



PIEDMONT
ENVIRONMENTAL
ASSOCIATES, P.A.

November 27, 2023
3769

Project #

KC2 Development
Kyler Zadell
218 Edinburgh Dr.
Cary, NC
27511, United States

RE: Responses to Chatham County Planning Comments, Property Located at 4980
Beaver Creek Road., Wake County, NC, PIN: 0005491 (Approx: 40 acres).

Mr. Zadell,

In Fall of 2022 my firm was hired to conduct a preliminary soil investigation of the above referenced property. A copy of our preliminary soil report and map is provided in Attachment 1.

In that report, we suggest allowing 20,000 – 30,000 square feet for surface drip systems. It should be noted that this is a *very conservative estimate* for these types of systems to allow the most flexibility from a land planning standpoint.

Since this time, an updated land plan has been provided showing additional setbacks to intermittent streams and wetlands. A copy of the revised land plan with soil areas is provided in Attachment 2. Based on these constraints Lot 5 is now the most limiting, with 12,400 sq ft of surface drip soils available.

The determination of drain field size for a single-family surface drip system is dependent on values of in-situ saturated hydraulic conductivity (K_{sat}) and water budget calculations, per NC Division of Environmental Quality (NC DEQ) guidelines. Attachment 3 provides a sample water budget calculation sheet. We utilized a representative K_{sat} value from similar sites in Chatham County where permits have been issued from our work (0.010 in/hr). As shown in Attachment 3, these K_{sat} values would generate a required irrigation area of 11,172 sq ft, which is well below the 12,400 sq ft of the most limited lot of this project.

Our conclusion is surface drip systems are permissible on this project. A sample water budget shows a required disposal area that is well below that of the most restrictive lot.

We are pleased to be of service in this matter. If you have additional questions, please contact me at 336-662-5487.

Sincerely,



List of Attachments:

- Attachment 1, Original Soil Report and Map
- Attachment 2, Land Plan with Revised Soil Areas, Fall 2023
- Attachment 3, Representative Single Family Water Budget Calculation Sheet



PIEDMONT
ENVIRONMENTAL
ASSOCIATES, P.A.

November 2, 2022

Project # 3769

KC2 Development
Kyler Zadell
218 Edinburgh Dr.
Cary, NC
27511, United States

RE: Detailed Soil/Site Evaluation on Property Located at 4980 Beaver Creek Road., Wake County, NC, PIN: 0005491 (Approx: 40 acres).

Mr. Zadell,

This report details the findings of a detailed site and soil evaluation performed on the tract referenced above. The evaluation was conducted at the clients written request to determine the site's suitability for the installation of sub-surface wastewater disposal systems to serve domestic strength wastewater. This evaluation was for residential wastewater applications. Any other type of use may require additional testing and/or stricter setbacks. This report does not address systems receiving more than 3,000 gallons per day of flow.

The evaluation was conducted by Chris Murray, North Carolina Licensed Soil Scientist on Tuesday, October 25, 2022. The evaluation was conducted during moist soil conditions with the use of a hand-auger to determine soil suitability for on-site sewage disposal systems in accordance with 15A NCAC 18A .1900 "Laws and Rules for Sewage Treatment and Disposal Systems". Characteristics that affect the suitability of sub-surface systems include soil depth to expansive clay, seasonal high-water table, rock, and unusable saprolite. Topography and slope also affect the suitability of an area for septic systems. The evaluation of these components was conducted on the site. The level of the evaluation was detailed for this tract.

Findings are conveyed by showing areas on the enclosed map that are usable for different system types. Areas that are suitable for EZ Treat subsurface drip wastewater systems (which require no additional soil testing) are hatched in pink. These areas have usable topography and a minimum slope-corrected soil depth of 18 inches. Areas that are suitable for TSII pre treatment subsurface drip wastewater systems (which require additional ksat soil testing) are hatched in purple. These areas have usable topography and a minimum slope-corrected soil depth of 13 inches. Areas that are suitable for surface drip wastewater systems (which require additional soil testing and are permitted through NC DEQ) are hatched in blue. These areas have usable topography and a minimum slope-corrected soil depth of 12 inches. All hatched areas are generated using gps technology in the field and are not survey located. The areas are labeled with approximate square footages.

Once the soils map is complete the size of area required for a septic system can be estimated. Residential systems are sized according to the number of bedrooms in the proposed dwelling.

Systems are not sized based on the number of bathrooms in the dwelling. Each bedroom in the proposed dwelling is calculated to generate a daily flow of 120 gallons. A four-bedroom dwelling would have a daily calculated flow of 480 gallons. The daily flow is divided by the loading rate based on the soil texture. This site has a clay texture so would have an estimated long-term acceptance rate (LTAR) of 0.1 gallons per square foot of trench bottom per day. The minimum required area or square footage on the ground for the primary septic system and the repair area with this LTAR for the conventional hatched areas would be approximately 10,000 – 15,000 square feet for a subsurface drip type system and 20,000-30,000 square feet for a surface drip type system. These areas must meet all setbacks from property lines, wells, water lines and structures as well as any other easement imposed by other entity. All lots will require an application and evaluation by the county health department on an individual basis.

This report discusses the general location of potentially usable soils for on-site wastewater disposal and the soil and site limitations on the property that exists at the time of the evaluation. Piedmont Environmental Associates, PA (“Piedmont”) provides professional consulting specializing in the practice of soil science and wastewater management. Piedmont is therefore hired for its professional opinion regarding these matters. Laws and rules governing wastewater treatment and disposal are forever evolving and subject to the interpretation and opinion of individuals which are employed by local and state agencies that govern these laws and rules. Due to this fact, Piedmont cannot guarantee in any way that any area located in the field, shown on a sketch, or discussed with the client will be permitted by any of these agencies. It is for this reason that **Piedmont strongly recommends to anyone considering a financial commitment on any piece of property be completely aware of all permit requirements on that property before purchase and obtain those permits prior to a final financial commitment.** We are pleased to be of service in this matter. If you have any further questions, please feel free to call (336)662-5487

Sincerely,



G. Christopher Murray
NC Licensed Soil Scientist #1284
Piedmont Environmental Associates, P.A.

Attachment I

.1950 Location of Sanitary Sewage Systems

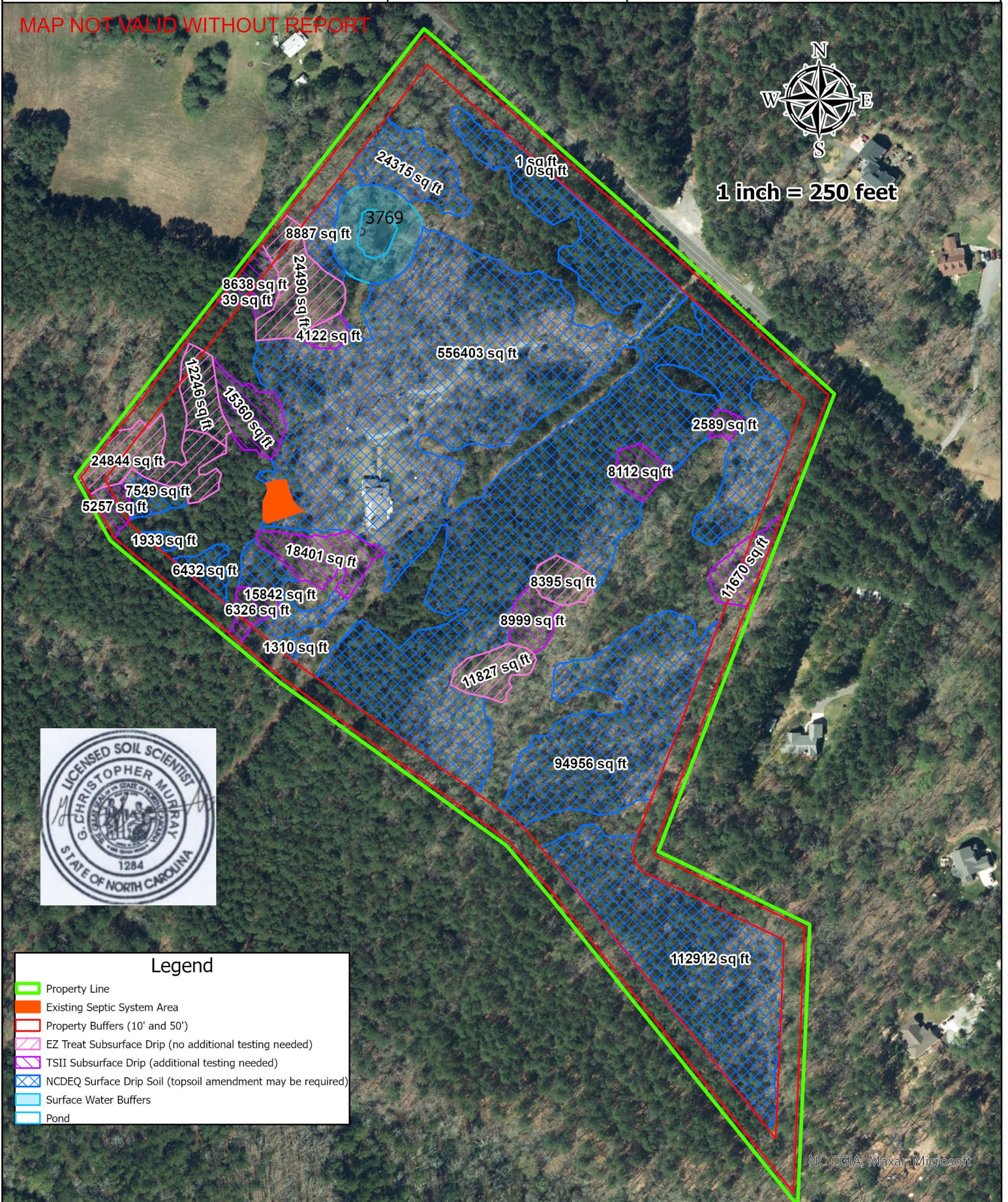
- (c) Every sanitary sewage treatment and disposal system shall be located at least the minimum horizontal distance from the following:
- | | |
|--|----------|
| (1) Any private water supply source including a well or spring | 100 feet |
| (2) Any public water supply source | 100 feet |
| (3) Streams classified as WS-I | 100 feet |
| (4) Water classified as S.A.
from mean high water mark | 100 feet |
| (5) Other coastal waters
from mean high water mark | 50 feet |
| (6) Any other stream, canal, marsh, or other surface waters | 50 feet |
| (7) Any Class I or Class II reservoir
from normal pool elevation | 100 feet |
| (8) Any permanent storm water retention pond
from flood pool elevation | 50 feet |
| (9) Any other lake or pond
from normal pool elevation | 50 feet |
| (10) Any building foundation | 5 feet |
| (11) Any basement | 15 feet |
| (12) Any property line | 10 feet |
| (13) Top of slope of embankments or cuts of 2 feet or more
vertical height | 15 feet |
| (14) Any water line | 10 feet |
| (15) Drainage systems: | |
| (A) Interceptor drains, foundation drains and storm water diversions | |
| (i) upslope | 10 feet |
| (ii) sideslope | 15 feet |
| (iii) downslope | 25 feet |
| (B) Groundwater lowering ditched and devices | 25 feet |
| (16) any swimming pool | 15 feet |
| (17) any other nitrification field (except repair area) | 20 feet |
| (b) Ground absorption, sewage treatment and disposal systems may be located closer than 100 feet from a private well supply, except springs and uncased wells located downslope and used as a source of drinking water, repairs, space limitations and other site-planning considerations but shall be located the maximum feasible distance and, in no case, less than 50 feet. | |
| (c) Nitrification fields and repair areas shall not be located under paved areas or areas subject to vehicular traffic. If effluent is to be conveyed under areas subject to vehicular traffic, ductile iron or its equivalent pipe shall be used. However, pipe specified in Rule .1955 (e) may be used if a minimum of 30 inches of compacted cover is provided over the pipe. | |

Note: Systems over 3000 GPD or an individual nitrification fields with a capacity of 1500 GPD or more have more restrictive setback requirements, see .1950 (a) (17) (d) for specifics.









MAP NOT VALID WITHOUT REPORT

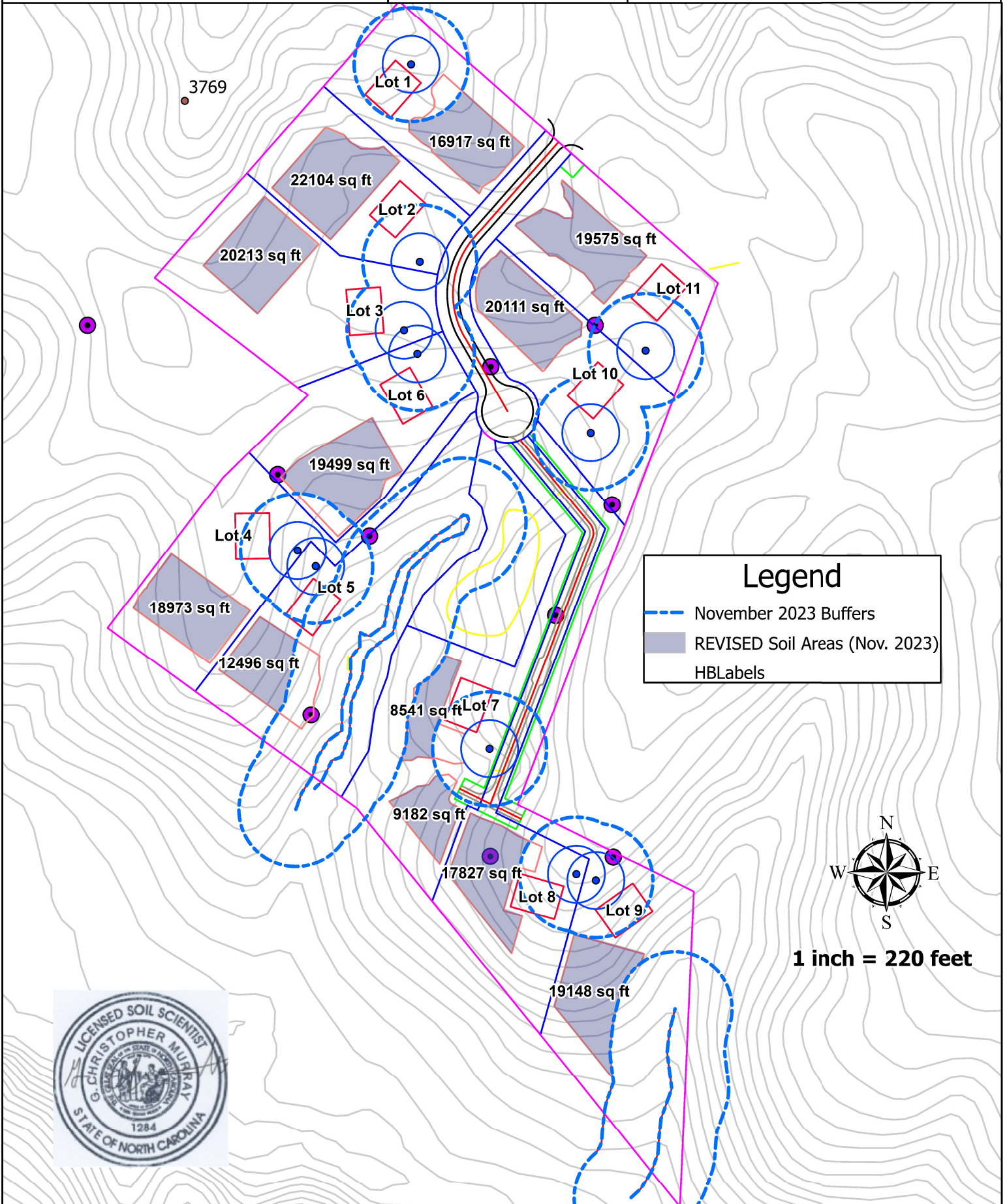


1 inch = 250 feet



Legend

-  Property Line
-  Existing Septic System Area
-  Property Buffers (10' and 50')
-  EZ Treat Subsurface Drip (no additional testing needed)
-  TSII Subsurface Drip (additional testing needed)
-  NCDEQ Surface Drip Soil (topsoil amendment may be required)
-  Surface Water Buffers
-  Pond



Legend

- November 2023 Buffers
- REVISED Soil Areas (Nov. 2023)
- HBLLabels



1 inch = 220 feet



SFR Irrigation Area Calculation Worksheet (15A NCAC 02T .0600 ONLY)

Project Name: EXAMPLE

Design Flow = 360 gal/day	Annual Hydraulic Loading Rate = 18.87 inch/yr
SFR Loading Rate Group: SFR-C	
Limiting Soil K_{sat} = 0.010 inch/hour	Irrigation Area = 11,172 square ft
Drainage Coefficient = 0.430	= 0.25648 acres

Drainage Rate = **0.1032** inch/day (Formula: $K_{sat} * \text{Drainage Coefficient} * 24$)

	Number of Days in the Month	PET (in/mo)	Vertical Drainage (in/mo)	80th Percentile Monthly Precipitation (in/mo)	Maximum Allowable Irrigation (in/mo)	Maximum Allowable Irrigation (gallons/day)	Maximum Allowable Irrigation (gallons/month)
January	31	0.29	3.20	4.47	0.00	0	0
February	28	0.51	2.89	3.58	0.00	0	0
March	31	1.20	3.20	5.34	0.00	0	0
April	30	2.30	3.10	3.80	1.59	370	11,101
May	31	3.94	3.20	2.81	4.34	974	30,199
June	30	5.52	3.10	3.64	4.98	1,157	34,696
July	31	6.36	3.20	6.84	2.72	611	18,933
August	31	5.73	3.20	6.21	2.72	610	18,918
September	30	3.92	3.10	7.22	0.00	0	0
October	31	2.20	3.20	3.60	1.79	403	12,494
November	30	1.03	3.10	3.42	0.71	165	4,947
December	31	0.37	3.20	3.55	0.02	4	113
TOTAL =	365	33.38	37.67	54.48	18.87	4293.27	131,400

Formulas: (Max. Allowable Irrigation) = (PET) + (Drainage) - (Precipitation)

SFR Loading Rate Table		
SFR Loading Rate Group	Maximum Annual Loading Rate (in/yr) Low - High	Geometric Mean K_{sat} Range (in/hr) Low - High
SFR-A	26.0 - 50.0	>0.05
SFR-B	19.5 - 26.0	0.015 - 0.05
SFR-C	13.0 - 19.5	0.003 - 0.015
SFR-D	0.0 - 13.0	0.0 - 0.003

Assignment to a SFR Loading Rate Group for each 15A NCAC 02T .0600 permit application shall be determined by the geometric mean of insitu saturated hydraulic conductivity data collected in the most restrictive horizon for each soil mapping unit within the irrigation area.

Required Flow		
2 bedrooms	240 gal/day	87,600 gal/yr
3 bedrooms	360 gal/day	131,400 gal/yr
4 bedrooms	480 gal/day	175,200 gal/yr
5 bedrooms	600 gal/day	219,000 gal/yr
6 bedrooms	720 gal/day	262,800 gal/yr
Maximum allowable irrigation: 131,400 gal/yr		
The Maximum Allowable Irrigation number must be greater than or equal to the required flow.		