

GROUNDWATER OBSERVATION PLAN

Fairfield, SC Quarry

Schnabel Reference #19C19037.00
July 31, 2020

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Mr. John Aultman
Vulcan Construction Materials, LLC
201 Brown Road
Piedmont, SC 29673

**Subject: Groundwater Observation Plan
Fairfield, SC Quarry
Schnabel Reference 19C19037.00**

Dear Mr. Aultman:

SCHNABEL ENGINEERING, LLC is pleased to submit our groundwater observation plan for this project.

1.0 EXECUTIVE SUMMARY

The proposed Fairfield, SC Quarry is located in a metamorphosed granitic deposit within the Piedmont geologic setting. Quarrying activities have taken place historically in Fairfield County. Based upon extensive knowledge in conducting mining operations in such settings and related groundwater studies, it has been Vulcan's experience that the ability of groundwater to move within the rock mass is very limited. This groundwater flow characteristic has also been well documented in a variety of published reports with similar geology. Consequently, no off-site drawdown of the groundwater table extending from the project site to surrounding properties is anticipated. Nevertheless, in an abundance of caution and in the interest of protection for surrounding properties, Vulcan proposes to implement a Groundwater Observation Plan to ensure that neighbors' wells and properties will not be adversely affected by the proposed operations. We are providing this executive summary solely for purposes of overview. Any party that relies on this plan must read the full plan.

1.0 PURPOSE

The purpose of the Groundwater Observation Plan is to enable Vulcan to measure static groundwater levels on a continual basis to document changes, if any, to the existing groundwater levels, and if any such changes have the potential to extend beyond the quarry property. There are a number of factors that affect groundwater levels including surface water features, rainfall (or lack thereof), site geology, and the number and extent of existing groundwater users. This Plan is designed to detect groundwater

drawdown at the perimeter of the project site. If conditions are detected that indicate a potential risk of drawdown to domestic wells located off site, remedial actions can then be taken to eliminate or otherwise mitigate such impacts. In the unlikely event that a neighboring domestic well is reported to have a supply issue, the data collected by this program will assist in analyzing what influence, if any, the quarry may be having related to the observed condition.

Should groundwater be encountered during operations, it will be collected in the pit sump(s), temporarily stored and pumped periodically to surface collection pond(s) for use in the process plant and for dust suppression. Due to topography, surface hydrology and typical low aquifer transmissivity in Piedmont geology, any groundwater drawdown that may occur is expected to extend only a few hundred feet from the outer pit boundary, remain well within the quarry property and not extend onto adjoining properties.

2.0 POTENTIAL TO IMPACT OFFSITE WATER SUPPLY WELLS

Typical sources of groundwater for domestic wells in the immediate vicinity of the proposed quarry are from the granitic bedrock aquifer and possibly from the shallow overburden (the unconsolidated aquifer) where present. Both units have the potential to be groundwater bearers, and extend over the general area in and around the proposed Fairfield Quarry. However, both potential aquifers typically have low transmissivity characteristics that limit the horizontal distances that groundwater will travel in response to pit dewatering.

The unconsolidated aquifer is unconfined and under static water table conditions, i.e., not under artesian pressure. The unconsolidated aquifer is relatively thin (an average of 44 feet thick) and is dissected by surface drainages. Surface drainages (streams, creeks) typically act as hydrologic boundaries within unconsolidated aquifers and therefore shallow flow does not extend across these boundaries. Consequently, the potential for groundwater drawdown extending beyond the permit area in the unconsolidated aquifer is limited by the location of streams and creeks on two sides of the proposed mine pit.

Groundwater hydrology in crystalline rock aquifers depends upon the natural fractures in the rock for groundwater flow. The recharge to the bedrock aquifer is a function of the thickness of the overlying sediments/weathered rock and how much precipitation is received. However, the transmissivity of these fractures is typically relatively low (as compared to clastic aquifers) and the fractures, which are often not interconnected, diminish with depth. In other words, the fracture widths and their ability to transmit groundwater diminish with depth. Consequently, with a low transmissivity aquifer (as is anticipated at this site), groundwater drawdown is typically limited to only a few hundred feet from the edge of the mine pit.

3.0 OBSERVING THE PIT'S INFLUENCE ON GROUNDWATER LEVELS

The final pit areal extent is planned to be approximately 98 acres in surface area. Based upon aerial photos and public domain satellite imagery, there are 14 property tracts within 1/2 mile (2,640 feet) of the mining area. The well inventory will more accurately determine the total number of wells within the 1/2 mile radius.

The current plan is to locate four (4) groundwater observation wells around the proposed mine permit area. The Groundwater Observation Plan, Figure 1 shows the proposed location of the observation wells. The planned observation wells will be a telescoping well construction, that is, it will extend into the granite aquifer and have the overburden sealed off with a surface casing. These observation wells will be finished as open hole constructions in the granite bedrock. If the well inventory determines that there are

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shallow domestic wells within the 1/2 mile radius, shallow observation wells may be included or substituted at one or more of the proposed observation well locations. These observation wells (if needed) will be constructed in such a way that they provide representative shallow groundwater elevation and flow data for comparison to off-site domestic wells.

Ground surface and top of casing elevations will be established for each observation well so all groundwater data can be recorded in elevations relative to mean sea level (+/-MSL). Groundwater data will be manually measured using a water level indicator for each observation well on a monthly basis. These groundwater elevation data will be reported on a quarterly basis.

Often, water table elevations are affected primarily by rainfall as opposed to pit pumping. Therefore, daily rainfall data will be collected at the site. In addition, daily quarry pit pumping data will be collected. These data will all be reduced and evaluated for correlation to groundwater elevations at the proposed quarry.

Observation wells OBW-1, OBW-2, OBW-3, and OBW-4 will be located in the general directions of the closest residents to provide groundwater elevation data in their respective areas. This is planned to provide assurances that the groundwater data collected is relevant to these neighboring properties. Groundwater observations will continue throughout the mining process utilizing the proposed groundwater observation wells. This long-term groundwater data collection plan will: 1) document groundwater conditions over the life of the quarry; 2) document groundwater conditions with regard to neighboring properties before any impacts would potentially occur offsite; 3) allow Vulcan to adjust mining plans if warranted; and 4) provide site specific data to determine what influence, if any, the quarry has should a neighbor report a well failure or malfunction.

Sincerely,

SCHNABEL ENGINEERING, LLC



David J. Ebinger, PG
Project Geologist



P. Brent Scott
Senior Associate

Figures

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Fairfield, SC Quarry

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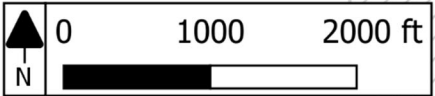
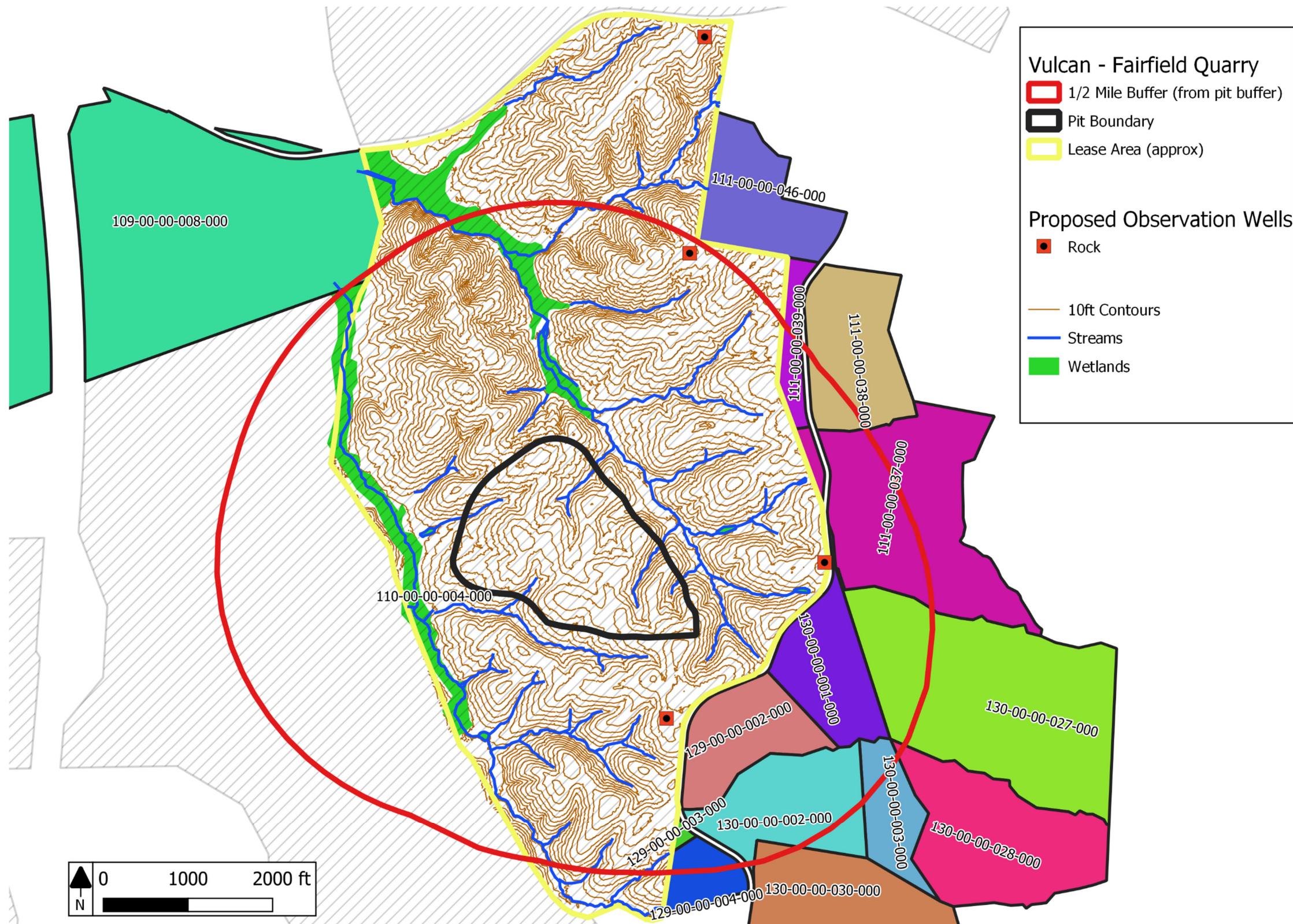
Attn: John Aultman, Vulcan Construction Materials, LLC

Others (1 Copies)

Attn: Craig Kennedy, Kennedy Consulting Services

FIGURES

Figure 1: Observation Well Plan



VULCAN CONSTRUCTION MATERIALS, LLC
FAIRFIELD QUARRY

DRAWN BY:
DE

DATE:
03/11/2020

OBSERVATION WELL PLAN

CHECKED BY:
PBS

SCALE:
AS SHOWN

PROJECT NO.: 19C19037.00