July 1, 2025

TO: Adolfo Mendoza
2801 S. College Rd.
Wilmington NC, 28412

RE: Preliminary soil and site suitability evaluation of the 2.41 ac tract off Neck Rd., Bolivia, Brunswick County, NC. Parcel #: 1540004401. Job #:P.ENV0005590

Dear Connor,

On Tuesday, July 1st, 2025, Davey Resource Group (DRG) evaluated the 2.41 acre tract off Neck Road, Bolivia, Brunswick County, NC. The purpose of the evaluation was to determine the suitability of the soil resources for onsite wastewater for multiple residential dwellings on the property. Multiple shallow auger borings were observed, and limited soil information was collected. The property corners were not marked in the field. Accordingly, a GIS tax parcel boundary along with a hand-held GPS was utilized to determine the location of review during the evaluation. We utilized the 15A NCAC 18A .1900 laws and rules for subsurface wastewater application and the Southeast Regional Supplement to the US Army Corps of Engineers Wetland Manual as guides. Per NC State regulations, soil evaluations include and must meet the following for a location to be deemed suitable for subsurface onsite septic systems-landscape position, soil characteristics (structure, color, and minerology), soil wetness condition (SWC), restrictive horizons, and available space. The findings for this evaluation are cursory only. This information is our best professional judgement on whether septic system(s) for residential home(s) are feasible for this property. Accordingly, I offer the following guidance.

Generalized Septic System Requirements

Each septic system drain field type requires different soil characteristics and has limiting soil conditions. In sandy soils a shallow conventional gravel system, chambers, and EZ Flow polystyrene require 30 inches of suitable soil and depth to the soil wetness condition (SWC). Loamy or clayey soils require 24 inches to the SWC for conventional systems. Low pressure pipe (LPP) requires 24 inches to SWC. T&J Panel Block is an alternative gravel aggregate that reduces the drain field area by 50% and requires 26 inches to SWC for all soil types. Fill mounds for both gravel, T&J Panels, or LPP require 12 inches to SWC and 18 inches of suitable structure. Drip irrigation requires 13 inches to SWC and 18 inches of suitable structure.

Reduction systems and configurations such as T&J Panels, Chambers, EZ Flow, or bed configurations may be considered to reduce the overall size of the drain field. These system types can reduce the amount of linear line length and field area by 25% to 50%.

Additional note on drip irrigation systems: while they can be a way to maximize the suitable soil area on a lot, also they are costly to maintain, require a pump and bi-yearly maintenance contract.

A residential structure will have a flow rate of 120 gallons per day (gpd) per bedroom. For example, a 3-bedroom home will have a residential flow rate of 360 gpd. Any lot in North Carolina recorded after January 1, 1983, requires area for an initial system to be installed and repair field area to be set aside in the instance of failure of the initial. The gallons per day of a home along with the estimated long-term acceptance rate (LTARs) and depth to the soil wetness condition (SWC) of the soil are used to calculate the size and parameters of a system for the different soils identified on the lot that will be described below.

Description

The area examined is approximately 2.41 acres and the vegetation was mostly forests of mixed pine and hardwood trees with light to moderate underbrush. The northern boundary of the parcel has a generally high elevation with the topography sloping down towards the southern boundary. The parcel boundary is indicated by the red outline seen in Figure 1.

Soil Evaluation

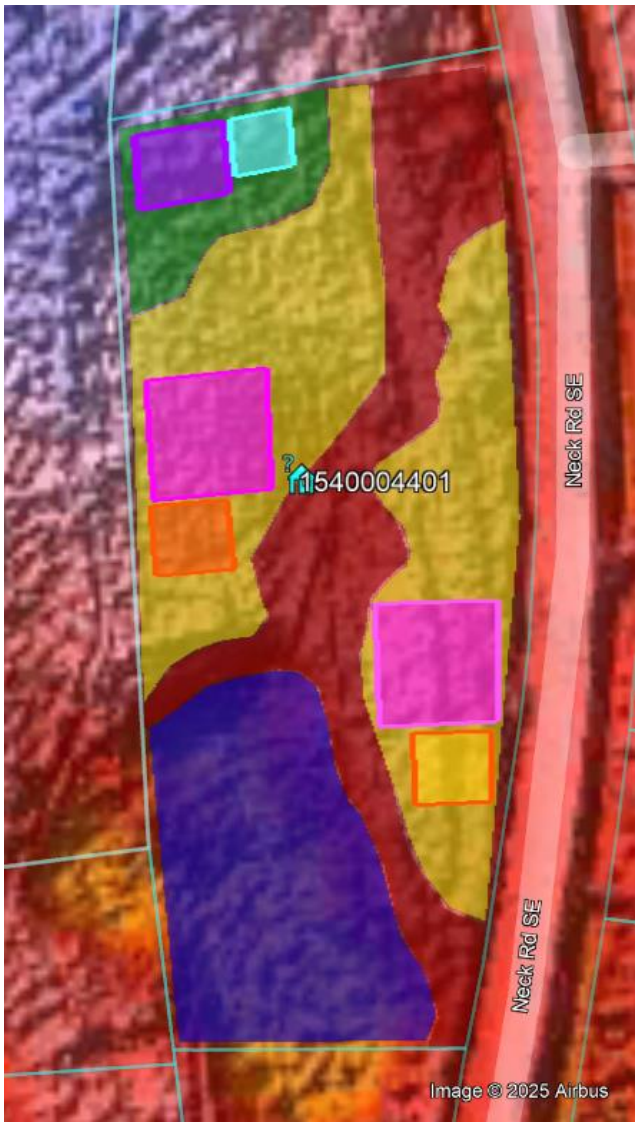
The soils identified on the site can generally be grouped into 4 types identified by the green, yellow, red and blue map units as seen in Figure 1. Suitable soils for any type of onsite wastewater are within the green and yellow units. Soils in the green unit are coarse loams over fine loams with a 24-36in depth to soil wetness indicators (SWC) from the existing surface. This unit of soil has an estimated long-term acceptance rate (LTAR) of 0.4 to 0.7 gpd/ft^2 with 0.4 gpd/ft^2 being the most common. The yellow map unit indicates coarse loams over fine loams with an estimated LTAR of 0.4-0.6 gpd/ft^2 and approximately 12-

24in depth to the SWC where an LTAR of 0.4 gpd/ft^2 and a depth to SWC of around 20 inches is the most common depth.

The red soil map unit would be considered unsuitable for onsite wastewater and portions of this unit may contain jurisdictional wetlands. This map unit contained soils that did not appear to meet the minimum separation to the SWC and/or were in unsuitable landscape positions. Portions of this soil were coarse and fine loams that had soil colors of 2 or less chroma and would be considered unsuitable for any type of subsurface wastewater system design as per rules .0504 and/or .0502.

The blue map unit identifies soils that may be considered 404 wetlands which are regulated by the US Army Corps of Engineers (COE). Only the COE can determine the absolute extent of 404 wetlands. Impacts to jurisdictional 404 wetlands require COE review and permitting approval.

Figure 1. Soil testing area, soil units, and potential system configurations



*Google Earth Imagery with Parlay GIS Taxparcel Boundaries and DRG site testing Overlay.

Project Discussion

The green soil map unit may provide a good option for an onsite wastewater system and represents soils that may be suitable for shallow conventional septic systems and other innovative systems. A shallow conventional system for a 3-bedroom system designed with the most common LTAR for the green map unit on site (0.5 gpd/ft^2 LTAR) would be approximately 39ft x 48ft or (5) 48ft gravel drain lines for a full-sized initial. This area can be represented as the purple rectangle in Figure 1.

Due to space available within the green mapping unit, a space reduction systems and configurations such as T&J Panel may be considered to reduce the overall size of the area. T&J Panel Block is an alternative gravel aggregate that reduces the drain field area by 50%. The T&J panel systems can be seen as the aqua rectangle repair area in Figure 1.

The yellow soil map unit may provide an option for an onsite wastewater system and represents soils that may be suitable for a modified fill mound, alternative, or drip irrigation system. Fill systems require a much larger space to design, incorporating added fill sand which will be costly and space-consuming. T&J Panel block system in fill can be represented by the pink rectangle and would be approximately 67ft x 68ft which is (4) 30ft line installed into a 2.1ft fill mound. In places where there is 18 inches or more to the SWC and space is limited, drip can reduce the footprint to approximately 1,440sqft and can be seen as repair areas in orange in figure 1.

Pump tanks may be required if gravity flow cannot be achieved to the drain field. Nitrification field can be placed away from proposed dwelling which gives versatility for where the house can be placed. A more detailed site investigation is required to prove that the above-mentioned proposed systems are possible. Our office can assist with permitting if desired, however, no guarantees can be made without a detailed site investigation.

Please note that the soil resources on this lot are very limited in some areas and if development is to be pursued any clearing must be conducted with an abundance of care. Disturbing and/or removing even a few inches of soil will likely render the large portions of already limited area unsuitable for most onsite wastewater systems due to the already shallow soil wetness condition in many places. Site clearing should only be conducted during low soil moisture conditions, utilizing low ground pressure, track based machinery. It is recommended that you utilize a site clearing contractor that understands how to limit soil disturbance within purposed septic areas.

Summary

In summary the parcel off Neck Rd in Bolivia was evaluated for the placement of multiple onsite wastewater systems for possible residential dwellings. It may be possible to get up to 3 individual dwellings on the parcel, with two likely requiring large fill mound systems and one utilizing a more conventional system. Any proposed well must maintain 50 feet from adjacent septic systems and

components and 25 feet from any house foundation. The findings listed in this report are based upon limited ground truthing, available records and our best professional judgement. This report does not guarantee a wastewater permit as all areas are subject to review and approval by the appropriate local and/or state permitting agency. Please be advised that editing a document sealed by a licensed soil scientist is illegal and may result in legal action. Any unauthorized modification, alteration, or revision of a sealed document is strictly prohibited per NC Code Chapter 89F-19 (a). If you have any questions about this report or need any additional information, I may be reached at 910-452-0001, 910-471-0505, or at nicholas.howell@davey.com .

Sincerely,

C. Purdy
Environmental Scientist

Nicholas “Nick” P. Howell
NC Licensed Soil Scientist #1294