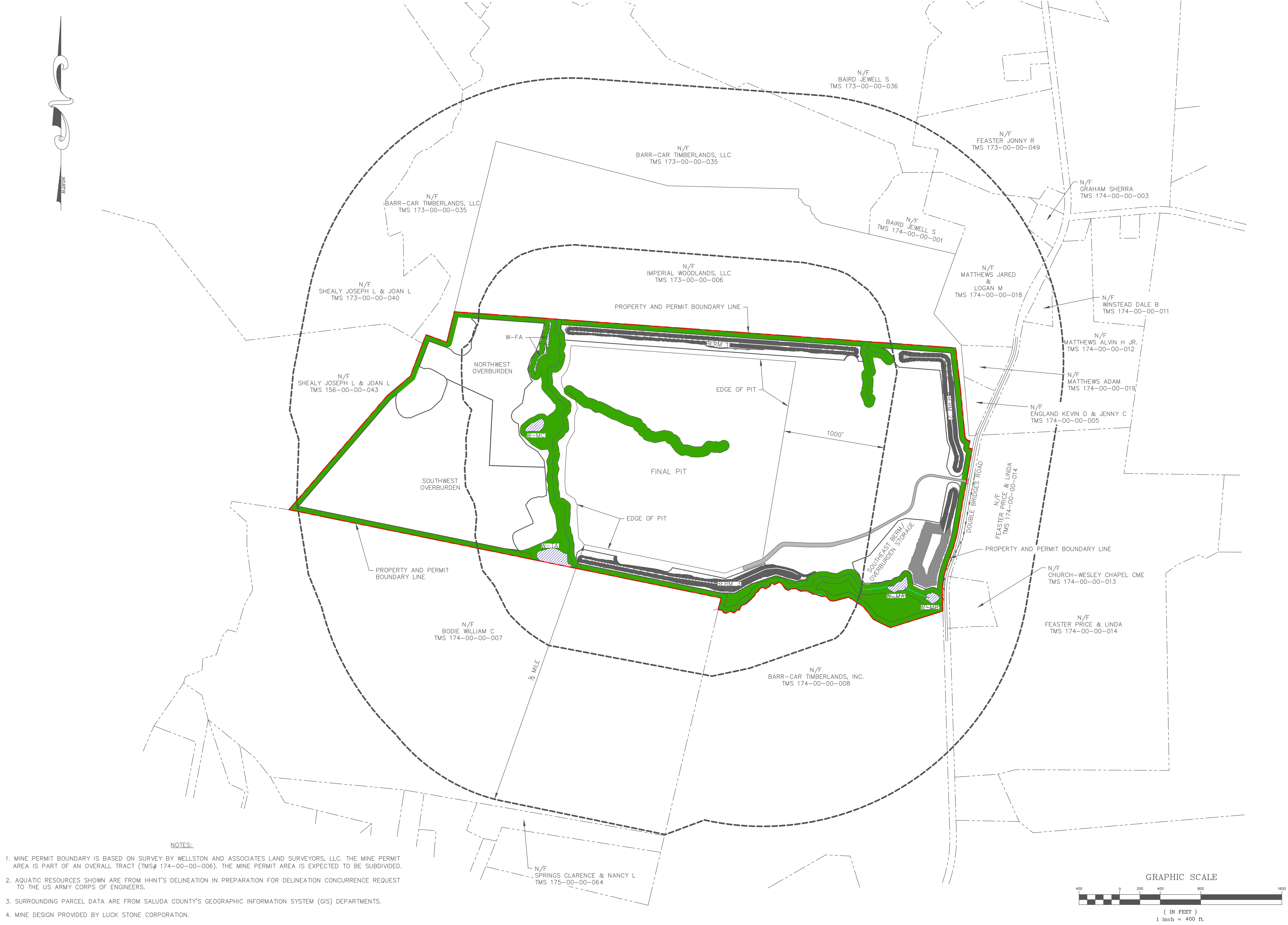
Office:
403 Seaside court Lexington, SC 29072
Cell 803.960.2562

Mail:
P.O. Box 364 Irmo, SC 29063
craigkennedy.KCS@gmail.com

Luck Saluda
Reclamation Bond "Bonded" Map
Prepared for
Luck Stone Corporation
Saluda County, South Carolina

Project No.: KCS 23-180
Date: 08-01-23
Approved by: RCK
Drawn by: B.C.
Scale: 1"=300'

Sheet No.
2
of
4



NOTES:

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4. MINE DESIGN PROVIDED BY LUCK STONE CORPORATION.

REVISIONS

Description	Date	By

Kennedy Consulting Services, LLC
Craig Kennedy, P.G.
KCS

Office:
403 Seaside court Lexington, SC 29072
Cell 803.960.2562

Mail:
P.O. Box 364 Irmo, SC 29063
craigkennedy.KCS@gmail.com

Luck Saluda
1,000 Foot Blasting Setback and
1/2 Mile Pre-Blast Survey Area
Prepared for
Luck Stone Corporation
Saluda County, South Carolina

Project No.: KCS 23-180
Date: 08-01-23
Approved by: RCK
Drawn by: B.C.
Scale: 1"=400'

Sheet No.
3
of
4

LEGEND

🟦	PIT RECLAIMED TO POND
▨	PIT OVERBURDEN GRADED TO 3:1 SLOPE & REVEGETATED
⬜	PIT WITH EXPOSED ROCK HIGHWALLS
🟩	OVERBURDEN/BERMS GRADED TO OVERALL 3:1 SLOPE AND REVEGETATED, ASSOCIATED SEDIMENT BASINS, GRADED AND REVEGETATED
▨	WETLANDS – UNDISTURBED
🟩	PROCESS PLANT EQUIPMENT AND STOCKPILES REMOVED AREA GRADED AND REVEGETATED, PROCESS AND SEDIMENT POND GRADED AND REVEGETATED
☐	PREVIOUS BUFFER AREAS, FUTURE IMPACT AREA – UNDISTURBED
―	STREAMS – UNDISTURBED
–·–·–	FENCE OR OTHER SUITABLE AND APPROVED BARRIER

NOTES:

1. MINE PERMIT BOUNDARY IS BASED ON SURVEY BY WELLSTON AND ASSOCIATES LAND SURVEYORS, LLC. THE MINE PERMIT AREA IS PART OF AN OVERALL TRACT (TMS# 174-00-00-006). THE MINE PERMIT AREA IS EXPECTED TO BE SUBDIVIDED.
2. SURROUNDING PARCEL DATA ARE FROM SALUDA COUNTY'S GEOGRAPHIC INFORMATION SYSTEM (GIS) DEPARTMENTS.
3. MINE DESIGN PROVIDED BY LUCK STONE CORPORATION.

GRAPHIC SCALE

(IN FEET)
1 inch = 300 ft.

REVISIONS

Description	Date	By

Kennedy Consulting Services, LLC
Craig Kennedy, P.G.
KCS

Office:
403 Seaside court Lexington, SC 29072
Cell 803.960.2562

Mail:
P.O. Box 364 Irmo, SC 29063
craigkennedy.KCS@gmail.com

Luck Saluda
Reclamation Map
Prepared for
Luck Stone Corporation
Saluda County, South Carolina

Project No.: KCS 23-180
Date: 08-01-23
Approved by: RCK
Drawn by: B.C.
Scale: 1"=300'

Sheet No.
4
of
4

APPENDIX C
Geophysical Methods and Results

GEOPHYSICAL INVESTIGATION
Confidential Site #1
Saluda, South Carolina

Prepared for:
Bunnell Lammons Engineering
6004 Ponders Court
Greenville, South Carolina 29615

August 28, 2023

Prepared by:

THG Geophysics, Ltd.
4280 Old William Penn Highway
Murrysville, Pennsylvania 15668
724-325-3996
www.thggeophysics.com
THG Project No. 1384-11325rev

TABLE OF CONTENTS

LIST OF FIGURES

DIGITAL APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

Bunnell Lammons Engineering, Inc. (BLE) contracted with THG Geophysics, Ltd. (THG) to investigate the subsurface of the Confidential Site #1 project (Project) located in Saluda, South Carolina (**Figure 1**). Due to site access restrictions preventing full workdays, the survey was completed over three (3) mobilizations on April 3-7, April 17-21, and May 11-14, 2023. The objective of the survey was to image bedrock fractures within an approximately 96-acre area of interest. The survey area consisted of densely vegetated abandoned agricultural lands and tree farm property.

1.2 WORK SCOPE

The primary work scope consisted of acquiring eight (8) very low frequency (VLF) survey profiles, totaling approximately 20,000 linear feet, in a regular grid over the project site. To further characterize fractures identified in VLF data, six (6) 2-D electrical resistivity imaging (EI) profiles, totaling approximately 9,000 linear feet, were collected over the site (**Figure 2**).

2.0 GEOPHYSICAL METHODS

2.1 VERY LOW FREQUENCY SURVEY

A VLF bedrock fracture survey was conducted using an ABEM WADI meter to collect eight (8) profiles (**Figure 2**). The VLF method can be used to find steeply dipping structures that differ from their surroundings with regard to electrical resistance. VLF transmitters, the strongest located in Cutler, Maine, send out low frequency military radio signals (15-30 kHz). When the field emitted by one of the transmitters strikes an anomaly, secondary currents are created that can be read and recorded by the WADI VLF meter.

Cables, metal pipes, and grounded metal fences can also cause very strong anomalies because they are grounded, which permits a large ground-return current loop to form, showing a similar signature to that of fractured bedrock (ABEM Geophysics, 1989).

When a field emitted by a transmitter strikes a body having low electrical resistance, secondary circuits are created in the body. Fraser filtering, a numeric algorithm is performed on the real part of the VLF data to enhance the anomaly. Fraser filtering is based upon the work of Karous and Hjelt (1983):

$$F_o = - 0.102\, H_{-3} + 0.059\, H_{-2} - 0.561\, H_{-1} + H_0 + 0.561\, H_1 - 0.059\, H_2 + 0.102\, H_3$$

Where; $\mathbf{F_0}$ is the filtered result and $\mathbf{H_{-3}}$ to $\mathbf{H_3}$ are the original VLF data.

Approximately 20,000 linear feet of VLF data were collected in eight (8) profile lines; VLF Lines 1 through 4 are oriented west to east and VLF lines 5 through 8 are oriented south to north (**Figure 2**). The composite VLF profiles are generated through the Fraser-filtering algorithm and is an estimate of the presence and dip of fractures, where the portion of the image in red (or darker colors) is considered to be the profile of a fracture (however overhead power lines, underground utilities and fences can create noise within this image). These profiles are projected to image to a depth of 300 feet below grade (**Figure 3**).

2.2 ELECTRICAL IMAGING SURVEY

2.2.1 Introduction

Electrical resistance is based upon Ohm's Law:

$$R = \frac{V}{I} \quad [ohms]$$

Where, resistance, **R**, is equal to the ratio of potential, **V** (volts) to current flow, **I** (amperes).

Resistivity is the measure of the resistance along a linear distance of a material with a known cross-sectional area. Consequently, resistivity is measured in Ohm-meters. This report presents the geophysical results as geo-electrical profiles of modeled resistance plotted as 2-dimensional profiles of distance and depth, in units of feet.

Electrical currents propagate as a function of three material properties (1) ohmic conductivity, (2) electrolytic conductivity, and (3) dielectric conductivity. Ohmic conductivity is a property exhibited by metals. Electrolytic conductivity is a function of the concentration of total dissolved solids and chlorides in the groundwater that exists in the pore spaces of a material. Dielectric conductivity is a function of the permittivity of the matrix of the material. Therefore, the matrix of most soil and bedrock is highly resistive. Of these three properties, electrolytic conductivity is the dominant material characteristic that influences the apparent resistivity values collected by this method. In general, resistivity values decrease in water-bearing rocks and soil with increasing:

a. Fractional volume of the rock occupied by groundwater;
b. Total dissolved solid and chloride content of the groundwater;
c. Permeability of the pore spaces; and,
d. Temperature.

Materials with minimal primary pore space (i.e., limestone, dolomite) or those which lack groundwater in the pore spaces will exhibit high resistivity values (Mooney, 1980). Highly porous, moist, or saturated soil will exhibit very low resistivity values.

In homogeneous ground, the apparent resistivity is the true ground resistivity; however, in heterogeneous ground, the apparent resistivity represents a weighted average of all formations through which the current passes. Many electrode placements (arrays) have been proposed (for examples see Reynolds, 1997); however, the Schlumberger array has proven to be an effective configuration for imaging bedrock. The following Schlumberger array was used in the collection of data:

$$R_i = \frac{\pi a^2}{b}[1-\frac{b^2}{4a^2}]R; a = 5b$$

Where, $\boldsymbol{R_i}$, resistivity, is related to the number of poles, ***n***, the separation distance between the current source and current sink ***b***, and the pole spacing, **a**.

2.2.2 Methods

The resistivity survey was performed using the ARES II multi-electrode cable system (GF Instruments, s.r.o., Brno, Czech Republic). The survey was conducted using stainless steel electrodes and passive multi-electrode cables with switch boxes. EI profiles were collected with a 3-meter step-out Schlumberger array. All lines were designed to image approximately 300 feet below grade (**Figure 5**). The locations of all data were recorded in the field using a Trimble Geo-7XH global positioning system (GPS). Elevation data for further processing was obtained from client-provided GIS data.

2.2.3 Processing

A forward modeling subroutine was used to calculate the apparent resistivity values using the EarthImager2D program (AGI, 2002). This program is based on the smoothness-constrained least-squares method (deGroot-Hedlin and Constable, 1990; Loke and Barker, 1996). The smoothness-constrained least-squares method is based upon the following equation:

$$J^T g = (J^T J + \mu F)d$$

Where, **F** is a function of the horizontal and vertical flatness filter, **J** is the matrix of partial derivatives, **μ** is the damping factor, **d** is the model perturbation vector, and **g** is the discrepancy vector.

The EarthImager2D program divides the subsurface 2-D space into a number of rectangular blocks. Resistivities of each block are then calculated to produce an apparent resistivity pseudo section. The pseudo section is compared to the actual measurements for consistency. A measure of the difference is given by the root-mean-squared (rms) error.

The results of the 2-D EI profiles were modeled in 3-D space with the Voxler 4 program. A volume of apparent resistivity data was generated through 3-D interpolation. Elevation depth slices of apparent resistivity were extracted at 10-ft intervals across elevations common to all profiles from 250-430 ft amsl (**Figure 5, Digital Appendix D1**).

2.3 QUALITY ASSURANCE AND QUALITY CONTROL

The interpretation of geophysically-generated data is not an exact science since the responses to induced disturbance is affected by many phenomena including buried metals, operator error, precipitation, and net changes in ground saturation conditions. Some sources of spurious data can be overcome through a QA/QC program and use of multiple geophysical methods. The quality control program employed with this study included frequent checks of the equipment and resurveys of lines and locations. The QA/QC program indicates that all geophysical equipment functioned as designed during the survey program.

3.0 GEOLOGY

The area of focus for this survey lies within the Late Paleozoic-aged Clouds Creek pluton. The Clouds Creek is a composite body consisting of biotite and cordierite-biotite monzogranite and granodiorite (Speer, 1981). This elongate pluton has considerable variation in texture and color, but it is distinctly porphyritic throughout its western half and its northern end. Phenocrysts in the porphyritic granite are generally very distinctive, being round to oval crystals of potassium feldspar as much as 2 inches in diameter (Overstreet, 1965).

4.0 GEOPHYSICAL INTERPRETATION

4.1 INTRODUCTION

Mapping subsurface fractures with the VLF method requires the collection of many individual measurements along each profile. This is due to the final Fraser-filtered output, where each data point is dependent on the six adjacent measurements. Additionally, each individual profile must completely cover an anomaly (i.e. fracture), and ideally should cover multiple anomalies across each profile. This is necessary to develop a model of local fractures through characterization of similar anomalies on adjacent, parallel profiles. Eight (8) VLF profiles were collected at the site in an orthogonal orientation (south-north and west-east) (**Figures 2-3**). In order to adequately survey the entire approximately 96-acre site, parallel VLF profiles were spaced approximately 500 feet apart. The VLF profiles imaged to a depth of 300 feet below grade; however, this does not take topography into account.

VLF profiles 1-4 were collected in an approximately west to east orientation and profiles 5-8 were acquired in an approximately south to north orientation (Figure 2). All profiles were collected using a 32-foot (10 meter) station separation.

In addition to fractures, anomalies can be generated by cultural sources. For example, power lines, subsurface utilities and metal fencing can also cause very strong anomalies. No utilities, fences or overhead power lines are identified at the site. One approximately 200-foot section of VLF data in profile 6 was corrupted during acquisition and therefore omitted from the report (**Figure 3**). Overall, VLF data quality is very good.

To further characterize fractures identified from VLF data, six (6) electrical imaging profiles were collected across the site. Profiles were positioned and oriented to image strong VLF fractures. Each profile was collected using a 9.8 feet (3 meters) electrode spacing in various cable configurations (**Figure 4**). The resulting 2-D profiles imaged to depths of approximately 300 feet below grade.

Generally, individual geologic units have a common apparent resistivity value. Low apparent resistivity values are typically associated with soils, saturated materials, and highly weathered bedrock; whereas, high apparent resistivity values are associated with rock (also increasing with rock competence). Clay materials can exhibit a range of apparent resistivity from 1-20 Ohm-m, sand can exhibit a range from 20-200 Ohm-m, and metamorphic units can exhibit a range from 10-5,000 Ohm-m. (Palacky, 1987).

Consequently, very high apparent resistivity measurements can indicate very hard, non-permeable rock or air–filled voids. Very low apparent resistivity measurements can indicate soil or saturated voids. In cases of severe weathering, rock can become fractured and highly porous. As sediment and water migrate into fractures and pore spaces, these lithologies can display very low apparent resistivity values.

4.2 DISCUSSION

Numerous fractures are interpreted within the site footprint (**Figure 2**). The VLF and EI data indicate that the site is characterized by generally orthogonally oriented southwest to northeast and southeast to northwest fractures.

Locally, graben fracture systems were located along VLF profiles 2, 3 and 7 (**Figure 3**). These features are generally favorable for groundwater production. Fractures identified in EI profiles correlate well with the locations of interpreted fracture grabens in VLF profiles 2 and 7 (**Figures 2-4**). No EI data was collected in the vicinity of the fracture graben interpreted in VLF profile 3. A very strong VLF anomaly is identified in VLF profile 6 at approximately 1,100 feet along the profile and correlates well with the location of a fracture identified in EI profile 5 (**Figures 3-4**).

Fractures are positioned on the map based on where they would theoretically intercept the ground surface. In some cases, interpreted VLF and EI fractures align and interpreted fracture orientations extend across the entire site (**Figure 2**).

Apparent resistivity values at the project site range from approximately 50 to 82,000 Ohm-m; consistent with the geology of the site. EI profiles are positioned to image deeper portions of strong VLF anomalies, consistent with depths likely reached during geotechnical drilling. Several fractures are identified in the EI data including one interpreted graben fracture system in EI profile 1 (**Figure 4**).

5.0 CONCLUSION

Two geophysical (VLF and EI) methods were used to identify subsurface fractures at the Confidential Site #1 project located in Saluda, South Carolina. The interpreted fractures at the site generally trend southeast to northwest and southwest to northeast (**Figure 2**). Fracture dips were interpreted in both directions perpendicular, respectively, to the trend of a fracture.

Geophysical investigations are a non-invasive method of interpreting physical properties of the shallow earth using electrical, electromagnetic, or mechanical energy. This document contains geophysical interpretations of responses to induced or real-world phenomena. As such, the measured phenomenon may be impacted by variables not readily identified in the field that can result in a false-positive and/or false-negative interpretation. THG makes no representations or warranties as to the accuracy of the interpretations.

6.0 REFERENCES

AGI, 2002. EarthImager Program. American Geosciences Inc., Austin Texas.

deGroot-Hedlin, C. and Constable, S., 1990, Occam's inversion to generate smooth, two-dimensional models from magnetotelluric data. Geophysics, V. 55, 1613-1624.

Horton, J.D., C.A. San Juan, and D.B. Stoeser, 2017, The State Geologic Map Compilation (SGMC) geodatabase of the conterminous United States: U.S. Geological Survey Data Series 1052. < https://macrostrat.org/map/#/z=14.0/x=-79.3840/y=37.7022/bedrock/lines/>

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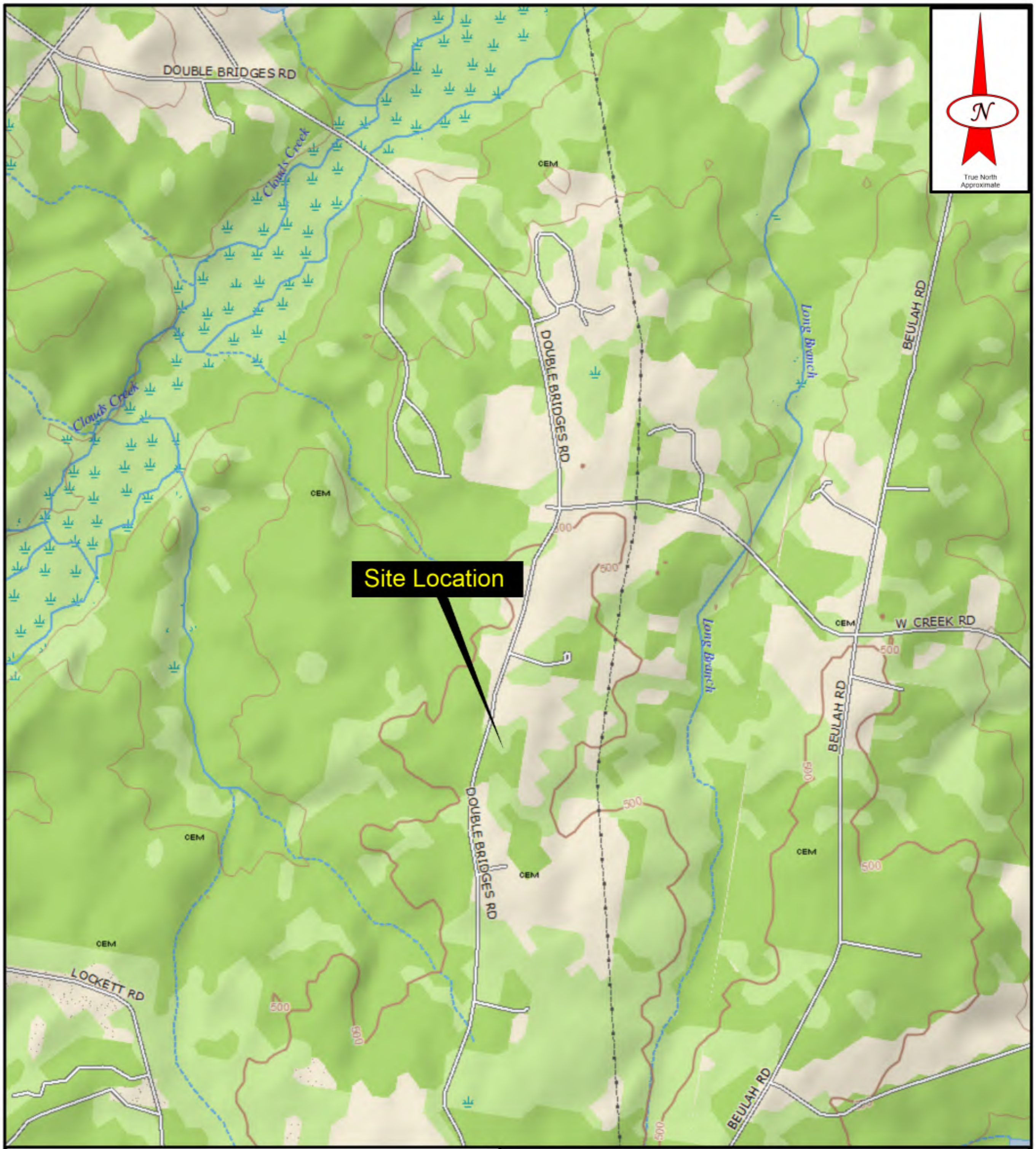
Palacky, G (1987). Resistivity Characteristics of Geological Targets. Electromagnetic Methods in Applied Geophysics Theory. Society of Exploration Geophysicists, Tulsa OK, 53-129.

Reynolds, J. M. (1997). An Introduction to Applied and Environmental Geophysics. New York, NY, Wiley.

Speer, J. A. (1981). Petrology of Cordierite- and Almandine-Bearing Granitoid Plutons of the Southern Appalachian Piedmont, USA. Canadian Mineralogist: Vol. 19, pp. 35-49.



THG GEOPHYSICS Ltd

4280 Old William Penn Hwy
Murrysville, Pennsylvania 15668
(724) 325-3996 Fax: (724) 733-7901

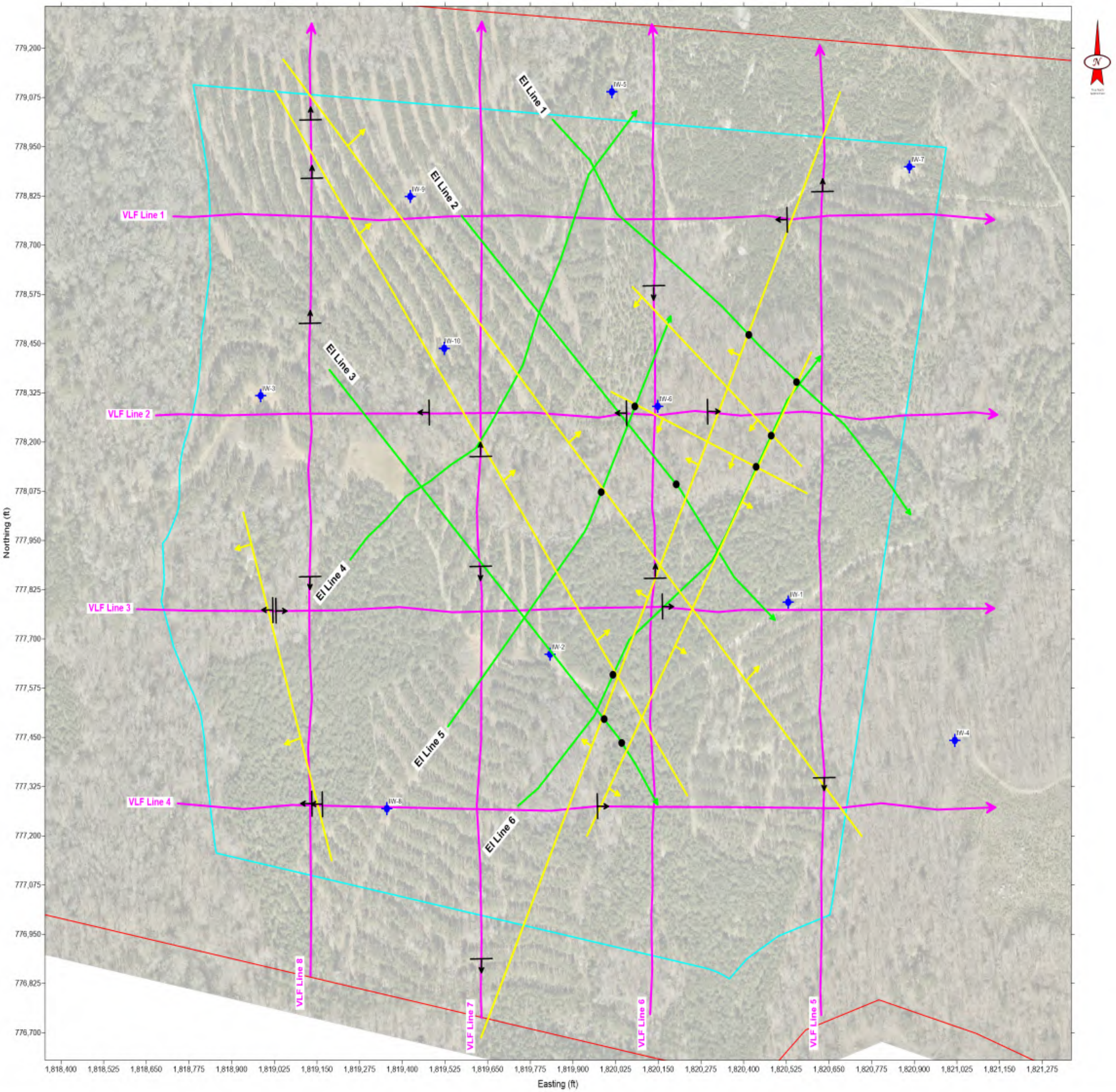
www.thggeophysics.com

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft

Figure 1
Site Location Map

Geophysical Survey
Confidential Site #1
Saluda, South Carolina

SCALE: 1:24,000	PROJECT NO.:	DRAWING NO.:
DATE : 6/26/2023	1384-11325	DWG11325F1rev
DRAWN BY: MES	SOURCE: 1987 Batesburg (SC) USGS 7.5 Minute Topographic Quadrangle	
CHECKED BY: PJH		



Legend

→	VLF Profile
→	EI Profile
▭	Proposed Extraction Area
▭	Parcel Footprint
IW-1 ✦	Core Drilling
	Interpolated Fracture Orientation and Dip
●	Interpreted Fracture - EI Profile
	Interpreted Fracture and Dip - VLF Profile

Notes

Geophysical surveys conducted April 3-7, 2023.
using ABEM Wadi Very Low Frequency meter and
April 17-21 & May 11-14, 2023, using GF Instruments
ARES II electrical resistivity meter.

Real-time positioning of data using fully integrated Trimble
Geo-7X global positioning system set to NAD 1983
US State Plane (South Carolina) coordinate system
in US Survey feet.

Locations are approximate.

Sources

Aerial
LuckSaludaCO_Ortho_20230310

Topography
USGS_1M_17_x44y376_SC_SavannahPeeDee_2019_B19
Contour interval = 10 ft

Basemaps
Confidential #1 (Saluda) GIS Files

Map Scale: 1 inch = 125 feet

0 ft 38.1000762 ft 76.2001524 ft 114.3002286 ft 152.4003048 ft

GEOPHYSICS

DRN
DES
CHK
REV
PROJ. MGR.

1 in. = 125 ft

See Notes

Geophysical Investigation
Confidential Site #1
Saluda, South Carolina

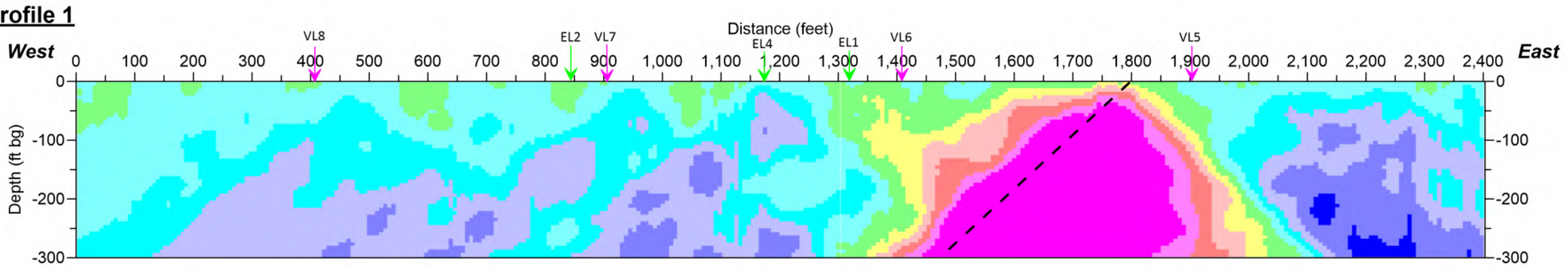
Figure 2
Survey Layout

BLE BUNNELL LAMMONS ENGINEERING

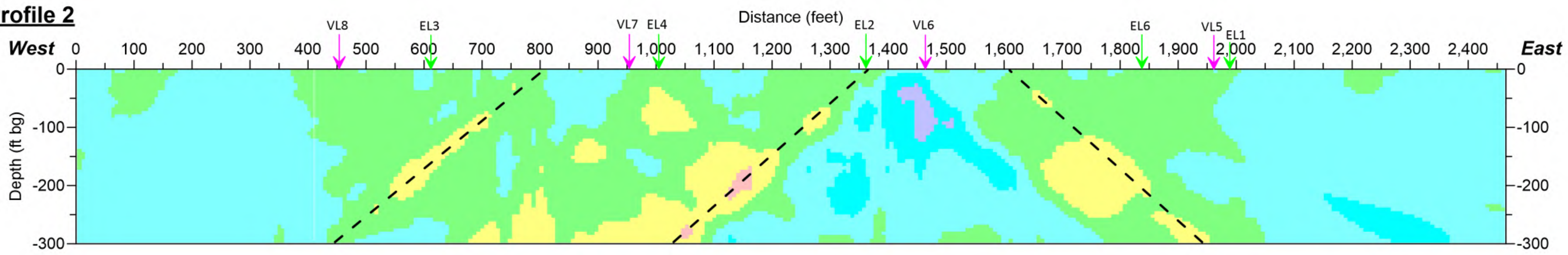
1384-11325

DWG11325F2rev

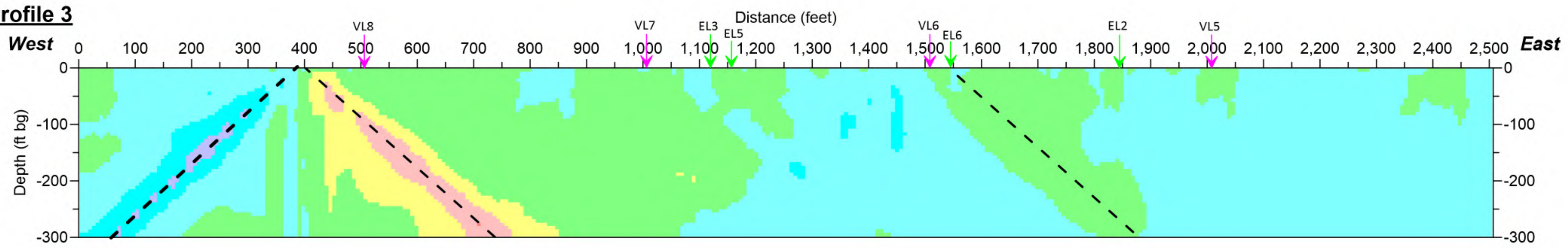
VLF Profile 1



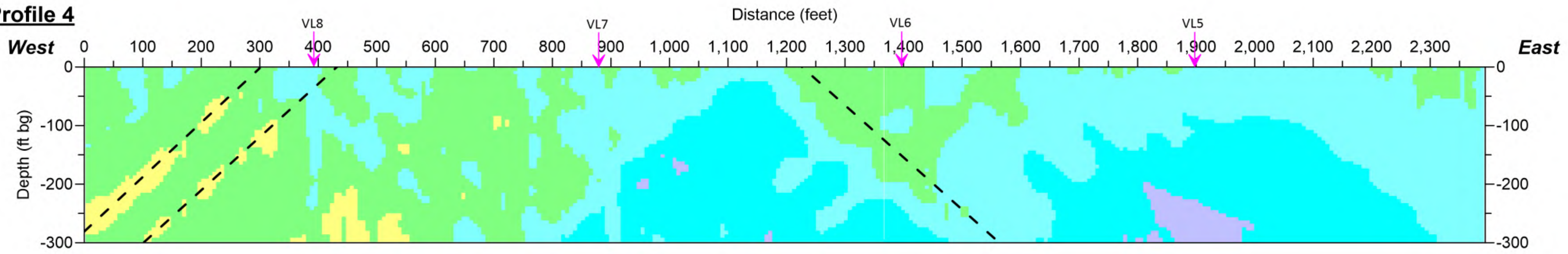
VLF Profile 2



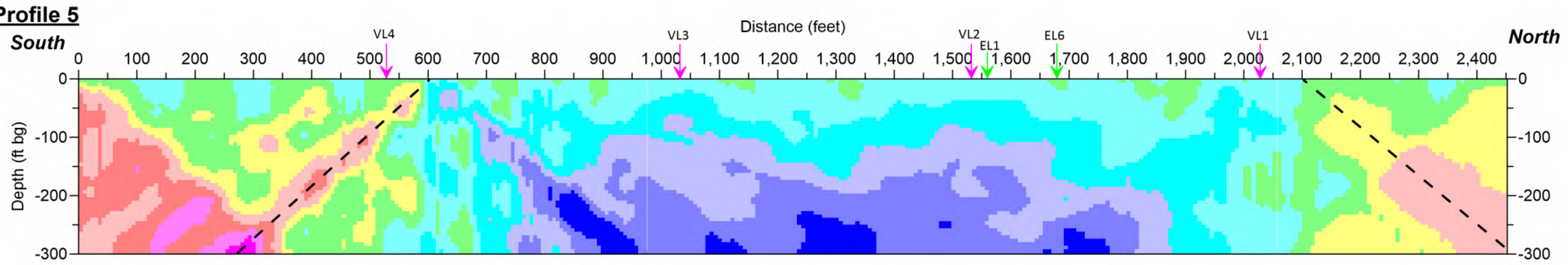
VLF Profile 3



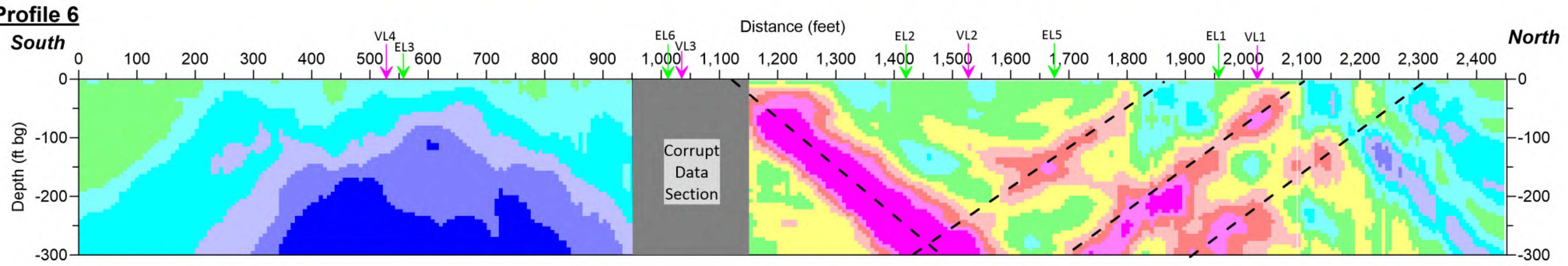
VLF Profile 4



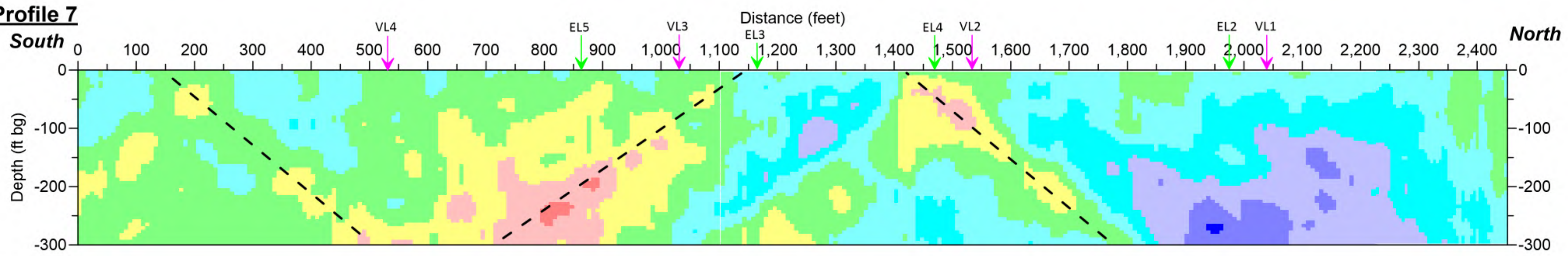
VLF Profile 5



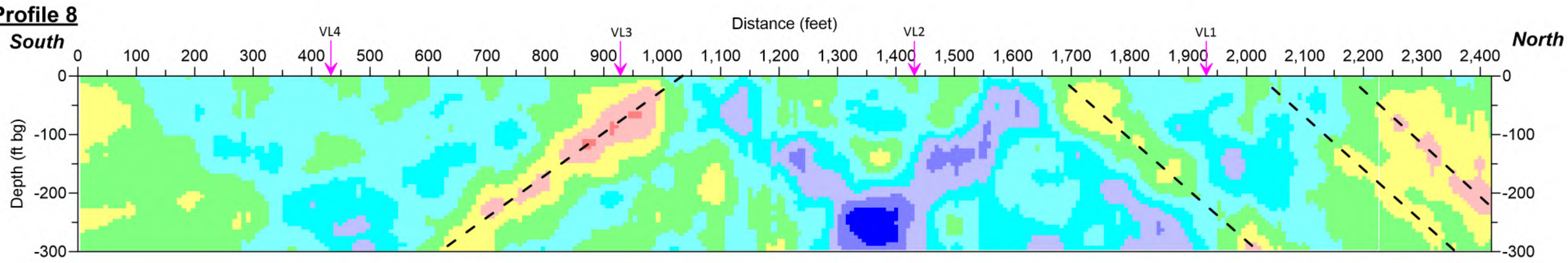
VLF Profile 6



VLF Profile 7



VLF Profile 8



Legend (Profiles)

- VL6 ↓ VLF Profile Tie Location (See Figs. 3-4)
- EL3 ↓ EI Profile Tie Location
- ⁄ Interpreted Fracture (EI Data)

Color Scale (In-Phase Saturation)

Notes

Geophysical survey conducted April 3-7, 2023 using ABEM Wadi Very Low Frequency meter.

4280 Old William Penn Hwy
Murrysville, Pennsylvania 15668
(724) 325-3996 Fax: (724) 733-7901
www.thggeophysics.com

DRN	AXB	4/13/23
DES	AXB	4/13/23
CHK	PJH	6/25/23
REV	ZCM	8/28/23
PROJ. MGR.	KSM	6/25/23

SCALE: 1 in = 200 ft

SOURCE: RAMAG

PROJECT: Geophysical Investigation
Confidential Site #1
Saluda, South Carolina

DRAWING NO.: Figure 3
VLF Profiles 1-8

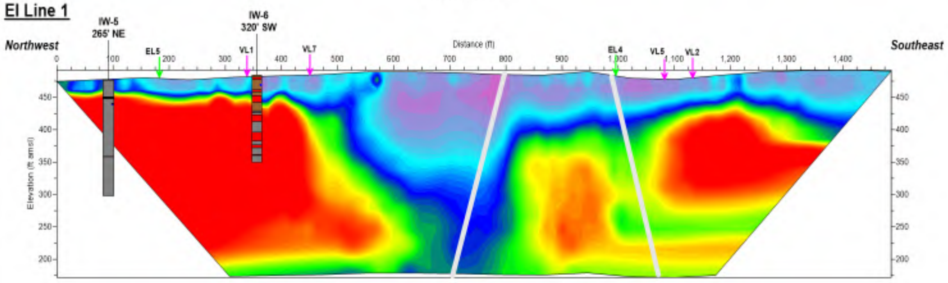
PREPARED FOR: BUNNELL LAMMONS ENGINEERING

PROJECT NO.: 1384-11325

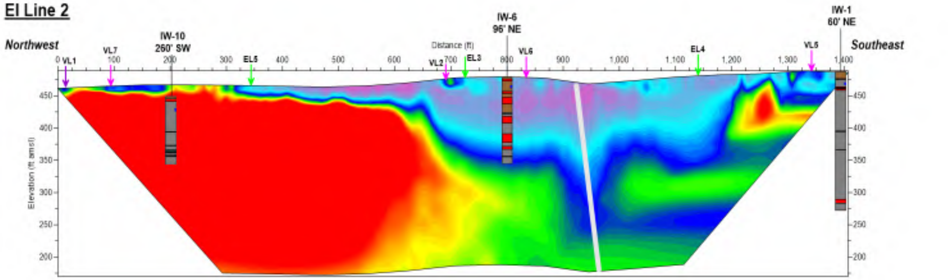
SHEET TITLE: DWG11325F3rev

NORTHWEST-SOUTHEAST PROFILES

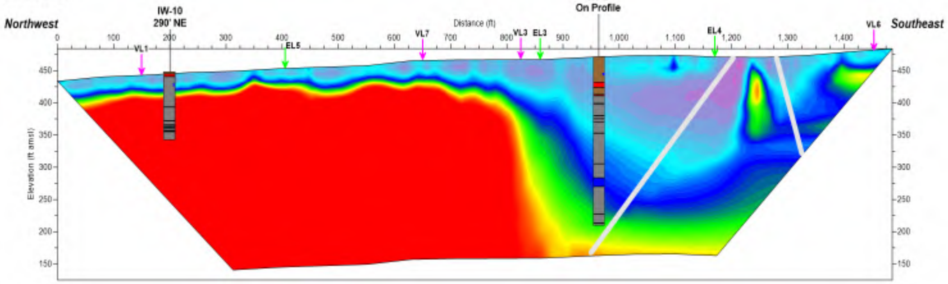
EI Line 1



EI Line 2

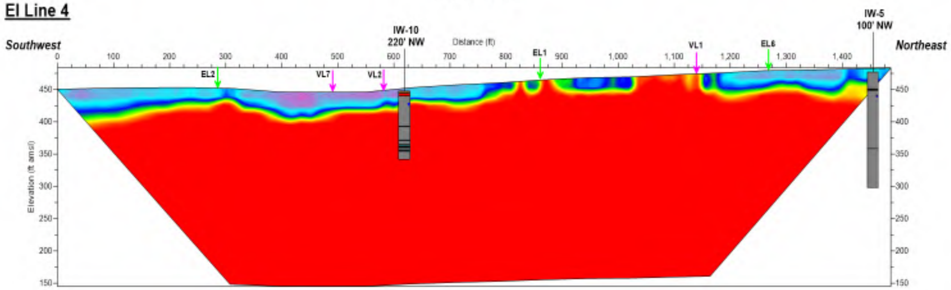


EI Line 3

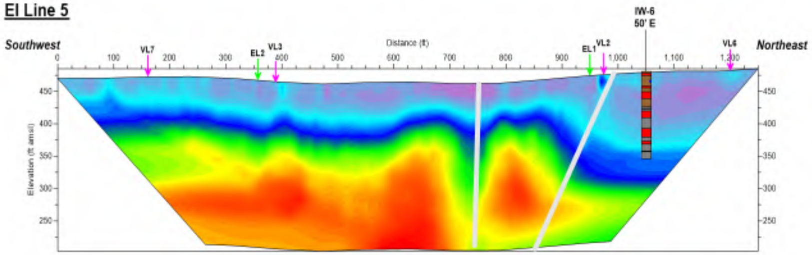


SOUTHWEST-NORTHEAST PROFILES

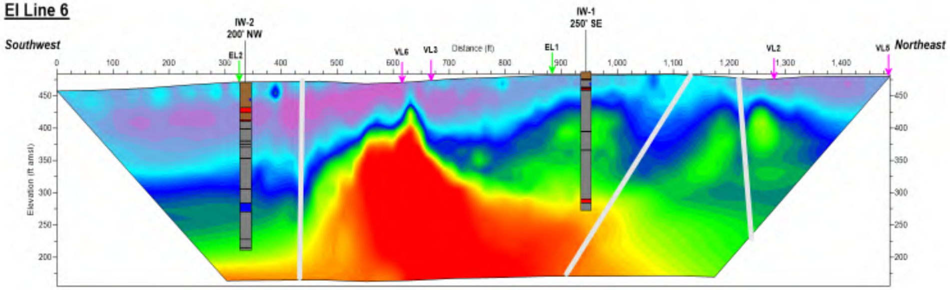
EI Line 4



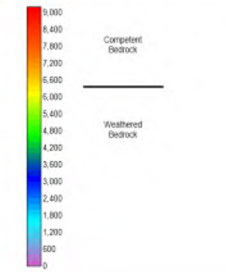
EI Line 5



EI Line 6



Apparent Resistivity (Ohm-m)

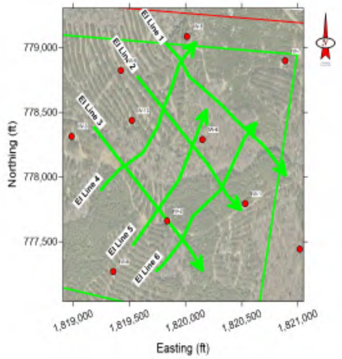


Legend (Borings)

- 🟫 Overburden
- ⬛ Granite
- 🟥 Weathered Granite/Granite Boulders
- 🟦 Schist
- 🟦 Quartz
- ⬛ Dike
- ▼ Groundwater Level

Legend (Profiles)

- VL6 ↓ VLF Profile Tie Location (See Figs. 3-4)
- EL3 ↓ EI Profile Tie Location
- / Interpreted Fracture (EI Data)



Legend (map)

- → EI Profile
- 🟩 Proposed Extraction Area
- 🟥 Parcel Footprint
- IW-1 ● Core Drilling

Scale (map)

0 ft 152.4003048 ft 304.8006096 ft 457.2009144 ft 609.6012192 ft

1 in = 500 ft

Notes

Geophysical survey was conducted April 17-21 and May 11-14, 2023, using a GF Instruments ARES II electrical resistivity meter with stainless steel electrodes in a 3-meter Schlumberger array.

Horizontal Scale: 1 in = 100 ft
Vertical Scale: 1 in = 100 ft
No vertical exaggeration.

Locations and depths are approximate.

DRN	AKB	[illegible]
DES	AKB	[illegible]
CHK	[illegible]	[illegible]
REV	[illegible]	[illegible]
PROJ. MGR.	[illegible]	[illegible]

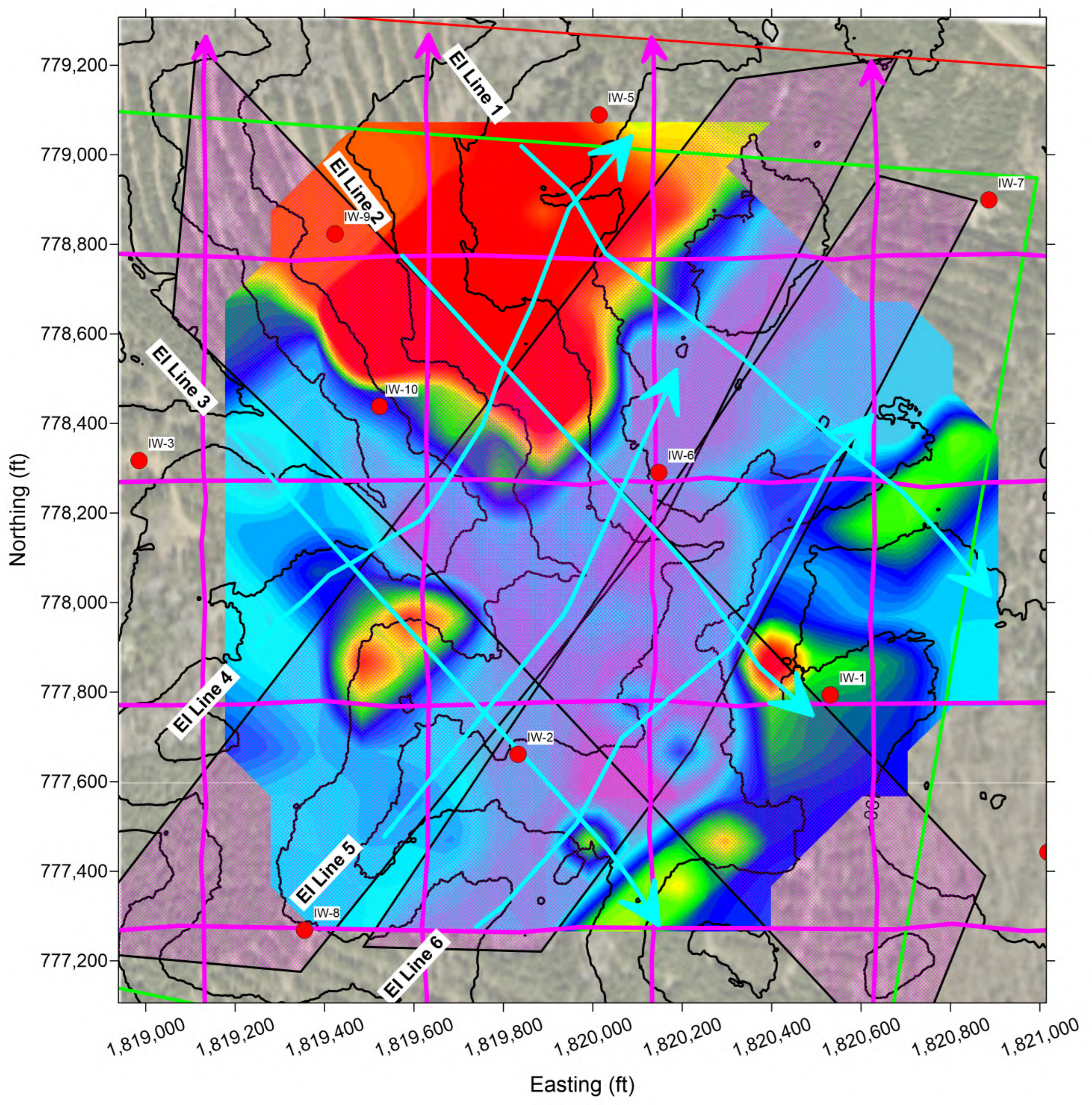
1 inch = 100 feet
ADI Earthimager 2D

Geophysical Investigation
Confidential Site #1
Saluda, South Carolina

Figure 4
Electrical Imaging Profiles: Lines 1-6

BLE BUNNELL LAMMONS ENGINEERING

1384-11325
DWG11325F4rev



N

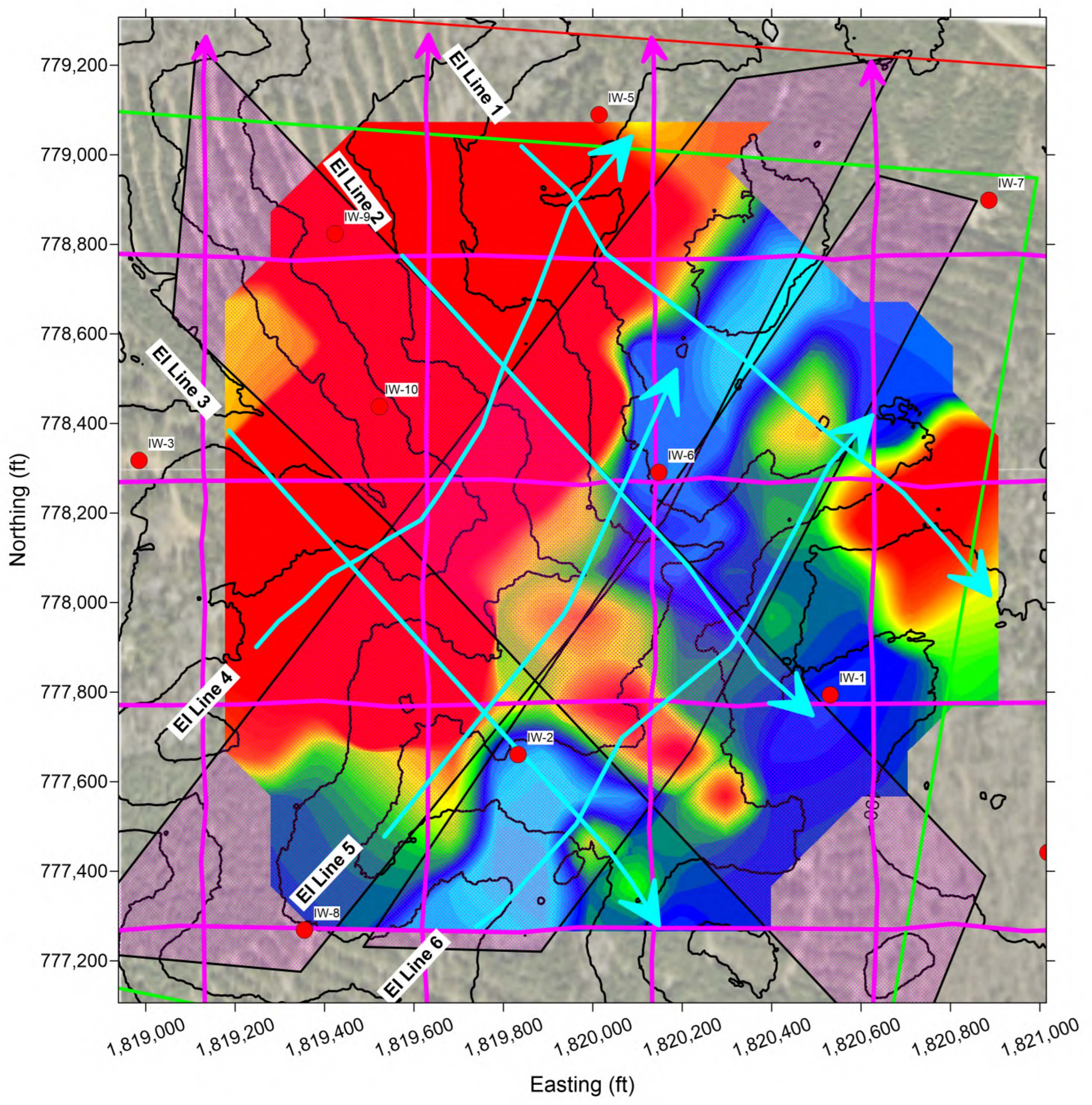
True North Approximate

ELEVATION:

430 ft amsl

Apparent Resistivity (Ohm-m)

9,000	Competent Bedrock
8,400	
7,800	
7,200	
6,600	
6,000	
5,400	Weathered Bedrock/Overbuden
4,800	
4,200	
3,600	
3,000	
2,400	
1,800	
1,200	
600	
0	



ELEVATION:

350 ft amsl

Legend

→	VLF Profile
→	EI Profile
🟩	Proposed Extraction Area
🟥	Parcel Footprint
IW-1 ●	Core Drilling
⬠	Interpreted VLF Fracture Zones

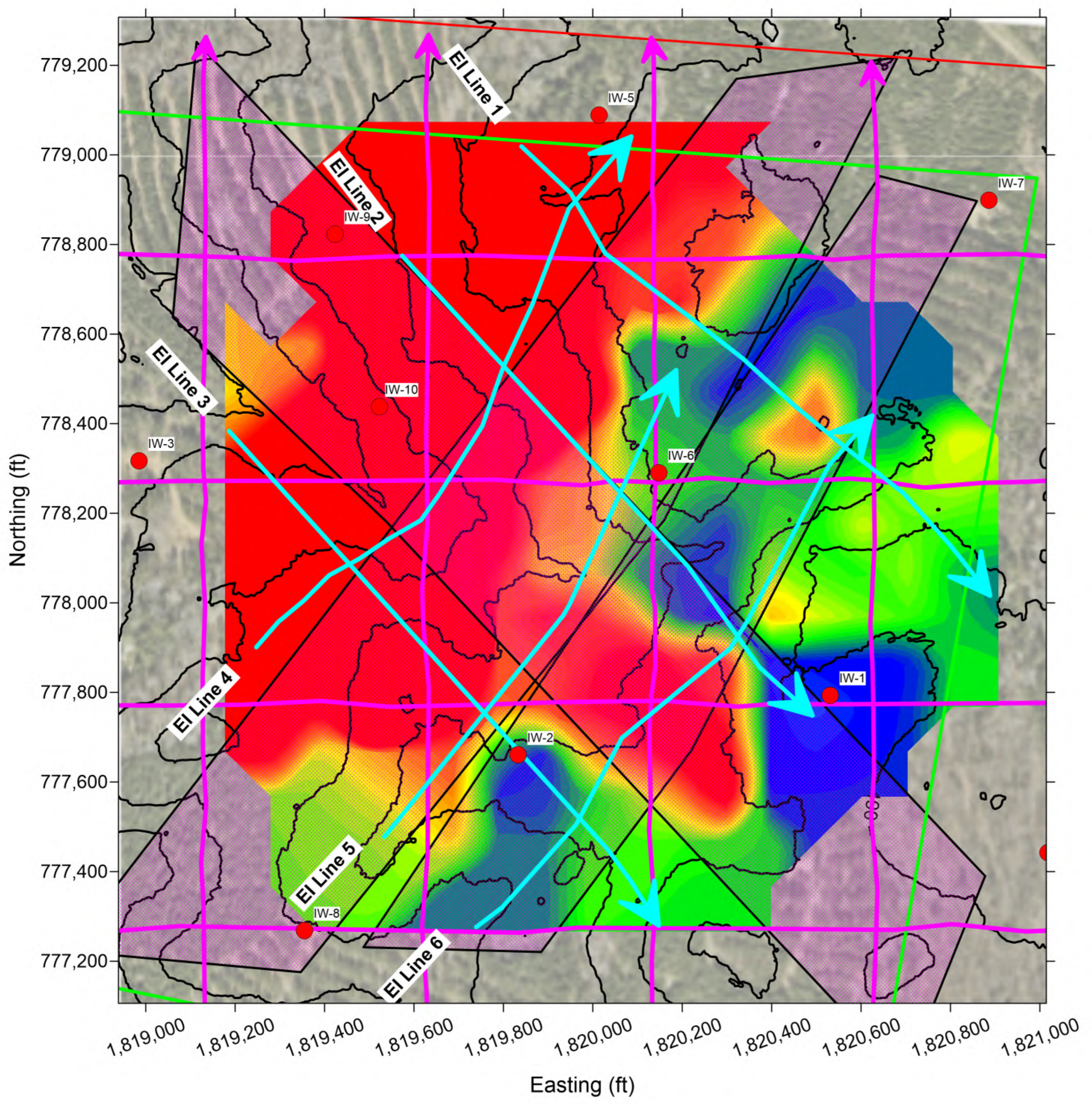
Notes

Geophysical surveys conducted April 3-7, 2023. using ABEM Wadi Very Low Frequency meter and April 17-21 & May 11-14, 2023, using GF Instruments ARES II electrical resistivity meter.

Real-time positioning of data using fully integrated Trimble Geo-7X global positioning system set to NAD 1983 US State Plane (South Carolina) coordinate system in US Survey feet.

EI data modeled in Voxler 4 and interpolated in 3-D. Plan view depth slices for elevations common across all EI profiles were extracted at 10-foot intervals. A full illustration of all depth slices from 250-430 ft amsl is included digitally as Saluda_3D_EI.gif.

Locations are approximate.



ELEVATION:

250 ft amsl

Sources

Aerial
LuckSaludaCO_Ortho_20230310

Topography
USGS_1M_17_x44y376_SC_SavannahPeeDee_2019_B19
Contour interval = 10 ft

Basemaps
Confidential #1 (Saluda) GIS Files

1 in = 250 ft

0 ft 250 ft 500 ft 750 ft 1,000 ft

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Murrysville, Pennsylvania 15668
(724) 325-3996 Fax: (724) 733-7901
www.thggeophysics.com

DRN	AXB	5/24/23
DES	AXB	5/24/23
CHK	PJH	6/25/23
REV	ZCM	8/28/23
PROJ. MGR.	KSM	6/25/23

SCALE: 1 in = 250 ft

SOURCE: See Notes

PROJECT:
Geophysical Investigation
Confidential Site #1
Saluda, South Carolina

DRAWING NO.:
Figure 5
3D Interpolation
Apparent Resistivity Depth Slice

PREPARED FOR:
BLE BUNNELL LAMMONS ENGINEERING

PROJECT NO.: 1384-11325

SHEET TITLE: DWG11325F5rev

APPENDIX D
Well Permit and Well Records

Healthy People. Healthy Communities.

Monitoring Well Approval

Approval is hereby granted to: Luck Stone Corporation
Attention: Bruce Smith, T.J. Daniel

Facility: **Luck Stone Corporation** – Saluda Quarry
Facility: Mine Operating Permit No. Pending
Saluda County

This approval is for the installation of a monitoring well, identified and located as specified and in accordance with the construction plans and specifications described in the monitoring well application (enclosed). This well is to be used for water level monitoring prior to a quarry construction and operation.

Conditions:

1. The well shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.

2. The well shall be properly developed per R.61-71.H.2.d. A Water Well Record Form (DHEC 1903) and drillers/geologists logs shall be completed and submitted within 30 days after well completion or abandonment unless another schedule has been approved by DHEC. The form should contain the "as-built" construction details and all other information required by R.61-71.H.1.f.

3. All analytical data and water levels obtained from the monitoring well shall be submitted to the author of the approval within 30 days of receipt of laboratory results unless another schedule has been approved by DHEC as required by R.61-71.H.1.d.

4. The monitoring well shall be labeled, as required by R.61-71.H.2.c.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, effective May 27, 2016.

Date of Issuance: June 16, 2023

Sarah Harris

Sarah Harris, Geologist / Hydrologist
Mining and Reclamation Section
Division of Mining and Solid Waste Management
Bureau of Land & Waste Management

BLE
BUNNELL
LAMMONS
ENGINEERING

June 13, 2023

South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Attention: Mr. Jeremy Eddy
Mining Section Manager

Subject: **DHEC 3736 Monitoring Well Application**
Luck Companies Saluda Quarry
Saluda County, South Carolina
BLE Job Number J23-18886-01

Dear Mr. Eddy:

On behalf of Luck Companies, Bunnell-Lammons Engineering, Inc. is pleased to submit this DHEC 3736 Monitoring Well Application (**Appendix A**) to the South Carolina Department of Health and Environmental Control (DHEC) in association to the installation of six (6) observation monitoring wells for the purpose of aquifer testing and subsequent groundwater modeling at the proposed Luck Companies Saluda Quarry (**Figures 1** and **2**).

The anticipated depth of each proposed observation well is not anticipated to exceed approximately 400 feet below ground surface. The actual depth of the proposed observation wells will vary based on site specific conditions such as depth to groundwater and presence of water bearing fractures. Please see the attached **Figure 3** for a typical observation well schematic. In general, each well will be constructed of 6-inch diameter Schedule 40 PVC from ground surface to the top of bedrock at which point the well will be completed "open-hole" until boring termination. The wells will be secured with a locked stick-up well cover.

We ask that DHEC please provide review and response of this application to BLE and Luck Companies prior to the tentative drilling start date of June 19, 2023. If you have any questions, please contact us at (864) 288-1265.

Sincerely,

BUNNELL LAMMONS ENGINEERING INC.
PEF002542 Exp. 06/30/2024

T.J. Daniel

T.J. Daniel, P.G.
Project Geologist
Registered, South Carolina #2385

David R.

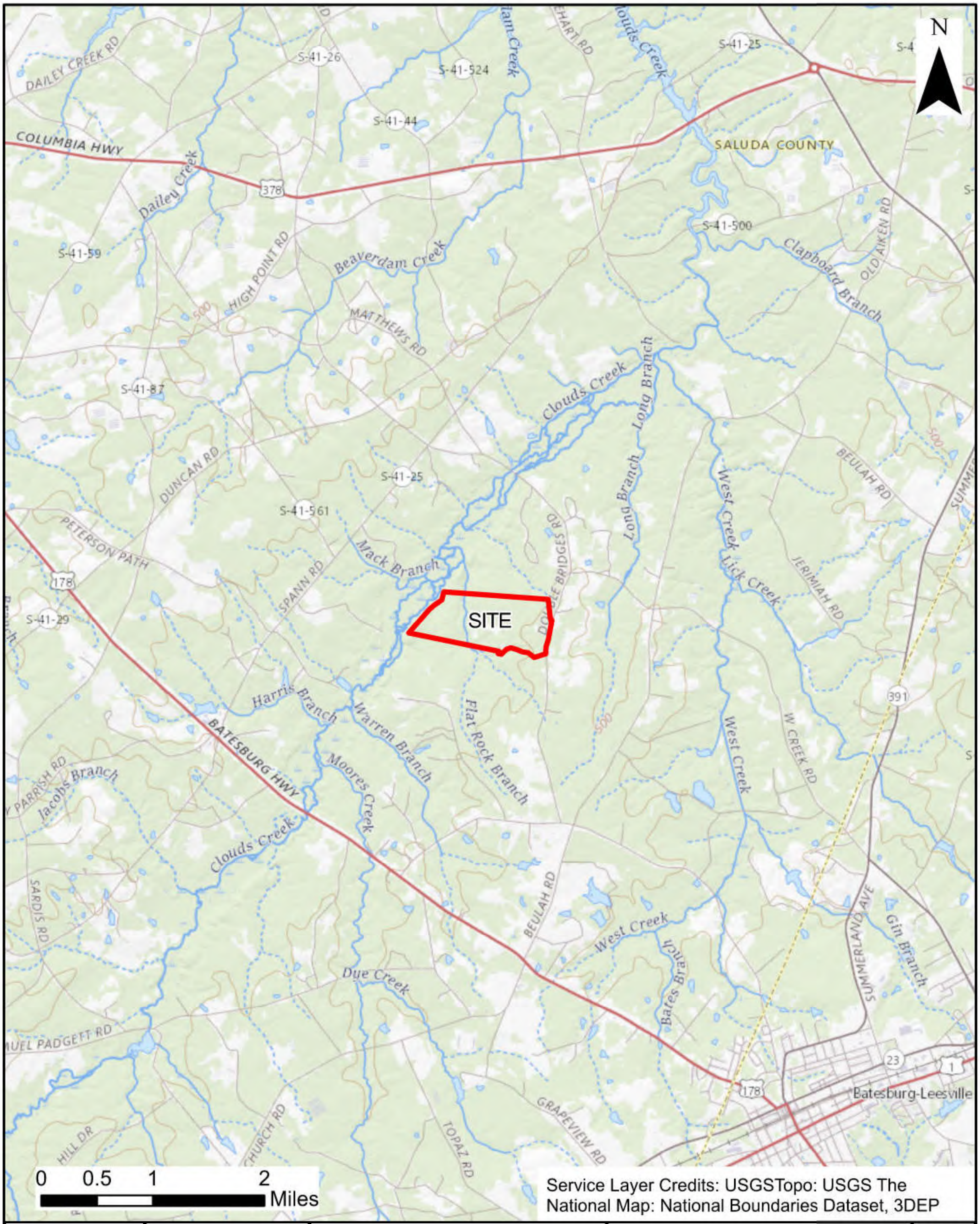
David Loftis, P.E.
Senior Engineer
Registered, South Carolina #27867

cc: Bruce Smith – Luck Companies
Clint Courson, CHMM – HHNT
Tyler Moody, P.E. – BLE

Attachments: Figures
Appendix A: DHEC 3637 Monitoring Well Application

6004 Ponders Court, Greenville, SC 29615 864.288.1265 864.288.4430 info@blecorp.com
BLECORP.COM

FIGURES



Service Layer Credits: USGSTopo: USGS The National Map: National Boundaries Dataset, 3DEP

DRAWN BY: TJD

CHECKED BY: TAO

APPROVED BY: TWM

DATE: 06-05-2023

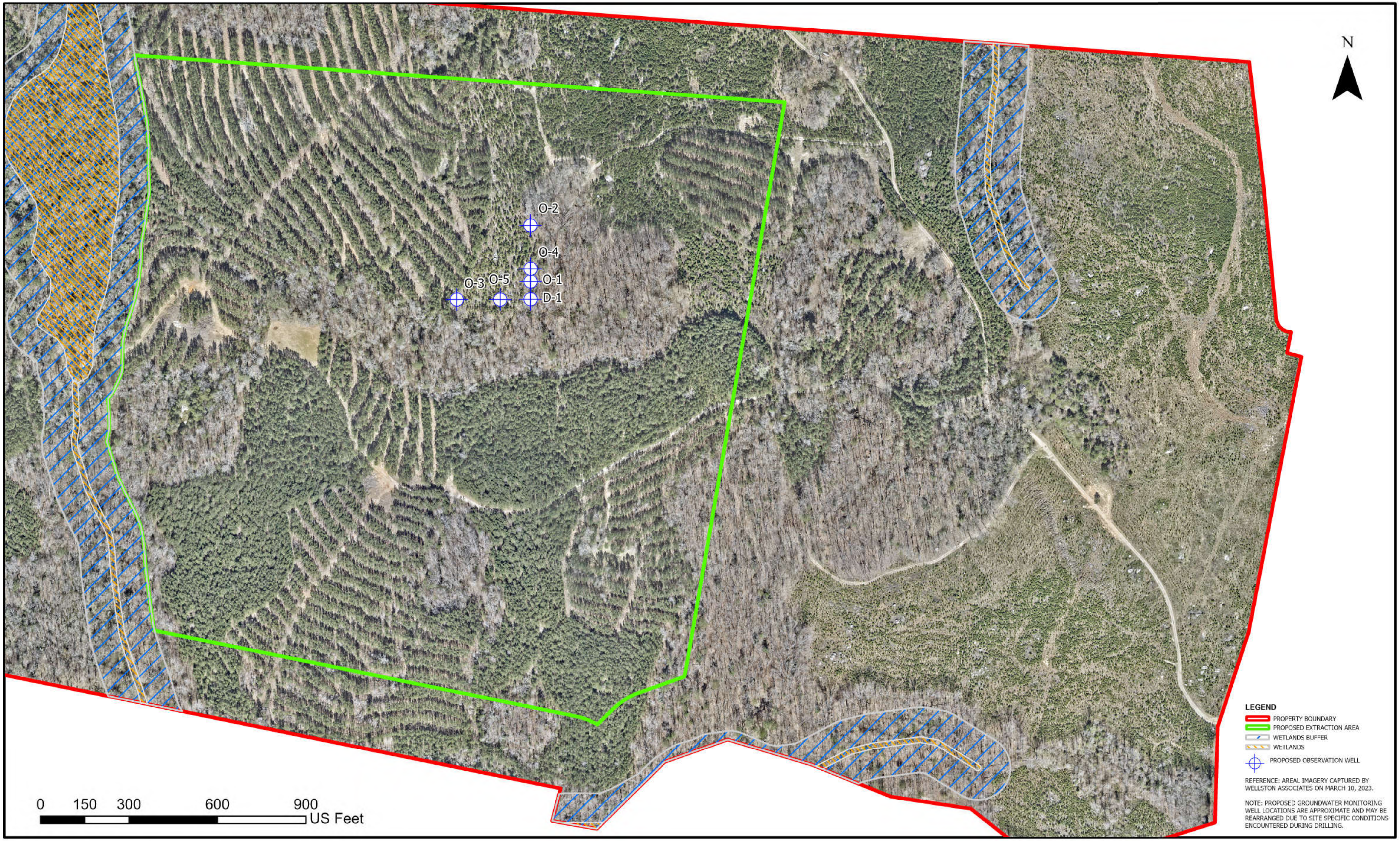
FILE NAME: SAL_LOC

JOB NO: J23-18886-01

BLE BUNNELL LAMMONS ENGINEERING

SITE VICINITY MAP
LUCK COMPANIES SALUDA QUARRY
SALUDA, SOUTH CAROLINA

FIGURE
1



REFERENCE: AREAL IMAGERY CAPTURED BY WELLSTON ASSOCIATES ON MARCH 10, 2023.

NOTE: PROPOSED GROUNDWATER MONITORING WELL LOCATIONS ARE APPROXIMATE AND MAY BE REARRANGED DUE TO SITE SPECIFIC CONDITIONS ENCOUNTERED DURING DRILLING.

DRAWN BY: TJD
CHECKED BY: GL
APPROVED BY: TWM

DATE: 06-05-23
FILE NAME: SAL_MW_LOC
JOB NO: J23-18886-01

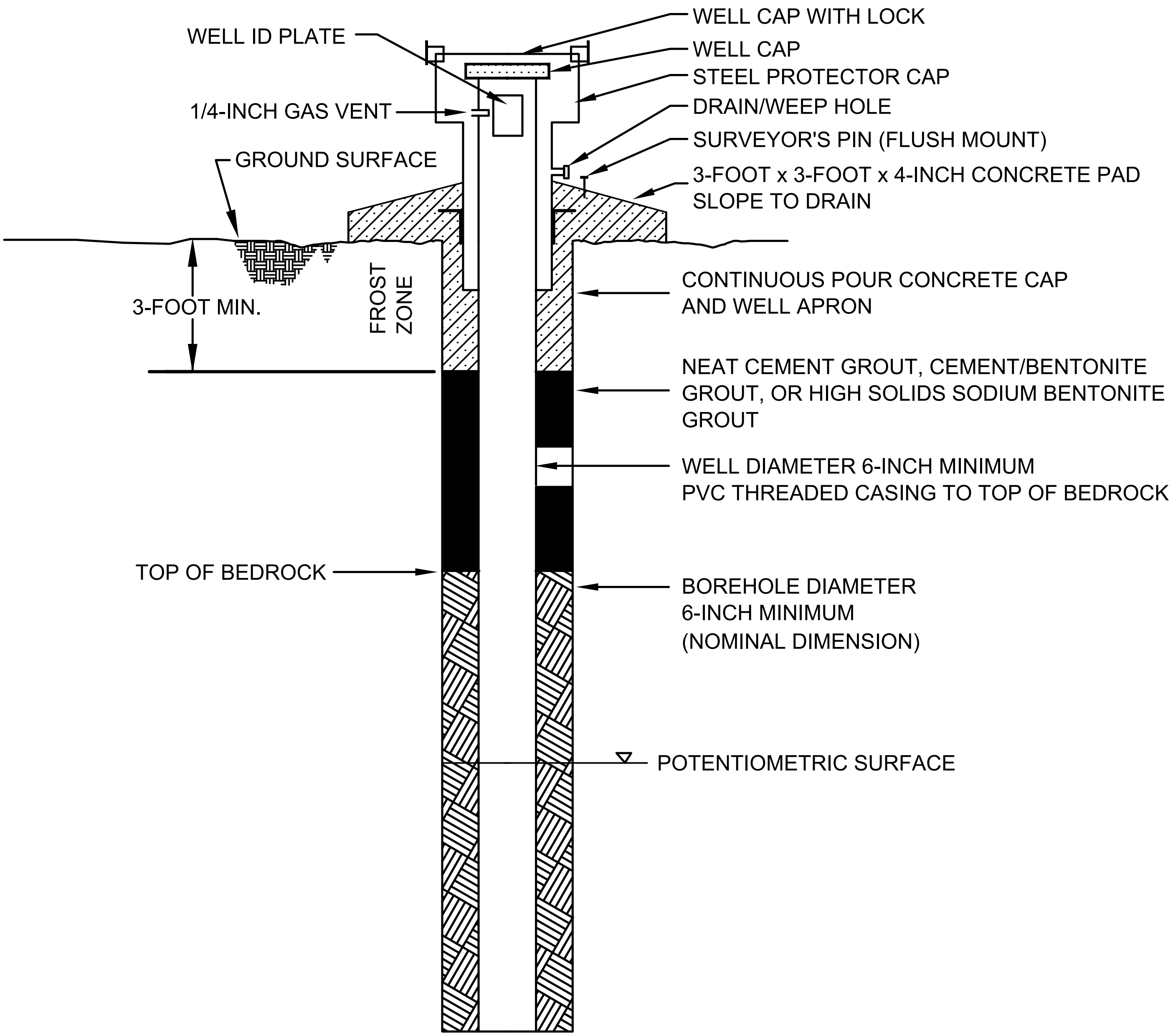
REVISIONS

No.	DESCRIPTION	BY

BLE BUNNELL LAMMONS ENGINEERING

PROPOSED MONITORING WELL LOCATION PLAN
LUCK COMPANIES SALUDA QUARRY
SALUDA, SOUTH CAROLINA

FIGURE
2



NOTE: WELL CONSTRUCTION DETAILS MAY VARY SLIGHTLY BASED ON SITE SPECIFIC CONDITIONS ENCOUNTERED.

OBSERVATION WELL (TYP.)

JOB NO.:	J23-18886-01
DATE:	6-5-23
SCALE:	NOT TO SCALE

BUNNELL LAMMONS ENGINEERING
6004 Ponders Court, Greenville, SC 29615
Phone: (864) 288-1265 **Fax:** (864) 288-4430

OBSERVATION WELL DETAIL
LUCK COMPANIES SALUDA QUARRY
SALUDA COUNTY, SOUTH CAROLINA

FIGURE
3

APPENDIX A
DHEC 3736 Monitoring Well Application

Monitoring Well Application

1. Proposed Location of Monitoring Well(s):

Street Address: **33.970873°, -81.592730°**
Tax ID # 174-00-00-006

City (including Zip): **Leesville, SC 29070-1754**

County: **Saluda**

Please attach Scaled Map or Plat

2. Well Owner's Information:

Name (Last then First): **Smith, Bruce**

Company: **Luck Companies**

Complete Address: **P.O. Box 29682**
Richmond, VA 23242

Telephone Number: **(804) 641-9458**

3. Property Owner's Information:

☐ Check if same as Well Owner

Name (Last then First): **Carson, Amy**

Company: **Imperial Woodlands**

Address: **PO Box 3754**
Leesville, SC 29070

Telephone Number:

4. Proposed Drilling Date: **06/19/2023**

5. Intended Purpose of Well(s):

Pre-Purchase ☑

Investigation ☐

NOTE: If this request is for an existing DHEC project, please enter the Program area and ID number below.

Program Area:
Project or Site ID #:

6. Proposed number of monitoring wells: **6**

7. Proposed parameters to be analyzed (check all that apply), please specify analytical method beside check box:

VOCs ☐
BTEX ☐
MtBE ☐
Naphthalene ☐
PAHs ☐
Metals ☐
Nitrates ☐
Base, Neutral & Acid Ex. ☐
Pesticides/Herbicides ☐
Phenols ☐
Radionuclides ☐
PCBs ☐
Other (specify below) ☐

No laboratory analysis is anticipated.

8. Proposed construction details (complete and attach proposed monitoring well schematics):

See Figure 3.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

Note: Personal information provided on this document is subject to public scrutiny or release.

1. WELL OWNER INFORMATION:
Name: Smith, Bruce
(last) (first)
Address: P.O. Box 29682
City: Richmond State: VA Zip: 23242
Telephone: Work: (804) 641-9458 Home:

2. LOCATION OF WELL: D-1 **COUNTY:** Saluda
Name: Imperial Woodlands
Street Address: Tax ID # 174-00-00-006
City: Leesville Zip: 29070-1754
Latitude: 33.971039° Longitude: -81.593335°

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Give Details Below
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Overburden (Residual Soils)	55'	55'
*Granite (Clouds Creek)	108'	163'
Diabase Dike	15'	178'
*Granite (Clouds Creek)	>227'	>405'

*Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

5. REMARKS:
Monitoring Well Approval Granted by Sarah Harris on 6-16-2023

6. TYPE: ☐ Mud Rotary ☐ Dug ☐ Cable tool ☐ Jetted ☑ Air Rotary ☐ Other ☐ Bored ☐ Driven

7. PERMIT NUMBER: MONITORING WELL: DW-1

8. USE:
☐ Residential ☐ Irrigation ☐ Test Well ☐ Public Supply ☐ Air Conditioning ☑ Monitor Well ☐ Process ☐ Emergency ☐ Replacement

9. WELL DEPTH (completed) 405 ft.
Date Started: 06-19-2023
Date Completed: 07-03-2023

10. CASING: ☐ Threaded ☑ Welded
Diam.: 6.25", 4"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
6.25" in. to 55 ft. depth
4" in. to 160 ft. depth
Height: Above/Below Surface 1.75' ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 4"
Slot/Gauge: 0.010-inch Length: 20'
Set Between: 140 ft. and 160 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 20.1 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☑ Yes (please enclose) ☐ No
Yield: 38 GPM

14. WATER QUALITY
Chemical Analysis ☐ Yes ☑ No Bacterial Analysis ☐ Yes ☑ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from ____ ft. to ____ ft.
Effective size ____ Uniformity Coefficient ____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other ____
Depth: From 55 ft. to Ground Surface ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☑ Yes ☐ No Type: Chlorine Amount: ____

18. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Robert Costello **CERT. NO.:** 2384
Address: (Print) PO Box 188
Pomaria, SC 29126
Level: A B C [✓ D] (circle one)
Telephone No.: 803-926-7080 Fax No.:

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: ____ Date: 8/4/23
Well Driller

If D Level Driller, provide supervising driller's name: Shay Austin

DHEC 1903 (08/2017)

COPY 1 MAIL TO SCDHEC, COPY 2 TO WELL OWNER, COPY 3 TO WELL DRILLER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

Note: Personal information provided on this document is subject to public scrutiny or release.

1. WELL OWNER INFORMATION:
Name: Smith, Bruce
(last) (first)
Address: P.O. Box 29682
City: Richmond State: VA Zip: 23242
Telephone: Work: (804) 641-9458 Home:

2. LOCATION OF WELL: O-1 **COUNTY:** Saluda
Name: Imperial Woodlands
Street Address: Tax ID # 174-00-00-006
City: Leesville Zip: 29070-1754
Latitude: 33.971162° Longitude: -81.593408°

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No
Give Details Below
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Overburden (Residual Soils)	54'	54'
*Granite (Clouds Creek)	128'	182'
Diabase Dike	13'	195'
*Granite (Clouds Creek)	>110'	>305'
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
Monitoring Well Approval Granted by Sarah Harris on 6-16-2023

6. TYPE: ☐ Mud Rotary ☐ Dug ☐ Cable tool ☐ Jetted ☑ Air Rotary ☐ Other ☐ Bored ☐ Driven

7. PERMIT NUMBER: MONITORING WELL: O-1

8. USE:
☐ Residential ☐ Irrigation ☐ Test Well
☐ Public Supply ☐ Air Conditioning ☑ Monitor Well
☐ Process ☐ Emergency ☐ Replacement

9. WELL DEPTH (completed) 305 ft.
Date Started: 06-19-2023
Date Completed: 07-03-2023

10. CASING: ☐ Threaded ☑ Welded
Diam.: 6.25", 4"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
6.25" in. to 54 ft. depth
4" in. to 180 ft. depth
Height: Above/Below ✓
Surface 1.75' ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☑ No

11. SCREEN:
Type: PVC Diam.: 4"
Slot/Gauge: 0.010-inch Length: 20'
Set Between: 180 ft. and 200 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 18.6 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: 12 GPM

14. WATER QUALITY
Chemical Analysis ☐ Yes ☑ No Bacterial Analysis ☐ Yes ☑ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No
Installed from ____ ft. to ____ ft.
Effective size ____ Uniformity Coefficient ____

16. WELL GROUTED? ☑ Yes ☐ No
☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other ____
Depth: From 54 ft. to Ground surface ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☑ Yes ☐ No Type: Chlorine Amount: ____

18. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Robert Costello **CERT. NO.:** 2384
Address: (Print) Po Box 188
Pomaria, SC 29126
Level: A B C [✓ D] (circle one)
Telephone No.: 803-926-7090 Fax No.:

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: ____ Date: 8/14/23
Well Driller

If D Level Driller, provide supervising driller's name: Shay Austin

COPY 1 MAIL TO SCDHEC, COPY 2 TO WELL OWNER, COPY 3 TO WELL DRILLER

dhec

Water Well Record
Bureau of Water

2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

***Note:** Personal information provided on this document is subject to public scrutiny or release.*

1. WELL OWNER INFORMATION:

Name: Smith, Bruce
(last) (first)

Address: P.O. Box 29682

City: Richmond State: VA Zip: 23242

Telephone: Work: (804) 641-9458 Home:

2. LOCATION OF WELL: O-2 **COUNTY:** Saluda

Name: Imperial Woodlands

Street Address: Tax ID # 174-00-00-006

City: Leesville Zip: 29070-1754

Latitude: 33.971314° Longitude: -81.593352°

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No

Give Details Below

Grouted Depth: from ________ ft. to ________ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Overburden (Residual Soils)	67'	67'
*Granite (Clouds Creek)	116'	183'
Diabase Dike	29'	212'
*Granite (Clouds Creek)	>93'	>305'

*Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

5. REMARKS:

Monitoring Well Approval Granted by Sarah Harris on 6-16-2023

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored
☐ Dug ☑ Air Rotary ☐ Driven
☐ Cable tool ☐ Other

7. PERMIT NUMBER: MONITORING WELL: O-2

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 06-26-2023

305 ft. Date Completed: 07-03-2023

10. CASING: ☐ Threaded ☑ Welded

Diam.: 6.25", 4"

Type: ☑ PVC ☐ Galvanized
☐ Steel ☐ Other

6.25" in. to 67 ft. depth

4" in. to 180 ft. depth

Height: Above/Below ✓

Surface 1.75' ft.

Weight ________ lb./ft.

Drive Shoe? ☐ Yes ☑ No

11. SCREEN:

Type: PVC Diam.: 4"

Slot/Gauge: 0.010-inch Length: 20'

Set Between: 180 ft. and 200 ft. **NOTE: MULTIPLE SCREENS**

________ ft. and ________ ft. **USE SECOND SHEET**

Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 20.0 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.

________ ft. after ________ hrs. Pumping ________ G.P.M.

Pumping Test: ☐ Yes (please enclose) ☐ No

Yield: 6 GPM

14. WATER QUALITY

Chemical Analysis ☐ Yes ☑ No Bacterial Analysis ☐ Yes ☑ No

Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No

Installed from ________ ft. to ________ ft.

Effective size ________ Uniformity Coefficient ________

16. WELL GROUTED? ☑ Yes ☐ No

☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other ________

Depth: From 67 ft. to Ground surface ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction

Type ________

Well Disinfected ☑ Yes ☐ No Type: Chlorine Amount: ________

18. PUMP: Date installed: ________ Not installed ☑

Mfr. Name: ________ Model No.: ________

H.P. ________ Volts ________ Length of drop pipe ________ ft. Capacity ____ gpm

TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Robert Costello **CERT. NO.:** 2384

Address: (Print) PO Box 188
Pomaria, SC 29126

Level: A B C [✓ D] (circle one)

Telephone No.: 803-926-7080 Fax No.:

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: ________ Date: 8/4/23
Well Driller

If D Level Driller, provide supervising driller's name: Shay Austin

DHEC 1903 (08/2017)

COPY 1 MAIL TO SCDHEC, COPY 2 TO WELL OWNER, COPY 3 TO WELL DRILLER

Water Well Record
Bureau of Water

2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

Note: Personal information provided on this document is subject to public scrutiny or release.

1. WELL OWNER INFORMATION:

Name: Smith, Bruce
(last) (first)

Address: P.O. Box 29682

City: Richmond State: VA Zip: 23242

Telephone: Work: (804) 641-9458 Home:

2. LOCATION OF WELL: O-3 **COUNTY:** Saluda

Name: Imperial Woodlands

Street Address: Tax ID # 174-00-00-006

City: Leesville Zip: 29070-1754

Latitude: 33.970919° Longitude: -81.593614°

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No

Give Details Below

Grouted Depth: from ______ ft. to ______ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Overburden (Residual Soils)	34'	34'
*Granite (Clouds Creek)	150'	184'
Diabase Dike	26'	210'
*Granite (Clouds Creek)	>95'	>305'

*Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

5. REMARKS:

Monitoring Well Approval Granted by Sarah Harris on 6-16-2023

6. TYPE: ☐ Mud Rotary ☐ Dug ☐ Cable tool ☐ Jetted ☑ Air Rotary ☐ Other ☐ Bored ☐ Driven

7. PERMIT NUMBER: MONITORING WELL: O-3

8. USE:

☐ Residential ☐ Irrigation ☐ Test Well ☐ Public Supply ☐ Air Conditioning ☑ Monitor Well ☐ Process ☐ Emergency ☐ Replacement

9. WELL DEPTH (completed) 305 ft.

Date Started: 06-30-2023

Date Completed: 07-03-2023

10. CASING: ☐ Threaded ☑ Welded

Diam.: 6.25", 4"

Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other

6.25" in. to 34 ft. depth

4" in. to 140 ft. depth

Height: Above/Below ✓

Surface 1.75' ft.

Weight ______ lb./ft.

Drive Shoe? ☐ Yes ☑ No

11. SCREEN:

Type: 4" diameter Diam.: 4"

Slot/Gauge: 0.010-inch Length: 20'

Set Between: 140 ft. and 160 ft.

______ ft. and ______ ft.

NOTE: MULTIPLE SCREENS USE SECOND SHEET

Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 15.7 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.

______ ft. after ______ hrs. Pumping ______ G.P.M.

Pumping Test: ☐ Yes (please enclose) ☐ No

Yield: 20 GPM

14. WATER QUALITY

Chemical Analysis ☐ Yes ☑ No Bacterial Analysis ☐ Yes ☑ No

Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No

Installed from ______ ft. to ______ ft.

Effective size ______ Uniformity Coefficient ______

16. WELL GROUTED? ☑ Yes ☐ No

☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other ______

Depth: From 34 ft. to Ground surface ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction

Type ______

Well Disinfected ☑ Yes ☐ No Type: Chlorine Amount: ______

18. PUMP: Date installed: ______ Not installed ☑

Mfr. Name: ______ Model No.: ______

H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm

TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Robert Costello **CERT. NO.:**

Address: (Print) Po Box 188
Pomaria, SC 29126

Level: A B C [✓ D] (circle one)

Telephone No.: 803-926-7080 Fax No.:

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: ______ Date: 8/4/23
Well Driller

If D Level Driller, provide supervising driller's name: Shay Austin

COPY 1 MAIL TO SCDHEC, COPY 2 TO WELL OWNER, COPY 3 TO WELL DRILLER

Water Well Record
Bureau of Water

2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

***Note:** Personal information provided on this document is subject to public scrutiny or release.*

1. WELL OWNER INFORMATION:

Name: Smith, Bruce (last) (first)

Address: P.O. Box 29682

City: Richmond State: VA Zip: 23242

Telephone: Work: (804) 641-9458 Home:

2. LOCATION OF WELL: O-4 **COUNTY:** Saluda

Name: Imperial Woodlands

Street Address: Tax ID # 174-00-00-006

City: Leesville Zip: 29070-1754

Latitude: 33.971728° Longitude: -81.593301°

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No

Give Details Below

Grouted Depth: from ______ ft. to ______ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Overburden (Residual Soils)	58'	58'
*Granite (Clouds Creek)	159'	217'
Diabase Dike	17'	234'
*Granite (Clouds Creek)	>71'	>305'

*Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

5. REMARKS:

Monitoring Well Approval Granted by Sarah Harris on 6-16-2023

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☑ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: MONITORING WELL: O-4

8. USE:

☐ Residential ☐ Public Supply ☐ Process

☐ Irrigation ☐ Air Conditioning ☐ Emergency

☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 06-27-2023

305 ft. Date Completed: 07-03-2023

10. CASING: ☐ Threaded ☑ Welded

Diam.: 6.25", 4"

Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other

6.25" in. to 58 ft. depth

4" in. to 140 ft. depth

Height: Above/Below ✓

Surface 1.75' ft.

Weight ______ lb./ft.

Drive Shoe? ☐ Yes ☑ No

11. SCREEN:

Type: PVC Diam.: 4"

Slot/Gauge: 0.010-inch Length: 20'

Set Between: 140 ft. and 160 ft.

______ ft. and ______ ft.

NOTE: MULTIPLE SCREENS USE SECOND SHEET

Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 23.5 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.

______ ft. after ______ hrs. Pumping ______ G.P.M.

Pumping Test: ☐ Yes (please enclose) ☐ No

Yield: 24 GPM

14. WATER QUALITY

Chemical Analysis ☐ Yes ☑ No Bacterial Analysis ☐ Yes ☑ No

Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No

Installed from ______ ft. to ______ ft.

Effective size ______ Uniformity Coefficient ______

16. WELL GROUTED? ☑ Yes ☐ No

☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other ______

Depth: From 58 ft. to Ground surface ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction

Type ______

Well Disinfected ☑ Yes ☐ No Type: Chlorine Amount: ______

18. PUMP: Date installed: ______ Not installed ☑

Mfr. Name: ______ Model No.: ______

H.P. ______ Volts ______ Length of drop pipe ______ ft. Capacity ____ gpm

TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Robert Costello **CERT. NO.:** 2384

Address: (Print) Po Box 188
Pomaria, SC 29126

Level: A B C [✓ D] (circle one)

Telephone No.: 803-926-7080 Fax No.:

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: ______ Date: 8/14/23

Well Driller

If D Level Driller, provide supervising driller's name: Shay Austin

DHEC 1903 (08/2017)

COPY 1 MAIL TO SCDHEC, COPY 2 TO WELL OWNER, COPY 3 TO WELL DRILLER

dhec

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

Note: Personal information provided on this document is subject to public scrutiny or release.

1. WELL OWNER INFORMATION:

Name: Smith, Bruce
(last) (first)

Address: P.O. Box 29682

City: Richmond State: VA Zip: 23242

Telephone: Work: (804) 641-9458 Home:

2. LOCATION OF WELL: O-5 **COUNTY:** Saluda

Name: Imperial Woodlands

Street Address: Tax ID # 174-00-00-006

City: Leesville Zip: 29070-1754

Latitude: 33.971025° Longitude: -81.594149°

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☑ No

Give Details Below

Grouted Depth: from ______ ft. to ______ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Overburden (Residual Soils)	26'	26'
*Granite (Clouds Creek)	>279'	>305'

*Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

5. REMARKS:

Monitoring Well Approval Granted by Sarah Harris on 6-16-2023

6. TYPE: ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☑ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: MONITORING WELL: O-5

8. USE:

☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☑ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 06-19-2023

305 ft. Date Completed: 07-03-2023

10. CASING: ☐ Threaded ☑ Welded

Diam.: 6.25", 4"

Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other

6.25" in. to 26 ft. depth

4" in. to 40 ft. depth

Height: Above/Below ✓

Surface 1.75' ft.

Weight ______ lb./ft.

Drive Shoe? ☐ Yes ☑ No

11. SCREEN:

Type: PVC Diam.: 4"

Slot/Gauge: 0.010-inch Length: 20'

Set Between: 40 ft. and 60 ft. **NOTE: MULTIPLE SCREENS**

______ ft. and ______ ft. **USE SECOND SHEET**

Sieve Analysis ☐ Yes (please enclose) ☑ No

12. STATIC WATER LEVEL 4.8 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.

______ ft. after ______ hrs. Pumping ______ G.P.M.

Pumping Test: ☐ Yes (please enclose) ☐ No

Yield: 25 GPM

14. WATER QUALITY

Chemical Analysis ☐ Yes ☑ No Bacterial Analysis ☐ Yes ☑ No

Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☑ No

Installed from ______ ft. to ______ ft.

Effective size ______ Uniformity Coefficient ______

16. WELL GROUTED? ☑ Yes ☐ No

☐ Neat Cement ☑ Bentonite ☐ Bentonite/Cement ☐ Other ______

Depth: From 26 ft. to Ground surface ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction

Type ______

Well Disinfected ☑ Yes ☐ No Type: Chlorine Amount: ______

18. PUMP: Date installed: ______ Not installed ☑

Mfr. Name: ______ Model No.: ______

H.P. ______ Volts ______ Length of drop pipe ______ ft. Capacity ____ gpm

TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Robert Costello **CERT. NO.:**

Address: (Print) PO BOX 188
Pomaria, SC 29126

Level: A B C [✓ D] (circle one)

Telephone No.: 803-926-7080 Fax No.:

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: ______ Date: 8/4/23
Well Driller

If D Level Driller, provide supervising driller's name: Shay Austin

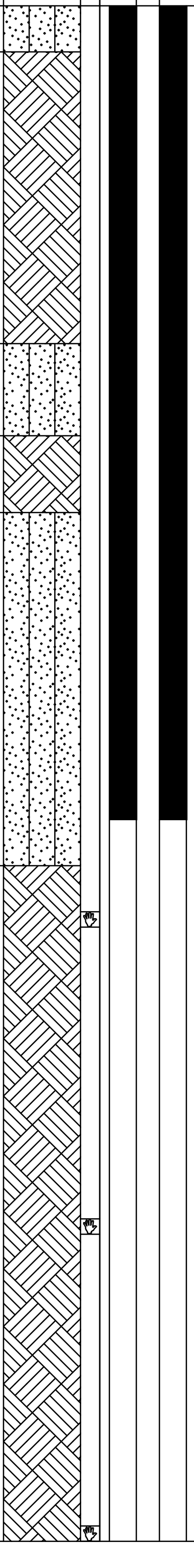
COPY 1 MAIL TO SCDHEC, COPY 2 TO WELL OWNER, COPY 3 TO WELL DRILLER

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. D-1

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-19-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 480.30
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD/TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 40.3 AFTER 24 HOURS: ▼ 20.1 CAVING> ▨



ELEVATION/ DEPTH (FT)		DESCRIPTION	MONITOR WELL INSTALLATION DETAILS
		Brownish red, dry, silty, fine to coarse SAND - (residuum)	
	5	White to black, moderately fresh, GRANITE BOULDER - (Clouds Creek) (Apparent mineral composition of plagioclase, quartz, hornblende, biotite, with trace muscovite)	**SURFACE COMPLETION** 6-inch locking expandable well cap. 1/4 inch vent hole installed in the PVC casing. Washed pea gravel spread around the base Top of PVC casing elevation = 482.15 feet Ground elevation = 480.30 feet Stick up height = 1.85 feet Northing: 778,279.61 feet Easting: 1,820,132.57 feet
470	10		
	15		
460	20 ▼		
	25	Brownish red, dry, silty, fine to coarse SAND	High solids Bentonite grout, 0 to 53.0 feet
450	30	White and black, fresh, GRANITE BOULDER - (Clouds Creek)	
	35	Brownish red, dry, silty, fine to coarse SAND	6 1/4-inch I.D. schedule 40 PVC casing, 0.0 to 55.0 feet
440	40 ▽		
	45		4-inch I.D. schedule 40 PVC casing, 0.0 to 140.0 feet
430	50		
	55	Competent bedrock at 55.0 feet below ground surface. Fresh, white and black GRANITE - (Clouds Creek)	
420	60		
	65		
410	70		
	75		
400	80		
	85		
390	90		
	95	Heavily fractured from 92.0 to 94.0 feet below ground surface	

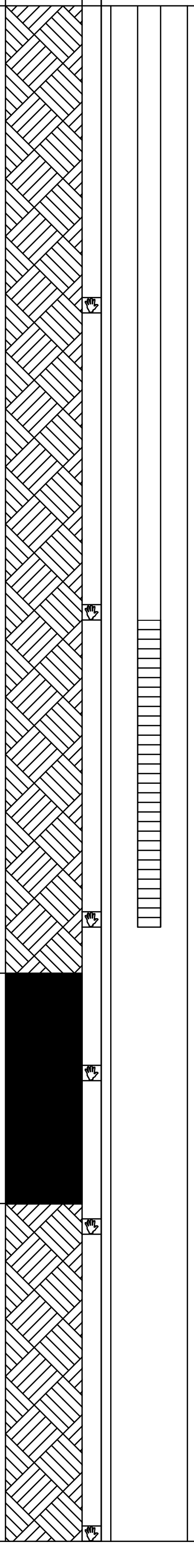
BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. D-1

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-19-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 480.30
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD/TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ∇ 40.3 AFTER 24 HOURS: ▼ 20.1 CAVING> ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION	MONITOR WELL INSTALLATION DETAILS
		Iron stained, quartz-rich, pegmatite vein at approximately 100.0 feet below ground surface.	
	105		
370	110		
	115	Water-bearing fracture from 114.0 to 115.0 feet below ground surface	
360	120		
	125		
350	130	Water-bearing fracture at 130.0 feet below ground surface	
	135		
340	140	Some iron staining observed at approximately 140.0 feet [Approximately 15 gallons per minute (GPM) at 140.0 feet below ground surface]	
	145		4-inch I.D., 0.010-inch slotted Schedule 40 PVC well screen, 140.0 to 160.0 feet
330	150	More competant at 150.0 feet below ground surface	
	155		
320	160	Moderately weathered fracture zone from 160.0 to 163.0 feet below ground surface	7.5-inch diameter open borehole from 160.0 to 405.0 feet
	165	Fresh, black, fine-grained, DIABASE	
310	170		
	175		
300	180	Fresh, black, green, and white GRANITE - (Clouds Creek)	
	185		
290	190		
	195		



BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. D-1

PROJECT: Luck Companies Saluda Quarry Hydro Assessment

PROJECT NO.: J23-18886-01

CLIENT: Luck Stone Corp.

START: 6-19-23 END: 7-3-23

LOCATION: Saluda County, South Carolina

ELEVATION: 480.30

DRILLER: Austin Well Drilling, R. Costello

LOGGED BY: TJD/TAO

DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer

DEPTH TO - WATER> INITIAL: ▽ 40.3 AFTER 24 HOURS: ▼ 20.1 CAVING>

ELEVATION/ DEPTH (FT)		DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
	205				
270	210				
	215				
260	220	Fresh, black, green, and white GRANITE with minor pink orthoclase - (Clouds Creek)			
	225				
250	230				
	235				
240	240	Fresh, bluish black and white, GRANITE - (Clouds Creek)			
	245				
230	250				
	255				
220	260				
	265				
210	270				
	275				
200	280	[Approximately 40 GPM at 280.0 feet below ground surface]			
	285				
190	290				
	295				

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. D-1

PROJECT: Luck Companies Saluda Quarry Hydro Assessment

PROJECT NO.: J23-18886-01

CLIENT: Luck Stone Corp.

START: 6-19-23 END: 7-3-23

LOCATION: Saluda County, South Carolina

ELEVATION: 480.30

DRILLER: Austin Well Drilling, R. Costello

LOGGED BY: TJD/TAO

DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer

DEPTH TO - WATER> INITIAL: ▽ 40.3 AFTER 24 HOURS: ▼ 20.1 CAVING> ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
		Fresh, bluish black and white, GRANITE - (Clouds Creek)	▨		
	305				
170	310				
	315				
160	320				
	325				
150	330				
	335				
140	340				
	345				
130	350				
	355				
120	360				
	365				
110	370				
	375				
100	380				
	385				
90	390				
	395				

BORING NO. D-1

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-19-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 480.30
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD/TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 40.3 AFTER 24 HOURS: ▼ 20.1 CAVING> ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
			▨		
	405	Boring terminated at 405.0 feet below ground surface. Groundwater encountered at 40.3 feet below ground surface at time of drilling and 20.1 feet after 24 hours.			
70	410				
	415				
60	420				
	425				
50	430				
	435				
40	440				
	445				
30	450				
	455				
20	460				
	465				
10	470				
	475				
0	480				
	485				
-10	490				
	495				

BLE INC.

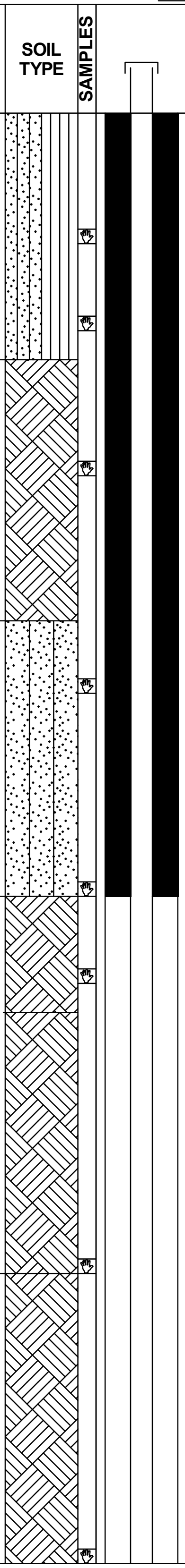
BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-1

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-21-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 479.33
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 15.9 AFTER 24 HOURS: ▼ 18.6 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS



ELEVATION: 470, 460, 450, 440, 430, 420, 410, 400, 390, 380

DEPTH: 5, 10, 15 ▽, 20 ▼, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95

Brown, dry to moist, medium to coarse sandy SILT and silty medium to coarse SAND - (Residuum)

Moderately weathered black and white GRANITE BOULDER

Brown, wet, micaceous, silty medium to coarse SAND

Competant bedrock encountered at 54.0 feet below ground surface.

Moderately weathered, black and white GRANITE - (Clouds Creek)
(Apparent mineral composition of plagioclase, hornblende, quartz, biotite with trace orthoclase and muscovite)
[Water-bearing fracture at 59.0 feet below ground surface (approximately 1 GPM)]

Fresh to slightly weathered, black and white GRANITE - (Clouds Creek)

Fresh, black and white GRANITE - (Clouds Creek)
(plagioclase, hornblende, quartz, biotite with trace orthoclase and muscovite)

SURFACE COMPLETION
6-inch locking expandable well cap. 1/4 inch vent hole installed in the PVC casing. Washed pea gravel spread around the base
Top of PVC casing elevation = 482.12 feet
Ground elevation = 479.33 feet
Stick up height = 2.79 feet
Northing: 778,320.44 feet
Easting: 1,820,107.25 feet

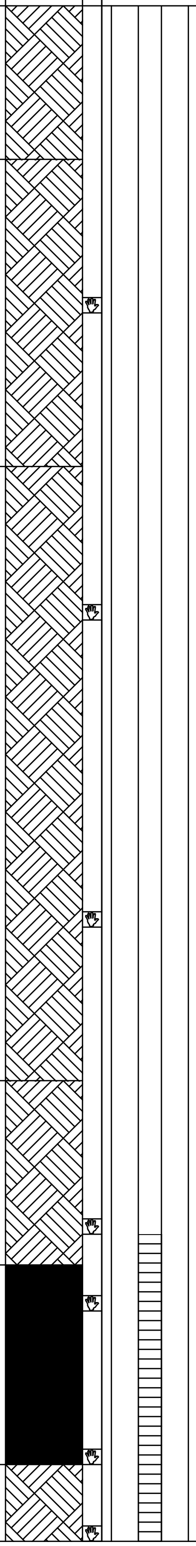
High solids Bentonite grout, 0 to 54.0 feet

6 1/4-inch I.D. schedule 40 PVC casing, 0.0 to 54.0 feet

4-inch I.D.schedule 40 PVC casing, 0.0 to 180.0 feet

BORING NO. O-1

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-21-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 479.33
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 15.9 AFTER 24 HOURS: ▼ 18.6 CAVING> ▨



ELEVATION/ DEPTH (FT)		DESCRIPTION	MONITOR WELL INSTALLATION DETAILS
		[Approximately 4 GPM at 100.0 feet below ground surface]	
	105		
370	110		
	115		
360	120	Fresh to moderately weathered, black and white GRANITE - (Clouds Creek) (plagioclase, hornblende, quartz, biotite with trace orthoclase and muscovite)	
	125		
350	130		
	135	Fresh, black and white, moderately weathered GRANITE - (Clouds Creek) (plagioclase, hornblende, quartz, biotite with trace orthoclase and muscovite)	
340	140		
	145		
330	150		
	155		
320	160	[Approximately 6 GPM at 160.0 feet below ground surface]	
	165		
310	170	Fresh, black and white, moderately weathered GRANITE - (Clouds Creek) increased orthoclase and chlorite (plagioclase, hornblende, quartz, biotite with trace orthoclase and muscovite)	
	175		
300	180		
	185	Fresh, black, fine-grained, DIABASE	
290	190		4-inch I.D., 0.010-inch slotted Schedule 40 PVC well screen, 180.0 to 200.0 feet
	195	Fresh, dark gray to black and pink, fine-grained, GRAINITE - (Clouds Creek)	
280			

BORING NO. O-1

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-21-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 479.33
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ∇ 15.9 AFTER 24 HOURS: ▼ 18.6 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
205		▨		7.5-inch diameter open borehole from 200.0 to 301.8 feet
270 — 210		▨		
215		▨		
260 — 220		▨	▽	
225		▨		
250 — 230		▨		
235		▨		
240 — 240		▨	▽	
245		▨		
230 — 250		▨		
255		▨		
220 — 260		▨	▽	
265		▨		
210 — 270		▨		
275		▨		
200 — 280	[Approximately 10 GPM at 280.0 feet below ground surface]	▨	▽	
285		▨		
190 — 290		▨		
295		▨		
180 —		▨	▽	

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-1

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-21-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 479.33
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ∇ 15.9 AFTER 24 HOURS: ▼ 18.6 CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
305	Boring terminated at 301.8 feet below ground surface. Groundwater encountered at 15.9 feet below ground surface at time of drilling and at 18.6 feet after 24 hours.			
170 / 310				
315				
160 / 320				
325				
150 / 330				
335				
140 / 340				
345				
130 / 350				
355				
120 / 360				
365				
110 / 370				
375				
100 / 380				
385				
90 / 390				
395				
80				

BLE INC.

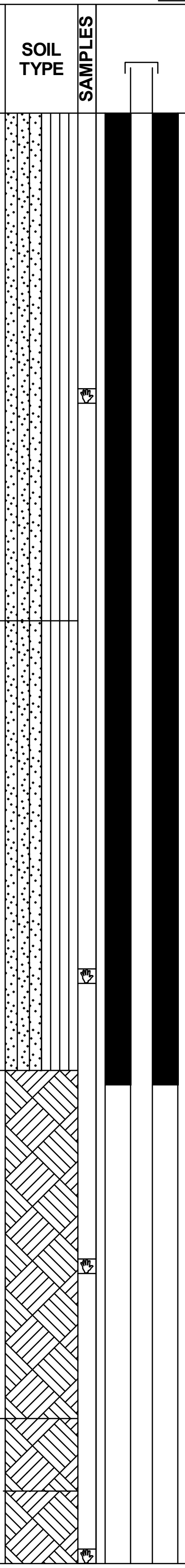
BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-2

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-26-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 481.16
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD/TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 23.2 AFTER 24 HOURS: ▼ 22.2 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	MONITOR WELL INSTALLATION DETAILS
480	Brown, dry to wet, silty medium to coarse SAND - (residuum)	
5		SURFACE COMPLETION 6-inch locking expandable well cap. 1/4 inch vent hole installed in the PVC casing. Washed pea gravel spread around the base Top of PVC casing elevation = 483.48 feet Ground elevation = 481.16 feet Stick up height = 2.32 feet Northing: 778,377.48 feet Easting: 1,820,120.62 feet
10 / 470		
15		
20 / 460	▼ ▽	
25		
30 / 450		High solids Bentonite grout, 0 to 67.0 feet
35		
40 / 440		6 1/4-inch I.D. schedule 40 PVC casing, 0.0 to 67.0 feet
45	Partially weathered rock sampled as silty medium to coarse SAND	4-inch I.D.schedule 40 PVC casing, 0.0 to 180.0 feet
50 / 430		
55		
60 / 420		
65	(Competent bedrock at 67.0 feet below ground surface) Fresh to slightly weathered, dark gray and white, GRANITE - (Clouds Creek) (Apparent mineral composition of quartz, hornblende, biotite, plagioclase, with trace muscovite)	
70 / 410		
75		
80 / 400		
85		
90 / 390	Fresh to severely weathered, dark gray and white, GRANITE - (Clouds Creek) (Apparent mineral composition of quartz, hornblende, biotite, plagioclase, with trace muscovite)	
95		



BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-2

PROJECT: Luck Companies Saluda Quarry Hydro Assessment

PROJECT NO.: J23-18886-01

CLIENT: Luck Stone Corp.

START: 6-26-23 END: 7-3-23

LOCATION: Saluda County, South Carolina

ELEVATION: 481.16

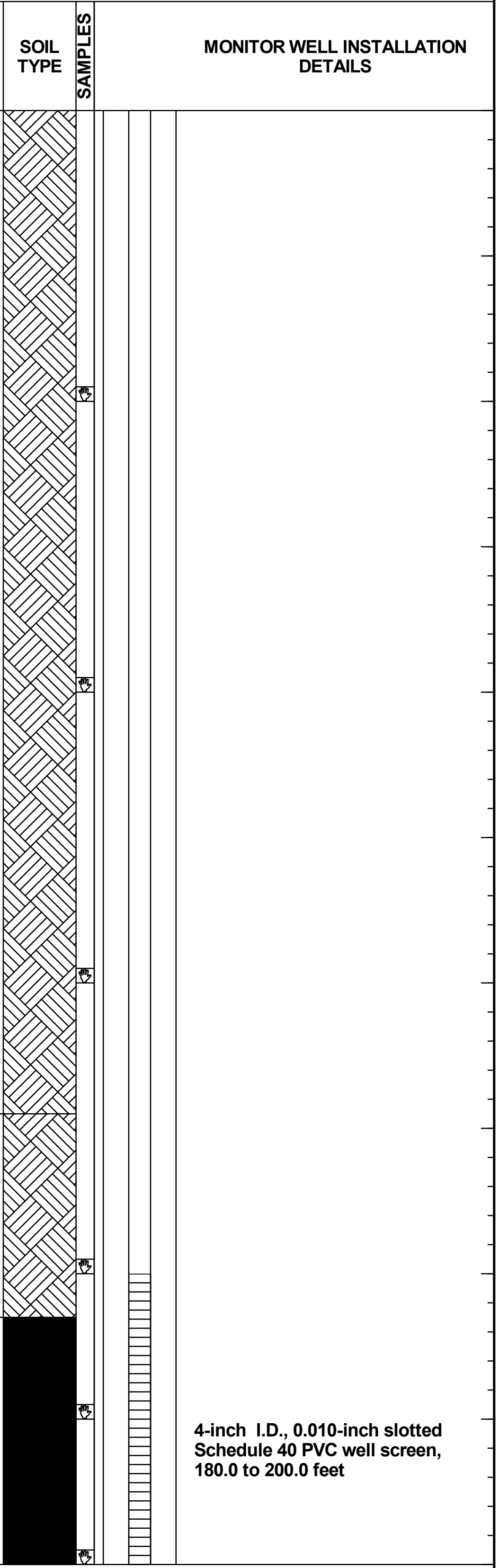
DRILLER: Austin Well Drilling, R. Costello

LOGGED BY: TJD/TAO

DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer

DEPTH TO - WATER> INITIAL: ▽ 23.2 AFTER 24 HOURS: ▼ 22.2 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION
380	
105	
110 / 370	
115	
120 / 360	
125	
130 / 350	
135	
140 / 340	
145	
150 / 330	
155	
160 / 320	[Approximately 5 GPM at 160.0 feet below ground surface]
165	
170 / 310	Fresh to moderately weathered, dark gray and white, GRANITE - (Clouds Creek) (Apparent mineral composition of quartz, hornblende, biotite, plagioclase, with trace muscovite)
175	
180 / 300	
185	Fresh, black, fine grained DIABASE
190 / 290	
195	



4-inch I.D., 0.010-inch slotted Schedule 40 PVC well screen, 180.0 to 200.0 feet

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BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-2

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-26-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 481.16
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD/TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ∇ 23.2 AFTER 24 HOURS: ▼ 22.2 CAVING> ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
280		[Approximately 7 GPM at 200.0 feet below ground surface]			7.5-inch diameter open borehole from 200.0 to 302.3 feet
	205				
	210				
270					
		Fresh, black and white, GRANITE - (Clouds Creek) (plagioclase, hornblende, quartz, biotite)			
	215				
	220				
260					
	225				
	230				
250					
	235				
	240				
240					
	245				
	250				
230					
	255				
	260				
220		Fresh, black and white, GRANITE - (Clouds Creek) (plagioclase, hornblende, quartz, biotite) increased orthoclase			
	265				
	270				
210					
	275				
	280				
200					
	285				
	290				
190					
	295				

BORING NO. O-2
Sheet 3 of 4

BORING NO. O-2

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-26-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 481.16
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD/TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 23.2 AFTER 24 HOURS: ▼ 22.2 CAVING> ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
180		[Approximately 7 GPM at 300 feet]	▨		
	305	Boring terminated at 302.3 feet below ground surface. Groundwater encountered at 23.2 feet below ground surface at time of drilling and at 22.2 feet after 24 hours.			
	310				
170					
	315				
	320				
160					
	325				
	330				
150					
	335				
	340				
140					
	345				
	350				
130					
	355				
	360				
120					
	365				
	370				
110					
	375				
	380				
100					
	385				
	390				
90					
	395				

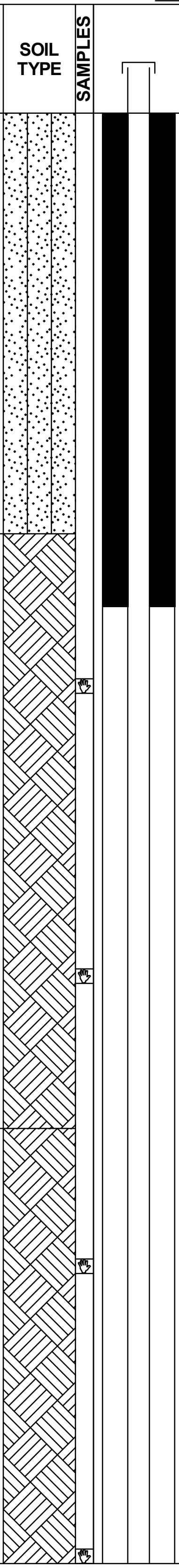
BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-3

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-30-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 473.07
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 29.0 AFTER 24 HOURS: ▼ 13.5 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION
473.07 / 0	Brown, moist, micaceous, silty fine to coarse SAND - (residuum)
459.57 / 13.5	▼
444.07 / 29.0	▽
443.07 / 30.0	Competent bedrock encountered at 30.0 feet below ground surface Moderately to severely weathered, black, white, and brown, GRANITE - (Clouds Creek) (Apparent mineral composition of hornblende, biotite, quartz, and plagioclase)
403.07 / 70.0	Fresh to moderately weathered, black, white, and brown, GRANITE - (Clouds Creek) (Apparent mineral composition of hornblende, biotite, quartz, and plagioclase) Fractured from 76.0 to 77.0 feet below ground surface



MONITOR WELL INSTALLATION DETAILS

SURFACE COMPLETION
6-inch locking expandable well cap. 1/4 inch vent hole installed in the PVC casing. Washed pea gravel spread around the base
Top of PVC casing elevation = 475.32 feet
Ground elevation = 473.07 feet
Stick up height = 2.25 feet
Northing: 778,218.52 feet
Easting: 1,820,053.12 feet

High solids Bentonite grout, 0 to 34.0 feet

6 1/4-inch I.D. schedule 40 PVC casing, 0.0 to 34.0 feet

4-inch I.D.schedule 40 PVC casing, 0.0 to 140.0 feet

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-3

PROJECT: Luck Companies Saluda Quarry Hydro Assessment

PROJECT NO.: J23-18886-01

CLIENT: Luck Stone Corp.

START: 6-30-23 END: 7-3-23

LOCATION: Saluda County, South Carolina

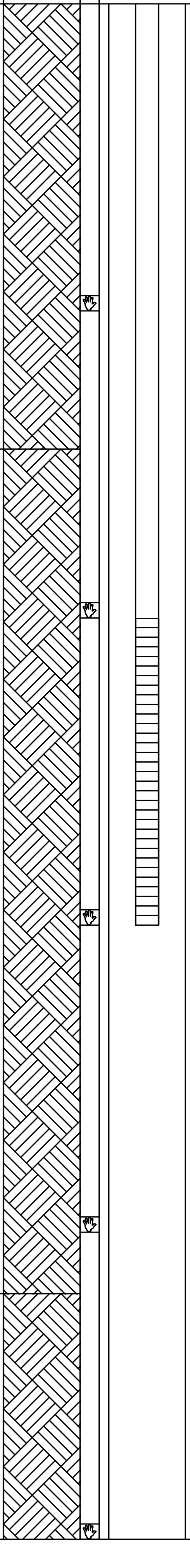
ELEVATION: 473.07

DRILLER: Austin Well Drilling, R. Costello

LOGGED BY: TJD

DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer

DEPTH TO - WATER> INITIAL: ▽ 29.0 AFTER 24 HOURS: ▼ 13.5 CAVING> ▨



ELEVATION/ DEPTH (FT)	DESCRIPTION	MONITOR WELL INSTALLATION DETAILS
370		
105	Heavily fractured from 104.0 to 107.0 feet below ground surface	
110		
360		
115		
120		
350		
125		
130	Fresh, black and white, GRANITE - (Clouds Creek) (Apparent mineral composition of hornblende, biotite, quartz, and plagioclase)	
340		
135		
	Heavily fractured from 137.0 to 139.0 feet below ground surface	
140		
330		
145		4-inch I.D., 0.010-inch slotted Schedule 40 PVC well screen, 140.0 to 160.0 feet
150		
320		
155		
160		7.5-inch diameter open borehole from 160.0 to 302.1 feet
310		
165		
170		
300		
175		
180		
290		
185	Fresh, black, fine-grained, DIABASE	
190		
280		
195		

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-3

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-30-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 473.07
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 29.0 AFTER 24 HOURS: ▼ 13.5 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
270				
205				
210	Fresh, black and white, GRANITE - (Clouds Creek)			
260				
215				
220				
250				
225				
230				
240				
235				
240				
230				
245				
250	Fresh to slightly weathered, black and white, GRANITE - (Clouds Creek)			
220				
255				
260				
210				
265				
270				
200				
275				
280				
190				
285				
290				
180				
295				

BORING NO. O-3
Sheet 3 of 4

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-3

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-30-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 473.07
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ∇ 29.0 AFTER 24 HOURS: ▼ 13.5 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
	[Approximately 35 GPM at 300.0 feet below ground surface]	▨		
170	Boring terminated at 302.0 feet below ground surface. Groundwater encountered at 29.0 feet below ground surface at time of drilling and 13.5 feet below ground surface after 24 hours.			

Elevation: 170, 160, 150, 140, 130, 120, 110, 100, 90, 80

Depth: 305, 310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, 370, 375, 380, 385, 390, 395

BLE INC.

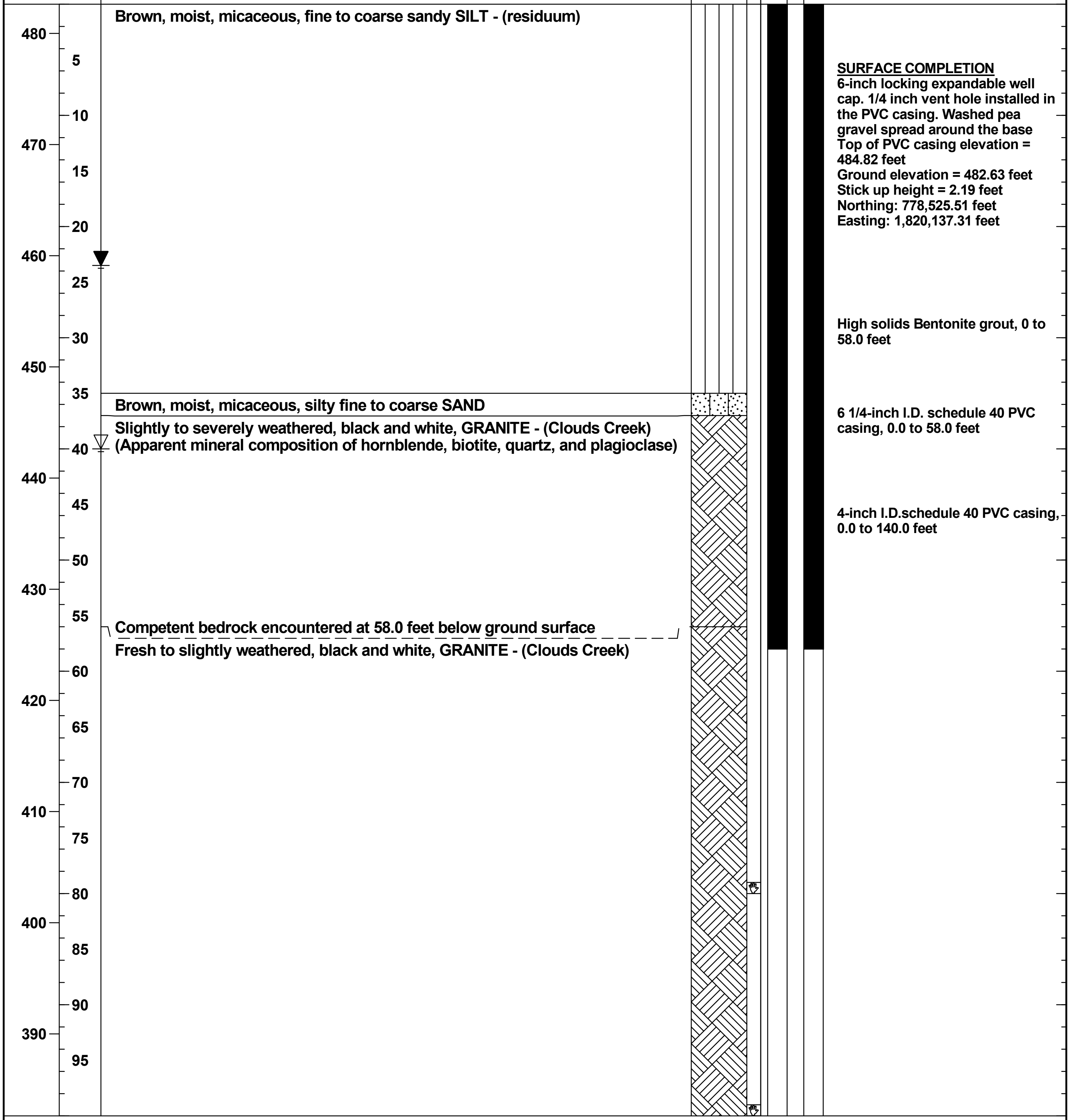
BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-4

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-27-23 END: 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 482.63
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD/TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 40.0 AFTER 24 HOURS: ▼ 23.5 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS



Brown, moist, micaceous, fine to coarse sandy SILT - (residuum)

Brown, moist, micaceous, silty fine to coarse SAND

Slightly to severely weathered, black and white, GRANITE - (Clouds Creek)
(Apparent mineral composition of hornblende, biotite, quartz, and plagioclase)

Competent bedrock encountered at 58.0 feet below ground surface

Fresh to slightly weathered, black and white, GRANITE - (Clouds Creek)

SURFACE COMPLETION
6-inch locking expandable well cap. 1/4 inch vent hole installed in the PVC casing. Washed pea gravel spread around the base
Top of PVC casing elevation = 484.82 feet
Ground elevation = 482.63 feet
Stick up height = 2.19 feet
Northing: 778,525.51 feet
Easting: 1,820,137.31 feet

High solids Bentonite grout, 0 to 58.0 feet

6 1/4-inch I.D. schedule 40 PVC casing, 0.0 to 58.0 feet

4-inch I.D.schedule 40 PVC casing, 0.0 to 140.0 feet

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-4

PROJECT: Luck Companies Saluda Quarry Hydro Assessment

PROJECT NO.: J23-18886-01

CLIENT: Luck Stone Corp.

START: 6-27-23 END: 7-3-23

LOCATION: Saluda County, South Carolina

ELEVATION: 482.63

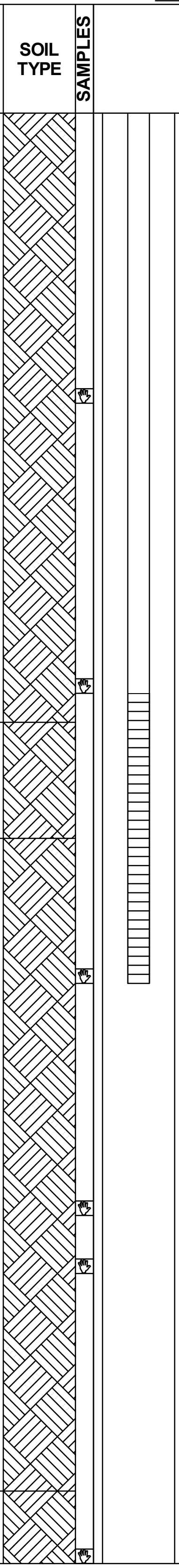
DRILLER: Austin Well Drilling, R. Costello

LOGGED BY: TJD/TAO

DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer

DEPTH TO - WATER> INITIAL: ∇ 40.0 AFTER 24 HOURS: ▼ 23.5 CAVING> ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION	MONITOR WELL INSTALLATION DETAILS
380			
	105		
	110		
370			
	115		
	120	Fresh to slightly weathered, black and white, GRANITE - (Clouds Creek)	
360			
	125		
	130		
350			
	135		
	140		
340		Moderately to severely weathered, black and white, GRANITE - (Clouds Creek) water-bearing fracture at 146.0 feet below ground surface [approximately 35 GPM at 150.0 feet below ground surface]	
	145		4-inch I.D., 0.010-inch slotted Schedule 40 PVC well screen, 140.0 to 160.0 feet
	150	Fresh to slightly weathered, black and white, GRANITE - (Clouds Creek) trace orthoclase and chlorite	
330			
	155		
	160		7.5-inch diameter open borehole from 160.0 to 302.2 feet
320			
	165		
	170		
310			
	175		
	180	[Approximately 25 GPM at 180 feet below ground surface]	
300			
	185		
	190		
290			
	195	Fresh to slightly weathered, black and white, GRANITE - (Clouds Creek) increased orthoclase and chlorite	



INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-4

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-27-23 **END:** 7-3-23
LOCATION: Saluda County, South Carolina
ELEVATION: 482.63
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: TJD/TAO
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ∇ 40.0 **AFTER 24 HOURS:** ▼ 23.5 **CAVING>**

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
280				
205				
210				
270				
215				
	Fresh, black, fine-grained DIABASE			
220				
260				
225				
230				
250				
235	Fresh to slightly weathered, black and white, GRANITE - (Clouds Creek) with minor orthoclase and chlorite			
240				
240				
245				
250				
230				
255				
260				
220				
265				
270				
210				
275				
280				
200				
285				
290				
190				
295				

BORING NO. O-4

PROJECT: Luck Companies Saluda Quarry Hydro Assessment

PROJECT NO.: J23-18886-01

CLIENT: Luck Stone Corp.

START: 6-27-23 END: 7-3-23

LOCATION: Saluda County, South Carolina

ELEVATION: 482.63

DRILLER: Austin Well Drilling, R. Costello

LOGGED BY: TJD/TAO

DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer

DEPTH TO - WATER> INITIAL: ▽ 40.0 AFTER 24 HOURS: ▼ 23.5 CAVING> ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
180	305	Boring terminated at 302.2 feet below ground surface. Groundwater encountered at 40.0 feet below ground surface at time of drilling and 23.5 feet after 24 hours.	▨		
	310				
170	315				
	320				
160	325				
	330				
150	335				
	340				
140	345				
	350				
130	355				
	360				
120	365				
	370				
110	375				
	380				
100	385				
	390				
90	395				

GEOT_WELL NO BLOWS 18886-01.GPJ 8/30/23

BLE INC.

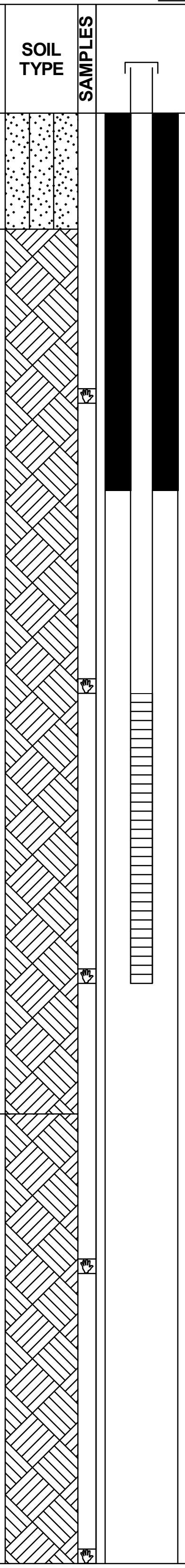
BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-5

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-29-23 END: 6-29-23
LOCATION: Saluda County, South Carolina
ELEVATION: 463.48
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: ACJ/TJD
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 4.83 AFTER 24 HOURS: ▼ 4.9 CAVING> ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION
		Brown, moist, micaceous, silty fine to coarse SAND - (residuum)
460		
	5 ▼	
		Slightly to moderately weathered, black and white, GRANITE - (Clouds Creek) (Apparent mineral composition of hornblende, biotite, quartz, and plagioclase)
	10	
450		
	15	
	20	
		[Approximatey 2 GPM at 20.0 feet below ground surface] Fracture at 21.0 feet below ground surface
440		
	25	
	30	
430		
	35	
		Fracture at 36.0 feet below ground surface
	40	
420		
	45	
	50	
		Fracture at 50.0 feet below ground surface
410		
	55	
		Fracture at 58.0 feet below ground surface
	60	
400		
	65	
	70	Fresh, black and white, GRANITE - (Clouds Creek)
390		
	75	
	80	
380		
	85	
	90	
370		
	95	



MONITOR WELL INSTALLATION DETAILS

SURFACE COMPLETION
6-inch locking expandable well cap. 1/4 inch vent hole installed in the PVC casing. Washed pea gravel spread around the base
Top of PVC casing elevation = 465.92 feet
Ground elevation = 463.48 feet
Stick up height = 2.44 feet
Northing: 778,293.88 feet
Easting: 1,819,898.30 feet

High solids Bentonite grout, 0 to 26.0 feet

6 1/4-inch I.D. schedule 40 PVC casing, 0.0 to 26.0 feet

4-inch I.D.schedule 40 PVC casing, 0.0 to 40.0 feet

4-inch I.D., 0.010-inch slotted Schedule 40 PVC well screen, 40.0 to 60.0 feet

7.5-inch diameter open borehole from 60.0 to 301.5 feet

BORING NO. O-5

PROJECT: Luck Companies Saluda Quarry Hydro Assessment

PROJECT NO.: J23-18886-01

CLIENT: Luck Stone Corp.

START: 6-29-23 END: 6-29-23

LOCATION: Saluda County, South Carolina

ELEVATION: 463.48

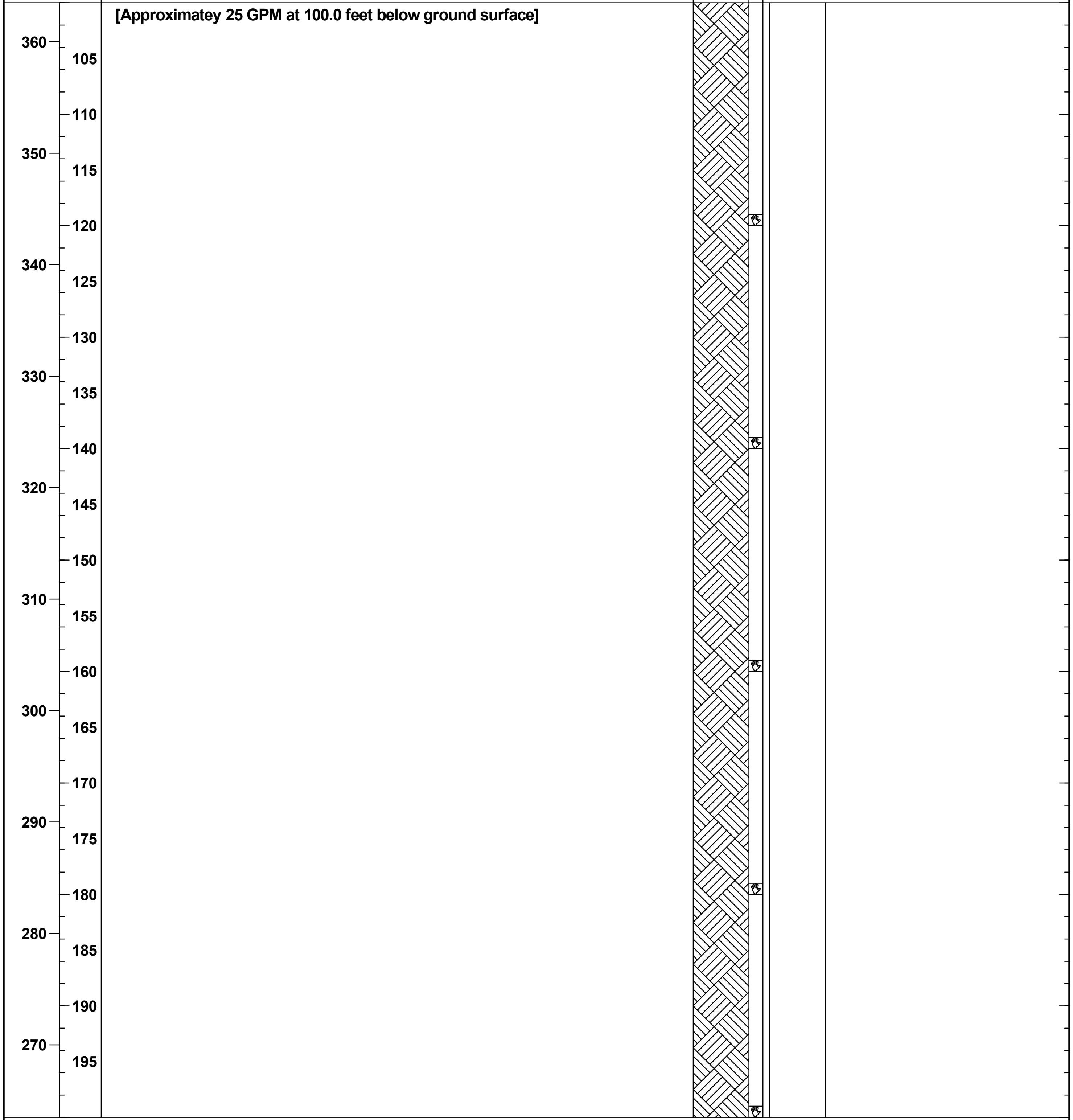
DRILLER: Austin Well Drilling, R. Costello

LOGGED BY: ACJ/TJD

DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer

DEPTH TO - WATER> INITIAL: ▽ 4.83 AFTER 24 HOURS: ▼ 4.9 CAVING> ▨

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
	[Approximatey 25 GPM at 100.0 feet below ground surface]			



BORING NO. O-5

PROJECT: Luck Companies Saluda Quarry Hydro Assessment
PROJECT NO.: J23-18886-01
CLIENT: Luck Stone Corp.
START: 6-29-23 **END:** 6-29-23
LOCATION: Saluda County, South Carolina
ELEVATION: 463.48
DRILLER: Austin Well Drilling, R. Costello
LOGGED BY: ACJ/TJD
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer
DEPTH TO - WATER> INITIAL: ▽ 4.83 **AFTER 24 HOURS:** ▼ 4.9 **CAVING>** ▨

ELEVATION/ DEPTH (FT)		DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
		Fresh, black and white, GRANITE - (Clouds Creek)			
260					
	205				
	210				
250					
	215				
	220				
240					
	225				
	230				
230					
	235				
	240				
		Fresh, black and white, GRANITE increasing orthoclase - (Clouds Creek)			
220					
	245				
	250	Fresh to slightly weathered, black and white GRANITE - (Clouds Creek)			
210					
	255				
	260				
200					
	265				
	270				
190					
	275				
	280	Fresh, black and white GRANITE - (Clouds Creek)			
180					
	285				
	290				
170					
	295				

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

BORING NO. O-5

PROJECT: Luck Companies Saluda Quarry Hydro Assessment

PROJECT NO.: J23-18886-01

CLIENT: Luck Stone Corp.

START: 6-29-23 END: 6-29-23

LOCATION: Saluda County, South Carolina

ELEVATION: 463.48

DRILLER: Austin Well Drilling, R. Costello

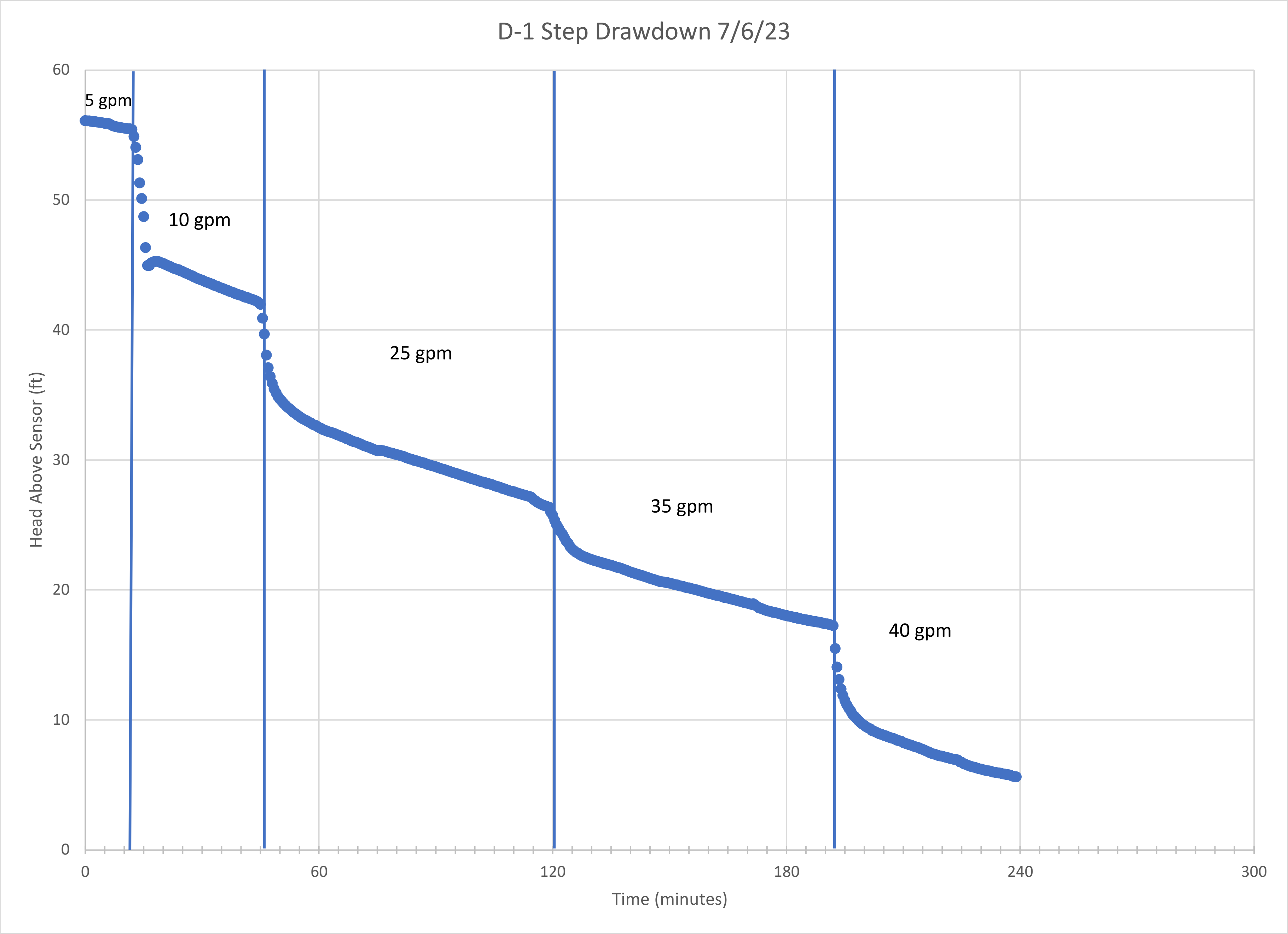
LOGGED BY: ACJ/TJD

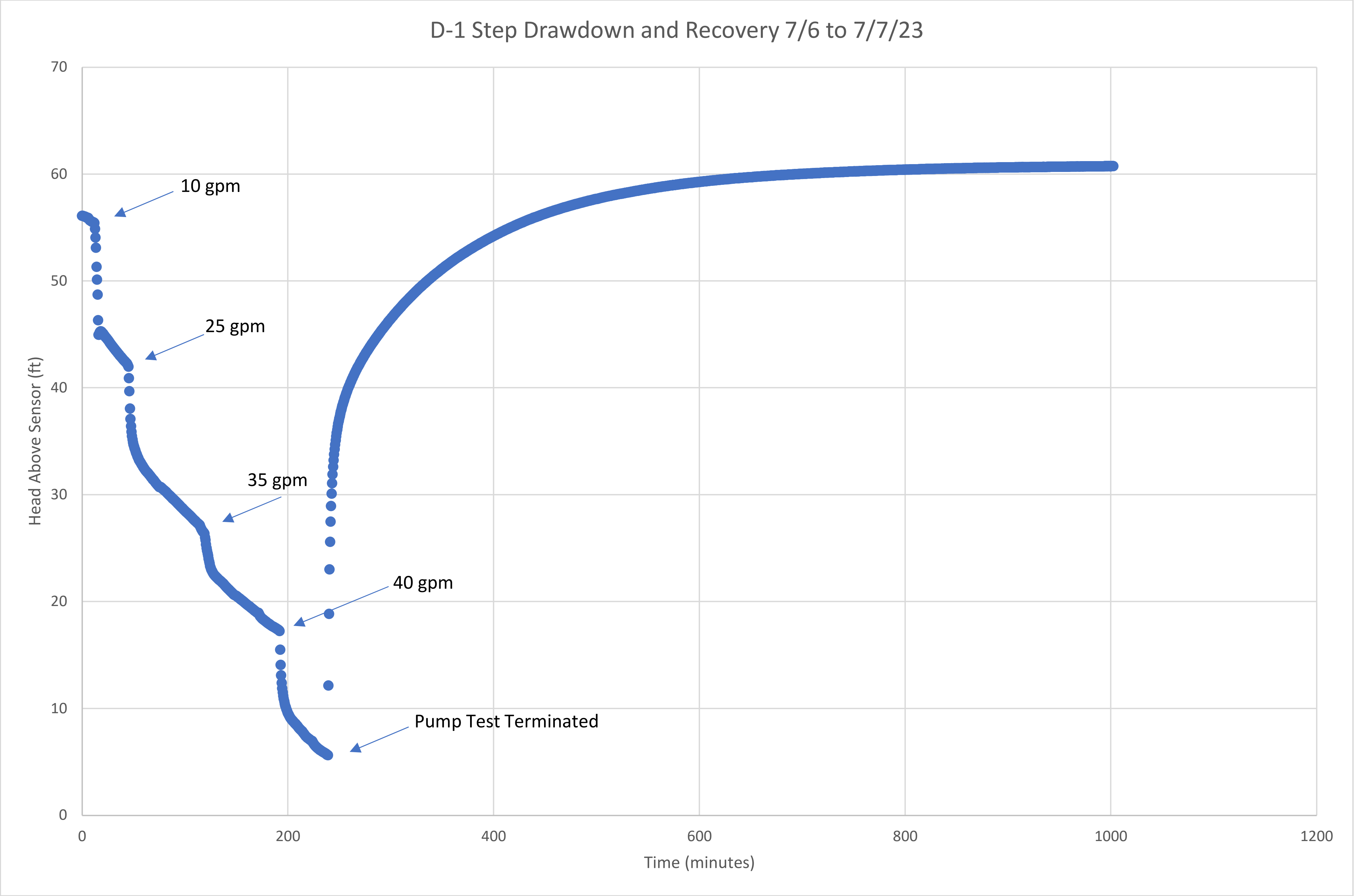
DRILLING METHOD: Schramm T450WS; 9 7/8" OD roller cone & 7.5" air hammer

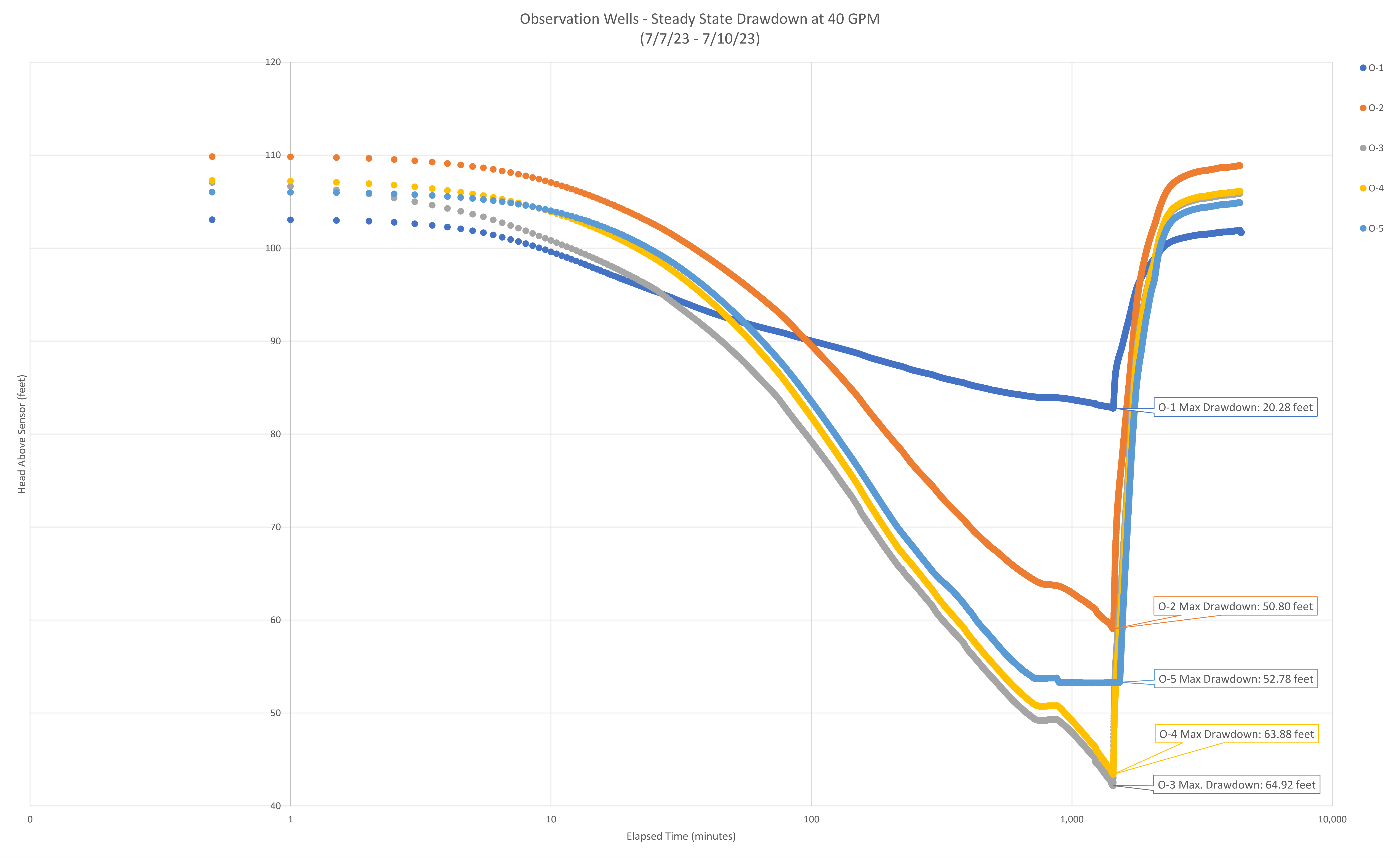
DEPTH TO - WATER> INITIAL: ▽ 4.83 AFTER 24 HOURS: ▼ 4.9 CAVING> ▨

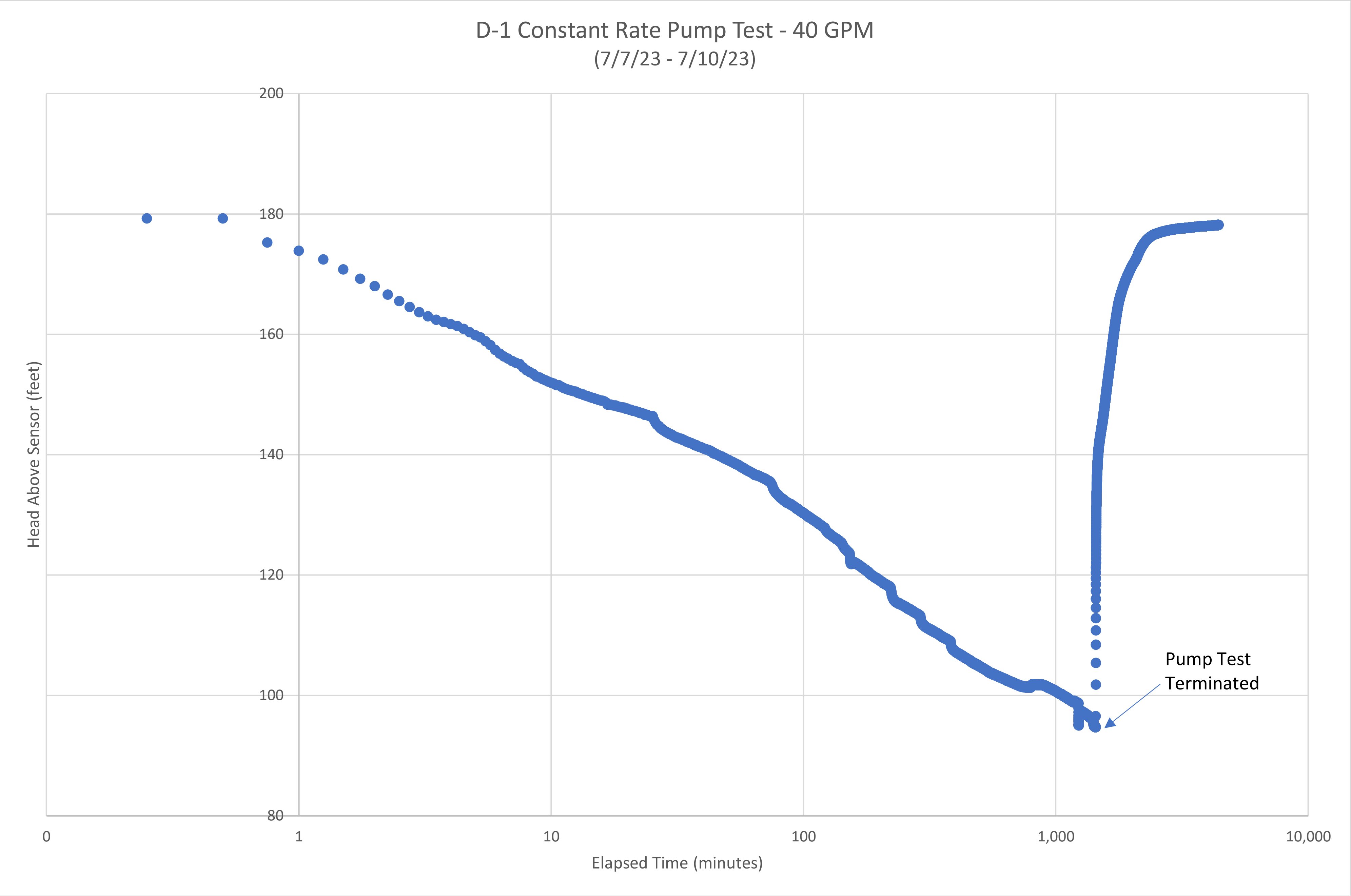
ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	MONITOR WELL INSTALLATION DETAILS
160 / 305	Boring terminated at 301.5 feet below ground surface. Groundwater encountered at 4.8 feet below ground surface at time of drilling and at 4.9 feet after 24 hours.	▨		
310				
150 / 315				
320				
140 / 325				
330				
130 / 335				
340				
120 / 345				
350				
110 / 355				
360				
100 / 365				
370				
90 / 375				
380				
80 / 385				
390				
70 / 395				

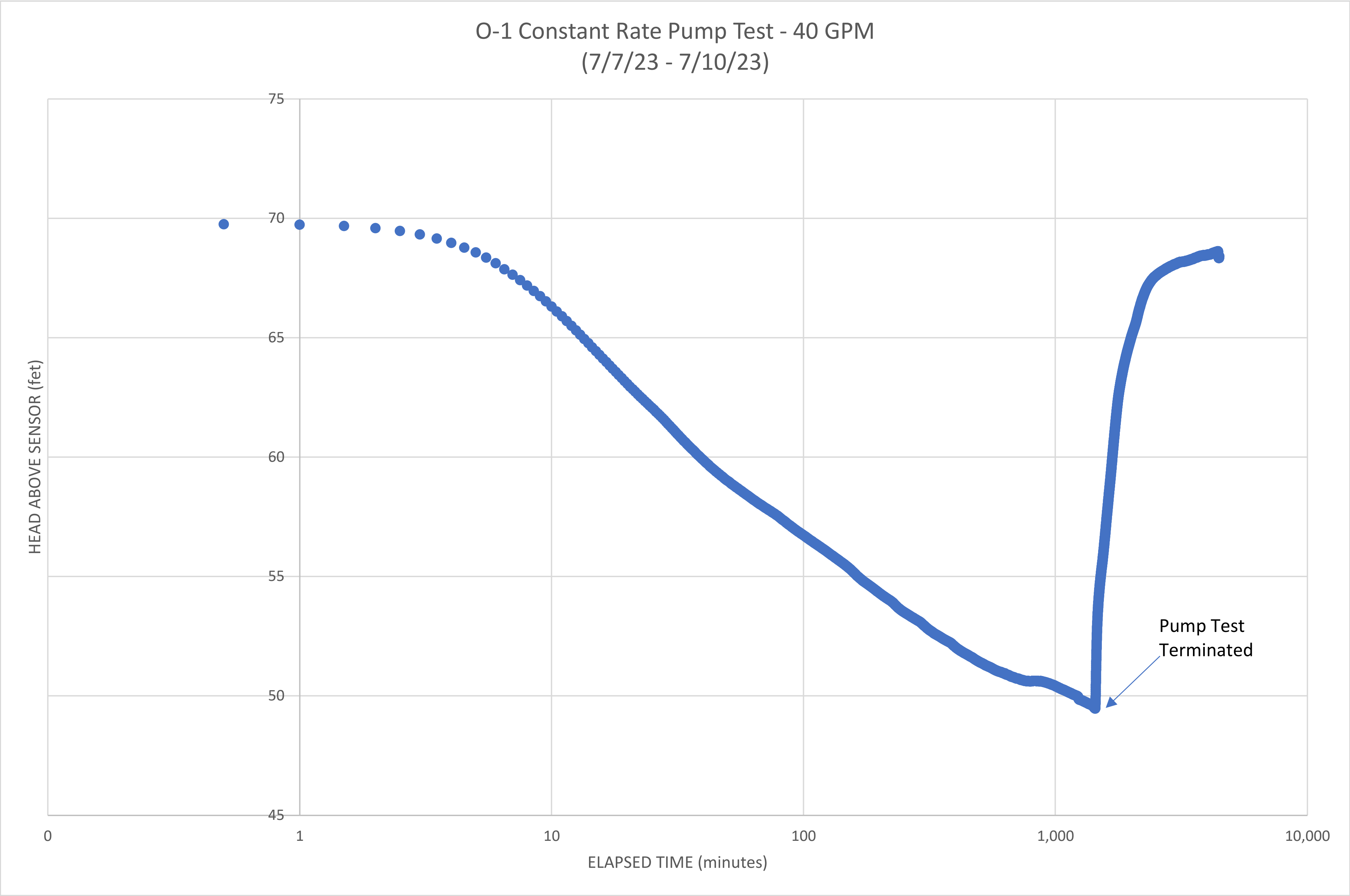
APPENDIX E
Pump Test Charts


D-1 Step Drawdown 7/6/23
Head Above Sensor (ft)
Time (minutes)
60
50
40
30
20
10
0
0
60
120
180
240
300
5 gpm
10 gpm
25 gpm
35 gpm
40 gpm

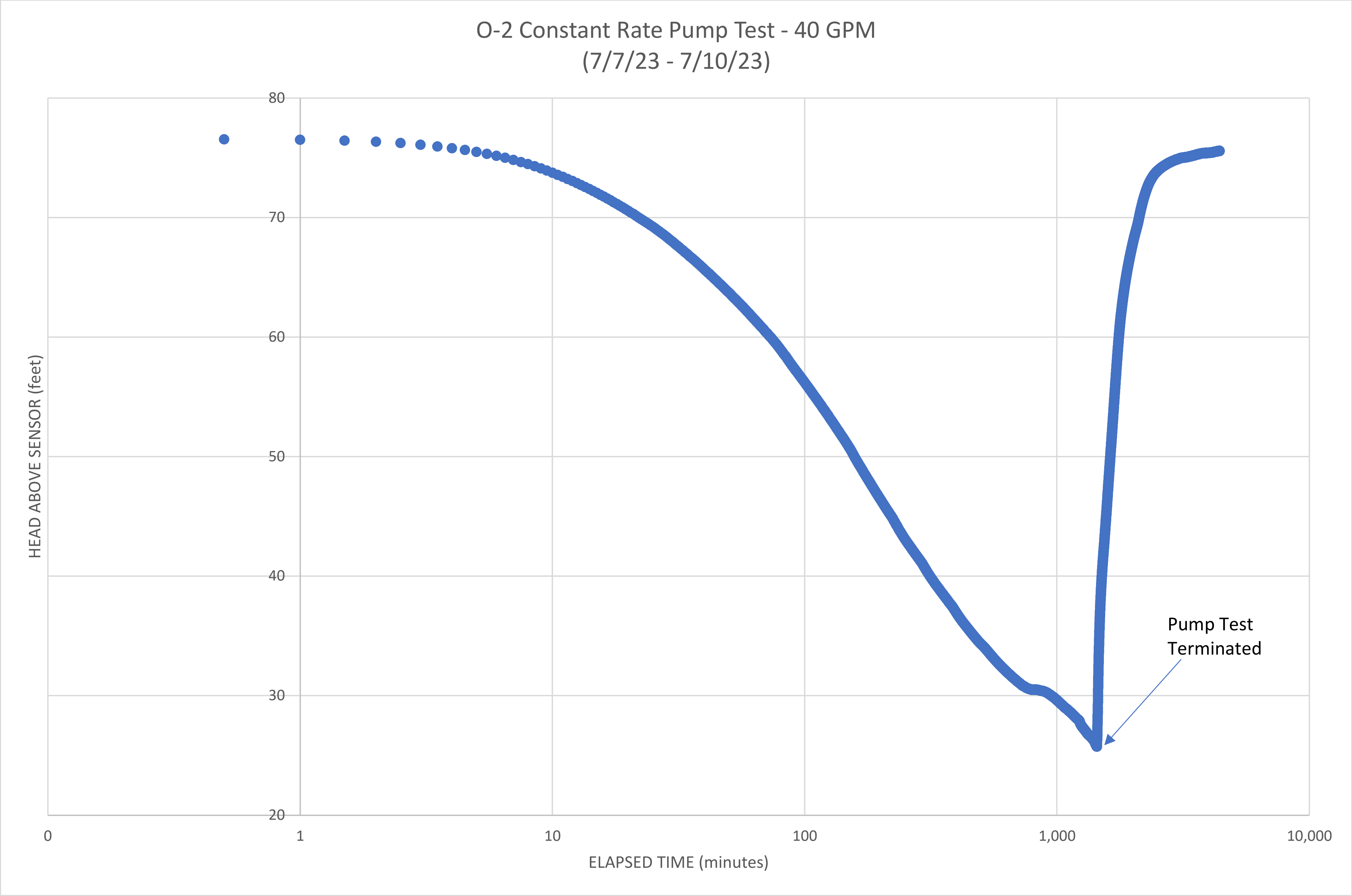

D-1 Step Drawdown and Recovery 7/6 to 7/7/23
Head Above Sensor (ft)
70
60
50
40
30
20
10
0
0
200
400
600
800
1000
1200
Time (minutes)
10 gpm
25 gpm
35 gpm
40 gpm
Pump Test Terminated

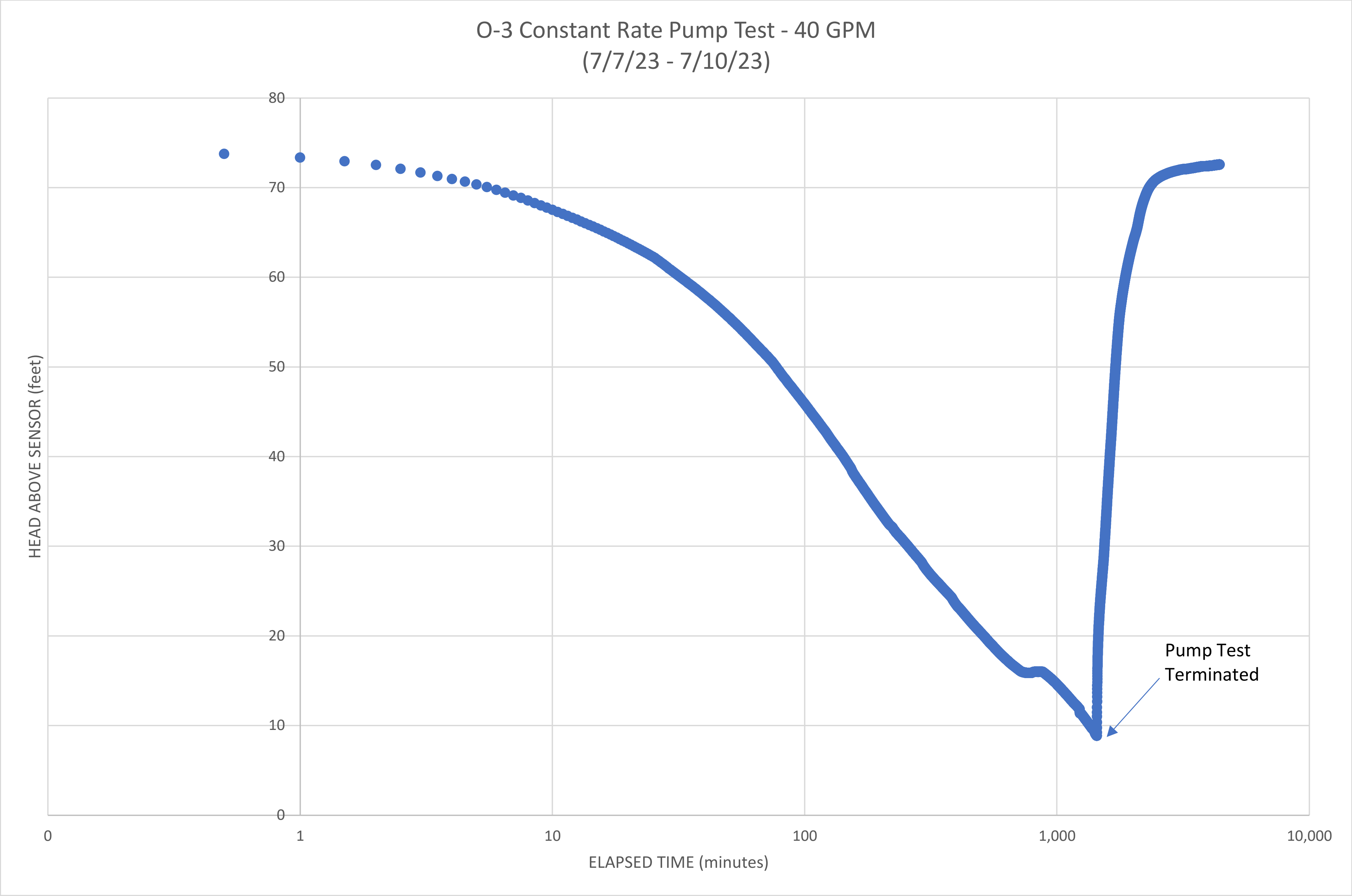

Observation Wells - Steady State Drawdown at 40 GPM
(7/7/23 - 7/10/23)
Head Above Sensor (feet)
120
110
100
90
80
70
60
50
40
0
1
10
100
1,000
10,000
Elapsed Time (minutes)
● O-1
● O-2
● O-3
● O-4
● O-5
O-1 Max Drawdown: 20.28 feet
O-2 Max Drawdown: 50.80 feet
O-5 Max Drawdown: 52.78 feet
O-4 Max Drawdown: 63.88 feet
O-3 Max. Drawdown: 64.92 feet

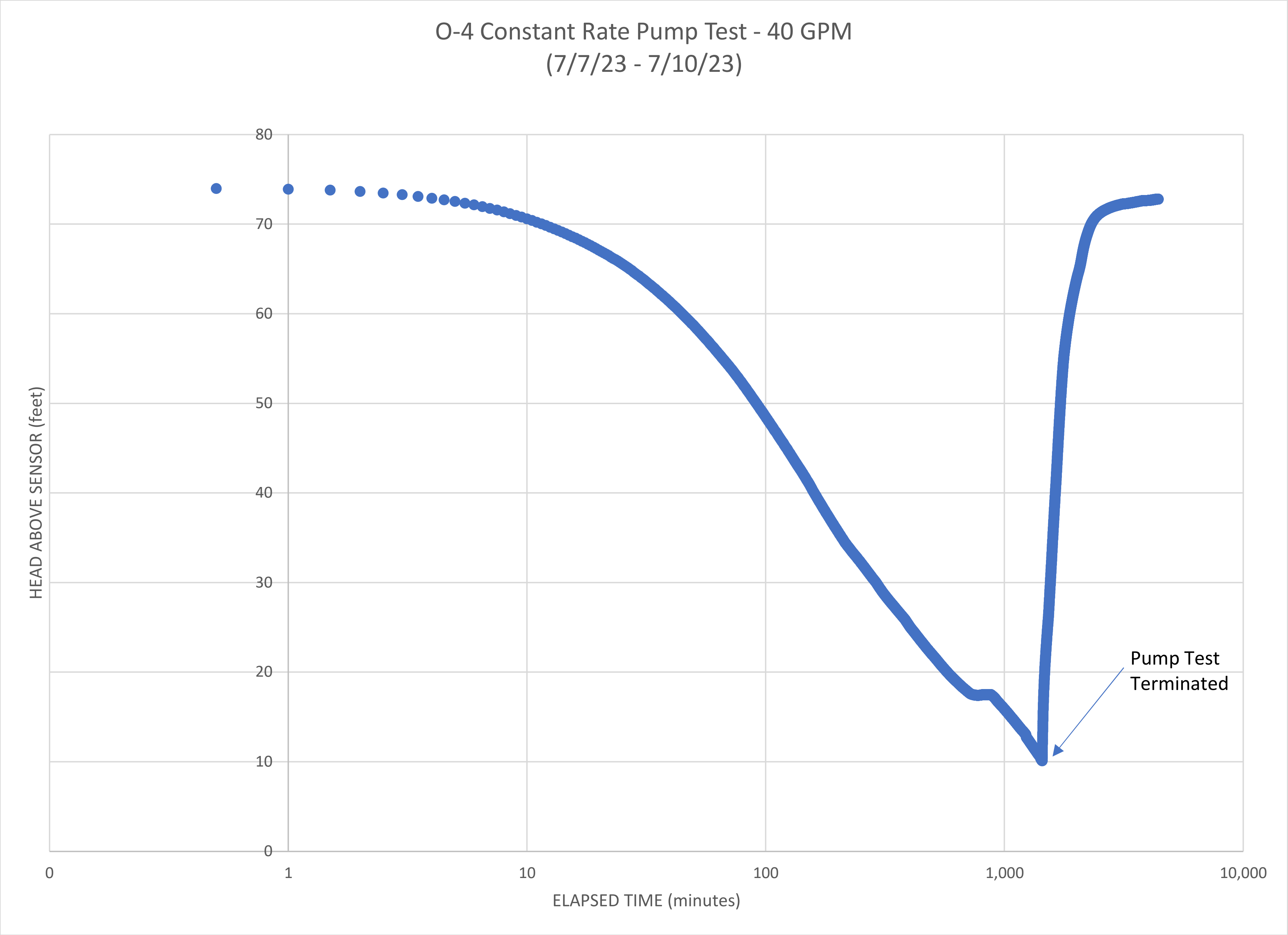

D-1 Constant Rate Pump Test - 40 GPM
(7/7/23 - 7/10/23)
Head Above Sensor (feet)
200
180
160
140
120
100
80
0
1
10
100
1,000
10,000
Elapsed Time (minutes)
Pump Test Terminated

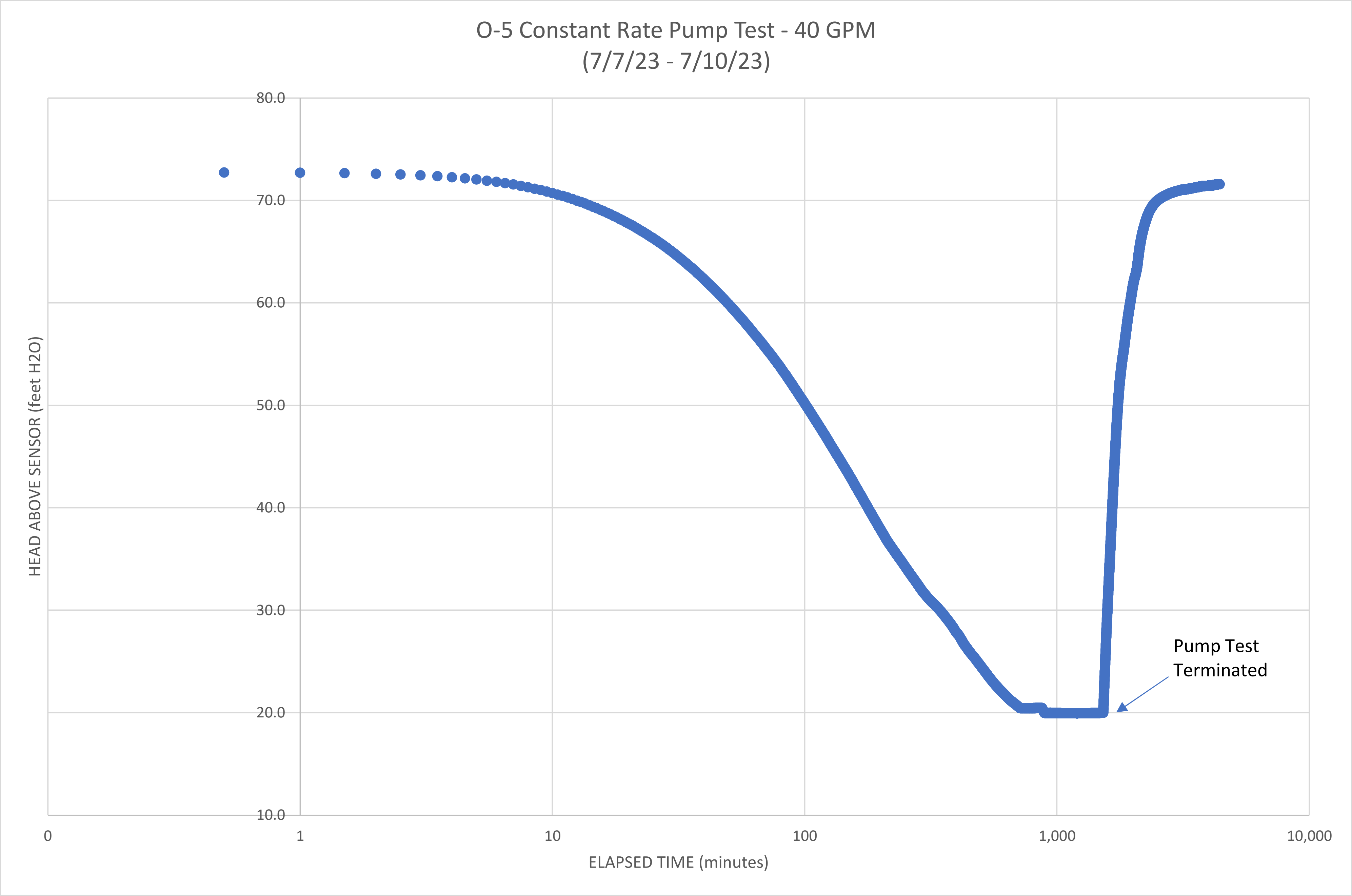


O-1 Constant Rate Pump Test - 40 GPM
(7/7/23 - 7/10/23)


O-2 Constant Rate Pump Test - 40 GPM
(7/7/23 - 7/10/23)
HEAD ABOVE SENSOR (feet)
80
70
60
50
40
30
20
0
1
10
100
1,000
10,000
ELAPSED TIME (minutes)
Pump Test
Terminated

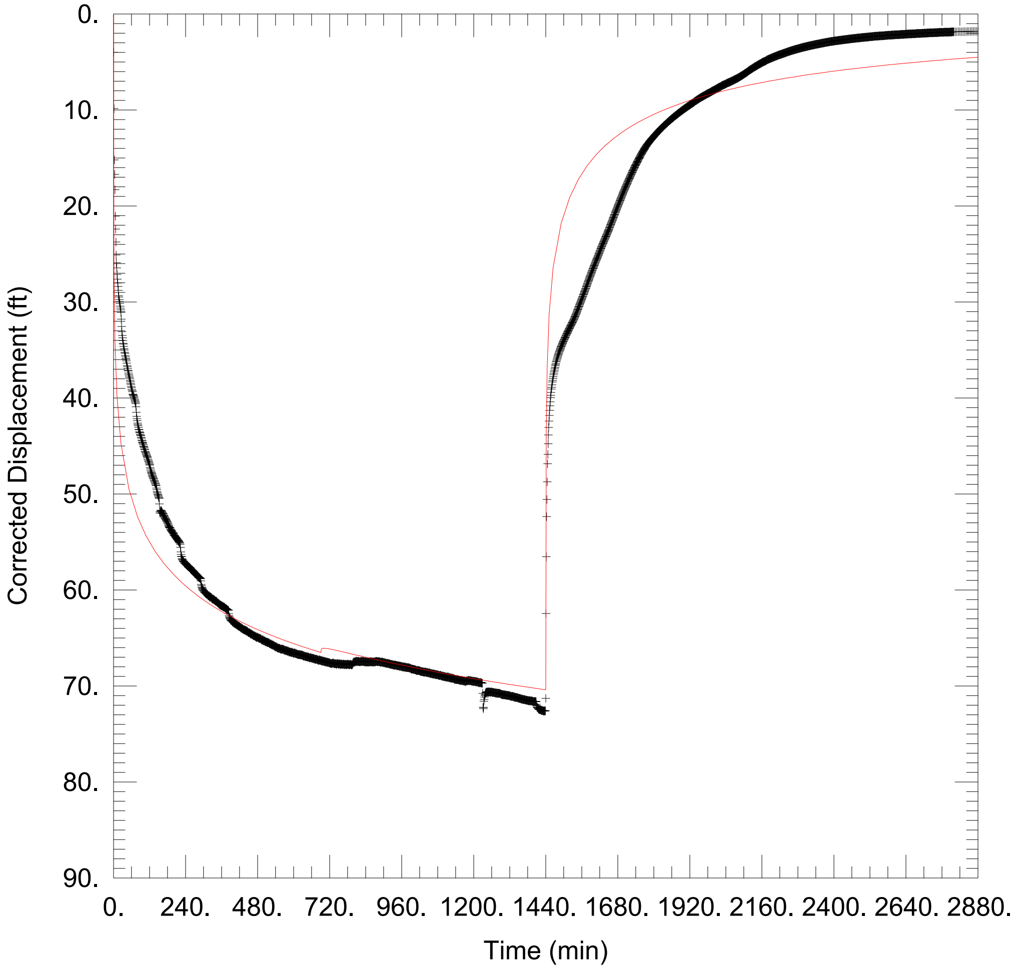

O-3 Constant Rate Pump Test - 40 GPM
(7/7/23 - 7/10/23)
HEAD ABOVE SENSOR (feet)
80
70
60
50
40
30
20
10
0
0
1
10
100
1,000
10,000
ELAPSED TIME (minutes)
Pump Test Terminated


O-4 Constant Rate Pump Test - 40 GPM
(7/7/23 - 7/10/23)
HEAD ABOVE SENSOR (feet)
80
70
60
50
40
30
20
10
0
0
1
10
100
1,000
10,000
ELAPSED TIME (minutes)
Pump Test Terminated


O-5 Constant Rate Pump Test - 40 GPM
(7/7/23 - 7/10/23)
HEAD ABOVE SENSOR (feet H2O)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
1
10
100
1,000
10,000
ELAPSED TIME (minutes)
Pump Test
Terminated

APPENDIX F
Groundwater Modeling Results

Observed and Simulated Drawdown in Pumping Well D-1



SALUDA 24-HR TEST

Data Set: C:\zMGE\L&A-2\Saluda\Pumping Test Data July 2023\PW only.aqt
Date: 08/11/23 Time: 17:52:15

PROJECT INFORMATION

Company: L&A
Client: BLE
Location: Saluda, SC
Test Well: D-1
Test Date: 7/7/2023

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

Observation Wells

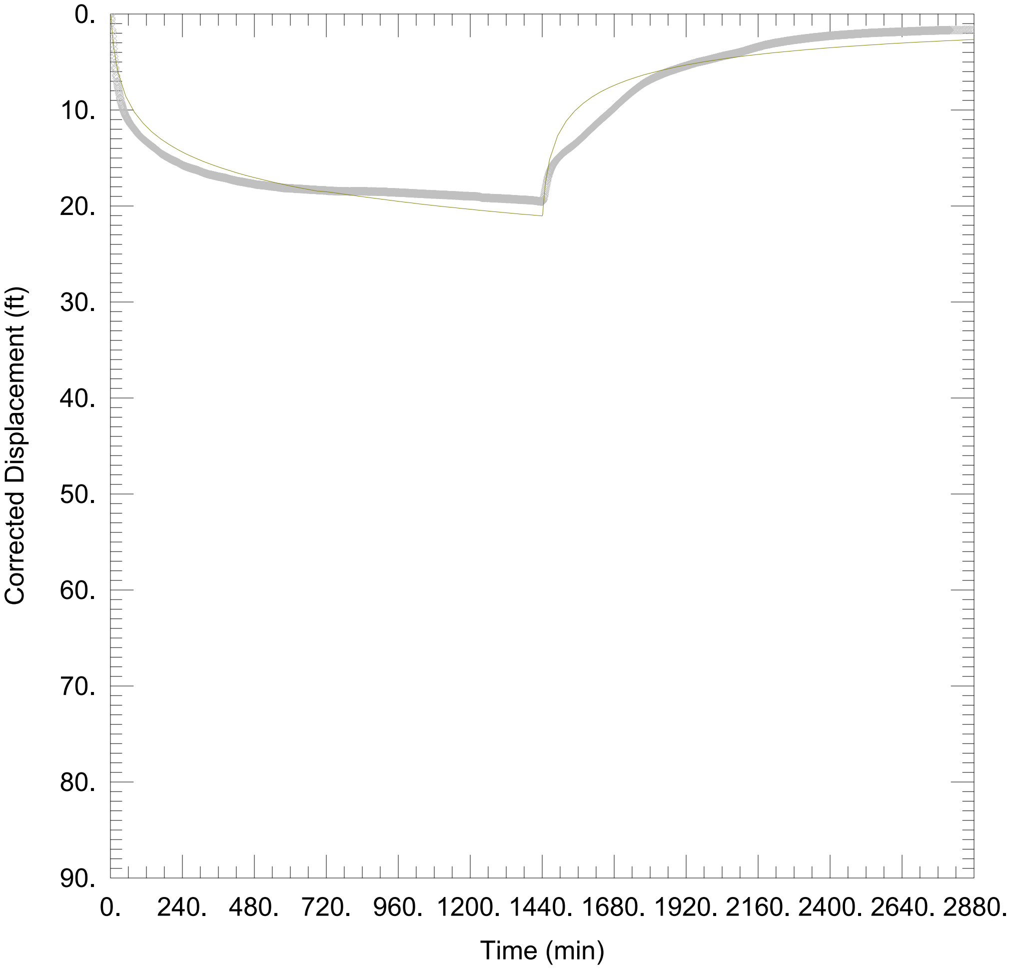
Well Name	X (ft)	Y (ft)
+ PW	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 93. ft^2/day
S = 0.1
Kz/Kr = 1.
b = 300. ft

Observed and Simulated Drawdown in Observation Well O-1



SALUDA 24-HR TEST

Data Set: C:\zMGE\L&A-2\Saluda\Pumping Test Data July 2023\OW-1.aqt
Date: 08/11/23 Time: 16:30:38

PROJECT INFORMATION

Company: L&A
Client: BLE
Location: Saluda, SC
Test Well: D-1
Test Date: 7/7/2023

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

Observation Wells

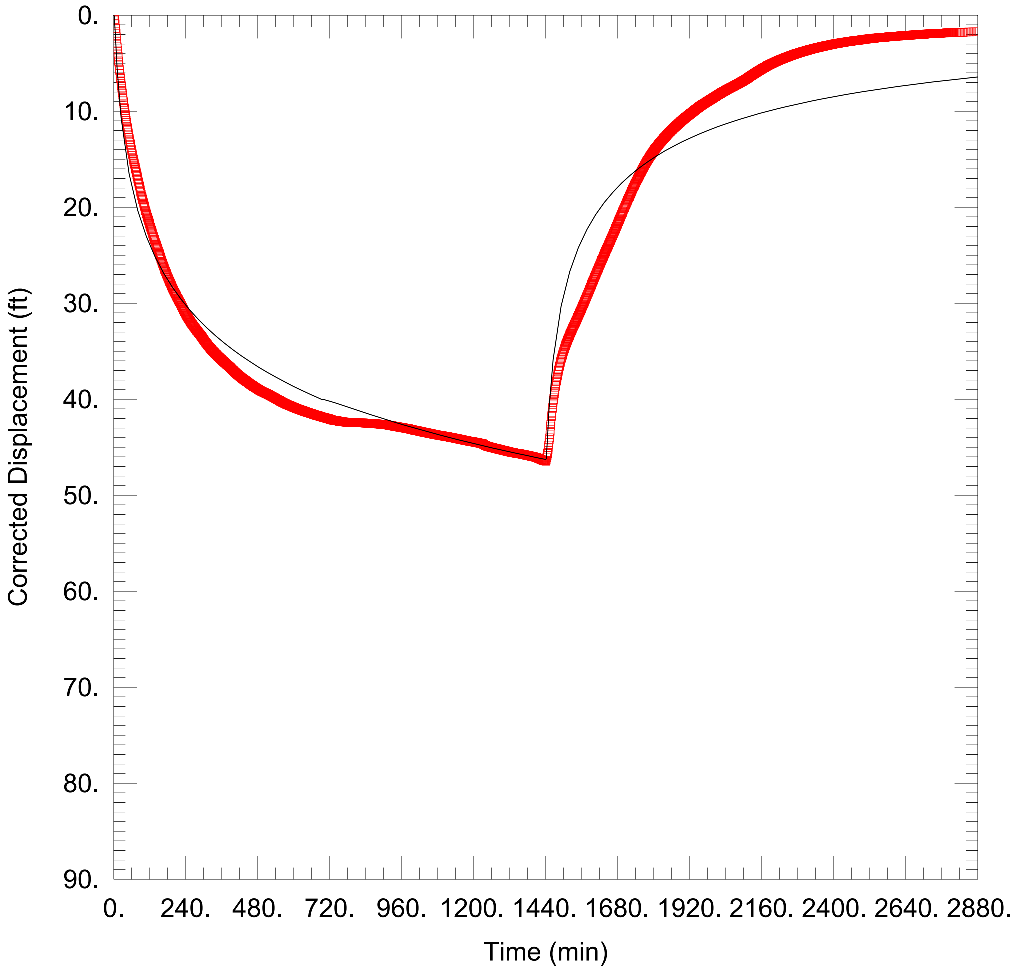
Well Name	X (ft)	Y (ft)
◇ O-1	-21	45

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 157. ft^2/day
S = 0.0006
Kz/Kr = 1.
b = 300. ft

Observed and Simulated Drawdown in Observation Well O-2



SALUDA 24-HR TEST

Data Set: C:\zMGE\L&A-2\Saluda\Pumping Test Data July 2023\OW-2.aqt
Date: 08/10/23 Time: 19:03:50

PROJECT INFORMATION

Company: L&A
Client: BLE
Location: Saluda, SC
Test Well: D-1
Test Date: 7/7/2023

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

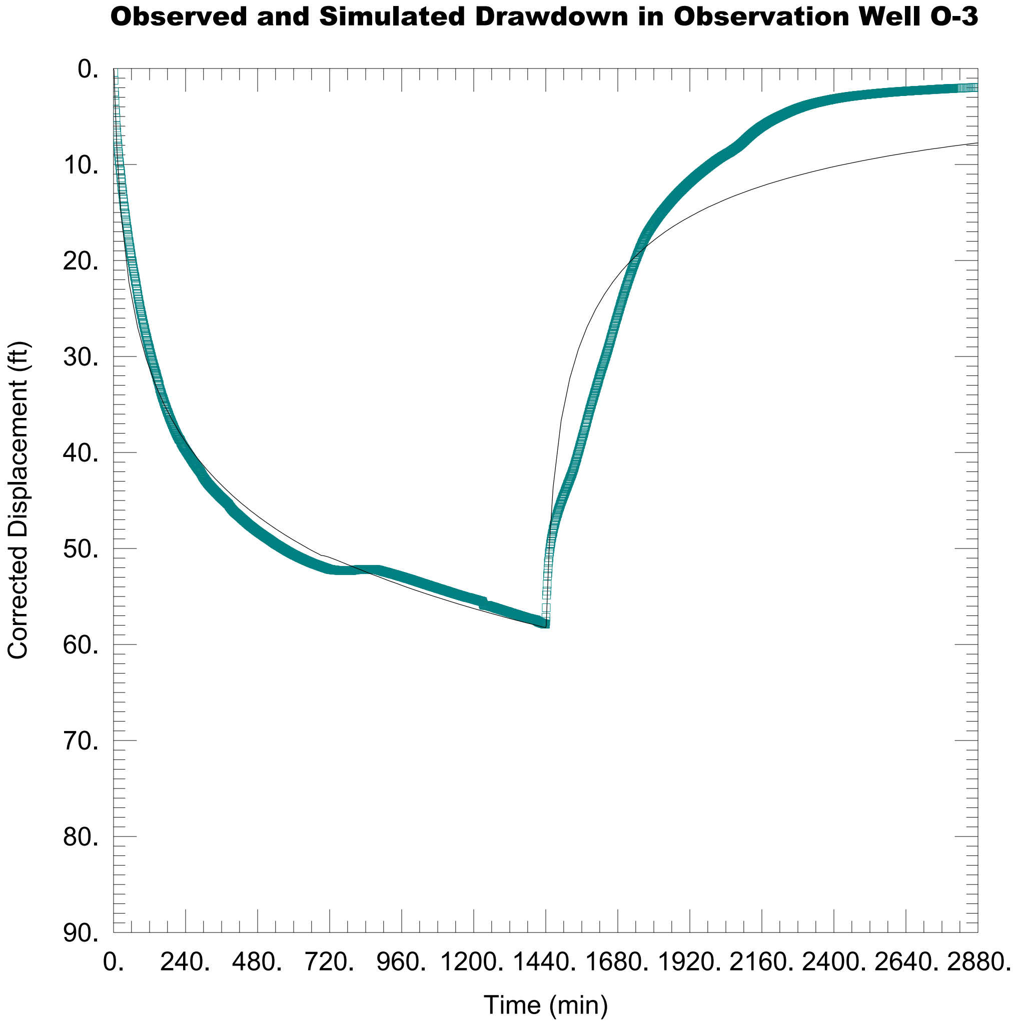
Observation Wells

Well Name	X (ft)	Y (ft)
□ O-2	-4	100

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 65. ft^2/day
S = 0.0001
Kz/Kr = 1.
b = 300. ft



SALUDA 24-HR TEST

Data Set: C:\zMGE\L&A-2\Saluda\Pumping Test Data July 2023\OW-3.aqt
Date: 08/10/23 Time: 19:06:37

PROJECT INFORMATION

Company: L&A
Client: BLE
Location: Saluda, SC
Test Well: D-1
Test Date: 7/7/2023

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

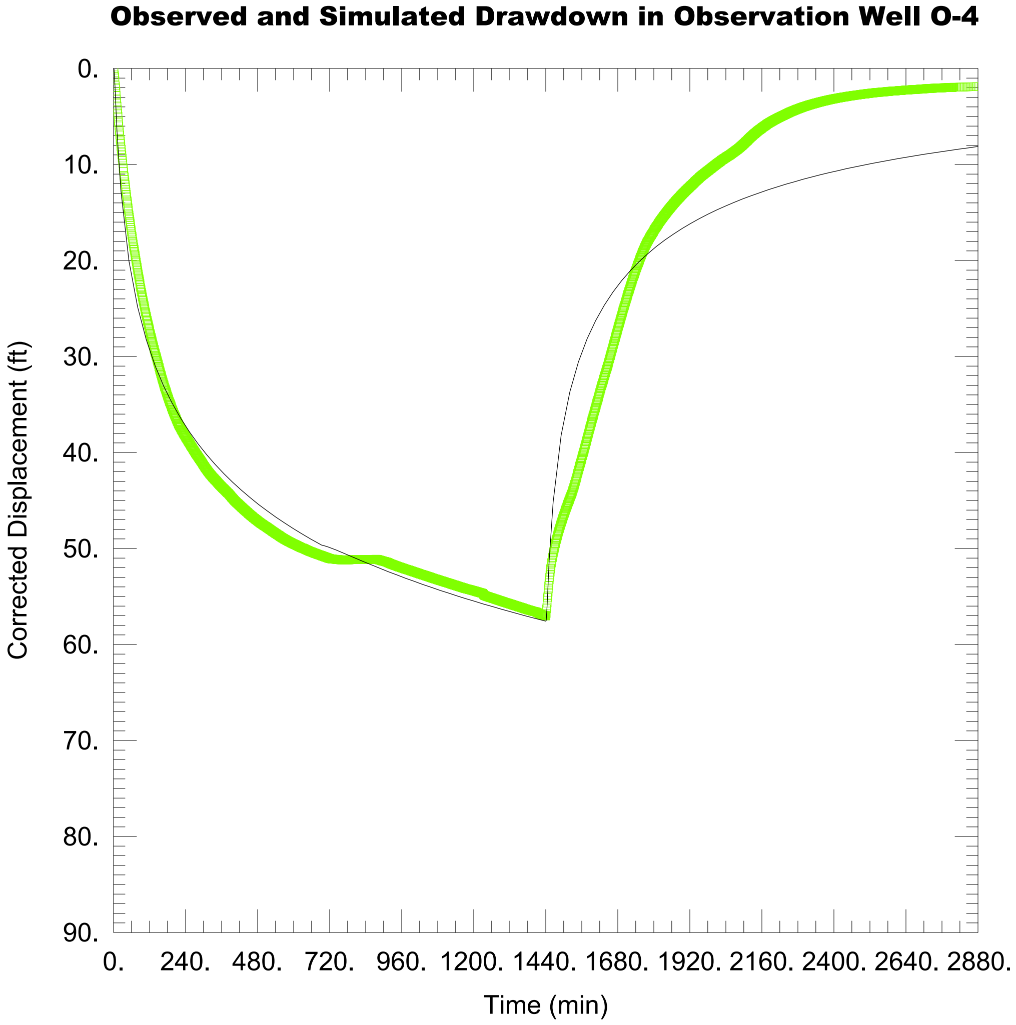
Observation Wells

Well Name	X (ft)	Y (ft)
□ O-3	-84	-43

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 54.02 ft^2/day
S = 7.417E-5
Kz/Kr = 1.
b = 300. ft



SALUDA 24-HR TEST

Data Set: C:\zMGE\L&A-2\Saluda\Pumping Test Data July 2023\OW-4.aqt
Date: 08/11/23 Time: 16:41:47

PROJECT INFORMATION

Company: L&A
Client: BLE
Location: Saluda, SC
Test Well: D-1
Test Date: 7/7/2023

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ O-4	12	251

SOLUTION

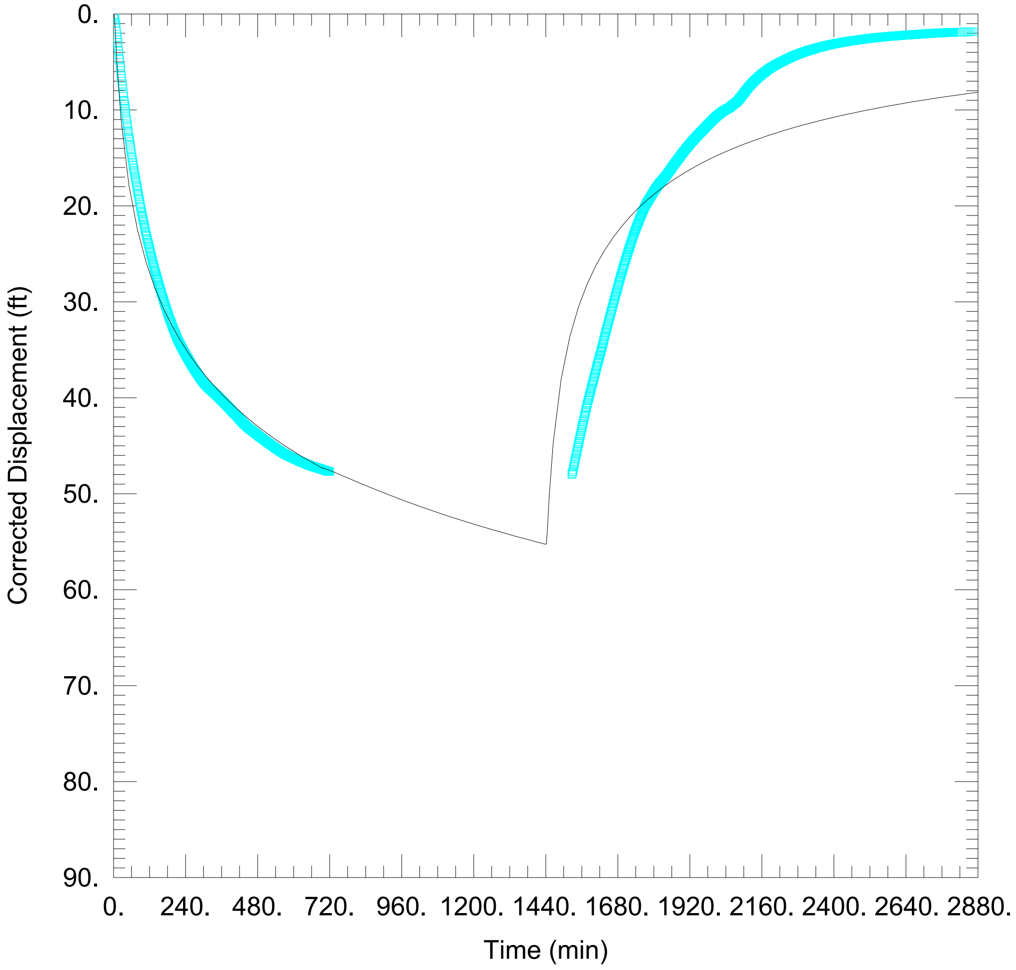
Aquifer Model: Unconfined

Solution Method: Theis

T = 51.4 ft^2/day
Kz/Kr = 1.

S = 1.36E-5
b = 300. ft

Observed and Simulated Drawdown in Observation Well O-5



SALUDA 24-HR TEST

Data Set: C:\zMGE\L&A-2\Saluda\Pumping Test Data July 2023\OW-5.aqt
Date: 08/11/23 Time: 16:44:51

PROJECT INFORMATION

Company: L&A
Client: BLE
Location: Saluda, SC
Test Well: D-1
Test Date: 7/7/2023

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
PW	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ O-5	-247	-4

SOLUTION

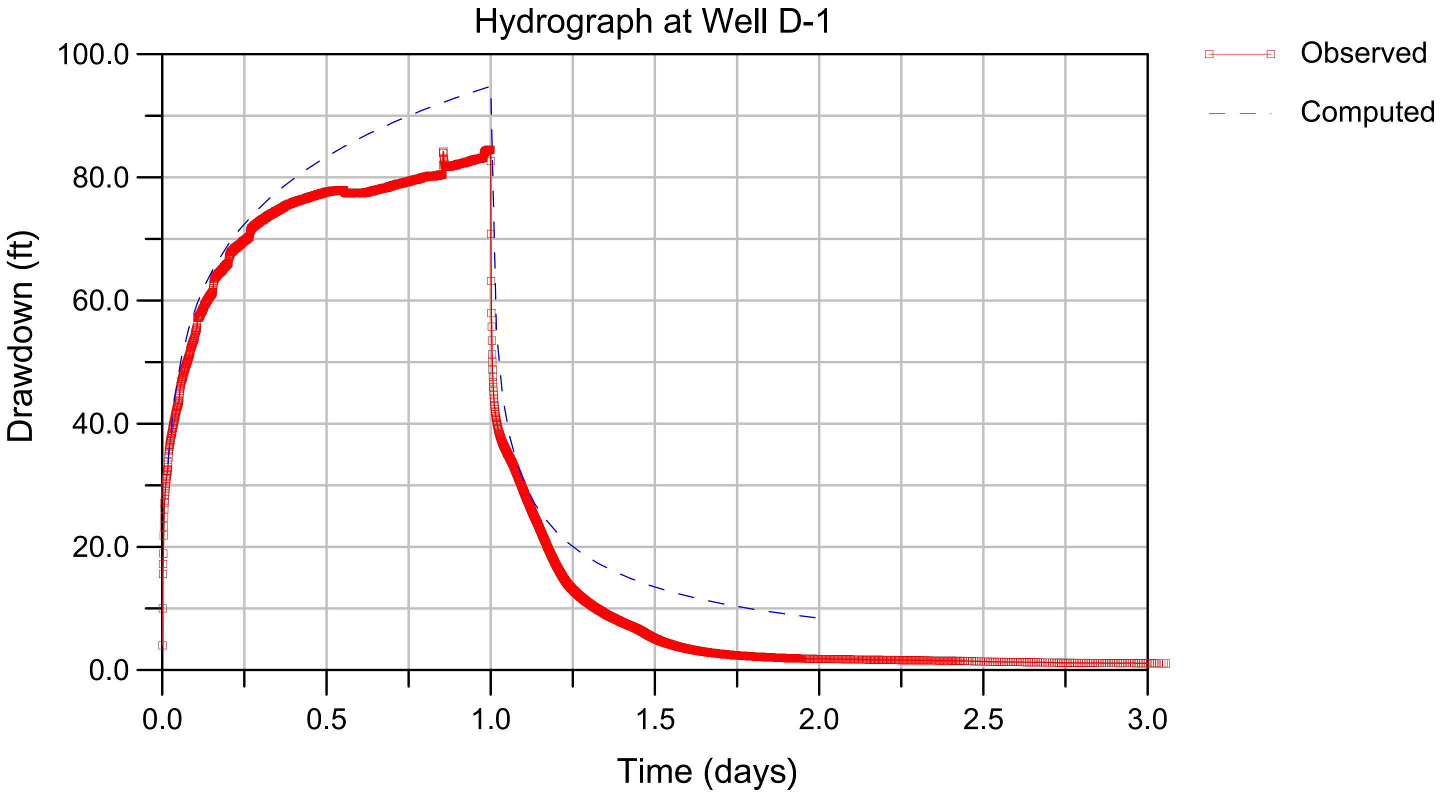
Aquifer Model: Unconfined

Solution Method: Theis

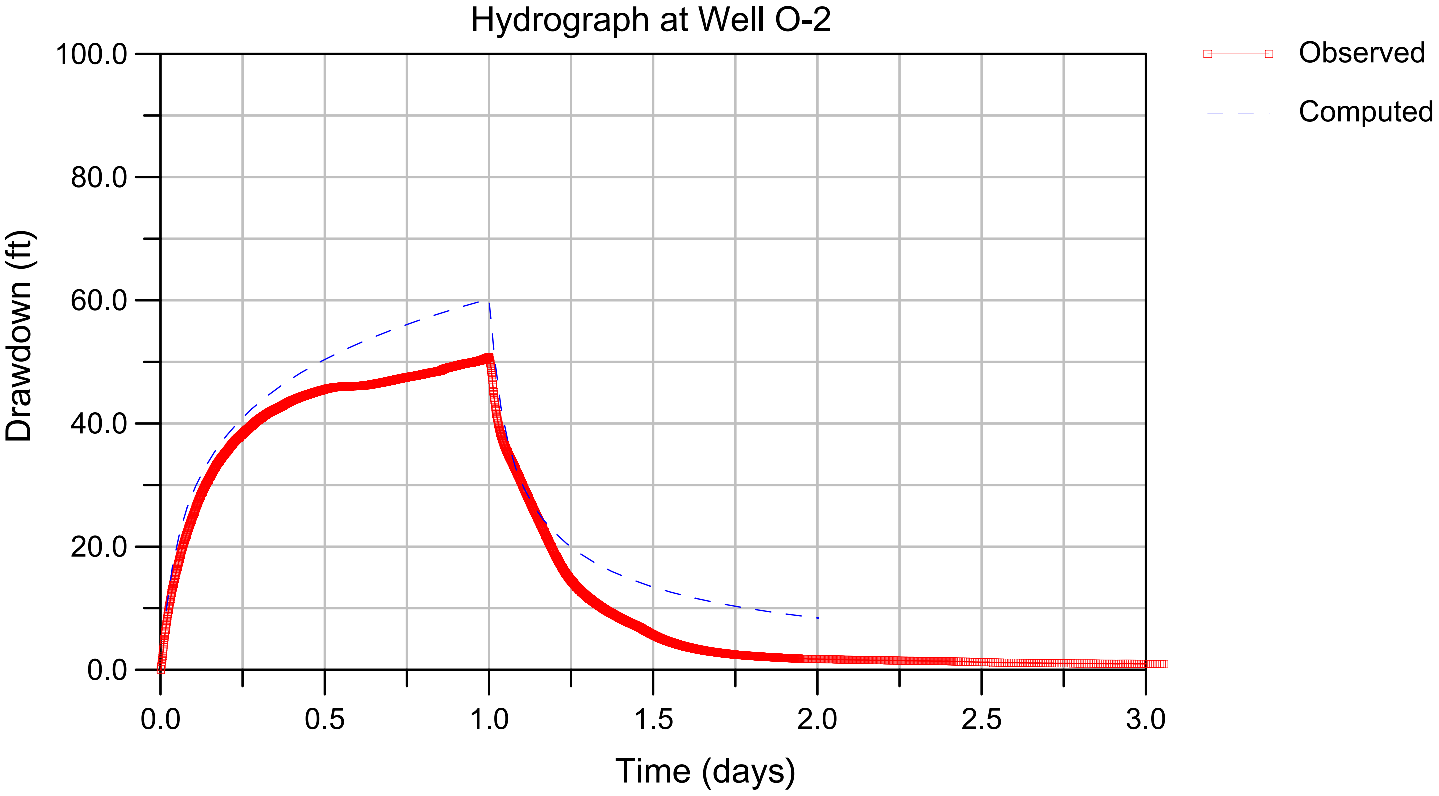
T = 51.2 ft^2/day
Kz/Kr = 1.

S = 1.74E-5
b = 300. ft

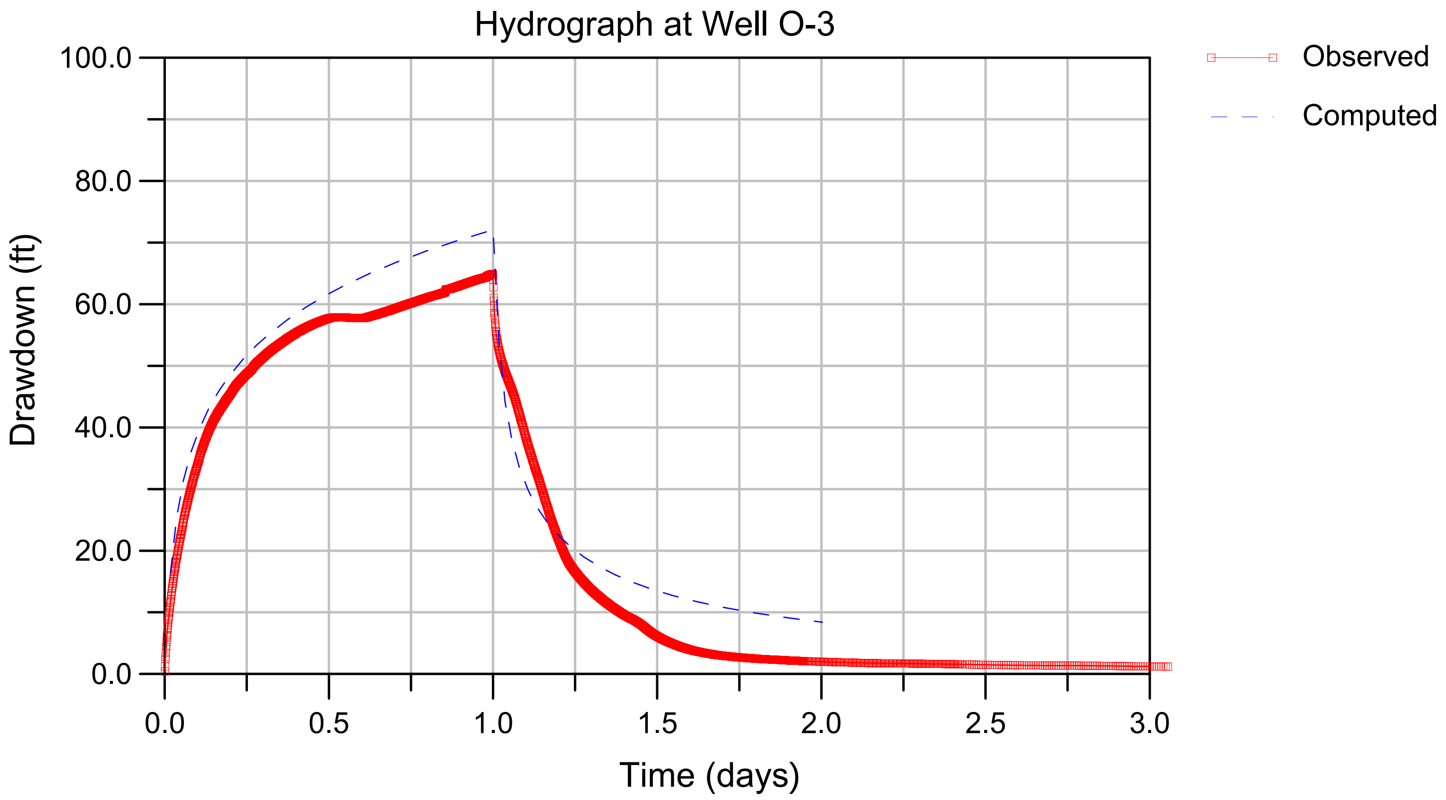
Observed and Simulated Drawdown in Pumping Well D-1
(east to west)



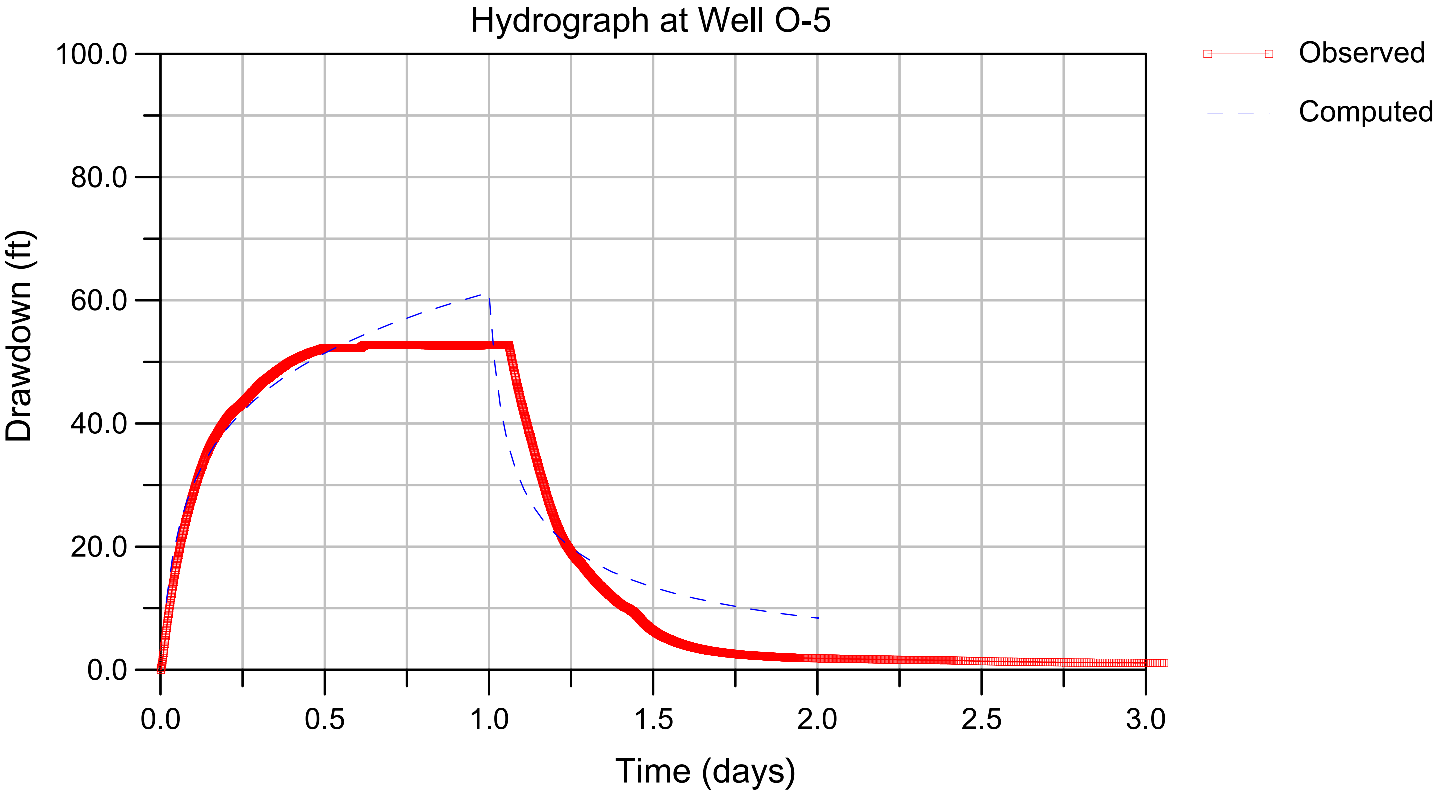
Observed and Simulated Drawdown in Observation Well O-2
(east to west)



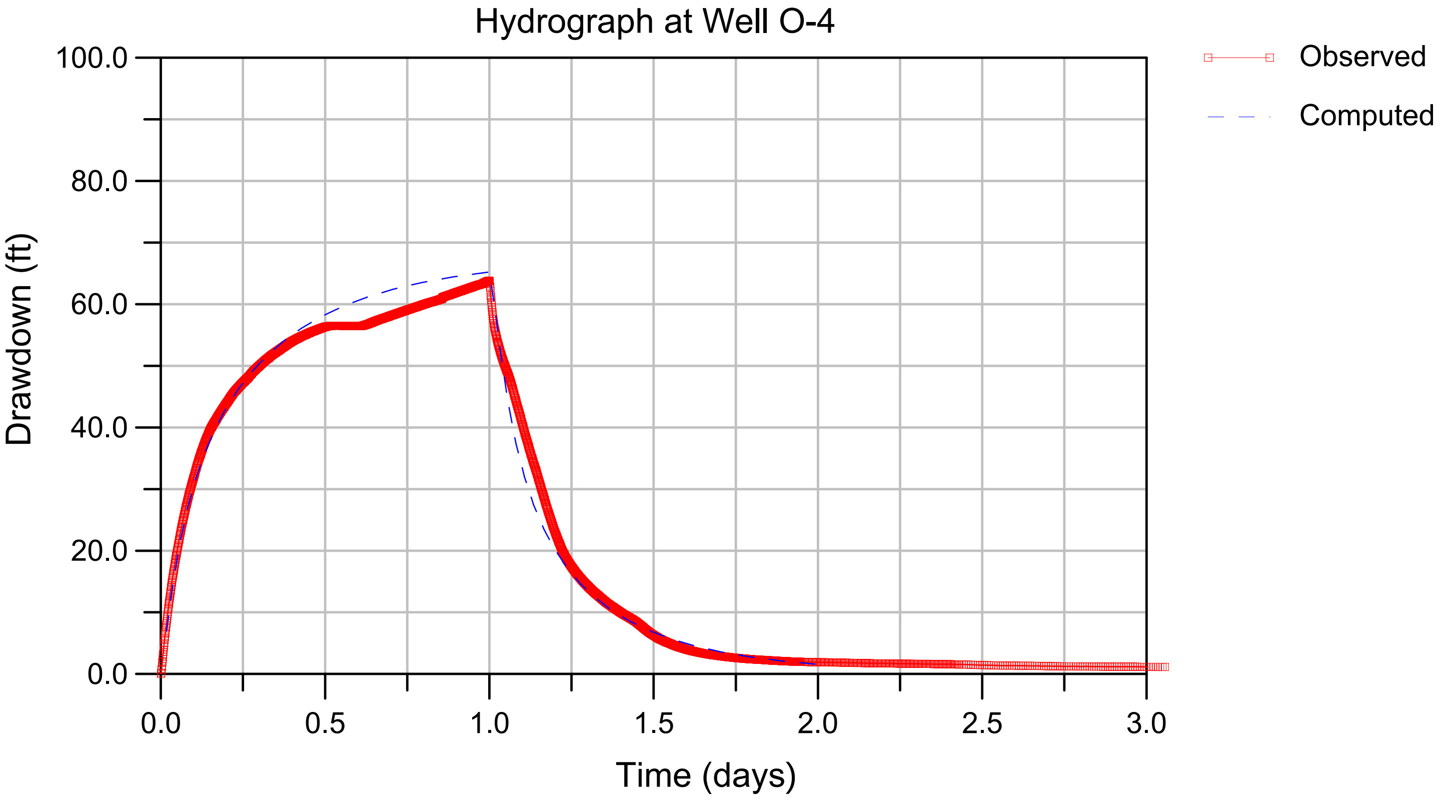
Observed and Simulated Drawdown in Observation Well O-3
(east to west)



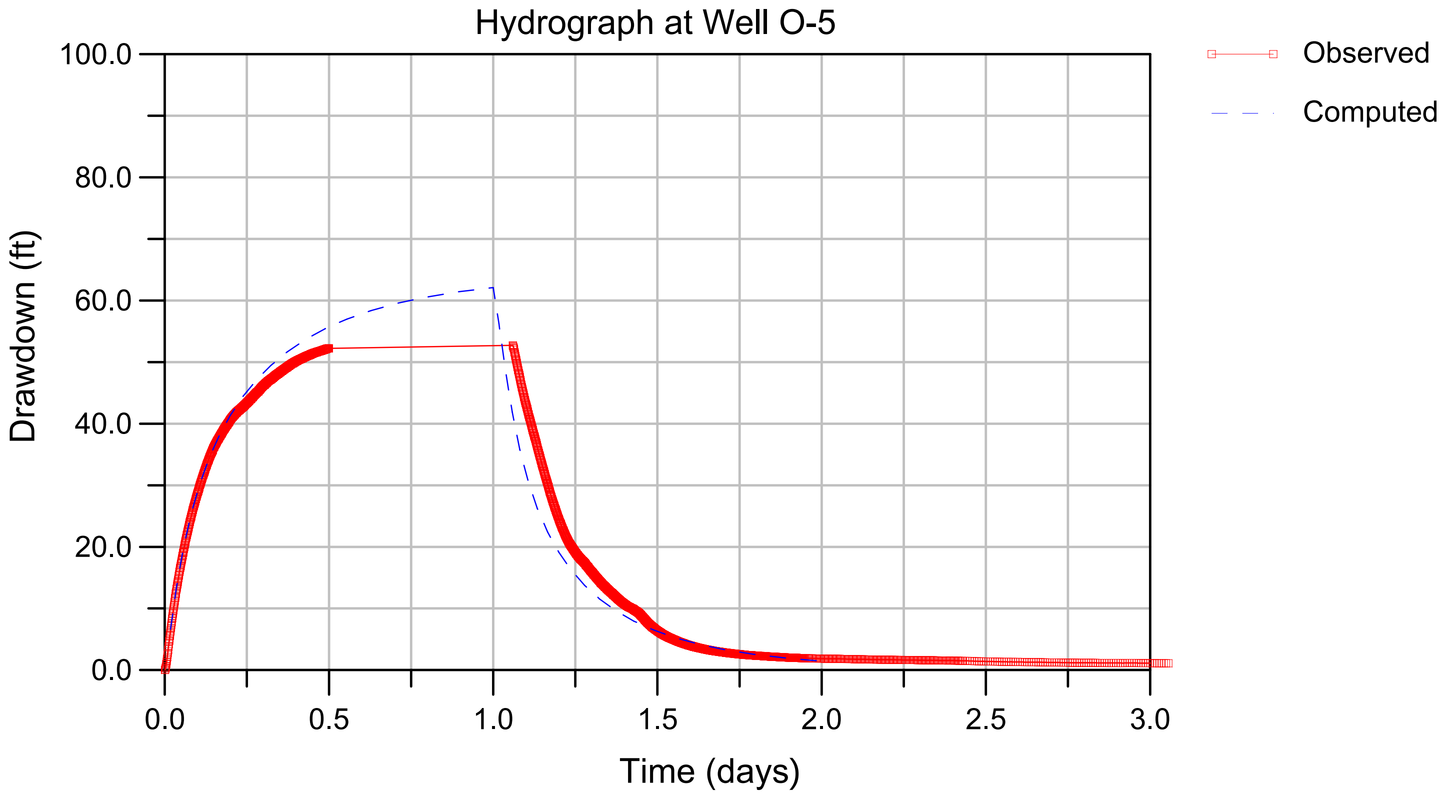
Observed and Simulated Drawdown in Observation Well O-5
(east to west)



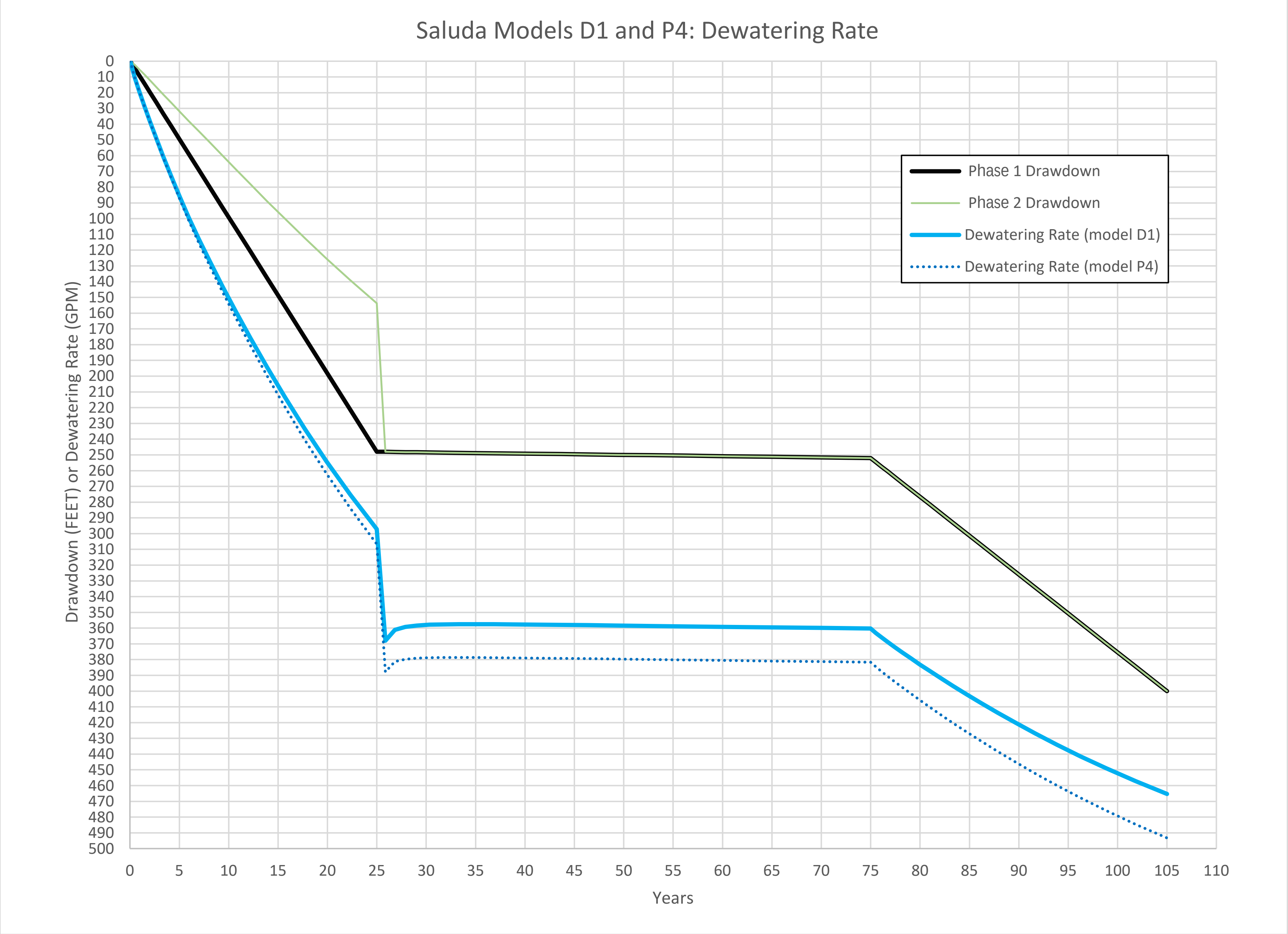
Observed and Simulated Drawdown in Observation Well O-4
(far field)



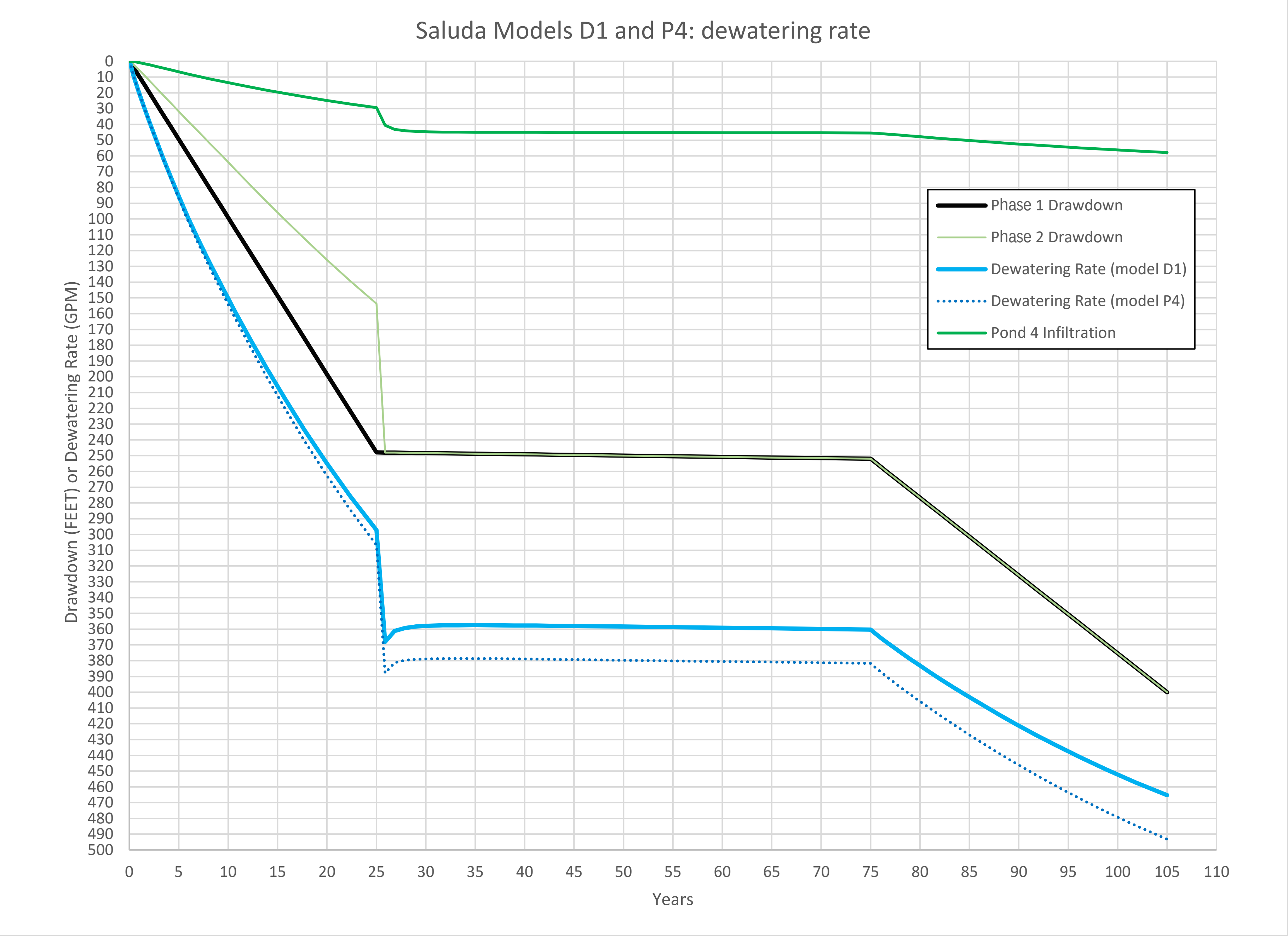
Observed and Simulated Drawdown in Observation Well O-5 (far field)



Dewatering Rate in Dry Model (D1) and Pond 4 Infiltration Model (P4); and Drawdown over Time in Phase 1 Pit and Phase 2 Pit



Dewatering Rate in Dry Model (D1) and Pond 4 Infiltration Model (P4); Pond 4 Infiltration Rate; and Drawdown over Time in Phase 1 Pit and Phase 2 Pit



Drawdown over Time in Phase 1 Pit, Phase 2 Pit, and Observation Wells; Dry Model (D1) (no re-infiltration of discharge water) and Pond 4 Infiltration Model (P4)