

PTA Attachment XVII
Landfill Impact Statement
Green Ridge Recycling and Disposal Facility
Permit No. (Pending)
Cumberland County, Virginia



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December 9, 2019



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I certify that I have prepared or supervised preparation of the attached report, that it has been prepared in accordance with industry standards and practices, and that the information contained herein is truthful and accurate to the best of my knowledge.

Certified this 9th day of December, 2019

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1.0 EXECUTIVE SUMMARY

Green Ridge Recycling and Disposal Facility, LLC (Green Ridge) is seeking permit approval to construct and operate a privately-owned solid waste disposal facility (Facility) in Cumberland County (County), Virginia. Draper Aden Associates (DAA) has prepared this Landfill Impact Statement (LIS) for Green Ridge in accordance with the requirements of the Code of Virginia, §10.1-1408.4.A.2 and B.6, and the *Virginia Solid Waste Management Regulations (VSWMR)* §9 VAC 20-81-460.H, Part A Landfill Permit Application. This LIS is a standalone document and satisfies a portion of the requirements for the Part A Permit Application, Attachment XVII, as required by the Virginia Department of Environmental Quality (DEQ), Solid Waste Permitting, Submission Instruction No. 1, Procedural Requirements for a New or Modified Solid Waste Management Facility (SWMF) Permit Application.

The purpose of the LIS is to assess the potential environmental impacts of the proposed sanitary landfill on existing parks and recreational areas, wildlife management areas, critical habitat areas of endangered species as designated by applicable local, state, or federal agencies, public water supplies, marine resources, wetlands, historic sites, fish and wildlife, water quality, and tourism within a five-mile radius of the Facility. In addition, appropriate state agencies were contacted to request their opinion on the impact of the Facility on the resources listed above. Findings by those agencies along with studies conducted by consultants hired by Green Ridge are presented herein, along with an evaluation of landfill siting, configuration alternatives, and feasibility. Potential negative impacts identified in the studies and potential solutions to those impacts are discussed.

The proposed Facility site is located in eastern Cumberland County, in Clinton, Virginia. The site is comprised of 13 parcels totaling approximately 1,178 acres north of U.S. Route 60 (Anderson Highway), and loosely bounded by Route 654 (Pinegrove Road) and Route 685 (Miller Lane). Current conceptual plans envision approximately 238 acres being dedicated to the waste disposal unit (disposal footprint). A large portion of the site has been subjected to growing and harvesting timber. Green Ridge has received approval of a Conditional Use Permit from the County to construct and operate a landfill at the proposed Facility. The Conditional Use Permit addresses special conditions for development of the Facility.

The County and Green Ridge executed a Host Agreement (Agreement) on August 2, 2018 as amended on July 11, 2019 (**NOI-PTA ATTACHMENT VI**). The Agreement outlines the provisions under which the County and Green Ridge will forge a long-term relationship that will be beneficial to both parties. The County will receive financial stability through guaranteed income in the form of host fees, reduced solid waste disposal costs, a long-term disposal option, and increased job opportunities for residents of the area.

By conducting a thorough site screening and selection process, evaluation of potential impacts to regulatory-specified area resources, and confirmation of the findings with the appropriate agencies, no negative impacts are anticipated that would not be addressed and mitigated as part of the various permitting and approval processes. Simply put, the site evaluation process supports one of the main objectives of the project: to provide a Facility that serves the public interest by providing the County with a reliable and substantial source of revenue, which can be used to offset costs of needed infrastructure

improvements (such as schools), and cost control through significantly reduced solid waste disposal costs, and a long-term disposal solution. The proposed project will be able to accomplish these goals while eliminating, avoiding, and/or mitigating potential negative impacts to the surrounding community. By completing the permitting process for all of the required operating permits, the Facility will have planned, designed and undergone regulatory review of proposed controls to adequately protect both human and environmental health and safety.

1.1 Introduction

The Green Ridge Recycling and Disposal Facility, LLC (Green Ridge) is seeking approval to construct and operate a privately-owned solid waste disposal facility (Facility) in Cumberland County (County), Virginia. The proposed sanitary landfill will provide an environmentally sound and responsible solid waste management solution, addressing the need for cost-effective disposal of non-hazardous solid waste. The siting, permitting and operations of the proposed Facility shall be in accordance with the *Virginia Solid Waste Management Regulations (VSWMR)*, which are implemented and enforced by the Virginia Department of Environmental Quality (DEQ). This LIS has been prepared in accordance with 9 VAC 20-81-460 H and applicable Submission Instructions developed by the Virginia Department of Environmental Quality (DEQ).

This LIS is one piece of a larger application package for the Part A Permit submission (Attachment XVII of the Part A). Throughout this document, references will be made to Appendices, which will refer to material supplemental to this impact statement. References to Attachments shall refer to the overall Part A Permit submission package and its various sections that align with the submission instructions. Obtaining a permit for a solid waste management facility from the DEQ involves submitting the Part A Permit package, including a Notice of Intent that can be submitted prior or concurrently, and submitting a Part B Permit package subsequent to the Part A. The Part A Permit Application is intended to address requirements for general siting criteria (setback from public water supplies, parks and recreational areas, schools, homes, etc.) and demonstrate that the proposed Facility: is located in a geologically stable region; does not adversely impact rare, threatened or endangered species; and can be reasonably monitored for groundwater impacts between the proposed Disposal Unit Boundary and the overall Facility Boundary. The Part B Permit application pertains to the engineering related items and addresses the detailed design, operating plans, construction quality assurance plans, closure and post-closure plans, and financial assurance.

2.0 PURPOSE OF AND NEED FOR ACTION

The purpose of a Landfill Impact Statement (LIS) is to identify the potential environmental impacts to existing parks and recreation areas; wildlife management areas; critical habitat areas of endangered species as designated by applicable local, state, or federal agencies; public water supplies; marine resources; wetlands; historic sites; fish and wildlife; water quality and tourism that could result from the construction and operation of a proposed sanitary landfill. The potential impacts, or lack thereof, are discussed in further detail in Section 4.0, Affected Environments of The Selected Alternative.

3.0 ALTERNATIVES, INCLUDING THE SELECTED ALTERNATIVE

The following section outlines the actions taken and factors considered by County Waste of Virginia, LLC (“County Waste”) and Green Ridge Recycling and Disposal, LLC (“Green Ridge”) in evaluating alternative sites prior to choosing the one undergoing permitting. Green Ridge is a subsidiary of County Waste. County Waste initiated the planning for this project including alternative site evaluations, then passed the permitting to Green Ridge after Green Ridge was approved by the State Corporation Commission as an LLC on May 10, 2018.

In general, when considering the permitting of a new landfill there are three broad categories of alternatives that can be considered. They are:

- Alternative 1 – Take no action – Use existing capacity in other facilities;
- Alternative 2 – Purchase an already permitted landfill; or
- Alternative 3 – Permit a new landfill.

As set forth below, permitting a new landfill on the subject property is the best and only feasible option among the alternatives available.

All figures referenced in this discussion can be found in **Appendix LIS-1**.

3.1 Alternative 1 – No Action – Use Existing Capacity in Other Facilities

County Waste serves over 320,000 customers in Virginia. As part of this application, Green Ridge’s Notice of Intent includes a detailed discussion demonstrating the need for a new landfill in Virginia. As explained in that discussion, a new landfill would not only protect County Waste’s interests and those of its hundreds of thousands of customers, but would also ensure a competitive environment in the solid waste disposal industry in Virginia, helping to control future costs for local governments and other agencies and institutions, as well as Virginia businesses and residents generally. (Currently in Virginia, almost 88% of private landfill capacity is controlled by just two companies and that will likely increase to about 99% within the next six years.)

As also explained in Green Ridge’s Demonstration of Need, less than 20 years of permitted landfill capacity exists in Virginia when waste streams are projected, the remaining life in existing facilities is evaluated, and the substantial future increase in out of state waste is accounted for.

In addition, the proposed landfill would provide much needed revenues to Cumberland County and drastically reduce its disposal costs.

Based on the need for additional landfill capacity in Virginia, the importance of County Waste’s ability to serve its Virginia customers, and the advantages a landfill provides to Cumberland County, Alternative 1 was omitted from further consideration.

3.2 Alternative 2 – Purchase of an Already Permitted Landfill

County Waste first considered purchasing an existing permitted and operating landfill in Virginia. To that end, County Waste approached various landfill owners and considered multiple disposal facilities; however, confidentiality precludes identifying the specific landfills approached. Despite its efforts, County Waste could not find an operating landfill with sufficient remaining capacity that was suitable for purchase and would meet County Waste's long-term goals.

In addition to inquiring about currently operating landfills, County Waste contacted Republic Services, Inc. about purchasing its property in Cumberland County that was permitted by VDEQ as a sanitary landfill, but never constructed. **Figure 1** illustrates the location of the Republic Services site in relation to the Green Ridge site currently undergoing permitting, and **Figures 3A and 3B** provide additional details. During discussions, County Waste discovered that Republic would only sell its property with a restriction on the deed that would prohibit a landfill. Since initial discussions with Republic, the permit for that facility has been terminated.

Finally, purchasing an existing landfill would not address the overall projected lack of capacity in Virginia.

Based on the lack of available facilities, and the termination of the Republic permit, Alternative 2 was omitted from further consideration.

3.3 Alternative 3 – Permit A New Landfill

County Waste's hauling companies collect in excess of 3,200 tons per day of municipal solid waste in Virginia, which is mostly generated in Central and Southwest Virginia. County Waste is expanding, and anticipates that it may be collecting up to 5,000 tons of waste per day in projected growth plans as its network of collections continues to increase, further underscoring the need for additional disposal capacity. To reduce costs and better serve its Virginia customers, County Waste has determined that it needs to own a landfill to protect its interests and those of its customers. Without such a landfill, the waste collected by County Waste must be directed primarily to landfills owned by County Waste's competitors. County Waste would therefore not be able to control tipping fees and in turn could not control costs for its customers. Given the lack of competition in the market and the limited number of disposal facilities in the Commonwealth, private tipping fees will escalate significantly over the next ten years, to the detriment of local governments, businesses, and residents. Indeed, tipping fees have already begun to rise.

Given the duopoly that currently controls private landfills in Virginia and the projected decline in disposal capacity that County Waste predicts will occur, County Waste /Green Ridge began to search for a property on which to build a new landfill in Virginia. That process had two phases. The first phase was to identify a locality that would embrace the Facility; the second phase was to identify sites within an interested locality.

During its initial search over the course of several years to find a host locality, County Waste contacted multiple communities in locations suitable to receive waste from Central Virginia. Confidentiality precludes

identifying the specific localities approached. Ultimately, the search narrowed to Cumberland County for two reasons:

- First, the County had previously indicated its interest in a private landfill in the County (i.e., the Republic facility). The County had approved all the required zoning and a conditional use permit for a municipal solid waste facility, signed the local government certification required by DEQ, and executed a Host Agreement. (As indicated earlier, this landfill was permitted by DEQ but never constructed, and the permit has now been terminated.)
- Second, the County continued to be interested in a private landfill because it needed to replace the substantial revenues that would have resulted from the Republic facility, revenues upon which the County had depended in making substantial capital improvements. (Among other things, the County incurred tens of millions of dollars of debt to build a new high school in reliance on the receipt of the fees set forth in the Republic Host Agreement.) A new landfill would offset deficits in the County's annual budget, reduce the County's waste disposal costs, fund much needed capital projects and avoid the possible loss of public services to Cumberland residents because of County budget shortfalls and fiscal constraints.

Based on the continued interest of the Cumberland County Board of Supervisors, County Waste /Green Ridge considered four potential landfill sites in Cumberland County, only one of which was found to meet all necessary criteria. The sites considered reflected the goal of minimizing the landfill's impact on productive agricultural lands, potential development properties, residential properties, the environment and historic resources. The search in Cumberland began by identifying timberland and timber farms prevalent in the County. **Figure 1** illustrates the general location of the four sites in relation to the previously permitted Republic site.

A short description of each site follows.

3.4.1 Alternate 1: Old Buckingham Road (Route 13) (Figures 2A and 2B)

The Alternate 1 site is approximately 780± acres in size. Trucks accessing the site would travel west on Route 60 and most likely turn south onto Route 13. Access into the site would be directly from Route 13 and is approximately 3 miles from Route 60. The intersection of Route 13/Route 60 would need improvements. As an alternative, trucks could exit Route 60 further east onto Route 682 and then onto Route 13. A detailed evaluation, and discussions with VDOT made it apparent that both the intersection at Route 60 and the intersection at Route 13 would require significant upgrades if this site were selected.

The site is heavily dissected by streams with Little Guinea Creek running through the southern portion of the site. Because of this, significant wetlands are present in the southern part of the property.

A general overview of the potential historic resources on this site was completed by Browning and Associates. The report is contained in **Appendix LIS-2F**. The findings in that report indicate that the *"prehistoric potential for the three alternatives is much higher than for the chosen alternative (Green Ridge)*

*due to the presence of watercourses that penetrate inland from larger water courses.”.....(Page 15)
“Combining the potential archaeological sites for each of the alternatives, Alt 1, Alt 2, Alt 3, all have a higher potential for the presence of archaeological sites based upon standard settlement models than the chosen alternative.” (Page 16)*

As the smallest of the sites considered, it contains the least usable acreage.

Because of the limited development acreage, the presence of Little Guinea Creek, the need for significant road improvements, and extended truck travel along secondary routes, the site was eliminated from further consideration.

3.4.2 Alternate 2: West of Clinton (south of Route 601) – Frenchs Store Road (Figures 3A and 3B)

The Alternate 2 site is approximately 1089± acres in size. Trucks accessing the site would travel east on Route 60 and turn south from Route 60 into the site. The site has a limited boundary on Route 60, and access through this area would be directly across from Route 601. Additional property or an alternate access into the site would need to be considered. The site also abuts Route 654 (Frenchs Store Road) approximately 3,000± feet south of Clinton. Frenchs Store Road is almost immediately across from Pinegrove Road, and improvements at the intersection of Route 654 and Route 60 would be needed, but may not be possible given the location. There are also a number of homes along this stretch of Route 654.

Route 654 divides the property in the southern area, leaving approximately 15% - 20% of the site south of the road and unusable.

The site is dissected by streams (Mill Creek runs through the southern part of the property), and because of this, wetlands are present in the south part of the property just north of Route 654, removing further acreage from availability.

A general overview of the potential historic resources on this site was completed by Browning and Associates. The report is contained in **Appendix LIS-2F**. The findings in that report indicate that the *“prehistoric potential for the three alternatives is much higher than for the chosen alternative (Green Ridge) due to the presence of watercourses that penetrate inland from larger water courses.”..... (Page 15)
“Combining the potential archaeological sites for each of the alternatives, Alt 1, Alt 2, Alt 3, all have a higher potential for the presence of archaeological sites based upon standard settlement models than the chosen alternative.” (Page 16)*

More usable acreage exists on this site than the Alternate 1 site. However, because of the difficulty with access to and from Route 60 or Route 654, limited setback from these roads for waste disposal, division of site by Mill Creek and Route 654, and the proximity to Clinton, the site was eliminated from further consideration.

3.4.3 Alternate 3: Guinea Mills (Figures 4A and 4B)

The Alternate 3 site is approximately 1,990± acres in size, but actual usable acreage is much smaller as discussed below. Trucks accessing the site would travel west on Route 60 and turn south from Route 60 onto Route 45 (Cumberland Road), then travel along Route 45 for approximately 4 miles to enter the site from Route 45 west of Guinea Mills. Route 60 at the intersection with Route 45 is divided and would probably require improvements for the additional truck traffic. Route 45 connects Route 60 to Farmville and is heavily trafficked. Thus, significant improvements would likely be needed at the entrance to the site.

The site is the furthest west of all the sites evaluated and is located near the Buckingham County line. Traffic from the east (the majority of the traffic) would travel through Cumberland Courthouse and past the primary entrance to the County schools.

The site is heavily dissected by streams. Significantly, the Willis River and its flood plain/wetlands divide the site in half. Access to the eastern half of the site would be as described above. Access to the western half of the site would require trucks to continue on Route 45 and to turn west on to Route 634. Further study of the bridge over the Willis River on Route 634 would be required to determine if it has the capacity for the volume of truck traffic, or if improvements would be needed. Route 634 divides the western side of the site in half, and there is a major utility corridor running north – south through this site as well. Because of the complications present in the western side of the property, only the eastern area is considered viable, but the eastern area is compromised by streams and has limited development area. In addition, development of the eastern half would push waste disposal closer to Route 45.

A general overview of the potential historic resources on this site was completed by Browning and Associates. The report is contained in **Appendix LIS-2F**. The findings in that report indicate that the *“prehistoric potential for the three alternatives is much higher than for the chosen alternative (Green Ridge) due to the presence of watercourses that penetrate inland from larger water courses.”*..... (Page 15) *“Combining the potential archaeological sites for each of the alternatives, Alt 1, Alt 2, Alt 3, all have a higher potential for the presence of archaeological sites based upon standard settlement models than the chosen alternative.”* (Page 16)

This site also has the potential for Willis River navigation structures (historic resources) and needs at least one bridge or ford. In addition, per the Browning report, this property has a *“very high probability of structures that were extant during the Civil War and thus possibly as early as the first round of land patents for the County.”*

Because of the presence of the Willis River, the high probability of historic resources, the division of the site by various features, access, and the site’s location on the western side of the County, the site was eliminated from further consideration.

3.5 Proposed Green Ridge Recycling and Disposal Facility Site (Figure 5)

The Green Ridge Recycling and Disposal Facility site is approximately 1,178 ± acres in size. The parcels combined for the site include American Timberland properties and some individual holdings. The site has been heavily timbered and disturbed historically.

Trucks accessing the site will travel west on Route 60 and, and immediately after crossing the Powhatan County Line, turn north onto a private road which will be constructed by Green Ridge. This road will be approximately 1 mile in length, thereby enabling the landfill to achieve separation from Route 60. Scales and infrastructure are to be located away from Route 60, to the south and east of Miller Lane, allowing for significant queuing space for traffic entering the site. Improvements at the intersection of this private road and Route 60 will be needed. VDOT has reviewed the traffic impact statement and conceptually agrees with the preliminary layout for the entrance.

The expected disposal unit will be approximately 4,200 feet from Route 60 (straight- line distance). Usable acreage for disposal is approximately 500 acres, or a little less than half the site, with sufficient room for buffers, internal roads, soil borrow areas, stormwater management, leachate handling and future active gas system installation in the remaining acreage.

The site is dissected by streams to a lesser extent than the other sites, with NWI wetlands identified in the northern area. Although wetland delineations have been performed on the proposed site, for consistency with comparison to the other alternate sites, only NWI information is illustrated on the mapping in Figure 5. The site is bounded on the north and northwest by Muddy Creek (and one of its unnamed tributaries). Muddy Creek ultimately flows into the James River over 5 miles northeast of the site. The site is bounded on the east by Miller Lane. Maple Swamp Creek is located on the far eastern side of Miller Lane.

Pinegrove Road and Miller Lane will require some re-alignment during development of the site. Re-alignment will require coordination with VDOT and Cumberland County. VDOT has indicated conceptual agreement with the realignments proposed.

As expected with any site of this size, some historic resources have been identified that will be addressed when developing the site. Phase 1A and Phase1B historic resource inventories have been completed, with some areas identified for further investigation. Per the Browning and Associates report, *“Combining the potential archaeological sites for each of the alternatives, Alt 1, Alt 2, Alt 3, all have a higher potential for the presence of archaeological sites based upon standard settlement models than the chosen alternative.”* (Page 16). The Pine Grove School, a Rosenwald structure, is located to the west of the property on the western side of Pinegrove Road.

All sites considered had some residential properties located in their vicinity. At the Green Ridge Site, most properties with residences are located on the eastern side of the site along Miller Lane. Included in the Host Agreement with Cumberland County is a property value protection plan available for property owners of certain identified properties who believe they would be impacted by development of the landfill and who meet certain criteria outlined in the protection plan.

This site has the best access of the alternatives, the most usable disposal space, and sufficient acreage for infrastructure and support operations. It has the longest access road, which will allow sufficient queuing space for incoming vehicles and push the waste disposal operations away from Route 60.

As is typical for properties of the size needed for this landfill, all sites considered had wetlands and were dissected by streams, which is a function of the underlying geology. Design of the Green Ridge Facility includes minimal impact to streams; however, wetlands will not be directly impacted.

For the reasons identified above, this site was chosen for the Green Ridge Recycling and Disposal Facility.

4.0 AFFECTED ENVIRONMENTS OF THE SELECTED ALTERNATIVE

In accordance with 9 VAC 20-81-460 H, the purpose of the LIS is to document potential environmental impacts to the resources referenced in the regulations and in Section 4 of this report, within a 5-mile radius of the Facility. This section of the report evaluates resources, including parks and recreation areas, wildlife management areas, critical habitat areas of endangered species as designated by applicable local, state, or federal agencies, public water supplies, marine resources, wetlands, historic sites, fish and wildlife, water quality and tourism. In addition, appropriate state agencies were contacted to request their opinion on the impact of the Facility on the specific resources listed above. This section of the report also presents the findings of those agencies. Potential impacts (if any) and resolutions to each potential impact are discussed below. A five-mile radius map showing the resources is provided as **PTA Attachment IX-Figure 3- Regional Map**.

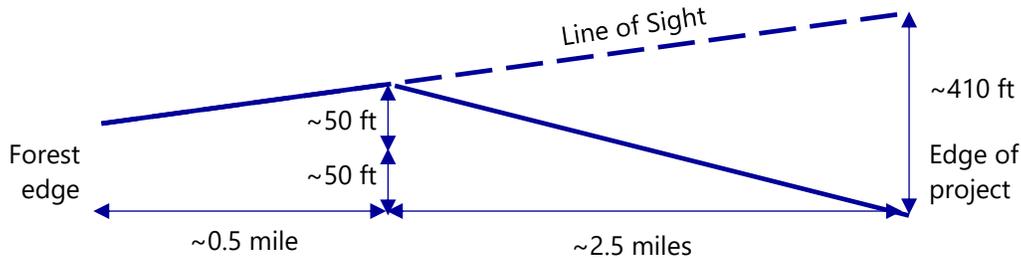
4.1 Parks and Recreation Areas

An online request for information services was submitted to the Department of Conservation and Recreation (DCR) for the project site, to identify surrounding Parks and Recreation areas within a two-mile radius. The response letter dated June 14, 2019 from DCR is included in **Appendix LIS-2A**. As stated in the letter, DCR reviewed the surrounding area and responded that there were no documented natural heritage resources within two miles of the project boundary, and that there are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity. An additional request was submitted to expand the area of interest to a 5-mile buffer around the site. The response from DCR is presented in **Appendix LIS-2A**.

As depicted on **PTA Attachment IX – Figure 2- Regional Map**, portions of the Cumberland State Forest fall within five miles of the project site. The Cumberland State Forest is managed by the Virginia Department of Forestry. The proposed project is not anticipated to have an impact on the forest. Below are four factors that were considered in evaluating the potential impacts that are typical concerns related to landfills, including visual, traffic, odor and vectors.

Visual: The edge of the forest is approximately three miles west of the proposed landfill site. State Route 45 is approximately 2.5 miles west of the site and loosely follows a ridgeline between the site and the forest. The elevation difference from the edge of the forest and the ridgeline is approximately 50 feet of rise according to the USGS 7.5' Topographic Quad, Whiteville. This same topo map indicates that there is at least 100 feet of fall from the ridgeline to the proposed base of the project. This change in elevation, the ridgeline, and the surrounding trees that make up the forest provide a visual buffer that is anticipated to eliminate any visual impact to the forest.

Based on the geometry explained above, a person standing at the edge of the forest, looking up at the ridge line toward the proposed project (provided conditions are conducive to seeing three miles), would be looking at a point that is approximately 410' above the existing grades in the area of the proposed facility. This assumes that the line of sight from the edge of the forest to the ridgeline is unimpeded by any trees. Below is a sketch depicting the geometry discussed herein.



Traffic: It is anticipated that most of the traffic related to the proposed site will come from the east. Since the forest is west of the site, impacts to the forest from landfill traffic are anticipated to be minimal along Route 60, with no detrimental impact anticipated on the local routes around and through the State Forest due to little to no new traffic in the area created as a result of this project.

Odor: Green Ridge, through its Host Agreement with Cumberland County, has pledged to not accept many common waste types that contribute to odors that can be emitted from a landfill. The materials that are deemed unacceptable at the Facility include sludge, fly ash, drywall, and material amounts of animal carcasses during a one-day period. Additional best management practices will be employed by the Facility to reduce and/or eliminate odors. These will include the installation and operation of a landfill gas extraction system, daily cover, the use of rain cover, and partial closure of completed disposal phases. The gas extraction system will harvest the gas, and use the gas to either produce electricity, or in an evaporator system designed to reduce the quantity of leachate that needs to be treated.

Vectors: Vectors (including rodents, birds, insects) will be managed through many of the same best management practices that are used to control odors. These will include the use of daily cover, minimizing the working face to the smallest size practical, employing rain covers, and partial closure of completed portions of the landfill. Green Ridge will also seek outside vendors to assist with pest management should a situation arise where this is necessary.

4.2 Wildlife Management Areas

Wildlife Management Areas in Virginia are managed by the Department of Games and Inland Fisheries (VDGIF).

Their website locator map: (<https://www.dgif.virginia.gov/wp-content/uploads/wmalocator.pdf>) shows that there are no wildlife management areas as managed by VDGIF in Cumberland County. A copy of that map is included in **Appendix LIS-2B**.

The United States Forest Service does not have any wildlife management areas in Cumberland County.

In addition, a Threatened and Endangered Species review was conducted by Koontz Bryant, Johnson Williams. Their Summary report (dated December 9, 2019) is presented in **Appendix LIS-2G**.

4.3 Public Water Supplies

Pursuant to the requirements of Code of Virginia §10.1-1408.4.B.3 no new sanitary landfill shall be constructed within 3 miles upgradient of any existing surface water or groundwater public water supply (PWS) intake or reservoir (unless certain criteria, monitoring requirements, and design considerations are met). Under no circumstances will any new sanitary landfill be permitted within one mile of any public water supply system.

A "*public water supply*" or "*community water system*" (C) is defined in the Virginia Department of Health (VDH) regulations as serving more than 25 year-round residents, or having at least fifteen service connections. This is the type of water system commonly understood to be a "*public water system*".

Additionally, water systems serving the same population daily, but in a non-residential setting, (e.g. schools) are classified as a non-transient, non-community public water system (NTNC). Water systems serving a transient population in a non-residential setting (e.g. restaurant or campground) are classified as a transient, non-community public water system (NC). Standards for each of these three system types are different, with the highest standards set for the community water systems (C).

VDH records were searched for all three forms of public water systems in Cumberland and Powhatan counties. A list of the systems is included in **Appendix LIS-2C**. Goochland County was not included in the search because it is located more than five miles from the Green Ridge Facility boundary (regulatory requirement). Goochland County is also north of the James River, which is a presumed hydrologic divide and barrier to groundwater flow from areas south of the River.

In addition to the records search, a review of aerial photography on Google Earth was conducted, looking for evidence of land uses indicating a public water system. Following this aerial review, a windshield survey was completed along public roads within five miles of the Green Ridge Facility boundary.

A total of 28 public water systems within Cumberland and Powhatan counties were identified and plotted, to determine location and distance relative to the Facility's Waste Management Boundary (WMB). Per DEQ *Solid Waste Permitting Submission Instructions* (IV.D.3, and §9 VAC 20-81-120.C3,120.I, and 460.H.), all public water systems within five miles of the WMB are shown on **PTA Attachment IX- Figure 3 - Regional Map**. Based on this analysis, the Green Ridge Facility is not located upgradient of, nor within three miles of any public water systems.

The Virginia Department of Health - Central Office also conducted a similar review and confirmed these findings (see email in **Appendix LIS-2C**). **No public water systems are located within three miles of the Green Ridge Facility, and only one public system is located within a five-mile radius of the WMB.**

4.3.1 Public Water Systems Within Five Miles

Fairview Farm Events (PWSID# 4145170) is located on Ballsville Road in Powhatan, Virginia. The supply well is located 3.96 miles southeast of the closest point of the WMB, and 3.06 miles from the closest point of the Green Ridge Facility boundary (access road off Route 60). This is a transient, non-community system (NC - lowest level of regulation) with a groundwater source, a listed service population of 30, and a source capacity (Well No.1) of 5,760 gallons per day (gpd). However, the system only has a permitted flow capacity of 215 gpd, based on design factors.

The supply well was completed on April 19, 2016 by Anderson Well Drilling and was constructed to a total depth of 423 feet, with 72 feet of PVC casing grouted to a depth of 50 feet. Pump testing results indicated a yield of 4.6 gpm after 24 hours of pumping, with a static water level of 22 feet. The VDH Engineering Description Sheet describing the water system, the well drilling log, and the pump testing results are included in **Appendix LIS-2C**.

The Green Ridge Facility is over three miles from, and *NOT upgradient* of the Fairview Farm Events public water system. Two natural drainage systems separate the Green Ridge Facility from the Fairview Farms Events water system: Maple Swamp Creek and Deep Creek, both serving as hydrologic divides and barriers to flow between the two sites. Topography indicates surface and groundwater flow at Fairview Farm Events is northward to Deep Creek, in the direction of the Green Ridge Facility. There will be no impact to this public water system from the Green Ridge Facility.

4.3.2 Additional Systems Worth Noting > 5 Miles

No other public water systems were identified within the five-mile radius of the WMB, however there are a few other water systems worth noting at this time, addressing in advance any potential questions or concerns that may arise during the permitting process.

Cozy Acres Campground (PWSID# 4145080) is located approximately 6 miles east of the Green Ridge Facility along Ridge Road in Powhatan, Virginia. One groundwater well supplies the system and is located 5.71 miles southeast of the closest point of the WMB. This is a transient non-community system (NC - lowest level of regulation) with a groundwater source, although there is no information available on the well construction. The VDH Engineering Description Sheet is included in **Appendix LIS-2C**. The design capacity is 5,700 gpd, serving 144 campsites (assumes two persons per site), a bathhouse and a trading post.

The Green Ridge Facility is over five miles from, and *NOT upgradient* of the Cozy Ares Campground public water system. Four natural drainage systems separate the Green Ridge Facility from the Cozy Acres Campground water system: Maple Swamp Creek, Deep Creek, Moore Creek and an unnamed tributary to Deep Creek. All of these drainages combine to provide a distinct hydraulic barrier to flow between these locations. Topography indicates surface and groundwater flow at Cozy Acres Campground is westerly to the unnamed tributary to Deep Creek, in the direction of the Green Ridge Facility. There will be no impact to this public water system from the Green Ridge Facility.

Cumberland County Water System (PWSID# 4049150) is located over 7 miles southwest of the WMB along US Route 60 in Cumberland Courthouse, Virginia. Due to its size and its status as a public community water system (C - highest level of regulation), it is worth noting here. The system is supplied by three groundwater wells ranging in depth from 264 to 678 feet, the closest of which is 7.38 miles southwest of the closest point of the WMB. This well is located on Foster Road, behind the Cumberland Courthouse. The system has a greensand filtration system, and a total demand of 185,800 gpd. More information is available about this water system in the VDH Engineering Description Sheet included in **Appendix LIS-2C**.

The Green Ridge Facility is over seven miles from, and *NOT upgradient* of the Cumberland County public water system. Several natural drainage systems separate the Green Ridge Facility from the Cumberland County water system. There will be no impact to this public water system from the Green Ridge Facility.

Lakeside Village (PWSID# 4049400) is located 6.97 miles to the northwest of the WMB along Trice Lake Road in Cumberland County, Virginia. This is a public community water system (C - highest level of regulation) and is supplied by groundwater. The Green Ridge Facility is over six miles from, and *NOT upgradient* of the Lakeside Village public water system.

Three significant natural drainage systems separate the Green Ridge Facility from the Lakeside Village water system: Muddy Creek, Davis Creek and the Willis River. There will be no impact to this public water system from the Green Ridge Facility.

Cartersville Estates Mobile Home Park is located 3.5 miles to the northwest of the WMB, along Cartersville Road (SR 45). From a regulatory perspective, this is not a public water system as it has fewer than 15 connections. VDH records do not list this as a public system, nor was it identified as a public water system by the VDH during their research. However, being a small community water system, it is worth noting in the permitting process. No detailed information was collected for this system, which appears to be groundwater based.

The Green Ridge Facility is over three miles from, and *NOT upgradient* of, the Cartersville Estates Mobile Home Park. Two significant natural drainage systems separate the Green Ridge Facility from the Cartersville MHP: Muddy Creek and Davis Creek. There will be no impact to this water system from the Green Ridge Facility.

Cobbs Creek Reservoir is a public community water system reservoir under construction approximately 11 miles northwest of the Green Ridge Facility. This is a surface water system, drawing water from the James River at a location approximately 11 miles upstream from the mouth of Muddy Creek, the main surface water body flowing adjacent to the Green Ridge Facility. Three major drainage systems separate the reservoir location from the Green Ridge Facility: Muddy Creek, Davis Creek and Willis River. The intake for this reservoir will not be impacted by the Green Ridge Facility.

4.4 Marine Resources

Marine resources are defined as “materials and attributes found in the ocean that are considered to have value.” Cumberland County is in the Piedmont Physiographic Province of Virginia. Strictly speaking, marine resources will not be impacted by the project.

However, the Virginia Marine Resources Commission has jurisdiction over any encroachments in, on or over the beds of the bays, ocean, rivers, streams or creeks, which are the property of the Commonwealth. Accordingly permitting with VMRC will be required for the project. The Virginia Marine Resources Commission (VMRC) was contacted for their opinion of impacts from the proposed project. A response letter was received and is presented in **Appendix LIS-2D**. While the project site is within the jurisdictional areas of the VMRC, any impacts will be addressed during the Joint Permit Application process.

4.5 Wetlands

Koontz Bryant Johnson and Williams delineated all wetlands across the Facility and submitted their results to the Army Corps of Engineers on May 11, 2018 as part of a request for a Preliminary Jurisdictional Determination. This request and the delineation study is included in **Appendix LIS-2E**, along with the wetland delineation maps and the final Preliminary Jurisdictional Determination from the Army Corps on August 22, 2019.

Following delineation of wetlands across the Facility, project elements (disposal units, roads, etc.) were modified or eliminated to remove all direct impacts to wetlands.

4.6 Historic Sites

During 2018 and 2019, Browning and Associates, LTD completed a Phase 1 Cultural Resources Investigation of the Facility and surrounding areas. This included both a Phase 1A investigation (desktop and site walkover), as well as a Phase 1B investigation, (more detailed site investigations including over 2000 shovel

test pits, metal detecting, and sampling of artifacts). Their report is undergoing final review and will be submitted under separate cover.

A project review application was submitted to the Virginia Department of Historic Resources on June 23, 2019, **Appendix LIS-2F**.

An August 16, 2019 response from the VDHR was received and is also included in **Appendix LIS-2F**. The VDHR recommended the completion of a Phase 1 cultural resources survey, which has since been completed by Browning and Associates, and which will be submitted to the VDHR for their review.

4.7 Fish and Wildlife

Several Virginia agencies keep databases on fish and wildlife and threatened and endangered species. These include:

- Virginia Department of Conservation and Recreation – Division of Natural Heritage – Biotics Data System (natural resources and ecologically significant sites.)
<https://www.dcr.virginia.gov/natural-heritage/rare-species-com>
- Virginia Department of Game and Inland Fisheries (vertebrates and invertebrates)
<https://www.dgif.virginia.gov/wp-content/uploads/virginia-threatened-endangered-species.pdf>
- Virginia Department of Agriculture and Consumer Services (Plants and insects)
<https://www.vdacs.virginia.gov/plant-industry-services-endangered-species.shtml>

Please see, *Threatened and Endangered Species Summary (Appendix LIS-2G)*, prepared by Koontz, Bryant, Johnson, Williams Group, May 24, 2019, for a more detailed summary of potential threatened and endangered species impacts.

A mussel survey was conducted by Daguna Consulting, LLC on May 25 and 26, 2019 at Muddy Creek and Maple Swamp Creek. Results of the survey concluded that Muddy Creek supports a low-density mussel population that is comprised of common species, and the tributaries to Muddy Creek from the Green Ridge property do not exhibit signs of suitable habitat for mussels. Additionally, Maple Swamp Creek and its tributaries did not exhibit any signs of habitation by native mussel species. The final report is provided in **Appendix LIS-2G**.

4.8 Water Quality

4.8.1 Surface Water

USGS quadrangle maps were used to identify surface water resources within five miles of the Facility. In addition, mapping of surface waters and wetlands within the site has occurred and that information is

available in **PTA Attachment XXII – Wetlands Demonstration**. The Virginia DEQ web site was used to obtain information on impaired surface waters.

Muddy Creek, a perennial stream flowing west to east across the northern portion of the site, is the main receiving water for the proposed Facility. Approximately 90% of the Disposal Unit is located within the Muddy Creek Basin. Muddy Creek discharges to the James River approximately 5.6 miles northeast of the Facility. There are approximately 10 miles of stream length along Muddy Creek between the Facility and the James River.

A small portion of the southeast corner of the Facility, as well as most of the access road portion of the Facility, drains into the Maple Swamp Creek basin. Maple Swamp Creek cuts across the access road route, and discharges to Muddy Creek approximately 0.6 miles downstream from and northeast of the Facility. Muddy Creek and Maple Swamp Creek, and their smaller tributaries, are the only surface water drainages that are direct receiving waters from the Facility.

Several other major surface water drainages that are not receiving waters for the Facility are located within five miles of the Facility. These include Davis Creek, located approximately 2.1 miles north-northwest of the Facility. Davis Creek flows northeasterly and discharges to Muddy Creek approximately 3.5 miles north-northeast of the Facility. Located northwest of the Facility at approximately 4.6 miles is Deep Run, a small drainage that also discharges to Muddy Creek just upstream from its mouth at the James River. Tributaries to the Willis River, the main stem of which is more than 5 miles from the Facility, are located approximately 3.5 miles northwest of the Facility. Approximately 2.5 miles south of the Facility, and on the opposite side of a major drainage divide, is Maxey Mill Creek, which discharges into Deep Creek at a location 2.9 miles southeast of the Facility. Deep Creek discharges to the James River at a location 7.6 miles to the northeast of the Facility.

Surface water resources within the 5-mile radius are shown on figure **LIS-2H-1 Surface Water Resources**. Streams that are classified as impaired resources are shown in red and yellow. Information on impaired surface water bodies was obtained from the DEQ 2018 Impaired Waters 303(d) data associated with the 2018 305(b)/303(d) Water Quality Assessment Integrated Report. Davis Creek is identified as an impaired water body along its entire 7.68 miles length, from its headwaters to its mouth at Muddy Creek, due to *Escherichia coli*. Muddy Creek is impaired through the 3.58 miles reach from its confluence with Davis Creek downstream to its mouth at the James River, due to dissolved oxygen.

4.8.2 Groundwater

Groundwater is utilized as a source of drinking water in the vicinity of the Facility. This is true throughout the Piedmont Province as well, including the area within the five-mile radius of regulatory concern. Information about public water systems is contained in previous section LIS- 4C. This section of the LIS focuses on groundwater as a resource utilized by private drinking water supplies.

Both the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**) and well records (logs) for private water wells help to characterize and assess the potential impacts to this resource. Per the DEQ Solid Waste Permitting Submission Instructions IV.D.2, and §9 VAC 20-81-460.C., "all water supply wells, springs or intakes, both public and private", within 500 ft. of the Facility boundary are shown on **PTA Attachment IX- Figure 2 – Near Vicinity Map**. There are no known springs or public water supplies within this perimeter. Private wells exist within the 500-ft perimeter.

It should be noted that inconsistencies in GIS parcel maps, changes in ownership over the years since drilling, incomplete record keeping at the Virginia Department of Health (VDH), and a lack of reporting of logs (especially older wells), all contribute to inherent inaccuracies in locating water wells, and matching logs to a particular property. Through the permitting process, corrections and additional information about nearby water wells may emerge.

VDH was contacted for information about drinking water wells in the area (**Appendix LIS-2H**). Logs for wells along Pinegrove Road and Miller Lane/Alder Lane were requested. Logs for wells along these roads provide useful information relevant to the analysis (even if that well is outside the 500-ft. perimeter around the Facility).

Well logs were also sought for homes along abutting portions of US Route 60, Blenheim Road, Mosby Lane, Lily Lane, Pine Cove Trail and Brown Road.

Tax parcels interior to and exterior to the Facility are shown on **PTA Attachment IX- Figure 2 – Near Vicinity Map**, and were investigated for the presence of a water supply well. Although all tax parcels within the 500-ft. perimeter are shown on **PTA Attachment IX- Figure 2 – Near Vicinity Map**, if the well is known or suspected to be outside the 500-ft. perimeter, it is not shown on the map. **LIS-2H - Table 1** shows a listing of tax parcels within this 500-ft. perimeter and the status of information relative to water supplies.

The locations of most private wells adjacent the site were obtained through a windshield survey, during which wells were visually identified and their locations recorded on field maps. For parcels where a well could not be visually verified (but a dwelling was present), a record review was conducted. Land records at the Cumberland County Courthouse were traced back to determine the original dwelling builder (and assumed original name on well drilling log and building permit). VDH records were searched for building permit plats showing well locations at the time of dwelling construction under the original owner. Lastly, to further aid in determining well locations, an unmanned aerial vehicle (drone) was used to fly selected areas around the site.

A total of forty-four (44) private drinking water wells (32 known, 12 assumed) were identified within the 500-ft. perimeter around the Facility boundary, (**PTA Attachment IX- Figure 2 – Near Vicinity Map**). This includes the access road portion of the site, an area where there will be no landfilling. Assumed wells are those not directly observed, but assumed to exist based on the presence of a dwelling, information from building plats, or from drone footage. During the permitting process, it is anticipated that further clarification on assumed well locations and/or additional information on existing wells may emerge.

Well records (drillers logs) obtained from the VDH are not available for many of the wells near the site, however logs for 18 wells could be matched to particular parcels. The logs and associated VDH permit plats (where available) showing well locations, are included in **Appendix LIS-2H**. A summary of the information from the logs is contained in **LIS-2H - Table 1**. In the following sections, information from these logs is used to help characterize the resource, demonstrate how it is being used, and inform ways to monitor and protect it.

Examination of **PTA Attachment IX- Figure 2 – Near Vicinity Map** shows that the distribution of nearby water wells group into five main clusters as discussed below. All depths referred to in the following discussion are in feet below ground surface (bgs).

Cluster: Miller Lane/Alder Lane

Hydrogeology

Along Alder Lane, and Miller Lane north of Alder Lane, there are a total of 14 wells (9 observed, 5 assumed). Per the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**), and the Potentiometric Surface Maps (**PTA Attachment XV**), the direction of groundwater flow in the vicinity of these wells is west, toward an unnamed tributary to Muddy Creek, which bisects the Facility into an eastern and western side. Groundwater flow is toward the Facility, which is located downgradient of these wells. No portion of the Facility is located upgradient of these wells. All wells in this area are at least 500 ft. from the waste management boundary. The closest well is more than 2500 ft. from the (waste) Disposal Unit, and the most northerly of this group of private wells is over 5000 ft. from the Disposal Unit.

Only the western side of the Facility will contain a Disposal Unit. The unnamed bisecting tributary provides protection to these wells as a hydraulic barrier (sink) that will redirect any groundwater flow from the Disposal Unit away from wells along Miller Lane.

At the northern end of this grouping of wells, groundwater flow is more northwesterly toward Muddy Creek (instead of the unnamed tributary).

Well ID #07-124-087 – Lot 45-A-2-G3 – 180 Miller Lane

There may be two wells on this lot (located more than 2500 ft. from the Disposal Unit), as there are two sets of information (see well logs in **Appendix LIS-2H**); however, both wells have the same number assigned - 07-124-087. A well with a small diameter PVC casing was visually observed on the property, which likely corresponds to the log for a drilled well that was constructed on 11/2/2007 to a depth of 205 ft. and yielding 5 gallons per minute (gpm). Casing was installed to 36 ft., which was also noted as the depth to bedrock. The well was grouted with cement from 0 to 20 ft. Static water level was 25 ft. at the time of completion. No information was presented about the bedrock formation or the location of water bearing fractures.

A July 17, 2009 VDH Record of Inspection however indicates there is a well on this lot that is of large-diameter construction, (bored well-24 inch concrete casing) to a depth of 55.5 ft., and with a construction date of 11/17/2008. Static water level in this well when completed was 30 ft.

If both wells are in fact present, this would indicate capture of groundwater from two zones within the aquifer; one zone near the top of bedrock around 40-50 ft., captured by bored wells and concrete casings, and another zone in the deeper bedrock fracture system, tapped by rotary drilling and smaller diameter casings.

Well ID #07-124-151 – Lot 45-A-4 – 16 Alder Lane

A well was not visually observed on this parcel, only a tiny portion of which is within the 500-ft. perimeter. It is likely there is a well on this parcel based on the match of owner's name to parcel name, and a log for a well here with matching information. Although the tax parcel is within the 500-ft. perimeter, the well is likely not, and is not shown on **PTA Attachment IX- Figure 2 – Near Vicinity Map**. The information from the well is nonetheless useful. The well was drilled on 5/28/2008 to a depth of 305 ft. and yields 2 to 3 gpm. Depth to bedrock is 60 ft. Casing was installed to this depth, and grouted with cement to 20 ft. Static water level when drilled was 40 ft. No information was presented on the log regarding depth of water bearing fractures.

Summary

Based on the limited information available, and other wells of similar construction visible on the windshield survey, there are two zones within the aquifer being utilized in this vicinity. One zone is in the saprolite just above unweathered bedrock, at depths ranging from 36 to 60 ft., and the other is in the solid crystalline bedrock to depths of 300 ft. Static water levels range from 25 to 40 ft. Well yields ranged from 3 to 5 gpm, however higher yields are possible in other wells nearby. This is a limited database, but consistent with other information from the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**) on depth to bedrock and depth to static groundwater levels in the saprolite. Given the location upgradient from the Facility and more than 2500 ft. from the Disposal Unit, it is unlikely that wells in this area will be impacted.

Cluster: Access Road/Miller Lane

Hydrogeology

In the area where Miller Lane intersects the proposed access road entrance to the Waste Management Unit, there are currently 8 private drinking water wells, (2 observed, 6 assumed). Per the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**), and the Potentiometric Surface Maps (**PTA Attachment XV**), groundwater flow in this area is complex due to a groundwater divide passing beneath the very sharp corner of Miller Lane. Most (>90%) of the approximately 1178 acre Facility drains northward to Muddy Creek; however, a small portion of the southeast corner of the Facility drains southeast to Maple Swamp Creek, see Hydrogeologic and Geotechnical Report (**PTA Attachment XI**). This area is where that divide in flow occurs.

Some wells may be within the Maple Swamp Creek (MSC) drainage system, others may not. The well on lot 44-A-23 is most likely within the MSC drainage system, and thus downgradient of the southeastern portion

of the Disposal Unit. Four other wells to the south of the proposed intersection of Miller Lane with the access road, (Tax Parcels 45-2-3-C; 45-2-3 E1 (two wells) and 45-3-3-E) could potentially be downgradient of a small portion of the Disposal Unit. The other three wells to the north of this intersection (Tax Parcels 45-2-1-A1 (two wells) and 45-A-8-A) are not likely to be downgradient of the Disposal Unit and more likely to be protected by the headwaters of the stream that bisects the Facility. All wells are more than 500 ft. from the WMB, and more than 700 ft. from the Disposal Unit boundary.

Particular emphasis should be given to this area when designing the groundwater monitoring program for the Facility. With permission of the owners, all private wells in this vicinity should be monitored/sampled routinely for water quality impacts, including pre-construction sampling.

Well ID #00-124-067 – Lot 44-A-23 – 60 Miller Lane

One of the observed wells (now owned by the Facility), is Well ID #00-124-067. This well is located downgradient from the southeast corner of the Disposal Unit and was completed on 8/16/01 to a total depth of 356 ft. Casing was installed to 52 ft., which was also noted as the depth to bedrock. The well does not appear to be grouted. Water bearing fractures were noted in the log at 60 ft. (1.5 -2 gpm) and 215 ft. (total yield of 4 gpm). Water zones are also noted on the log at 45 – 65 ft. and 205 – 225 ft. No information is given on static water level. This well obtains about half of its yield from a shallow groundwater zone located just below the saprolite and into the top of the bedrock surface at around 60 ft., and a deeper zone in the solid bedrock at around 215 ft.

Well ID# 04-124-068 - Lot 45-2-3-E – 62 Miller Lane

Well ID# 04-124-068 was drilled on 10/27/04. There are several properties listed under this owner in this vicinity. It is believed that this well is located on Tax Parcel 45-2-3-E. The locational coordinates on the log place it closer to this lot than any of the others listed under that owner. This well is 50 ft. deep, and bedrock is at 50 ft., similar to nearby Well ID #00-124-067. This is what is commonly called a 'bored well', meaning it is a large diameter well, constructed in the saprolite using concrete tiles. The water zone is listed at 30-35 ft., as is the static water level, indicating this is an unconfined aquifer. The bottom of the concrete casing is at 50 ft., and grouted from 20 ft. to the surface. Thus, the capture point for the well is between 30 and 50 ft. below ground. The yield is only 2 gpm. This well is in the Maple Swamp Creek drainage basin; however, it is not directly downgradient of the Disposal Unit.

Summary

Based on the limited information above, and other wells of similar construction visible on the windshield survey, there are two zones within the bedrock aquifer being utilized in this vicinity, adjacent to the Facility. One is in the saprolite just above un-weathered bedrock, at depths ranging from 50 -52 feet, and the other is in the solid crystalline bedrock at depths of over 200 feet. Static water level in the saprolite aquifer is 30 ft., the same as in the Miller Lane/Alder Lane saprolite well. Well yields ranged from 2 to 4 gpm; however, higher yields are possible in other nearby wells. This is a limited database, but consistent with other information from the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**) on depth to bedrock and depth to static groundwater levels in the saprolite. Given the location of wells downgradient of the

Disposal Unit, and uncertainty relative to a groundwater divide, particular emphasis should be given to this area when designing the groundwater monitoring program for the Facility.

Cluster: Route 60 Facility Entrance

Hydrogeology

This area includes wells at homes along US Route 60 as well as nearby Mosby Lane, Lily Drive, Pine Cove Trail and Blenheim Road. There are 10 observed wells and 1 assumed well within 500 ft. of the Facility boundary. All of these wells are more than 3500 ft. away from and upgradient of the WMB and Disposal Unit, and separated from the Disposal Unit by Maple Swamp Creek, a hydraulic divide. It is highly unlikely that groundwater in this area will be impacted by disposal operations. Because this area is so far from the Disposal Unit, it is not included in the Hydrogeologic and Geotechnical Report (PTA Attachment XI). Several wells provide information on the groundwater resource in this vicinity.

Well ID #08-124-117 – Lot 45-1-36-A - 2379 Mosby Road

This is a drilled well completed on 6/02/10 to a total depth of 205 ft. Casing was installed to 94 ft., which was also noted as the depth to bedrock. The well was grouted to a depth of 20 ft. No information was noted on water bearing fractures. The total yield is 8 gpm. Static water level is 35 ft.

Well ID #02-124-062 – Lot 45-1-16 - 24 Lily Drive

Two wells were observed on this lot, one drilled well and one bored well. The drilled well was completed on 5/17/02 to a total depth of 200 ft. Bedrock was logged at 70 ft., and casing was installed to 75 ft. and grouted. Water bearing fractures were noted in the log as “most water” at 160-180 ft., with a total yield of 12 gpm. The static water level was 25 ft. at the time of completion, indicating confined conditions in this well, and suggesting the presence of a confining unit protecting the lower aquifer zone. No information is available for the bored well.

Well ID #02-124-159 – Lot 45-1-16-A - 118 Lily Drive

One drilled well was observed on this lot, completed on 4/22/03 to a total depth of 170 ft. and yielding 25 gpm. This well is on tax parcel 45-1-16-A; however, the log indicated it was drilled on parcel 45-1-16-B. There is no such parcel, and it is believed that this well is correctly located on lot 45-1-16-A. Casing was installed to 61 ft., but the log shows depth to bedrock at 65 ft. The well is grouted to 30 ft. Water bearing zones were noted in the log at 140-141 ft. and 155-156 ft. The static water level was 26 ft., indicating confined conditions in this well, and suggesting the presence of a confining unit protecting the lower portions of the aquifer.

Well ID #05-124-164 – Lot 45-A-15-A - 15 Anderson Highway

One bored well was observed on this lot, completed on 12/20/06 to a total depth of 45 ft. and yielding 3 gpm. The lot is within the 500-ft perimeter, but the well is not, and is not shown on **PTA Attachment IX-Figure 2 – Near Vicinity Map**. Large-diameter casing was installed to 45 ft; however, the log shows the depth to bedrock is unknown. The well is grouted to 20 ft. The water bearing zone was noted in the log

at 30-33 ft. Static water level is 17 ft. This is shallow saprolite well; however, "White Quartz" was noted at the bottom of the log, so it is likely that this well is completed near the bedrock surface.

Well ID #17-124-071 – Lot 45-A-12-C - 6678 Blenheim Road

One drilled well was observed on this lot, completed on 1/27/18 to a total depth of 475 ft. and yielding 50 gpm. Casing was installed to 64 ft., and the log shows depth to bedrock at 50 ft. The well is grouted to 55 ft. with a cement/bentonite mix. Water bearing zones were not noted in the log. Static water level was 30 ft. at the time of completion. This lot is inside the 500-ft. perimeter; however, the well is not and thus not shown on **PTA Attachment IX- Figure 2 – Near Vicinity Map**.

Summary

Based on the above information, and other wells of similar construction visible on the windshield survey, there are two water zones within the aquifer being utilized in this vicinity. One well is completed in the saprolite just above bedrock, at a depth of 45 ft. (in the one bored well with a log). The yield in the saprolite well was low (3 gpm) with a high static level (17 ft.). Other bored wells nearby are likely to show similar conditions.

Other wells in this vicinity are completed in the solid crystalline bedrock at depths ranging from 170 to 475 ft.; however, in three of the four drilled wells total depths ranged from 170 – 205 ft. It appears likely that adequate supplies of water are available from the crystalline bedrock within the first 200 ft. Water bearing zones (where noted) ranged from 140 to 180 ft. Static water levels in the crystalline aquifer ranged from 25 to 35 ft., and yields ranged from 8 to 50 gpm. Depths to bedrock ranged from 50 to 94 ft. This area appears to be deeper to bedrock and higher in yield than areas near Miller Lane. This information is consistent with that presented in the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**) on depth to bedrock and depth to static groundwater levels in the saprolite.

Cluster: Pinegrove Road South

Hydrogeology

This is a group of homes located just to the south of the Facility, along Pinegrove Road. There are a total of 9 wells (8 observed and 1 assumed well) within the 500-ft. perimeter around the Facility. Per the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**), and the Potentiometric Surface Maps (**PTA Attachment XV**), groundwater in this area flows north, away from these wells, and toward the Facility. All wells are upgradient of, and greater than 500 ft. from, the WMB and Disposal Unit.

Well ID #11-124-043 – Lot 44-A-32 - 79 Pinegrove Road

One drilled well was observed on this lot, completed on 6/21/11 to a total depth of 225 ft. and yielding 15 gpm. Casing was installed to 83 ft., and the log shows depth to bedrock at 81 ft. The well is grouted to 81 ft. with a cement/bentonite mix. Water bearing zones were not noted in the log. Static water level was 30 ft. at the time of completion.

Well ID #08-124-054 – Lot 44-2-7-A - 49 Pinegrove Road

This lot and well are outside of the 500-ft. perimeter around the Facility Boundary and were not field located, nor shown on the **PTA Attachment IX- Figure 2 – Near Vicinity Map**. However, based on information received from the VDH, the location can be identified as just south of the 500 ft. Facility perimeter. Only the VDH Record of Inspection was available, and not the actual driller’s log. This is a drilled well, completed on 6/20/08 to a total depth of 181 ft. and yielding 20 gpm. Casing was installed to 55 ft. and the well was grouted to 20 ft. with bentonite. Water bearing zones are not noted on the inspection form, nor was the static water level.

Summary

Both drilled and bored wells were observed south of the Facility along Pinegrove Road and Liberty Lane, although only logs for drilled wells are available. Drilled wells (for which logs are available) are completed in the solid crystalline bedrock at depths ranging from 185 to 225 ft. It appears likely that adequate supplies of water are available from the crystalline bedrock within the first 200 ft. No information on water bearing zones is available. Static water level in the crystalline aquifer is 30 ft., and yields ranged from 15-20 gpm. Depths to bedrock ranged from 55 to 81 ft. This area appears to be deeper to bedrock and higher in yield than areas near Miller Lane. This is a limited database, but consistent with other information from the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**) on depth to bedrock and depth to static groundwater levels.

Cluster: Pinegrove Road North

This area is along the northwest side of the Facility where Pinegrove Road exits the Facility in a northward direction. There are two observed wells in this area, one belonging to the Pinegrove Community Center (Tax Parcel 44-A-17), and the other belonging to Roosevelt Gregory (Tax Parcel 44-A-16). These wells are more than 500 ft. from the WMB, however, per the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**), and the Potentiometric Surface Maps (**PTA Attachment XV**), they are located in a general downgradient direction relative to the Disposal Unit. It is recommended that these wells be monitored as part of the nearby private well monitoring program offered by Green Ridge. The Part B groundwater monitoring program should also include sentinel well(s) between the Disposal Unit and this area. There are no other wells in this immediate vicinity. Wells further north along Pinegrove Road are more than 500 ft. from the Facility, not downgradient, and separated from the Facility by Muddy Creek, a likely hydraulic barrier. Wells located on properties on Brown Road are also more than 500 ft. from the Facility, not downgradient, and separated from the Facility by an unnamed tributary to Muddy Creek. Both Muddy Creek and the unnamed tributary crossing Brown Road provide a hydraulic divide that will serve to direct flow from the Facility away from wells along Pinegrove Road north of Muddy Creek, and away from wells along Brown Road.

Downgradient of Facility

No Well ID-Pinegrove Community Center – Lot 44-A-17 - 267 Pinegrove Road

One drilled well was observed on this lot, completed on 11/27/91 to a total depth of 145 ft. and yielding 2.5 gpm. Casing was installed to 38 ft., and the log shows depth to bedrock at 36 ft. The well is grouted to

38 ft. with cement. Water bearing zones were not noted in the log. Static water level was at 28 ft. at the time of completion. Bedrock was described in the log as “white and grey type of rock”. Overburden is described as “sandy and clay type soil”, consistent with findings of the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**), as is the depth to bedrock in this well.

Upgradient of Facility

Well ID #02-124-345 – Lot 44-1-22 - 302 Brown Road

A very small portion of this lot is within the 500-ft. perimeter but the dwelling and well are not. The well was not field located, nor is it shown on the **PTA Attachment IX- Figure 2 – Near Vicinity Map**. However, a well was completed on this lot on 3/14/02 to a total depth of 41 ft. and yielding 4 gpm. This is a large diameter bored well with concrete casing installed to 41 ft., and the log shows depth to bedrock at 41 ft. The well is grouted to 20 ft. The water bearing zone was at 23-24 ft. Static water level was 23 ft. at the time of completion, same as the encounter depth, indicating non-confining conditions as expected in the saprolite zone of the aquifer.

Upgradient of Facility

Well ID #01-124-012 – Lot 37-2-3 - 385 Pinegrove Road

This well is approximately 1500 ft. from and upgradient of the Facility Boundary, and thus is not shown on **PTA Attachment IX- Figure 2 – Near Vicinity Map**. A large-diameter bored well was constructed on this lot on 4/6/01, to a total depth of 36 ft. and yielding 2 gpm. Casing was installed to 36 ft., (assumed to be to bedrock, although the log does not specify). The well is grouted to 20 ft. with concrete. The water bearing zone is 22-23 ft. The static water level was not noted on the log at the time of completion.

Upgradient of Facility

Well ID #05-124-019 – Lot 37-2-2 - 391 Pinegrove Road

This lot and well are approximately 1500 ft. from and upgradient of the Facility Boundary, and are not shown on **PTA Attachment IX- Figure 2 – Near Vicinity Map**. However, a well was completed on this lot on 4/25/05 to a total depth of 140 ft. and yielding 10 gpm. Casing was installed to 57 ft., and the log shows depth to bedrock at 56 ft. The well is grouted to 20 ft. with bentonite. Water bearing zones were not noted in the log. The static water level was 40 ft. at the time of completion.

Upgradient of Facility

Well ID #09-124-042 – Lot 37-A-63-B - 448 Pinegrove Road

A small portion of this lot lies within the 500-ft. perimeter; however, the house and well are upgradient of and approximately 1000 ft. from the Facility boundary. The well is not shown on **PTA Attachment IX- Figure 2 – Near Vicinity Map**; however, a well was completed on this lot on 11/8/11, to a total depth of 205 ft. and yielding 7 gpm. Casing was installed to 21 ft., and the log shows depth to bedrock at 21 ft. The well is grouted to 20 ft. with cement. Water bearing zones were not noted in the log. The static water level was 40 ft. at the time of completion.

Summary

Both drilled and bored wells are present north of the Facility along Pinegrove Road. Bored wells ranged from 36 to 41 ft., with yields of 2-4 gpm. Drilled wells (for which logs are available) are completed in the solid crystalline bedrock at depths ranging from 140 to 205 ft. It appears likely that adequate supplies of

water are available from the crystalline bedrock within the first 200 ft. No information on water bearing zones is available. Static water levels in the crystalline aquifer range from 28 to 40 ft., and yields ranged from 2.5 to 10 gpm. Depths to bedrock ranged from 21 to 56 ft. This is a limited database, but consistent with other information from the Hydrogeologic and Geotechnical Report (**PTA Attachment XI**) on depth to bedrock and depth to static groundwater levels.

4.8.3 Mitigating Potential Impacts

Surface Water

The project will not, by law, be permitted to impact applicable surface and/or groundwater resources. Sanitary landfills shall not:

- Cause a discharge of pollutants into Waters of the United States, including wetlands, that violates any requirements of the Clean Water Act, including, but not limited to the Virginia Pollutant Discharge Elimination System (VPDES) requirements and the Virginia Water Quality Standards (9 VAC 26-260).
- Cause the discharge of a non-point source of pollution to Water of the United States, including wetlands, that violates any requirements of an area-wide or statewide water quality management plan that has been approved under the Clean Water Act, as amended; or violates any requirements under the Virginia Water Quality Standards.

This includes preventing adverse impacts due primarily to stormwater run-on and runoff, and also to unauthorized discharge of leachate.

The site consists primarily of managed forestland, with deeply incised intermittent streams that discharge into Muddy Creek. Any streams within the Disposal Unit boundary will be mitigated as discussed in the Drainage Patterns/Flows section below. An approximate 300-foot natural wooded buffer will be maintained between the Disposal Unit boundary and Muddy Creek where practical. In addition, a minimum 100-foot buffer will be maintained on all streams outside the Disposal Unit boundary.

In the Part B Permit Application, an erosion and sediment control plan and stormwater management plan will be prepared to maintain compliance with the regulations. Implementation of these controls will minimize stormwater discharges to receiving streams and minimize the potential for secondary wetland impacts. The measure will also include run-on controls, such as diversion swales designed to prevent storm events of a certain size from coming onto the site, or at least active portions of the site. Stormwater erosion and sediment controls will include:

- adequately-sized gravity and pressure system conveyances,
- inlet/outlet and stream bed protection,
- sediment basins with appropriate outlet control structures,
- sediment traps such as silt fencing and rock filter berms,

- stilling basins and similar measures to reduce water velocity,
- seeding and mulching, and vegetated buffers, among others.

A Stormwater Pollution Prevention Plan (SWPPP) will be prepared as part of the VPDES permit requirements.

Groundwater

The Facility will not detrimentally alter or deplete groundwater supplies in the general area of the site. A majority of the 44 private drinking water supply wells identified within the vicinity of the site are upgradient of the Disposal Unit. There are two wells along Pinegrove Road, immediately north of the Facility, that are downgradient of the Disposal Unit. These wells should be monitored (once the owners grant permission). Additionally, there is at least one, and possibly as many as five private wells near the sharp corner of Miller Lane that are potentially downgradient of the Disposal Unit. These wells should be monitored (once the owners grant permission). In the Part B Permit Application, a groundwater monitoring program will be developed that will include an appropriate groundwater monitoring well network to monitor the Facility in accordance with regulatory requirements. There is more than adequate room on the site to develop a monitoring network between the Disposal Unit/WMB and the Facility Boundary. In addition, where given permission and where appropriate, other nearby drinking water supplies will be monitored. Mitigation of any impact caused by the Facility will be through the development of an alternate water supply.

Drainage Patterns / Flows

During construction and operation, the site drainage patterns will be altered to conform to the design of the Facility. Stormwater controls and best management practices will be designed and implemented in accordance with the VPDES permitting process to reduce potential impacts. Stormwater containment structures will be designed to a higher standard of care (a larger storm event) to provide additional management capacity. At completion, the project will not detrimentally alter general drainage patterns of the area, as the landfill will be situated along an existing ridge. There will be no primary impacts to wetlands from the landfill construction or operation. However, there will be impacts to streams located with the landfill footprint, and secondary impacts to wetlands and streams may be present. These secondary impacts will be determined by pre- and post-development drainage patterns and flows. Impacts to streams and wetlands will be mitigated by purchasing credits, as authorized by regulatory agencies.

Flood Plain

Per the Federal Insurance Administration Flood Insurance Rate Map for the site, no housing/structures will be placed within the 100-year flood hazard area near Muddy Creek. Additionally, none of the project structures will impede or redirect flood flows as the flood area is downstream of the site.

As mapped by the Federal Insurance Administration the Disposal Unit does not fall within the 100-year flood plain (**see Attachment PTA-XXI**).

Flooding

Flippen Lake is located just east of the proposed Facility and has been evaluated with respect to inundation due to breach of the dams. The Disposal Unit will not be impacted by potential flooding caused by breach of the dams.

4.9 Tourism

In Cumberland County, one site was identified as having potential for tourism located within 5 miles of the proposed project: the Cumberland State Forest. Located within the State Forest is Bear Creek Lake State Park. The potential for impacts to the forest (and thus, the park) are discussed above in Section 4.1, Parks and Recreation Areas. A brochure as distributed by the Cumberland State Forest, and information about Bear Creek Lake State Park are provided in **Appendix LIS-2I**.

5.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVE

5.1 Overview

Green Ridge has worked diligently to inform the public on all aspects of the project. As indicated in Section 3.0 County Waste of Virginia considered multiple alternatives and after careful consideration and support from Cumberland County, determined that the current Green Ridge Recycling and Disposal Facility site meets the goals of both the County and County Waste of Virginia. The landfill will be regulated by a number of agencies. A list of regulations that will govern the landfill includes but is not limited to:

- EPA Subtitle D (40 CFR Parts 257 and 258)
- Virginia Waste Management Act (Title 10.1, Chapter 14)
- Virginia Solid Waste Management Regulations (9 VAC 20-81)
 - Siting restrictions
 - Landfill design
 - Construction
 - Operations
 - Closure and post closure care
 - Groundwater monitoring
 - Gas and odor management
 - Leachate management
 - Storm water management
- Financial Assurance (9 VAC 20-20-70)
- Permit action fees and annual fees (9 VAC 20-90)
- Planning Regulations (9 VAC 20-130)

- Operator training (10.1-1408.2)
- VPDES industrial activity stormwater permitting (9VAC 25-151)
- Storm water Regulations (9 VAC 25-870)
- Erosion control regulations (4 VAC 25-840)
- Air permitting – Minor new source review (9 VAC-5-80-6)
- Air permitting – Title V (9 VAC 5-80-1)
- Wetland permitting (9VAC25-210)
- Department of Historic Resources

Submission Instruction No. 1 in referencing PTA Attachment XVII: Landfill Impact Statement – Section V Environmental Consequences of Alternative, states the following: *“Discuss the environmental consequences of each of the alternatives presented in Section III of the LIS, such as loss of land used for forestry, agriculture or other purposes, wetlands and streams, if any, noise pollution, odor and traffic. Discuss how the environmental consequences of the alternatives will be mitigated by meeting the regulatory requirements of the Virginia Waste Management Act and the Solid Waste Management Regulations.”* Because Section 3.0 of the Landfill Impact Statement indicates that based on the goals and objectives of the County and County Waste, there are no other viable alternatives this section only addresses the chosen alternative.

Potential impacts from the Facility will be mitigated through appropriate design, proper operation, regulatory compliance and enforcement. A brief discussion of potential areas of impact at the Facility follows. The final design will carefully and thoughtfully consider and mitigate environmental consequences of the Facility and set up open communications with the County and the public to verify that mitigation efforts are in place and operating as planned. The County will employ a County Landfill Liaison who’s duties will include monitoring and inspection of waste disposal practices at the Landfill and monitoring all requirements of the Host Agreement and zoning. (See Section 3.1 of the Host Agreement).

5.2 Loss of Forestry or Agricultural Land

The majority of the Green Ridge site was previously owned by American Timberland and heavily timbered. Approximately 400± acres were purchased from American Timberland. Historically the site was also farmed but not in recent history. While some timberland will be lost, the County has significant timber resources under management by American Timberland and other companies. The County’s comprehensive plan indicates that as of 2006, the County had 119,000 acres of forestland or approximately 60% of the County’s total land area. The Green Ridge site (if considered all forest in good condition – which is a conservative assumption) would constitute 1% of the forested land.

Green Ridge has pledged to maintain forested buffers around the facility boundary. The Host Agreement indicates a buffer of 100’ to 200’ depending on ownership of the adjacent property and its use. This buffer will be maintained as forest.

At the end of usage, the Facility will be maintained as green space. In addition, at the end of usage, Green Ridge will provide a minimum of 25 acres of land for public use.

5.3 Traffic Control

A traffic impact analysis was completed by Davenport and submitted to VDOT. It received approval from VDOT. (**PTA Attachment XVI**) In that analysis it was assumed that 80% of the regional waste hauling vehicles would access the facility between 6:00PM and 6:00AM, to reduce traffic on Route 60 during peak travel times. At the entrance, appropriate turn lanes, tapers, signage and lighting will be provided to meet VDOT standards. An entrance permit from VDOT is required.

The access road into the site off of Route 60 is approximately 1 mile long. This will allow sufficient queuing space for trucks and allow the trucks to exit Route 60 rapidly.

In addition, road relocations planned for Pine Grove Road and Miller Lane will be designed to improve traffic flow and safety along the relocated sections of the road.

All efforts with regards to traffic control will conform to VDOT requirements and in accordance with subsequent permit approvals in addition to requirements as may be set forth in the Host Agreement and Conditional Use Permit.

5.4 Wetland and Stream Mitigation

VSWMR 9VAC20-81-120.E.1 sets forth requirements relative to landfill development and wetlands as follows: *"New sanitary landfills and expansions of existing landfills, other than those impacting less than 2.0 acres of nontidal wetlands, shall not be constructed in any tidal wetland or nontidal wetland contiguous to any surface water body."* Significant detail has been given to wetland and stream mapping on the site. The ACOE has issued their preliminary jurisdictional approval (**PTA Attachment XXII**) While wetlands are present on the site, efforts have been taken to eliminate primary impacts to wetlands. (**PTA Attachment IX – Near Vicinity Map**). There will be impacts to streams and potentially secondary impacts to wetlands. Green Ridge must adhere to all regulatory requirements and all permitting requirements of the Army Corps of Engineers and Virginia Department of Environmental Quality (VWP) during the development of the site. Permitting is in progress and must address mitigation of impacts.

Mitigation will take the form of avoidance, potential off-site improvements and as needed, the purchase of credits.

Appropriate stormwater BMPs will be designed, permitted, and installed to protect wetlands and streams from impact. These BMPs will be approved and monitored by the appropriate regulatory agencies.

5.5 Stormwater

Stormwater on site will be managed under multiple regulatory agencies. Both the VDEQ – Land Protection and Revitalization Division (under the Sanitary Landfill Permit) and the VDEQ – Water Division (Individual Storm water Permit for Industrial Activities) will review and issue appropriate permits. Cumberland County must issue land disturbance permits for construction. Thus, Green Ridge will be bound with regulatory monitoring and reporting requirements as set forth by these agencies.

During construction and operation, the site drainage patterns will need to be altered to conform to the design of the Facility. Stormwater controls and best management practices will be designed and implemented in accordance with the VPDES permitting process to reduce potential impacts. Stormwater containment structures will be designed to a higher standard of care (a larger storm event) to provide additional management capacity.

At completion, the project will not detrimentally alter general drainage patterns of the area, as the landfill will be situated along an existing ridge.

5.6 Leachate

Leachate will be collected and disposed of in accordance with the Leachate Management Plan which will be submitted during the Part B application process. At this time, it is assumed that leachate will be collected from the landfill cell and pumped into a series of holding tanks. Appropriate backup power generation facilities will be provided. Leachate will be hauled from the site to a permitted wastewater treatment facility. The Part B application must provide evidence of approval for the leachate from the receiving facility. In the future, once sufficient tonnage has been landfilled, an evaporator system will be considered to reduce the volume of leachate that must be hauled off site. An evaporation system will require appropriate permitting with VDEQ including air permitting. At no time will untreated leachate be allowed to discharge off site.

5.7 Odor

Green Ridge has committed to excluding certain wastes from its operations which are known to be odor producing. Per the Host Agreement (Paragraph 1.2), the facility will not accept sludge or recycled/processed construction and demolition debris focusing on sheet rock. In addition, animal carcasses will be controlled and be approved by the County.

The Host Agreement specifically states the following under Section 1.20 relative to odor management: *"Green Ridge agrees to control odor at and around the Landfill property. As required by the Regulations, Green Ridge shall have an Odor Management Plan. To minimize odor, Green Ridge will not accept Sludge. The County shall be provided with a copy of this plan prior to submittal to VDEQ to review for adequacy in addressing complaints, including the timeliness of planned responses, and monitoring odor control activities. Any odor complaint shall be directed to the County and shall be immediately forwarded to VDEQ."*

In addition, Green Ridge has pledged to design and install an active gas system which will collect and burn landfill gas which will reduce not only greenhouse gas emissions but also manage odor.

5.8 Noise and Lighting

Noise and lighting impacts will be managed as outlined in the Host Agreement, Section 1.2.1 which states: *“Green Ridge shall take such steps as are necessary to prevent noise levels associated with operations on the site from exceeding 67 decibels (not including ambient noise) when measures at the property line of the landfill site (not including the normal sounds of trucks entering the site). Except for bird control, no external speakers shall be used at the Landfill. Except for the entrance lighting and lighting at intersections, any and all outside lighting shall be designed so that there is no more than 0.5 foot candles of ambient light conditions when measures at the landfill facility property line. ”*

5.9 Summary

In summary, Green Ridge will act thoughtfully and responsibly to minimize impacts and to mitigate rapidly should an issue arise. The landfill operations will be overseen by the County’s Landfill Liaison. Design and operational controls must be identified and outlined in detail in the Part B application which will allow public comment once the draft permit is prepared by DEQ. Nothing has been identified in the Part A application that could not be addressed adequately in the Part B.

6.0 COORDINATION

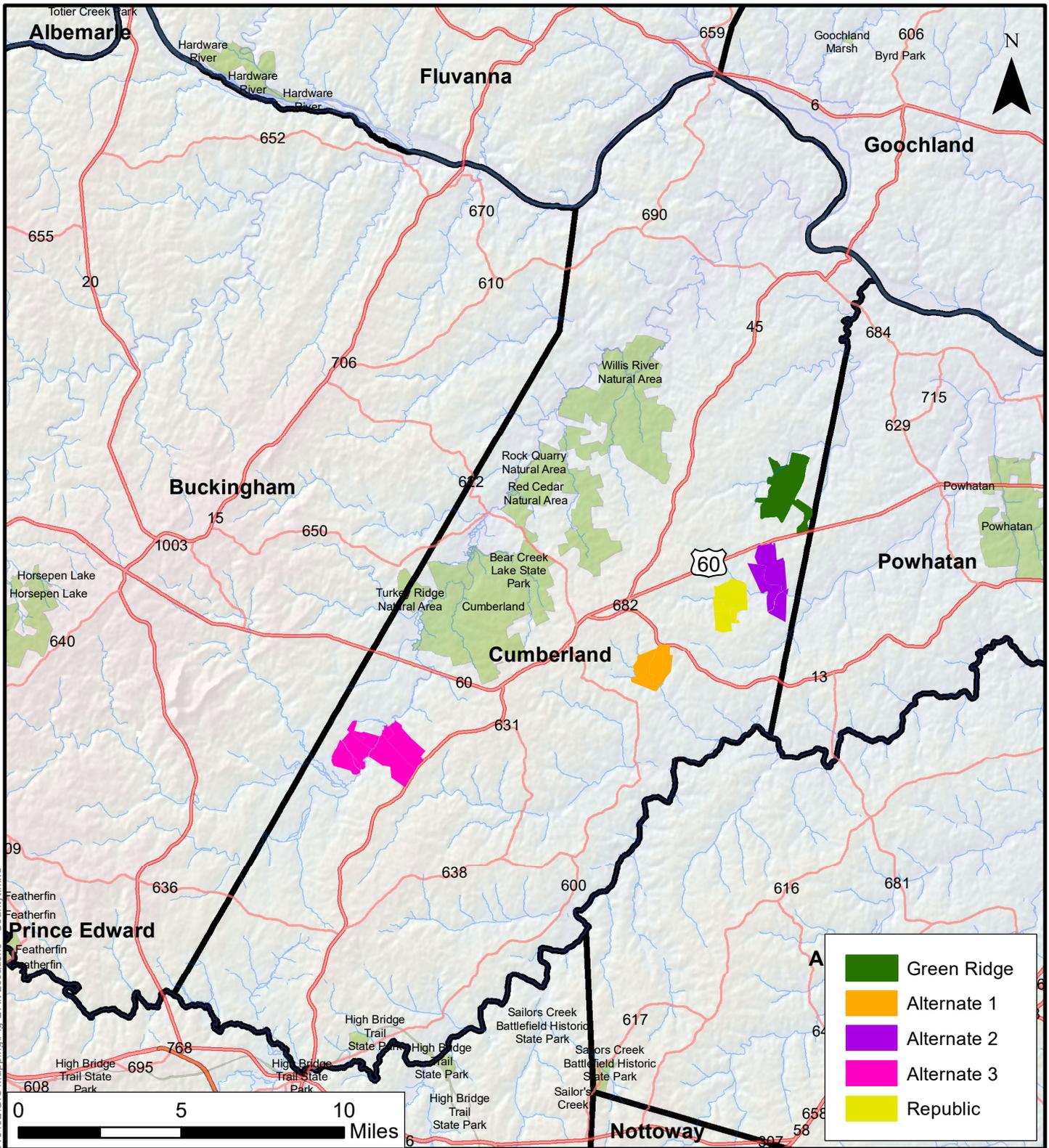
Several agencies were consulted during the process of the LIS and Part A preparation. A list of those agencies and contacts is provided in **APPENDIX LIS-3**.

7.0 LIST OF CONTRIBUTORS

Consultants and/or agencies that contributed in the preparation of this LIS are listed in **Appendix LIS-3**.

8.0 REFERENCES

Sources of information are cited at appropriate locations in the narrative. Consultants and/or agencies that contributed in the preparation of this LIS are listed in **Appendix LIS-3**.



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**Area Map
Alternate Sites**

Green Ridge Recycling and Disposal Facility LLC
Cumberland County, Virginia

SCALE: 1:270,000

PROJECT: 18020117-030102



Draper Aden Associates
Engineering • Surveying • Environmental Services

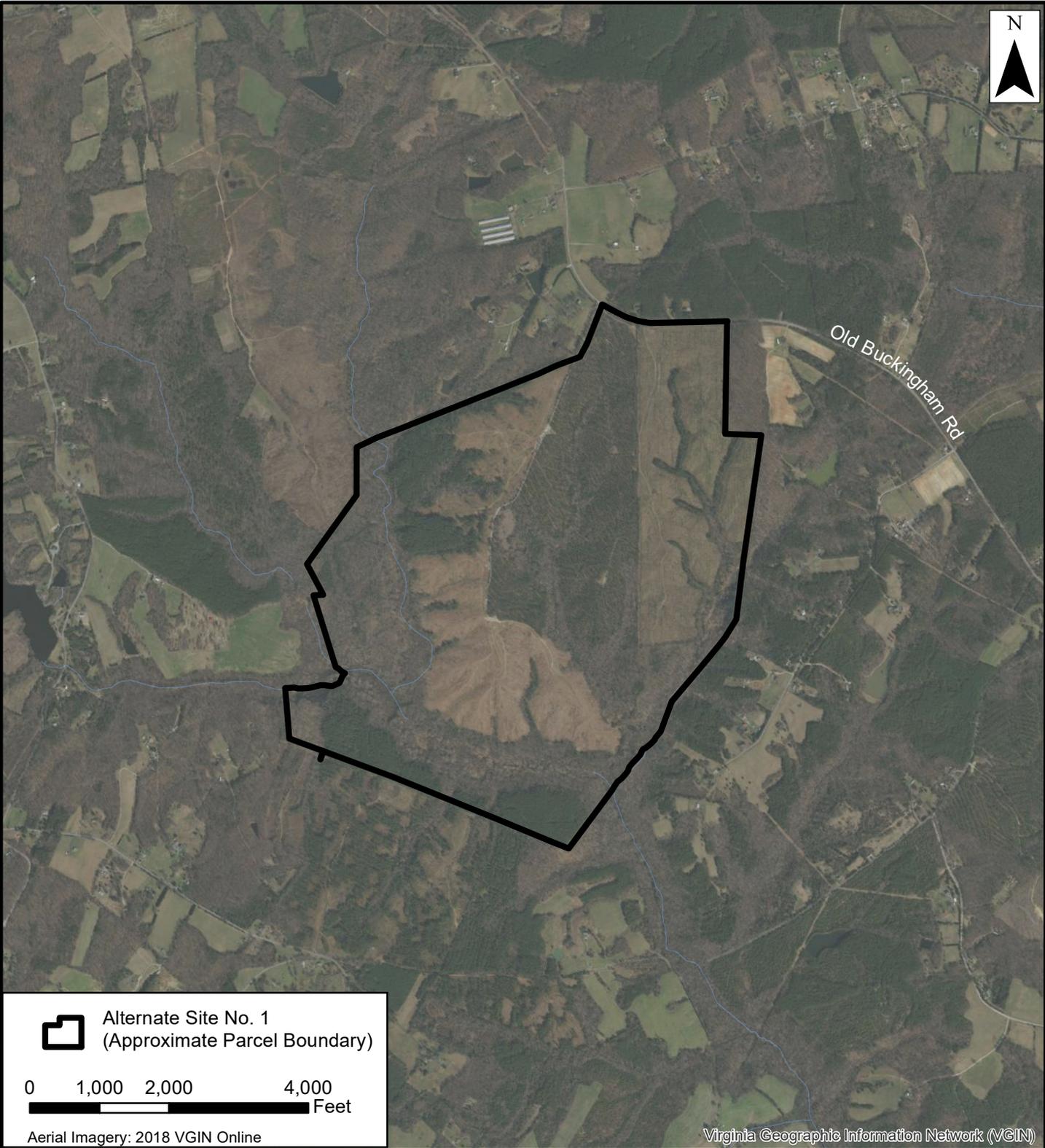
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291

Richmond, VA
Charlottesville, VA
Hampton Roads, VA

Raleigh, NC
Fayetteville, NC
Northern Virginia

DESIGNED: LPK
DRAWN: WMD
CHECKED: LPK
DATE: 8-10-19

**FIGURE
1**



Alternate Site No. 1
(Approximate Parcel Boundary)

0 1,000 2,000 4,000
Feet

Aerial Imagery: 2018 VGIN Online

Virginia Geographic Information Network (VGIN)

**Site Location &
Aerial Imagery**

Alternate Site No. 1
Green Ridge Recycling and Disposal Facility LLC
Cumberland County, Virginia

SCALE: 1" : 2000'

PROJECT: 18020117-030102



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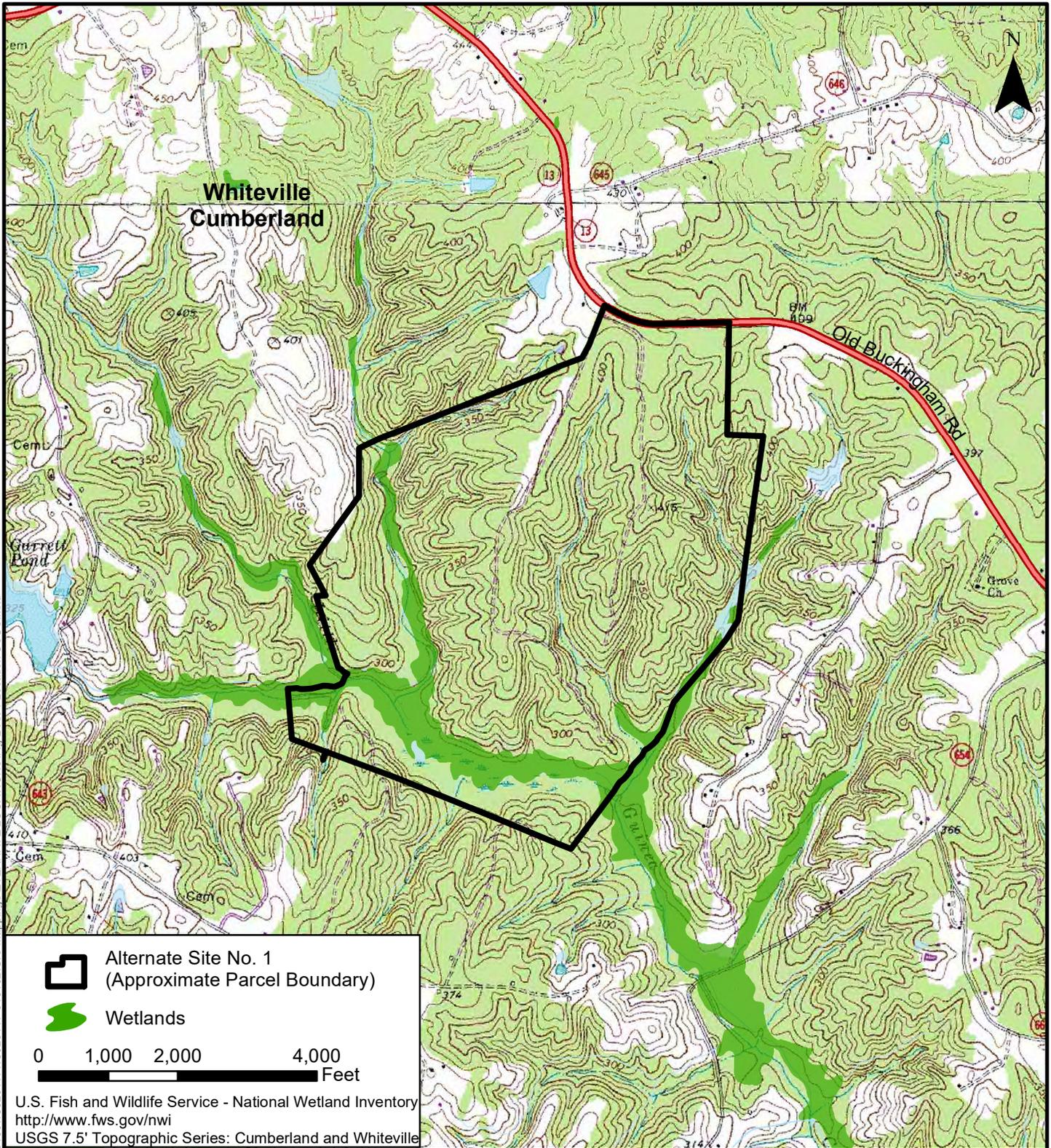
Richmond, VA
Charlottesville, VA
Hampton Roads, VA

Raleigh, NC
Fayetteville, NC
Northern Virginia

DESIGNED: LPK
DRAWN: WMD
CHECKED: LPK
DATE: 8-10-19

FIGURE

2A



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**Site Location &
NWI Inventory**

Alternate Site No. 1
Green Ridge Recycling and Disposal Facility LLC
Cumberland County, Virginia

SCALE: 1" : 2000'

PROJECT: 18020117-030102



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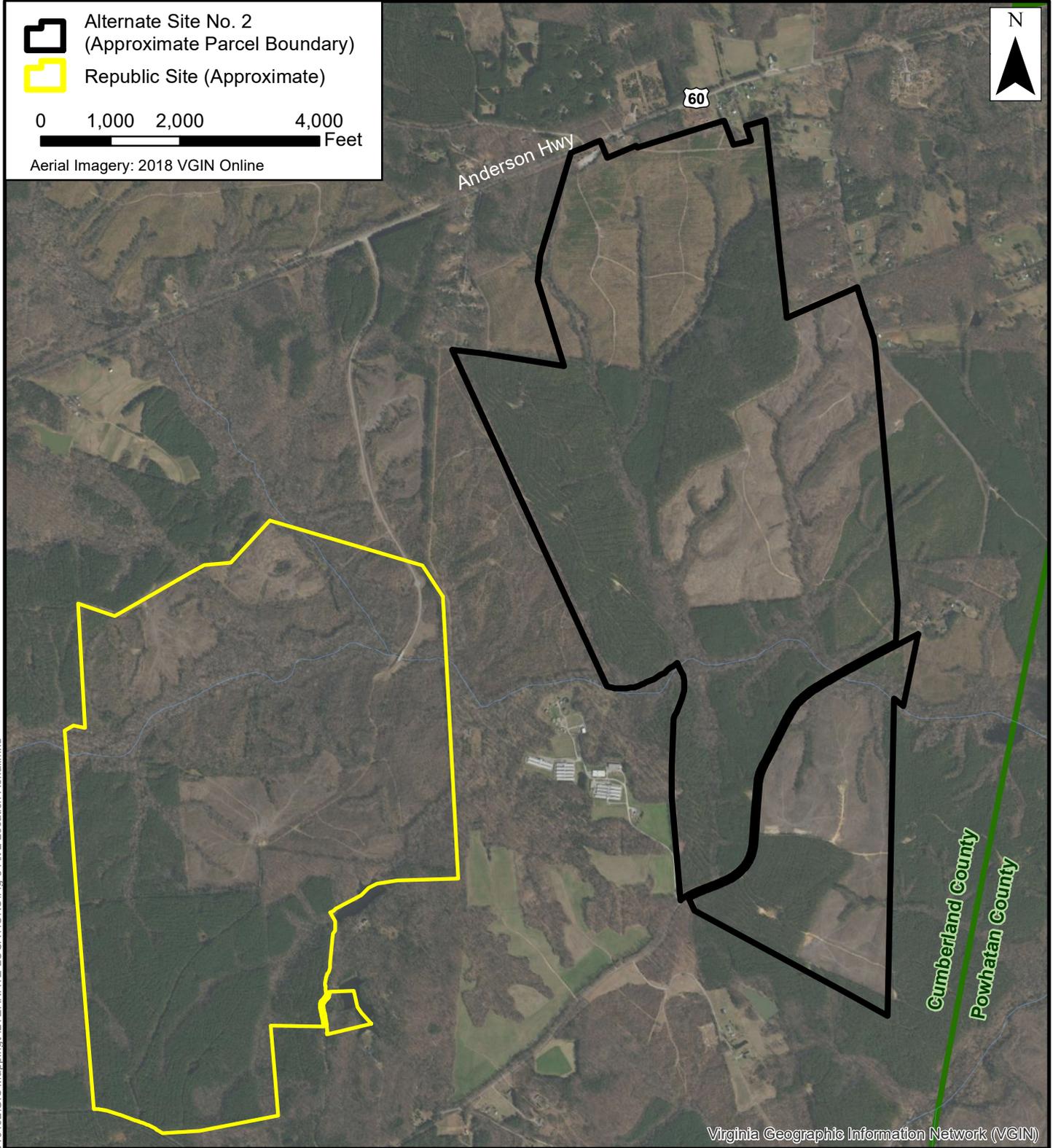
DESIGNED: LPK
DRAWN: WMD
CHECKED: LPK
DATE: 8-10-19

**FIGURE
2B**

-  Alternate Site No. 2
(Approximate Parcel Boundary)
-  Republic Site (Approximate)

0 1,000 2,000 4,000
Feet

Aerial Imagery: 2018 VGIN Online



Virginia Geographic Information Network (VGIN)

**Site Location &
Aerial Imagery**

Alternate Site No. 2 and Republic Site
Green Ridge Recycling and Disposal Facility LLC
Cumberland County, Virginia

SCALE: 1" : 2000'

PROJECT: 18020117-030102



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Northern Virginia

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CHECKED: LPK
DATE: 8-10-19

FIGURE

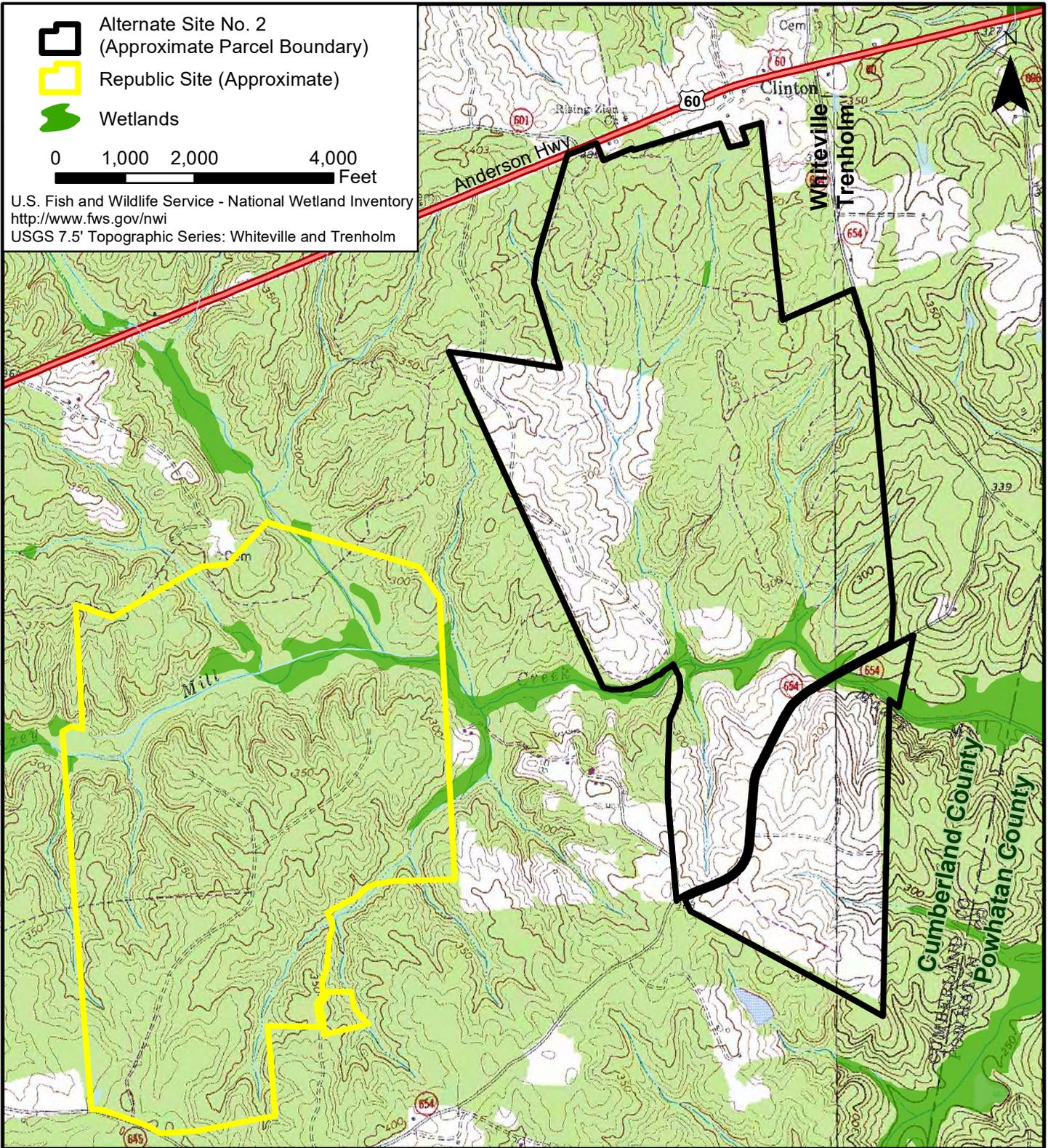
3A

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-  Alternate Site No. 2
(Approximate Parcel Boundary)
-  Republic Site (Approximate)
-  Wetlands

0 1,000 2,000 4,000 Feet

U.S. Fish and Wildlife Service - National Wetland Inventory
<http://www.fws.gov/nwi>
 USGS 7.5' Topographic Series: Whiteville and Trenholm



Site Location & NWI Inventory

Alternate Site No. 2 and Republic Site
 Green Ridge Recycling and Disposal Facility LLC
 Cumberland County, Virginia

SCALE: 1" : 2000'

PROJECT: 18020117-030102



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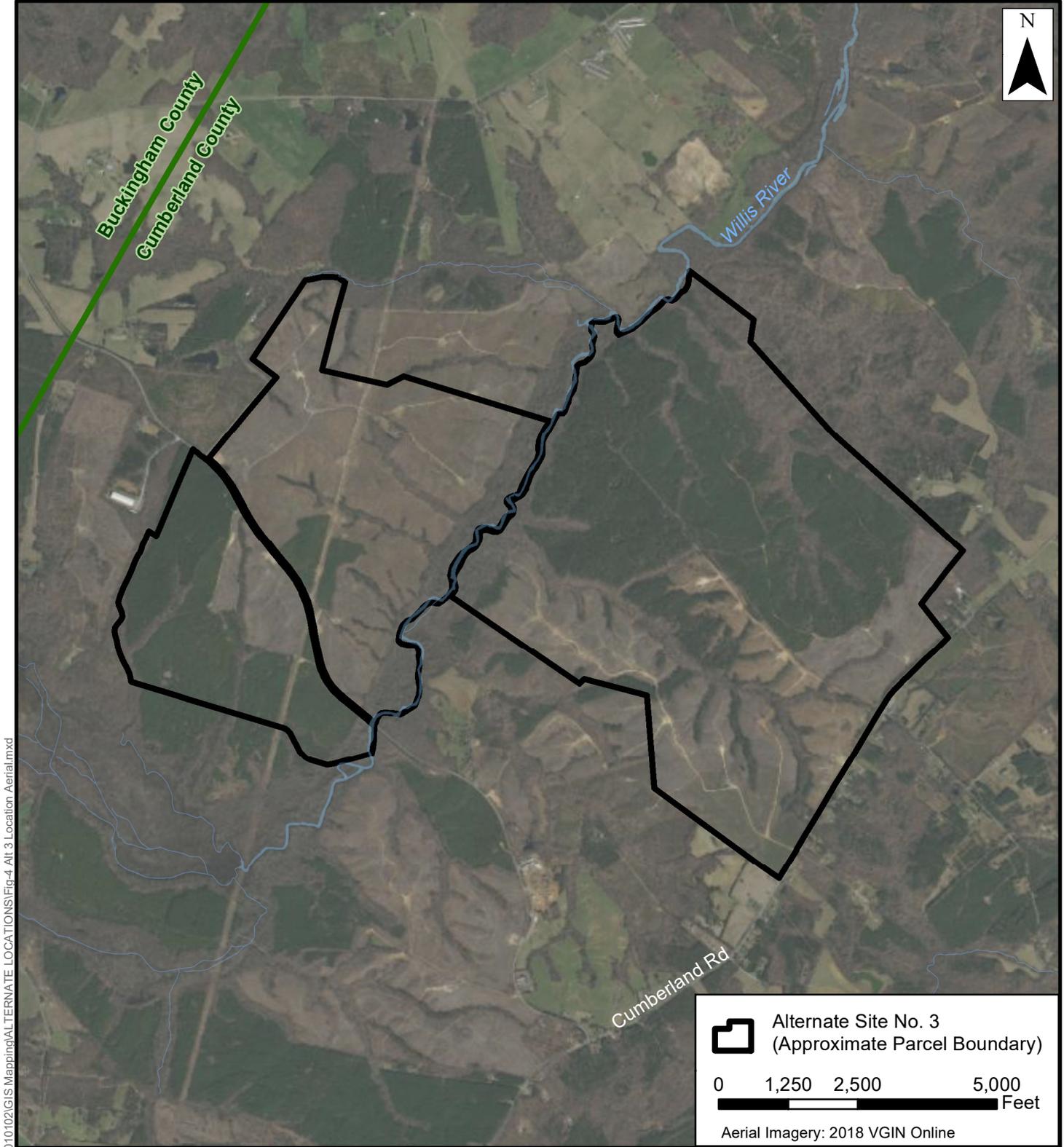
Richmond, VA
 Charlottesville, VA
 Hampton Roads, VA

Raleigh, NC
 Fayetteville, NC
 Northern Virginia

DESIGNED: LPK
 DRAWN: WMD
 CHECKED: LPK
 DATE: 8-10-19

FIGURE
3B

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 Alternate Site No. 3
 (Approximate Parcel Boundary)

0 1,250 2,500 5,000
 Feet

Aerial Imagery: 2018 VGIN Online

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Site Location & Aerial Imagery

Alternate Site No. 3
 Green Ridge Recycling and Disposal Facility LLC
 Cumberland County, Virginia

SCALE: 1" : 2500'
 PROJECT: 18020117-030102

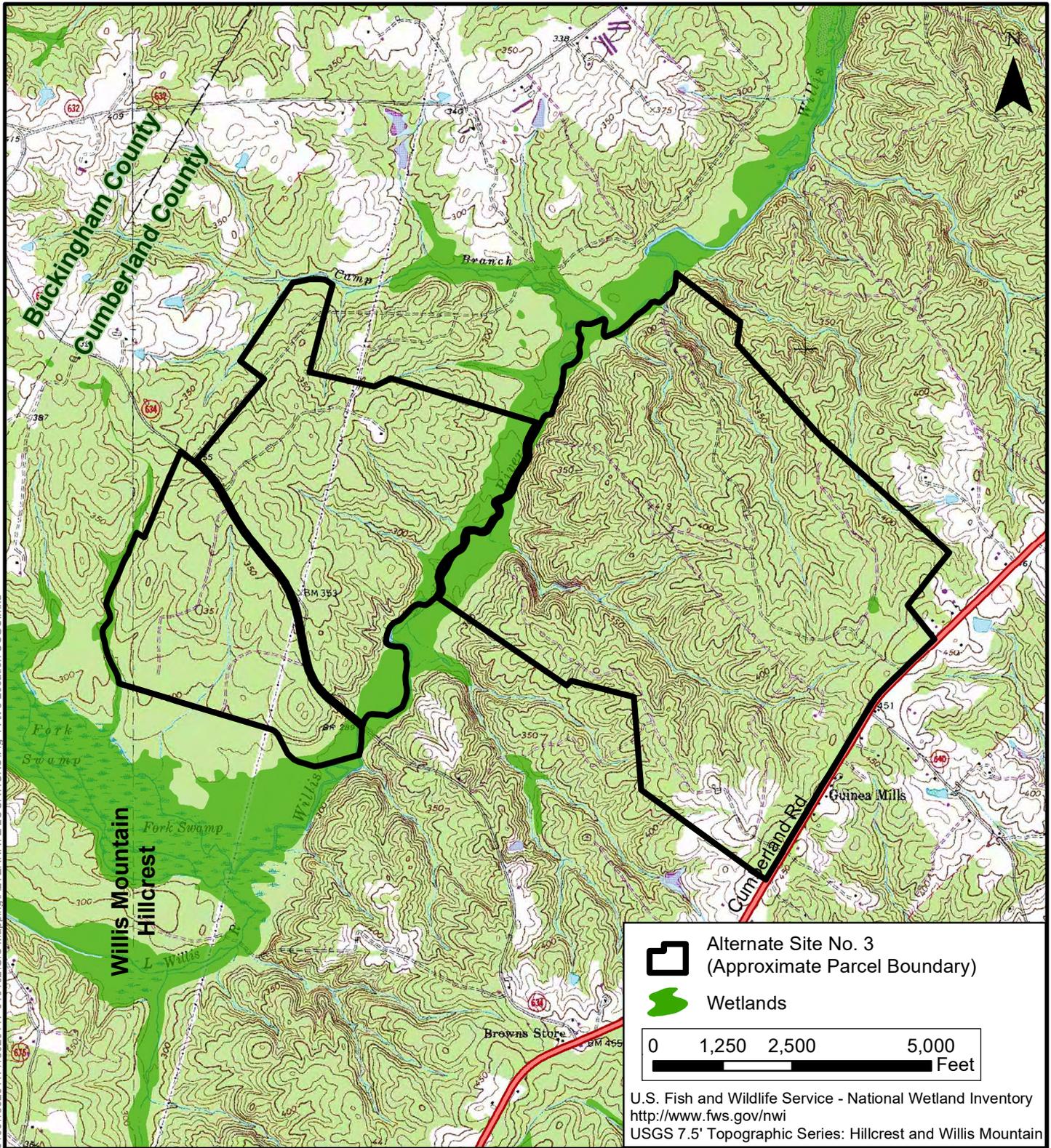

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 540-552-0444 Fax: 540-552-0291 Hampton Roads, VA Northern Virginia

DESIGNED: LPK
 DRAWN: WMD
 CHECKED: LPK
 DATE: 8-10-19

FIGURE
4A

Path: \\draperaden.net\data\Projects\2018\18020117\18020117-010102\GIS Mapping\ALTERNATE LOCATIONS\Fig-4_Alt 3_Location_USGS.mxd



 Alternate Site No. 3
 (Approximate Parcel Boundary)

 Wetlands

0 1,250 2,500 5,000
 Feet

U.S. Fish and Wildlife Service - National Wetland Inventory
<http://www.fws.gov/nwi>
 USGS 7.5' Topographic Series: Hillcrest and Willis Mountain

Site Location & NWI Inventory

Alternate Site No. 3
 Green Ridge Recycling and Disposal Facility
 Cumberland County, Virginia

SCALE: 1" : 2500'
 PROJECT: 18020117-010102



Draper Aden Associates
Engineering • Surveying • Environmental Services

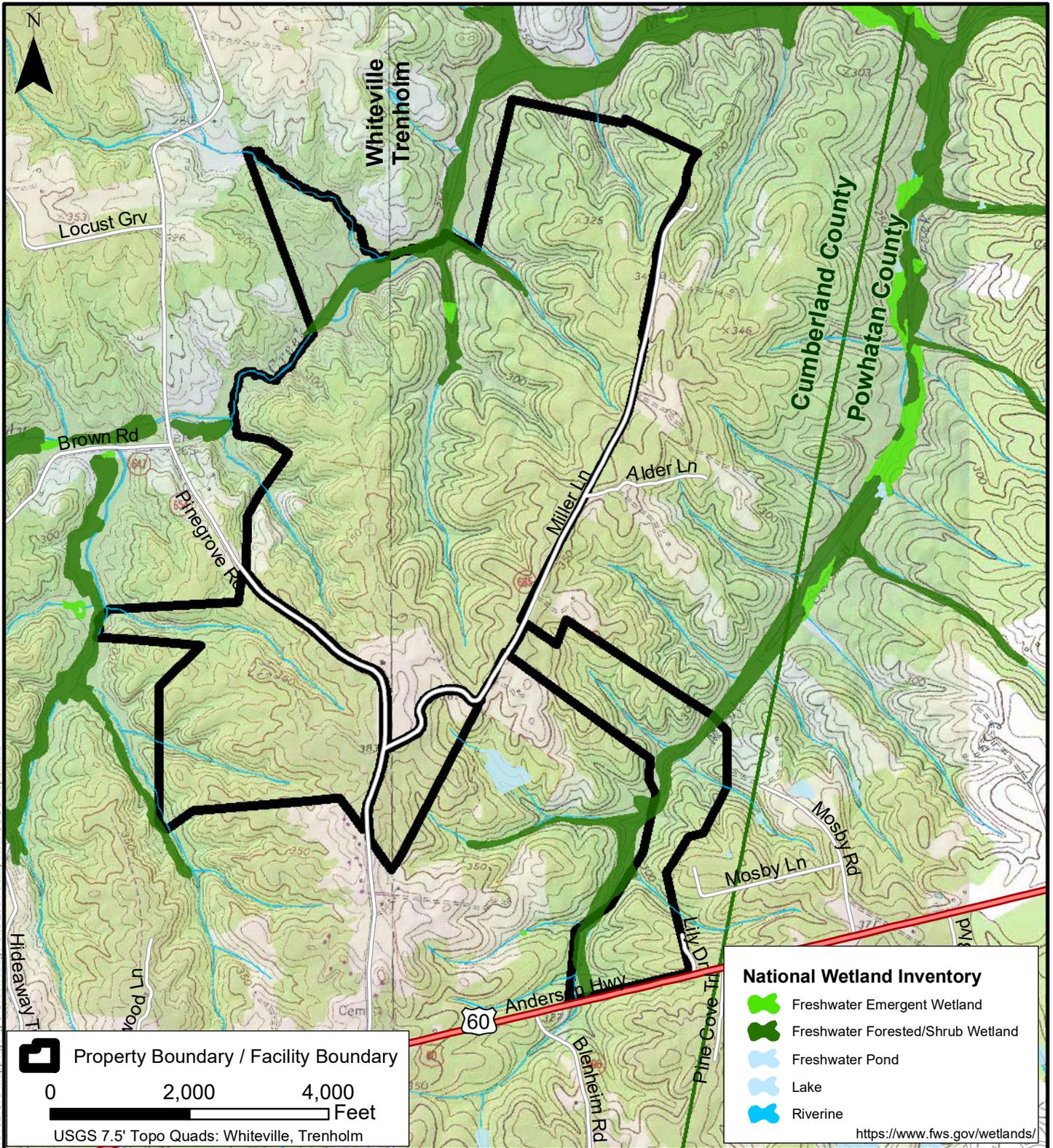
2206 South Main Street
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Richmond, VA
 Charlottesville, VA
 Hampton Roads, VA

Raleigh, NC
 Fayetteville, NC
 Northern Virginia

DESIGNED: LPK
 DRAWN: WMD
 CHECKED: LPK
 DATE: 7-1-19

FIGURE
4B



Path: P:\2018\18020117\18020117-010102\GIS Mapping\Fig-5 Green Ridge Site Loc Facility NWI USGS Topo.mxd

 Property Boundary / Facility Boundary

0 2,000 4,000
Feet

USGS 7.5' Topo Quads: Whiteville, Trenholm

National Wetland Inventory

-  Freshwater Emergent Wetland
-  Freshwater Forested/Shrub Wetland
-  Freshwater Pond
-  Lake
-  Riverine

<https://www.fws.gov/wetlands/>

Site Location and NWI Map

Green Ridge
Recycling and Disposal Facility
Cumberland Co., Virginia

SCALE: 1" = 2000'

PROJECT: 18020117-010102



Draper Aden Associates

Engineering ♦ Surveying ♦ Environmental Services

2206 South Main Street
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Raleigh, NC
Fayetteville, NC
Northern Virginia
Virginia Beach, VA

DESIGNED: LPK
DRAWN: SMF
CHECKED: KEB
DATE: 11-21-19

FIGURE

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