May 16, 2022

Woodridge Solar, LLC

Special Use Permit Application Narrative for Solar Energy Facility and Energy and Communications Transmission Facilities (Substation)

Tax Map Parcels 114-51; 114-55; 114-56; 114-58; 114-65; 114-68; 114-69; 114-70; 115-10

SP 2022-_____
SP 2022-_____

INTRODUCTION

Hexagon Energy, LLC is a clean energy development firm based in Charlottesville and the sole owner of Woodridge Solar, LLC (the "Applicant"). Hexagon Energy has delivered over 6,500 megawatts of clean energy to communities across the United States. Hexagon Energy is committed to helping our community achieve a future of clean energy, and the company is pleased to propose a solar energy project in Albemarle County.

PROJECT PROPOSAL

Woodridge Solar is a proposed solar energy facility (the "Project") to be located near Woodridge, in the Scottsville Magisterial District, within a project area of approximately 1,500 timbered acres (the "Special Use Permit Area") located on nine parcels of land with a total acreage of approximately 2,259 acres (collectively, the "Property"). The panels will encompass 650 acres, and the remaining acreage of the project area will be restored and planted with pollinators and meadow mix. The Property is zoned Rural Areas.

The Project is a "solar energy system" that may be allowed by special use permit in the Rural Areas district Zoning Ordinance § 10.2.2(58). A "solar energy system" is defined as "an energy conversion system consisting of photovoltaic panels, support structures, and associated control, conversion, and transmission hardware occupying one-half acre or more of total land area." Zoning Ordinance § 3.1.

As part of the Project, a substation or "energy and communications transmission facilities" is also proposed and may be allowed by special use permit in the Rural Areas district Zoning Ordinance §

10.2.2(6). An "energy and communications transmission facility" is defined as "electrical power substations, transmission lines and related towers; gas or oil transmission lines, pumping stations and appurtenances; unmanned telephone exchange centers, micro-wave and radio-wave transmission and relay towers, substations and appurtenances; but excluding personal wireless service facilities." Zoning Ordinance § 3.1.

The Project will be located on property owned by J D Land Holdings, L.C., a Virginia limited liability company (the "Owner"). The Special Use Permit Area will consist of approximately 1,200 acres as which is a portion of 2,259 acres of the following parcels:

Tax Map Parcel	Acreage	Special Use Permit Area Acreage
11400-00-00-05100	113	97.5
11400-00-00-05500	89	78.1
11400-00-00-05600	14.8	12
11400-00-00-05800	143.65	81.9
11400-00-00-06500	35.48	34.2
11400-00-00-06800	42	16.4
11400-00-00-06900	42	37.9
11400-00-00-07000	1728	1097.2
11500-00-00-01000	48.5	44.5

The Property has been historically used for timbering of planted pine over the last 80 years and a significant portion of the site is already cleared. The Project will allow the Property to be restored and rest for the next 30 years. See Attachment A.

The Project has a nameplate capacity of 138 megawatts AC from equipment installed on approximately 630 acres of the Property. The Project will deliver over 315 million kWh of clean, emissions free power to our electrical grid, enough to power over 25,000 homes each year. The power generated by the Project will be sold via a long-term (20 year) power purchase agreement to a public utility or entity with suitably high-power usage. Such entities include large corporations, non-profits, Universities, municipalities, or the Commonwealth of Virginia.

CHARACTER AND USE OF SURROUNDING PARCELS

The surrounding land is used for agricultural, forestry, conservation, and residential purposes. The operation of a solar facility in the Rural Area would not affect the viability of agriculture, forestry, or conservation in the surrounding rural landscape.

CONSISTENCY WITH THE COMPREHENSIVE PLAN

Rural Areas Plan

The Property is designated for Rural Areas in the Comprehensive Plan. The Rural Areas Plan supports agricultural and silvicultural uses, and the protection of natural and cultural resources. The Project is consistent with the Comprehensive Plan because it would preserve lands for future agricultural and silvicultural uses.

Unlike other utility uses such as traditional power plants, the Project would not permanently remove land from agricultural or silvicultural uses. After the Project has reached the end of its useful life, which is expected to be approximately 35-40 years, the solar energy equipment can be removed from the Property and the land can be returned to agricultural or silvicultural uses.

The Project plans to preserve large areas of vegetated buffers along the Property's boundaries and public roads to screen the solar energy equipment from adjacent parcels and roads. In addition to helping screen the facility, a vegetated buffer would help establish a perimeter that supports the character of the surrounding rural landscape.

Natural Resources

The Natural Resources chapter of the Comprehensive Plan refers to the Local Climate Action Planning Process Report, which the County approved on September 7, 2011. That report recommended that the community "promote wider awareness and adoption of cleaner sources of electrical energy (e.g., solar photovoltaic, co-generation, biomass, wind)."

In addition, the Natural Resources chapter (Page 4.45) of the Comprehensive Plan states:
In 2010, members of the community and representatives of the County, the City, and UVA began a local planning process to find ways to lower the community's energy consumption and, thus, greenhouse gas emissions. The Committee, known as the Local Climate Action Planning Process (LCAPP) Steering Committee, recommended that the City, County, and UVA:

- Continue to demonstrate leadership in energy and carbon reductions at the local level;
- Build on existing synergies by continued collaboration of City, County, UVA, and community partners;
- Integrate the role of energy and carbon emissions in projects and planning;
- Equip the community at all levels to make informed decisions about the impacts of carbon emissions and energy; and
- Identify and promote actions that enable the community to reap the health, economic and environmental benefits that accompany sound energy-based decisions.

The proposed project will meet these objectives.

Historic Resources

The Property is located within the geographic boundaries of the Southern Albemarle Rural Historic District, a national historic district listed on the National Register of Historic Places (the "SARHD"). None of the nine parcels making up the Property are identified as contributing to the SARHD. Therefore, the Property is not listed on the National Register.

The County GIS indicates that parcels 114-51 and a sliver of the adjacent parcel 114-55 is within the the Monticello Viewshed which is less than 5% of the total project site. However, no panels are proposed within parcel 114-51 and only a very small portion of 114-55 is within the viewshed. Given that the installed solar facility equipment has a low profile (< 10' high), the vast majority, if not all, of the Project is not expected to cause visual impacts to the Monticello Viewshed. The Applicant met with Liz Russel, the Director of Planning, Sustainability, & Project Management at Monticello and she did not express any concerns with the proposal, and is in support of solar..

PUBLIC NEED AND BENEFIT

Direct Revenue to the County

Albemarle County can benefit directly from the Project in the form of increased tax revenue, both from real property tax and from personal property taxation. After construction of the solar project, it is anticipated that the real property taxation will increase due to the increased value placed on the Project.

In addition to taxes on real property, personal property tax can provide additional revenue for the County. Solar projects in Virginia can be assessed for Personal Property Taxation in one of two ways, dependent on the County's choosing:

1. Machine and Tool (M&T) Tax Stepdown- this begins as an 80% abatement for Personal Property Taxes in years 1-5. IT steps down to 70% in years 6-10, and 60% after year 10.
2. Energy Revenue Share- this is a straightforward taxation methodology which requires $1,400/MWac/year in Personal Property Taxation. Utilizing this taxation methodology would represent $193,200 in Personal Property Tax revenue for the County in year 1 of operations, and $6.7 million over the life of the Project.

Another consideration is the amount of public services that accompany this additional tax revenue base; while the Project will increase tax base provided to the County from the Project, it will not have any significant draw on public resources such as schools, emergency services, or roads.

Economic Development

In addition to direct revenue from taxes, there are other economic benefits to consider. The largest of these is jobs directly attributable through the construction of the Project.

Hexagon Energy and other local environmental, engineering, and consultants that are employed through the Project contribute to the local economy in Albemarle County. In addition, upon reaching construction, the Project would contribute to support local jobs by sourcing local contractors and subcontractors wherever possible. From fence installers, to panel electricians, civil engineers, and construction laborers, significant local job creation during the engineering and construction of the Project is guaranteed.

Climate Action Plan

In October 2020, the County adopted the Climate Action Plan that recommends a number of strategies and actions for renewable energy and other initiatives. The Project will specifically contribute to the following strategies and actions:
Strategy: Enable and incentivize utility scale renewable energy projects in the County Code and during the community development regulatory process.

Actions:

- *Establish a County policy clarifying this strategy to enable and incentivize utility-scale renewable energy projects, incorporating holistic analysis of local impacts on equity and environment.*
- *Review the building, zoning, subdivision, land use, and tax sections of the County Code for opportunities to better facilitate and incentivize renewable energy projects. Encourage and prioritize the use of roof tops, parking lots, brownfields, landfills, and post-industrial or other open lands over forested or ecologically valuable lands.*

Strategy: Partner with utilities and renewable energy companies to increase local renewable energy and energy storage initiatives.

Actions:

- *Conduct a study in cooperation with renewable energy companies to identify locations for utility scale projects in Albemarle County. Prioritize the use of roof tops, parking lots, brownfields, landfills, and post-industrial or other open lands over forested or ecologically valuable lands.*

POTENTIAL IMPACTS OF THE PROPOSED PROJECT

Impact to Adjacent Properties

There are a number of single-family residential lots and vacant parcels that are adjacent to the Project. Mitigation of the Project will be done through the careful siting of the panels, setbacks of 200 feet from any parcel boundary, and use of existing vegetation and additional planted vegetation for buffering as necessary.

Glint and Glare Study and Analysis

Research shows that solar panels, while flat and somewhat shiny, are designed to absorb light, rather than reflect it and therefore produce less glint and glare than snow or concrete. An analysis for Woodridge was conducted using the Federal Aviation Administration's Notice Criteria Tool, which takes into consideration the Project Site latitude, longitude, horizontal datum, site elevation, and structure height, and it was determined that the proposed solar facility would not pose a risk to air traffic and no further glare and glint study would be necessary. The results can be found in Attachment E.

Lighting

The Applicant recognizes and appreciates the County's desire to protect its dark skies. All lighting will comply with the County's Zoning Ordinance requirements and will be kept to the minimum necessary

to ensure the safe operation of the facility. All lighting will be designed to prevent spillover and will be arranged or shielded away from adjoining residences and roads.

Visibility Analysis

Hexagon conducted a visibility analysis and photo renderings of proposed conditions at locations along Secretary's Road and adjacent to property to the south of the project, see Attachment C. While there is some visibility from Secretary's Road, the propose vegetation buffer will minimize the visibility such that it will have a negligible impact from the road.

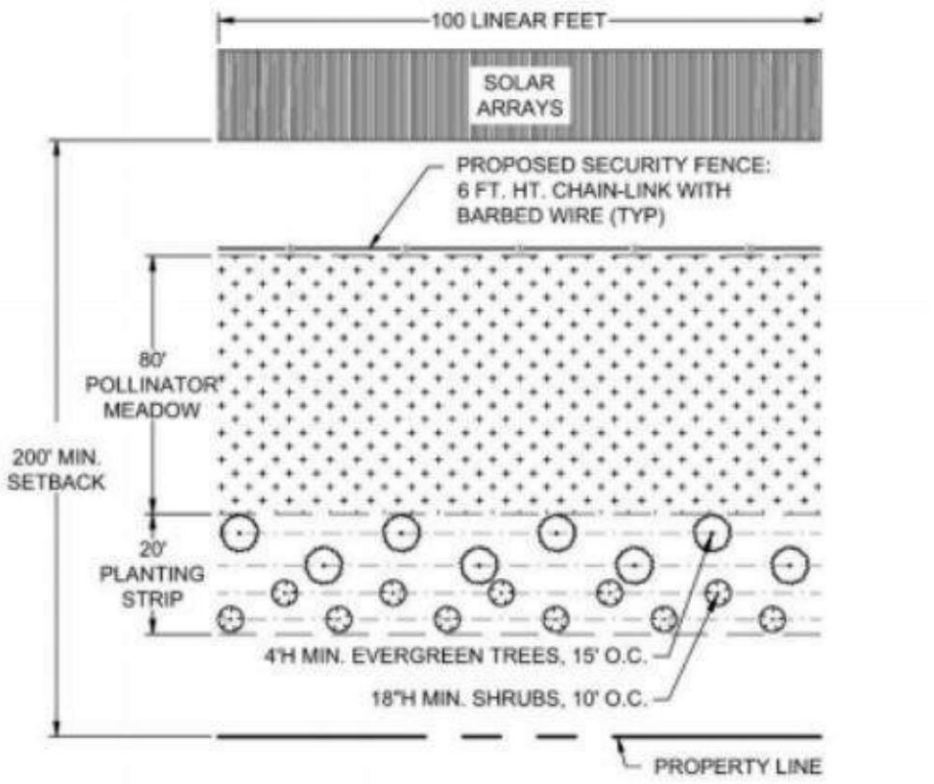
Noise Analysis

Solar facilities produce negligible noise when operating, such that any noise produced becomes inaudible at approximately one hundred (100) feet from the noise producing components. These components include inverters and tracker motors, which have few moving parts that produce decibel levels that will not be heard from adjacent properties. The solar inverters have a manufacturer listed noise rating of sixty-five (65) decibels at one meter aware from the inverter. The CDC reports this level of noise as comparable to an air conditioner, washing machine, or dishwasher. The inverters on the site will be setback at least two hundred (200) feet from property lines. At one hundred (100) feet away from the inverter the noise is reduced to approximately thirty-five (35) decibels which is comparable to the noise of a refrigerator hum.

There will be some noise increase during construction of the facility. It is estimated that the construction will take between 12 and 18 months. However, noise producing construction activities will be limited to daytime hours. The amount and frequency of noise is anticipated to be similar to the timbering activity that has occurred on site for 80 years.

Vegetative Buffer

The Project site has been evaluated to determine visibility impacts from adjacent roads and properties where vegetation is sparse or not existent, and a two hundred (200) foot setback has been established along the property boundaries. The existing mature vegetation will be used as buffer and screening wherever possible within the 200 feet. The setback will be divided into two sections: forest and meadow. The forest section will be a minimum of 100 feet where the existing mature vegetation and trees will remain. In areas in the forest section where possible visibility will occur along the roads and adjacent to residential homes, an additional vegetative screening buffer will be provided as shown on the concept plan that will be 20 feet wide. Within the other 100ft-wide section, native pollinator-friendly meadow mix will be planted. In areas with a planted screening buffer, the meadow width will be 80 feet wide. The security fence will be located interior to the forest buffer but may be located in the meadow buffer area. Native, non-invasive species will be utilized wherever possible for the screening. Vegetative buffering will be maintained throughout the life of the Project. See diagram below.



Security

The Project components will be completely enclosed in a perimeter fencing of not less than 6 feet. When possible, The Project will be split into several individual sub-arrays, each individually fenced to allow for natural wildlife corridors. The fencing will serve to prevent unauthorized personnel from entering the Project site and will protect the system components from damage from wildlife. Locked gates will be installed to allow for ingress and egress of authorized personnel.

Temporary fencing will be installed, as necessary for safety and security, during construction. Access will be limited to authorized personnel, including designated County officials.

Public Facilities & Public Infrastructure

As stated above, the Project will not have any impacts to roads or schools. Site access has been identified on the concept plan. The majority of the access points are existing entrances and accessways that have been used by Dominion, for the timbering operation, or for hunting activities. Temporary traffic control measures that meet VDOT and the County's best management practices, will be employed during construction. Once operational, there will be no daily staff at the Project site and site visits are expected to be limited to approximately one or two times per month.

It is not anticipated that the Project would impact other County services such as Fire/Rescue and Police. All project gates will have a knox box that will be accessible to Fire/Rescue and Police should

the need to access the project area arises. If requested, the Applicant will provide training for Fire/Rescue personnel to address the unique characteristics of a utility scale solar facility.

Environmental Resources

Streams, Flood plain, and Wetlands

A wetland delineation, along with field verification, was performed by Wild Ginger Services to identify all streams, flood plain, and wetlands as shown on the Concept Plan, and the delineation was approved by the US Army Corps of Engineers on April 25, 2022. The Project has been designed to ensure that there will be no impact on any identified streams, flood plain, or wetlands within the Special Use Permit Area. Consistent with the Albemarle County Water Protection Ordinance, the project design incorporates a 100-foot buffer around all identified and field verified streams and wetlands. Additional buffer has been provided between the Limits of Disturbance and the Special Use Permit lines to allow for the Water Protection Ordinance to protect all 100 feet. All proposed limits of disturbance, stormwater management, and panels will be outside of these areas as shown on the Concept Plan, and where possible the panels will be located at least 70 feet from any buffer. The Project will not impact any delineated streams, flood plain, or wetlands and will be developed and constructed in conformance with all applicable federal, state, and local laws and regulations including the Chesapeake Bay Act, Clean Water Act, and VA-DEQ Stormwater Management Program Regulations.

Grading and Stormwater Management

Conceptual grading and stormwater management plans have been provided within the special use permit plan set. Careful siting of the panels has been done to minimize grading and impacts to critical slopes. Stormwater management facilities are shown located outside of stream buffers, flood plain, and wetlands to protect these environmental features. All stormwater management plans will be in conformance with all applicable local laws and regulations, as well as with the VA-DEQ Stormwater Management Program Regulations.

Critical Slopes

There are approximately 60 acres of critical slopes are located on the approximate 1,500 acre Special Use Permit Area. An application for disturbance of 8.55 acres of the slopes has been submitted with this application. The majority of the slopes to be disturbed are outside of the stream buffers and are small areas (less than 10,000 square feet) that are not part of a system of slopes. Careful grading of the site, along with erosion and sediment control measures and the preservation of wetlands and stream buffers will allow for the health, safety, and welfare of the public to be maintained with the small area of disturbance proposed.

Prime Agricultural Soils

Included with the Conceptual Plan is a plan showing the location of prime agricultural soils. While the plan indicates that the limits of disturbance will include areas where prime soils are designated, it should be noted that this property has timbered planted pine and used for silviculture for over 80 years. In addition, the Project includes the planting of native pollinator-friendly seed and meadow mix. The decommissioning plan will allow the property to be used for agricultural/forestall uses in the future.

The grasses and pollinators planted around the array will help nurture the soil and improve its agricultural viability over the timber growing activities of the past decades.

Wildlife Study and Analysis

As part of the environmental due diligence, the Applicant engaged Timmons Group to determine the likelihood of encountering any species on the State or Federal lists of Threatened and Endangered Species within a one-mile radius of the project. See Attachment F for full findings and analysis; below is an excerpt from the findings of that review.

Common Name	Scientific Name	Status	Agency Source
Northern Long-eared Bat	*Myotis septentrionalis*	Federal, State Threatened	USFWS
James Spinymussel	*Parvaspina collina*	Federal, State Endangered	VDWR
Monarch Butterfly	*Danaus plexippus*	Candidate Species	USFWS

There were three potential species identified: Northern Long-eared bat, James Spinymussel (located 0.73 miles south of the site within the Hardware River), and the Monarch Butterfly. Given the timbering of the parcels, along with the large, preserved buffers along the identified wetlands and streams, it is not anticipated that these species will be impacted. However, during permitting the Applicant will continue to coordinate with Local, State, and Federal agencies through the State led Permit by Rule process to ensure there is no impact to local fish and wildlife species. If a potential impact is identified, the Applicant will coordinate with those applicable agencies to draft and enact plans to mitigate the impact.

In addition, when possible, The Project will be split into several individual sub-arrays, each individually fenced to allow for natural wildlife corridors, and the proposed fencing is located six (6) inches off of the ground to allow small wildlife to go in and out of the Project.

Historic and Cultural Resources

A small portion of TMP 114-55 is within the Monticello Viewshed. The Applicant met with Liz Russel, the Director of Planning, Sustainability, & Project Management at Monticello and she did not express any concerns with the proposal, and is in support of solar.

In addition, a historic and cultural resources assessment was completed by Stantec in 2020 in accordance with the Commonwealth of Virginia Department of Quality (DEQ) Solar Permit By Rule for solar projects, see Attachment B. There is a small cemetery and home site within the project area that has been identified and set aside to be preserved and located outside of the limits of disturbance. Additional areas were identified has high, moderate, and low potential for containing cultural resources. As part of the required PBR process for renewable energy generating facilities in Virginia, further

described below, a Phase 1 archeological study will be required by DEQ and completed by the Applicant prior to any land disturbance for the Project.

CONSTRUCTION PHASING

Construction of the Project is expected to begin no earlier than 2023 and take approximately 12-18 months for completion. The Project will be developed in multiple phases to allow for minimal impact and proper stabilization. Each phase will be stabilized and required stormwater management will be installed prior to moving on to the next phase. Phasing will be established during the Site Plan and Water Protection Ordinance processes.

PERMIT BY RULE

All renewable energy generating facilities in the Commonwealth of Virginia must complete requirements set forth under the Department of Environmental Quality Permit By Rule ("PBR") process. The PBR process provides a streamlined method for cultural and environmental permitting of renewable energy projects. PBR incorporates review from the Department of Quality (DEQ), Department of Wildlife resources (DWR), Department of Conservation and Recreation (DCR), and Department of Historic Resources (DHR) to identify and mitigate potential impacts a project may have to the state's cultural, historic, natural, and wildlife resources. Any identified impacts must be sufficiently mitigated to receive approval under the PBR process.

The PBR process addresses 15 major points required by DEQ for approval. These points include the completion of reviews from DHR, DWR, and DCR, as well as assessments on air quality and interconnection. A mitigation plan and operating plan outlining how the Applicant will avoid environmental and cultural impacts are also required. A 30-day review and public comment period, inclusive of a public community meeting, must occur prior to the permit submittal.

DEQ recommends submittal of the project's Notice of Intent (NOI) to complete the PBR process after local land use approval has been secured. However, the Applicant will begin initial discussion with DEQ prior to local land use approval in order to coordinate with applicable agencies and ensure compliance with all federal, state, and local laws and regulations.

The Applicant will submit a NOID for the Woodridge project to DEQ if the Special Use Permit is secured. The Applicant will update Albemarle County staff on permit progress through the PBR process. A complete permit will be forwarded to the County once secured.

DECOMMISSIONING PLAN

At the time the Project permanently ceases to operate, the Project Owner (the "Owner") will perform decommissioning activities. The Owner will provide notification to the Zoning Administrator of the abandonment or discontinuance of the use, and complete physical removal of the project within phases

over two years of abandonment. Decommissioning includes the removal of all equipment and materials as it relates to the operation of a solar project including:

- Removal of all racking, panels, and electrical equipment
- Removal of all cabling above 36" below grade
- Removal of all above ground cabling
- Removal of all concrete foundations
- Removal of all internal roadways and fencing

Any existing vegetation and buffering will remain in place and disturbed areas will be covered with topsoil. All refuse and materials will be removed from the site and disposed of according to applicable laws and regulations. Where possible, materials will be recycled, savaged, or reused. Decommissioning is designed to restore the property to its condition prior to the Project's construction.

The Applicant has developed a preliminary Decommissioning Plan, see Attachment D. Prior to the Project's construction the Owner will enter into a written agreement with the County, along with posting a bond, to decommission the facility in the event the Owner is not able to do so. This agreement will be developed in accordance with State regulation (15.2-2241.2).

ATTACHMENTS

A. Property Timber History and Drone Photographs
B. Historic and Cultural Resources Study
C. Visualizations
D. Decommissioning Plan
E. Glint and Glare Analysis
F. Wildlife Study

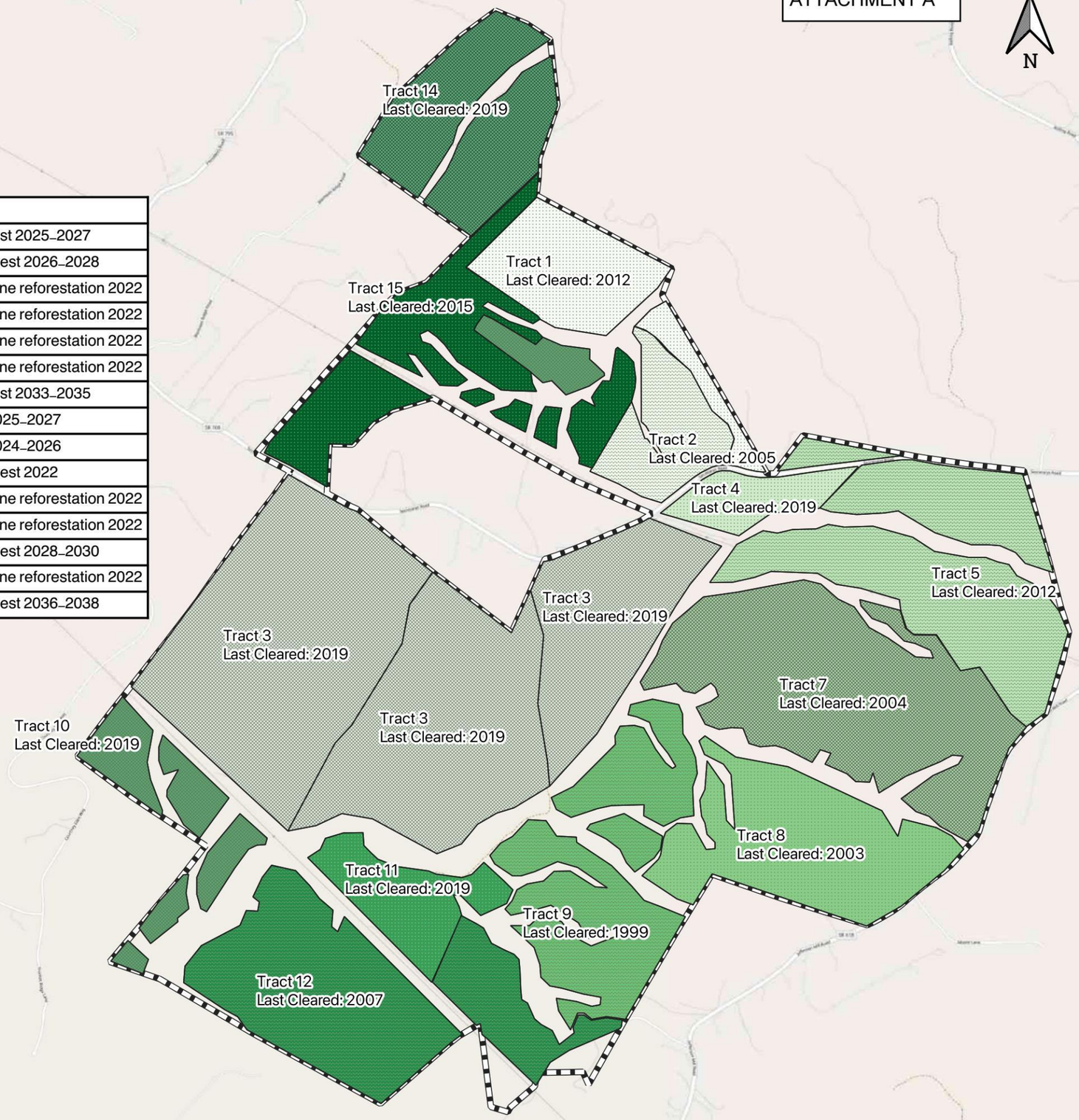
ATTACHMENT A

JD Landholdings Properties

Approximate Timber Tracts

-All displayed tracts planted in managed loblolly pine
-Corridors between tracts contain hardwoods
-Tracts displayed are approximate, and all environmental setbacks and regulations are followed in timber harvesting procedures

Tract Number:	Last Cleared:	Last Planted:	Next Clear Date:	Acreage:	Notes
1	2012	2007	2026	97	Inspect for either thinning or clear-cut harvest 2025-2027
2	2005	2008	2027	48	Inspect for either Thinning or Clear-cut harvest 2026-2028
3	2019	2022	2042	235	Site prep sprayed summer 2021 & loblolly pine reforestation 2022
3	2019	2022	2042	109	Site prep sprayed summer 2021 & loblolly pine reforestation 2022
3	2019	2022	2042	137	Site prep sprayed summer 2021 & loblolly pine reforestation 2022
4	2019	2022	2042	38	Site prep sprayed summer 2021 & loblolly pine reforestation 2022
5	2012	2015	2034	150	Inspect for either thinning or clear-cut harvest 2033-2035
7	2004	2007	2026	217	Inspect for Thinning or Clear-Cut harvest 2025-2027
8	2003	2006	2025	130	Inspect for Thinning or Clear-Cut harvest 2024-2026
9	1999	2002	2022	145	Inspect for either Thinning or Clear-cut harvest 2022
10	2019	2022	2042	60	Site prep sprayed summer 2021 & loblolly pine reforestation 2022
11	2019	2022	2042	43	Site prep sprayed summer 2021 & loblolly pine reforestation 2022
12	2007	2010	2029	175	Inspect for either Thinning or Clear-cut harvest 2028-2030
14	2019	2022	2042	108	Site prep sprayed summer 2021 & loblolly pine reforestation 2022
15	2015	2018	2037	150	Inspect for either Thinning or Clear-cut harvest 2036-2038



Legend

Project Parcel Boundaries

Forest Management Plan

Forest Management Tracts

- Tract 1
- Tract 2
- Tract 3
- Tract 4
- Tract 5
- Tract 7
- Tract 8
- Tract 9
- Tract 10
- Tract 11
- Tract 12
- Tract 14
- Tract 15

Woodridge Solar Layout

Approximate Timber Tracts

-Solar panels to be placed almost exclusively in commercial timber tracts

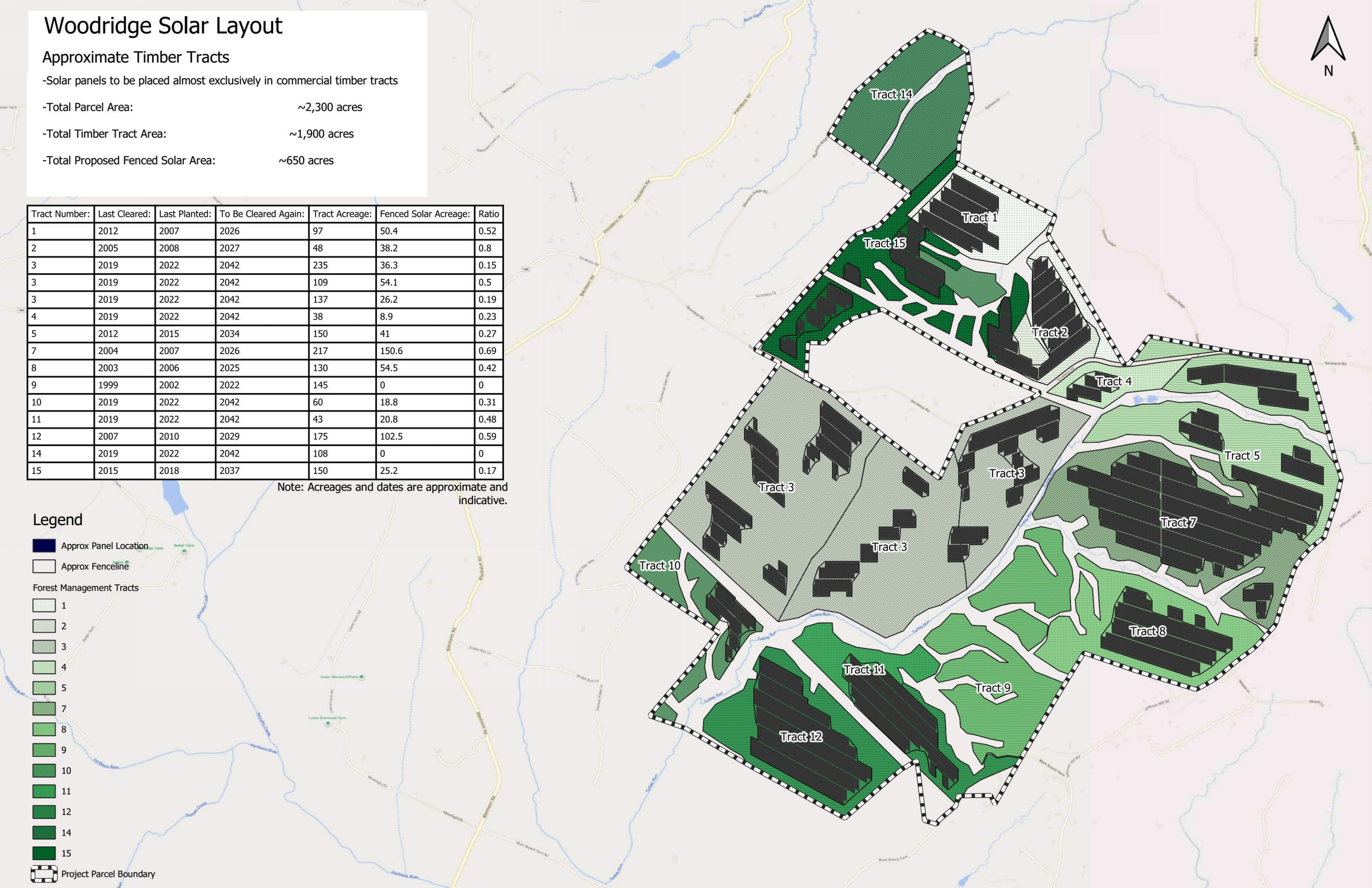
-Total Parcel Area: ~2,300 acres

-Total Timber Tract Area: ~1,900 acres

-Total Proposed Fenced Solar Area: ~650 acres

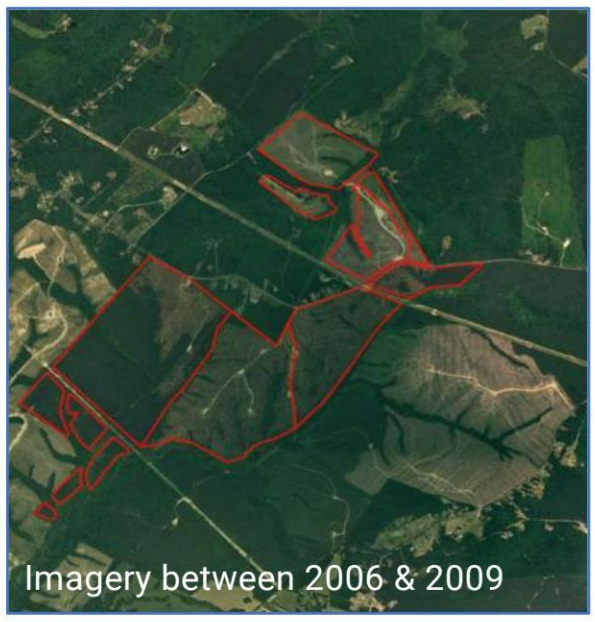
Tract Number:	Last Cleared:	Last Planted:	To Be Cleared Again:	Tract Acreage:	Fenced Solar Acreage:	Ratio
1	2012	2007	2026	97	50.4	0.52
2	2005	2008	2027	48	38.2	0.8
3	2019	2022	2042	235	36.3	0.15
3	2019	2022	2042	109	54.1	0.5
3	2019	2022	2042	137	26.2	0.19
4	2019	2022	2042	38	8.9	0.23
5	2012	2015	2034	150	41	0.27
7	2004	2007	2026	217	150.6	0.69
8	2003	2006	2025	130	54.5	0.42
9	1999	2002	2022	145	0	0
10	2019	2022	2042	60	18.8	0.31
11	2019	2022	2042	43	20.8	0.48
12	2007	2010	2029	175	102.5	0.59
14	2019	2022	2042	108	0	0
15	2015	2018	2037	150	25.2	0.17

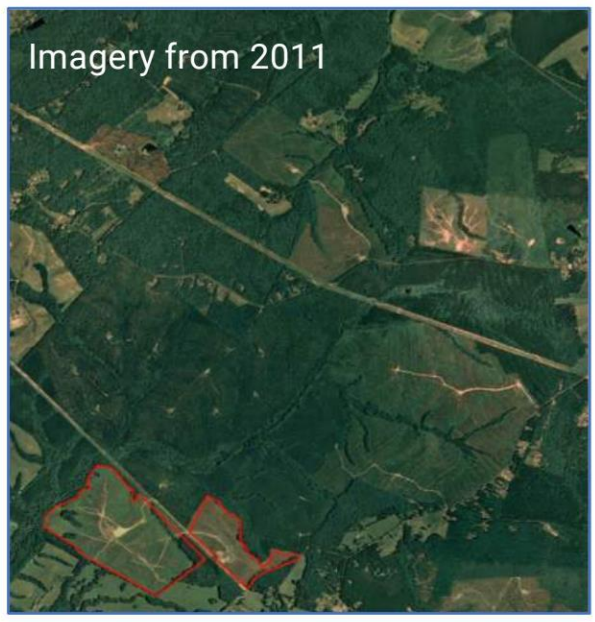
Note: Acreages and dates are approximate and indicative.

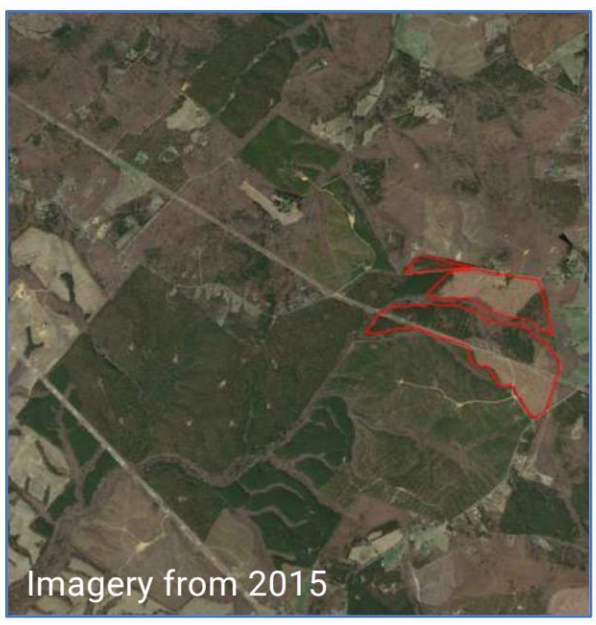


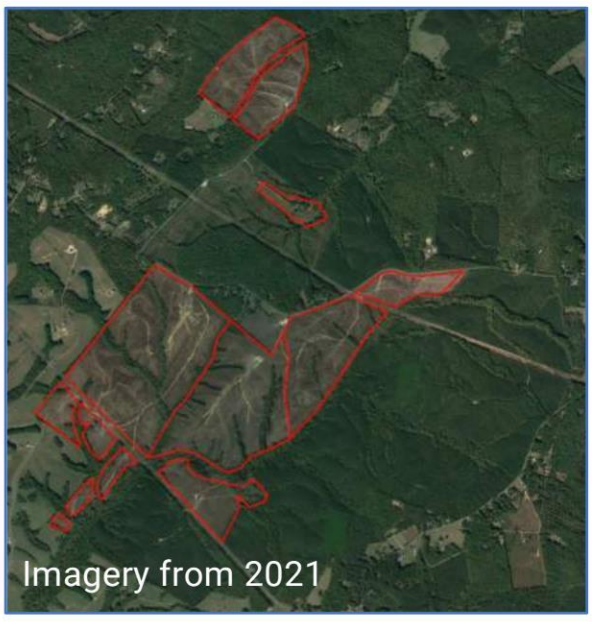
Woodridge Solar:

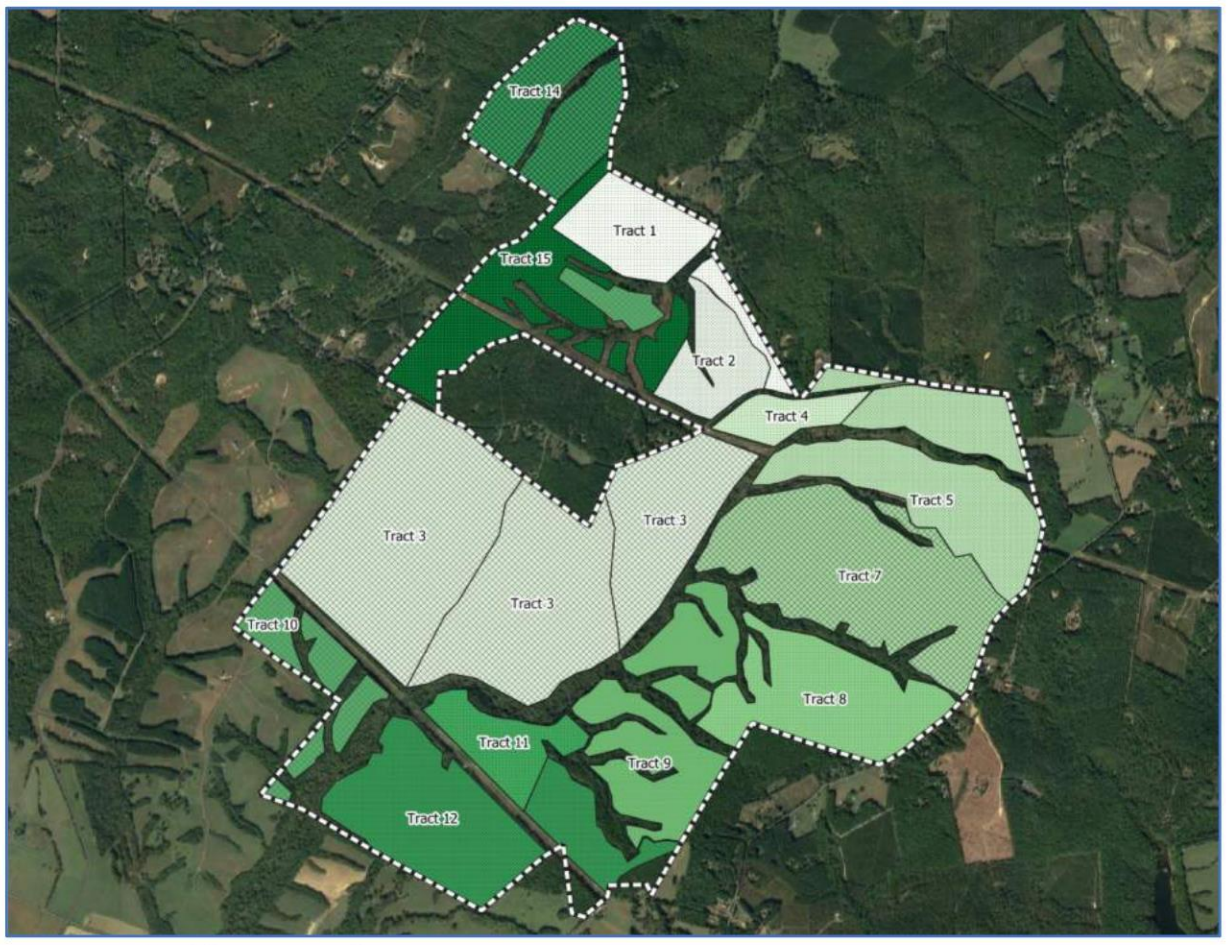
Satellite Imagery of Timber Management since 2006







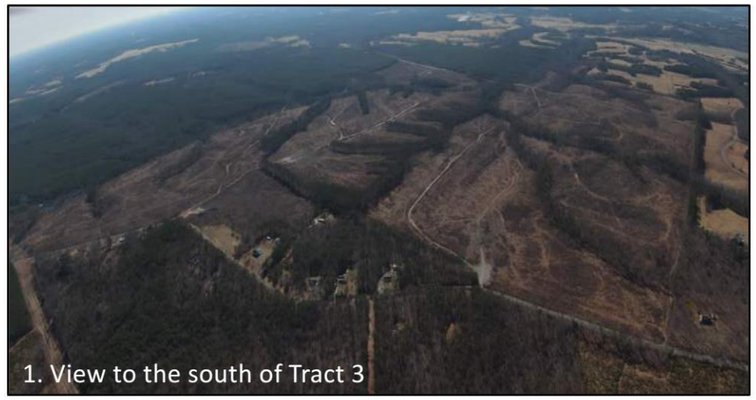




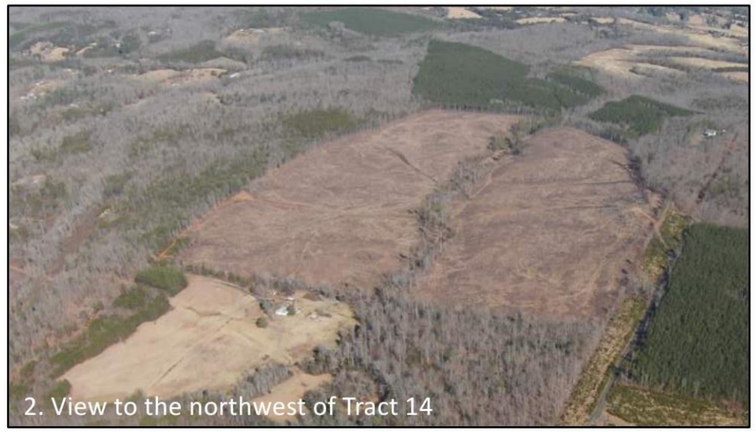
JD Landholdings Timber Tracts

Woodridge Solar:

Drone Flight Imagery, 2022



1. View to the south of Tract 3

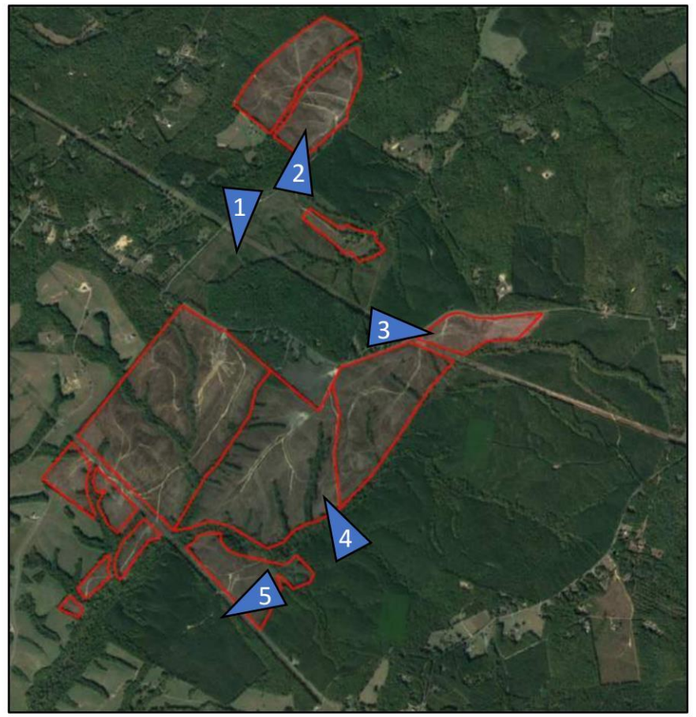


2. View to the northwest of Tract 14

3. View to the east of Tract 4

4. View to the northwest of Tract 3

5. View to the southwest of Tract 12



ATTACHMENT B

Stantec

Cultural Resources Assessment and Work Plan for Approximately 2,276.4 Acres for the Proposed Woodridge Solar Site in Albemarle County, Virginia

February 14, 2020

Prepared for:

Hexagon Energy
722 Preston Avenue, Suite 102
Charlottesville VA 22903

Prepared by:

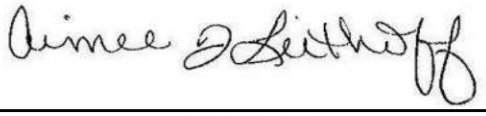
Aimee Leithoff, Principal Investigator

and

Brynn Stewart, Senior Principal Investigator

Stantec Consulting Services Inc.
1011 Boulder Springs Drive, Suite 225
Richmond VA 23225

This document entitled *Cultural Resources Assessment and Work Plan for Approximately 2,276.4 Acres for the Proposed Woodridge Solar Site in Albemarle County, Virginia* was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of174 Power Global Corporation (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 
(signature)
Aimee Leithoff, Principal Investigator

Reviewed by 
(signature)
Brynn Stewart, Senior Principal Investigator

Approved by 
(signature)
Ellen Brady, Cultural Resources Practice Leader

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Executive Summary

From January 13–16 of 2019, Stantec Consulting Services Inc. (Stantec) conducted a cultural resources assessment and work plan for approximately 2,276 acres associated with the proposed Woodridge Solar Site in Albemarle County, Virginia. The study area is located within a planted pine forest on either side of Route 708 (Secretary's Road). The entire study area is located within the National Register of Historic Places (NRHP) and Virginia Landmarks Register (VLR)-listed Southern Albemarle Rural Historic District (Virginia Department of Historic Resources [VDHR] #002-5045). The work was conducted on behalf of Hexagon Energy, LLC (Hexagon), in accordance with the Commonwealth of Virginia Department of Environmental Quality (DEQ) Solar Permit by Rule (PBR) for solar projects (DEQ 2012).

Stantec conducted the cultural resources assessment to determine the nature of the soils and topography in the study area as well as to provide information on previously identified cultural resources located within the bounds of the study area. The assessment also identified previously recorded cultural resources located within a 1-mile radius of the study area and developed a site-specific historic context. In addition, this effort created a predictive model that identifies areas of enhanced and low cultural resources potential within the study area, to serve as a planning tool for proposed development of the study area. Determinations of high, moderate, and low potential were based upon soil properties, drainage, topography, distance to water, historic landscape features and alterations, and a predictive model extrapolated from archaeological survey in similar environments.

Documentary research was conducted via the VDHR's Virginia Cultural Resources Information System (V-CRIS) files for archaeological sites and historic structures. These files were examined, and information was retrieved on all sites or structures located within the study area. Information was also retrieved for cultural resources located within a 1-mile radius of the study area. Background research also focused on relevant sources of local historical information and available historical maps, which were examined to provide a historical context for the study area and to determine if any buildings and/or other cultural features were present within the study area. The processes of archival research and context development help to identify potentially undocumented historic properties such as domestic farmsteads, gravesites, and/or military encampment areas that may be associated with the vicinity of the study area, and to determine the most likely locations for earlier cultural resources such as prehistoric encampment sites.

The archaeological predictive model was prepared for the entire acreage within the Project boundary but may be amended to focus on the area identified for potential development according to the preliminary solar farm layout, when available. Of the 2,276.4-acre study area, approximately 286.7 acres (12.6 percent) are defined as retaining a high potential for cultural resources, approximately 710.2 acres (31 percent) are defined as retaining a moderate potential for cultural resources, and approximately 1,279.5 acres (56 percent) are defined as retaining a low potential for containing cultural resources.

One previously recorded archaeological site and one previously recorded architectural resource were identified within the study area. Site 44AB0571, a prehistoric lithic scatter of indeterminate age, was identified in a transmission line corridor and has been determined to be not eligible for NRHP inclusion.

The proposed Woodridge Solar project is located entirely within the NRHP and VLR-listed Southern Albemarle Rural Historic District (VDHR #002-5045). In addition, one architectural complex and one cemetery were observed within the study area during this investigation. As such, the probability for the identification of historic resources within the study area is high, with resources likely dating from the nineteenth through the twentieth century.

The predictive model development took into consideration both environmental factors significant to historic and prehistoric settlement patterns as well as a review of relevant historic contexts, historic maps, and aerial photographs in order to identify the three tiers of probability. This review coupled with an assessment of current conditions within the study area resulted in an assessment of the potential for previously undocumented historic and prehistoric cultural resources to exist within the Project boundary and potential development area for the solar facility. The comparison of historic maps to current available maps and aerial photographs suggests that the project vicinity retains some potential for the discovery of historic archaeological remains associated with these locations and occupations. For prehistoric resources, it is anticipated that sites may be located in proximity to Turkey Run and its tributaries. Large sites would not be expected as much of the area has been bulldozed and subsoil is present on the surface, however smaller, seasonal or temporary sites may be present in areas where A horizon is still present.

The proposed Woodbridge solar site in Albemarle County falls under the purview of the Virginia DEQ PBR (DEQ 2012). For large acreage projects, a cultural resources assessment may be conducted to provide a means of quickly identifying the potential for historic resources within the larger study area. Following the cultural resources assessment, a Phase I cultural resources survey, including archaeological survey within areas of proposed ground disturbance and reconnaissance level architectural survey within a 0.5-mile radius of the project limits, is recommended and would be conducted in compliance with the regulations set forth by the DEQ and the VDHR.

Abbreviations

amsl	above mean sea level
APE	Area of Potential Effect
CRI	Cultural Resources, Inc.
DEQ	Department of Environmental Quality
GIS	Geographic Information System
GPS	Global Positioning System
Hexagon	Hexagon Energy, LLC
n.d.	no date
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
PBR	Permit by Rule
Stantec	Stantec Consulting Services Inc.
STP	Shovel Test Pit
USDI	United States Department of the Interior
USGS	United States Geological Survey
V-CRIS	Virginia Cultural Resources Information System
VDHR	Virginia Department of Historic Resources
VLR	Virginia Landmarks Register

1.0 INTRODUCTION

From January 13–16 of 2020, Stantec Consulting Services Inc. (Stantec) conducted a cultural resources assessment and work plan for approximately 2,276 acres associated with the proposed Woodridge Solar Site in Albemarle County, Virginia. The study area is located within a planted pine forest on either side of Route 708 (Secretary's Road) (Figure 1). The entire study area is located within the National Register of Historic Places (NRHP) and Virginia Landmarks Register (VLR)-listed Southern Albemarle Rural Historic District (Virginia Department of Historic Resources [VDHR] #002-5045). The work was conducted on behalf of Hexagon, in accordance with the Commonwealth of Virginia Department of Environmental Quality (DEQ) Solar Permit by Rule (PBR) for solar projects (DEQ 2012).

The cultural resources investigations described herein were conducted pursuant to the National Historic Preservation Act of 1966 (NHPA-PL89-665), as amended, the Archaeological and Historic Preservation Act of 1974, Executive Order 11593, and relevant sections of 36 CFR 60 and 36 CFR 800. In addition, these investigations were conducted in accordance with the Virginia DEQ PBR and associated Solar PBR Guidance (effective July 18, 2012). The cultural resources investigations were conducted with reference to federal (Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* [United States Department of the Interior {USDI} 1983]) and state (*Guidelines for Conducting Historic Resources Investigations in Virginia* [VDHR 2017]) guidelines for conducting archaeological investigations.

Senior Principal Investigator Brynn Stewart oversaw the project. Principal Investigator Aimee Leithoff authored the report. Project Archaeologist Taft Kiser conducted the fieldwork. Cultural Resource Practice Leader Ellen M. Brady aided with project oversight, preparation of the report, and quality review. GIS Analyst Kate Meeks prepared the archaeological predictive model, report graphics, and project maps. Copies of all historical research materials are on file at Stantec's office in Richmond, Virginia.

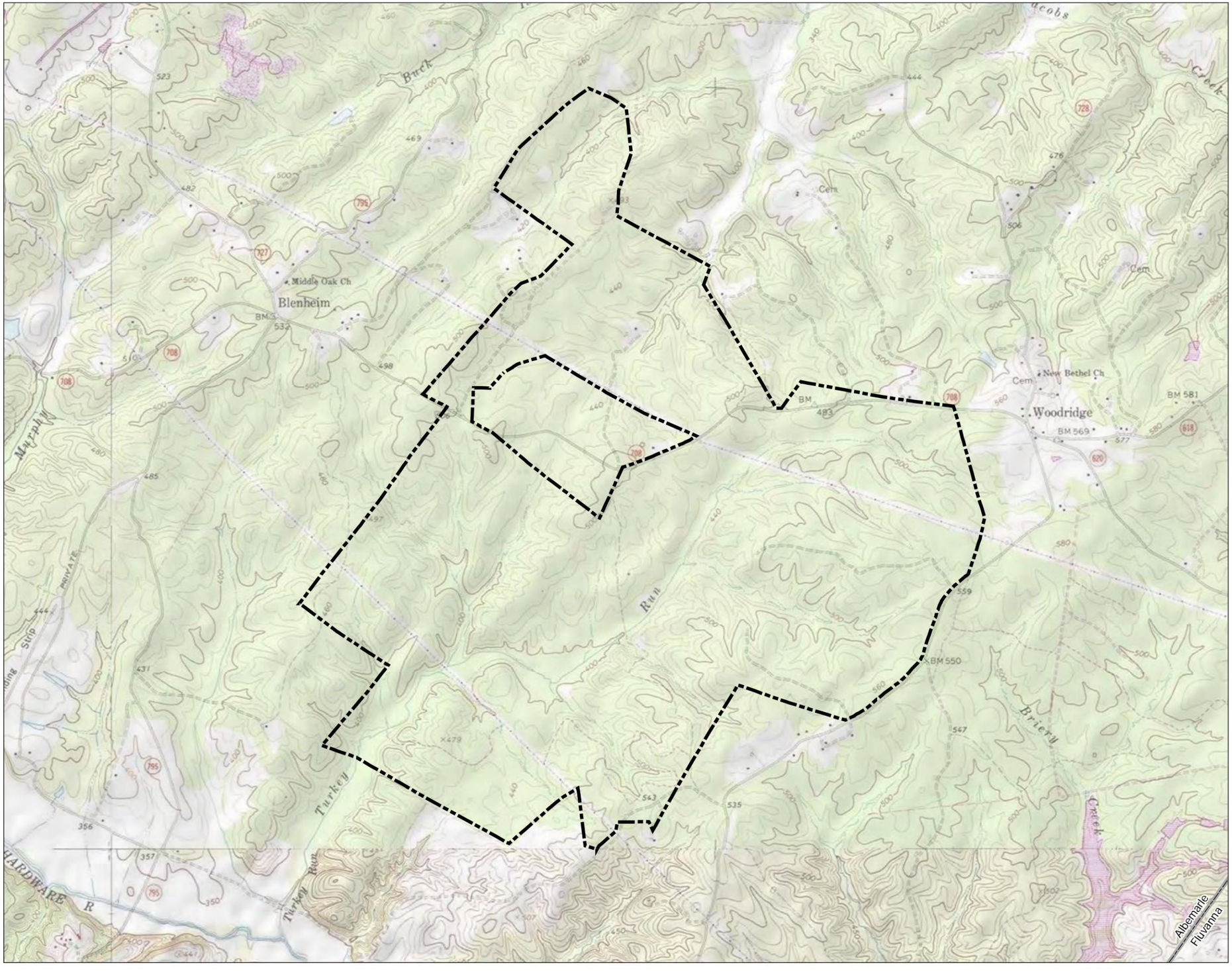


Figure No.

1

Title

Location of the Study Area

Client/Project 203401407

Hexagon Energy
Woodridge Solar Site

Project Location

Albemarle County, Virginia

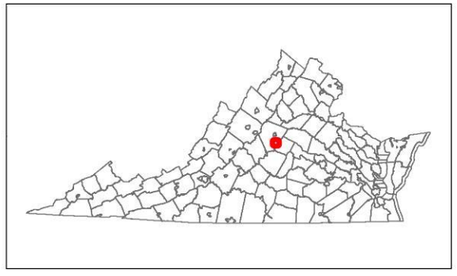
Prepared by JKM on 2019-12-11
TR by TPS on 2019-12-12
IR by BSS on 2019-12-12

N

0 2,000 4,000 Feet

(At original document size of 11x17)
1:24,000

Project Limits



Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Project limits provided by Hexagon Energy
3. County boundary provided by VA DCR
4. Topographic map © USGS 7.5 Minute Series Topographic Map

Stantec

2.0 PHYSICAL AND ENVIRONMENTAL CONTEXT

2.1 INTRODUCTION

The study area is located in the eastern portion of Albemarle County, Virginia, southeast of Charlottesville. The study area is divided by Route 708 (Secretary's Road) and is predominately bounded by private property lines. Two cleared power line corridors bisect the study area, which is primarily comprised of planted pine forest.

2.2 TOPOGRAPHY AND GEOLOGY

The 2,276-acre study area is located within the Outer Piedmont subprovince of the Piedmont physiographic province of Virginia. The Outer Piedmont subprovince exhibits broad upland with low to moderate slopes (Roberts and Bailey 2000). A variety of predominantly Proterozoic and Paleozoic igneous and metamorphic rock constitute the bedrock in the Piedmont province and forms the core of the Appalachian mountain belt. A number of grabens (elongated depressions between geologic faults) and half-grabens contain Triassic sedimentary rocks, diabase dikes, and basalt flows (The College of William and Mary Department of Geology 2011 and DEQ n.d.). Elevations within the study area range from 383 to 590 feet above mean sea level (amsl).

2.3 HYDROLOGY

The study area is drained by Turkey Run, a tributary of the Hardware River. The Hardware River is a tributary of the James River, which flows into the Chesapeake Bay and thence to the Atlantic Ocean.

The main portion of Turkey Run extending through the study area is part of a riverine system classified as permanently flooded with an unconsolidated bottom. Along this portion of Turkey Run are both freshwater forested/shrub wetland and freshwater emergent wetland. The unnamed branches of Turkey Run which extend throughout the study area are also part of a riverine system; however, they are intermittent streambeds that are seasonally flooded (National Wetlands Inventory [NWI], accessed December 2019).

2.4 SOIL MORPHOLOGY

Soils within the study area primarily include silt loams and range from poorly and somewhat poorly drained to moderately well and well drained and somewhat excessively drained. Table 1 presents the soil types found within the Woodridge Solar site and serves as a key to Figure 2.

Map Unit Symbol	Description
16	Codorus silt loam, 0 to 2 percent slopes, occasionally flooded
1B	Meadowville silt loam, 2 to 7 percent slopes
32B	Orenda silt loam, 2 to 7 percent slopes
32C	Orenda silt loam, 7 to 15 percent slopes
46B	Grassland silt loam, 2 to 7 percent slopes
51B	Bugley channery silt loam, 2 to 7 percent slopes
51C	Bugley channery silt loam, 7 to 15 percent slopes
51D	Bugley channery silt loam, 15 to 25 percent slopes
51E	Bugley channery silt loam, 25 to 45 percent slopes
62B	Buffstat silt loam, 2 to 7 percent slopes
62C	Buffstat silt loam, 7 to 15 percent slopes
80B	Littlejoe silt loam, 2 to 7 percent slopes
80C	Littlejoe silt loam, 7 to 15 percent slopes
95	Hatboro silt loam, 0 to 2 percent slopes, occasionally flooded
96B	Delila loam, 2 to 7 percent slopes

Figure No.
2

Title
Soils Map

Client/Project
Hexagon Energy
Woodridge Solar Site

203401407

Map Date: 2019-12-11
Revised Date: 2020-01-23

Project Location
Albemarle County, Virginia

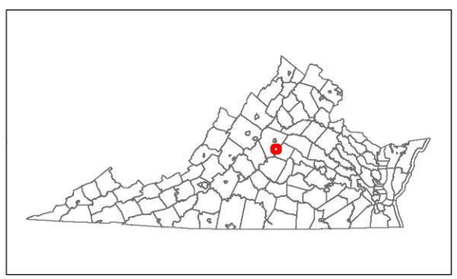
Prepared by JKM on 2019-12-11
TR by TPS on 2019-12-12
IR by BSS on 2019-12-12

N

0 1,600 3,200 Feet

(At original document size of 11x17)
1:19,200

Project Limits
Soils



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Project limits provided by Hexagon Energy
3. Soils data from USDA NRCS SSURGO Soil Survey
4. Orthoimagery © Bing Maps
5. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Stantec

Table 1 Soils in the Study Area

Symbol	Map Unit Name	Percent Slope	Drainage Description
1B	Meadowville silt loam	2-7%	Moderately Well Drained
16	Codorus silt loam, occasionally flooded	0-2%	Somewhat Poorly Drained
32B	Orenda silt loam	2-7%	Well Drained
32C	Orenda silt loam	7-15%	Well Drained
46B	Grassland silt loam	2-7%	Moderately Well Drained
51B	Bugley channery silt loam	2-7%	Somewhat Excessively Drained
51C	Bugley channery silt loam	7-15%	Somewhat Excessively Drained
51D	Bugley channery silt loam	15-25%	Somewhat Excessively Drained
51E	Bugley channery silt loam	25-45%	Somewhat Excessively Drained
62B	Buffstat silt loam	2-7%	Well Drained
62C	Buffstat silt loam	7-15%	Well Drained
80B	Littlejoe silt loam	2-7%	Well Drained
80C	Littlejoe silt loam	7-15%	Well Drained
95	Hotboro silt loam, occasionally flooded	0-2%	Poorly Drained
96B	Delia loam	2-7%	Poorly Drained

2.5 NATURAL RESOURCES

The character of the topography, the proximity of water resources, and the types of soils all have a direct effect on the variety of flora that is attracted to the setting and in turn, the fauna that relies on that ecological setting for sustenance. The quantity and variety of both plants and animals in an area has a direct influence on human habitation. Native American populations successfully utilized a wide variety of native flora and fauna whose seasonal availability was well-known to them. New settlers relied on available timber to build shelter and in part, on procurable plants and animals to augment their diet. It would be difficult for a Woodland Indian in AD 900, a colonial planter in 1750, or a farmer in 1870 to have prospered without certain key natural resources (Dent 1995).

During the Holocene, prior to European contact, this region of Virginia supported a diverse biotic and floral community. The riverine area, dominated by hardwoods, provided shallow water environments beneficial to shellfish and baitfish, as well as a wide variety of amphibians, reptiles, and larger fishes. This habitat also supported numerous avian species, including raptors. The uplands of the interior supported numerous species of large game animals such as elk and whitetail deer, as well as predators including black bear, eastern gray wolf, and bobcat (Dent 1995).

A wide variety of native wildlife species still prosper in the upland and riverine setting and are typical of the mid-Atlantic region. The most common terrestrial wildlife in the area today includes deer, turkey, fox, raccoon, opossum, squirrel, rabbit, weasel, and groundhog. Amphibians and reptiles such as snakes,

lizards, salamanders, frogs, and turtles are found throughout the area. Numerous species of wild songbirds nest in the area (Dent 1995).

3.0 CULTURAL CONTEXT

3.1 INTRODUCTION

Virginia's Native American prehistory is typically divided into three main periods – Paleoindian, Archaic, and Woodland – based on changes in material culture and settlement systems. In recent decades, the possibility of human presence in the region that pre-dates the Paleoindian period has moved from remote to probable. For this reason, a Pre-Clovis discussion precedes the traditional tripartite division of Virginia's Native American history. The seventeenth-through twentieth-century historical overview follows the VDHR's guidelines (2017). The cultural context, as defined by the Secretary of the Interior's Standards and Guidelines for Archeology and Chapter 3 of VDHR's 2017 guidelines, provides the historic, social, and environmental information required for evaluation of any cultural resources present within the proposed study area.

3.2 PRE-CLOVIS (?–13,000 BC)

The 1927 discovery, at Folsom, New Mexico, of a fluted point in the ribs of an extinct species of bison proved that ancient North Americans had immigrated during the Pleistocene. It did not, however, establish the precise timing of the arrival of humans in the Americas, nor did it adequately resolve questions about the lifestyle of those societies (Meltzer 1988:2-3). Both the stratigraphic record and the radiocarbon assays from several sites, including the Cactus Hill site in Sussex County, Virginia, suggest the possibility of human occupation of Virginia before the fluted-point makers appeared on the scene (McAvoy and McAvoy 1997). Buried strata at the Cactus Hill site have returned radiocarbon dates of 15,000 years ago from strata below levels containing fluted points (McAvoy and McAvoy 1997:165).

McAvoy's team encountered artifacts and charcoal separated from the Paleoindian level by 3 to 4 inches (7.6 to 10.2 centimeters) of sterile sands. Subsequent fieldwork confirmed the presence of artifact-bearing strata located between 3 and 8 inches below the fluted-point levels. The artifacts recovered from the pre-fluted-point levels present a striking contrast with the tool kit typically used by Paleoindians. Rather than relying on extensively finished chert knives, scraping tools, and spear points, the pre-Clovis peoples used a different, but highly refined stone technology. Prismatic blade-like flakes of quartzite, chipped from specially prepared cobbles and lightly worked along one side to produce a sharp edge, constitute the majority of the stone cutting and scraping tools. Sandstone grinding and abrading tools, possibly indicating production of wood and bone tools or ornaments, also occurred in significant numbers in the deepest artifact-bearing strata. Because these tools do not possess unique characteristics which immediately identify them as dating to the Pleistocene, archaeologists must recognize the possibility that pre-Clovis sites have been overlooked for years. At present, only a handful of potential pre-Clovis sites have been identified in North America. The probability of discovering pre-Clovis remains within the proposed study area is, consequently, extremely low.

3.3 PALEOINDIAN (PRIOR TO 8000 BC)

In the decades following the discovery at Folsom, New Mexico, the association of fluted points with the bones of large, extinct mammals, in particular mastodons, on the western plains coupled with the scarcity of other Paleoindian sites, led to the inference that the Paleoindian subsistence strategy centered on the pursuit of big game. This picture, however, exaggerates the reliance of western Paleoindian groups on large game and appears to be of limited relevance to eastern Paleoindian life. The archaeological data from Virginia compiled by Dr. Ben McCary (1957) records numerous discoveries of fluted points, but no unambiguous association between extinct large game and fluted points (Boyd 1989:139). A similar situation occurs throughout the eastern United States. For this reason, many archaeologists now hold that eastern Paleoindians were generalized foragers (e.g., Grayson and Meltzer 2003; but see Fiedel and Haynes 2004).

Most large Paleoindian sites in the southeastern United States are quarry or quarry-related (Meltzer 1988:21), though multiple band aggregation sites also occur (McAvoy 1992:145). Recognizable sites most often result from long-term habitation or repeated use of the same location. It follows from the presence of primarily quarry or quarry-related sites that stone outcrops were regularly revisited. Though the full range of available lithic resources was used to manufacture fluted points (e.g., Phelps 1983), a number of studies have noted a focus on cryptocrystalline materials (e.g., chert, jasper, chalcedony) (Gardner 1974, 1989; Goodyear 1979). The recovery of cryptocrystalline materials at locations far removed from quarries indicates exchange, extensive group movement, or both characterized the Paleoindian era. In addition, the very limited differences between sites and within sites suggest that most people had access to all available resources, while the small size of most Paleoindian sites indicates group size generally was limited to extended families.

3.4 ARCHAIC PERIOD (8000–1200 BC)

The beginning of the Archaic period coincided with the start of the Holocene period around 8,000 BC. The Holocene is a geological period that began with the recession of the ice sheets that covered large portions of North America. The start of the Archaic is marked by a shift from a moist, cool climate to a warmer, dryer climate within the region, more similar to the temperate ecosystem of today. This warming trend was gradual and somewhat continuous throughout the first 5,000 years of the Archaic period. The shift in climate allowed for the development of diverse plant and animal communities, as currently found throughout the Middle Atlantic region. These changes in flora and fauna had a marked impact on the hunter-forager subsistence base of the Archaic period (Dent 1995:147, 164-5). The retreat of the ice sheets also caused the sea levels to rise, leading to the gradual formation of the Chesapeake Bay. Prior to the Archaic period the Chesapeake Bay was merely an extension of the Susquehanna River, emptying into the Atlantic Ocean several miles east of Virginia Beach, Virginia.

As with the earlier Paleoindian period, our understanding of the cultural chronology of the Archaic is based primarily upon lithic artifacts: chipped-stone tools and the debris associated with their manufacture. More “biodegradable” forms of material culture have simply not survived in the region’s archaeological record and the items recovered are biased towards lithic materials (Geier 1990:82-83). The basic

chronology of Archaic projectile points for the Mid-Atlantic region and the southeastern United States closely follows the sequence outlined by Joffre Coe (1964) for the North Carolina Piedmont, with regional variants. Coe's chronology has been modified over the past 40 years, but the basic typology remains intact (Broyles 1971; Dent 1995; Hranicky 2003; Justice 1995; Ward and Davis 1999).

The Archaic period is often divided into three sub-periods (Early Archaic, Middle Archaic, and Late Archaic) based primarily on the point typology discussed previously. But the Archaic period can also be characterized by the development of more specialized resource procurement activities as well as the development of new technologies to accomplish these activities. These differences in the material culture are believed to reflect larger, more localized populations and changes in methods of food procurement and processing.

3.4.1 Early Archaic (8000–6500 BC)

Corner- and side-notched points with serrated blades predominate at the beginning of the Early Archaic period, reflecting innovation in hafting technology and, possibly, the invention of the atlatl. Notched point forms include Palmer and Kirk Corner-Notched and, in localized areas, various side-notched types. Around 7000 BC, a variety of bifurcate base projectile point forms appeared in the Middle Atlantic region. In eastern Virginia, LeCroy points constitute the majority of bifurcate forms (Dent 1995; Justice 1995). Despite the shift in point form over time some researchers portray the Early Archaic as a continuation of the Paleoindian period, characterized by reliance on cryptocrystalline lithic material and similar settlement and subsistence patterns (Gardner 1989).

3.4.2 Middle Archaic (6500–3000 BC)

The appearance of stemmed projectile points and a shift towards more expedient use of stone marks the beginning of the Middle Archaic across much of the Atlantic Slope and Southeast (Amick and Carr 1996:43-45; Justice 1995). In this area of Virginia, the most common Middle Archaic projectile point types are (from oldest to most recent) LeCroy, Stanly, Morrow Mountain, and Guilford, followed by the side-notched Halifax type sometime after 3500 BC. This latter type is generally one of the most abundant found in upland interior settings; however, it is possible that many riverine sites of the period are hidden under alluvial sediment. Informal modified flakes to some extent replaced formal unifacial tools, and local materials constitute a greater percentage of Middle Archaic assemblages than had been true of earlier time periods. Sites occur throughout the landscape area, including beneath the now-inundated Chesapeake Bay (Blanton 1996; Dent 1995:173-178).

An analysis of components from relevant central Piedmont settings (Klein and Klatka 1991) indicates only slightly higher use of interior uplands over riverine settings during the Middle Archaic period and, within riverine settings such as the present study area, there is a fully equal use of both alluvial landforms (floodplains/low terraces) and upland landforms/bluffs adjacent to the rivers (Klein and Klatka 1991:155). However, a repetition of this pattern in the study area would be dependent on geomorphological conditions: i.e., artifacts indicating the entire span of the Middle Archaic could be present on all landforms, unless the alluvial bottoms are restricted to sediments of too recent an age to contain deposits of such

antiquity. Where sediments are too young, however, evidence of Middle Archaic presence should be concentrated on old, stable landforms lying as close as possible to the river and its small tributary.

3.4.3 Late Archaic (3000–1200 BC)

Stemmed and notched knife and spear point forms, including various large, broad-bladed stemmed knives and projectile points (e.g., Savannah River, Susquehanna, Perkiomen points), rank among the most distinctive and securely dated Late Archaic point forms (Coe 1964; Dent 1995; Justice 1995; Ritchie 1971). Marked increases in population, and, in some areas, decreased mobility appear to characterize the Late Archaic throughout eastern North America. Locally, the increase in the number of Halifax and Savannah River components and sites relative to the preceding periods suggests population rose in Virginia between about 3500 BC and c. 1200 BC.

Mouer (1991a:262) believes it likely that “at least intensive harvesting of wild seeds,” if not the beginnings of domestication, characterized Transitional through Early Woodland times (c. 2000-500 BC) in the Chesapeake Bay region, as it did in the Midwest. The process, however, did not proceed at an even rate across the Eastern Woodlands or the Middle Atlantic Region (Stewart 1995:184-5). Yarnell (1976:268), for example, states that sunflower, sump weed, and possibly goosefoot may have been cultivated as early as 2000 BC. In the lower Little Tennessee River Valley, the remains of squash have been found in Late Archaic Savannah River contexts (c. 2400 BC), with both squash and gourd recovered from Iddins period contexts of slightly more recent date (Chapman and Shea 1981:70). Experiments with domestication in the Mid-Continent indicate the possibility, even the likelihood, that the inhabitants of the Middle Atlantic cultivated small grains and other plants (Hodges 1991:228-230; Mouer 1991b:259- 263). “Scant” evidence for early cultivation appears in the archaeological record from Virginia, however (Mouer 1991a:259; Gallivan and McKnight 2006).

Soapstone bowls are a well-known feature of Late Archaic exchange systems (McLearen 1991:107-8). In addition, Stewart (1989:52) argues for broad-based exchange of "artifacts made from jasper, argillite, rhyolite, ironstone, soapstone, Midwestern lithics, obsidian, marine shell and copper" throughout the Middle Atlantic region during the Late Archaic. Thus, Late Archaic society clearly differed from that of earlier times. The production and wide-spread exchange of utilitarian and ritually important, labor-intensive goods does not fit the expected archaeological signature of highly egalitarian foragers. Rather, a social order exhibiting some sort of status differences among individuals or groups (Mouer 1991a:265) and somewhat restricted group movement (Stewart 1989:57) likely existed. Still, sites dating to the Late Archaic occur frequently throughout Virginia and the Middle Atlantic region. Late Archaic sites occur in greater numbers and in a wider range of environments than sites associated with the Early and Middle Archaic periods (Klein and Klatka 1991).

3.5 WOODLAND PERIOD (1200 BC–AD 1606)

Increasing use of ceramic technology, a growing dependence upon horticulture, and a shift toward greater sedentism all characterize the Woodland period. Most researchers divide the Woodland period into three sub-periods (Early Woodland, Middle Woodland, and Late Woodland), based primarily on stylistic and technological changes observed in ceramic wares and projectile points, as well as shifts in

settlement patterning (e.g., Gardner 1982). Not all researchers agree with this tripartite subdivision, however (e.g., Custer 1989).

The onset of the Woodland period traditionally correlates with the appearance of ceramics (Willey and Phillips 1958:118). Early theorists linked ceramics with agriculture, though few continue to support this position (cf. reviews in Egloff 1991; Hodges 1991). Rather, the evolution of subsistence and technological systems (e.g., Gardner 1982) and various aspects of pan-Eastern interaction (e.g., Egloff 1991; Klein 1997) currently are believed to underlie the evolution of ceramic containers. Popes Creek Net-impressed ceramics appear after roughly 500 BC, marking the beginning of the Middle Woodland I period (500 BC–AD 200) (Blanton 1992:72-3; Egloff and Potter 1982:99). However, cord-marked ceramics and stemmed points continued in use for some time after AD 500 (McLearen 1992:44-5). By the Late Woodland period (AD 900–1600), the use of domesticated plants had assumed a role of major importance in the prehistoric subsistence system. The adoption of agriculture represented a major change in the prehistoric subsistence economy and settlement patterns. With the development of a more sedentary settlement-subsistence system culminating in the Late Woodland Period, permanent habitation sites gradually replaced base camps, which were characteristic of earlier foragers and hunter-gatherers.

3.5.1 Early Woodland (1200 BC–AD 300)

The steatite-tempered Marcey Creek type and variants containing other mineral inclusions appear to date between 1200 and 800 BC (Egloff 1991:244-5). Manson (1947) unearthed flat bottomed, plain sherds and cord-marked sherds with conoidal bases, both of which included soapstone-temper, in the uppermost of two distinct strata at the Marcey Creek Site. The lowermost level contained narrow variants of Savannah River points, termed Holmes Points by Gardner (1986), and soapstone bowls, suggesting that soapstone-tempered sherds post-date bowls of soapstone (but see Sassaman 1999). Earlier Slattery (1946) had identified similar sherds at a site on Seldon Island, along the Potomac River to the northeast of Leesburg, along with sand-and-grit tempered sherds. Though friable sand-and-grit-tempered Accokeek Creek and Elk Island ceramics appear subsequent to Marcey Creek, associated C-14 on stratified sites, dates range from 1100 through 500 BC. Klein and Stevens (1996) cite regional data to support the proposition that, while the thickness, amount of temper, and size of temper in quartz/sand tempered, cord-marked ceramics shifted over time, similar pots continued in use into Middle Woodland times.

Radiocarbon dates recommend placement of the Calvert and Fishtail points in the Early Woodland (Gleach 1985). Ovoid to lozenge-shaped points, classified as Teardrop Points, have been dated to 940-50 BC in the Northeast (Mounier and Martin 1994). Nevertheless, similar points have been recovered from Middle Archaic through Middle Woodland I contexts in North Carolina and Virginia (Kirchen 2001:53-69). The Potts Corner-Notched point type, the Vernon point type, and the Claggett point type have been dated only through stratigraphic context or association with early ceramics (Gleach 1985; Stephenson 1963). Similarly, a variety of small stemmed and side-notched forms of assumed association with the Early Woodland period lack definitive temporal assignment (Dent 1995:227-228).

Small bifaces and expedient tools such as drills, perforators, scrapers, and utilized flakes regularly appear in Early Woodland assemblages. Other lithic artifacts reported on Early Woodland sites in the Chesapeake region include bipolar flakes, hammerstones, net sinkers, mortars, and pestles (McLearen

1991). Also noted on sites in the region are tools of bone, and projectile points manufactured from antler, bone, turkey spurs, and shark's teeth (Waselkov 1982).

The increased number of sites dating to the Early Woodland, coupled with the recognition of structures, features, and activity areas at some sites, suggests rising population size in the Chesapeake region (e.g., Mouer 1991b:38-9; Stewart 1995:183). In contrast, noting that the addition of pottery to stone adds temporally diagnostic artifacts to the archaeological record, Fiedel (2001:106-7) observes that more sites are expected to appear in the archaeological record during Woodland times. Furthermore, the various Broadspears, dating to the Terminal Archaic (c. 2000–1000 BC), may represent a curated technology (Barber and Tolley 1984), while replication experiments suggest stemmed bifaces similar to Early Woodland types rank among the easiest forms to produce using quartz (Bourdeau 1981). Therefore, a shift from a curated, less commonly discarded biface form, to points easily produced from a ubiquitous material accompanied the appearance of ceramics. Thus, the absence of a dramatic swell in the number of sites, coupled with decreased representation of diagnostic point forms, indicates a demographic trough or at best a flat demographic curve characterized the period.

3.5.2 Middle Woodland (AD 300–1000)

Popes Creek net-impressed ceramics appear after roughly 500 BC, marking the beginning of the Middle Woodland I period (500 BC–AD 200) (Blanton 1992:72-3; Egloff and Potter 1982:99). Cord-marked ceramics and stemmed points, however, continued in use for some time after AD 500 (McLearen 1992:44-5), for example, lumps the period between 3000 BC and AD 1000 under the rubric Woodland I based on the similarity in adaptation and the presence of considerable variation in the form of contemporaneous stemmed and notched points.

Net-impressed surface treatments occur on a variety of ceramic types manufactured during Middle Woodland times. Pope's Creek ceramics first appear after 500 BC, with the start of the Middle Woodland (Blanton 1992:72-3; Egloff and Potter 1982:99). Early Woodland cord-marked ceramics and stemmed projectile points are found in Middle Woodland contexts, suggesting a continuation of Early Woodland technologies (McLearen 1992:44-5). The Prince George and Varina types appear to represent a continuum of development in the technology used to produced Popes Creek sherds, rather than dramatically different types (Mouer et al. 1986). After AD 200, shell-tempered, net-impressed, cord-marked, and plain pottery classified as the Mockley type becomes predominant in the outer Coastal Plain of Virginia and Maryland, though generally similar sherds tempered with grit continued in production as well (Johnson 2001:100).

The appearance of assemblages containing significant amounts of durable ceramics after 500 BC indicates a shift in the organization of production occurred during the Middle Woodland periods (Brown 1986, 1989). In addition to the advantages of ceramic vessels as cooking pots, ceramic production contrasts with the manufacture of baskets and wooden bowls in its embrace of economies of scale. Rather than a start-and-stop process that fits well into odd bits of time, ceramic production required greater scheduling and continued attention over an extended period of time. Shifts in the scheduling of work, therefore, accompanied the transition from Early to Middle Woodland times.

Broad-spectrum hunting-fishing-gathering continued to characterize the region as a whole throughout the Middle Woodland period. Shellfish, anadromous and resident fishes, deer, waterfowl, and turkey ranked high among the important fauna in the Middle Woodland diet. Various nuts, amaranth, and chenopod seeds also appear to be important resources during this period. After 300 BC, large shell middens containing dense concentrations of artifacts become increasingly common, indicating repeated use of at least one type of site. Middens and the presence of houses at a number of sites indicate longer stays, though populations remained far from sedentary (Gallivan 2003). People continued to reside for much of the year in relatively small settlements, and interior storage features rarely occur on Middle Woodland sites (Gallivan 2003:75-98).

Around 500 BC, stone and earth burial cairns and cairn clusters in the Shenandoah Valley of Virginia mark the first appearance of elaborate burial ceremonialism in Virginia, though not in the wider world of Eastern North America (McLearen 1992; Stewart 1992). The major upsurge in ceremonial activity occurred during the AD 500–1100 period, however. Sites containing elaborately decorated zoned-incised ceramics (Stewart 1998) and indications of extended mortuary ceremonies have been identified in the Chesapeake region.

3.5.3 Late Woodland (AD 1000–1606)

Intensified use of cultivated plants, particularly maize, beans, and squash, distinguished the Late Woodland adaptation from that of earlier periods. European accounts describe a heavy reliance on slash-and-burn agricultural methods. In addition to cultigens and shellfish, Late Woodland peoples throughout the region continued to rely on various mammals, fish, and birds for sustenance (Dent 1995:251). Perhaps as a consequence of the greater importance of cultigens in the diet, access to expanses of arable land ranks among the most important factors influencing site selection (Dent 1995; Potter 1993).

Heightened diversity characterizes ceramic assemblages recovered from Late Woodland sites in Virginia (Gallivan 2003:131-154). Ware include crushed-rock-tempered, fabric-and cord-marked ware which appear similar to that of the local late Middle Woodland pottery, as well as a sand-tempered, cord-marked pottery sequence that, in general appearance, is similar to the Vincent-Clements continuum of the North Carolina Piedmont. Small, triangular arrow points, generally believed to reflect the widespread use of the bow-and arrow, form the overwhelming majority of Late Woodland projectile points. Triangular points include the Levanna, Madison, Roanoke, and Clarksville types, which vary in size and base form. Point size may also decrease over time (Coe 1964; Potter 1993; Ritchie 1971).

Shell beads and copper beads became important ornaments and symbols during the Late Woodland period, primarily in the last few centuries prior to the arrival of European colonists. Powhatan's Mantle, a deerskin cloak decorated with thousands of small marginella beads sewn into various patterns, reflects the use of shell beads as symbols of identity and status. Pendants and gorgets made of shell were also common. Of note, five engraved shell masks, decorated with a traditional Southeastern "forked/weeping eye" motif were found in a seventeenth-century burial on the floodplain of the Potomac River in Stafford County. Three of the five masks exhibit similarities to masks recovered from sites in the Southeastern U.S. (Smith and Smith 1989), possibly an indication of long-distance trade. Bone also was used to manufacture beads, as well as utilitarian items such as pins, fishhooks, and points.

CULTURAL CONTEXT

In addition to palisaded villages, Native American settlements included nucleated villages lacking palisades, dispersed hamlets, and temporary camps. Recent work by Potter (1993), Hodges and Hodges (1994), and Mouer et al. (1992) suggest that dispersed villages were common throughout Virginia. The difficulty in identifying them archaeologically may have contributed to the low number of archaeologically identified Contact-era settlements recorded by the Jamestown colonist John Smith. Housing varied throughout this region: some sites show evidence of longhouses located adjacent to the palisade, while elsewhere, short, oval structures have been unearthed (Dent 1995; Gallivan 2003; Hodges and Hodges 1994; Mouer et al. 1992; Potter 1993; Stephenson 1963).

3.6 SETTLEMENT TO SOCIETY (1607–1750)

When the first English settlers arrived at Jamestown in 1607, the vicinity of the study area was inhabited by the Ontponeas (Saponi) and the Tutelo who resided in the village of Monasukapanough near Charlottesville. Until 1722, European settlement in Albemarle County was limited to exploration and sparse settlements. An agreement signed by the Five Nations of the Iroquois in 1722 stating that the Iroquioan people would not cross the Potomac River essentially ended the threat of Indian attack in the Virginia Piedmont. With this threat removed, settlement of the area increased rapidly.

Originally encompassed by Goochland County, the western portion of what is now Albemarle was first settled by Europeans beginning in the early 1720s. The first land grants were based on the headright system, with 50 acres allotted for each planter, and additional land for each individual whose passage to Virginia they financed. During this period, settlement of “frontier” areas followed a predictable pattern, clustering initially along rivers and navigable creeks, then moving inland, as the most desirable land was exhausted (Moore 1976).

As Virginians increasingly moved west to take advantage of the newly opened lands, the population of this area grew rapidly enough to warrant the creation of a new county of Albemarle, carved from the western part of Goochland in 1744. Prior to the County’s incorporation, large land grants had been made by patent to several people including George Hoomes Jr. who received 3,100 acres in 1727, and Nicholas Meriwether who received 31,000 acres, also in 1727. Meriwether patented an additional 1,020 acres, which later became the eastern section of the City of Charlottesville. Abraham Lewis, by 1735, received approximately 800 acres, now the campus of the University of Virginia (Cooper 2007:26-27; Woods 1901:2-10).

During the first decades of settlement in Albemarle, it was tobacco that determined the pattern of nearly every aspect of life, encompassing the economy, the cultural landscape, and social relations. Despite the overwhelming focus on tobacco, however, Albemarle planters did produce a variety of other crops, including corn, oats, barley, buckwheat, rye, broom, hemp, and cotton (Kulikoff 1986; Moore 1976). Despite the influx of settlers to the Albemarle County vicinity during the 1740s, historic maps from the period (Smith 1606, and Herrmann 1673) do not extend as far as modern Albemarle County.

3.7 COLONY TO NATION (1751–1789)

The Piedmont population continued to grow during this period and in 1761, Albemarle County was subdivided into several counties. The county seat was moved to a central location and the town of Charlottesville was established in 1762 (Moore 1976). A frame courthouse was soon constructed and the small community on the Rivanna River began to thrive.

The population of Albemarle County, at its division with Goochland, had reached almost 1,400 tithables. By 1761, with a further increase in population, it was decided to form the counties of Augusta and Buckingham out of lands belonging to Albemarle. With the realignment of the counties, the county seat was moved in 1762 to lands belonging to Colonel Richard Randolph and became the City of Charlottesville, named after the wife of King George III, Sophia Charlotte (Cooper 2007:27-28; Woods 1901:27).

In the late 1770s, Major Thomas Anburey, a British officer, spent time in Albemarle. His shrewd, and often unflattering, observations provide at least some insight into the character of the county and its inhabitants. To his eye, this country appeared “an immense forest interspersed with various plantations four or five miles distant from each other.” Describing a typical Albemarle plantation, he wrote:

> On these there is a dwelling house in the center, with kitchen, smoke house and other outhouses detached . . . [having] the appearance of a small village . . . . Peach and apple orchards, . . . negroes’ huts, and tobacco barns . . . large and built of wood for the cure of that article. The houses, mostly of wood with shingle roofs, often go unlathed and unplastered within, only those of the better sort being painted, and many having not brick but wooden chimneys coated inside with clay and, except for special cases, the windows with no glass, only wooden shutters. Most of the planters consign the care of their plantations and Negroes to an overseer . . . they are so abominably lazy. I’ll give you a sketch of this man’s way of living. He rises about eight o’clock, drinks what he calls a julep, which is a large glass of rum sweetened with sugar, then walks, or more generally rides, round his plantation, views his stock, inspects his crops, and returns about ten o’clock to breakfast on cold meat or ham, fried hominy, toast and cider; tea and coffee are seldom tasted but by the women. He then saunters about the house, sometimes amusing himself with the little negroes who are playing round the door, or else scraping on a fiddle. About twelve or one he drinks a toddy to create him an appetite for dinner, which he sits down to at two o’clock. After he has dined he generally lies down on the bed, rises about five . . . [and] commonly drinks toddy till bed time; during all this time he is neither drunk nor sober, but in a state of stupefaction. When he leaves his plantation to attend the Courthouse on Court Days or some horse races or cockfight, he gets so egregiously drunk his wife sends a couple of Negroes to conduct him safe home (Moore 1969:35).

In 1781, the state assembly fled Richmond and convened in Charlottesville to elect a new governor. With news of the approach of one of Cornwallis’ detachments, the assembly again moved and adjourned in Staunton. The effects of the Revolutionary War in Charlottesville and Albemarle were felt only mildly

though as Tarleton's troops entered town, they did take some prisoners and destroy public stores (Wyllie 1961).

3.8 EARLY NATIONAL PERIOD (1790–1829)

By the 1790s, the exhaustion of agricultural land and the decline in tobacco markets overseas spelled the end of tobacco's economic dominance in Albemarle and throughout the Piedmont. Although Albemarle farmers continued to grow tobacco until the mid-nineteenth century, wheat and corn gradually emerged as the region's principal crops (Moore 1976).

The transition to grain agriculture was accelerated by the development of improved modes of transportation that allowed more rapid and economical shipment of farm produce to urban seaboard markets. Albemarle County's economy in the early part of the nineteenth century was boosted by the construction of one of Virginia's most successful transportation projects, the James River and Kanawha Canal. As early as the 1780s, proponents of a canal linking the James River with the Ohio Valley-including George Washington-had lobbied the Virginia legislature to fund this project. An act to this effect was finally passed in 1785. By 1808 the James River Company had made improvements along a 220-mile stretch of the James from Richmond to Botetourt County. But consistent complaints about the condition of the route and financial difficulties prompted the Commonwealth to purchase the company's charter in 1820. Over the next 15 years, the state made extensive improvements to the system between Richmond and Goochland County. Virginia, in turn, had difficulty funding new construction, and the James River and Kanawha Canal Company, incorporated in 1832, took over operations in 1835. Overcoming serious flood damage in 1842, the canal reached its peak usage during the 1850s, with 195 boats, 867 employees, and 423 horses (Moore 1969; Agee 1962).

With growing population and commerce, modes of transportation were particularly important during this period. The construction of roads and turnpikes became increasingly regulated due to an act passed by the General Assembly in 1817. The act provided guidelines for the construction of bridges, the width of the new roads, and for maintenance (Pawlett 1977). In addition to these guidelines, tollgates were erected, and tolls collected in order to maintain the new system of roads. By 1827, the first railroads had reached Virginia, and several were chartered in 1830 and 1831 and between 1832 and 1837, 35 railroad companies were chartered (Pawlett 1977).

3.9 ANTEBELLUM PERIOD (1830–1860)

As the population of European American planters in the Upper South grew more and more dependent on the production of cash crops like tobacco, the demand for enslaved labor increased. This increased dependence on the system of slavery is reflected in the census records, which show that the enslaved population increased steadily throughout the nineteenth century as the population of free African Americans remained comparatively low, increasing from 171 in 1790 to 606 by 1860, while the enslaved population grew from 5,579 in 1790 to 13,960 in 1860.

The enslaved population also outnumbered the free white population for most of the nineteenth century. Although population statistics registered 6,835 whites, 5,579 slaves, and 171 free blacks in 1790, by 1810, the enslaved population outnumbered whites by 584. In 1830, Albemarle County enumerated 10,455 whites and 11,679 enslaved men, women and children, in addition to 84 free African American families consisting of 484 individuals. 1860 population statistics included 12,103 whites, 13,916 enslaved African Americans, and 606 free African Americans (Cooper 2007:78; Irwin 1929:91).

During this period, commerce and development of adequate transportation appears to be the predominant theme. In the early years of the nineteenth century, residents in the vicinity of the study area were served by a branch of Three Notched Road, which ran west from Charlottesville through Hillsboro, later known as Yancey's Mill. Construction of the first rail line in Albemarle began in the late 1840s with the inception of the Virginia Central Railroad. Beginning at Gordonsville, the line had reached the Blue Ridge Mountains by 1854, providing regular and economical rail service for the residents of western Albemarle (Moore 1976). A second rail line, the Orange and Alexandria, linked Charlottesville and Albemarle County to Gordonsville and Lynchburg.

Traditionally the economy of Albemarle County was based in agriculture with a large number of enslaved people to plant and harvest crops (US Federal Slave Census, 1850 and 1860). The largest cash crop during the eighteenth century was tobacco, grown by small scale farms to large plantations. Though the concentration of resources was focused on tobacco, other crops such as corn and barley, among others were also produced. According to agricultural non-population schedules of the mid-nineteenth century, in spite of soil problems stemming from single crop production, tobacco production remained a staple crop with, in some cases, upwards of over 10,000 pounds grown per farm. Corn and oats followed in production (United States Non-Population Census, 1850 and 1860). With the advent of rail service through the county in the mid-nineteenth century, Albemarle County's agricultural crops were open to wider markets.

3.10 CIVIL WAR (1861–1865)

Military operations in Albemarle County were extremely limited during the Civil War, and other than the Federal occupation of Charlottesville in 1864, activity was confined mainly to troop movements. No known military engagements occurred in the vicinity of the study area, though a number of battles were fought in surrounding counties. Charlottesville was known primarily for its military hospitals (Robertson 1982).

In an 1864 map (Figure 3), Turkey Run is shown within the study area, though it is not named. A single farmstead is shown in the eastern portion of the study area; however, the remainder was uninhabited woodland.

CULTURAL CONTEXT

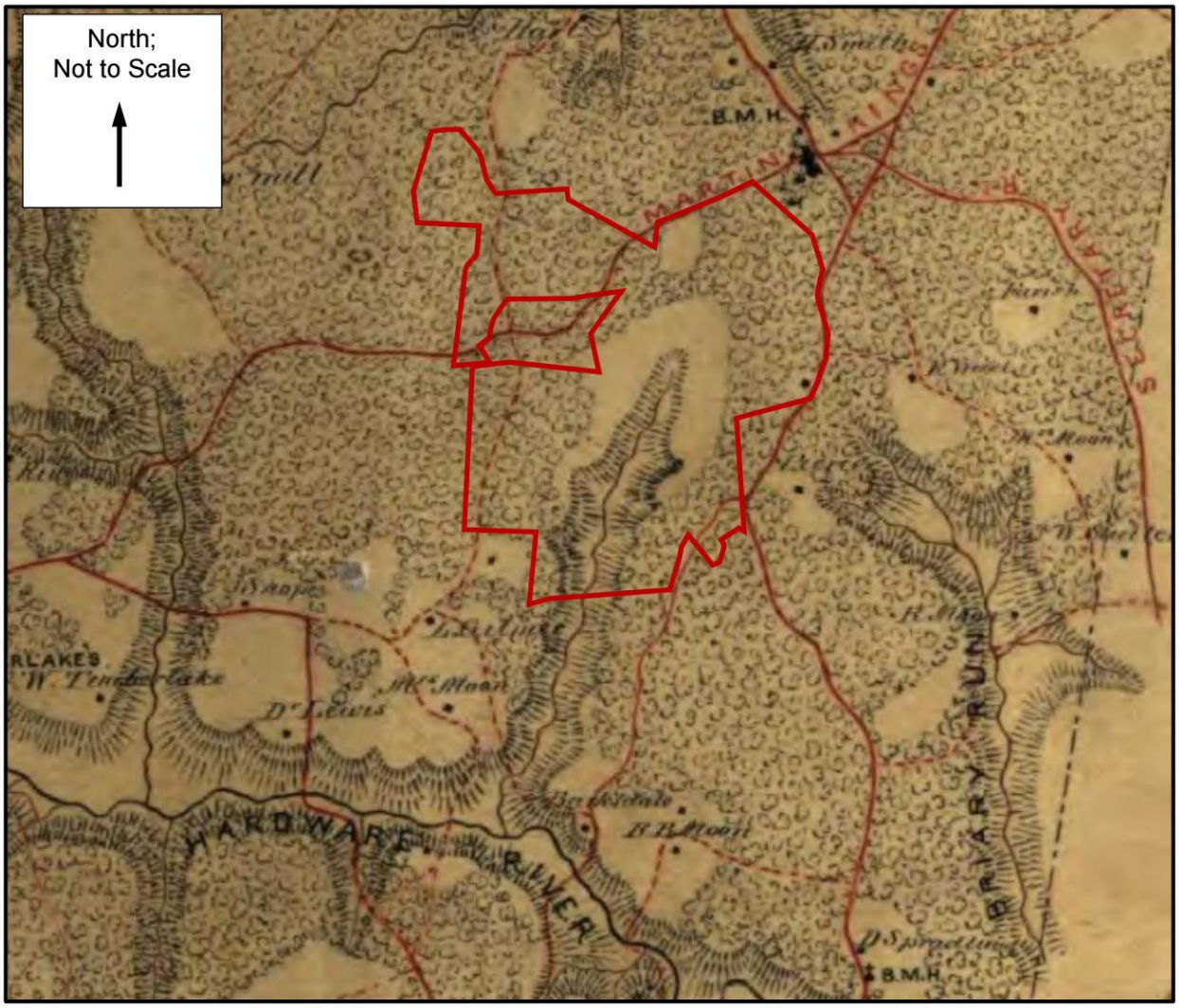


Figure 3 Detail of *Map of Albemarle: Made under the direction of Maj. A.H. Campbell Capt. Engs. In charge of Top. Dept. D.N.V. from surveys and reconnaissances* Depicting the Study Area Vicinity (Chief Engineer's Office D.N.V. 1864; Library of Congress Geography and Map Division).

3.11 RECONSTRUCTION AND GROWTH (1866–1916)

Four years of war had a devastating effect on Virginia, and Albemarle County was no exception. The combined loss of manpower and draft animals, the neglect of agricultural land, and the emancipation of the enslave population had a detrimental effect on the county's economic and social landscape in the postwar era. Over the following years, property values plummeted. Land that had sold for $10 per acre decreased in price and was now being sold for only a dollar or two per acre. In fact, the real estate market was so depressed that during their 1869-70 session the General Assembly enacted a law prohibiting the sale of land for less than 75.0 percent of its assessed value (Kaplan 1993).

CULTURAL CONTEXT

In a pattern reminiscent of the early nineteenth century, postwar agricultural difficulties prompted Albemarle farmers to seek alternative sources of income. The solution for many was to turn to fruit production, and Albemarle rapidly became a center for the production of apples, peaches, cherries, and strawberries (Moore 1976).

Lumbering was also a mainstay of the economy during this period. After the Civil War, thousands of acres were abandoned and reverted back to forest. This increase in wood resources resulted in the operation of four sawmills in Albemarle County by 1875. Three of the four mills were located in the western part of the county while the Rio Mill serviced the Charlottesville area and points eastward (Tice 1987). Lumbering eventually took its toll on the natural resources of the area. By 1875, the demand for forest conservation resulted in the establishment of the American Forestry Association. The United States Forest Service was formed in 1904 and was followed by the establishment of the Virginia Forest Service in 1907 (Tice 1987).

At the turn of the century, transportation again became a major focus in Virginia. This renewed interest arose due to the increased popularity of motor cars and the demand for better and well-maintained roads. The interest in transportation resulted in the formation of the State Highway Commission in 1906 followed by the enactment of a law allowing federal participation in the construction of interstate highways in 1916 (Wallenstein 1991). Residents of the town of Charlottesville and Albemarle County wanted to assure that a major road would pass through the area and their efforts were rewarded as US 29 and US 250 intersect in Charlottesville.

A map produced in 1867 (Figure 4) no longer shows evidence of structures within the study area, depicting it as open land with Turkey Run extending through the southern portion. Beginning the late nineteenth century, historic topographic maps depict the Woodridge Solar site primarily as uninhabited land. The 1891 *Palmyra, Virginia* topographic map (Figure 5) depicts Turkey Run and what is today Route 708 (Secretary's Road). Blenheim is shown to the northwest and Woodridge a short distance east of the study area. No evidence of structures is present interior to the study area.

3.12 WORLD WAR I AND WORLD WAR II (1917–1945)

In the 1920s, tourism became a major factor in Albemarle County as Thomas Jefferson's home, Monticello, was acquired by the Thomas Jefferson Memorial Foundation and was opened to the public (Moore 1976). In addition, the Michie Tavern was moved from its original location to Monticello Mountain and was also opened as a tourist attraction. Charlottesville also became home to an annual auto show and construction of a municipal airport was the buzz around town. The airport was constructed in 1929 to the northwest of Charlottesville (Moore 1976).

By the mid-twentieth century, maps depict two structures within the study area. The 1943 *Scottsville, Virginia* topographic map (Figure 6) is similar to that from the late nineteenth century. However, this map also shows secondary roads or long driveways interior to the study area. Three residentials structures are also depicted within the study area at this time.

CULTURAL CONTEXT

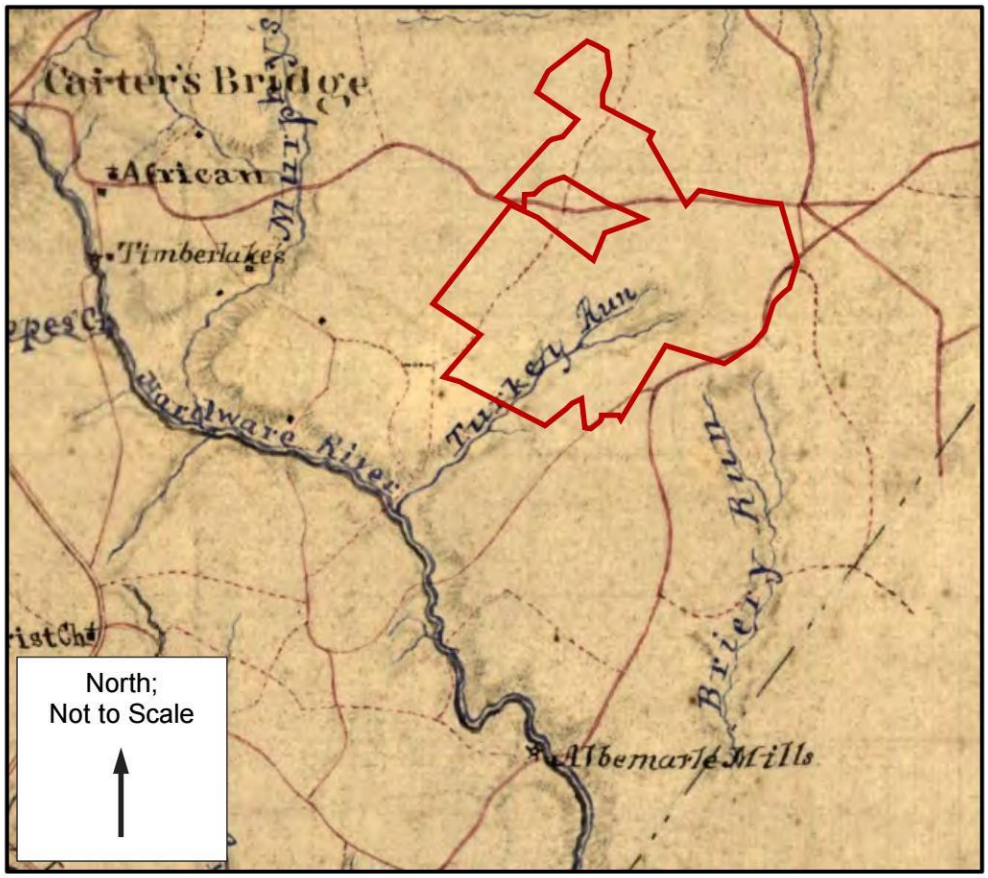


Figure 4 Detail of *Albemarle County, Virginia* Depicting the Study Area Vicinity (Hotchkiss 1867; Library of Congress Geography and Map Division).

CULTURAL CONTEXT

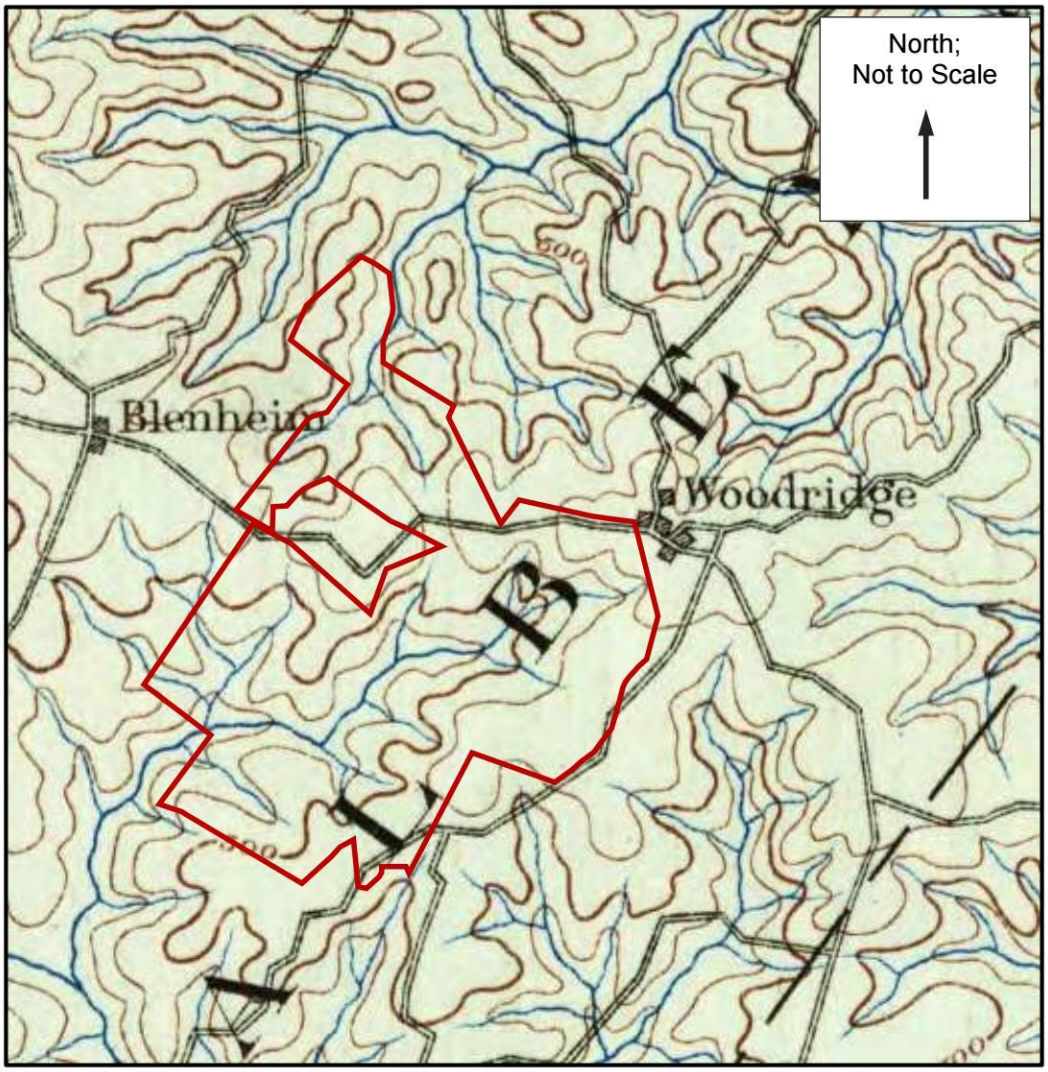


Figure 5 Detail of the 1891 *Palmyra, Virginia* Topographic Map Depicting the Study Area (USGS 1891; https://livingatlas.arcgis.com/topoexplorer/index.html, accessed 2019).

CULTURAL CONTEXT

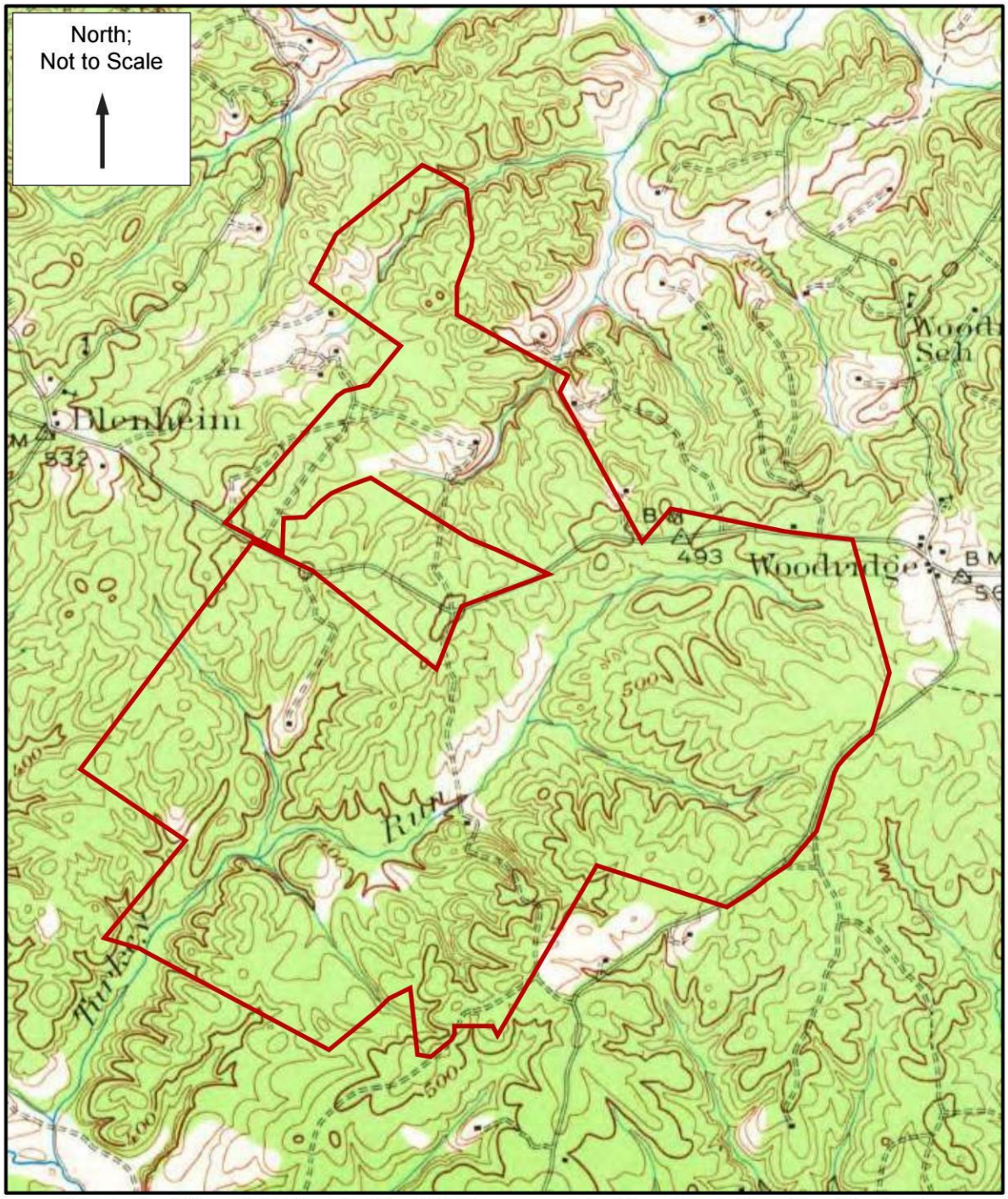


Figure 6 Detail of the 1943 *Scottville, VA* Topographic Map Depicting the Study Area (USGS 1943; https://livingatlas.arcgis.com/topoexplorer/index.html, accessed 2019).

3.13 THE NEW DOMINION (1946–PRESENT)

In the postwar decades, agriculture remained the mainstay of the Albemarle county economy until the mid-twentieth century when the fruit industry began to wane. At that point the University of Virginia grew and began to play a larger economic role in Charlottesville. The population has since increased significantly. More people meant more housing, and a significant amount of rural land was encompassed by suburban development on the fringes of the rapidly growing area. By 1967, Only one structure is shown within the study area (Figure 7).

CULTURAL CONTEXT

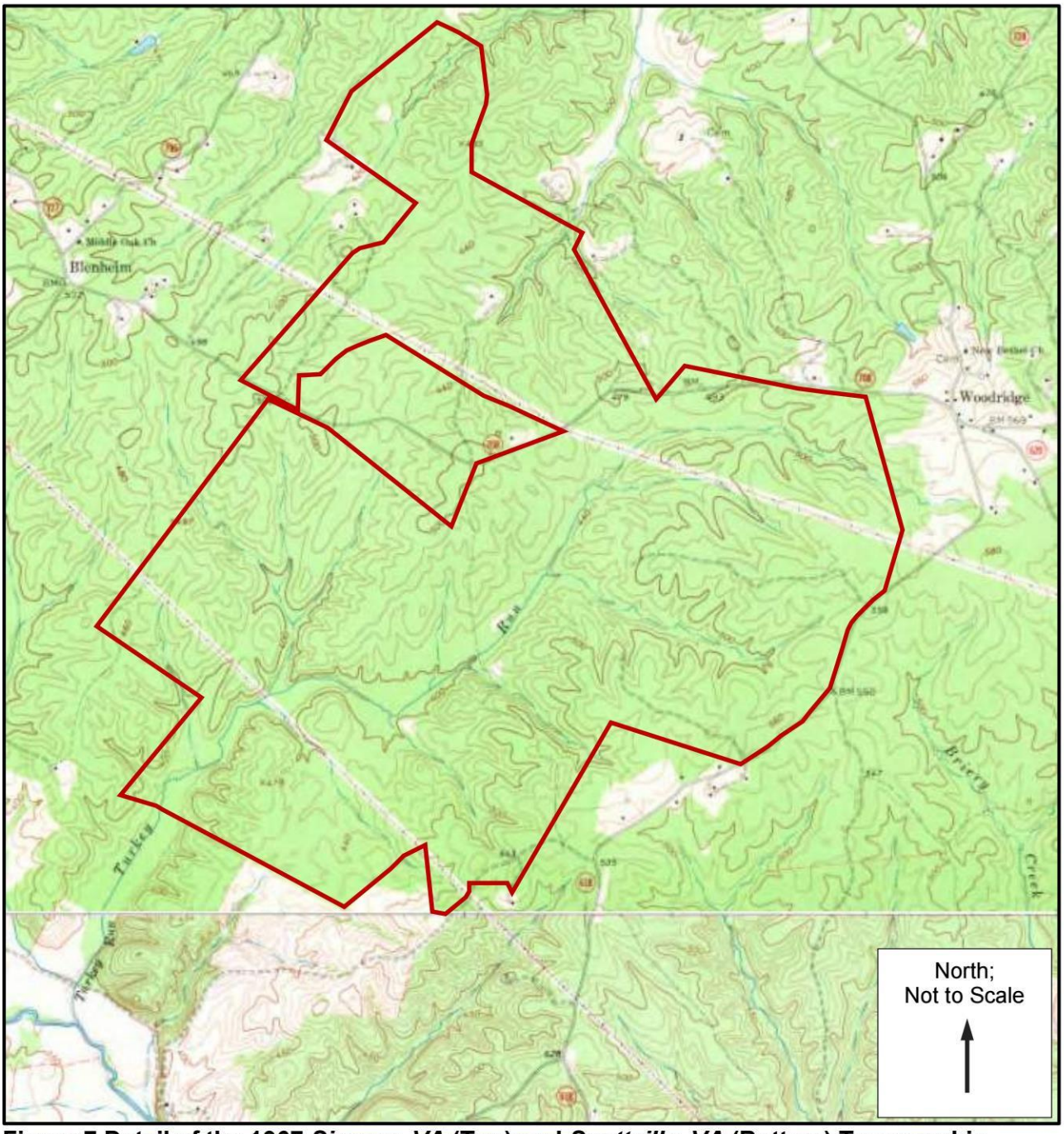


Figure 7 Detail of the 1967 *Simeon, VA* (Top) and *Scottville, VA* (Bottom) Topographic Maps Depicting the Study Area (USGS 1967; https://livingatlas.arcgis.com/topoexplorer/index.html, accessed 2019).

4.0 RESEARCH DESIGN

4.1 OBJECTIVES

The purpose of this project was to prepare an assessment of archaeological potential within the proposed Brookneal site boundary. The cultural resources assessment was intended to provide information on the soils and topography within the study area as well as on previously identified cultural resources located within the bounds of the study area and within a 1-mile radius of the study area. In addition, the assessment developed a site-specific predictive model that identified areas of enhanced and low cultural resource potential within the study area to serve as a planning tool for proposed development. While a cultural resources assessment and work plan report will not satisfy federal, state, or county regulatory requirements for a Phase I cultural resources identification survey, it does allow the client to quickly review the nature and scope of potential cultural resource issues associated with a specific study area.

4.2 PREVIOUS INVESTIGATIONS

4.2.1 Previous Cultural Resource Surveys

One previously conducted cultural resources survey extended through a portion of the proposed Woodridge Solar site study area. In 2012, Cultural Resources, Inc. (CRI), now Stantec, conducted a Phase I cultural resources survey of approximately 30.58 miles in association with the proposed Dominion Virginia Power, now Dominion Energy Virginia, Transco Delivery point to Dooms Substation 230 kV transmission line project in Fluvanna, Albemarle, and Augusta counties, Virginia (Stewart et al. 2012). This project included survey of the transmission line which extends northwest to southeast through the southwestern portion of the Woodridge Solar study area.

The 2012 survey identified one archaeological site interior to the study area. Site 44AB0571 represented a low-density lithic scatter of indeterminate temporal affiliation. CRI recommended the site as not eligible for inclusion on the NRHP, but the resource has not been formally evaluated by the VDHR for potential eligibility.

In addition, the 2012 survey extended through the Southern Albemarle Rural Historic District (VDR #002-5045), within which the entire Woodridge Solar study area is located. While the district is listed on the NRHP and the VLR, the portion of the district through which the transmission line extended was found to contain no historic structures contributing to the district.

4.2.2 Archaeological Sites

One previously identified archaeological site is located within the study area. Three additional previously identified archaeological sites are located within a 1-mile radius of the study area (Figure 8; Table 2). One site is prehistoric and three are historic. One site has been determined not eligible for NRHP inclusion and the remaining three have not been formally evaluated for potential NRHP eligibility by the VDHR.

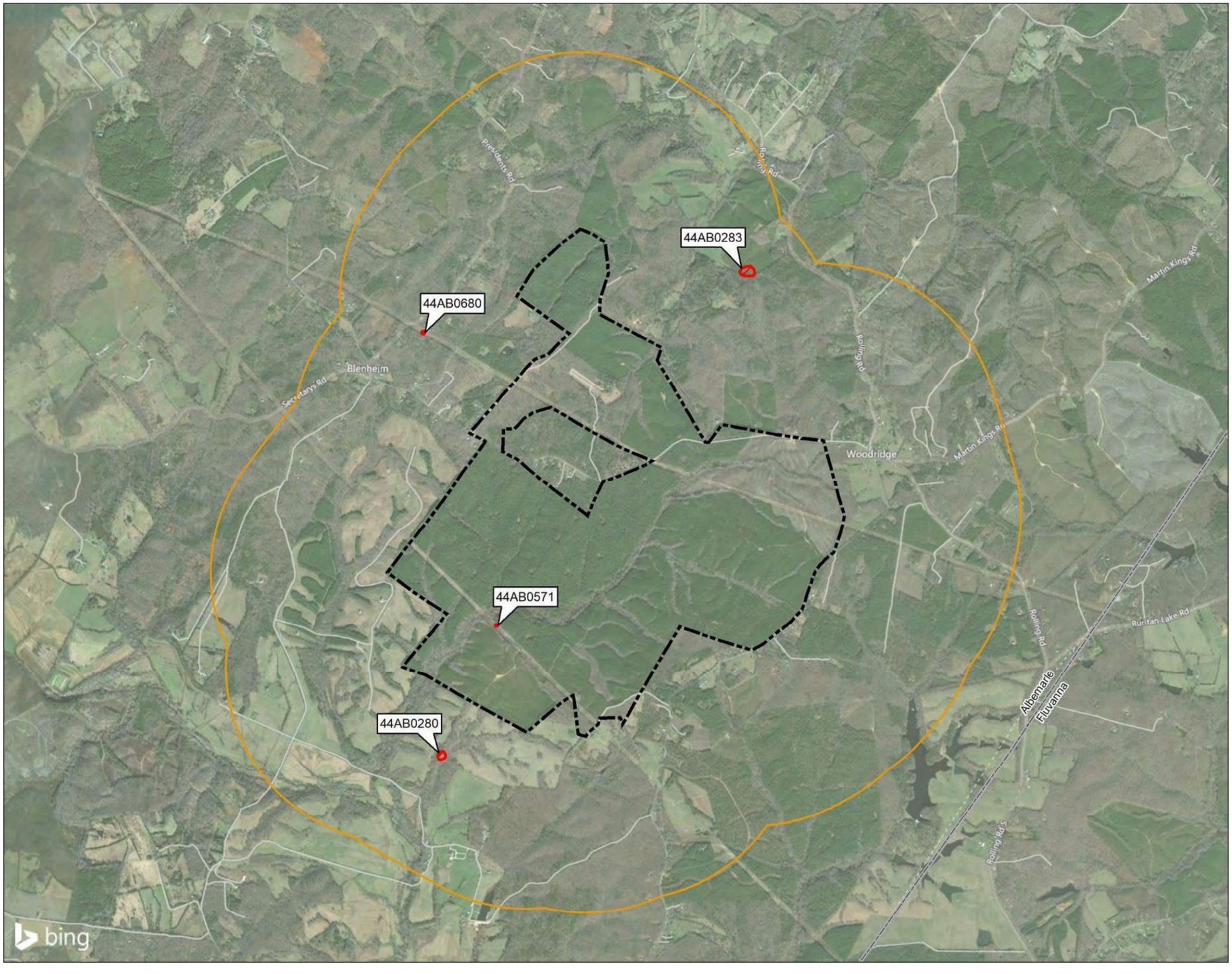


Figure No.
8

Title
Previously Identified Archaeological Sites within a 1-Mile Radius of the Study Area

Client/Project 203401407
Hexagon Energy
Woodridge Solar Site

Project Location
Albemarle County, Virginia

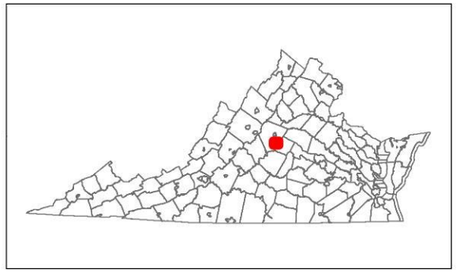
Prepared by JKM on 2019-12-12
TR by TPS on 2019-12-12
IR by BSS on 2019-12-12

N

0 3,000 6,000 Feet

(At original document size of 11x17)
1:36,000

Project Limits
1-Mile Buffer
Archaeological Resource



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Project limits provided by Hexagon Energy
3. Historic resource data provided by Virginia Department of Historic Resources, Virginia Cultural Resources Information System (VCRIS)
4. County boundary from Virginia DCR
5. Orthoimagery © Bing Maps
6. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Stantec

Table 2 Previously Identified Archaeological Sites within a 1-Mile Radius of the Study Area

Site #	Resource Type	Association	Recorded By	NRHP Recommendation
44AB0280	Limestone Quarry	19th c. & Mid- to Late 20th c.	VDHR 1986	Not Evaluated
44AB0283	Limestone Quarry	Mid- to Late 19th c.	VDHR 1986	Not Evaluated
44AB0571	Lithic Scatter	Prehistoric Unknown	CRI 2012	Not Eligible (VDHR 2012)
44AB0680	Artifact Scatter	Late 19th c.	Stantec 2016	Not Evaluated

***Highlighted resources are located within the boundaries of the study area**

4.2.3 Architectural Resources

One previously identified architectural resource is located within the study area. Twenty-one additional previously identified architectural resources are located within a 1-mile radius of the study area (Table 3 Figure 9). These resources included the post 1730 Southern Albemarle Rural Historic District ,12 houses dating from between pre-1820 and c. 1990, two churches dating to c. 1855 and c. 1891, respectively, the Mount Air Church Site with no listed date, one c. 1830 farm, one farm with no listed date, a c. 1910 school (now house), the c. 1850 Gilmer saw mill site, and two bridges, one with no listed date and one dating to c. 1907. The Southern Albemarle Rural Historic District (VDHR #002-5045) has been listed to the NRHP and the VLR. Eight resources have been determined to be not eligible for NRHP inclusion and the remaining 13 have not been formally evaluated for potential NRHP eligibility.

Table 3 Previously Identified Architectural Resources Within a 1-Mile Radius of the Study Area

Resource#	Resource Type	Association	Recorded By	NRHP Recommendation
002-0393	Church, 4899 Rolling Road/New Bethel United Methodist Church	c. 1855	Arcadia Preservation 2004	Not Evaluated
002-0394	House, 4672 Rolling Road/ Durham-Bunch House	c. 1990	Arcadia Preservation 2004	Not Evaluated
002-0395	House, 2852 Secretary's Road/Bishop Log House	c. 1859	Arcadia Preservation 2004	Not Evaluated
002-0467	House, 4944 Rolling Road/ Weather Hill/Elliton House	c. 1890	Stantec 2016; Arcadia Preservation 2004	Not Eligible (VDHR 2017)
002-0468	House, 1789 Ed Jones Road/Schoolhouse	c. 1920	Unknown 2004	Not Evaluated
002-0469	House, Rolling Road (Route 620)/Strother Log House	None Listed	Arcadia Preservation 2005	Not Evaluated
002-0470	House, 4028-4030 Rolling Road/ Schwarzenboeck House	c. 1890	Arcadia Preservation 2004; O'Dell 1982 UVA 1977	Not Evaluated
002-0471	House, 3790 Rolling Road/Hart House	Pre-1820	Arcadia Preservation 2004; UVA 1977	Not Evaluated
002-0500	Farm, 510-538 Mount Pleasant Farm/Mount Pleasant	c. 1830	Arcadia Preservation 2005; VDHR 1978	Not Evaluated

RESEARCH DESIGN

Resource#	Resource Type	Association	Recorded By	NRHP Recommendation
002-0904	Gilmer Saw Mill Site/George Gilmer Mill Site	c. 1850	VDHR 1982	Not Evaluated
002-1161	Church, 4735 President's Road/Blenheim School/Middle Oak Baptist Church	c. 1891	Stantec 2016; Arcadia Preservation 2004; VDHR 1984	Not Eligible (VDHR 2017)
002-1545	Former School/House, 2787 Campbell Farm Lane	c. 1910	Dutton 2019; VDHR n.d.	Not Evaluated
002-1548	Mount Air Church Site	None Listed	VDHR n.d.	Not Evaluated
002-1640	Buck Island Creek Bridge	None Listed	VDHR 1987	Not Evaluated
002-2134	Bridge #6244, Blenheim Road (Route 795), Hardware River	c. 1907	Arcadia Preservation 2005; VDOT 1995 & 1974	Not Eligible (VDHR 2016 & 1996)
002-5014	Moon Farm	None Listed	Unknown n.d.	Not Evaluated
002-5045	Jefferson-Carter Rural Historic District/Southern Albemarle Rural Historic District	Post 1730	VDOT 2017; CRI 2012; New South n.d.	NRHP Listed (2007) VLR Listed (2007)
002-5260	House, 395 Bruchs Creek Road	1961	Stantec 2016	Not Eligible (VDHR 2017)
002-5266	House, 5345 Rolling Road	1960	Stantec 2016	Not Eligible (VDHR 2017)
002-5267	House, 5110 Rolling Road	1950	Stantec 2016	Not Eligible (VDHR 2017)
002-5268	House, 1950 Martin Kings Road	1950	Stantec 2016	Not Eligible (VDYR 2017)
002-5282	House, 5051 Rolling Road	c. 1930	Stantec 2016	Not Eligible (VDHR 2017)

***Highlighted resources are located within the boundaries of the study area**

4.2.3.1 SOUTHERN ALBEMARLE RURAL HISTORIC DISTRICT (VDHR #002-5045)

The entirety of the Woodridge Solar study area is located within the bounds of the NRHP and VLR listed Southern Albemarle Rural Historic District (VDHR #002-5045). The district encompasses 83,627 acres and includes 2,169 contributing resources (buildings, sites, structures, and objects), including Thomas Jefferson's Monticello, and 2,215 non-contributing resources. The district's period of significance extends between 1729 and c. 1955. The district was found to be eligible for NRHP inclusion under all four NRHP criteria; Criterion A for its association with events that have made a significant contribution to the broad patterns of our history, Criterion B for its association with the lives of persons of significance in our past, Criterion C for its embodiment of the distinctive characteristics of a type, period, or method of construction or being representative of the work of a master or possessing high artistic values, or representing a significant and distinguishable entity whose components slack individual distinction, and Criterion D for yielding information important to prehistory or history (NRHP Nomination Form, Accessed 2019).

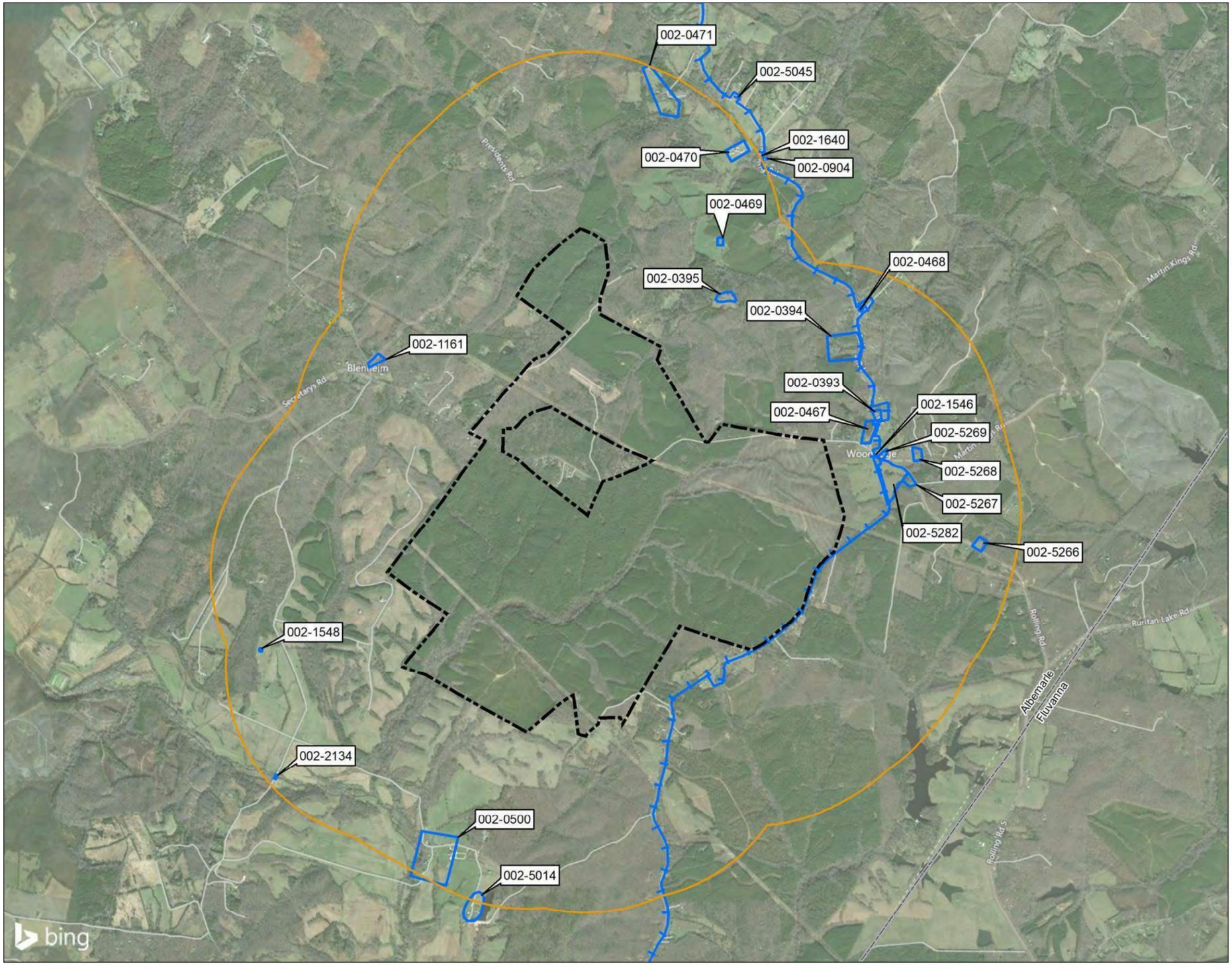


Figure No.
9

Title
Previously Recorded Architectural Resources within a 1-Mile Radius of the

Client/Project 203401407
Hexagon Energy
Woodridge Solar Site

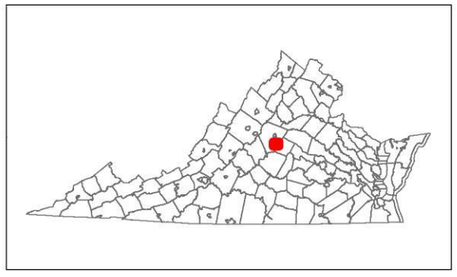
Project Location
Albemarle County, Virginia

Prepared by JKM on 2019-12-12
TR by TPS on 2019-12-12
IR by BSS on 2019-12-12

N

0 3,000 6,000 Feet
(At original document size of 11x17)
1:36,000

- Project Limits
- 1-Mile Buffer
- Architectural Resource
- Rural Historic District (VDHR #002-5045)



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Project limits provided by Hexagon Energy
3. Historic resource data provided by Virginia Department of Historic Resources, Virginia Cultural Resources Information System (VCRIS)
4. County boundary from Virginia DCR
5. Orthoimagery © Bing Maps
6. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Stantec

RESEARCH DESIGN

While the proposed Woodridge Solar site is located within the Southern Albemarle Rural Historic District (VDHR #002-5045), the study area is situated along the northeast edge of the district, where few contributing resources are located. Despite this, this portion of the district retains its rural flavor, a key element associated with the district's significance. The study area is situated within privately owned planted pine forest, and while this is not an original part of the landscape associated with the earliest period of significance for the district, it does appear, through review of historic aerial photographs, that the area was planted in pine as early as the 1930s, which falls within the district's larger period of significance. The loblolly pine has been timbered periodically and in different sections, creating different clear cut areas over time.

5.0 CULTURAL RESOURCES ASSESSMENT RESULTS

5.1 INTRODUCTION

The cultural resources assessment field effort examined all portions of the approximately 2,276.4-acre study area through visual inspection of exposed ground surfaces and shovel testing. The study area was further subject to photo documentation to document current field conditions.

Stantec field archaeologists conducted pedestrian survey across the entire study area. This pedestrian survey was supplemented with the excavation of judgmentally placed shovel tests and photo documentation. Shovel tests were excavated to determine the nature of the soils and topography in the study area. In addition, this effort was used to create a predictive model that identifies areas of enhanced and low cultural resources potential within the study area to serve as a planning tool for proposed development. Determinations of potential were based upon soil properties, drainage, topography, and other factors.

All shovel tests measured approximately 1.25 feet (15 inches) in diameter and were excavated to sterile subsoil. Soil from all shovel tests was passed through 1/4-inch mesh screen. For each excavated shovel test, the stratigraphic profile was recorded with complete descriptions using Munsell color designators (Munsell Color 1994) and US Department of Agriculture soil texture terminology (Elder 1989).

5.2 SHOVEL TESTING AND PHOTO DOCUMENTATION

A total of 29 locations were subject to photo-documentation and shovel testing. Shovel test locations were selected to examine data addressing spatial and topographic variation within the study area, as well as stratigraphic integrity, soil quality, and soil types across the property. No shovel tests were positive for cultural material. Modern debris and a piece of historic brick in a wetlands crossing were observed and are discussed below.

5.2.1 Location 1

Location 1 was placed in the central portion of study area, approximately 380 feet west of an unnamed tributary of Turkey Run. The location was situated atop a knoll that has been clear cut and was bulldozed approximately 30 years ago (Figure 10; Appendix A). Due to previous bulldozing, subsoil is present on the surface in this area. Subsoil consisted of 10YR6/6 brownish yellow silty clay with 5% gravel inclusions (Table 4). No artifacts were recovered, and no surface features were observed.

Table 4 STP 1 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	Surface	10YR6/6 Brownish Yellow	Silty Clay w/ 5% Gravel	Subsoil

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 10 General View of Location 1 with clear cut trees; View to the North.

5.2.2 Location 2

Location 2 was placed to the south of Location 1, approximately 330 feet west of an unnamed tributary of Turkey Run. The location was situated atop a knoll that has been clear cut and was bulldozed approximately 30 years ago (Figure 11; Appendix A). Due to previous bulldozing subsoil is present on the surface in this area. Subsoil consisted of 10YR6/6 brownish yellow silty clay with 5% gravel inclusions (Table 5). No artifacts were recovered, and no surface features were observed.

Table 5 STP 2 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	Surface	10YR6/6 Brownish Yellow	Silty Clay w/ 5% Gravel	Subsoil

5.2.3 Location 3

Location 3 was placed in the south of Location 2, approximately 300 feet west of an unnamed tributary of Turkey Run. The location was situated in a low, poorly drained area that has been clear cut and was bulldozed approximately 30 years ago (Figure 12; Appendix A). Due to previous bulldozing subsoil is present on the surface in this area. Subsoil consisted of 10YR6/6 brownish yellow clayey silt (Table 6). No artifacts were recovered, and no surface features were observed.

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 11 View of Location 2 on a finger ridge; View to the North.

Figure 12 View of Location 3; View to the North.

Table 6 STP 3 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	Surface	10YR6/6 Brownish Yellow	Clayey Silt	Subsoil

5.2.4 Location 4

Location/Shovel Test Pit (STP) 4 was placed west of Location 3 (Appendix A). The location was situated on a narrow finger between two springs (Figure 13). STP 4 contained two strata in profile. Stratum I was characterized as a layer of 10YR6/3 pale brown loam with 40% gravel inclusions (A Horizon) that extended in depth from approximately 0 to 0.3 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/6 brownish yellow clay (Subsoil). Stratum II was excavated from approximately 0.3 to 0.7 feet below ground surface (Table 7). No artifacts were recovered, and no surface features were observed.

Figure 13 General View of Location/STP 4; View to the North.

Table 7 STP 4 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.3	10YR6/3 Pale Brown	Loam w/ 40% Gravel	A Horizon
II	0.3–0.7	10YR6/6 Brownish Yellow	Clay	Subsoil

5.2.5 Location 5

Location 5 was placed northwest of Location/STP 4, approximately 740 feet north of Turkey Run (Appendix A). The location was situated on a broad ridge that has been previously bulldozed (Figure 14). Due to previous bulldozing subsoil is present on the surface in this vicinity. Subsoil consisted of 10YR6/6 brownish yellow clay with 40% gravel inclusions (Table 8). No artifacts were recovered, and no surface features were observed.

Figure 14 General View of Location 5; View to the South.

Table 8 STP 5 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	Surface	10YR6/6 Brownish Yellow	Clay w/ 40% Gravel	Subsoil

5.2.6 Location 6

Location 6 was placed north of Location 5 and approximately 250 feet east of an unnamed tributary of Turkey Run (Appendix A). The location was situated on a sloping hillside that has been previously bulldozed (Figure 15). Due to previous bulldozing subsoil is present on the surface in this vicinity. Subsoil consisted of 10YR6/6 brownish yellow clay with 40% gravel inclusions (Table 9). No artifacts were recovered, and no surface features were observed.

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 15 General View of Location 6; View to the North.

Table 9 STP 6 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	Surface	10YR6/6 Brownish Yellow	Clay w/ 40% Gravel	Subsoil

5.2.7 Location 7

Location 7 was placed north of Location 1, approximately 2,565 feet west of Turkey Run (Appendix A). The location was situated on a broad, flat finger ridge that has been previously bulldozed (Figure 16). Due to previous bulldozing subsoil is present on the surface in this area. Subsoil consisted of 10YR6/6 brownish yellow silty clay with 10% gravel inclusions (Table 9). No artifacts were recovered, and no surface features were observed.

Table 10 STP 7 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	Surface	10YR6/6 Brownish Yellow	Silty Clay w/ 10% Gravel	Subsoil

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 16 General View of Location 7; View to the South.

5.2.8 Location 8

Location 8 was placed north of Location 6, near the western limits of the study area (Appendix A). The location was situated on a broad, flat finger ridge that has been previously bulldozed (Figure 17). Due to previous bulldozing subsoil is present on the surface in this area. Subsoil consisted of 10YR6/6 brownish yellow silty clay with 10% gravel inclusions (Table 11). No artifacts were recovered; however, modern debris was noted on the surface. No surface features were observed.

Table 11 STP 8 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	Surface	10YR6/6 Brownish Yellow	Silty Clay w/ 10% Gravel	Subsoil

5.2.9 Locations 9 & 10

Locations 9 & 10 were located south of Turkey Run in the transmission line corridor (Appendix A). The locations were situated on a marshy, poorly drained bottomland (Figure 18). No shovel tests were excavated due to the presence of wetlands. No artifacts were recovered though a few fragments of brick were observed in the wetland crossing (location 10) (Figure 19). These brick fragments appear to have been redeposited and do not represent an intact archaeological site. No surface features were observed.

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 17 General View of Location 8; View to the South.

Figure 18 General View of Location 10; View to the East.

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 19 Brick Fragment Dumped in Wetland Crossing.

5.2.10 Location 11

Location 11 was placed east of Locations 9 & 10 and approximately 350 feet north of a tributary of Turkey Run (Appendix A). The location was situated on a ridge tip that has been previously bulldozed (Figure 20). Due to previous bulldozing subsoil is present on the surface in this area. Subsoil consisted of 10YR6/6 brownish yellow silty clay with 10% gravel inclusions (Table 12). No artifacts were recovered; however, modern debris was noted on the surface. No surface features were observed.

Table 12 STP 11 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	Surface	10YR6/6 Brownish Yellow	Clay w/50% Quartz Gravel	Subsoil

5.2.11 Location 12

Location/STP 12 was placed northeast of Location 11, approximately 400 feet south of Turkey Run (Appendix A). The location was situated on a ridge tip that has been recently logged and partially bulldozed (Figure 21). STP 12 contained two strata in profile. Stratum I was characterized as a layer of 10YR3/3 dark brown loam with 10% quartz gravel inclusions (A Horizon) that extended in depth from approximately 0 to 0.2 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/6 brownish yellow clay (Subsoil). Stratum II was excavated from approximately 0.2 to 0.6 feet below ground surface (Table 13). No artifacts were recovered, and no surface features were observed.

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 20 General View of Location 11; View to the South.

Figure 21 General View of Location/STP 12; View to the South.

Table 13 STP 12 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.2	10YR3/3 Dark Brown	Loam w/10% Quartz Gravel	A Horizon
II	0.2–0.6	10YR6/6 Brownish Yellow	Clay	Subsoil

5.2.12 Location 13

Location/STP 13 was placed in the southern portion of the study area, approximately 1,400 feet south of Turkey Run (Appendix A). The location was situated on a broad, flat ridge with 15-year-old pine trees. STP 13 contained two strata in profile. Stratum I was characterized as a layer of 10YR4/4 dark yellowish-brown sandy loam (A Horizon) that extended in depth from approximately 0 to 0.8 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/6 brownish yellow clay with gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.8 to 1.2 feet below ground surface (Table 14). No artifacts were recovered, and no surface features were observed.

Table 14 STP 13 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.8	10YR4/4 Dark Yellowish Brown	Sandy Loam	A Horizon
II	0.8–1.2	10YR6/6 Brownish Yellow	Clay w/ Gravel	Subsoil

5.2.13 Location 14

Location/STP 14 was placed south of Location/STP 13 in the southern portion of the study area (Appendix A). The location was situated on a gentle slope covered in 15-year-old pine (Figure 22). STP 14 contained two strata in profile. Stratum I was characterized as a layer of 10YR6/2 light brownish gray sandy loam (A Horizon) that extended in depth from approximately 0 to 0.3 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/6 brownish yellow clay with gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.3 to 0.7 feet below ground surface (Table 15). No artifacts were recovered, and no surface features were observed.

Table 15 STP 14 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.3	10YR6/2 Light Brownish Gray	Sandy Loam	A Horizon
II	0.3–0.7	10YR6/6 Brownish Yellow	Clay w/ Gravel	Subsoil

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 22 General View of Location/STP 14; View to the East.

5.2.14 Location 15

Location/STP 15 was placed south of Location/STP 13 in the southern portion of the study area (Appendix A). The location was situated on steep slope covered in hardwoods (Figure 23). STP 15 contained two strata in profile. Stratum I was characterized as a layer of 10YR6/2 light brownish gray sandy loam (A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/6 brownish yellow clay (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 16). No artifacts were recovered, and no surface features were observed.

Table 16 STP 15 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	10YR6/2 Light Brownish Gray	Sandy Loam	A Horizon
II	0.4–0.8	10YR6/6 Brownish Yellow	Clay	Subsoil

5.2.15 Location 16

Location 16 was placed at the southeastern limits of the study area (Appendix A). The location was situated on a ridge with 40-year old hardwoods. A shovel test was not excavated; however, surface deposits indicate soils with a high potential for intact deposits in this area. No artifacts were recovered, and no surface features were observed.

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 23 General View of Location/STP 15; View to the North.

5.2.16 Location 17

Location/STP 17 was placed in the north central portion of the study area (Appendix A). The location was situated on a ridgetop covered in dense 10-year old pine trees (Figure 24). STP 17 contained two strata in profile. Stratum I was characterized as a layer of 7.5YR5/6 strong brown silty loam (A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 7.5YR5/8 strong brown clay with quartz gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 17). No artifacts were recovered, and no surface features were observed.

Table 17 STP 17 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	7.5YR5/6 Strong Brown	Silty Loam	A Horizon
II	0.4–0.8	7.5YR5/8 Strong Brown	Clay w/ quartz gravel	Subsoil

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 24 View towards Location/STP 17; View to the North.

5.2.17 Location 18

Location/STP 18 was placed in the north central portion of the study area, northeast of Location/STP 17 (Appendix A). The location was situated on a ridgetop covered in dense 15-year old pine trees. STP 18 contained two strata in profile. Stratum I was characterized as a layer of 7.5YR5/6 strong brown silty loam (A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 7.5YR5/8 strong brown clay with 10% quartz gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 18). No artifacts were recovered, and no surface features were observed.

Table 18 STP 18 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0−0.4	7.5YR5/6 Strong Brown	Silty Loam	A Horizon
II	0.4−0.8	7.5YR5/8 Strong Brown	Clay w/ 10% Quartz Gravel	Subsoil

5.2.18 Location 19

Location/STP 19 was placed on the western portion of the study area (Appendix A). The location was situated on a broad ridge covered in broom straw and stumps from logged trees (Figure 25). STP 19 contained two strata in profile. Stratum I was characterized as a layer of 10YR4/4 dark yellowish-brown sandy loam (A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/4 light yellowish-brown clay with 30% gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 19). No artifacts were recovered, and no surface features were observed.

Figure 25 View of Location/STP 19; View to the North

Table 19 STP 19 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	10YR4/4 Dark Yellowish Brown	Sandy Loam	A Horizon
II	0.4–0.8	10YR6/4 Light Yellowish Brown	Clay w/ 30% Gravel	Subsoil

5.2.19 Location 21

Location/STP 21 was placed on the northwestern portion of the study area (Appendix A). The location was situated on a slope that had been recently logged and the area had been previously bulldozed (Figure 26). STP 21 contained two strata in profile. Stratum I was characterized as a layer of 10YR4/4 dark yellowish-brown clay loam (disturbed A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/4 light yellowish-brown clay with 30% gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 20). No artifacts were recovered, and no surface features were observed.

Figure 26 General View of Location/STP 21; View to the North.

Table 20 STP 21 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	10YR4/4 Dark Yellowish Brown	Clay Loam	Disturbed A Horizon
II	0.4–0.8	10YR6/4 Light Yellowish Brown	Clay w/ 30% Gravel	Subsoil

5.2.20 Location 22

Location/STP 22 was placed in the northwestern portion of the study area (Appendix A). The location was situated on a ridge with dense pine trees. The area had been previously bulldozed (Figure 27). STP 22 contained two strata in profile. Stratum I was characterized as a layer of 10YR4/4 dark yellowish-brown clay loam (disturbed A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/4 light yellowish-brown clay with 30% gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 21). No artifacts were recovered, and no surface features were observed.

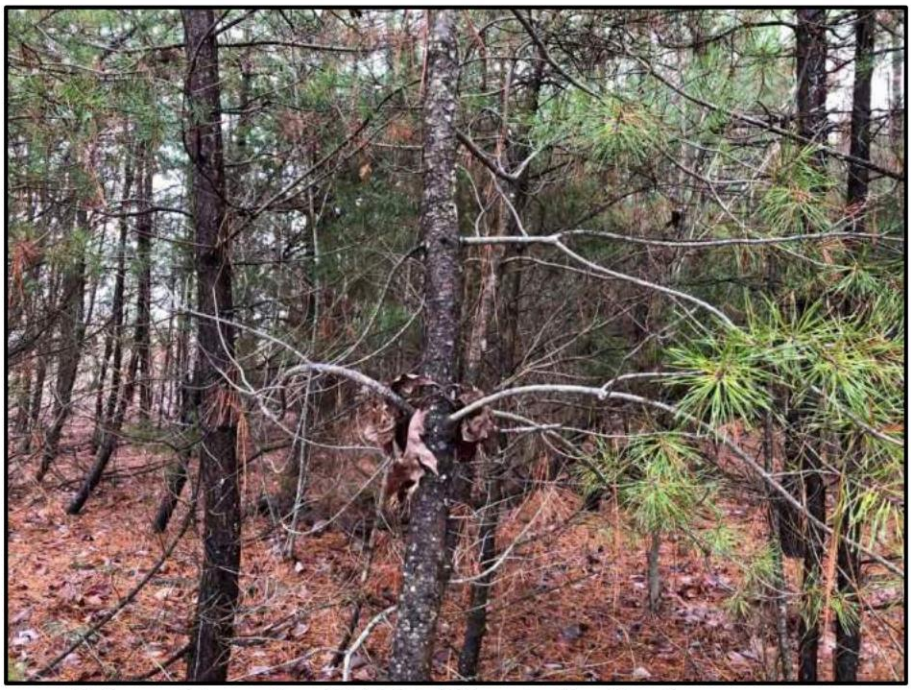


Figure 27 General View of Location/STP 22; View to the North.

Table 21 STP 22 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	10YR4/4 Dark Yellowish Brown	Clay Loam	Disturbed A Horizon
II	0.4–0.8	10YR6/4 Light Yellowish Brown	Clay w/ 30% Gravel	Subsoil

5.2.21 Location 23

Location/STP 23 was placed on the northern portion of the study area (Appendix A). The location was situated on a broad ridge finger near the existing Hunt Club compound (Figure 28). STP 23 contained two strata in profile. Stratum I was characterized as a layer of 10YR6/4 light yellowish-brown clayey loam (disturbed A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/6 brownish yellow clay (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 22). No artifacts were recovered. The observed structures are discussed collectively as Architectural Complex 1 below.

Figure 28 View of STP 23 and the Hunt Club; View to the North.

Table 22 STP 23 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	10YR6/4 Light Yellowish Brown	Clayey Loam	Disturbed A Horizon
II	0.4–0.8	10YR6/6 Brownish Yellow	Clay	Subsoil

5.2.22 Location 25

Location/STP 25 was placed in the northeastern portion of the study area (Appendix A). The location was situated on a broad ridge covered in dense pine trees, approximately 600 feet north of Turkey Run (Figure 29). STP 25 contained two strata in profile. Stratum I was characterized as a layer of 7.5YR5/6 strong brown silty loam (A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 7.5YR5/8 strong brown clay with 10% quartz gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 23). No artifacts were recovered, and no surface features were observed.

Figure 29 View of Area near Location/STP 25; View to the South.

Table 23 STP 25 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	7.5YR5/6 Strong Brown	Silty Loam	A Horizon
II	0.4–0.8	7.5YR5/8 Strong Brown	Clay w/ 10% Quartz Gravel	Subsoil

5.2.23 Location 26

Location/STP 26 was placed in the southeastern portion of the study area (Appendix A). The location was situated on a ridge with 25-year old pine trees (Figure 30). STP 25 contained two strata in profile. Stratum I was characterized as a layer of 10YR4/6 dark yellowish-brown silty loam (A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 10YR6/6 brownish yellow clay (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 24). No artifacts were recovered, and no surface features were observed.

Figure 30 View of Area near Location/STP 26; View to the North.

Table 24 STP 26 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	10YR4/6 Dark Yellowish Brown	Silty Loam	A Horizon
II	0.4–0.8	10YR6/6 Brownish Yellow	Clay	Subsoil

5.2.24 Location 27

Location/STP 27 was placed south of Location/STP 25 in the northern portion of the study area (Appendix A). The location was situated on a ridge between Turkey Run and a tributary of Turkey Run with dense 10-year-old pines (Figure 31). STP 27 contained two strata in profile. Stratum I was characterized as a layer of 7.5YR5/6 strong brown silty loam (A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 7.5YR5/8 strong brown clay with 10% quartz gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 25). No artifacts were recovered, and no surface features were observed.

Figure 31 View from Location/STP 27; View to the North.

Table 25 STP 27 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	7.5YR5/6 Strong Brown	Silty Loam	A Horizon
II	0.4–0.8	7.5YR5/8 Strong Brown	Clay w/ 10% Quartz Gravel	Subsoil

5.2.25 Location 28

Location/STP 28 was placed southeast of Location/STP 27 in the eastern portion of the study area (Appendix A). The location was situated on a ridge between Turkey Run and a tributary of Turkey Run with dense 10-year-old pines (Figure 32). STP 27 contained two strata in profile. Stratum I was characterized as a layer of 7.5YR5/6 strong brown silty loam (A Horizon) that extended in depth from approximately 0 to 0.4 feet below ground surface. Underlying Stratum I was Stratum II, a layer of 7.5YR5/8 strong brown clay with 10% quartz gravel inclusions (Subsoil). Stratum II was excavated from approximately 0.4 to 0.8 feet below ground surface (Table 26). No artifacts were recovered, and no surface features were observed.

Figure 32 View of Location/STP 28; View to the North.

Table 26 STP 28 Soil Profile

Stratum	Depth (ft.)	Color	Soil Type/Texture	Interpretation
I	0–0.4	7.5YR5/6 Strong Brown	Silty Loam	A Horizon
II	0.4–0.8	7.5YR5/8 Strong Brown	Clay w/ 10% Quartz Gravel	Subsoil

5.3 NEWLY OBSERVED ARCHITECTURAL RESOURCES

Two newly identified architectural resources were observed within the study area during the course of the assessment (Appendix A) and include a frame former dwelling with a barn and a cemetery. The architectural complex included an individual structure with one additional secondary structure. The architectural complex and the cemetery were not formally recorded as architectural resources during this assessment.

5.3.1 Architectural Complex 1

Architecture Complex 1 is situated in a small clearing with several large trees in the vicinity of the building. The area surrounding the building was fenced in. At least one wood fence post was visible. The fence location is more easily discernable by the hedges now present. The building, although most recently functioning as a hunt club, appears to have originally been a residence dating to the early to mid-nineteenth century. The original dwelling has been added onto several times and obscures the one-and-a-half-story main block. The barn behind is a frame structure with weatherboard exterior and is likely contemporary with the original dwelling (Figures 33 and 34). The location of the primary resource appears to be depicted on the 1943 *Scottsville, VA* and the 1967 *Simeon, VA* USGS Topographic maps (see Figures 6 and 7).

Figure 33 Primary Structure and Fence Post at Architectural Complex 1; View to the North.

Figure 34 Barn and Primary Structure at Architectural Complex 1; View to the Southeast.

5.3.2 Cemetery

The cemetery observed during this assessment was located approximately 380 feet west of Architectural Complex 1. The cemetery contains the graves of members from the Mullins, Cookenour, and Wood families. Five marked graves are present with the likelihood of unmarked burials present as well (Figure 35). The earliest grave, which belongs to Walter Mullins, dates to 1890 with the most recent interment belonging to William Cookenour, who died in 1960. The cemetery is bounded by an early twentieth century iron fence, which dates to around 1910. One of the marked graves is located outside the fence line suggesting that additional unmarked burials may also lay beyond the limits of the fence. The cemetery does not appear on any historical topographic maps.

CULTURAL RESOURCES ASSESSMENT RESULTS

Figure 35 Mullins-Cookenour-Wood Cemetery; View to the Northwest.

6.0 PREDICTIVE MODEL

A predictive model was developed to define areas of high, moderate, low, and no cultural resources potential located within the limits of the overall study area because a solar panel layout has not yet been completed. The following section provides an overview of the environmental and cultural landscape attributes incorporated into the model, which was developed with ArcGIS software.

Environmental landscape attributes included topography, soil class and type, wetland class, and distance to viable water sources. These attributes were examined to assist with predicting the potential for both prehistoric and historic cultural resources within the study area (Appendix B). Cultural landscape attributes were primarily utilized in predicting the potential for historic cultural resources within the study area; however, cultural attributes did have some bearing on prehistoric predictive modeling. Cultural landscape attributes included the presence of primary roads and crossroads, historic structures and/or cemeteries, and the presence of previously identified prehistoric and historic cultural resources in the vicinity of the study area. Information on previously recorded archaeological sites in the study area vicinity were examined in an effort to identify patterning in the locations of previously identified prehistoric and historic sites in the area. Current study area conditions were also factored into the overall assessment of site probability.

Taking into consideration the numerous environmental and landscape attributes discussed previously, three tiers of probability have been identified for identification of prehistoric and historic cultural resources. In addition, a no survey required category has been applied for those areas with no potential for cultural resources. The three levels of probability for the study area: Low Probability, Moderate Probability, and High Probability. Low probability areas were defined by the presence of at least one of the following attributes/conditions (Table 27). Moderate probability areas were defined utilizing an assessment of the following attributes/conditions (Table 28). High probability areas were defined utilizing an assessment of the following attributes/conditions (Table 29).

Table 27 Low Probability Attributes

Attribute	Definition
Slope	Greater than 15 percent
Soils	Poorly drained, severely eroded, or Class V and up soil rating. Soils may be greater than 15 percent for some of these
Wetlands	Presence of wetlands
Disturbance	Significant observable ground disturbance

Table 28 Moderate Probability Attributes

Attribute	Definition
Slope	Between 7 and 15 percent
Soils	Class III-IV soil rating
Wetlands	Limited presence of wetlands
Proximity to Water	750 feet or more from viable water sources
Disturbance	Moderate to low observable ground disturbance

Table 29 High Probability Attributes

Attribute	Definition
Slope	Between 0 and 6 percent
Soils	Class I-II soil rating and generally well drained or very well drained
Wetlands	Absence of wetlands
Proximity to Water	0-750 feet from viable water sources
Disturbance	Little to no observable ground disturbance

The above attributes have been applied in the development of a model designed to predict the presence or absence of both prehistoric and historic sites within the study area. In addition to these attributes, the model also included an examination of historic maps, topographic maps, and aerial imagery to identify potential historic sites as well as the application of field observations. This examination paid particular attention to the presence or absence of major roads or crossroads within or adjacent to the study area, railroads within or adjacent to the study area, and/or the documented presence of cemeteries within or adjacent to the study area. Portions of the study area exhibiting such landscape features were identified as retaining a moderate to high probability for historic sites depending on distance to said features. In the absence of any such features, historic site prediction was based solely on the abovementioned attributes.

6.1 SITE-SPECIFIC ARCHAEOLOGICAL PREDICTIVE MODEL

The overall study area containing the proposed Woodridge Solar site comprises approximately 2,276.4 acres; no panel plan has yet been developed for the project. The predictive model and cultural resources assessment cover the entirety of the study area but may be amended to focus primarily on the area identified for potential development according to the preliminary panel layout, when said layout is available. Of the 2,276.4-acre study area, approximately 286.7 acres (12.6 percent) are defined as retaining a high potential for cultural resources, approximately 710.2 acres (31 percent) are defined as retaining a moderate potential for cultural resources, and approximately 1,279.5 acres (56 percent) are defined as retaining a low potential for containing cultural resources (Figure 36).

The study area consists of rolling topography with some areas of steep slope in the vicinity of Turkey Run. The study area is predominately comprised of rolling pine forest some of which has been recently and historically logged and bulldozed. It appears that the study area has historically been utilized for tree farming, much as it is today.

Figure No.
36

Title
Archaeological Predictive Model for the Project

Client/Project 203401407
Hexagon Energy
Woodridge Solar Site

Project Location
Albemarle County, Virginia

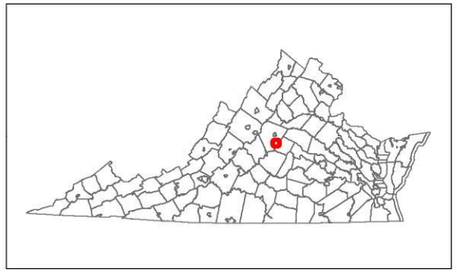
Prepared by JKM on 2020-01-23
TR by TPS on 2020-01-29
IR by BSS on 2020-01-30

N

0 1,500 3,000 Feet

(At original document size of 11x17)
1:19,200

- Project Limits
- High Probability Area (286.7 Acres)
- Moderate Probability Area (710.2 Acres)
- Low Probability Area (1,279.5 Acres)



Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Project limits provided by Hexagon Energy
3. Predictive model created with data from USDA NRCS SSURGO Soil Survey, NWI, NHD, and digital elevation model derived from VGIN LiDAR.
4. The approximate limits of Waters of the US (WOUS), including wetlands, have not been field located and are for planning purposes only.
5. Orthoimagery © Bing Maps
6. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Stantec

6.1.1 Prehistoric Predictive Modeling

Native American occupation of the region began more than 13,000 years ago (McAvoy and McAvoy 1997). Early historic maps have depicted Native American settlement along major waterways throughout the region since the arrival of Europeans in the New World in the early seventeenth century. Though no documentation for pre-Contact settlement exists within the study area, Native American occupation throughout the region in which the solar site is located has been documented archaeologically.

Native American sites in Virginia have generally been found within 1,000 to 1,500 feet of a significant water source, on moderately well- to well-drained soils on low relief landforms. However, sites may appear in a variety of environmental settings depending on site function and temporal affiliation. Archaic period sites, for instance, have been frequently identified in upland settings; however, other sites are located in riverine settings, and may be present beneath modern waterways (Blanton 1996; Dent 1995). In Virginia's Central Piedmont, Archaic sites appear to be spread nearly equally amidst alluvial landforms (floodplains/low terraces) and upland landforms or bluffs adjacent to rivers (Klein and Klatka 1991).

For the purposes of predictive modeling for the study area, it was necessary to examine the study area's topography, soils types, presence or absence of established wetlands, and proximity to water. In addition, previously conducted cultural resources surveys in the vicinity of the study area were examined to determine whether patterning in prehistoric site location had been identified in the region. No prehistoric artifacts were observed during the field visit.

6.1.2 Historic Predictive Modeling

Early European settlement in Virginia and the region relied heavily on the production of tobacco. As a result, settlement, which was initially restricted to the Jamestown Island area, began spreading to landscapes suitable for the cultivation of tobacco. Such areas exhibited gently sloping landscapes with well drained soils. Over time, settlement spread into the Piedmont region, where soil erosion due to heavy tobacco cultivation had not yet depleted agricultural soils (Farmer 1993). As time went on, overland transportation routes began to improve, and settlement began to cluster around major roadways and crossroads.

For the purposes of predictive modeling for the study area, it was necessary to examine the study area's topography, soil types, presence or absence of established wetlands, and proximity to water. In addition, previously conducted cultural resources surveys in the vicinity of the study area were examined to determine whether known historic sites were recorded in the area.

Historic maps, topographic maps, and aerial photographs were also examined to identify historic structures which may have once stood within or adjacent to the study area, major roadways in the vicinity, and/or the presence of cemeteries. Historic map review was conducted during the historic context development for the Woodridge Solar site detailed in Chapter 3. Historic map review served to assist in the development of the predictive model for the identification of historic sites within the study area. Review of historic maps focused on the presence or absence of structures, major roadways, railroads,

and crossroads, as indicators of potential historic occupation within or adjacent to the study area. Prior to the mid-twentieth century, historic maps provided little to no detail of the study area vicinity.

Beginning the late nineteenth century, historic topographic maps depict the Woodridge Solar site primarily as uninhabited land. The 1891 Palmyra, Virginia topographic map depicts Turkey Run and what is today Route 708 (Secretary's Road). Blenheim is shown to the northwest and Woodridge a short distance east of the study area. No evidence of structures is present interior to the study area. By the mid-twentieth century, though, two structures are shown within the study area. The 1943 Scottsville, Virginia topographic map is similar to that from the late nineteenth century. However, this map also shows secondary roads or long driveways interior to the study area. Three residentials structures are also depicted within the study area at this time. By 1967, Only one structure is shown within the study area.

6.1.3 Comparative Predictive Modeling

One cultural resources survey has been conducted within the Woodridge Solar site. This survey was conducted in association with improvements to the Dominion Virginia Power, now Dominion Energy Virginia, Transco Delivery point to Dooms Substation 230 kV transmission line. In the immediate vicinity of the study area, this survey resulted in the recordation of one archaeological site. The site represented a prehistoric lithic scatter of indeterminate temporal affiliation. The lack of documented archaeological sites, however, is not necessarily a reflection of a lack of potential, but more likely the result of limited archaeological survey efforts in the study area vicinity. In the wider region, prehistoric and historic sites alike have been identified along the floodplains of the Hardware River and the James River, and along their tributaries. Prehistoric sites, including lithic scatters and camps, have also been identified in the vicinity of secondary waterways.

Survey efforts in proximity to the study area are limited to the above referenced study and the recording of quarries in the area by the VDHR. Previously identified archaeological sites, both prehistoric and historic, are located in the general vicinity of the proposed Woodridge Solar site. The single prehistoric site identified by CRI was situated in a wooded setting adjacent to an upland tributary of Turkey Run. The historic resources were primarily representative of a historic scatter and limestone quarries dating from the nineteenth to the twentieth century.

7.0 CONCLUSIONS AND RECOMMENDATIONS

From January 13-16 of 2020, Stantec conducted a cultural resources assessment and work plan for approximately 2,276 acres associated with the proposed Woodridge Solar Site in Albemarle County, Virginia. The study area is located within a planted pine forest on either side of Route 708 (Secretary's Road). The work was conducted on behalf of Hexagon Energy, LLC (Hexagon)., in accordance with the Commonwealth of Virginia DEQ Solar PBR for solar projects (DEQ 2012).

7.1 RESULTS OF THE CULTURAL RESOURCES ASSESSMENT

One previously recorded archaeological site is located within the study area. Site 44AB0571, a prehistoric lithic scatter of indeterminate age, has been determined not eligible for listing on the NRHP. Three previously recorded archaeological sites are located within a 1-mile radius of the study area, each dating from the nineteenth through the twentieth centuries. The study area is located entirely within the bounds of architectural resource VDHR #002-5045, the NRHP and VLR-listed Southern Albemarle Rural Historic District. Twenty-one previously recorded architectural resources are located within a 1-mile radius of the study area. These 21 additional resources included houses, churches, farms, bridges, a school, and a saw mill site, each of which was nineteenth or early twentieth century in date. In addition to these previously recorded architectural resources, one architectural complex and one cemetery were observed within the study area. Architectural Complex 1, comprised of two structures, and the cemetery both also date from the nineteenth to twentieth century. Architectural Complex 1 appears on early to mid-twentieth century topographic maps; however, the cemetery is not documented on these maps.

The archaeological predictive model was prepared for the entire acreage within the Project boundary but may be amended to focus primarily on the area identified for potential development according to the preliminary solar farm layout, when available. Of the 2,276.4-acre study area, approximately 286.7 acres (12.6 percent) are defined as retaining a high potential for cultural resources, approximately 710.2 acres (31 percent) are defined as retaining a moderate potential for cultural resources, and approximately 1,279.5 acres (56 percent) are defined as retaining a low potential for containing cultural resources.

The predictive model development took into consideration both environmental factors significant to historic and prehistoric settlement patterns as well as a review of relevant historic contexts, historic maps, and aerial photographs in order to identify the three tiers of probability. This review coupled with an assessment of current conditions within the study area resulted in an assessment of the potential for previously undocumented historic and prehistoric cultural resources to exist within the Project boundary and potential development area for the solar facility. The comparison of historic maps to current available maps and aerial photographs suggests that the project vicinity retains some potential for the discovery of historic archaeological remains associated with these locations and occupations. For prehistoric resources, it is anticipated that sites may be located in proximity to Turkey Run. Large sites would not be expected; however, smaller seasonal or temporary sites may be present.

7.2 RECOMMENDED PHASE I SURVEY METHODOLOGY

The proposed Woodridge Solar site in Albemarle County falls under the purview of the Virginia DEQ PBR (DEQ 2012). For large acreage projects, a cultural resources assessment may be conducted to provide a means of quickly identifying the potential for historic resources within the larger study area. Following the cultural resources assessment, a Phase I survey would be conducted in compliance with the regulations set forth by the DEQ and the VDHR, and also in Section 106 of the National Historic Preservation Act of 1966, as amended, the Archaeological and Historic Preservation Act of 1974, Executive Order 11593, and relevant sections of 36CFR60 and 36CFR800. Phase I survey would be conducted in reference to state and federal guidelines to ensure that each project meets the criteria specified in the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (Federal Register 48:44716-44742, September 29, 1983) and the VDHR's *Guidelines for Conducting Historic Resource Survey in Virginia* (VDHR 2017).

To meet PBR requirements, the Phase I study must include a compilation of known historic resources within the proposed area of potential effects (APE), or disturbance zone, and within a 0.5-mile radius of the proposed APE boundary. This information must be depicted on a map and be presented in tabular format. In addition, field survey of all architectural resources, including cultural landscapes, 50 years of age or older within the APE and within a 0.5-mile radius of the APE boundary to evaluate the eligibility of any identified resource for listing to the VLR must be completed. Finally, an archaeological survey of the APE must be conducted, and any identified archaeological sites must be evaluated for listing to the VLR. This survey requirement may be waived if the applicant can demonstrate to the DEQ that the project will utilize non-penetrating footings technology and that any necessary grading of the site prior to construction does not have the potential to adversely impact any archaeological resource (DEQ 2012).

7.2.1 Recommendations

Pursuant to the requirements of the PBR, Stantec recommends Phase I level archaeological survey within the proposed limits of the solar development area, and according to a proposed panel layout plan when such a plan is developed. Based on the 2,276.4-acre study area utilized for this assessment, Stantec recommends a Phase I cultural resources survey of approximately 592.2 acres of the overall study area pursuant to the predictive model results to include historic architectural survey within a 0.5-mile radius of the project limits. In addition to the traditional Phase I level survey, a formal assessment of potential effects to the Southern Albemarle Rural Historic District is recommended. This assessment should include both an assessment of direct effects should significant archaeological sites be identified within the project footprint and an assessment of potential visual effects to the district and contributing resources identified within the 0.5-mile Phase I survey area.

Of the 2,276.4-acre study area, approximately 286.7 acres (12.6 percent) are defined as retaining a high potential for cultural resources, approximately 710.2 acres (31 percent) are defined as retaining a moderate potential for cultural resources, and approximately 1,279.5 acres (56 percent) are defined as retaining a low potential for containing cultural resources. The 592.2 acres recommended archaeological survey area encompasses areas of high, moderate, and low probability for the identification of cultural

resources. A typical survey strategy may include 100 percent survey of the high probability areas (286.7 acres), 25 percent of the moderate probability areas (177.6 acres), and 10 percent of the low probability areas (127.9 acres). Areas retaining no probability for the identification of cultural resources will not be subject to subsurface testing. Pedestrian reconnaissance of the entire project footprint would also be recommended to account for those types of resources (i.e. battlefield resources, earthworks, landscape features) that may not be identified or sufficiently assessed through shovel test survey.

The methodology implemented to complete the survey would follow the guidance of the VDHR and include systematic shovel testing (50-foot intervals) of 100 percent of all acres defined as retaining high probability for the identification of cultural resources, systematic shovel testing (50-foot intervals) of 25 percent of the acres defined as retaining a moderate probability for the identification of cultural resources, and a 10 percent sample of the low potential areas (50-foot interval shovel testing). Shovel testing within moderate and low probability areas would be restricted to landforms likely to contain cultural resources. Judgmentally placed shovel tests may also be excavated within the moderate and low probability locations to achieve an appropriate assessment of the model and conditions within these locations. Where prudent and possible, surface reconnaissance will be employed should ground surface visibility be greater than 50 percent and soils freshly turned or plowed. In addition to the archaeological survey, and pursuant to the PBR, an architectural reconnaissance survey would take place within a 0.5-mile radius of the project site. This effort would be conducted according to the guidelines of the VDHR and take into account resources 50 years of age or older as of 2020.

8.0 REFERENCES

Advisory Council for Historic Preservation (ACHP)
2000 *36 CFR 800: Part 800- Protection of Historic and Cultural Properties*. Federal Register, September 2, Washington, D.C.

Agee, Helène Barret
1962 *Facets of Goochland County's History*. Dietz Press, Inc. Richmond, Virginia.

Amick, Daniel S. and Phillip J. Carr
1996 Changing Strategies of Lithic Technological Organization. In *Archaeology of the Mid-Holocene Southeast*, edited by Kenneth E. Sassaman and David G. Anderson, pp. 41-56. The University Press of Florida, Gainesville, Florida.

Barber, Michael B., and George A. Tolley
1984 The Savannah River Broadspear: A View from the Blue Ridge. In *Upland Archaeology in the East: Symposium 2*, ed. C. R. Geier, M. B. Barber, and G. A. Tolley, pp. 25-43. USDA, Forest Service, Southern Region.

Blanton, Dennis B.
1992 Middle Woodland Settlement Systems in Virginia. In *Middle and Late Woodland Research in Virginia: A Synthesis,* edited by Theodore R. Reinhart and Mary Ellen N. Hodges, pp. 65-96. Special Publication No. 29 of the Archaeological Society of Virginia. The Diez Press, Richmond.

1996 Accounting for Submerged Mid-Holocene Archaeological Sites in the Southeast: A Case from the Chesapeake Bay Estuary, Virginia. In *Archaeology of the Mid Holocene Southeast*, edited by Kenneth E. Sassaman and David G. Anderson, pp. 200-217. University Press of Florida, Gainesville.

Bourdeau, J.
1981 Replicating Quartz Squibnocket Small Stemmed and Triangular Projectile Points. In *Quartz Technology in Prehistoric New England*, ed. R. Barber. Institute for Conservation Archaeology, Peabody Museum, Harvard University: Cambridge, Mass.

Boyd, C.C., Jr.
1989 Paleoindian Paleoecology and Subsistence in Virginia. In *Paleoindian Research in Virginia: A Synthesis,* edited by J. M. Wittkofski and T. R. Reinhart, pp. 53-70. Special Publication No. 19 of the Archeological Society of Virginia. Dietz, Richmond

Brown, James A.
1986 Early Ceramics and Culture: A Review of Interpretations. In *Early Woodland Archaeology*, ed. K. B. Farnsworth and T. E. Emerson, pp. 598-608. Center for American Archaeology, Kampsville Seminars in Archaeology No. 2, Kampsville, IL.

1989 The Origins of Pottery as an Economic Process. In *What's New: A Closer Look at the Process of Innovation*, ed. S. E. van der Leeuw and R. Torrence, pp. 203-224. Unwin-Hyman: London, UK.

REFERENCES

Broyles, Bettye J.
1971 *The St. Albans Site, Kanawha County, West Virginia*. Report of Archaeological Investigations No. 3. West Virginia Geological and Economic Survey.

Chapman, Jefferson, and Andrea Brewer Shea
1981 The Archaeobotanical Record: Early Archaic Period to Contact in the Lower Little Tennessee River Valley. In *Tennessee Anthropologist* VI(1):61-84.

Chief Engineer's Office, D.N.V.
1864 *Map of Albemarle : Made under the direction of Maj. A.H. Campbell Capt. Engs. In charge of Top. Dept. D.N.V. from surveys and reconnaissances*. Library of Congress Geography and Map Division.

Coe, Joffrey L.
1964 The Formative Cultures of the Carolina Piedmont. In *Transactions of the American Philosophical Society, N.S*. 54(4), Philadelphia.

College of William and Mary Department of Geology
2011 *Piedmont Province*. Available from: http://web.wm.edu/geology/virginia/provinces/piedmont/piedmont.html. Accessed July 2019.

Cooper, Jean L.
2007 *A Guide to Historic Charlottesville & Albemarle County, Virginia*. Charleston, SC: History Press.

Custer, Jay F.
1989 Early and Middle Archaic Cultures of Virginia: Cultural Change and Continuity. In *Early and Middle Archaic Research in Virginia*: *A Synthesis*, edited by Theodore R. Reinhart and Mary Ellen N. Hodges, pp. 1-60. Council of Virginia Archaeologists and the Archaeological Society of Virginia. The Dietz Press, Richmond.

Dent, Richard J., Jr.
1995 *Chesapeake Prehistory: Old Traditions, New Directions*. Plenum Press, New York.

Egloff, Keith T.
1991 Development and Impact of Ceramics in Virginia. In *Late Archaic and Early Woodland Research in Virginia: A Synthesis*. T. R. Reinhart and M. E. N. Hodges ed., pp. 243-253. The Dietz Press: Richmond, Virginia.

Egloff, Keith T. and Stephen R. Potter
1982 Indian Ceramics from Coastal Plan Virginia. In *Archaeology of Eastern North America* 10:95-117.

Elder, John H., Jr.
1989 *Soil Survey of Stafford County, Virginia*. United States Department of Agriculture Soil Conservation Service and the Virginia Polytechnic Institute and State University, Washington, D.C.

Farmer, Charles J.
1993 *In the Absence of Towns: Settlement and Country Trade in Southside Virginia, 1730 1800.* Roman and Littlefield Publishers, Inc: Lanham, MD.

REFERENCES

Fiedel, S. J.
2001 What Happened in the Early Woodland? In *Archaeology of Eastern North America* 29:101-142.

Fiedel, Stuart, and Gary Haynes
2004 A Premature Burial: Comments on Grayson and Meltzer's "Requiem for Overkill." In *Journal of Archaeological Science* 31:121-131.

Gallivan, Martin D.
2003 *James River Chiefdoms: Thee Rise of Social Inequality in the Chesapeake*. University of Nebraska Press: Lincoln.

Gallivan, M. D., and J. McKnight
2006 *Archaeobotanical Assessment of Chesapeake Horticulture: The View from Werowocomoco*. Paper Presented at the Middle Atlantic Archaeological Conference, Virginia Beach, Virginia.

Gardner, William M.
1974 *The Flint Run Paleoindian Complex: Preliminary Report 1971-73 Seasons*. Occasional Publication No. 1, Department of Anthropology, The Catholic University of America, Washington, D. C.

1982 Early and Middle Woodland in the Middle Atlantic: An Overview. In *Practicing Environmental Archaeology: Methods and Interpretations*, edited by Roger W. Moeller, pp. 53-86. American Indian Archaeological Institute *Occasional Paper* No. 3.

1986 *Lost Arrowheads and Broken Pottery*. Thunderbird Publications, Manassas, Virginia.

1989 An Examination of Cultural Change in the Late Pleistocene and Early Holocene (Circa 9200 to 6800 B.C.). In *Paleoindian Research in Virginia: A Synthesis*, edited by J. Mark Wittkofski and Theodore R. Reinhart, pp. 5-51. Dietz Press, Richmond.

Geier, Clarence R.
1990 The Early and Middle Archaic Periods; Material Culture and Technology. In *Early and Middle Archaic Research in Virginia: A Synthesis*, edited by Theodore R. Reinhart and Mary Ellen N. Hodges, pp. 81-98. Archeological Society of Virginia Special Publication No. 22. The Dietz Press, Richmond.

Gleach, Frederic
1985 A Compilation of Radiocarbon Dates with Applicability to Central Virginia. In *Quarterly Bulletin, Archeological Society of Virginia* 40(4):180-200.

Goodyear, A. C.
1979 *A Hypothesis for the Use of Cryptocrystalline Raw Materials among Paleoindian Groups of North America*. Research Manuscript Series No. 156. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.

Grayson, Donald K., and David J. Meltzer
2003 A Requiem for North American Overkill. In *Journal of Archaeological Science* 30:585-593.

REFERENCES

Herrmann, Augustine
1673 *Virginia and Maryland as it is planted and inhabited this present year 1670/surveyed and exactly drawne by the only labour & endeavour of Augustin Herrmann bohemiensis; W. Faithorne Sculpt.* The Geography and Map Division of the Library of Congress, Online Map Collection.

Hodges, Mary Ellen N.
1991 The Late Archaic and Early Woodland Periods in Virginia: Interpretation and Explanation within an Eastern Context. In *Late Archaic and Early Woodland Research in Virginia*, ed. T. R. Reinhart and M. E. N. Hodges, pp. 221-242. The Dietz Press: Richmond, Virginia.

Hodges, Mary Ellen N., and Charles T. Hodges, editors
1994 *Paspahegh Archaeology: Data Recovery Investigations of Site 44JC308 at The Governor's Land at Two Rivers, James City County, Virginia.* Prepared by James River Institute for Archaeology, Inc. Prepared for Governor's Land Associates, Inc.

Hotchkiss, Jedediah
1867 *Albemarle County, Virginia*. Library of Congress Geography and Map Division.

Hranicky, William J.
2003 *Projectile Point Typology for the Commonwealth of Virginia*. Virginia Academic Press, Alexandria, Virginia.

Irwin, Marjorie Felice
1929 *The Negro in Charlottesville and Albemarle County, an Explanatory Study*. Thesis, University of Virginia.

Johnson, Michael F.
2001 Gulf Branch (44AR5): Prehistoric Interaction at the Potomac Fall Line. In *Quarterly Bulletin, Archeological Society of Virginia* 56(3):77-114.

Justice, Noel D.
1995 *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States.* Indiana University Press, Bloomington.

Kaplan, Barbara Beigun Ph.D.
1993 *Land and Heritage in the Virginia Tidewater: A History of King and Queen County*. Richmond, VA: Cadmus Fine Books.

Kirchen, Roger
2001 *The E. Davis Site: Technological Change at the Archaic-Woodland Transition.* M.A. Thesis, Department of Anthropology, Wake Forest University, Winston-Salem, NC.

Klein, Michael J.
1997 The Transition from Soapstone Bowls to Marcey Creek Ceramics in the Middle Atlantic Region: Vessel Technology, Ethnographic Data, and Regional Exchange. In *Archaeology of Eastern North America* 25:143-158.

REFERENCES

Klein, Michael J. and Thomas Klatka
1991 Late Archaic and Early Woodland Demography and Settlement. In *Late Archaic and Early Woodland Research in Virginia: A Synopsis,* edited by Theodore R. Reinhart and Mary Ellen N. Hodges, pp. 139-184. Council of Virginia Archaeologists and the Archaeological Society of Virginia. The Dietz Press, Richmond.

Klein, Mike, and J. Sanderson Stevens
1996 Ceramic Attributes and Accokeek Creek Chronology: An Analysis of Sherds from the Falcon's Landing (18Pr131) and Accotink Meander (44FX1908) Sites. In *North American Archaeologist* 17 (2):113-142.

Kulikoff, Allan
1986 *Tobacco and Slaves: The Development of Southern Cultures in the Chesapeake, 1680-1800*. University of North Carolina Press, Chapel Hill, North Carolina.

McAvoy, Joseph M.
1992 *Nottaway River Survey, Part I. Clovis Settlement Patters: The 30-Year Study of a Late Ice Age Hunting Culture on the Southern Interior Coastal Plain of Virginia.* Special Publication No. 28 of the Archeological Society of Virginia. The Dietz Press, Richmond.

McAvoy, Joseph M., and Lynn D. McAvoy
1997 *Archaeological Investigations of Site 44SX202, Cactus Hill, Sussex County, Virginia*. Research Report Series No. 8. Virginia Department of Historic Resources, Richmond.

McCary, Ben C.
1957 *Indians in Seventeenth Century Virginia*. University of Virginia Press, Charlottesville, Virginia.

McLearen, Douglas C.
1991 Late Archaic and Early Woodland Material Culture in Virginia. In *Late Archaic and Early Woodland Research in Virginia: A Synthesis*, edited by Theodore R. Reinhart and Mary Ellen N. Hodges, pp. 89-138. Archeological Society of Virginia Special Publication No. 23. Dietz Press, Richmond.

1992 Virginia's Middle Woodland Period: A Regional Perspective. In *Middle and Late Woodland Research in Virginia: A Synthesis*, edited by Theodore R. Reinhart and Mary Ellen N. Hodges, pp. 39-64. Council of Virginia Archaeologists and the Archeological Society of Virginia. The Dietz Press, Richmond.

Manson, Carl
1947 Marcey Creek Site: An Early Manifestation in the Potomac Valley. In *American Antiquity* 13:223-227.

Moore, John Hammond
1976 *Albemarle: Jefferson's County, 1727-1976*. University Press of Virginia, Charlottesville.

Moore, Virginia
1969 *Scottsville on the James*. The Jarman Press, Charlottesville, Virginia.

REFERENCES

Mouer, L. Daniel
1991a The Formative Transition in Virginia. In *Late Archaic and Early Woodland Research in Virginia: A Synthesis*, edited by Theodore R. Reinhart and Mary Ellen N. Hodges. Special Publication No. 23. The Dietz Press, Richmond.

1991b The Formative Transition in Virginia. In *Late Archaic and Early Woodland Research in Virginia: A Synthesis*, edited by Theodore R. Reinhart and Mary Ellen N. Hodges, pp. 1-88. Council of Virginia Archaeologists and the Archaeological Society of Virginia. The Dietz Press, Richmond.

Mouer, L. Daniel, Frederic W. Gleach, and Douglas C. McLearen
1986 A Ceramics Temporal Typology in Progress for Central Virginia. In *Archaeology in Henrico, Volume 2: Introduction to Phase 2 and Phase 3 Archaeological Investigations of the Henrico County Regional Wastewater System,* edited by L.D. Mouer, pp. 119-149. Virginia Commonwealth University Archaeological Research Center, Richmond. Submitted to Henrico County, Virginia. On file at the VDHR, Richmond.

Mouer, L. Daniel, Douglas C. McLearen, R. Taft Kiser, C. P. Egghard, B. J. Binns, and Dane T. Magoon
1992 *Jordan's Journey*. Virginia Commonwealth Archaeological Research Center, Richmond, Virginia.

Mounier and Martin
1994 For Crying Out Loud!: News About Teardrops. In *Journal of Middle Atlantic Archaeology* 10:125-140.

Munsell Color
1994 *Munsell Soil Color Charts.* Macbeth Division of Kollmorgen Instruments Corporation, New Windsor, NY.

National Wetlands Inventory (NWI)
n.d. Accessed 2019.

Pawlett, N.
1977 A Brief History of the Roads of Virginia, 1607-1840. Virginia Highway and Transportation Research Council, Charlottesville.

Phelps, David Sutton
1983 Archaeology of the North Carolina Coast and Coastal Plain: Problems and Hypotheses. In *The Prehistory of North Carolina: An Archaeological Symposium,* edited by Mark A. Mathis and Jeffrey J. Crow, pp. 1-51. North Carolina Division of Archives and History, Department of Cultural Resources, Raleigh.

Potter, Stephen R.
1993 *Commoners, Tribute, and Chiefs: The Development of Algonquian Culture in the Potomac Valley*. University of Virginia Press, Charlottesville.

Ritchie, W. A.
1971 A Typology and Nomenclature for New York Projectile Points. New York State Museum and Science Service, *Bulletin 384*, Albany.

REFERENCES

Roberts, C. and C. M. Bailey
2000 *Physiographic Map of Virginia Counties*. Modified from Virginia Division of Mineral Resources/U.S. Geological Survey Map of Mineral Producing Localities. Available from: https://training.fws.gov/courses/CSP/CSP3200/resources/documents/Physiographic Map of Virginia Accessed July 2019.

Robertson, J.I., Jr.
1982 *Civil War Sites in Virginia: A Tour Guide.* University of Virginia Press, Charlottesville.

Sassaman, Kenneth E.
1999 A Southeastern Perspective on Soapstone Vessel Technology in the Northeast. In *The Archaeological Northeast*, ed. M. A. Levine, K. E. Sassaman, and M. S. Nassaney, pp. 75- 98. Bergin & Garvey: Westport, CT.

Slattery, Richard C.
1946 A Prehistoric Indian Site on Selden Island, Montgomery County, Maryland. In *Journal of the Washington Academy of Sciences* 36:262-266.

Smith, John
1610 *Virginia Discovered and Discribed* [sic]. Library of Congress Geography and Map Division.

Smith, Marvin T. and Julie Barnes Smith
1989 Engraved Shell Masks in North America. In *Southeastern Archaeology* 8(1):9-18.

Stephenson, Robert L.
1963 *The Accokeek Creek Site: A Middle Atlantic Seaboard Culture Sequence*. Anthropological Papers, Museum of Anthropology, University of Michigan, No. 20, Ann Arbor.

Stewart, Brynn, Sandra DeChard, and Dane Magoon
2012 *A Phase I Cultural Resources Survey of Approximately 30.58 Miles of the Dominion Virginia Power Transco Road to Dooms 230 kV Transmission Line, Fluvanna, Albemarle, and Augusta County, Virginia*.

Stewart, T. Dale
1989 Archeological Exploration of Patawomeke: The Indian Town Site (44ST2) Ancestral to the One (44St1) Visited in 1608 by Captain John Smith. In *Smithsonian Contributions to Anthropology* Number 36.

Stewart, R. Michael
1995 The Status of Woodland Prehistory in the Middle Atlantic Region. In *Archaeology of Eastern North America* 23:177-206.

1998 *Unraveling the Mystery of Zoned Decorated Pottery: Implications for Middle Woodland Society*. Dietz Press, Richmond.

Tice, D.
1987 A History of Albemarle's Forests. *Magazine of Albemarle County History* 45:19-60.

REFERENCES

United States Department of the Interior (USDI)
1981 *Department of the Interior's Regulations, 36 CFR Part 60: National Register of Historic Places*. U.S. Department of the Interior, Washington, D.C.

1983 *Department of the Interior, Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines*. U.S. Department of the Interior, Washington, D.C.

1991 How to Apply the National Register Criteria for Evaluation. In *National Register Bulletin 15.* U.S. Department of the Interior, Interagency Resources Division, Washington D.C.

United States Federal Slave Census 1850 and 1860.

United States Non-Population Census (Industry) 1850, and 1860.

United States Geological Survey (USGS)
1967 *Scottsville, Virginia* 7.5 Minute Quadrangle.

1976 *Simeon, Virginia* 7.5 Minute Quadrangle.

1943 *Scottsville, Virginia* 15 Minute Quadrangle.

1891 *Palmyra, Virginia* 30 Minute Quadrangle.

Virginia Department of Environmental Quality (DEQ)
n.d. *Physiographic Provinces of Virginia*. Available from: http://www.deq.state.va.us/Programs/Water/WaterSupplyWaterQuantity/GroundwaterProtectionSteeringCommittee/PhysiographicProvincesofVirginia.aspx

Virginia Department of Historic Resources (VDHR)
2017 *Guidelines for Conducting Historic Resources Survey in Virginia*. VDHR, Richmond.

2019 Archaeological and Architectural Site Files.

Ward, H. Trawick and R.P. Stephen Davis Jr.
1999 *Time Before History: The Archaeology of North Carolina*. University of North Carolina Press, Chapel Hill.

Wallenstein, P.
1991 Case of the Laborer from Louisa: Three Central Virginians and the Origins of the Virginia Highway System. In *Magazine of Albemarle County History* 49:19-48.

Waselkov, Gregory A.
1982 *Shellfish Gathering and Shell Midden Archaeology*. Ph.D. dissertation, University of North Carolina, Chapel Hill.

Willey, Gordon R. and Phillip Phillips
1958 *Method and Theory in American Archaeology*. University of Chicago Press, Chicago.

Wyllie, J.C.
1961 Daniel Boone's Adventures in Charlottesville 1781: Some Incidents Connected with Tarleton's Raid. *Magazine of Albemarle County History* 19:5-18.

REFERENCES

Woods, Reverend Edgar
1901 *Albemarle County in Virginia*. Bowie, MD: Heritage Books, Inc., 1989.

Yarnell, Richard A.
1976 Early Plant Husbandry in Eastern North America. In *Cultural Change and Continuity: Essays in Honor of James Bennett Griffin*, edited by Charles E. Cleland, Academic Press, New York.

APPENDICES

Appendix A BASE MAPPING FOR FIELD ASSESSMENT

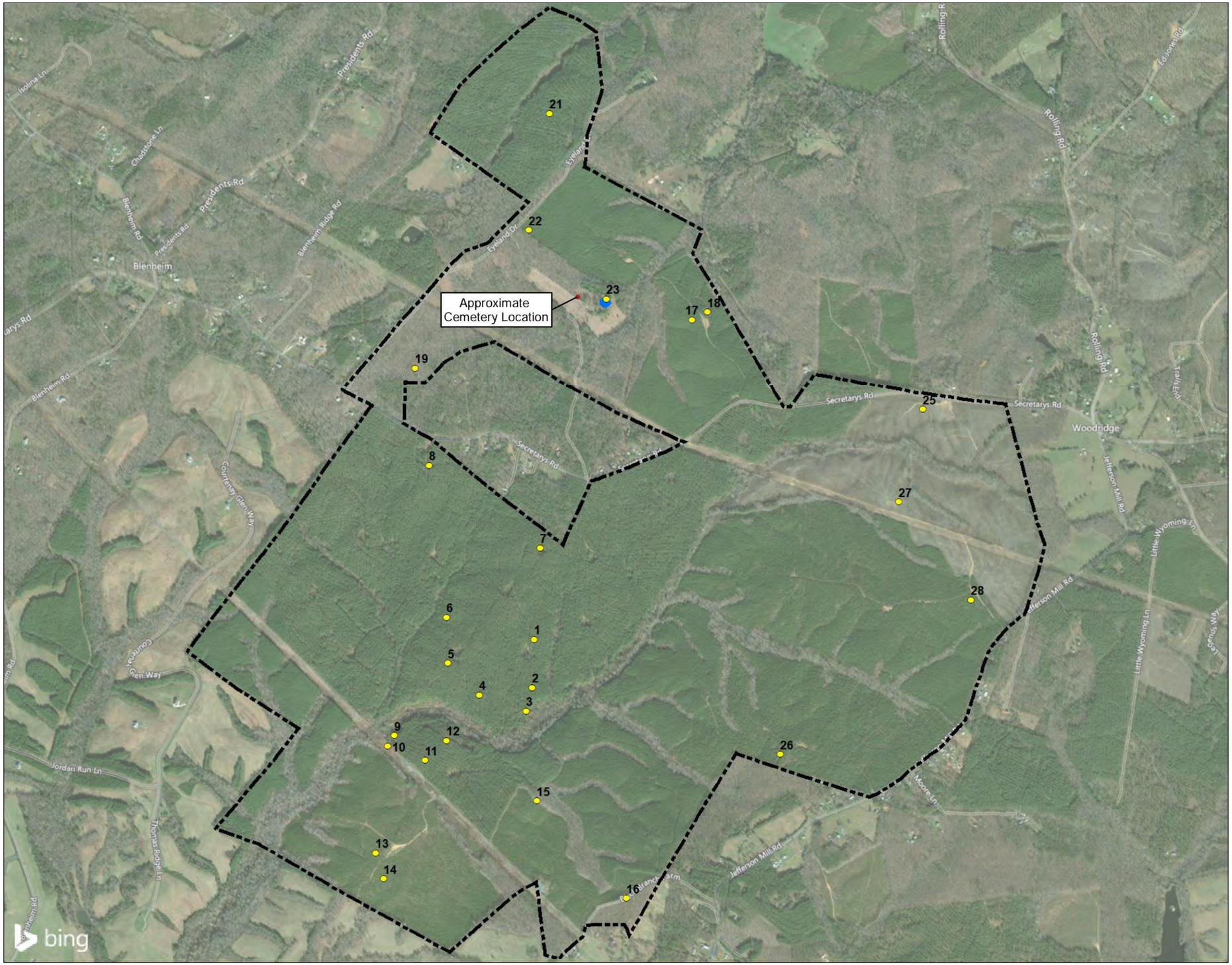


Figure No.

Appendix A

Title

Base Mapping for Field Assessment

Client/Project 203401407

Hexagon Energy
Woodridge Solar Site

Project Location

Albemarle County, Virginia

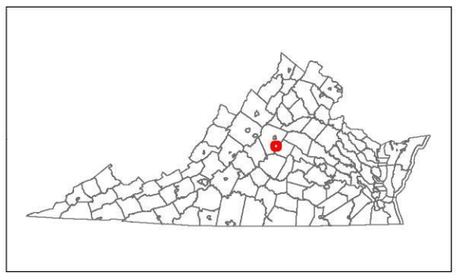
Prepared by JKM on 2020-02-11
TR by MGS on 2020-02-12
IR by BSS on 2020-02-12

N

0 1,500 3,000 Feet

(At original document size of 11x17)
1:19,200

- Project Limits
- Approximate Architectural Complex Location
- Approximate Cemetery Location
- Reference Point



Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Project limits provided by Hexagon Energy
3. Orthoimagery © Bing Maps
4. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Stantec

Appendix B SUPPORTING DATA – PREDICTIVE MODEL

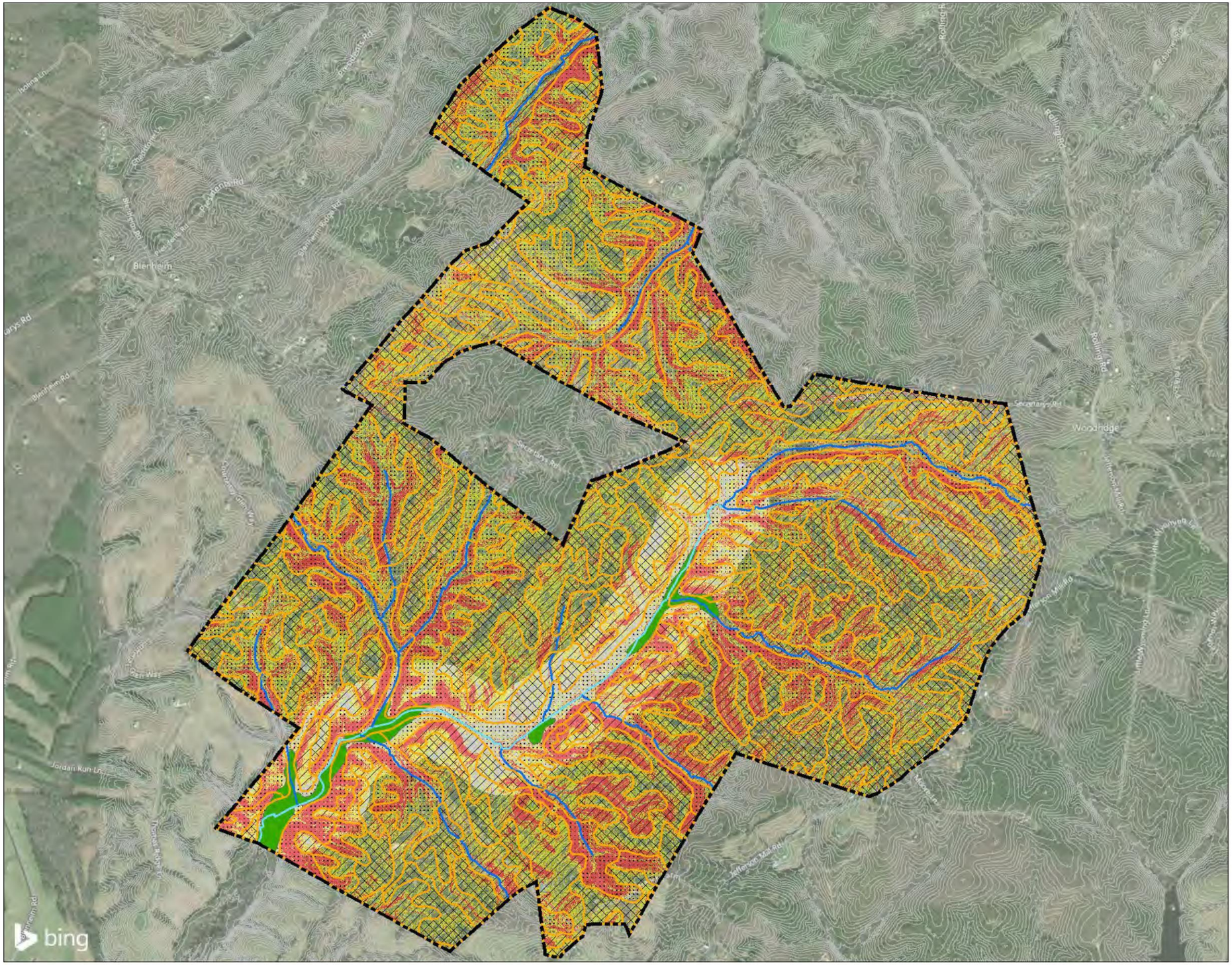


Figure No.

Appendix B

Title

Predictive Model Data

Client/Project 203401407

Hexagon Energy
Woodridge Solar Site

Project Location

Albemarle County, Virginia

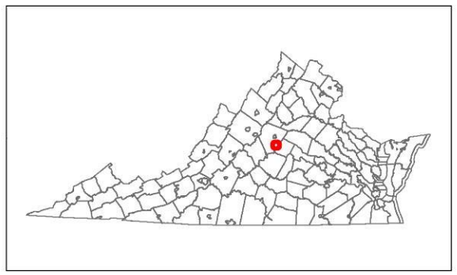
Prepared by JKM on 2020-02-11
TR by MGS on 2020-02-12
IR by BSS on 2020-02-12

N

0 1,500 3,000 Feet

(At original document size of 11x17)
1:19,200

- Project Limits
- Soils
- Approximate Wetlands
- Approximate Waters
- Low Probability Soils
- Moderate Probability Soils
- High Probability Soils
- 7 - 15% Slope
- >15% Slope
- 750-Foot Perennial Stream Buffer
- Approximate Intermittent Streams
- Approximate Perennial Streams
- 5-Foot Contours



Notes

1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Project limits provided by Hexagon Energy
3. Data from USDA NRCS SSURGO Soil Survey, NWI, NHD, and slopes and contours derived from VGIN LiDAR.
4. The approximate limits of Waters of the US (WOUS), including wetlands, have not been field located and are for planning purposes only.
5. Orthoimagery © Bing Maps
6. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Stantec

Appendix C KEY PERSONNELL RESUMES

Aimee Leithoff MA, RPA

Principal Investigator

Aimee is an Archaeologist and one of Stantec's Principal Investigators. She has over 19 years of experience in cultural resources management. She has experience in prehistoric and historical archaeology and she meets the Secretary of the Interior's standards and guidelines for a professional archaeologist. Aimee is a Registered Professional Archaeologist (RPA) since 2001.

Aimee has served as project manager and principal investigator for 10 years on numerous transportation, water, telecommunication and energy-related projects. She manages in-house technical staff, supervises technical document preparation, and provides quality control and peer review for cultural resources studies. Her expertise includes archaeological identification, evaluation, and data recovery projects in compliance with local, state, and federal laws and regulations. She has extensive experience developing implementation programs in compliance with state and federal regulations, including the requirements of Section 106 of the National Historic Preservation Act (NHPA) compliance projects.

Aimee has experience managing curatorial processes, as well as experience conducting outreach, and public involvement for cultural resources. Aimee also has experience in NAGRPA consultation, GIS, and database management.

EDUCATION

M.A., Anthropology, Wichita State University, Wichita, Kansas, 2001

B.S., Anthropology, Kansas State University, Manhattan, Kansas, 1999

CERTIFICATIONS & TRAINING

OSHA- 10HR Certification, National, US, 2014

REGISTRATIONS

Registered Professional Archaeologist #12404, Association of Professional Archaeologists

MEMBERSHIPS

Member, Plains Anthropological Society

Member, Society for American Archaeology

PROJECT EXPERIENCE

Transmission & Distribution, Distribution

Dominion Virginia Power - Cultural Resources Support for Transmission Lines, Multiple sites, Virginia

As part of an annual services contract, Aimee provides Phase I Archaeological and Cultural Resources Surveys and Phase II Evaluations for multiple miles of transmission lines throughout the Commonwealth.

Dominion Virginia Power - Archaeological Survey and Evaluation, Proposed Dominion Virginia Power Northeast Substation Expansion, Henrico County, Virginia

Aimee assisted with the completion of a Phase I Cultural Resources Survey of a proposed substation expansion in Henrico County. Additional intensive testing was also completed as part of the Phase I survey effort. Work included archaeological survey for the substation expansion as well as artifact analysis and final reporting. Responsibilities included day to day coordination and management of field staff, budget and project management, interpretation of results and reporting.

Dominion Virginia Power – Cultural Resources Survey and Support for the 20-mile Suffolk to Thrasher 230 kV Transmission Line Project*, Cities of Suffolk and Chesapeake, Virginia

Aimee assisted with a Phase I Cultural Resources Survey of a proposed Dominion Power 230kV utility line in the City of Suffolk and City of Chesapeake, Virginia. The proposed route of the Suffolk-Thrasher 230 kV line, with 155 tower structures, covers a distance of approximately 20 miles. Work included archaeological and architectural survey for the APE defined by the project for the entire ~ 60 mile corridor. Responsibilities included day to day coordination and management of field staff, budget and project management, interpretation of results and reporting.

** denotes projects completed with other firms*

Aimee Leithoff MA, RPA

Principal Investigator

Dominion Virginia Power – Cultural Resources Survey and Support for the 60-mile Carson to Suffolk 500 kV Transmission Line Project*, Dinwiddie, Prince George, Southampton, Sussex , Isle of Wight Counties, City of Suffolk, Virginia

Aimee assisted with the completion of a Phase I Cultural Resources Survey of a proposed Dominion Power 500 kV transmission line in Dinwiddie, Prince George, Sussex, Southampton and Isle of Wight Counties and the City of Suffolk, Virginia. The proposed route of the Carson-Suffolk 500 kV transmission line, with 308 tower structures, covers a distance of approximately 60.3 miles. Work included archaeological and architectural survey for the APE defined by the project for the entire ~ 60 mile corridor. Responsibilities included day to day coordination and management of field staff, budget and project management, interpretation of results and reporting.

Roadways

Archaeological Survey for the Proposed ND 17 Grade Raise Borrow Pits, Pierce County, North Dakota

Aimee provided Class III Cultural Resources Survey of approximately 74 acres for the proposed borrow pits. Aimee was Principal Investigator and work was conducted under the ND Stantec 2016 Cultural Resources Permit. Aimee conducted the background research, the fieldwork and wrote the report.

Archaeological Survey for Proposed Improvements to 52nd Street NW, Williams County, North Dakota

Aimee provided Class III Cultural Resources Survey of approximately 53 acres for the proposed road improvements. Aimee was Principal Investigator and work was conducted under the ND Stantec 2015 Cultural Resources Permit. Aimee conducted the background research, the fieldwork and wrote the report.

Regional / Suburban Planning

Archaeological Survey*, Dawes County, Nebraska

Aimee provided archaeological survey for approximately 16.71 acres associated with a proposed Chadron State College Rangeland Center. As Principal Investigator, Aimee conducted background research, field work, and authored the report.

Class III Archaeological Survey*, Lawrence County, South Dakota

Aimee provided archaeological survey for approximately 26.4 acres associated with a proposed Powder House Pass water treatment plant, water main line, and water treatment plant and booster station. As Principal Investigator, Aimee conducted background research, field work, and authored the report.

Class III Archaeological Survey*, Lawrence County, South Dakota

Aimee provided archaeological survey for approximately 43.74 acres associated with a proposed Powder House Pass Utility Corridors and Community Center. As Principal Investigator, Aimee conducted background research, field work, and authored the report.

Archaeological Survey and Monitoring*, Lawrence County, South Dakota

Aimee provided archaeological survey and archaeological monitoring for a historic domestic site associated with a proposed First Gold Parking Lot Expansion within the Deadwood National Historic Landmark. As Principal Investigator, Aimee conducted background research, field work and monitoring, and authored the report.

Archaeology

Archaeological Pedestrian Survey*, Kirwin and Webster Counties, Kansas

Aimee provided archaeological survey of 234.8 acres of open ditch laterals within the Kirwin Webster Irrigation Districts, Kirwin and Webster Units, Solomon Division Pick-Sloan Missouri River Basin Project, Bureau of Reclamation. As Principal Investigator, Aimee conducted background research, field work, and authored the report.

Archaeological Pedestrian Survey*, Jewel and Republic Counties, Kansas

Aimee provided archaeological survey of open ditch laterals within the Kansas Bostwick Irrigation Districts, Courtland Unit, Bostwick Division Pick-Sloan Missouri River Basin Project, Bureau of Reclamation. As Principal Investigator, Aimee conducted background research, field work, and authored the report.

** denotes projects completed with other firms*

Brynn Stewart, MA

Program Manager/Senior Principal Investigator

Brynn is the Program Manager/Senior Principal Investigator for Cultural Resources in Stantec's Williamsburg, Virginia, office. She has over 14 years of experience in cultural resources management. Brynn meets the Secretary of the Interior's standards and guidelines for a professional archaeologist. She has served as a Principal Investigator and Project Archaeologist on numerous transportation and energy-related projects as well as private development projects.

Brynn manages in-house technical staff, supervises technical document preparation, and provides quality control and peer review for cultural resources studies. Her expertise includes all phases of cultural resource management (archaeological assessments and Phase I, II, and III excavations) in compliance with local, state, and federal laws and regulations. Brynn's experience includes managerial tasks associated with all aspects of cultural resource management projects such as consultation with and representation of clients before state and national review agencies, writing and editing technical reports, preparing and managing project budgets, and developing and implementing archaeological research designs.

Brynn also has experience in the processing and analysis of artifact collections with special interest in Colonial-era ceramics and lithic analysis and the development and production of interpretive materials including pamphlets and exhibits.

EDUCATION

Master of Arts, Anthropology, University of Nevada, Las Vegas, Nevada, 2009

Bachelor of Arts, Anthropology, Washington College, Chestertown, Maryland, 2004

CERTIFICATIONS & TRAINING

OSHA Excavation Safety: Satisfies 29 CFR 1926.650

OSHA Confined Space Safety: Satisfies 29 CFR 1910.246, 29 CFR 1926.1001, 29 CFR 1915.1001

PROJECT EXPERIENCE

Ore Bank Undergrounding Project, Rockingham County, Virginia

Brynn served as Principal Investigator, developing a proposed scope of work and budget prior to the awarding of the project. Brynn directed pre-fieldwork planning and managed field personnel. She was responsible for coordinating with the Civil War Trust and will author the technical report upon completion of on-going investigations.

Abberly at South Campus Development, Stafford County, Virginia (Principal Investigator)

Brynn served as Principal Investigator, developing a proposed scope of work and budget prior to the awarding of the project. She directed pre-fieldwork planning, managed field personnel, and participated in Phase II evaluation of Site 44ST1141. Brynn synthesized data collected during evaluation and served as the lead author of the resulting technical report.

Data Recovery of Sites 44PW1305 and 44PW1306 for the Eagles Pointe Landbay A Section 2 Development Project, Prince William County, Virginia

Brynn is serving as Principal Investigator for this on-going project. She developed the scope of work and budget prior to the awarding of the project. Brynn coordinated with the client and the County Archaeologist on the Data Recovery Plan she developed. She has managed field personnel and coordinated with the VDHR to procure both an Anticipatory Permit and a Burial Permit for the excavation of a single burial identified within Site 44PW1306. Brynn coordinated the placement of public notice as part of the Burial Permit and gave a presentation concerning the burial feature to the Prince William County Historical Commission, which served as a public meeting as a result of responses received for the said public notice. Brynn is currently coordinating the reburial of the recovered remains with a local cemetery and will author the resulting technical report.

** denotes projects completed with other firms*

Brynn Stewart, MA

Program Manager/Senior Principal Investigator

Stantec

Data Recovery of Site 44JC0662, James City County, Virginia

Brynn served as Principal Investigator, directing pre-fieldwork planning and overseeing the field effort. Brynn participated in feature excavation. She coordinated the field effort with the client as well as site inspectors and was responsible for coordinating with local Native American tribal representatives with an interest in the project. Brynn participated in shovel testing and monitoring activities, synthesized the data collected during the project, and served as lead author on the resulting technical report.

Poplar Grove National Cemetery Archaeological Investigations and Monitoring, Dinwiddie County, Virginia

Brynn served as Principal Investigator, coordinating with the NPS and field staff. The NPS conducted rehabilitation at the cemetery, including the replacement of 5,700 headstones, rehabilitation of the Superintendent's lodge, restoration of site furniture and signs, replacement of the flagpole and site utilities, preservation of the cemetery wall, and rehabilitation of the landscape. Brynn participated in shovel testing and monitoring activities, synthesized the data collected during the project, and served as lead author on the resulting technical report.

Berkmar Data Recovery, Charlottesville, Virginia

Brynn served as Principal Investigator, assisting in the development of a scope of work and budget prior to the awarding of the project. Brynn directed pre-fieldwork planning and managed field personnel. She was responsible for coordinating with client representatives, conducting excavations, compiling and interpreting fieldwork results, on-going lithic analysis, and is in the process of co-authoring the resulting technical report.

Trowbridge-Pantego Transmission Line Project, Washington and Beaufort Counties, North Carolina

Brynn served as Principal Investigator, coordinating with Project Managers and field personnel. Brynn directed pre-fieldwork planning and was responsible for compiling and interpreting fieldwork results. She is currently in the process of co-authored the resulting technical report.

Fredericksburg Courthouse Project, City of Fredericksburg, Virginia

Brynn served as Principal Investigator, directing pre-fieldwork planning and managing field personnel during Phase I, Phase II, and Phase III investigations of eighteenth-century through nineteenth-century deposits. She also participated in fieldwork, synthesized data collected during all three phases of work, and served as the lead author of the resulting technical report. She helped develop and produce a public exhibit of artifacts on display in the new Courthouse.

Dominion Virginia Power Splice Pit within the Colonial National Historic Park, James City County, Virginia

Brynn served as Principal Investigator, leading the field effort and interpreting data post-field effort. She also authored the resulting technical report.

Mosby Substation (Laydown Yard and Storm Water Management Basin Area) Project, Loudoun County, Virginia

Brynn served as Principal Investigator, managing the field effort and interpreting data post-field effort. She also authored the resulting technical report.

Goose Creek to Loudoun 500kV Transmission Line Improvement Project, Loudoun County, Virginia

Brynn served as Principal Investigator, developing a proposed scope of work and budget prior to the awarding of the project. Brynn directed pre-fieldwork planning and managed field personnel. She was responsible for coordinating with client representatives, compiling fieldwork results, interpreting sites, entering site data into V-CRIS, and co-authoring the resulting technical report.

Warren County Power Station Proposed Auxiliary Parking Lot, Warren County, Virginia

Brynn served as Principal Investigator, developing a proposed scope of work and budget prior to the awarding of the project. Brynn directed pre-fieldwork planning and managed field personnel. She was responsible for compiling fieldwork results and authoring the resulting technical report.

** denotes projects completed with other firms*

ATTACHMENT C

HEXAGON ENERGY

Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

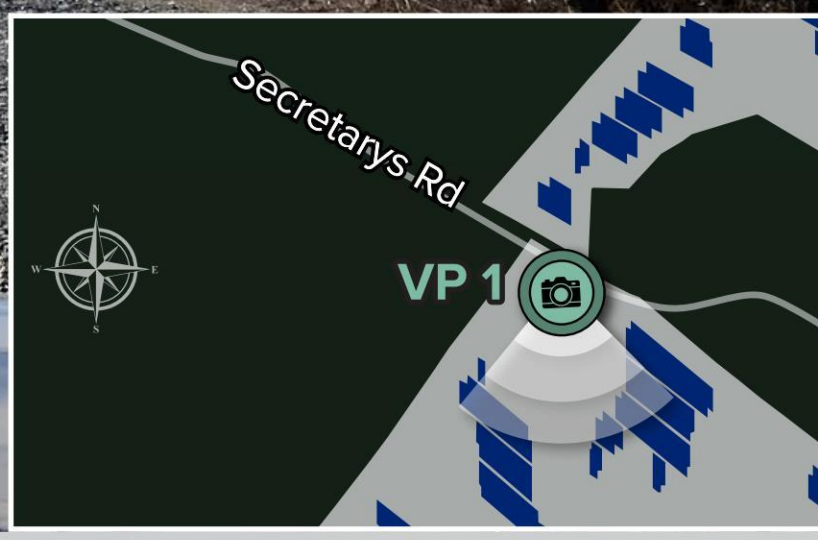
Woodridge
SOLAR PV PROJECT

VP1 Existing Conditions

Date: 2/8/2022

Time: 12:21 pm

Direction: South



VP1 Proposed Conditions

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

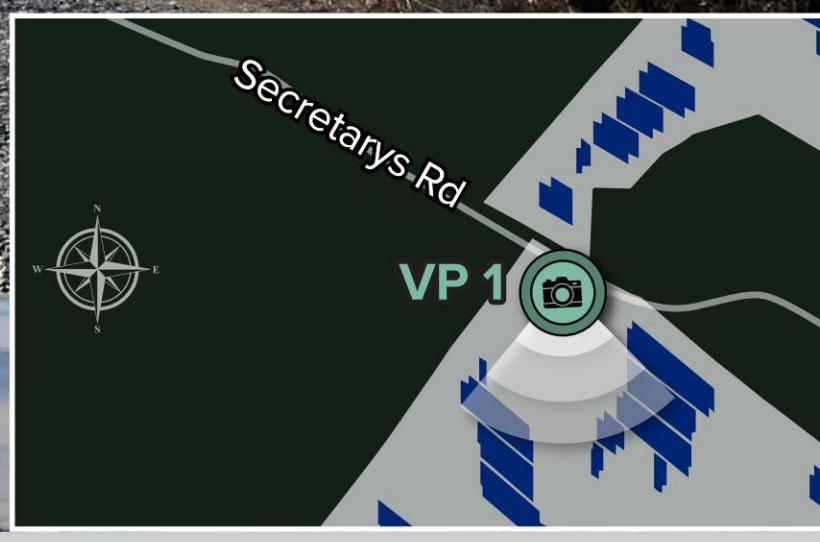
Woodridge
SOLAR PV PROJECT

VP1 Existing Conditions

Date: 2/8/2022

Time: 12:21 pm

Direction: South



VP1 5 Year Planting

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

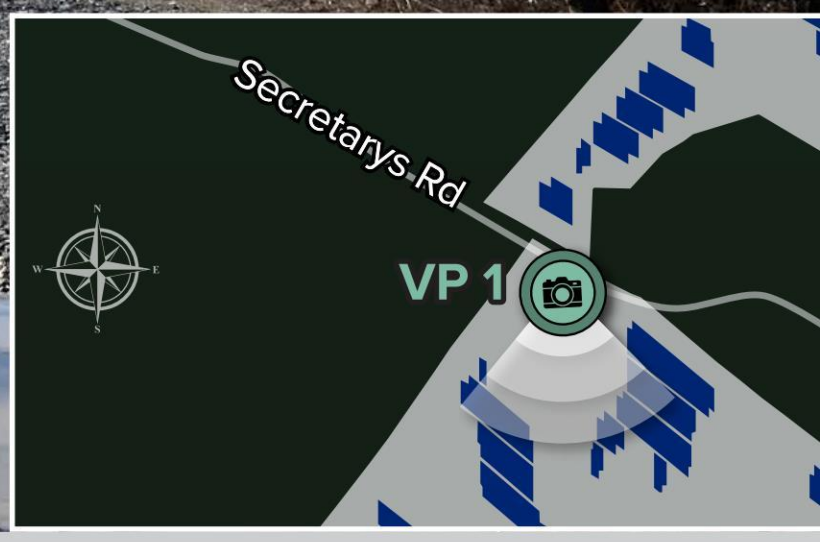
Woodridge
SOLAR PV PROJECT

VP1 Existing Conditions

Date: 2/8/2022

Time: 12:21 pm

Direction: South



VP1 Mature Height

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

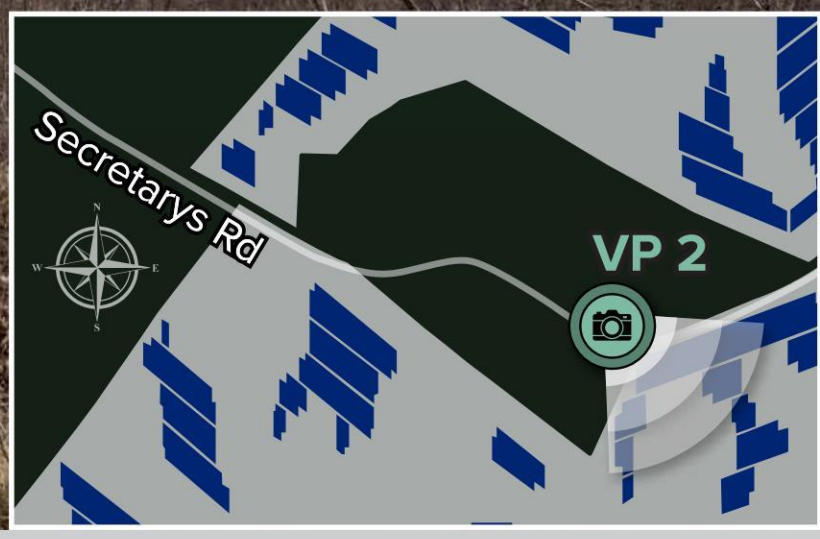
Woodridge
SOLAR PV PROJECT

VP2 Existing Conditions

Date: 3/3/2022

Time: 2:42 pm

Direction: Southeast



VP2 Proposed Conditions

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge
SOLAR PV PROJECT

VP2 Existing Conditions

Date: 3/3/2022

Time: 2:42 pm

Direction: Southeast

VP2 5 Year Planting

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge
SOLAR PV PROJECT

VP2 Existing Conditions

Date: 3/3/2022

Time: 2:42 pm

Direction: Southeast

VP2 Mature Height

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge
SOLAR PV PROJECT

VP3 Existing Conditions

Date: 3/3/2022

Time: 1:40 pm

Direction: Northeast

VP3 Proposed Conditions

Objects displayed in yellow represent project infrastructure and vegetation that are obscured by foreground vegetation.

Solar Arrays
Project Infrastructure and Vegetation

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge
SOLAR PV PROJECT

TYPICAL PROJECT ACCESS FROM SECRETARYS ROAD

Time: 9:30 am

Direction: South

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge
SOLAR PV PROJECT

TYPICAL PROJECT ACCESS FROM SECRETARYS ROAD

Time: 9:30 am

Direction: South

5 Year Planting

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge
SOLAR PV PROJECT

TYPICAL PROJECT ACCESS FROM SECRETARYS ROAD

Time: 9:30 am

Direction: South

Mature Height

HEXAGON
ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge
SOLAR PV PROJECT

TYPICAL VIEW FROM SECRETARYS ROAD

Time: 9:30 am

Direction: South

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge
SOLAR PV PROJECT

TYPICAL VIEW FROM SECRETARYS ROAD

Time: 9:30 am

Direction: South

5 Year Planting

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

Woodridge

SOLAR PV PROJECT

TYPICAL VIEW FROM SECRETARYS ROAD

Time: 9:30 am

Direction: South

Mature Height

HEXAGON ENERGY

Aerial Imagery Source: Google Maps LIDAR Data Source: USGS Contours Derived from LIDAR data
Visualization is for discussion purposes only. Final design is subject to change pending public, engineering, and regulatory review.

ATTACHMENT D

Prepared By:

TIMMONS GROUP
ENGINEERING | DESIGN | TECHNOLOGY

Woodridge Solar, LLC

Decommissioning Plan

Albemarle County, VA

Date: 4/22/2022

This cost estimate is based on high-level permitting Site Plans and drawings and is typical for a project of this scope and type. Final design drawings will be prepared prior to construction and this plan will be updated accordingly.

Prepared For:

HEXAGON
ENERGY

Woodridge Solar
Decommissioning Plan

CLIENT NAME	**Woodridge Solar, LLC.**
PROJECT NAME	**Woodridge Solar**
LOCATION	**Albemarle County, Virginia**
PROJECT	**Solar Electric Generating Facility**

Rev.	Date	Description	Prepared	Checked	Approved
0	4/22/2022	Released for Client Use	NBF	JD	DJ

Table of Contents

1 Introduction

Woodridge Solar (the" Project") is a solar electric generation facility ("Facility") up to 138 MWac proposed by Woodridge Solar, LLC the ("Project Owner"). The Project will be located in Albemarle County near the town of Windsor, Virginia. The project area will span approximately 650 acres and will connect to the existing 115kV transmission line owned by Dominion that crosses the property.

This Decommissioning and Restoration Plan ("Plan") has been prepared to address the requirements of the Albemarle County Solar Ordinance. The Project will also comply with any applicable municipal, state and federal regulations. The Plan assumes decommissioning and restoration will occur at the end of the Project's expected useful life of thirty-five (35) years. An overview of all activities related to the removal of the Project's equipment and panels, appurtenant structures, and for restoration of the site to its previous condition (as much as reasonably practicable) can be found in the Plan.

Within 12 months of initiating the decommissioning, the Project Owner will safely have the relevant components from the land removed and will then restore the site as described below.

This plan lays out the procedures for restoring the site to its near-original condition, suitable for whatever land use is desired by the relevant landowner at the end of the Facility's operational life. The Plan describes procedures for the removal of Facility components. The components of the Facility are described in detail in the project Exhibit and the preliminary layout is presented in Exhibit to the SUP application ("Conceptual Site Plan").

As shown in the following analysis, the anticipated salvage value of the project significantly exceeds the anticipated decommissioning costs. However, as a condition of the Special Use permit, Woodridge Solar will post a surety bond or similar financial instrument before construction equivalent to the estimated decommissioning costs without taking salvage value into account. This surety bond or similar instrument is to be reviewed with the county and updated to reflect recent decommissioning estimates every five (5) years.

2 Project Components

The Conceptual Site Plan provides detailed information regarding the anticipated location and description of the Facility components. The Facility generally consists of the equipment and infrastructure listed below:

- Steel Piers and Racking;
- PV Panels;
- Inverters;
- Electrical Collection Lines;
- Access Roads;
- Fencing, Gating, and Safety Features;
- Operations and Maintenance (O&M) Building (TBD);
- Weather Stations. Fencing, Gating, and Safety Features; and

- Project Collection Substation.

3 Regulatory Compliance

Prior to the commencement of decommissioning, the Owner will perform the appropriate due diligence requirements and obtain the necessary Albemarle County, state, and federal approvals to complete decommissioning activities. To mitigate any environmental impact from decommissioning, the Owner will assess the necessary permits and approvals in the future regulatory environment to maintain regulatory compliance. Anticipated types of evaluations may include the following:

- Review of on-site jurisdictional status and potential impacts to wetlands and waterbodies to comply with the Clean Water Act;
- Consultation with the United States Fish and Wildlife Service to evaluate compliance with the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and any other relevant regulations at the time of decommissioning;
- Consultation with the Virginia Department of Environmental Quality for compliance with any pertinent state regulatory requirements;
- Completion of a Phase I Environmental Site Assessment in support of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) protection;
- Development and implementation of a Stormwater Pollution Prevention Plan (SWPPP);
- Albemarle County building, road, discharge, or erosion control permits (as necessary); and
- Special state or local hauling permits (as necessary).

4 Decommissioning

The Project will be decommissioned at the end of its useful life. The Project is presumed to be at the end of its useful life if the facility generates no electricity for a continuous period of 24 months. At least 60 days prior to the commencement of decommissioning activities, the Owner will notify the appropriate Albemarle County officials. The following general decommissioning activities will occur:

Decommissioning Sequence

a. Obtain required site permits from Authority Having Jurisdiction (AHJ)
b. Disconnect all utility grid power
c. Move all disconnects to the off position
d. Disconnect all above ground wirings, cables, and electrical connections
e. Remove all PV Modules
f. Remove Inverters, mounting equipment, and posts
g. Remove all electrical switchgear, transformers, and their foundations
h. Remove DAS equipment, feeders, and conduit
i. Remove all above ground mounting equipment components and posts
j. Excavate and remove Underground feeders and conduit

k. Remove all MV feeders and utility poles
l. Removal of Collector Substation
m. Removal of weather station
n. Remove access road
o. Remove all fencing
p. Fill/Grade/Seed as needed

Some components may be left in place under certain circumstances. Electrical lines that will not impact future use of the Project Area (at least 3 feet below grade) may be left in place per renewable industry practices. Steel piles, where full removal is unattainable, may be cut and left in place at a depth of 3 feet or greater below the ground surface. Additionally, landowners may desire that private access roads remain in place for their use. The Owner will obtain a written request from the landowner for a road or structure (such as the O&M building) to remain in place.

5 Materials, Recycling, and Disposal

Many components of the Facility, such as racking, wiring, piles, and panels, retain value over time. Panels, while slightly less efficient—having lost about 0.5% efficiency per year, or 17.5% total efficiency—may be reused elsewhere, or components may be broken down and recycled. Recycling of solar panels and equipment is rapidly evolving and can be handled through a combination of sources such as certain manufacturers, PV Cycle (an international waste program founded by and for the PV industry), or waste management companies. More than 90 percent of the semiconductor material and glass can be reused in new modules and products. Other waste materials that hold no value will be recycled or disposed of via a licensed solid waste disposal facility.

6 Site Restoration

Following the completion of decommissioning activities, it is anticipated that the site will primarily be converted back to the pre-construction land uses. The land will be graded as necessary, though minimal grading is expected to be required, and decompacted to allow for productive agricultural use. Decommissioning of the Facility, including the removal of materials followed by site restoration, should be completed in approximately 12 months.

7 Decommissioning Cost Estimate

7.1 OPINION OF PROBABLE DECOMMISSIONING COST

Detailed Project Description: The Project is a single-axis tracking solar electric generating facility, consisting of 27 modules per string, that will be in Albemarle County, VA. Coordinate: 37.887°N, -78.464°W

Table 7-1: Estimated Decommissioning Cost:

PV Module Removal	QUANTITY	UNITS	Unit Cost	Total	Comment
# Solar Panels 360W	517,776	EA	$5	$2,588,880	Disassembly, Haul off-site
SUBTOTAL				$2,588,880	
Foundations Structural Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
# Panel Support Steel Piles	67,804	EA	$10	$678,040	Disassembly, Haul off-site
# Panel Racks	6,164	EA	$50	$308,200	Disassembly, Haul off-site
SUBTOTAL				$986,240	
Electrical Equipment Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
Inverter, 3.43 MW	45	EA	$1,000	$45,000	Disassembly, Haul off-site
MV Transformers, 3,430 kVA	45	EA	$3,000	$135,000	Disassembly, Haul off-site
Tracker Motor	250	EA	$15	$3,750	Disassembly, Haul off-site
SUBTOTAL				$183,750	
Electrical Wires Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
MV Conductor (10% removal)	145,478	FT	$20	$290,957	Removal, Excavation
DC/LC Conductor	231,036	FT	$2	$462,072	Removal, Non-Excavation
SUBTOTAL				$753,029	
Collector Substation Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
Circuit Breakers 34.5 kV	4	EA	$7,500	$30,000	Disassembly, Haul off-site
HV Circuit Breakers 115 kV	1	EA	$10,000	$10,000	Disassembly, Haul off-site
Substation Steel	1	LOT	$200,000	$200,000	Disassembly, Haul off-site
Foundation/Fence	1	LOT	$75,000	$75,000	Disassembly, Haul off-site
Main Power Transformers 115 - 34.5 kV 90/120/150	1	EA	$45,000	$45,000	Disassembly, Haul off-site
Substation Control House	1	EA	$15,000	$15,000	Disassembly, Haul off-site
Capacitor Bank (Size TBD)	1	EA	$40,000	$40,000	Disassembly, Haul off-site
SUBTOTAL				$415,000	
Fence/land, Removal/Restoration	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
Fence Perimeter	122,030	FT	$1	$122,030	Disassembly, Haul off-site
Civil Site Remediation (disturbed area)	450	Acre	$2,000	$900,000	Disassembly, Haul off-site
Storm Water Management Ponds	161	EA	$3,000	$483,000	Restoration
Mobilization, Engineering & Permitting				$175,000	Budgeted
SUBTOTAL				$1,680,030	

Summary of Estimate	
PV Module Removal	$2,588,880
Foundations Structural Removal	$986,240
Electrical Equipment Removal	$183,750
Electrical Wires Removal	$753,029
Collector Substation Removal	$415,000

Fence/land, Removal/Restoration	$1,680,030
ESTIMATED GRAND TOTAL	**$6,606,929**

Data Sources:

1. Material List and Quantities: Based on schematic design.
2. Unit Price Values: Based on R.S. Means and typical quantities for various components.

7.2 OPINION OF PROBABLE SALVAGE VALUE COST

There should be opportunity to reclaim metal scrap value from electrical equipment. Yard equipment such as bus work, circuit breakers, and power transformers contain a significant amount of conductive material such as copper and aluminum. Dead-end and other steel structures contain a significant amount of steel. Rubble from the foundation demolition and all other materials would be sent to landfill at cost. The scrap value of the substation is presented in Table 7-2.

Timmons Group considers that there is a resale market for substation transformers. Therefore, the transformer could be sold as operational second-hand equipment instead of being scrapped. This scenario has been considered.

Table 7-2 Estimated Salvage Value:

PV Module (At: $.33/W before Removal and Hauling)	QUANTITY	UNITS	Estimated New Cost/Unit	Estimated New Total Cost	Estimated Salvage Value 10% of New Cost
# Solar Panels 360W @ $.33/W =$118 less Hauling 20% = $90 net	517,776	EA	$90.00	$46,599,840	$4,659,984
SUBTOTAL					$4,659,984
Foundations Structural (at:$ .20/LB after Removal and Hauling)	**QUANTITY**	**UNITS**	**Estimated Weight LB.**	**Estimated Salvage Value**	**Estimated Salvage Value**
# Panel Support Steel Piles	67,804	EA	100	$0.20	$1,356,080.00
# Panel Racks	6,164	EA	1,000	$0.20	$1,232,800.00
SUBTOTAL					$2,588,880.00
Electrical Equipment	**QUANTITY**	**UNITS**	**Estimated New Cost/Unit**	**Estimated New Total Cost**	**Estimated Salvage Value 20% of New Cost**
MV Transformers: 3,350kVA	44	EA	$80,000	$3,520,000	$704,000
					$704,000
Electrical Collector Substation	**QUANTITY**	**UNITS**	**Estimated New Cost/Unit**	**Estimated New Total Cost**	**Estimated Salvage Value 20% of New Cost**
Circuit Breakers 34.5 kV	4	EA	$35,000	$140,000	$28,000
HV Circuit Breakers 115 kV	1	EA	$120,000	$120,000	$24,000
Substation Steel	1	LOT	$1,200,000	$1,200,000	$240,000

Foundation/Trench/Conduit/Cable*	1	LOT	$200,000	$200,000	$40,000
Main Power Transformers 115 - 34.5 kV 60/80/100	1	EA	$1,500,000	$1,500,000	$300,000
Substation Control House	1	EA	$400,000	$400,000	$80,000
Capacitor Bank (Size TBD)	1	EA	$250,000	$250,000	$50,000
SUBTOTAL				$3,810,000	$762,000
Electrical Wires/cables	**QUANTITY**	**UNITS**	**Estimated New Cost/Unit**	**Estimated New Total Cost**	**Estimated Salvage Value 10% of New Cost**
MV Conductor (only 10% of total)	145,478	FT	$35	$5,091,739	$509,174
DC/LC Conductor	231,036	FT	$3	$693,108	$69,311
SUBTOTAL					$578,485
Fence	**QUANTITY**	**UNITS**	**Estimated Weight LB.**	**Estimated Salvage Value**	**Estimated Salvage Value/Including Removal**
Fence Perimeter (1.3 lb. per square ft, 6ft height)	122,030	FT	951,834	$0.45	$214,162.65
Fence Post every 10 ft (9 ft length, 2.3 lb./Ft)	12,203	FT	142,644	$0.45	$32,094.90
SUBTOTAL					$246,257.55

Summary of Salvage Values Estimate	
PV Module	$4,659,984
Foundations Structural	$2,588,880
Electrical Equipment	$704,000
Electrical Wires	$762,000
Electrical Collector Substation	$578,485
Fence	$246,258
ESTIMATED GRAND TOTAL	**$9,539,606**

7.3 NET DECOMMISSIONING COST

The net decommissioning cost for the Project is calculated by subtracting the salvage value from the total of the disassembly and removal costs. As noted in Table 7-1 and Table 7-2 the total estimated decommissioning costs will be $6,606,929 and Table 7-2 the total estimated salvage value of Project components will be $9,539,606. The estimated net decommissioning cost will be a ($2,932,678) positive return.

Summary of Estimate	
Estimated Decommissioning Cost	$6,606,929
Estimated Salvage Value	$9,539,606
ESTIMATED NET COST	($2,932,678)

Note: Negative values, in parenthesis, is positive returns to the Project.

7.4 DECOMMISSIONING ASSUMPTIONS

To develop a cost estimate for the decommissioning of the Project, Timmons Group made the following assumptions and costs were estimated based on current pricing, technology, and regulatory requirements. The assumptions are listed in order from top to bottom of the estimate spreadsheet. We developed time and materials-based estimates considering composition of work crews. When materials have a salvage value at the end of the project life, the construction activity costs, and the hauling/freight cost are separated from the disposal costs or salvage value to make revisions to salvage values more transparent.

1. Decommissioning year is based on a 10-year initial period for the financial security. The projected life of the project is 40 years.
2. This Cost Estimate is based on the Timmons Group data request forwarded Aprily 2022.
3. Common labor will be used for the majority of the tasks except for heavy equipment operation. Pricing is based on local Southeast US labor rates.
4. Permit applications required include the preparation of a Stormwater Pollution Protection Plan (SWPPP) and a Spill Prevention Control and Countermeasure (SPCC) Plan.
5. Road gravel removal was estimated on a time and material basis using a 16 foot width and an 8 inch thickness for the access roads. Substation aggregate is included in the substation quantities. Since the material will not remain on site, a hauling cost is added to the removal cost. Road aggregate can often be disposed of by giving to landowners for use on driveways and parking areas. Many landfills will accept clean aggregate for use as “daily cover” and do not charge for the disposal.
6. Grade Road Corridor reflects the cost of mobilizing and operating light equipment to spread and smooth the topsoil stockpiled on site to replace the aggregate removed from the road.
7. Erosion and sediment control along road reflects the cost of silt fence on the downhill side of the road and surrounding all on-site wetlands.
8. Topsoil is required to be stockpiled on site during construction, therefore this top soil is available on site to replace the road aggregate, once removed. Subsoiling cost to decompact roadway areas is estimated as $350 per acre (based on previous bid prices), and revegetation on removed road area, which includes seed, fertilizer, lime, and care until vegetation is established is $2,300 per acre. The majority of the project area is “over-seeded” since the decommissioning activities are not expected to eliminate the existing grasses and vegetation under the arrays or heavily compact the soils. Over-seeding does not include fertilizer and lime, and is estimated at $350 per acre.
9. Fence removal includes loading, hauling, and recycling or disposal. Fences and posts weigh approximately 2.3 pounds per foot.
10. Array support posts are generally lightweight “I” beam sections installed with a piece of specialized tracked equipment. Crew productivity is approximately 240 posts per day, and the same crew and equipment should have a similar productivity removing the posts, resulting in a per post cost of approximately $15. We assume a cost of $15.00 per post to include hauling fees and contingencies.

11. A metal recycling facility (FEA Salvage and Recycling) is located in Orange, Virginia and is relatively close to the project site. Steel scrap pricing was acquired from www.scrapmonster.com.
12. The solar panels rated 360 watts can easily be disconnected, removed, and packed by a three-person crew at a rate we estimate at 12 panels per hour.
13. No topsoil is planned to be removed from the site during decommissioning and most of the site will not have been compacted by heavy truck or equipment traffic so the site turf establishment cost is based on RS Means unit prices for applying lime, fertilizer, and seed at the price of per acre plus an allowance for some areas to be decompacted.
14. There is an active market for reselling and recycling electrical transformers and inverters with several national companies specializing in recycling. We have assumed a 20% recovery of these units based on field experience with used transformers as opposed to trying to break them down into raw material components.
15. The underground collection lines are assumed to be aluminum conductor.
16. Care to prevent damage and breakage of equipment, PV modules, inverters, capacitors, and SCADA must be exercised, but removal assumes unskilled common labor under supervision.

The estimated salvage values are derived from years of experience decommissioning and uprating electric substations, overhead transmission and distribution hardware and underground distribution hardware that would include but not be limited to substation and pad mounted transformers, overhead and underground conductors, poles, fencing, ground grid conductors, control housings, circuit breakers (high and medium voltage), protective relaying, and other hardware items. These individual items have high salvage value either as stand-alone components to be reused or recycled and sold as used items. These items also have a relatively high salvage value as pure scrap for steel, copper and other commodities.

For all medium voltage transformers, breakers and other items, Southeastern Transformer Company in Dunn, NC provides complete repair, upgrading and recycling and resale for all items mentioned above. Their website is: https://www.setransformer.com. They have a national presence.

For any and all recycling and upgrading, Solomon Corporation offers the same set of services for transformer repair and recycling and complete substation decommissioning services. With seven different locations, Solomon is one of several vendors that can decommission and recycle the components as noted above. Their website is: https://www.solomoncorp.com/. Solomon Corporation is only one of many transmission and distribution recycle and decommissioning shops that do this mainly to harvest the components.

For recycling conductor, General Cable and Southwire both utilize extensive scrap procurement programs to reuse copper and aluminum conductor harvested from projects such as this one to supplement and reduce their raw material costs.

Here is the link to the General Cable program which only increases the salvage values found in this Plan: General Cable Recycling https://es.generalcable.com/na/us-can/socialresponsibility/sustainability/recycling

As for solar panels, they are in demand as salvageable items either in whole or for their raw material. According to the International Renewable Energy Agency (IRENA), more than 90% of all the materials are high grade silicon, aluminum and glass and are typically harvested to produce new panels. This is far less expensive than buying unprocessed raw materials for production.

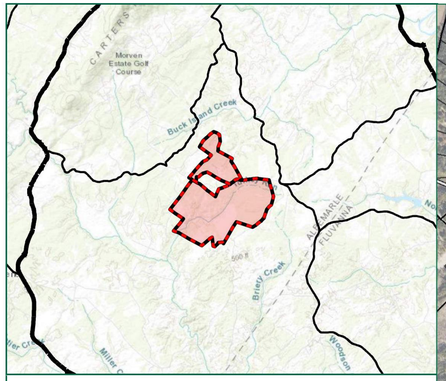
The base industry assumption is that since solar panels are expected to retain about 75% of their production capability after 35 years of use, a salvage value of 10% of original cost is a low estimate of their expected value and as we note in assumption. This considers possible technology improvements and undervalues the anticipated salvage value of the panel's raw materials. The Solar Energy Industries Association (SEIA) has an approved set of PV recycling vendors that specialize in doing this today and they can be found at: https://www.seia.org/initiatives/seia-national-pv-recycling-program.

First Solar, which has been active in the solar industry since its inception, takes solar modules and recycles 90% of the semiconductor material which is then reused in new modules. 90% of the glass product can be reused as new glass products, including panels and fiber optic cable. We can conclude that realistically the estimated 10% salvage value is low and reflects a conservative figure. Information about First Solar's recycling program is at: http://www.firstsolar.com/en/Modules/Recycling.

8 Financial Assurance

The Owner will post a financial surety per Condition of its Conditional Use Permit. Based on industry trends, the projected and actual costs of decommissioning are expected to go down over time based on improvements both to best practices in calculating these costs and the decommissioning process itself. The Owner will reevaluate decommissioning costs with a qualified engineering consultant every five years during the life of the Project.

As stated in the Introduction of this report, the Owner will place a surety bond or similar instrument equivalent to the decommissioning costs estimated in this report without taking any salvage value of the materials into account. The amount of the bond is to be reviewed and updated with the appropriate county staff every five (5) years.



- Property Limits - 2,259.5 Acres
- 200' Property Setbacks

Proposed Features (Conceptual)

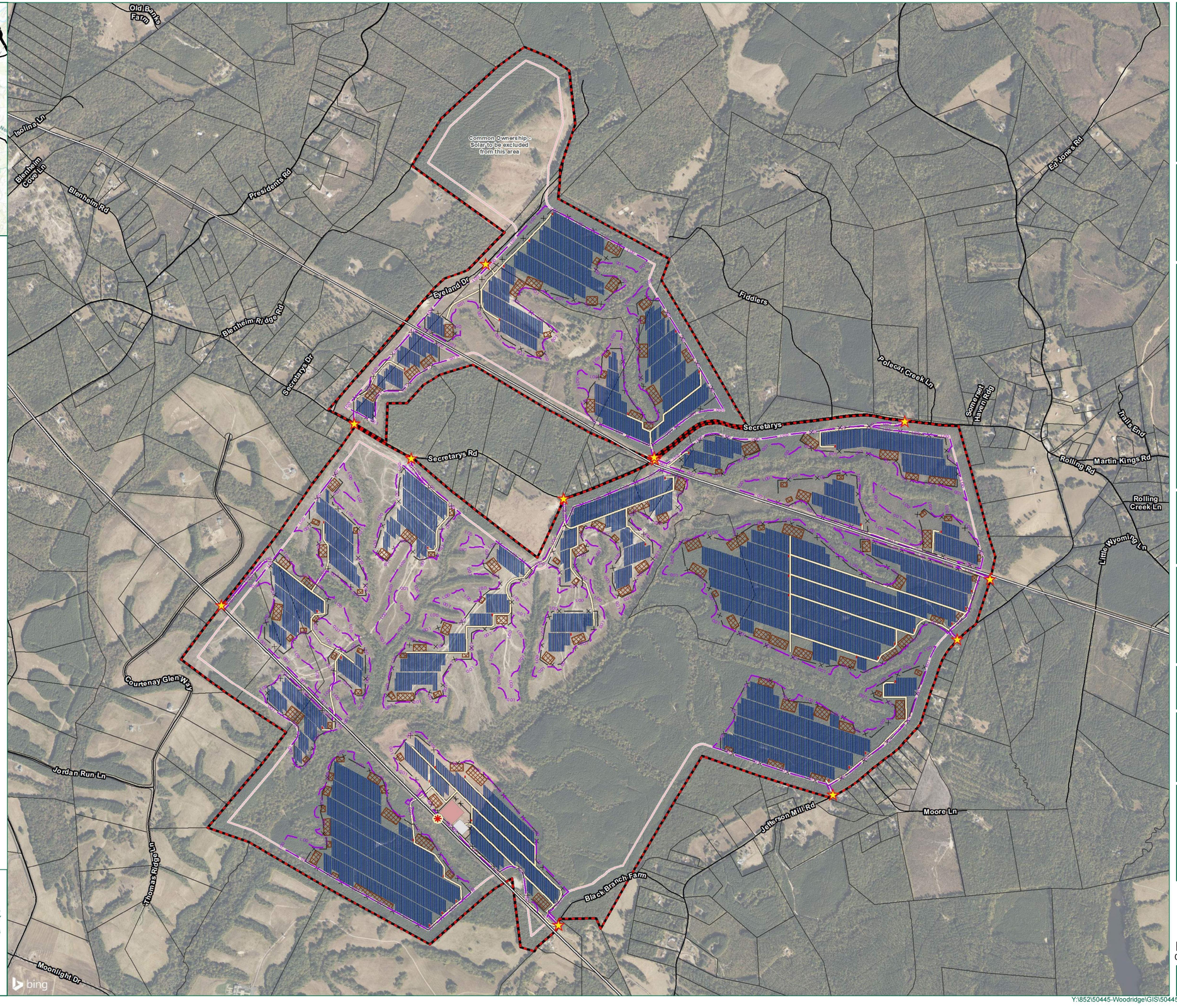
- Limits of Disturbance - 1,000 Acres
- Potenial Access Location
- Point of Interconnection
- Internal Roads
- Fence
- Solar Arrays
- Inverters
- Substation/Collection Yard Area
- Parking Area
- Stormwater Basin

Existing Features

- Transmission Line
- Albemarle Tax Parcels

NOTES:

1. PROPERTY LIMITS ARE APPROXIMATE FROM ALBEMARLE COUNTY GIS.
2. SITE LAYOUT IS CONCEPTUAL AND SUBJECT TO CHANGE. NOT FOR CONSTRUCTION.
3. PARKING AREAS ARE NOT PROPOSED EXCEPT IN THE SUBSTATION AREA.
4. ENTRANCE LOCATIONS AND INTERNAL DRIVEWAYS SHOWN ARE PRELIMINARY AND SUBJECT TO CHANGE. ANY NOTABLE CHANGES WILL BE SUBJECT TO COUNTY APPROVAL BEFORE CONSTRUCTION BEGINS.
5. APPROXIMATE CEMETERY LOCATION IDENTIFIED BY STANTEC CONSULTING SERVICES.
6. STEEP SLOPES OVERLAY DATA FROM ALBEMARLE COUNTY GIS.
7. AERIAL IMAGERY FROM MICROSOFT BING.



TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
TEL 804.200.6500
www.timmons.com

PROJECT NAME & LOCATION

WOODRIDGE SOLAR
ALBEMARLE COUNTY, VIRGINIA

DATE	05/12/2022
PROJECT NUMBER	50445
PROJECT NAME	WOODRIDGE SOLAR
DESIGNED BY / DRAWN BY	L. WHEELER

REVISIONS

#	MM/DD/YY	DESCRIPTION

DRAWING DESCRIPTION
CONCEPTUAL SITE PLAN

SCALE (FEET)
0 800 1,600
PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE	SHEET NUMBER
H:1 " = 800 '	1

Y:\852\50445-Woodridge\GIS\50445-CUP Site Plan for Reports.mxd

ATTACHMENT E

FORGESOLAR GLARE ANALYSIS

Project: **Woodridge Solar**
138MW project

Site configuration: **Woodridge R1**
Analysis conducted by Nicholas Ford (nford@hexagon-energy.com) at 17:20 on 21 Mar, 2022.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
2-mile flight path(s)	N/A	No flight paths analyzed
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

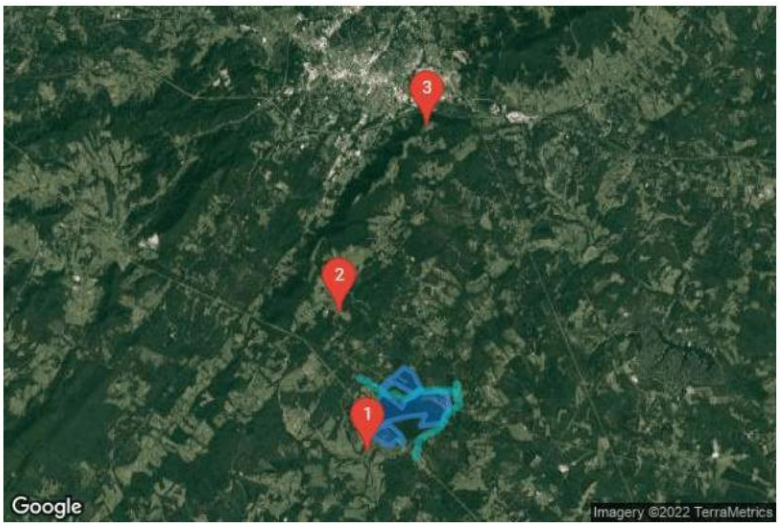
- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 66434.11733
Methodology: V2



PV Array(s)

Name: PV1
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 52.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.4
Rated power: 84.0 kW
Panel material: Light textured glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.884465	-78.455846	541.93	10.00	551.93
2	37.889465	-78.453249	484.62	10.00	494.62
3	37.888275	-78.464827	422.02	10.00	432.02
4	37.885536	-78.477296	418.32	10.00	428.32
5	37.883238	-78.480284	379.82	10.00	389.82
6	37.883371	-78.480769	372.22	10.00	382.22
7	37.884808	-78.480088	392.22	10.00	402.22
8	37.885604	-78.480254	395.62	10.00	405.62
9	37.886266	-78.481527	425.12	10.00	435.12
10	37.888473	-78.482355	441.52	10.00	451.52
11	37.891767	-78.481224	478.32	10.00	488.32
12	37.892066	-78.482410	479.82	10.00	489.82
13	37.892449	-78.482027	480.82	10.00	490.82
14	37.893488	-78.481020	472.42	10.00	482.42
15	37.894107	-78.480430	430.02	10.00	440.02
16	37.895717	-78.479021	496.52	10.00	506.52
17	37.896263	-78.478565	500.82	10.00	510.82
18	37.897378	-78.477511	492.82	10.00	502.82
19	37.898088	-78.475569	483.72	10.00	493.72
20	37.897355	-78.473793	497.62	10.00	507.62
21	37.895821	-78.471438	457.42	10.00	467.42
22	37.895387	-78.470740	445.02	10.00	455.02
23	37.894972	-78.470094	436.72	10.00	446.72
24	37.894562	-78.469408	438.92	10.00	448.92
25	37.892334	-78.465764	464.62	10.00	474.62
26	37.895526	-78.463929	497.62	10.00	507.62
27	37.895589	-78.463680	491.42	10.00	501.42
28	37.895634	-78.463520	485.82	10.00	495.82
29	37.895709	-78.463249	481.02	10.00	491.02
30	37.895738	-78.463154	480.72	10.00	490.72
31	37.895785	-78.463000	480.72	10.00	490.72
32	37.895843	-78.462809	480.92	10.00	490.92
33	37.895897	-78.462632	481.32	10.00	491.32
34	37.895955	-78.462447	482.12	10.00	492.12
35	37.896019	-78.462253	480.92	10.00	490.92
36	37.896042	-78.462165	480.02	10.00	490.02
37	37.896188	-78.461740	475.42	10.00	485.42
38	37.896321	-78.461348	474.52	10.00	484.52
39	37.896411	-78.461089	476.72	10.00	486.72
40	37.896447	-78.460959	478.12	10.00	488.12
41	37.896504	-78.460774	479.22	10.00	489.22
42	37.896551	-78.460650	479.52	10.00	489.52
43	37.896598	-78.460510	479.42	10.00	489.42
44	37.896686	-78.460258	479.12	10.00	489.12
45	37.896788	-78.459967	479.12	10.00	489.12
46	37.896887	-78.459682	480.22	10.00	490.22
47	37.896930	-78.459561	480.72	10.00	490.72
48	37.896982	-78.459443	480.92	10.00	490.92
49	37.897070	-78.459277	481.02	10.00	491.02
50	37.897122	-78.459066	480.62	10.00	490.62
51	37.898660	-78.456511	497.92	10.00	507.92
52	37.898781	-78.456202	499.22	10.00	509.22
53	37.898841	-78.455842	496.52	10.00	506.52
54	37.898841	-78.455662	494.12	10.00	504.12
55	37.898825	-78.455533	492.32	10.00	502.32
56	37.898574	-78.453907	476.32	10.00	486.32
57	37.898717	-78.452012	483.62	10.00	493.62

Name: PV2
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 52.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.4
Rated power: 28000.0 kW
Panel material: Light textured glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.880455	-78.482212	350.72	10.00	360.72
2	37.884115	-78.477750	384.12	10.00	394.12
3	37.885031	-78.472685	426.12	10.00	436.12
4	37.883642	-78.469961	395.22	10.00	405.22
5	37.880589	-78.466077	482.42	10.00	492.42
6	37.877711	-78.464424	540.33	10.00	550.33
7	37.877099	-78.465047	528.93	10.00	538.93
8	37.876759	-78.465427	515.23	10.00	525.23
9	37.876776	-78.465734	503.72	10.00	513.73
10	37.877503	-78.466677	496.22	10.00	506.22
11	37.878486	-78.466832	503.12	10.00	513.13
12	37.878956	-78.467659	480.02	10.00	490.02
13	37.878398	-78.468930	462.62	10.00	472.62
14	37.878038	-78.469507	451.62	10.00	461.62
15	37.876052	-78.472384	457.02	10.00	467.02
16	37.878503	-78.478000	441.52	10.00	451.52

Name: PV3
Axis tracking: Single-axis rotation
Backtracking: Shade-slope
Tracking axis orientation: 180.0°
Max tracking angle: 52.0°
Resting angle: 0.0°
Ground Coverage Ratio: 0.4
Rated power: 26000.0 kW
Panel material: Light textured glass without AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.900052	-78.455249	519.33	10.00	529.33
2	37.900014	-78.456189	509.12	10.00	519.13
3	37.899736	-78.457215	492.72	10.00	502.72
4	37.898341	-78.459498	480.32	10.00	490.32
5	37.899420	-78.462649	451.02	10.00	461.02
6	37.900529	-78.465176	437.62	10.00	447.62
7	37.901841	-78.467932	438.92	10.00	448.92
8	37.902673	-78.469697	430.72	10.00	440.72
9	37.902026	-78.472192	451.92	10.00	461.92
10	37.901629	-78.472992	459.82	10.00	469.82
11	37.900863	-78.473923	463.12	10.00	473.12
12	37.900876	-78.474656	471.72	10.00	481.72
13	37.899446	-78.475482	490.42	10.00	500.42
14	37.899790	-78.476221	501.52	10.00	511.52
15	37.900165	-78.477059	516.13	10.00	526.13
16	37.901247	-78.475776	494.62	10.00	504.62
17	37.904636	-78.472058	480.92	10.00	490.92
18	37.905052	-78.470616	468.32	10.00	478.32
19	37.905816	-78.469215	462.52	10.00	472.52
20	37.908884	-78.465356	455.52	10.00	465.52
21	37.909227	-78.465111	450.92	10.00	460.92
22	37.906979	-78.459858	412.22	10.00	422.22

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (ft)	Height (ft)
OP 1	1	37.873220	-78.483600	444.42	0.00
OP 2	2	37.931640	-78.499000	682.93	0.00
OP 3	3	38.010320	-78.452300	871.24	0.00

Route Receptor(s)

Name: Jefferson Mill Rd
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.902320	-78.436700	554.23	0.00	554.23
2	37.901970	-78.436700	555.03	0.00	555.03
3	37.901050	-78.436200	543.23	0.00	543.23
4	37.900850	-78.436200	543.63	0.00	543.63
5	37.900640	-78.436100	553.33	0.00	553.33
6	37.900430	-78.436100	554.73	0.00	554.73
7	37.900200	-78.436200	557.63	0.00	557.63
8	37.899340	-78.436700	572.53	0.00	572.53
9	37.899100	-78.436700	573.13	0.00	573.13
10	37.898890	-78.436800	571.03	0.00	571.03
11	37.898530	-78.436700	567.23	0.00	567.23
12	37.898320	-78.436600	568.43	0.00	568.43
13	37.893930	-78.434900	553.73	0.00	553.73
14	37.893700	-78.434900	551.83	0.00	551.83
15	37.893380	-78.435200	558.43	0.00	558.43
16	37.890680	-78.439500	564.53	0.00	564.53
17	37.889780	-78.441200	560.23	0.00	560.23
18	37.889370	-78.441700	565.83	0.00	565.83
19	37.888890	-78.442200	564.53	0.00	564.53
20	37.888570	-78.442500	562.13	0.00	562.13
21	37.888190	-78.442700	571.93	0.00	571.93
22	37.886020	-78.443600	563.33	0.00	563.33
23	37.885690	-78.443700	562.93	0.00	562.93
24	37.885450	-78.443900	555.03	0.00	555.03
25	37.885270	-78.444100	553.13	0.00	553.13
26	37.884380	-78.445100	563.23	0.00	563.23
27	37.883370	-78.446800	567.93	0.00	567.93
28	37.882980	-78.447300	574.33	0.00	574.33
29	37.882760	-78.447700	572.13	0.00	572.13
30	37.882590	-78.448000	568.43	0.00	568.43
31	37.882350	-78.448500	564.53	0.00	564.53
32	37.882120	-78.449100	562.83	0.00	562.83
33	37.881750	-78.450200	544.53	0.00	544.53
34	37.881530	-78.450900	536.63	0.00	536.63
35	37.881330	-78.451600	522.13	0.00	522.13
36	37.881250	-78.452000	518.33	0.00	518.33
37	37.881190	-78.452200	516.43	0.00	516.43
38	37.881090	-78.452400	512.12	0.00	512.12
39	37.880950	-78.452600	513.43	0.00	513.43
40	37.880770	-78.452800	515.03	0.00	515.03
41	37.880620	-78.453000	514.53	0.00	514.53
42	37.880400	-78.453300	512.63	0.00	512.63
43	37.880200	-78.453600	513.23	0.00	513.23
44	37.879830	-78.454300	517.83	0.00	517.83
45	37.879040	-78.455900	527.03	0.00	527.03
46	37.878520	-78.457000	531.93	0.00	531.93
47	37.878370	-78.457200	540.03	0.00	540.03
48	37.878070	-78.457500	543.63	0.00	543.63
49	37.877800	-78.457600	541.03	0.00	541.03
50	37.876940	-78.457300	547.53	0.00	547.53
51	37.876670	-78.457300	554.93	0.00	554.93
52	37.875940	-78.457400	554.23	0.00	554.23
53	37.875580	-78.457500	554.53	0.00	554.53
54	37.874990	-78.457800	546.33	0.00	546.33
55	37.874690	-78.457900	546.93	0.00	546.93
56	37.874450	-78.458000	545.23	0.00	545.23
57	37.873750	-78.458000	538.63	0.00	538.63

Name: Secretarys Road
Path type: Two-way
Observer view angle: 50.0°

Note: Route receptors are excluded from this FAA policy review. Use the 2-mile flight path receptor to simulate flight paths according to FAA guidelines.

Vertex	Latitude (°)	Longitude (°)	Ground elevation (ft)	Height above ground (ft)	Total elevation (ft)
1	37.904450	-78.488400	534.23	0.00	534.23
2	37.903160	-78.483900	505.22	0.00	505.22
3	37.901940	-78.482300	499.82	0.00	499.82
4	37.901210	-78.481000	492.62	0.00	492.62
5	37.897900	-78.473500	515.13	0.00	515.13
6	37.897750	-78.472600	503.12	0.00	503.12
7	37.897740	-78.471600	484.52	0.00	484.52
8	37.897990	-78.470300	472.22	0.00	472.22
9	37.898050	-78.469800	474.82	0.00	474.82
10	37.898030	-78.469500	470.32	0.00	470.32
11	37.897890	-78.469100	470.22	0.00	470.22
12	37.896220	-78.465700	508.62	0.00	508.62
13	37.896040	-78.465200	526.53	0.00	526.53
14	37.895980	-78.464600	515.63	0.00	515.63
15	37.896010	-78.464300	516.03	0.00	516.03
16	37.897350	-78.460000	479.12	0.00	479.12
17	37.899170	-78.456900	516.33	0.00	516.33
18	37.899390	-78.456300	516.63	0.00	516.63
19	37.899460	-78.455900	517.33	0.00	517.33
20	37.899410	-78.455400	515.53	0.00	515.53
21	37.899170	-78.454200	500.02	0.00	500.02
22	37.899210	-78.453000	509.72	0.00	509.72
23	37.899790	-78.447400	510.22	0.00	510.22
24	37.899790	-78.446700	516.13	0.00	516.13
25	37.899720	-78.446300	523.73	0.00	523.73
26	37.899440	-78.443600	537.03	0.00	537.03
27	37.899330	-78.442500	542.33	0.00	542.33
28	37.899220	-78.438600	568.83	0.00	568.83
29	37.899070	-78.437900	570.53	0.00	570.53
30	37.898830	-78.437300	566.13	0.00	566.13
31	37.898530	-78.436700	567.23	0.00	567.23
32	37.898530	-78.436700	567.23	0.00	567.23

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
PV1	SA tracking	SA tracking	0	0	232,000.0
PV2	SA tracking	SA tracking	0	0	75,030,000.0
PV3	SA tracking	SA tracking	0	0	72,930,000.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
Jefferson Mill Rd	0	0
Secretarys Road	0	0

Results for: PV1

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
Jefferson Mill Rd	0	0
Secretarys Road	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare

0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Jefferson Mill Rd

0 minutes of yellow glare
0 minutes of green glare

Route: Secretarys Road

0 minutes of yellow glare
0 minutes of green glare

Results for: PV2

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
Jefferson Mill Rd	0	0
Secretarys Road	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Jefferson Mill Rd

0 minutes of yellow glare
0 minutes of green glare

Route: Secretarys Road

0 minutes of yellow glare
0 minutes of green glare

Results for: PV3

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
Jefferson Mill Rd	0	0
Secretarys Road	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Route: Jefferson Mill Rd

0 minutes of yellow glare
0 minutes of green glare

Route: Secretarys Road

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to V1 algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
Refer to the Help page at **www.forgesolar.com/help/** for assumptions and limitations not listed here.

ATTACHMENT F

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

1001 Boulders Parkway
Suite 300
Richmond, VA 23225

P 804.200.6500
F 804.560.1016
www.timmons.com

MEMORANDUM

TO: Albemarle County Planning and Zoning Department

FROM: Timmons Group on behalf of Woodridge Solar

DATE: April 11, 2022

RE: Woodridge Solar Environmental Resource Impact Analysis

Timmons Group, on behalf of Woodridge Solar (Project), has conducted a limited environmental review of resources that may be present within a one-mile radius of the proposed project location. This environmental review includes National and State forests, National and State parks, wildlife management areas, conservation easements, and recreational areas.

Federal, State, and Local Conservation and Recreation Lands

Woodridge Solar does not intersect any federal, state, or local conservation or recreational lands, and there are no such resources within one mile of the project limits. The nearest managed lands are over one mile away.

Wetlands and Streams

Wetlands and streams on the project site have been delineated by Wild Ginger Field Services. The delineation results have not yet been verified by the United States Army Corps of Engineers (USACE). The Project will avoid wetlands and streams to the greatest extent possible, if wetland or stream impacts are unavoidable, the Applicant will obtain the appropriate USACE permit for any unavoidable impacts to USACE jurisdictional wetlands and streams.

Wetlands and streams form a natural wildlife corridor and, as they will generally not be impacted by the project, will remain as interior corridors for wildlife utilization. Wetlands and streams are generally outside the fenced area so free passage of wildlife will be allowed for the duration of the project. The Virginia Department of Wildlife Resources advises that interior passages through solar projects helps reduce potential impacts to wildlife, to which this project will adhere.

Threatened and Endangered Species

Timmons Group has conducted a threatened and endangered (T&E) species review of the Woodridge Solar project. The following databases were reviewed for the potential presence of T&E species:

- Virginia Department of Conservation and Recreation (VDCR) – Natural Heritage Review Service
- Virginia Department of Wildlife Resources (VDWR) – Virginia Fish and Wildlife Information Service (VaFWIS)
- US Fish and Wildlife Service (USFWS) – Information for Planning and Consultation (IPaC)

Based on the queried databases, there is the potential for four T&E species to occur near the Project.

Common Name	Scientific Name	Status	Agency Source
Northern Long-eared Bat	*Myotis septentrionalis*	Federal, State Threatened	USFWS
James Spinymussel	*Parvaspina collina*	Federal, State Endangered	VDWR
Monarch Butterfly	*Danaus plexippus*	Candidate Species	USFWS

Although there is potential habitat for bat species to exist on the Project, the majority of the land is timber tracts that were previously harvested. Furthermore, there are no known hibernacula or roost trees for these species within the vicinity of the Project. A common strategy recommended by reviewing agencies to avoid potentially harmful impacts to bat species is implementation of a time of year restriction on tree clearing. The Hardware River is noted as threatened and endangered water where the James spinymussel has been observed; the Hardware River is approximately 0.73 miles south of the Site. Wetlands and streams that drain to this river occur onsite, but a 100-foot buffer will be maintained around these features as well as the floodplain. The monarch butterfly is a candidate species, but it is not listed as federally or state threatened or endangered.

During permitting efforts at the state level, the Applicant will coordinate with the appropriate agencies to ensure the protection and avoidance of T&E species.

Attachments

- T&E Species Database Reviews

Species Observed within Two Miles		
Common Name	**Federal Status**	**State Status**
Bass, largemouth	NT/NE	NT/NE
Bass, smallmouth	NT/NE	NT/NE
Bluegill	NT/NE	NT/NE
Chub, bluehead	NT/NE	NT/NE
Chub, creek	NT/NE	NT/NE
Crayfish, no common name	NT/NE	NT/NE
Dace, blacknose	NT/NE	NT/NE
Dace, mountain redbelly	NT/NE	NT/NE
Dace, rosyside	NT/NE	NT/NE
Darter, fantail	NT/NE	NT/NE
Darter, glassy	NT/NE	NT/NE
Darter, johnny	NT/NE	NT/NE
Darter, longfin	NT/NE	NT/NE
Darter, stripeback	NT/NE	NT/NE
Fallfish	NT/NE	NT/NE
Madtom, margined	NT/NE	NT/NE
mussel spp.	NT/NE	NT/NE
Shiner, comely	NT/NE	NT/NE
Shiner, common	NT/NE	NT/NE
Shiner, golden	NT/NE	NT/NE
Shiner, satinfin	NT/NE	NT/NE
Shiner, swallowtail	NT/NE	NT/NE
Stoneroller, central	NT/NE	NT/NE
Sucker, northern hog	NT/NE	NT/NE
Sucker, torrent	NT/NE	NT/NE
Sucker, white	NT/NE	NT/NE
Sunfish, green	NT/NE	NT/NE
Sunfish, redbreast	NT/NE	NT/NE

NT = Non-Threatened, NE = Non-Endangered

Legend

- Project Study Limits - 2,259.3 Acres
- Two Mile Buffer
- NLEB Roost Trees - Not Present
- Trout Streams - Not Present
- Threatened/Endangered Waters
- Anadromous Fish Use
- Bald Eagle Concentration Areas and Roosts - Not Present
- Colonial Water Birds - Not Present
- Bat Hibernacula (0.5 Mile Buffer) - Not Present
- Bat Hibernacula (5.5 Mile Buffer) - Not Present
- Federal or State Listed Observation Area - Not Present

Federal Status, State Status

- Non-Threatened, Non-Endangered

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.
1001 Boulders Parkway, Suite 300
Richmond, VA 23225
TEL 804.200.6500
www.timmons.com

PROJECT NAME & LOCATION

WOODRIDGE SOLAR

ALBEMARLE COUNTY - VIRGINIA

DATE: 04/07/2022

PROJECT NUMBER: 50445

PROJECT NAME: WOODRIDGE SOLAR

DESIGNED BY / DRAWN BY: J. FRAZIER

NOTES:
Project Limits are approximate.
WERMS data from DWR.
Bat hibernacula include identifications of Northern long-eared bat, Tri-colored bat, Little-brown bat, Virginia big-eared bat, Gray bat, and Indiana bat.
Aerial imagery from VGIN.

REVISIONS

#	MM/DD/YY	DESCRIPTION

DRAWING DESCRIPTION

WILDLIFE ENVIRONMENTAL REVIEW MAP

SCALE (FEET)

0 2,000 4,000

PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE	SHEET NUMBER
H:1 " = 2,000 '	1

Y:\852\50445-Woodridge\GIS\WERMS.mxd

Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

Web Project ID: WEB0000017535

Client Project Number: 50445

PROJECT INFORMATION

TITLE: Woodridge Solar

DESCRIPTION: The project is a proposed solar facility. Wetlands and streams will be avoided to the extent practicable.

EXISTING SITE CONDITIONS: Forested and cleared lands

QUADRANGLES: Simeon, Scottsville

COUNTIES: Albemarle

Latitude/Longitude (DMS): 37° 53' 31.5794" N / 78° 27' 49.2793" W

Acreage: 2,260 acres

Comments:

REQUESTOR INFORMATION

Priority: N

Tier Level: Tier I

Tax ID: 54-1301413

Contact Name: Jillian Frazier

Company Name: Timmons Group

Address: 1001 Boulders Parkway

City: Chesterfield

State: VA

Zip: 23225

Phone: 804-448-5973

Fax:

Email: jillian.frazier@timmons.com

Conservation Site	Site Type	Brank	Acreage	Listed Species Presence	Essential Conservation Site?
Natural Heritage Screening Features Intersecting Project Boundary					

Intersecting Predictive Models
Predictive Model Results

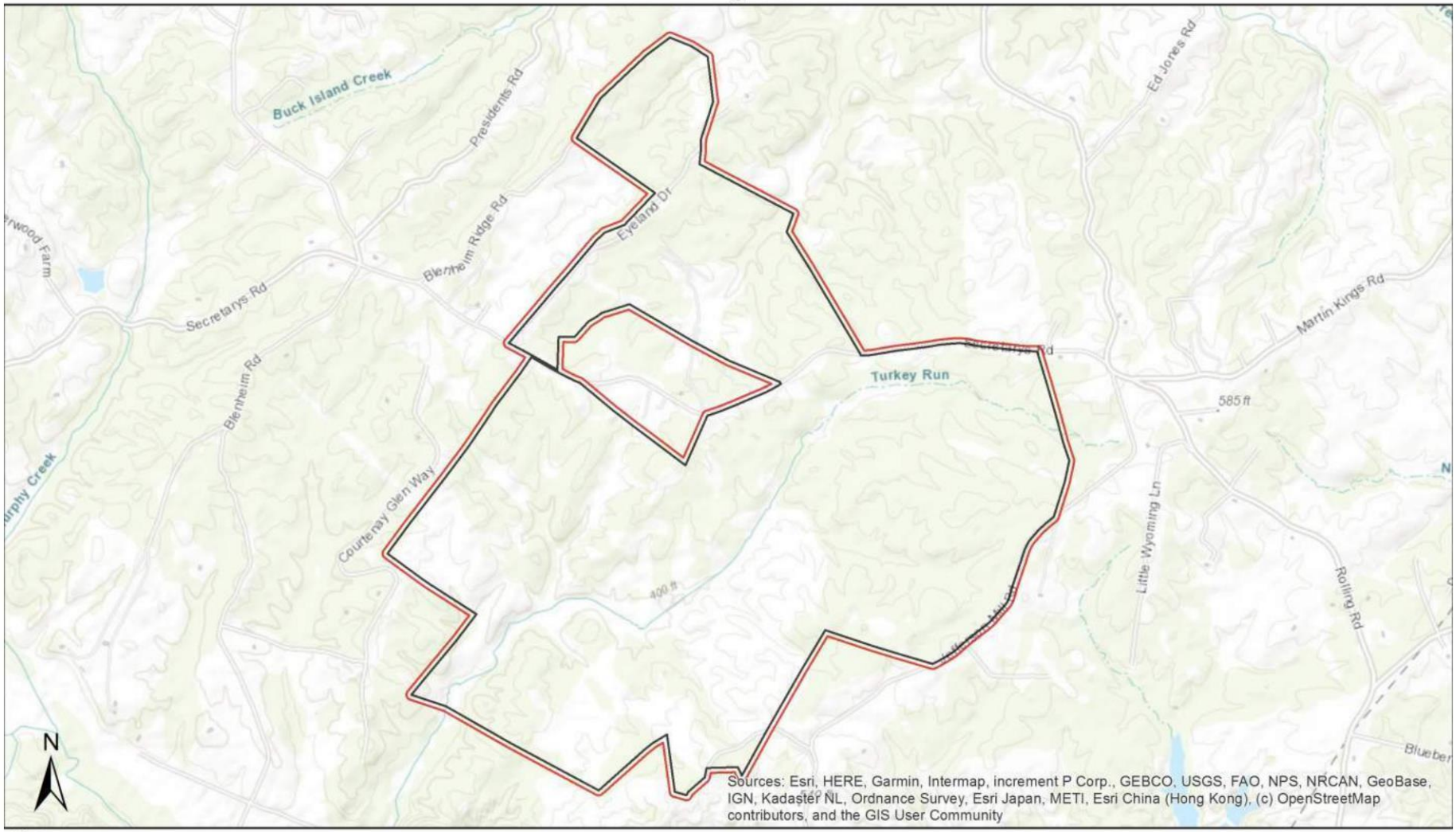
In addition, the proposed project will impact an Ecological Core(s) with rankings C3,C4,C5 as identified in the Virginia Natural Landscape Assessment. Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer, available here: https://vanhde.org/content/map.

Ecological Cores are areas of at least 100 acres of continuous interior, natural cover that provides habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as species that utilize marsh, dune, and beach habitats. Interior core areas begin 100 meters inside the nearest core edges and continue to the deepest parts of cores. Cores also provide natural and economic benefits of open space, recreation, water quality (including drinking water recharge and protection, and erosion prevention), and air quality (including carbon sequestration and oxygen production). Cores are ranked from C1 to C5 (C5 being the least significant) using nine prioritization criteria, including the habitats of natural heritage resources they contain.

Impacts to cores occur when their natural cover is partially or completely converted permanently to developed land uses. Habitat conversion to development results in changes that reduce ecosystem processes, biodiversity, population viability and habitat quality due to limited recolonization, increased predation, and increased introduction and establishment of invasive species.

Therefore, avoiding or minimizing core impacts is a key mitigation measure that will reduce deleterious effects and preserve the area and connectivity of habitats that are key components of biodiversity. DCR recommends efforts to minimize edge in remaining habitat fragments, retain natural corridors that allow movement between fragments and design the intervening landscape to support native wildlife (natural cover versus lawns).

Woodridge Solar



Project Boundary

Buffered Project Boundary

1:31,621

0 0.25 0.5 1 mi

0 0.425 0.85 1.7 km

Quads: Scottsville; Simeon

Counties: Albemarle

Company: Timmons Group

Lat/Long: 375331 / -782749

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

The project mapped as part of this report has been searched against the Department of Conservation and Recreation's Biotics Data System for occurrences of natural heritage resources in the vicinity of the area indicated for this project. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics, natural heritage resources have not been documented within the submitted project boundary including a 100 foot buffer. In addition, the project area does not intersect any of the predictive models identifying potential habitat for natural heritage resources.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

Any absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks additional natural heritage resources. New and updated information is continually added to Biotics. Please revisit this website or contact DCR for an update on this natural heritage information if a significant amount of time passes (DCR recommends no more than six months) before it is utilized.

The Virginia Department of Wildlife Resources maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, that may contain information not documented in the Natural Heritage Data Explorer. Their database may be accessed from http://vafwis.org/fwis/ or contact Amy Martin (804-367-2211 or amy.martin@dwr.virginia.gov).

Thank you for submitting your project to the Virginia Department of Conservation and Recreation's Natural Heritage Data Explorer Web Service. Based on the preliminary screening results for this project, no further correspondence will be sent from this office. Should you have any questions or concerns about this report, the Data Explorer, or other Virginia Natural Heritage Program services, please contact the Natural Heritage Project Review Unit at 804-371-2708.

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Albemarle County, Virginia

Local office

Virginia Ecological Services Field Office

(804) 693-6694
(804) 693-9032

6669 Short Lane
Gloucester, VA 23061-4410

http://www.fws.gov/northeast/virginiafield/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

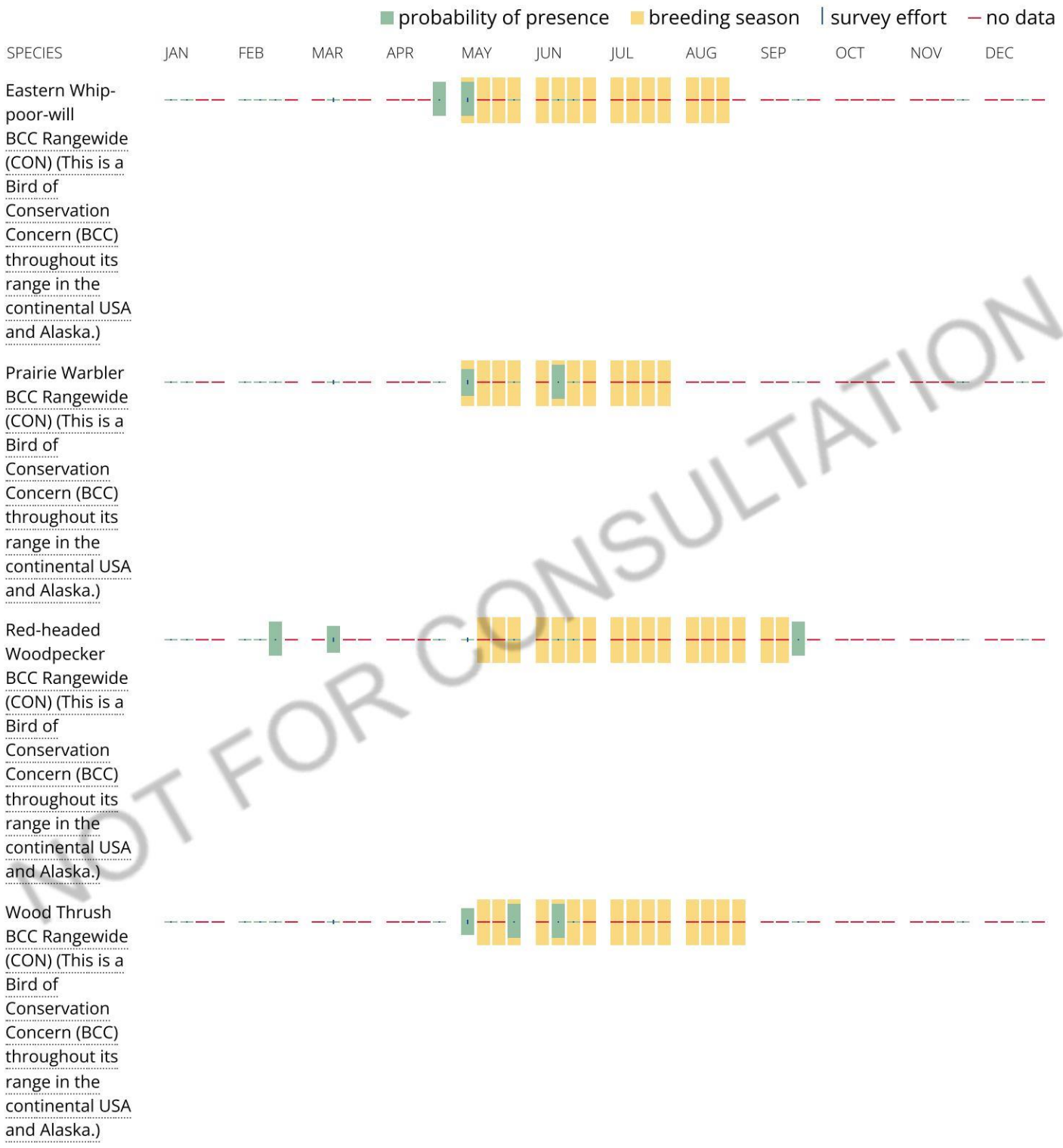
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to

occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters.

Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

VaFWIS - Department of Game and Inland Fisheries

37.89580 -78.46291
is the Search Point
Submit Cancel

Search Point
- ◉ **Change** to "clicked" map point
- ○ **Fixed** at 37.89580 -78.46291

Show Position Rings
○ Yes ◉ No
1 mile and 1/4 mile at the **Search Point**

Show Search Area
◉ Yes ○ No
2 Search distance miles buffer

Search Point is at map center

Base Map Choices
BW Aerial Photography

Map Overlay Choices
Current List: Anadromous, TEWaters, BAEANests, BECAR, Trout, TierII, Habitat, Search

Map Overlay Legend

T & E Waters
Federal
State

Predicted Habitat WAP Tier I & II
Aquatic
Terrestrial

Trout Waters
Class I - IV
Class V - VI

Anadromous Fish Reach
Confirmed
Potential

123 Impediment

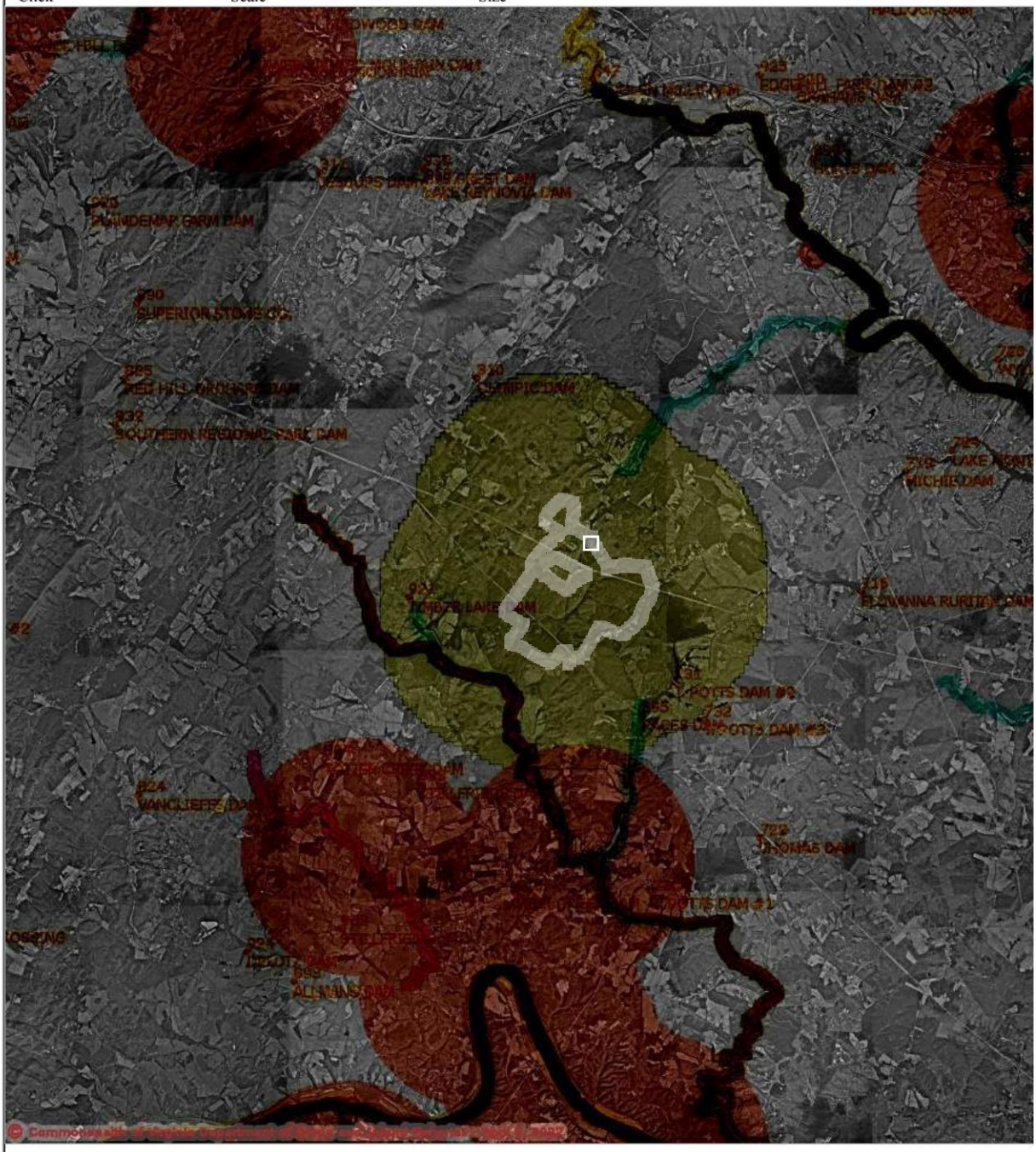
2 mile radius Search Area

Bald Eagle Concentration Areas and Roosts

Bald Eagle Nests

Data Observation Site

back
Refresh Browser Page
Map Click Pan Id M
Map Scale In Zoom Out
Screen Size Small Size Big
Help



Point of Search 37.89580 -78.46291
Map Location 37.89580 -78.46291

Select **Coordinate System:**
- ○ Degrees,Minutes,Seconds Latitude - Longitude
- ◉ Decimal Degrees Latitude - Longitude
- ○ Meters UTM NAD83 East North Zone
- ○ Meters UTM NAD27 East North Zone

Base Map source: Black & White USGS Aerial Photography (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 17 NAD 1983 with left 707083 and top 4213289. Pixel size is 18. .
Coordinates displayed are decimal Degrees North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixles. The map display represents 32000 meters east to west by 32000 meters north to south for a total of 1024.0 square kilometers. The map display represents 105004 feet east to west by 105004 feet north to south for a total of 395.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-
are from the United States Department of the Interior, United States Geological Survey.
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic
http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2022-04-05 14:37:04 (qa/qc March 21, 2016 12:20 - tn=1174946 dist=3218 I
)
$poi=37.9039500 -78.4572800

VaFWIS Initial Project Assessment Report Compiled on 4/5/2022, 2:38:41 PM

Help

Known or likely to occur within a **2 mile buffer around polygon; center 37.9039500 -78.4572799** in **003 Albemarle County, 065 Fluvanna County, VA**

View Map of Site Location

509 Known or Likely Species ordered by Status Concern for Conservation (displaying first 23) (23 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes	BOVA,TEWaters,Habitat
050022	FTST	Ia	Bat, northern long-eared	Myotis septentrionalis		BOVA
060173	FTST	Ia	Pigtoe, Atlantic	Fusconaia masoni		BOVA
060029	FTST	IIa	Lance, yellow	Elliptio lanceolata		BOVA
050020	SE	Ia	Bat, little brown	Myotis lucifugus		BOVA
050027	SE	Ia	Bat, tri-colored	Perimyotis subflavus		BOVA
060006	SE	Ib	Floater, brook	Alasmidonta varicosa		BOVA
040096	ST	Ia	Falcon, peregrine	Falco peregrinus		BOVA
040293	ST	Ia	Shrike, loggerhead	Lanius ludovicianus		BOVA
060081	ST	IIa	Floater, green	Lasmigona subviridis		BOVA,Habitat
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
030063	CC	IIIa	Turtle, spotted	Clemmys guttata		BOVA
030012	CC	IVa	Rattlesnake, timber	Crotalus horridus		BOVA
040092		Ia	Eagle, golden	Aquila chrysaetos		BOVA
040306		Ia	Warbler, golden-winged	Vermivora chrysoptera		BOVA
100248		Ia	Fritillary, regal	Speyeria idalia idalia		BOVA
060084		Ib	Pigtoe, Virginia	Lexingtonia subplana		BOVA
040052		IIa	Duck, American black	Anas rubripes		BOVA
040320		IIa	Warbler, cerulean	Setophaga cerulea		BOVA
040140		IIa	Woodcock, American	Scolopax minor		BOVA
040203		IIb	Cuckoo, black-billed	Coccyzus erythropthalmus		BOVA
040105		IIb	Rail, king	Rallus elegans		BOVA
040304		IIc	Warbler, Swainson's	Limnothlypis swainsonii		BOVA

To view **All 509 species** View 509

*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern

**I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need
Virginia Widlife Action Plan Conservation Opportunity Ranking:
a - On the ground management strategies/actions exist and can be feasibly implemented.;
b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.;
c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

Bat Colonies or Hibernacula: **Not Known**

Anadromous Fish Use Streams (1 records)

View Map of All Anadromous Fish Use Streams

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
P77	Hardware River	Potential	0			Yes

Impediments to Fish Passage (3 records)

View Map of All Fish Impediments

ID	Name	River	View Map
895	PACES DAM	TR-BRIERY CREEK	Yes
731	T. POTTS DAM #2	TR-BRIERY CREEK	Yes
921	TIMBER LAKE DAM	FLINT CREEK	Yes

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters (17 Reaches)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Hardware River (0100212)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (0100750)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (0101830)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (0101864)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (085651)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes

Hardware River (088871)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (091711)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (091974)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (092525)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (093184)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (093300)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (093961)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (094506)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (094692)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (096051)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (098543)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (098786)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Habitat Predicted for Aquatic WAP Tier I & II Species (4 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Briery Creek (20802031)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (20802031)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Murphy Creek (20802031)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
tributary (20802041)	ST	060081	ST	IIa	Floater, green	Lasmigona subviridis	Yes
tributary (20802041)	ST	060081	ST	IIa	Floater, green	Lasmigona subviridis	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Public Holdings:

N/A

Compiled on 4/5/2022, 2:38:41 PM I1174946.0 report=IPA searchType= P dist= 3218 poi= 37.9039500 -78.4572799 siteDD= 37.9039544 -78.4572847;37.8992278 -78.4538375;37.8991148 -78.4537841;37.8991235 -78.4534239;37.8991324 -78.4531793;37.8991329 -78.4531644;37.8991617 -78.4528919;37.8992007 -78.4525818;37.8992358 -78.4523175;37.8992697 -78.4520322;37.8993197 -78.4516587;37.8993640 -78.4512539;37.8994079 -78.4507621;37.8994417 -78.4503525;37.8994450 -78.4503131;37.8994656 -78.4500701;37.8994665 -78.4500597;37.8994987 -78.4497805;37.8995326 -78.4494125;37.8995661 -78.4490629;37.8995856 -78.4489114;37.8996222 -78.4486388;37.8996587 -78.4483489;37.8996790 -78.4480932;37.8996930 -78.4478347;37.8997185 -78.4474971;37.8997300 -78.4473127;37.8997302 -78.4471986;37.8997359 -78.4470148;37.8997329 -78.4468843;37.8997251 -78.4467552;37.8997079 -78.4465785;37.8996593 -78.4462430;37.8995995 -78.4458704;37.8995542 -78.4455090;37.8995285 -78.4452610;37.8995049 -78.4449970;37.8994674 -78.4446310;37.8994453 -78.4444000;37.8994248 -78.4441124;37.8993891 -78.4437145;37.8993584 -78.4433942;37.8993365 -78.4431692;37.8993351 -78.4431547;37.8993258 -78.4430588;37.8992866 -78.4427001;37.8992670 -78.4423691;37.8992513 -78.4419793;37.8992374 -78.4415862;37.8992364 -78.4415606;37.8973999 -78.4408953;37.8956398 -78.4402856;37.8941799 -78.4398148;37.8932157 -78.4394171;37.8920516 -78.4397454;37.8901244 -78.4405427;37.8900288 -78.4406946;37.8899617 -78.4408081;37.8898602 -78.4409697;37.8897367 -78.4411528;37.8895917 -78.4413574;37.8894895 -78.4415135;37.8893360 -78.4416913;37.8891527 -78.4419013;37.8889438 -78.4421329;37.8887989 -78.4422783;37.8886283 -78.4424076;37.8885457 -78.4424603;37.8884708 -78.4425067;37.8883952 -78.4425573;37.8881638 -78.4426585;37.8879703 -78.4427457;37.8879258 -78.4427626;37.8878368 -78.4427992;37.8877382 -78.4428362;37.8875254 -78.4429342;37.8872740 -78.4430466;37.8869938 -78.4431704;37.8869123 -78.4432086;37.8868692 -78.4432210;37.8868091 -78.4432491;37.8867179 -78.4432941;37.8865044 -78.4433869;37.8863398 -78.4434600;37.8859800 -78.4435966;37.8857280 -78.4436907;37.8856680 -78.4437188;37.8855923 -78.4437638;37.8855390 -78.4437975;37.8854833 -78.4438312;37.8854471 -78.4438601;37.8854162 -78.4438913;37.8853586 -78.4439503;37.8853174 -78.4439919;37.8852673 -78.4440474;37.8852282 -78.4440924;37.8851623 -78.4441756;37.8850630 -78.4442891;37.8848429 -78.4445420;37.8847599 -78.4446345;37.8846783 -78.4447274;37.8845360 -78.4448903;37.8844515 -78.4449970;37.8843819 -78.4450720;37.8843270 -78.4451627;37.8841536 -78.4454239;37.8840872 -78.4455426;37.8839602 -78.4457610;37.8839027 -78.4458677;37.8838090 -78.4460221;37.8836934 -78.4462047;37.8835992 -78.4463628;37.8835489 -78.4464462;37.8832676 -78.4468765;37.8831108 -78.4471062;37.8829280 -78.4473694;37.8828529 -78.4474882;37.8827395 -78.4476820;37.8826417 -78.4478617;37.8825305 -78.4481023;37.8823661 -78.4484570;37.8822572 -78.4487153;37.8822172 -78.4488220;37.8821309 -78.4490487;37.8827141 -78.4514428;37.8831474 -78.4531732;37.8840538 -78.4564658;37.8819186 -78.4581195;37.8785420 -78.4606221;37.8761105 -78.4623590;37.8765810 -78.4626340;37.8765723 -78.4632853;37.8765528 -78.4647127;37.8765522 -78.4647959;37.8764972 -78.4648098;37.8760421 -78.4649278;37.8759481 -78.4650664;37.8752577 -78.4660818;37.8750676 -78.4662135;37.8752614 -78.4670207;37.8784174 -78.4675196;37.8779429 -78.4685382;37.8776149 -78.4690643;37.8753856 -78.4722935;37.8780255 -78.4783414;37.8800959 -78.4828105;37.8807529 -78.4852080;37.8818257 -78.4840701;37.8837407 -78.4820110;37.8851445 -78.4806350;37.8866640 -78.4835514;37.8869856 -78.4841593;37.8885246 -78.4867555;37.8901250 -78.4852321;37.8927867 -78.4825735;37.8938213 -78.4815714;37.8944290 -78.4809912;37.8960245 -78.4795946;37.8965794 -78.4791318;37.8983621 -78.4773950;37.8992337 -78.4766199;37.8985446 -78.4751611;37.8981415 -78.4742287;37.8978911 -78.4736031;37.8978055 -78.4733094;37.8962491 -78.4710036;37.8958164 -78.4703072;37.8954043 -78.4696662;37.8949984 -78.4689872;37.8931920 -78.4660321;37.8959172 -78.4644656;37.8959420 -78.4643172;37.8959858 -78.4641681;37.8960565 -78.4638909;37.8960997 -78.4637384;37.8961724 -78.4634749;37.8961977 -78.4633918;37.8962168 -78.4633299;37.8962664 -78.4631666;37.8963027 -78.4630452;37.8963562 -78.4628719;37.8963670 -78.4628371;37.8964109 -78.4626935;37.8965027 -78.4623995;37.8966252 -78.4620450;37.8969554 -78.4610222;37.8973369 -78.4599483;37.8974028 -78.4597954;37.8976105 -78.4593551;37.8976131 -78.4593461;37.8977205 -78.4594320;37.8989266 -78.4629544;37.9000536 -78.4655228;37.9013695 -78.4682872;37.9020775 -78.4697883;37.9016119 -78.4717331;37.9014422 -78.4720161;37.9011536 -78.4726444;37.9003077 -78.4736247;37.9003283 -78.4747311;37.8985204 -78.4748333;37.8993434 -78.4766319;37.8995533 -78.4771011;37.9000181 -78.4781862;37.9016192 -78.4764253;37.9024970 -78.4754688;37.9030430 -78.4748833;37.9038658 -78.4739433;37.9055980 -78.4720439;37.9060284 -78.4714491;37.9064357 -78.4700802;37.9081770 -78.4679294;37.9112360 -78.4733211;37.9133978 -78.4716506;37.9145200 -78.4701071;37.9145245 -78.4701010;37.9157651 -78.4683946;37.9167061 -78.4667776;37.9162167 -78.4652944;37.9156242 -78.4641734;37.9131566 -78.4638320;37.9111161 -78.4646944;37.9104162 -78.4647262;37.9097294 -78.4648258;37.9069574 -78.4583528;37.9059554 -78.4588298;37.9039544 -78.4572847;

PixelSize=64; Anadromous=0.025587; BECAR=0.020649; Bats=0.02129; Buffer=0.165377; County=0.063111; Impediments=0.023637; Init=0.231293; PublicLands=0.033765; SppObs=0.38541; TEWaters=0.032535; TierReaches=0.045769; TierTerrestrial=0.049799; Total=1.175661; Tracking_BOVA=0.208466; Trout=0.030006

Threatened and Endangered Waters where Spinymussel, James (060017) observed

37.90395 -78.45727
is **the Search Point**

Show Position Rings
○ Yes ◉ No
1 mile and 1/4 mile at the **Search Point**

Show Search Area
◉ Yes ○ No
2 Search distance miles buffer

Display at center	**Search Point** is not at map center

Base Map Choices
BW Aerial Photography

Map Overlay Choices
Current List: Search, TEWaters

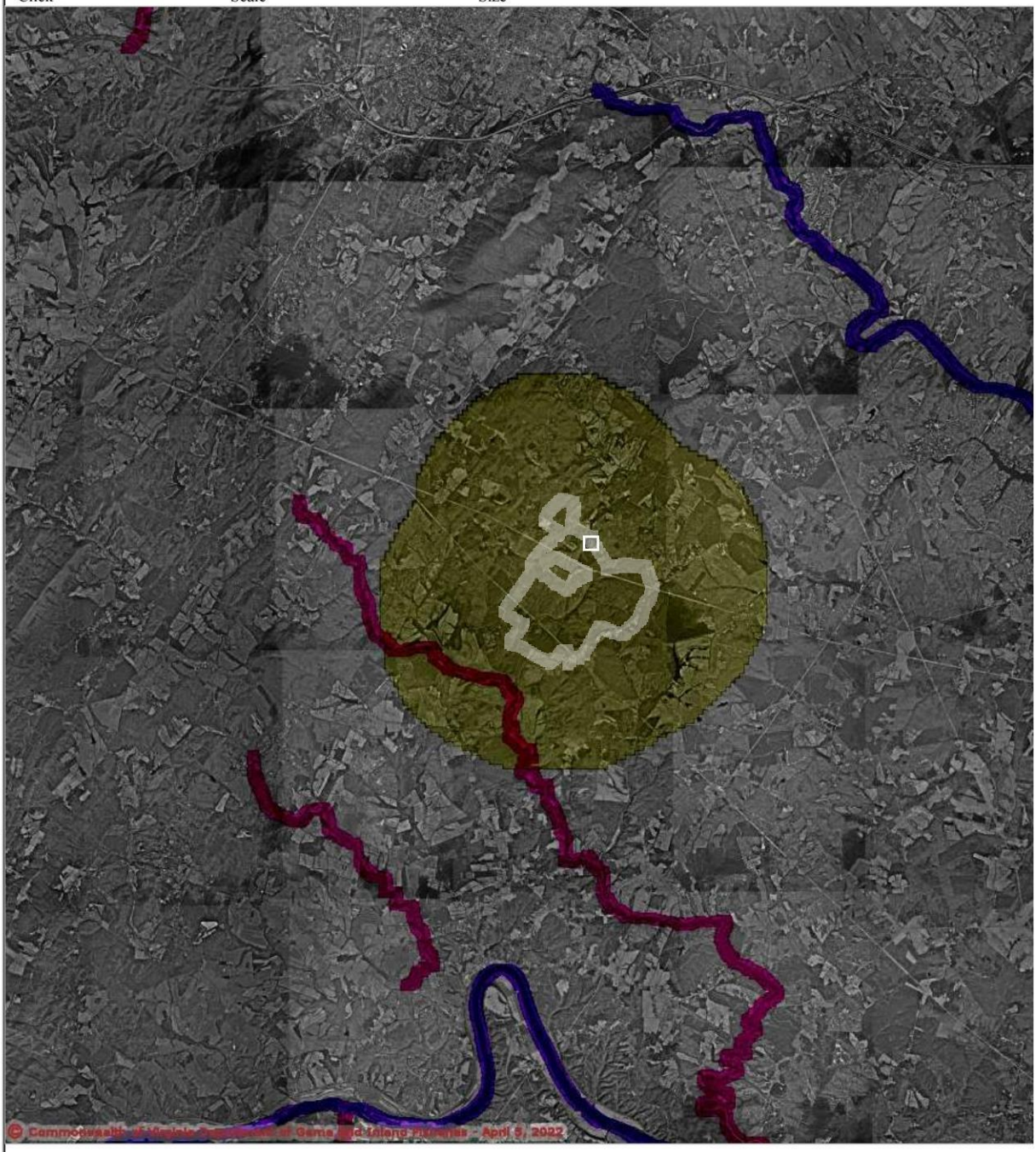
Map Overlay Legend

T & E Waters
Federal
State

2 mile radius Search Area

back | Refresh Browser Page | Help

Map Click: Pan Id M
Map Scale: In Zoom Out
Screen Size: Small Size Big



N
2.5 0 2.5 5 7.5 10 Kilometers
2 0 2 4 6 8 Miles

Point of Search 37.90395 -78.45727
Map Location 37.89580 -78.46291

Select **Coordinate System:**
○ Degrees,Minutes,Seconds Latitude - Longitude
◉ Decimal Degrees Latitude - Longitude
○ Meters UTM NAD83 East North Zone
○ Meters UTM NAD27 East North Zone

Base Map source: Black & White USGS Aerial Photography (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 17 NAD 1983 with left 707083 and top 4213289. Pixel size is 18. .
Coordinates displayed are decimal Degrees North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixles. The map display represents 32000 meters east to west by 32000 meters north to south for a total of 1024.0 square kilometers. The map display represents 105004 feet east to west by 105004 feet north to south for a total of 395.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-
are from the United States Department of the Interior, United States Geological Survey.
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic
http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2022-04-05 14:39:16 (qa/qc March 21, 2016 12:20 - tn=1174946.1 dist=3218 I)
$poi=37.9039500 -78.4572799

Virginia Department of Game and Inland Fisheries

4/5/2022 2:38:55 PM

Fish and Wildlife Information Service

VaFWIS Search Report Compiled on 4/5/2022, 2:38:55 PM

Help

Known or likely to occur within a **2 mile buffer around polygon; center 37.9039500 -78.4572799**
in **003 Albemarle County, 065 Fluvanna County, VA**
where (060017) **Spinymussel, James** observed.

View Map of Site Location

Threatened and Endangered Waters where Spinymussel, James (060017) observed

(17 Reaches)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Hardware River (0100212)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (0100750)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (0101830)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (0101864)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (085651)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (088871)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (091711)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (091974)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (092525)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (093184)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River	FESE						Yes

(093300)		060017	FESE	Ia	Spinymussel, James	Parvaspina collina	
Hardware River (093961)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (094506)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (094692)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (096051)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (098543)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (098786)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes

*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern

**I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;
II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;
III=VA Wildlife Action Plan - Tier III - High Conservation Need;
IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need
Virginia Widlife Action Plan Conservation Opportunity Ranking:
a - On the ground management strategies/actions exist and can be feasibly implemented.;
b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.;
c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

Habitat Predicted for Aquatic WAP Tier I & II Species where Spinymussel, James (060017) observed

(3 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Briery Creek (20802031)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Hardware River (20802031)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes
Murphy Creek (20802031)	FESE	060017	FESE	Ia	Spinymussel, James	Parvaspina collina	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species where Spinymussel, James (060017) observed

N/A

Compiled on 4/5/2022, 2:38:55 PM I1174946.1 report=BOVA searchType= P dist= 3218 poi= 37.9039500 -78.4572799

audit no. 1174946 4/5/2022 2:38:55 PM Virginia Fish and Wildlife Information Service