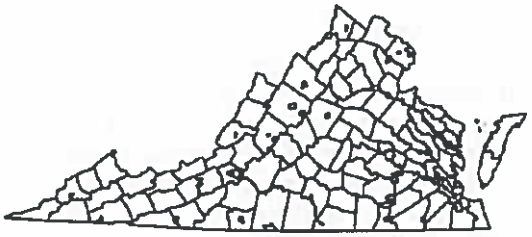
PROJECT NARRATIVE

FLATFOOT SOLAR – 2 MW_{DC}
STONY CREEK, VA
SUSSEX COUNTY



- ✓ **WELL-SITED**
  The project is set back 900+ feet from roads and homes, and offers natural visual buffers on all sides.

- ✓ **LOW IMPACT**
  Low profile, low traffic, low sound-levels. No odor, hazardous materials, nor light pollution. No permanent structures.

- ✓ **ECONOMIC DEVELOPMENT**
  Local labor and materials will be used to the extent they are available. Virginia now has over 4,400 solar jobs and the industry continues to grow faster than the overall economy (15.4% increase in 2019)

- ✓ **BASED IN VIRGINIA**
  We are a locally-owned Virginia company based in Charlottesville and have partnered with SVCC to create a solar jobs training program, SHINE.

- ✓ **PROVEN DESIGN & EQUIPMENT**
  Fully meets Dominion's equipment and design requirements, including industry standard Tier 1 components backed by bankable warranties.

Overview

Hexagon Energy is pleased to apply for a Conditional Use Permit for Flatfoot Solar (the Project), a 2-megawatt (MW) direct-current (DC) solar photovoltaic (PV) project located in Sussex County, Virginia. The Project will be located at Parcel IDs 65-A-45 and 65-A-37 (the Property), on the southern side of Sussex Drive (Route 40), west of Stony Creek. The Project will encompass approximately 10 acres of field and forest on two greater properties totaling 83.69 acres, and will be located in the A-1 Agricultural District. The project has been designed in full compliance with Sussex County and Virginia permitting and approval requirements.

Applicant & Facility Owner

Flatfoot Solar, LLC is both the applicant and facility owner for the Project. Flatfoot Solar, LLC is a wholly-owned subsidiary of Hexagon Energy, LLC (Hexagon Energy), a Virginia Limited Liability Company. Hexagon Energy is located in Charlottesville, Virginia—with our owners and all but two of our employees residing in Virginia.

Hexagon Energy is an independent, privately owned energy development firm that believes the path to a clean energy future requires a range of new sources and technologies. We develop projects across six diverse energy solutions with one common goal—powering a clean future.

Over the past 19 years, Hexagon Energy's principals have played a central role in building the renewable energy industry in Virginia and bringing renewable energy jobs to the Commonwealth. Our principals have advised Dominion on 232 MW of renewable energy purchases and developed over 650 MW of solar projects across the U.S., including some of the first utility-scale projects in Virginia. We are excited to work with Sussex County to develop a locally-based solar project that benefits Virginia communities, rate payers, and land owners.

AT A GLANCE

- Established in 2015
- Developing energy projects since the early 1990s
- 2,875 MW of energy development experience across 17 states
- Representing over $1.5 Billion USD in invested capital

LOCATION & CONTACT INFO

722 Preston Ave. | Suite 102
Charlottesville, VA 22903
info@hexagon-energy.com

Energy Development Experience

Hexagon Energy's principals have been developing energy projects since 2000 and have a wide range of experience that guides our work. Over the past 20 years, Hexagon Energy's principals have developed and financed nearly 3,000 MW of energy projects in 17 U.S. states, representing over $1.5 billion in invested capital. The projects include utility scale wind and solar projects ranging from a few megawatts to over a gigawatt. The following table summarizes the energy development experience of Hexagon Energy's principals, both at Hexagon and prior companies.

TYPE	SINCE	ADVISORY	OPERATING	UNDER DEVELOPMENT
Solar PV	2008	232 MW	597 MWac	2,317 MWac
Wind	2000	400 MW	2,278 MWac	550 MWac
Energy Storage	2013	20 MW	--	44 MWac
TOTAL		**652 MW**	**2,875 MWac**	**2,576 MWac**

Table 1: Hexagon Energy's Project Development Experience

PROJECT DESIGN

Hexagon Energy proposes to develop and construct Flatfoot Solar, with a nameplate capacity of $2MW_{DC}$ ($1.62MW_{AC}$). All of the clean energy generated by the facility will be interconnected to the Dominion power grid (the Grid) at the existing 34.5 kilovolt (kV) distribution line on the north side of Sussex drive/Route 40. The Project has executed an Interconnection Agreement with Dominion Energy, and has an electrical offtake proposal under consideration.

Flatfoot Solar will consist of approximately 5,500 crystalline silicon solar PV panels sourced from Tier 1 manufacturers. Additional equipment will include single axis tracker components, DC to AC string inverters, a medium voltage transformer and a control cabinet, project switch gear, a meter, and the interconnection to the existing distribution system.

To support the PV panels, the Project will utilize a single-axis tracking system designed to optimize power production of the panels by rotating them to follow the path of the sun. The single-axis tracker design consists of a series of mechanically linked horizontal steel support beams known as torque tubes, with a drive train system usually located in the center of the rows. The rows will be placed 18.5 feet apart (center to center) and the panels will cover approximately 35% of the Project area. The racking system will be supported by metal piles driven or screwed into the ground by a pile-driving machine to a depth of approximately 10 feet.

The PV panels in each row will be wired together into a circuit (string). There will be a DC to AC string inverter for approximately every 3 rows, typically mounted on a piling adjacent to the tracker structure. AC Power will be transmitted from the string inverters via three-phase direct-buried cables, buried at a depth of approximately 36 to 48 inches, and aggregated at the AC collection switch gear and then on to the medium voltage transformer. The transformer will be mounted on a concrete slab with the project switchgear and control cabinet. The transformer steps up the voltage of the electrical power to 34.5kV to match the Grid. The power is transmitted from the transformer to the Project's protective recloser and metering equipment before interconnecting with Dominion's existing infrastructure along Sussex Drive/Route 40.

An internal access drive, consisting of an all-weather aggregate base, will allow access to the PV panels. Site security will consist of a 7-foot-high chain-link fence with barbed wire installed around the perimeter of the solar panel array. Pursuant to Sec 16-406 (f), a performance bond reflecting the costs of anticipated fence maintenance shall be posted prior to commencement of construction, and maintained throughout the duration of the project. The fence area will be screened on all sides from view with existing natural forest vegetation. Manual swing gates will be constructed at the main entrance and in strategic areas, as required for access by maintenance crews. National Electric Code standards for safety and signage will be met or exceeded.

HEALTH & SAFETY

The project will utilize passive photovoltaic (PV) cells to generate electricity and inverters to change the direct current into alternating current. They consist of common materials including glass, polymer, aluminum, copper, and silicon semi-conductor material. Solar PV panels function as a solid state, inert crystal composed of non-toxic materials and are most similar to a pane of solid glass. There are no chemicals, fluids, or materials that are capable of entering the environment. The PV and inverter technology have been utilized and studied for over 30 years and are not known to pose any significant health dangers to neighbors. Instead, the reduction in pollution from fossil-fuel-fired electric generators make solar farms a positive impact on human health.

In May 2017, researchers at NC State University published a detailed review of the Health and Safety Impacts of Solar Photovoltaics that "utilizes the latest scientific literature and knowledge of solar practices in N.C. to address the health and safety risks associated with solar PV technology. These risks are extremely small, far less than those associated with common activities such as driving a car, and vastly

outweighed by health benefits of the generation of clean electricity." The full report can be found attached in Appendix I attached.

Site Location and Characteristics

Flatfoot Solar will encompass approximately 10 acres in the middle of a larger, 83.69-acre property cluster (the Site). The Site is located in the A-1 Agricultural District-zoned portion of the Property, and has historically served agricultural and wooded timber uses. A portion of the Property is zoned R-1 and R-2, and the northeastern portion of the Property is currently the location of the Sappony Mobile Village. The small field on a portion of the Site is currently rented out for farming, while the forested areas remain undeveloped. The topography of the Property is predominantly flat to gently rolling.

Approximately 7 acres of trees will be cleared to accommodate the array area and prevent shading. Any site grading will create finished grade slopes suitable for racking installation and storm water management improvements. Flatfoot Solar, LLC shall submit a grading plan for approval by the County prior to the issuance of a Building Permit. A storm water pollution prevention plan specific to the Project will be developed as well, and best management practices will be implemented and inspected regularly to ensure erosion and sedimentation is avoided.

The Site is naturally buffered by existing tree-line and forested areas on all sides, and the array will be set back over 900 feet from Sussex Drive/Route 40 and nearby residences. As depicted in the attached Location Map and Adjacent Property Owner List, the Property is abutted by A-1 agricultural parcels in addition to R-1 and R-2 zoned residences.

In 2019, Sussex County had updated its Comprehensive Plan to further address the development of utility-scale solar facilities. These updates identified preferences for the location and size of future proposed development. Flatfoot Solar is located in excess of the preferred two-mile setback from the existing Sappony Solar Project, also along Sussex Drive/Route 40. Using publicly available data, there are no other known solar projects within a 4-mile radius of the project. Additionally, we estimate that the Site is located approximately 2.79 miles from the town boundary of Stony Creek, which is within the preferred three-mile setback identified in the Comprehensive Plan update. To mitigate the potential impacts of town proximity, Flatfoot Solar shall be screened from Route 40, one of the thoroughfares leading to the Town.

Environmental and Cultural Impact

Wetlands

The Site is located near Sappony Creek. Hexagon Energy has partnered with Timmons Group to perform a field assessment and delineation of the wetlands on the Property. We plan to have this delineation verified by the US Army Corps of Engineers. The site area will be designed and constructed to setback from, and not impact delineated wetlands.

Site access will utilize an existing pathway located on parcel ID 65-A-45. While this pathway will be improved, we have identified that a wetland crossing is required. Flatfoot Solar will obtain all requisite state and local wetland permits and mitigation compliance prior to facility construction.

Wildlife Habitats

The Property has been screened, via desktop review, for known critical habitats for threatened and endangered species, and none are known to be present on the Property. Hexagon has generated an official species list using the US Fish and Wildlife Service's Information for Planning and Consultation (IPaC) tool to confirm that there are no known critical habitats. We will further engage US Fish and

Wildlife Services and the Virginia Department of Wildlife Resources in a critical habitat field assessment to ensure our site has no impact to threatened and endangered species.

Environmentally Sensitive Areas

There is one Virginia Department of Forestry (DOF) conservation easement present on a property approximately 1.7 miles northeast of the Site, on the border of Sussex County and Dinwiddie County. There are no state or nationally registered forests, recreational areas, wildlife management areas, nor environmental protection zones within a 3-mile radius of the Project. The Property abuts Sappony Creek on the south and southeastern sides, and the Site shall be set back to avoid these areas.

We have reviewed the Property using the Virginia Department of Conservation and Recreation Natural Heritage Database Explorer Tool. Preliminary findings identified that the Property is within the Nottoway County – Stony Creek Stream Conservation Unit (SCU). This SCU has been given a biodiversity ranking of B2, representing an area of very high significance. The Property was further reviewed by the agency. The report can be found in Appendix J. VADCR recommended that the Project adhere to applicable state and local erosion and sediment control/storm water management laws and best practices. Further, the agency recommended that the project establish and enhance natural riparian buffers with native plant species and maintain natural stream flow. We will coordinate with VADCR and VADWR to ensure that any impacts are mitigated.

Culturally and Historically Significant Resources

The Property has been screened for cultural and architectural sites via desktop analysis. A review of Virginia Cultural Resources Information System report (V-CRIS) data indicates there are 39 architectural and 52 archaeological resources within an approximate 3-mile radius of the Site. We have identified that the Property intersects an area identified as a potential battlefield approach area for the Battle of Stony Creek Depot / Sappony Church Battlefield. In previous study reports, research staff concluded that the battlefield area is likely eligible for listing in the National Register of Historic Places. As of the submission of this application, this area is not listed in the NRHP. The Site does not intersect this potential battlefield approach or core area. Flatfoot Solar shall be visually screened from these resources.

County Impact

Once constructed, Flatfoot Solar will be virtually unnoticeable and will not require any additional use of County law enforcement or resources.

Security

The Site will be fenced in by a 7-foot-high chain-link fence topped with strands of barbed wire to deter any unauthorized access to the site. After construction concludes, the gates will remain locked, access will be coordinated by authorized operations and maintenance personnel. The Site will also include a "Knox Box" on the gate to provide 24/7 emergency access for fire and police personnel.

Access & Attachment Facilities

Ingress and egress will be improved and maintained via the existing driveway off of Sussex Drive/Route 40, and will ensure suitable access for fire and other emergency vehicles. As identified in Appendix D, the proposed access pathway and grid attachment line cross an area designated as a Freshwater Forested/Shrub Wetland in the U.S. Fish and Wildlife Service National Wetlands Inventory. Flatfoot Solar LLC will comply with State and Federal regulations regarding wetland crossings, and will obtain the requisite Nationwide Permit from the US Army Corp of Engineers prior to any land disturbance.

The electrical attachment lines that span from the Site to Sussex Drive/Route 40 shall be overhead. Approximately two to three pole spans, or 280-300 feet, will be visible from Sussex Drive/Route 40, where

the path crosses a clearing from the woods on the Property. Visualizations of the attachment line can be found in Appendix D of this application.

Water

An on-site source of potable water will not be required during construction or operation of Flatfoot Solar. Any on-site water required will be supplied by Flatfoot Solar, LLC. No well-digging will be required.

Sound

From Sussex Drive/Route 40, the array will be virtually inaudible. The Project is planned to feature Solectria PVI 60TL (60kWac) inverters and DuraTrack HZ v3 racking equipment that will produce a small amount of sound (<60dBA at 1 meter away) within the Site.

Glare

In addition to being visually screened from Sussex Drive/Route 40, the panels are designed to absorb as much sunlight as possible, and are treated with an anti-glare coating. The Project is more than three miles from any major airport, and an FAA Hazard analysis is not required.

Construction

Based on the current project schedule, construction is forecasted to begin in the early spring of 2022 Construction is estimated to take one to two months, dependent on weather. Following construction, the Project will undergo testing and commissioning in coordination with Dominion Energy. The Project is estimated to commence operations in the early summer of 2022.

Hexagon estimates there will be 16 deliveries by full size tractor trailers to deliver the solar panels, racking, and wiring equipment. Construction will involve minimal ground disturbance, and Hexagon shall submit a detailed traffic study to the County prior to the issuance a Building Permit. The study shall model the construction and decommissioning processes, to be reviewed by County staff in cooperation with VDOT. Ingress and egress of heavy equipment and traffic will be restricted to the existing driveway on the Property off of Sussex Drive/Route 40.

A detailed erosion and sediment control plan will be developed and implemented to prevent runoff from entering the surrounding environment. Erosion and sediment control measures may include straw bales, hay coil logs, run-off channels, silt fencing, and sediment basins.

Natural vegetative ground cover will be established across the Site upon construction completion. The vegetative ground cover will include native grasses and ensure erosion and sediment control throughout the life of the Project. The ground cover shall be maintained in compliance with Section 16-406 (g). If required by the County, Hexagon shall submit a landscaping maintenance plan prior to the issuance of a Building Permit.

Operations and Maintenance

Once constructed, the Project will require very little maintenance and therefore traffic to the Site. Electrical engineers will service the inverters and transformers on average once per quarter. The solar panels have very low failure rates of approximately 1 in 10,000 per year. The Project output is monitored remotely and defective panels are easily replaced from inventory stores. The Project does not require on-site water or chemicals to keep the panels clean. Rain occurs with sufficient frequency and quantity in Sussex County to naturally keep the panels clean. Native vegetation will be maintained under and between the panels with periodic mowing during the growing season. The Site maintenance is typically contracted and performed by local companies.

Economic Development

Local materials and labor will be used for the construction and maintenance of the Project to the extent that they are available. The solar industry in Virginia is growing faster than the overall economy and presents new career opportunities throughout the Commonwealth. Hexagon Energy is on the Leadership Council of SHINE, a Virginia Solar Workforce Initiative partnered with Southside Virginia Community College. The program not only trains new workers, but pairs the training with an upcoming solar installation job. The program is aligned with upcoming solar projects and the first classes commenced in the fall of 2019

Flatfoot Solar will create approximately 20 construction, and 1-2 operations positions in the local community. Flatfoot Solar will also make roughly $2,645,000 in total capital investment for construction, material, labor, and professional services and the construction will contribute over $600,000 in direct spending in the local economy. The array will produce enough energy to power roughly 140 homes after it is completed.

DECOMMISSIONING

Facility decommissioning is generally described as the removal of all system components and the rehabilitation of the site to pre-construction conditions. The goal of project decommissioning and reclamation is to remove the installed power generation equipment and return the site to a condition as close to a pre-construction state as feasible. Pursuant to Section 16-404 (f) and Section 16-407, Hexagon proposes to provide a surety bond for the cost of facility decommissioning. The bond will be made available prior to any land disturbances associated with Project construction. The cost of facility decommissioning shall be recalculated every five (5) years to factor changes in removal costs, without any reduction for salvage value, by a professional approved by the County. The value of the surety bond will be updated to match the recalculated decommissioning cost estimate. Hexagon will engage a certified engineer to develop a full decommissioning plan detailing the amount of surety to be posted. This decommissioning plan shall be submitted to the County prior to receiving a Building Permit. The bond shall be maintained in full compliance with Section 16-404 (f) and 16-407 of the Sussex County Code.

Effectively, the decommissioning of the solar plant proceeds in reverse order of the installation.

1. The PV facility shall be disconnected from the utility power grid.
2. PV modules shall be disconnected, collected, and recycled off-site by an approved recycling facility. If no recycling facility is available, PV modules are deemed non-hazardous waste by EPA guidelines and can be landfilled.
3. Above ground and underground electrical interconnection and distribution cables shall be removed and salvaged or recycled off-site by an approved facility.
4. PV module support aluminum racking shall be removed and recycled off-site by an approved recycler.
5. PV module support steel and support posts shall be removed and recycled off-site by an approved metals recycler.
6. Electrical and electronic devices, including transformers and inverters shall be removed and recycled off-site by an approved recycler.
7. Concrete foundations shall be removed and recycled off-site by a concrete recycler.
8. Fencing shall be removed and will be recycled off-site by an approved recycler.
9. The interior roads can remain onsite should the landowner choose to retain them or be removed, and the gravel repurposed either on or off-site.
10. The Project Site may be converted to other uses in accordance with applicable land use regulations in effect at that time of decommissioning. There are no permanent changes to the site, and it can be restored to its original condition including re-vegetation. Any soil removed for construction purposes will be relocated on the site or used for landscaping after construction is complete.

Pursuant to the requirements set forth in Article XXIII of Sussex County's Zoning Ordinance, Flatfoot Solar shall be subject to the following additional decommissioning requirements:

- Within a period of six (6) months after the Project has ceased continuous service, or as otherwise specified within Section 16-407(a), the Project shall be removed;

- Pursuant to Sec. 16-407 (c) and (d) the Site shall be graded and re-seeded or replanted with pine seedlings, where appropriate; and
- Activities to re-grade and re-seed or replant the Site shall be initiated within six (6) months of Project removal, and be completed within 12 months after Project removal.

REGULATORY CONFORMANCE

Flatfoot Solar has been designed to be in substantial accord with the Comprehensive Plan and conform with the all requirements set forth in the County's Zoning Ordinance

CONFORMANCE WITH COMPREHENSIVE PLAN

The character and extent of Flatfoot Solar are substantially in accord with the County's Comprehensive Plan. The Project intends to provide locally generated, clean energy to Dominion customers as a part of Dominion's Community Solar program, promoting infrastructure service to the county and beyond. The Project will be clean, non-disturbing, and support local job training and educational opportunities through SHINE, the Virginia Solar Workforce Initiative hosted by Southside Virginia Community College. Specifically, Flatfoot Solar meets the following requirements and goals contained within the Comprehensive Plan:

Chapter II: Concerns and Aspirations, Section B. Issues and Existing and Emerging Conditions (p.11-12)

23. Utility-Scale Solar Facilities

Chapter X: Plan for the Future, Issue 6. Growth Management Goal:

Goal 2: Promote environmentally friendly development that is sustainable, aesthetically pleasing, and consistent with the County's rural image and character

REQUEST FOR ADDITIONAL CONSIDERATION

Concurrently with this Conditional Use Permit Application, Flatfoot Solar, LLC ("Applicant") requests additional consideration of the Zoning Ordinance via text amendment application.

Pursuant to Sec. 16-406: Minimum Development Standards, utility-scale solar facilities are subject to regulations that "are intended to mitigate the adverse effects of such uses on adjoining property owners, the area, and the County." Sec. 16-405 (c) sets the minimum setback to property lines of parcels *with dwellings* at 200 feet. Due to the Project's size and proposed location, the Applicant requests this standard be reduced to a 150ft setback from the parcel abutting the Property to the West (parcel ID 65-A-46).

The Applicant has included additional photos illustrating the current visual screenings present throughout the surrounding area in Appendix D. Setback #2 depicts the current visual characteristics of the parcel abutting the Property to the West. This parcel (parcel ID 65-A-46) contains a dwelling off of Sussex Drive, and would therefore require a buffer of 200 feet from all sides in compliance with the Zoning Ordinance.

The dwelling located on Parcel ID 65-A-46 is situated over 1,100 feet from the Site. This includes approximately 964 feet of visual screening from the Site to the tree line closest to the dwelling. Almost all viewsheds of the western property boundary are screened by at least 300 feet of vegetation present on Parcel ID 65-A-46. This buffer is further compounded with existing vegetation that will not be cleared for Project construction. The forested areas on Parcel ID 65-A-46 have been identified as a likely location of wetlands, which we believe will deter future clearing. Once installed, Flatfoot Solar will be nearly invisible under the current buffer conditions to adjoining property owners.

The Applicant asks that the Planning Commission and Board of Supervisors consider this request favorably in conjunction of reviewing this Conditional Use Permit Application.

APPENDIX A: PARCEL OWNERSHIP DOCUMENTATION

Enclosed.

Property Identification Card

Previous

Property Address
10080 VINCO CIRCLE
STONY CREEK, VA

Owner Name/Address
VINCO ENTERPRISES INC
109 HICKSFORD AVENUE
EMPORIA VA 23847

Map ID: 65 A 37
Acct No: 4626-1
Legal Description: SAPONY MOBILE VILLAGE RT 40 & 681

Deed Book/Page: 113 / 602
Will Book/Page: 53 / 653

Occupancy: OTHER
Dwelling Type: TRAILER PK
Use/Class: AGRICULTURAL- 20-100 AC **Acreage:** 52.360
Year Assessed: 2018 **Year Built:** **Land Use:** 0
Zoning: **Year Remodeled:** **Total Mineral:**
District: 03 STONY CREEK **Year Effective:** **Total Land:** 100300
MH/Type: **On Site Date:** 02/16/2017 **Total Improvements:** $119,700
Condition: AVERAGE **Review Date:** **Total Value:** $220,000

Improvement Description

Exterior	Interior	Site
		STREET-PAVED
		TOPO-LEVEL
		UTIL-WELL
		UTIL-SEPTIC
		UTIL-ELECTRIC

Other Improvements Valuation

Desc	Length	Width	Size	Grade	Rate	FV/Pct	Value
MH HOOK-U	1.0	32.0	32		3500.00		112000
SIGN	1.0	1.0	1				200
WELL HOUS	1.0	1.0	1				300
WELL HOUS	1.0	1.0	1				700
DECK-WOOD	1.0	25.0	25		100.00		2500
SHED							700
SHED							1000
SHED							200
SHED							1000
SHED							1000
SHED							100
Total Imp Value							119700

Land Valuation

M	Cls	Desc	G	Size	Dpth	Rate	FV/Pct	Value
A	40	COMM/INDUS	A	12.0000		5060.00		60720
T	23	W-SECONDRY	A	40.3600		756.00		30512
A	86	MIXED TIMB	E	40.3600		225.00		9081
Total Land Value				52.360				100300

Comments

SAPPONY TRAILER PARK
01/16/2020 TB 10150 VINCO CIRCLE LOT #8 SWMH
REPLACED BY ANOTHER SWMH ON PIERS.

Sec	Type	Str	Description	Area
Total Square Feet				

	Cur. Value	Prev. Value	%Inc.
Land	100300	96300	
Improvements	119700	115700	
Total	220000	212000	
Average Price Per Acre		1742	
Sale Date/Amount	9/01/1987	150000	

Real Estate Public Inquiry

Name: VINCO ENTERPRISES INC

		Dept	Ticket No.	Seq.	Account No.	Due Date	Name	Description	Balance
Details		RE2014	8252	1	4626	12/5/2014	VINCO ENTERPRISES INC	SAPONY MOBILE VILLAGE	$0.00
Details		RE2015	8225	1	4626	12/7/2015	VINCO ENTERPRISES INC	SAPONY MOBILE VILLAGE	$0.00
Details		RE2016	8232	1	4626	12/5/2016	VINCO ENTERPRISES INC	SAPONY MOBILE VILLAGE	$0.00
Details		RE2017	8254	1	4626	12/5/2017	VINCO ENTERPRISES INC	SAPONY MOBILE VILLAGE	$0.00
Details		RE2018	8255	1	4626	12/5/2018	VINCO ENTERPRISES INC	SAPONY MOBILE VILLAGE	$0.00
Details		RE2019	8232	1	4626	12/5/2019	VINCO ENTERPRISES INC	SAPONY MOBILE VILLAGE	$0.00

1

◉Show Description ○Show Map#

Total Due: $0.0(

Note: If payment was received within the past 10 business days, any returned items may not be posted yet.

Previous

Real Estate Public Inquiry Ticket Detail

REAL ESTATE 2019

Department: RE2019 **Ticket No:** 82320001 **Frequency:** 1 **Supplement No:** 0

Name: VINCO ENTERPRISES INC **Account No:** 4626

Name 2:

Address:

109 HICKSFORD AVENUE
EMPORIA VA 23847

Map No: 65 A 37

District: 03

Description: SAPONY MOBILE VILLAGE
RT 40 & 681

Bill Date: 09/13/2019 **Due Date:** 12/05/2019

Land Value: $100,300 **Improvement Value:** $119,700

Original Bill: $1,276.00 **Acres:** 52.3600 **Last Date:** 12/02/2019

Payments: $1,276.00- **Penalty Paid:** $0.00 **Interest Paid:** $0.00

Amount Owed: $0.00

Total Owed: $0.00 **Penalty:** $0.00 **Interest:** $0.00

Note: If payment was received within the past 10 business days, then any returned items may not be posted at this time.

Date	Type	Transaction No.	Amount	Balance
09/13/2019	Charge	0	$ 1276.00	$ 1276.00
12/02/2019	Payment	87318	$ -1276.00	$ 0.00

New Search Previous

(599)

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THIS DEED, made and entered into this 1st day of September, 1987, by and between W. H. CHAMBLISS, unmarried, party of the first part, and VINCO ENTERPRISES, INC., a Virginia Corporation, party of the second part;

WITNESSETH: That for and in consideration of the sum of Ten ($10.00) Dollars and other good and valuable consideration, cash in hand paid, the receipt of which is hereby acknowledged, the party of the first part does hereby grant, bargain, sell and convey with GENERAL WARRANTY AND ENGLISH COVENANTS OF TITLE, unto the said Vinco Enterprises, Inc., a Virginia corporation, all the following described real estate, to-wit:

ALL that certain tract, piece or parcel of land lying and being situate in Stony Creek Magisterial District, Sussex County, Virginia, containing 54.0 acres, more or less, being described as "Parcel B" on a "Plat of Survey of Property Owned by Herbert Parham - South of Route 40", made by S. G. Keedwell, C.L.S., dated March 5, 1970, which plat is recorded in the Clerk's Office of the Circuit Court of Sussex County, Virginia, in Deed Book 73, at page 634 and on which plat said tract is shown as being bounded on the North by State Highway Route No. 40 and a portion of Parham View Subdivision; on the East by State Highway Route No. 681; on the South by Sapony Creek; and on the West by the lands of Ananias Jones (Booth Tract) and "Parcel A", reference to the above plat is hereby made for a more detailed description of the real estate hereby conveyed. LESS AND EXCEPT 1.15 acres conveyed therefrom to Zelwood Pegram and wife by deed dated the 22nd day of July, 1971, and recorded in the aforesaid Clerk's Office in Deed Book 76, at page 531, and 0.491 acre acquired by the Commonwealth of Virginia by certificate dated the 8th day of November, 1978, and recorded in the aforesaid Clerk's Office in Deed Book 90, at page 633; BEING in all respects the same property as conveyed to W. H. Chambliss by deed dated June 16, 1987, of record in the Office of the Clerk of the Circuit Court of Sussex County, Virginia in Deed Book 113, at page 375.

LAW OFFICES
H. BENJAMIN VINCENT
EMPORIA, VIRGINIA

Mailed: SEP 10 1987
H. Benjamin Vincent, Atty.
109 Hicksford Avenue
Emporia, VA 23847

This conveyance is made subject, however, to all easements, conditions, restrictions and reservations appearing of record which affect the said property.

The grantor hereby expressly reserves unto himself the right to cut and remove all merchantible timber situated on the aforesaid property which shall be cut and removed within two (2) years from the date of this deed.

WITNESS the following signature and seal.

W. H. Chambliss (SEAL)

STATE OF VIRGINIA, AT LARGE,

CITY OF EMPORIA, to-wit:

The foregoing instrument, dated 1 September 1987, was acknowledged before me by W. H. Chambliss, unmarried, this 26th day of August, 1987.

My commission expires: 3-29-91.

Notary Public

VIRGINIA: In the Clerk's Office of the Circuit Court of Sussex County. The foregoing instrument was this day presented in the office aforesaid and is, together with the certificate of acknowledgment annexed, admitted to record this 1st day of September, 1987 at 11:50 A.M. The tax imposed by §58.1-802 of the Code has been paid in the amount of $ 150.00

TESTE: Gayne Williams Clerk

Property Identification Card

Previous

Property Address

Owner Name/Address
JONES ANANIAS
24205 JONES ROAD
STONY CREEK VA 23882

Map ID: 65 A 45
Acct No: 4991-1
Legal Description: S K ELLIS

Deed Book/Page: 65 / 638

Occupancy: VACANT
Dwelling Type:
Use/Class: AGRICULTURAL- 20-100 AC **Acreage:** 31.330
Year Assessed: 2018 **Year Built:** **Land Use:** 0
Zoning: **Year Remodeled:** **Total Mineral:**
District: 03 STONY CREEK **Year Effective:** **Total Land:** 40400
MH/Type: **On Site Date:** 02/19/2018 **Total Improvements:**
Condition: **Review Date:** **Total Value:** $40,400

Improvement Description		
Exterior	Interior	Site
		STREET-PAVED
		TOPO-LEVEL
		UTIL-ELECTRIC

Land Valuation

TRAC: 81.330 LMAT: .00

M	Cls	Desc	G	Size	Dpth	Rate	FV/Pct	Value
T	11	O-PRIMARY	A	6.0000		1941.00		11646
T	13	W-PRIMARY	A	25.3300		884.00		22391
A	86	MIXED TIMB	F	25.3300		250.00		6332
Total Land Value				31.330				40400
Total Property Value								40400

Sec	Type	Str	Description	Area
Total Square Feet				

	Cur. Value	Prev. Value	%Inc.
Land	40400	37800	
Improvements			
Total	40400	37800	
Average Price Per Acre		1086	

Real Estate Public Inquiry

Name: JONES ANANIAS

		Dept	Ticket No.	Seq.	Account No.	Due Date	Name	Description	Balance
Details		RE2014	4095	1	4991	12/5/2014	JONES ANANIAS	S K ELLIS	$0.00
Details		RE2015	4033	1	4991	12/7/2015	JONES ANANIAS	S K ELLIS	$0.00
Details		RE2016	4044	1	4991	12/5/2016	JONES ANANIAS	S K ELLIS	$0.00
Details		RE2017	4056	1	4991	12/5/2017	JONES ANANIAS	S K ELLIS	$0.00
Details		RE2018	4058	1	4991	12/5/2018	JONES ANANIAS	S K ELLIS	$0.00
Details		RE2019	4015	1	4991	12/5/2019	JONES ANANIAS	S K ELLIS	$0.00
1									

◉Show Description ○Show Map#

Total Due: $0.00

Note: If payment was received within the past 10 business days, any returned items may not be posted yet.

Previous

Real Estate Public Inquiry Ticket Detail

REAL ESTATE 2019

Department: RE2019 **Ticket No:** 40150001 **Frequency:** 1 **Supplement No:** 0

Name: JONES ANANIAS
Name 2:
Address:
24205 JONES ROAD
STONY CREEK VA 23882

Account No: 4991
Map No: 65 A 45
District: 03
Description: S K ELLIS

Bill Date: 09/13/2019
Due Date: 12/05/2019

Land Value: $40,400

Original Bill: $234.32 **Acres:** 31.3300 **Last Date:** 12/03/2019
Payments: $234.32- **Penalty Paid:** $0.00 **Interest Paid:** $0.00
Amount Owed: $0.00
Total Owed: $0.00 **Penalty:** $0.00 **Interest:** $0.00

Note: If payment was received within the past 10 business days, then any returned items may not be posted at this time.

Date	Type	Transaction No.	Amount	Balance
09/13/2019	Charge	0	$ 234.32	$ 234.32
12/03/2019	Payment	615	$ -234.32	$ 0.00

New Search Previous

REAL ESTATE TITLE REPORT

FILE NO.: 31533518-1

LOCATION: Sussex County, Virginia

CURRENT OWNER: 1) Ananias Jones, fee title

2) Theo Booth and Otelia Booth, life estate

2019 LAND ASSESSMENT:

MPN: 65-A-45
31.330 acres

Land: $40,400
Imp: 0
Total: 40,400

2019 Real estate tax: $234.32 (due annually on December 5)

DESCRIPTION:

All that certain tract or parcel of land lying and being situate in Stony Creek Magisterial District, Sussex County, Virginia, containing thirty-three and a third acres, more or less, and being bounded as follows: On the North by Cabin Point Road, on the East by the lands of John _____, on the South by Sappony Creek, and on the West by the lands of Thomas Foster.

Being the same real estate conveyed to Ananias Jones by Deed from Theo Booth and Otelia Booth, his wife, dated November 1, 1963 and recorded December 18, 1964 in the Clerk's Office of the Circuit Court of Sussex County, Virginia in Deed Book 65, page 638. The said Theo Booth and Otelia Booth having reserved a life estate.

Ananias Jones
Rci - Book 88
Stony Creek

THIS DEED, Made this 1st day of November, 1963, by and between THEO BOOTH and OTELIA BOOTH, HIS WIFE, parties of the first part, and ANANIAS JONES, party of the second part.

WITNESSETH: That for and in consideration of the sum of TWENTY-FIVE HUNDRED & NO/100THS ($2,500.00) DOLLARS, cash in hand paid, at and before the delivery of this deed, receipt of which is hereby acknowledged, the said parties of the first part do hereby grant, bargain, sell and convey, with General Warranty, but subject to the conditions hereinafter set forth, unto the said party of the second part, the following described real estate, to-wit:

All that certain tract or parcel of land lying and being situate in Stony Creek Magisterial District, Sussex County, Virginia, containing thirty-three and a third acres, more or less, and being bounded as follows: On the North by Cabin Point Road, on the East by the lands of John ____, on the South by Sappony Creek, and on the West by the lands of Thomas Foster; and being in all respects the identical real estate that was conveyed to Robert Booth by deed from E. A. Hartley and others, dated December 6, 1904, and duly recorded in the Clerk's Office of the Circuit Court of Sussex County, Virginia, in Deed Book 18, at page 201. Robert Booth departed this life intestate, leaving surviving him as his sole heir-at-law and next-of-kin the said Theo Booth.

This conveyance is made with the reservation that the parties of the first part for and during the terms of their natural lives shall have the exclusive right to use and occupy the dwelling house and out buildings located on the above described real estate and the further right to cut and use whatever firewood is required for their comfort.

The said parties of the first part hereby covenant that they have the right to convey the said real estate unto the said grantee; that they have done no act to encumber the same; that the said grantee shall have quiet and peaceable possession of the real estate hereby conveyed, free from all encumbrances whatsoever, and that they, the said parties of the first part, will execute such further assurances as may be requisite.

Witness the following signatures and seals:

Theo Booth (SEAL)

Otelia Booth (SEAL)

60

STATE OF VIRGINIA

COUNTY OF SUSSEX, TO-WIT:

I, John A. Ridley, a Commissioner in Chancery for the Circuit Court of the county aforesaid, in the State of Virginia, do hereby certify that Theo Booth and Otelia Booth, whose names are signed to the hereto-annexed writing, bearing date on the 1st day of November, 1963, have each acknowledged the same before me, in my county and state aforesaid.

Given under my hand this 2nd day of November, 1963.

John A. Ridley
Commissioner in Chancery
for Sussex Circuit Court

VIRGINIA: Clerk's Office of the Circuit Court of Sussex County
DEC 18 1964 19 at 11:30 o'clock A. M.
this deed was received and with the certificate annexed, admitted to record.

Teste: [illegible] Clerk

$3.75
REVENUE STAMPS AFFIXED AND CANCELLED

APPENDIX B: APPLICANT AUTHORIZATION DOCUMENTATION

Enclosed.

HEXAGON
ENERGY

July 28, 2020

I, H. Benjamin Vincent Jr., President of Vinco Enterprises, Inc. do hereby allow Hexagon Energy LLC, its Developers, and subsidiaries, to represent my property in Stony Creek, Virginia for purposes of obtaining a Conditional Use Permit for a Community Solar Facility with Sussex County.

Signed: H. Benj. Vincent

Date Signed: 8/4/2020

722 Preston Ave. | Suite 102 | Charlottesville, VA 22903
P 434.227.5090 hexagon-energy.com

HEXAGON
ENERGY

July 28, 2020

I, Ananias Jones, do hereby allow Hexagon Energy LLC, its Developers, and subsidiaries, to represent my property in Stony Creek, Virginia for purposes of obtaining a Conditional Use Permit for a Community Solar Facility with Sussex County.

Signed:

Ananias Jones

Date Signed: 07/28/2020

322 Preston Ave., Suite 402 | Charlottesville, VA 22903
434.227.5090 hexagon-energy.com

APPENDIX C: ADJACENT PROPERTY OWNER LIST

Enclosed

Parcel ID	Name	Address	City/State/Zip	Existing Use
65C-1-S-3	Tameka D. Blount	819 ZIRON COURT	VIRGINIA BEACH VA 23462	Residence/ House
65-A-43	Kathleen J. Cook	P O BOX 206	STONY CREEK, VA 23882	Residence/ House
65C-1-S-4	Sheila & Sierra Gurley	2122 CLOVERDALE AVENUE	HOPEWELL, VA 23860	Residence/ House
65-A-36	Barry & Pauline Kennedy	10057 PALESTINE ROAD	STONY CREEK, VA 23882	Vacant/Timber/Farming
65C-1-S-2	Rosa Ann May C/O Katrina Pearson	1331 MANNING DRIVE	VALENTIN, VA 23887	Residence/ House
65-A-46	Charlie Neaves Jr. & Winnie Neaves	2235 WALTON STREET	PETERSBURG, VA 23805	Residence/Farming
65-A-44	Clifton Owens & Lorine Moore	9362 SUSSEX DR	STONY CREEK, VA 23882	Residence/ House
65-A-38	Calvin Pegram	9458 SUSSEX DRIVE	STONY CREEK, VA 23882	Residence/ House

65-A-42	St. Johns Baptist Church	12364 ST JOHN CHURCH ROAD	STONY CREEK, VA 23882	Church/ Place of Worship

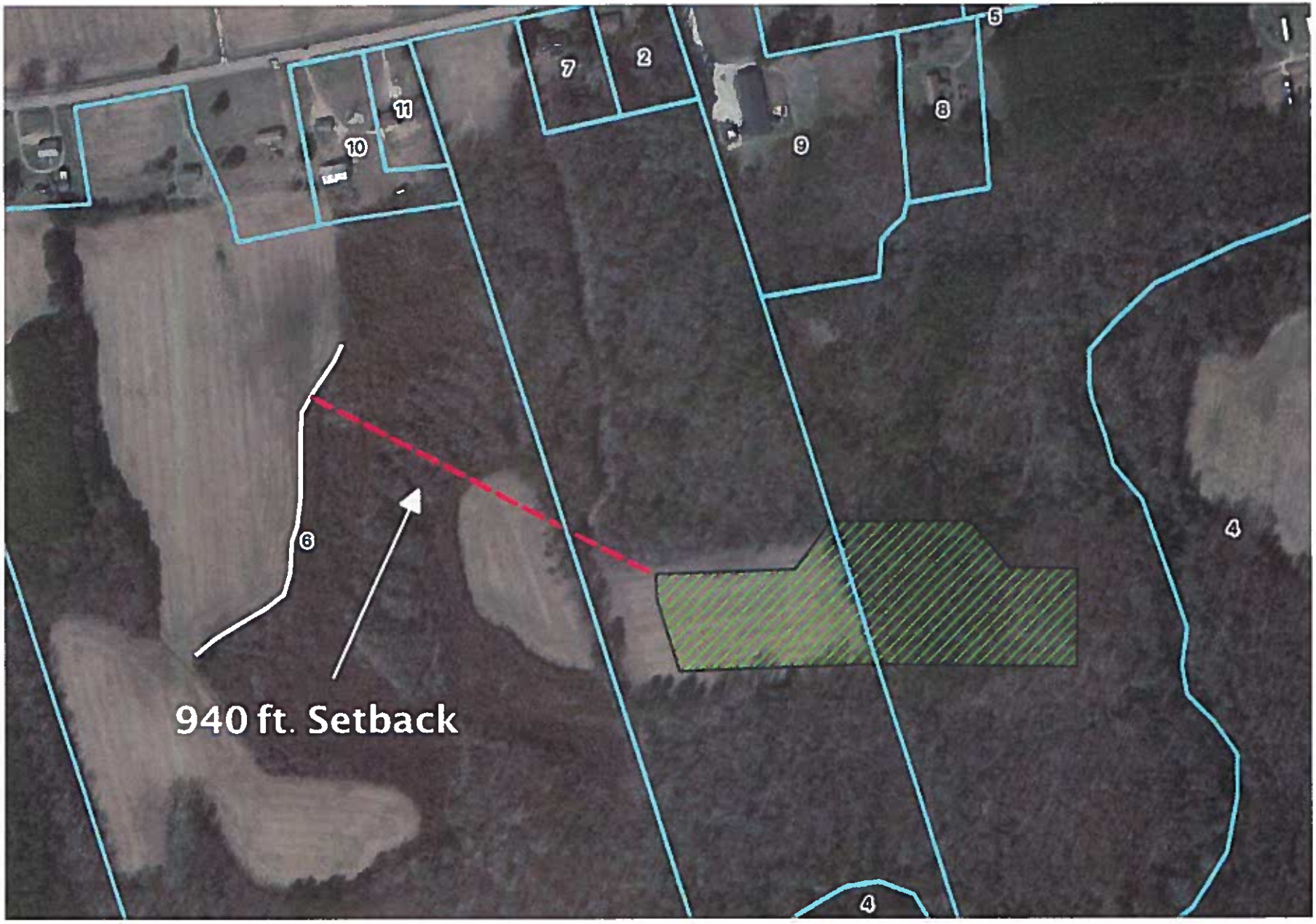
APPENDIX D: SITE LOCATION MAP

Enclosed.


Project Location Map
Legend
Property Boundary
Proposed Site Area
Grid Interconnection Point
Access Pathway
Attachment Line
Delineated Forested Wetland
Delineated Streams
Flood Zones
Regulatory Floodway
1% Annual Chance Flood Hazard
Undetermined Flood Hazard
0.2 PCT Annual Chance Flood Hazard

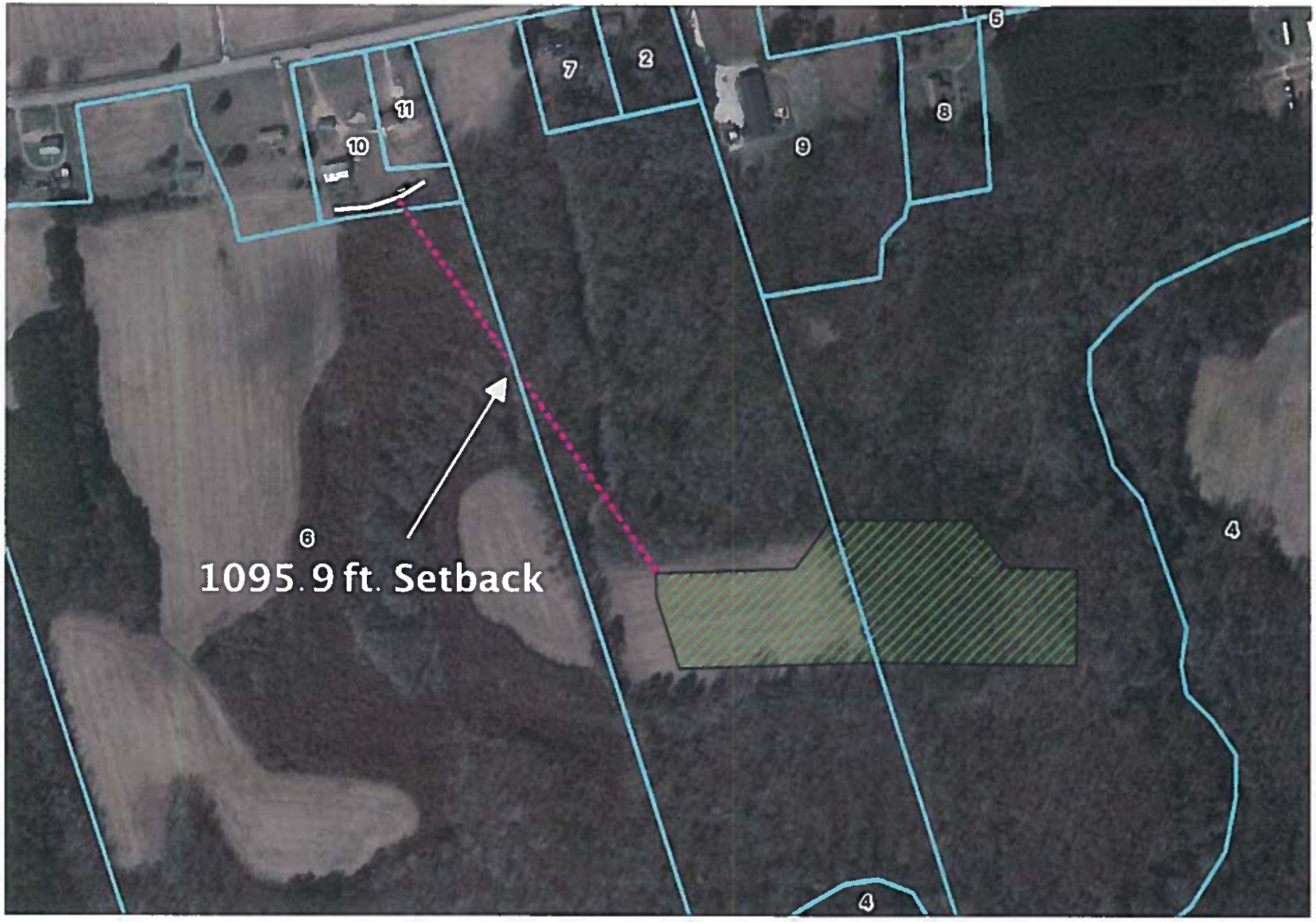

Site Proximity Map
Legend
Property Boundary
Proposed Site Area
Setback Distances from Site
163.38 ft.
210.14 ft.
656.13 ft.
792.55 ft.
1090.40 ft.
1124.90 ft.
1288.00 ft.
1424.70 ft.
1503.80 ft.
1
2
3
4
5
6
7
8
9
10
11
12


To Flatfoot Solar Array
Adjacent Parcel Screening
>450 ft.
Legend



Setback #1

Indicating visual buffer distance from treeline of adjacent property to Site Area. Total Buffer Distance: 940ft

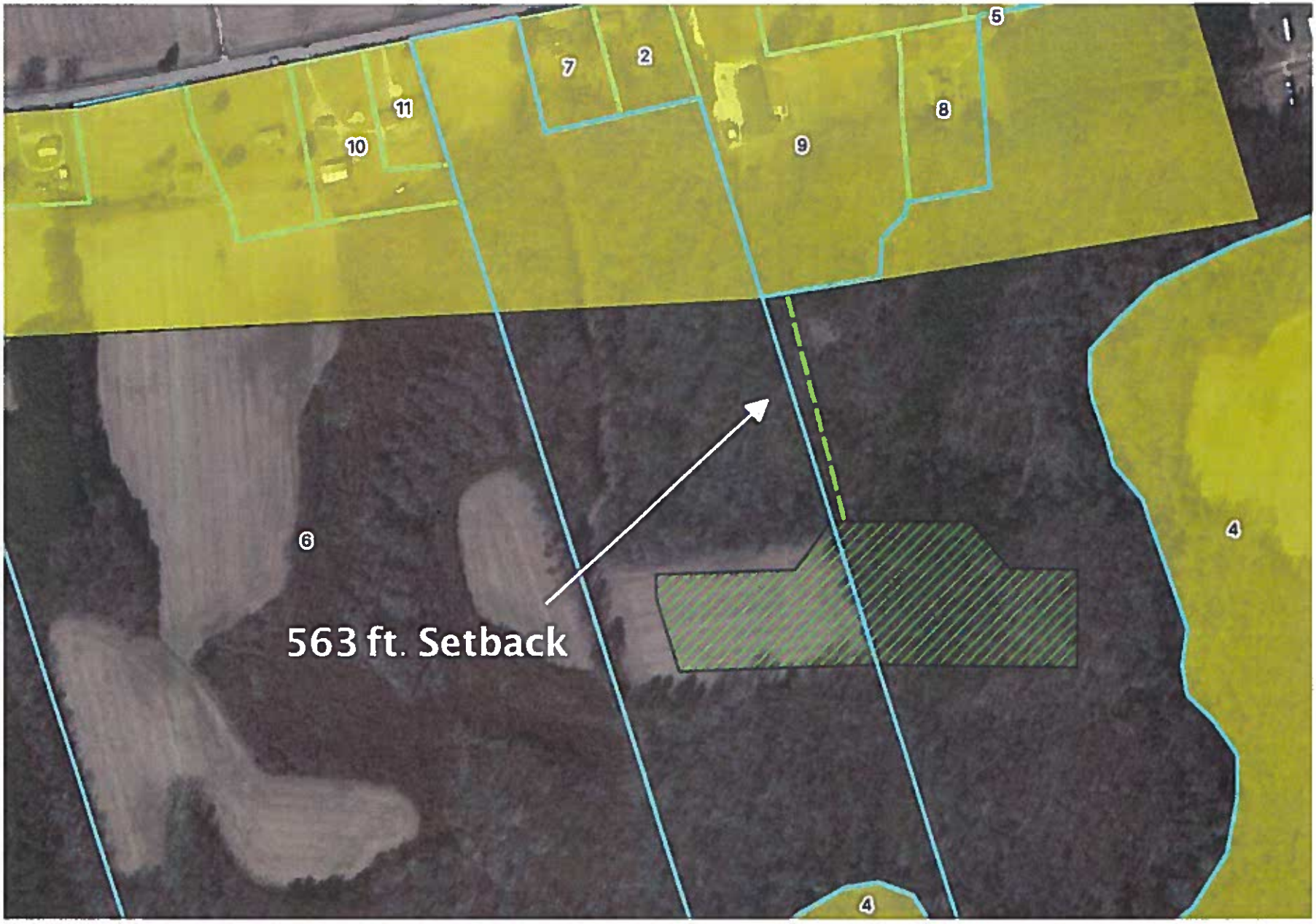


Setback #2

Indicating visual buffer distance from treeline of closest dwelling.
Total Buffer Distance: 1095.9ft

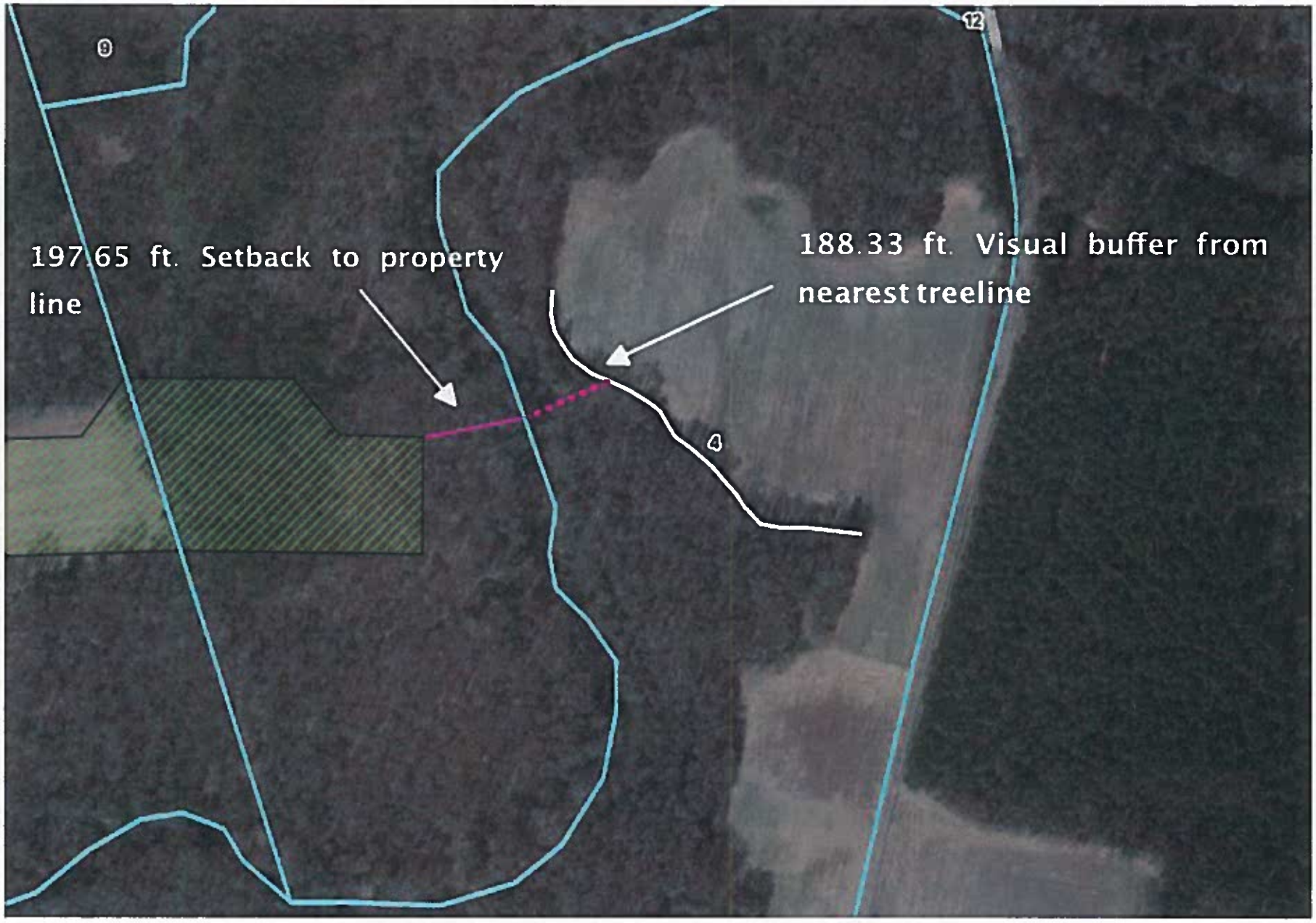

Flatfoot Solar Site Access Route
Sussex Dr. / Route 40


Google



Setback #3

Indicating visual buffer distance from residentially zoned property to Site Area. Total Buffer Distance: 563ft



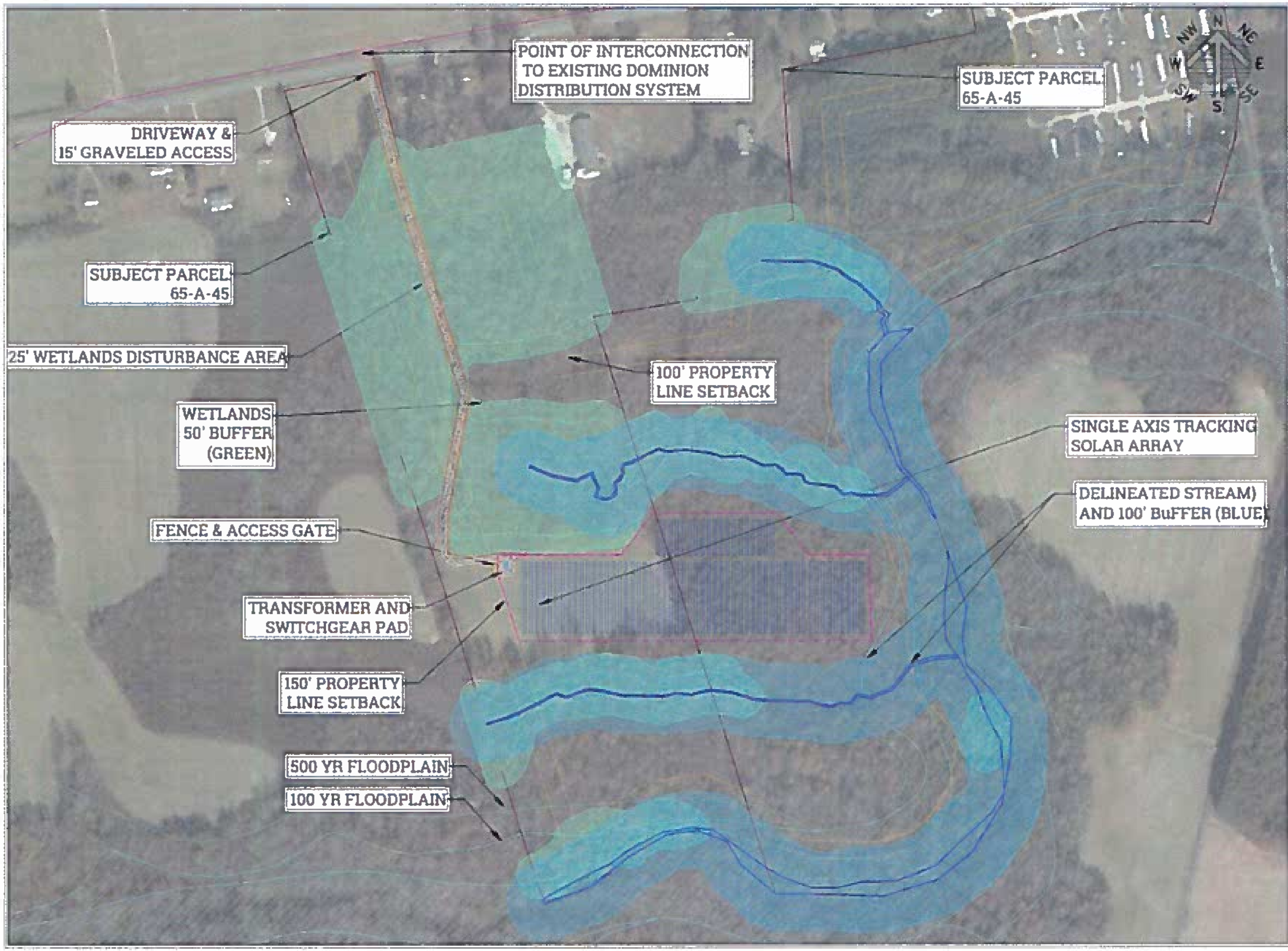
Setback #4

Indicating total buffer from closest treeline of residentially zoned property to Site Area. Total Buffer Distance: 385.98ft


South to Palestine Rd. / Route 657
North to Sussex Dr. / Route 40
Concord Sappony Rd. / Rte. 681

APPENDIX E: CONCEPT PLAN

Enclosed.



HEXAGON ENERGY

Professional Engineer:

PE Seal:

DRAWING TYPE

☒ Preliminary ☐ Construction
☐ Customer Approved ☐ As built
☐ Permitting ☐ Other

REVISIONS

Rev	By	Description	Date

Project Name: FLATFOOT SOLAR, LLC

Site Address: SUSSEX DRIVE, STONY CREEK, VA 23882, 36.943° N, -77.460° W

Sheet Name: SITE PLAN

Scale:

Project ID: TBD

Sheet No: L1.1

APPENDIX F: DECOMMISSIONING PLAN

To Be Provided Prior to Issuance of Building Permit.

APPENDIX G: TRAFFIC STUDY

To be Provided Prior to Issuance of Building Permit.

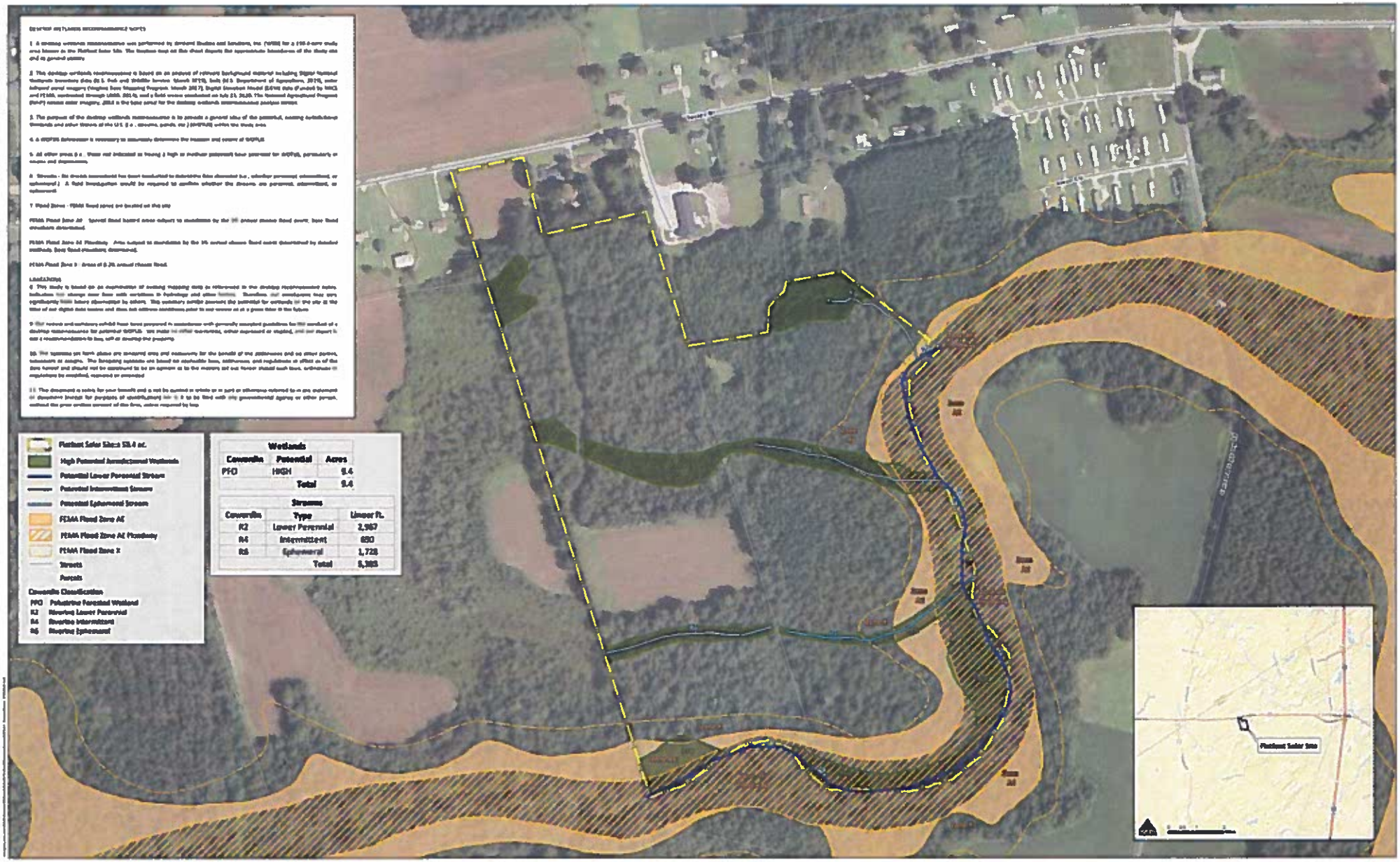
APPENDIX H: WETLANDS DELINEATION

Enclosed.

Desktop Reconnaissance Exhibit

Flatfoot Solar Site

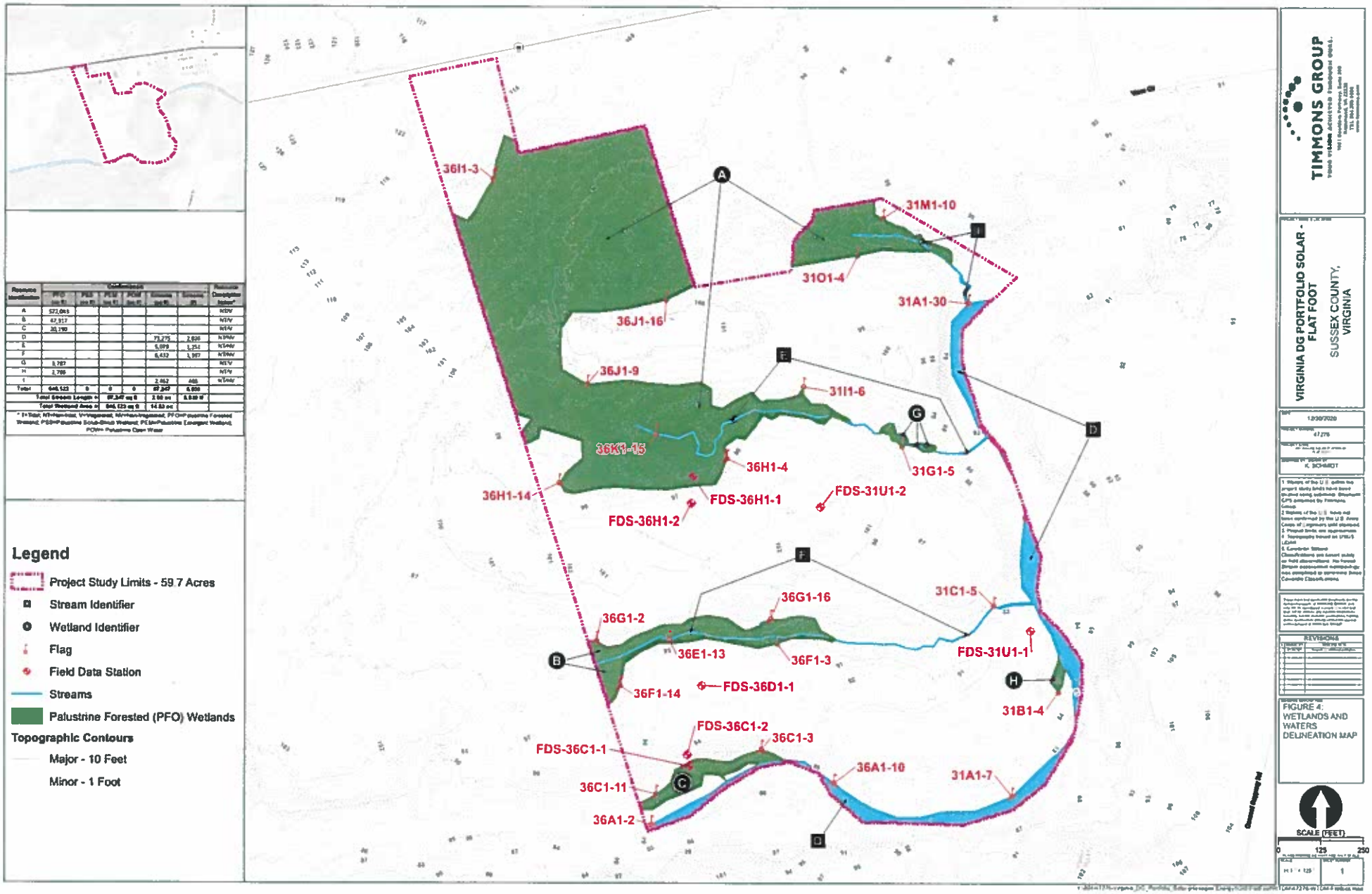
Sussex County, VA



Prepared: July 22, 2020
Last Modified: July 24, 2020

0 125 250 500 750 1,000 Feet

Wetland Studies and Solutions, Inc.
a GHD company


36I1-3
31M1-10
31O1-4
31A1-30
36J1-16
36J1-9
31I1-6
36K1-15
36H1-4
31G1-5
36H1-14
FDS-36H1-1
FDS-31U1-2
FDS-36H1-2
31C1-5
36G1-16
36G1-2
36E1-13
36F1-3
FDS-31U1-1
36F1-14
FDS-36D1-1
31B1-4
FDS-36C1-2
36C1-3
FDS-36C1-1
36A1-10
31A1-7
36C1-11
36A1-2
A
B
C
D
E
F
G
H
I
Legend
Project Study Limits - 59.7 Acres
Stream Identifier
Wetland Identifier
Flag
Field Data Station
Streams
Palustrine Forested (PFO) Wetlands
Topographic Contours
Major - 10 Feet
Minor - 1 Foot
TIMMONS GROUP
VIRGINIA DG PORTFOLIO SOLAR - FLAT FOOT
SUSSEX COUNTY, VIRGINIA
REVISIONS
FIGURE 4:
WETLANDS AND WATERS DELINEATION MAP
SCALE (FEET)
0
125
250

APPENDIX I:

NC State: Health and Safety Impacts of Solar Photovoltaics attached on following page.

NC CLEAN ENERGY
TECHNOLOGY CENTER

Health and Safety Impacts of Solar Photovoltaics

MAY 2017

NC CLEAN ENERGY TECHNOLOGY CENTER

NC STATE UNIVERSITY

Health and Safety Impacts of Solar Photovoltaics

The increasing presence of utility-scale solar photovoltaic (PV) systems (sometimes referred to as solar farms) is a rather new development in North Carolina's landscape. Due to the new and unknown nature of this technology, it is natural for communities near such developments to be concerned about health and safety impacts. Unfortunately, the quick emergence of utility-scale solar has cultivated fertile grounds for myths and half-truths about the health impacts of this technology, which can lead to unnecessary fear and conflict.

Photovoltaic (PV) technologies and solar inverters are not known to pose any significant health dangers to their neighbors. The most important dangers posed are increased highway traffic during the relative short construction period and dangers posed to trespassers of contact with high voltage equipment. This latter risk is mitigated by signage and the security measures that industry uses to deter trespassing. As will be discussed in more detail below, risks of site contamination are much less than for most other industrial uses because PV technologies employ few toxic chemicals and those used are used in very small quantities. Due to the reduction in the pollution from fossil-fuel-fired electric generators, the overall impact of solar development on human health is overwhelmingly positive. This pollution reduction results from a partial replacement of fossil-fuel fired generation by emission-free PV-generated electricity, which reduces harmful sulfur dioxide (SO_2), nitrogen oxides (NO_x), and fine particulate matter ($PM_{2.5}$). Analysis from the National Renewable Energy Laboratory and the Lawrence Berkeley National Laboratory, both affiliates of the U.S. Department of Energy, estimates the health-related air quality benefits to the southeast region from solar PV generators to be worth 8.0 ¢ per kilowatt-hour of solar generation.[1] This is in addition to the value of the electricity and suggests that the air quality benefits of solar are worth more than the electricity itself.

Even though we have only recently seen large-scale installation of PV technologies, the technology and its potential impacts have been studied since the 1950s. A combination of this solar-specific research and general scientific research has led to the scientific community having a good understanding of the science behind potential health and safety impacts of solar energy. This paper utilizes the latest scientific literature and knowledge of solar practices in N.C. to address the health and safety risks associated with solar PV technology. These risks are extremely small, far less than those associated with common activities such as driving a car, and vastly outweighed by health benefits of the generation of clean electricity.

This paper addresses the potential health and safety impacts of solar PV development in North Carolina, organized into the following four categories:

(1) Hazardous Materials
(2) Electromagnetic Fields (EMF)
(3) Electric Shock and Arc Flash
(4) Fire Safety

1. Hazardous Materials

One of the more common concerns towards solar is that the panels (referred to as "modules" in the solar industry) consist of toxic materials that endanger public health. However, as shown in this section, solar energy systems may contain small amounts of toxic materials, but these materials do not endanger public health. To understand potential toxic hazards coming from a solar project, one must understand system installation, materials used, the panel end-of-life protocols, and system operation. This section will examine these aspects of a solar farm and the potential for toxicity impacts in the following subsections:

(1.2) Project Installation/Construction
(1.2) System Components
    1.2.1 Solar Panels: Construction and Durability
    1.2.2 Photovoltaic technologies
        (a) Crystalline Silicon
        (b) Cadmium Telluride (CdTe)
        (c) CIS/CIGS
    1.2.3 Panel End of Life Management
    1.2.4 Non-panel System Components
(1.3) Operations and Maintenance

1.1 Project Installation/Construction

The system installation, or construction, process does not require toxic chemicals or processes. The site is mechanically cleared of large vegetation, fences are constructed, and the land is surveyed to layout exact installation locations. Trenches for underground wiring are dug and support posts are driven into the ground. The solar panels are bolted to steel and aluminum support structures and wired together. Inverter pads are installed, and an inverter and transformer are installed on each pad. Once everything is connected, the system is tested, and only then turned on.

Figure 1: Utility-scale solar facility (5 MW_{AC}) located in Catawba County. Source: Strata Solar

1.2 System Components

1.2.1 Solar Panels: Construction and Durability

Solar PV panels typically consist of glass, polymer, aluminum, copper, and semiconductor materials that can be recovered and recycled at the end of their useful life.[2] Today there are two PV technologies used in PV panels at utility-scale solar facilities, silicon, and thin film. As of 2016, all thin film used in North Carolina solar facilities are cadmium telluride (CdTe) panels from the US manufacturer First Solar, but there are other thin film PV panels available on the market, such as Solar Frontier's CIGS panels. Crystalline silicon technology consists of silicon wafers which are made into cells and assembled into panels, thin film technologies consist of thin layers of semiconductor material deposited onto glass, polymer or metal substrates. While there are differences in the components and manufacturing processes of these two types of solar technologies, many aspects of their PV panel construction are very similar. Specifics about each type of PV chemistry as it relates to toxicity are covered in subsections a, b, and c in section 1.2.2; on crystalline silicon, cadmium telluride, and CIS/CIGS respectively. The rest of this section applies equally to both silicon and thin film panels.

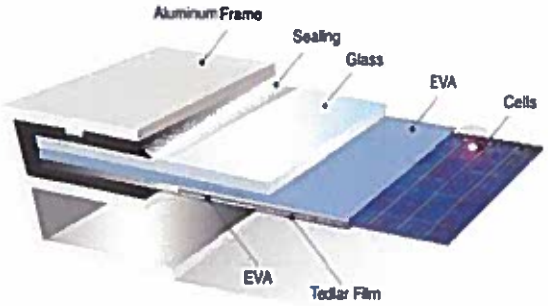


Figure 2: Components of crystalline silicon panels. The vast majority of silicon panels consist of a glass sheet on the topside with an aluminum frame providing structural support. Image Source: www.riteksolar.com.tw

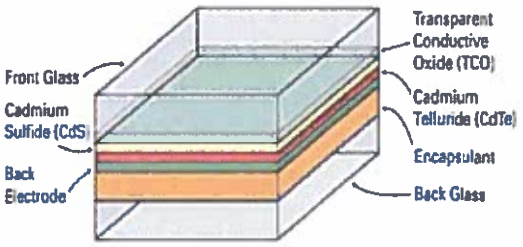


Figure 3: Layers of a common frameless thin-film panel (CdTe). Many thin film panels are frameless, including the most common thin-film panels, First Solar's CdTe. Frameless panels have protective glass on both the front and back of the panel. Layer thicknesses not to scale. Image Source: www.homepower.com

To provide decades of corrosion-free operation, PV cells in PV panels are encapsulated from air and moisture between two layers of plastic. The encapsulation layers are protected on the top with a layer of tempered glass and on the backside with a polymer sheet. Frameless modules include a protective layer of glass on the rear of the panel, which may also be tempered. The plastic ethylene-vinyl acetate (EVA) commonly provides the cell encapsulation. For decades, this same material has been used between layers of tempered glass to give car windshields and hurricane windows their great strength. In the same way that a car windshield cracks but stays intact, the EVA layers in PV panels keep broken panels intact (see Figure 4). Thus, a damaged module does not generally create small pieces of debris; instead, it largely remains together as one piece.

Figure 4: The mangled PV panels in this picture illustrate the nature of broken solar panels; the glass cracks but the panel is still in one piece. Image Source: http://img.alibaba.com/photo/115259576/broken_solar_panel.jpg

PV panels constructed with the same basic components as modern panels have been installed across the globe for well over thirty years.[3] The long-term durability and performance demonstrated over these decades, as well as the results of accelerated lifetime testing, helped lead to an industry-standard 25-year power production warranty for PV panels. These power warranties warrant a PV panel to produce at least 80% of their original nameplate production after 25 years of use. A recent SolarCity and DNV GL study reported that today's quality PV panels should be expected to reliably and efficiently produce power for thirty-five years.[4]

Local building codes require all structures, including ground mounted solar arrays, to be engineered to withstand anticipated wind speeds, as defined by the local wind speed requirements. Many racking products are available in versions engineered for wind speeds of up to 150 miles per hour, which is significantly higher than the wind speed requirement anywhere in North Carolina. The strength of PV mounting structures were demonstrated during Hurricane Sandy in 2012 and again during Hurricane Matthew in 2016. During Hurricane Sandy, the many large-scale solar facilities in New Jersey and New York at that time suffered only minor damage.[5] In the fall of 2016, the US and Caribbean experienced destructive winds and torrential rains from Hurricane Matthew, yet one leading solar tracker manufacturer reported that their numerous systems in the impacted area received zero damage from wind or flooding.[6]

In the event of a catastrophic event capable of damaging solar equipment, such as a tornado, the system will almost certainly have property insurance that will cover the cost to cleanup and repair the project. It is in the best interest of the system owner to protect their investment against such risks. It is also in their interest to get the project repaired and producing full power as soon as possible. Therefore, the investment in adequate insurance is a wise business practice for the system owner. For the same

reasons, adequate insurance coverage is also generally a requirement of the bank or firm providing financing for the project.

1.2.2 Photovoltaic (PV) Technologies

a. Crystalline Silicon

This subsection explores the toxicity of silicon-based PV panels and concludes that they do not pose a material risk of toxicity to public health and safety. Modern crystalline silicon PV panels, which account for over 90% of solar PV panels installed today, are, more or less, a commodity product. The overwhelming majority of panels installed in North Carolina are crystalline silicon panels that are informally classified as Tier I panels. Tier I panels are from well-respected manufacturers that have a good chance of being able to honor warranty claims. Tier I panels are understood to be of high quality, with predictable performance, durability, and content. Well over 80% (by weight) of the content of a PV panel is the tempered glass front and the aluminum frame, both of which are common building materials. Most of the remaining portion are common plastics, including polyethylene terephthalate in the backsheet, EVA encapsulation of the PV cells, polyphenyl ether in the junction box, and polyethylene insulation on the wire leads. The active, working components of the system are the silicon photovoltaic cells, the small electrical leads connecting them together, and to the wires coming out of the back of the panel. The electricity generating and conducting components makeup less than 5% of the weight of most panels. The PV cell itself is nearly 100% silicon, and silicon is the second most common element in the Earth's crust. The silicon for PV cells is obtained by high-temperature processing of quartz sand (SiO_2) that removes its oxygen molecules. The refined silicon is converted to a PV cell by adding extremely small amounts of boron and phosphorus, both of which are common and of very low toxicity.

The other minor components of the PV cell are also generally benign; however, some contain lead, which is a human toxicant that is particularly harmful to young children. The minor components include an extremely thin antireflective coating (silicon nitride or titanium dioxide), a thin layer of aluminum on the rear, and thin strips of silver alloy that are screen-printed on the front and rear of cell.[7] In order for the front and rear electrodes to make effective electrical contact with the proper layer of the PV cell, other materials (called glass frit) are mixed with the silver alloy and then heated to etch the metals into the cell. This glass frit historically contains a small amount of lead (Pb) in the form of lead oxide. The 60 or 72 PV cells in a PV panel are connected by soldering thin solder-covered copper tabs from the back of one cell to the front of the next cell. Traditionally a tin-based solder containing some lead (Pb) is used, but some manufacturers have switched to lead-free solder. The glass frit and/or the solder may contain trace amounts of other metals, potentially including some with human toxicity such as cadmium. However, testing to simulate the potential for leaching from broken panels, which is discussed in more detail below, did not find a potential toxicity threat from these trace elements. Therefore, the tiny amount of lead in the grass frit and the solder is the only part of silicon PV panels with a potential to create a negative health impact. However, as described below, the very limited amount of lead involved and its strong physical and chemical attachment to other components of the PV panel means that even in worst-case scenarios the health hazard it poses is insignificant.

As with many electronic industries, the solder in silicon PV panels has historically been a lead-based solder, often 36% lead, due to the superior properties of such solder. However, recent advances in lead-free solders have spurred a trend among PV panel manufacturers to reduce or remove the lead in their panels. According to the 2015 Solar Scorecard from the Silicon Valley Toxics Coalition, a group that tracks environmental responsibility of photovoltaic panel manufacturers, fourteen companies (increased from twelve companies in 2014) manufacture PV panels certified to meet the European Restriction of

Hazardous Substances (RoHS) standard. This means that the amount of cadmium and lead in the panels they manufacture fall below the RoHS thresholds, which are set by the European Union and serve as the world's de facto standard for hazardous substances in manufactured goods.[8] The Restriction of Hazardous Substances (RoHS) standard requires that the maximum concentration found in any homogenous material in a produce is less than 0.01% cadmium and less than 0.10% lead, therefore, any solder can be no more than 0.10% lead.[9]

While some manufacturers are producing PV panels that meet the RoHS standard, there is no requirement that they do so because the RoHS Directive explicitly states that the directive does not apply to photovoltaic panels.[10] The justification for this is provided in item 17 of the current RoHS Directive: "The development of renewable forms of energy is one of the Union's key objectives, and the contribution made by renewable energy sources to environmental and climate objectives is crucial. Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources (4) recalls that there should be coherence between those objectives and other Union environmental legislation. Consequently, this Directive should not prevent the development of renewable energy technologies that have no negative impact on health and the environment and that are sustainable and economically viable."

The use of lead is common in our modern economy. However, only about 0.5% of the annual lead consumption in the U.S. is for electronic solder for all uses; PV solder makes up only a tiny portion of this 0.5%. Close to 90% of lead consumption in the US is in batteries, which do not encapsulate the pounds of lead contained in each typical automotive battery. This puts the lead in batteries at great risk of leaching into the environment. Estimates for the lead in a single PV panel with lead-based solder range from 1.6 to 24 grams of lead, with 13g (less than half of an ounce) per panel seen most often in the literature.[11] At 13 g/panel[12], each panel contains one-half of the lead in a typical 12-gauge shotgun shell. This amount equates to roughly 1/750th of the lead in a single car battery. In a panel, it is all durably encapsulated from air or water for the full life of the panel.[14]

As indicated by their 20 to 30-year power warranty, PV modules are designed for a long service life, generally over 25 years. For a panel to comply with its 25-year power warranty, its internal components, including lead, must be sealed from any moisture. Otherwise, they would corrode and the panel's output would fall below power warranty levels. Thus, the lead in operating PV modules is not at risk of release to the environment during their service lifetime. In extreme experiments, researchers have shown that lead can leach from crushed or pulverized panels.[15, 16] However, more real-world tests designed to represent typical trash compaction that are used to classify waste as hazardous or non-hazardous show no danger from leaching.[17, 18] For more information about PV panel end-of-life, see the Panel Disposal section.

As illustrated throughout this section, silicon-based PV panels do not pose a material threat to public health and safety. The only aspect of the panels with potential toxicity concerns is the very small amount of lead in some panels. However, any lead in a panel is well sealed from environmental exposure for the operating lifetime of the solar panel and thus not at risk of release into the environment.

b. Cadmium Telluride (CdTe) PV Panels

This subsection examines the components of a cadmium telluride (CdTe) PV panel. Research demonstrates that they pose negligible toxicity risk to public health and safety while significantly reducing the public's exposure to cadmium by reducing coal emissions. As of mid-2016, a few hundred MWs of

cadmium telluride (CdTe) panels, all manufactured by the U.S. company First Solar, have been installed in North Carolina.

Questions about the potential health and environmental impacts from the use of this PV technology are related to the concern that these panels contain cadmium, a toxic heavy metal. However, scientific studies have shown that cadmium telluride differs from cadmium due to its high chemical and thermal stability.[19] Research has shown that the tiny amount of cadmium in these panels does not pose a health or safety risk.[20] Further, there are very compelling reasons to welcome its adoption due to reductions in unhealthy pollution associated with burning coal. Every GWh of electricity generated by burning coal produces about 4 grams of cadmium air emissions.[21] Even though North Carolina produces a significant fraction of our electricity from coal, electricity from solar offsets much more natural gas than coal due to natural gas plants being able to adjust their rate of production more easily and quickly. If solar electricity offsets 90% natural gas and 10% coal, each 5-megawatt (5 MW_{AC}, which is generally 7 MW_{DC}) CdTe solar facility in North Carolina keeps about 157 grams, or about a third of a pound, of cadmium *out of* our environment.[22, 23]

Cadmium is toxic, but all the approximately 7 grams of cadmium in one CdTe panel is in the form of a chemical compound cadmium telluride,[24] which has 1/100th the toxicity of free cadmium.[25] Cadmium telluride is a very stable compound that is non-volatile and non-soluble in water. Even in the case of a fire, research shows that less than 0.1% of the cadmium is released when a CdTe panel is exposed to fire. The fire melts the glass and encapsulates over 99.9% of the cadmium in the molten glass.[27]

It is important to understand the source of the cadmium used to manufacture CdTe PV panels. The cadmium is a byproduct of zinc and lead refining. The element is collected from emissions and waste streams during the production of these metals and combined with tellurium to create the CdTe used in PV panels. If the cadmium were not collected for use in the PV panels or other products, it would otherwise either be stockpiled for future use, cemented and buried, or disposed of.[28] Nearly all the cadmium in old or broken panels can be recycled which can eventually serve as the primary source of cadmium for new PV panels.[29]

Similar to silicon-based PV panels, CdTe panels are constructed of a tempered glass front, one instead of two clear plastic encapsulation layers, and a rear heat strengthened glass backing (together >98% by weight). The final product is built to withstand exposure to the elements without significant damage for over 25 years. While not representative of damage that may occur in the field or even at a landfill, laboratory evidence has illustrated that when panels are ground into a fine powder, very acidic water is able to leach portions of the cadmium and tellurium,[30] similar to the process used to recycle CdTe panels. Like many silicon-based panels, CdTe panels are reported (as far back ask 1998[31]) to pass the EPA's Toxic Characteristic Leaching Procedure (TCLP) test, which tests the potential for crushed panels in a landfill to leach hazardous substances into groundwater.[32] Passing this test means that they are classified as non-hazardous waste and can be deposited in landfills.[33,34] For more information about PV panel end-of-life, see the Panel Disposal section.

There is also concern of environmental impact resulting from potential catastrophic events involving CdTe PV panels. An analysis of worst-case scenarios for environmental impact from CdTe PV panels, including earthquakes, fires, and floods, was conducted by the University of Tokyo in 2013. After reviewing the extensive international body of research on CdTe PV technology, their report concluded, "Even in the worst-case scenarios, it is unlikely that the Cd concentrations in air and sea water will exceed the environmental regulation values."[35] In a worst-case scenario of damaged panels abandoned on the ground, insignificant amounts of cadmium will leach from the panels. This is because this scenario is

much less conducive (larger module pieces, less acidity) to leaching than the conditions of the EPA's TCLP test used to simulate landfill conditions, which CdTe panels pass.[36]

First Solar, a U.S. company, and the only significant supplier of CdTe panels, has a robust panel take-back and recycling program that has been operating commercially since 2005.[37] The company states that it is "committed to providing a commercially attractive recycling solution for photovoltaic (PV) power plant and module owners to help them meet their module (end of life) EOL obligation simply, cost-effectively and responsibly." First Solar global recycling services to their customers to collect and recycle panels once they reach the end of productive life whether due to age or damage. These recycling service agreements are structured to be financially attractive to both First Solar and the solar panel owner. For First Solar, the contract provides the company with an affordable source of raw materials needed for new panels and presumably a diminished risk of undesired release of Cd. The contract also benefits the solar panel owner by allowing them to avoid tipping fees at a waste disposal site. The legal contract helps provide peace of mind by ensuring compliance by both parties when considering the continuing trend of rising disposal costs and increasing regulatory requirements.

c. CIS/CIGS and other PV technologies

Copper indium gallium selenide PV technology, often referred to as CIGS, is the second most common type of thin-film PV panel but a distant second behind CdTe. CIGS cells are composed of a thin layer of copper, indium, gallium, and selenium on a glass or plastic backing. None of these elements are very toxic, although selenium is a regulated metal under the Federal Resource Conservation and Recovery Act (RCRA).[38] The cells often also have an extremely thin layer of cadmium sulfide that contains a tiny amount of cadmium, which is toxic. The promise of high efficiency CIGS panels drove heavy investment in this technology in the past. However, researchers have struggled to transfer high efficiency success in the lab to low-cost full-scale panels in the field.[39] Recently, a CIGS manufacturer based in Japan, Solar Frontier, has achieved some market success with a rigid, glass-faced CIGS module that competes with silicon panels. Solar Frontier produces the majority of CIS panels on the market today.[40] Notably, these panels are RoHS compliant,[41] thus meeting the rigorous toxicity standard adopted by the European Union even thought this directive exempts PV panels. The authors are unaware of any completed or proposed utility-scale system in North Carolina using CIS/CIGS panels.

1.2.3 Panel End-of-Life Management

Concerns about the volume, disposal, toxicity, and recycling of PV panels are addressed in this subsection. To put the volume of PV waste into perspective, consider that by 2050, when PV systems installed in 2020 will reach the end of their lives, it is estimated that the global annual PV panel waste tonnage will be 10% of the 2014 global e-waste tonnage.[42] In the U.S., end-of-life disposal of solar products is governed by the Federal Resource Conservation and Recovery Act (RCRA), as well as state policies in some situations. RCRA separates waste into hazardous (not accepted at ordinary landfill) and solid waste (generally accepted at ordinary landfill) based on a series of rules. According to RCRA, the way to determine if a PV panel is classified as hazardous waste is the Toxic Characteristic Leaching Procedure (TCLP) test. This EPA test is designed to simulate landfill disposal and determine the risk of hazardous substances leaching out of the landfill.[43,44,45] Multiple sources report that most modern PV panels (both crystalline silicon and cadmium telluride) pass the TCLP test.[46,47] Some studies found that some older (1990s) crystalline silicon panels, and perhaps some newer crystalline silicon panels (specifics are not given about vintage of panels tested), do not pass the lead (Pb) leachate limits in the TCLP test.[48,49]

The test begins with the crushing of a panel into centimeter-sized pieces. The pieces are then mixed in an acid bath. After tumbling for eighteen hours, the fluid is tested for forty hazardous substances that all must be below specific threshold levels to pass the test. Research comparing TCLP conditions to conditions of damaged panels in the field found that simulated landfill conditions provide overly conservative estimates of leaching for field-damaged panels.[50] Additionally, research in Japan has found no detectable Cd leaching from cracked CdTe panels when exposed to simulated acid rain.[51]

Although modern panels can generally be landfilled, they can also be recycled. Even though recent waste volume has not been adequate to support significant PV-specific recycling infrastructure, the existing recycling industry in North Carolina reports that it recycles much of the current small volume of broken PV panels. In an informal survey conducted by the NC Clean Energy Technology Center survey in early 2016, seven of the eight large active North Carolina utility-scale solar developers surveyed reported that they send damaged panels back to the manufacturer and/or to a local recycler. Only one developer reported sending damaged panels to the landfill.

The developers reported at that time that they are usually paid a small amount per panel by local recycling firms. In early 2017, a PV developer reported that a local recycler was charging a small fee per panel to recycle damaged PV panels. The local recycling firm known to authors to accept PV panels described their current PV panel recycling practice as of early 2016 as removing the aluminum frame for local recycling and removing the wire leads for local copper recycling. The remainder of the panel is sent to a facility for processing the non-metallic portions of crushed vehicles, referred to as "fluff" in the recycling industry.[52] This processing within existing general recycling plants allows for significant material recovery of major components, including glass which is 80% of the module weight, but at lower yields than PV-specific recycling plants. Notably almost half of the material value in a PV panel is in the few grams of silver contained in almost every PV panel produced today. In the long-term, dedicated PV panel recycling plants can increase treatment capacities and maximize revenues resulting in better output quality and the ability to recover a greater fraction of the useful materials.[53] PV-specific panel recycling technologies have been researched and implemented to some extent for the past decade, and have been shown to be able to recover over 95% of PV material (semiconductor) and over 90% of the glass in a PV panel.[54]

A look at global PV recycling trends hints at the future possibilities of the practice in our country. Europe installed MW-scale volumes of PV years before the U.S. In 2007, a public-private partnership between the European Union and the solar industry set up a voluntary collection and recycling system called PV CYCLE. This arrangement was later made mandatory under the EU's WEEE directive, a program for waste electrical and electronic equipment.[55] Its member companies (PV panel producers) fully finance the association. This makes it possible for end-users to return the member companies' defective panels for recycling at any of the over 300 collection points around Europe without added costs. Additionally, PV CYCLE will pick up batches of 40 or more used panels at no cost to the user. This arrangement has been very successful, collecting and recycling over 13,000 tons by the end of 2015.[56]

In 2012, the WEEE Directive added the end-of-life collection and recycling of PV panels to its scope.[57] This directive is based on the principle of extended-producer-responsibility. It has a global impact because producers that want to sell into the EU market are legally responsible for end-of-life management. Starting in 2018, this directive targets that 85% of PV products "put in the market" in Europe are recovered and 80% is prepared for reuse and recycling.

The success of the PV panel collection and recycling practices in Europe provides promise for the future of recycling in the U.S. In mid-2016, the US Solar Energy Industry Association (SEIA) announced that they are starting a national solar panel recycling program with the guidance and support of many

leading PV panel producers.[58] The program will aggregate the services offered by recycling vendors and PV manufacturers, which will make it easier for consumers to select a cost-effective and environmentally responsible end-of-life management solution for their PV products. According to SEIA, they are planning the program in an effort to make the entire industry landfill-free. In addition to the national recycling network program, the program will provide a portal for system owners and consumers with information on how to responsibly recycle their PV systems.

While a cautious approach toward the potential for negative environmental and/or health impacts from retired PV panels is fully warranted, this section has shown that the positive health impacts of reduced emissions from fossil fuel combustion from PV systems more than outweighs any potential risk. Testing shows that silicon and CdTe panels are both safe to dispose of in landfills, and are also safe in worst case conditions of abandonment or damage in a disaster. Additionally, analysis by local engineers has found that the current salvage value of the equipment in a utility scale PV facility generally exceeds general contractor estimates for the cost to remove the entire PV system..[59, 60, 61]

1.2.4 Non-Panel System Components (racking, wiring, inverter, transformer)

While previous toxicity subsections discussed PV panels, this subsection describes the non-panel components of utility-scale PV systems and investigates any potential public health and safety concerns. The most significant non-panel component of a ground-mounted PV system is the mounting structure of the rows of panels, commonly referred to as "racking". The vertical post portion of the racking is galvanized steel and the remaining above-ground racking components are either galvanized steel or aluminum, which are both extremely common and benign building materials. The inverters that make the solar generated electricity ready to send to the grid have weather-proof steel enclosures that protect the working components from the elements. The only fluids that they might contain are associated with their cooling systems, which are not unlike the cooling system in a computer. Many inverters today are RoHS compliant.

The electrical transformers (to boost the inverter output voltage to the voltage of the utility connection point) do contain a liquid cooling oil. However, the fluid used for that function is either a non-toxic mineral oil or a biodegradable non-toxic vegetable oil, such as BIOTEMP from ABB. These vegetable transformer oils have the additional advantage of being much less flammable than traditional mineral oils. Significant health hazards are associated with old transformers containing cooling oil with toxic PCBs. Transfers with PCB-containing oil were common before PCBs were outlawed in the U.S. in 1979. PCBs still exist in older transformers in the field across the country.

Other than a few utility research sites, there are no batteries on- or off-site associated with utility-scale solar energy facilities in North Carolina, avoiding any potential health or safety concerns related to battery technologies. However, as battery technologies continue to improve and prices continue to decline we are likely to start seeing some batteries at solar facilities. Lithium ion batteries currently dominate the world utility-scale battery market, which are not very toxic. No non-panel system components were found to pose any health or environmental dangers.

1.4 Operations and Maintenance – Panel Washing and Vegetation Control

Throughout the eastern U.S., the climate provides frequent and heavy enough rain to keep panels adequately clean. This dependable weather pattern eliminates the need to wash the panels on a regular basis. Some system owners may choose to wash panels as often as once a year to increase production, but most in N.C. do not regularly wash any PV panels. Dirt build up over time may justify panel washing a few times over the panels' lifetime; however, nothing more than soap and water are required for this activity.

The maintenance of ground-mounted PV facilities requires that vegetation be kept low, both for aesthetics and to avoid shading of the PV panels. Several approaches are used to maintain vegetation at NC solar facilities, including planting of limited-height species, mowing, weed-eating, herbicides, and grazing livestock (sheep). The following descriptions of vegetation maintenance practices are based on interviews with several solar developers as well as with three maintenance firms that together are contracted to maintain well over 100 of the solar facilities in N.C. The majority of solar facilities in North Carolina maintain vegetation primarily by mowing. Each row of panels has a single row of supports, allowing sickle mowers to mow under the panels. The sites usually require mowing about once a month during the growing season. Some sites employ sheep to graze the site, which greatly reduces the human effort required to maintain the vegetation and produces high quality lamb meat.[62]

In addition to mowing and weed eating, solar facilities often use some herbicides. Solar facilities generally do not spray herbicides over the entire acreage; rather they apply them only in strategic locations such as at the base of the perimeter fence, around exterior vegetative buffer, on interior dirt roads, and near the panel support posts. Also unlike many row crop operations, solar facilities generally use only general use herbicides, which are available over the counter, as opposed to restricted use herbicides commonly used in commercial agriculture that require a special restricted use license. The herbicides used at solar facilities are primarily 2-4-D and glyphosate (Round-up®), which are two of the most common herbicides used in lawns, parks, and agriculture across the country. One maintenance firm that was interviewed sprays the grass with a class of herbicide known as a growth regulator in order to slow the growth of grass so that mowing is only required twice a year. Growth regulators are commonly used on highway roadsides and golf courses for the same purpose. A commercial pesticide applicator license is required for anyone other than the landowner to apply herbicides, which helps ensure that all applicators are adequately educated about proper herbicide use and application. The license must be renewed annually and requires passing of a certification exam appropriate to the area in which the applicator wishes to work. Based on the limited data available, it appears that solar facilities in N.C. generally use significantly less herbicides per acre than most commercial agriculture or lawn maintenance services.

2. Electromagnetic Fields (EMF)

PV systems do not emit any material during their operation; however, they do generate electromagnetic fields (EMF), sometimes referred to as radiation. EMF produced by electricity is non-ionizing radiation, meaning the radiation has enough energy to move atoms in a molecule around (experienced as heat), but not enough energy to remove electrons from an atom or molecule (ionize) or to damage DNA. As shown below, modern humans are all exposed to EMF throughout our daily lives without negative health impact. Someone outside of the fenced perimeter of a solar facility is not exposed to significant EMF from the solar facility. Therefore, there is no negative health impact from the EMF

produced in a solar farm. The following paragraphs provide some additional background and detail to support this conclusion.

Since the 1970s, some have expressed concern over potential health consequences of EMF from electricity, but no studies have ever shown this EMF to cause health problems.[63] These concerns are based on some epidemiological studies that found a slight increase in childhood leukemia associated with average exposure to residential power-frequency magnetic fields above 0.3 to 0.4 μT (microteslas) (equal to 3.0 to 4.0 mG (milligauss)). μT and mG are both units used to measure magnetic field strength. For comparison, the average exposure for people in the U.S. is one mG or 0.1 μT, with about 1% of the population with an average exposure in excess of 0.4 μT (or 4 mG).[64] These epidemiological studies, which found an association but not a causal relationship, led the World Health Organization's International Agency for Research on Cancer (IARC) to classify ELF magnetic fields as "possibly carcinogenic to humans". Coffee also has this classification. This classification means there is limited evidence but not enough evidence to designate as either a "probable carcinogen" or "human carcinogen". Overall, there is very little concern that ELF EMF damages public health. The only concern that does exist is for long-term exposure above 0.4 μT (4 mG) that may have some connection to increased cases of childhood leukemia. In 1997, the National Academies of Science were directed by Congress to examine this concern and concluded:

> "Based on a comprehensive evaluation of published studies relating to the effects of power-frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard. Specifically, no conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."[65]

There are two aspects to electromagnetic fields, an electric field and a magnetic field. The electric field is generated by voltage and the magnetic field is generated by electric current, i.e., moving electrons. A task group of scientific experts convened by the World Health Organization (WHO) in 2005 concluded that there were no substantive health issues related to *electric* fields (0 to 100,000 Hz) at levels generally encountered by members of the public.[66] The relatively low voltages in a solar facility and the fact that electric fields are easily shielded (i.e., blocked) by common materials, such as plastic, metal, or soil means that there is no concern of negative health impacts from the electric fields generated by a solar facility. Thus, the remainder of this section addresses magnetic fields. Magnetic fields are not shielded by most common materials and thus can easily pass through them. Both types of fields are strongest close to the source of electric generation and weaken quickly with distance from the source.

The direct current (DC) electricity produced by PV panels produce stationary (0 Hz) electric and magnetic fields. Because of minimal concern about potential risks of stationary fields, little scientific research has examined stationary fields' impact on human health.[67] In even the largest PV facilities, the DC voltages and currents are not very high. One can illustrate the weakness of the EMF generated by a PV panel by placing a compass on an operating solar panel and observing that the needle still points north.

While the electricity throughout the majority of a solar site is DC electricity, the inverters convert this DC electricity to alternating current (AC) electricity matching the 60 Hz frequency of the grid. Therefore, the inverters and the wires delivering this power to the grid are producing non-stationary EMF, known as extremely low frequency (ELF) EMF, normally oscillating with a frequency of 60 Hz. This frequency is at the low-energy end of the electromagnetic spectrum. Therefore, it has less energy than

other commonly encountered types of non-ionizing radiation like radio waves, infrared radiation, and visible light.

The wide use of electricity results in background levels of ELF EMFs in nearly all locations where people spend time – homes, workplaces, schools, cars, the supermarket, etc. A person's average exposure depends upon the sources they encounter, how close they are to them, and the amount of time they spend there.[68] As stated above, the average exposure to magnetic fields in the U.S. is estimated to be around one mG or 0.1 μT, but can vary considerably depending on a person's exposure to EMF from electrical devices and wiring.[69] At times we are often exposed to much higher ELF magnetic fields, for example when standing three feet from a refrigerator the ELF magnetic field is 6 mG and when standing three feet from a microwave oven the field is about 50 mG.[70] The strength of these fields diminish quickly with distance from the source, but when surrounded by electricity in our homes and other buildings moving away from one source moves you closer to another. However, unless you are inside of the fence at a utility-scale solar facility or electrical substation it is impossible to get very close to the EMF sources. Because of this, EMF levels at the fence of electrical substations containing high voltages and currents are considered "generally negligible".[71, 72]

The strength of ELF-EMF present at the perimeter of a solar facility or near a PV system in a commercial or residential building is significantly lower than the typical American's average EMF exposure.[73, 74] Researchers in Massachusetts measured magnetic fields at PV projects and found the magnetic fields dropped to very low levels of 0.5 mG or less, and in many cases to less than background levels (0.2 mG), at distances of no more than nine feet from the residential inverters and 150 feet from the utility-scale inverters.[75] Even when measured within a few feet of the utility-scale inverter, the ELF magnetic fields were well below the International Commission on Non-Ionizing Radiation Protection's recommended magnetic field level exposure limit for the general public of 2,000 mG.[76] It is typical that utility scale designs locate large inverters central to the PV panels that feed them because this minimizes the length of wire required and shields neighbors from the sound of the inverter's cooling fans. Thus, it is rare for a large PV inverter to be within 150 feet of the project's security fence.

Anyone relying on a medical device such as pacemaker or other implanted device to maintain proper heart rhythm may have concern about the potential for a solar project to interfere with the operation of his or her device. However, there is no reason for concern because the EMF outside of the solar facility's fence is less than 1/1000 of the level at which manufacturers test for ELF EMF interference, which is 1,000 mG.[77] Manufacturers of potentially affected implanted devices often provide advice on electromagnetic interference that includes avoiding letting the implanted device get too close to certain sources of fields such as some household appliances, some walkie-talkies, and similar transmitting devices. Some manufacturers' literature does not mention high-voltage power lines, some say that exposure in public areas should not give interference, and some advise not spending extended periods of time close to power lines.[78]

3. Electric Shock and Arc Flash Hazards

There is a real danger of electric shock to anyone entering any of the electrical cabinets such as combiner boxes, disconnect switches, inverters, or transformers; or otherwise coming in contact with voltages over 50 Volts.[79] Another electrical hazard is an arc flash, which is an explosion of energy that can occur in a short circuit situation. This explosive release of energy causes a flash of heat and a shockwave, both of which can cause serious injury or death. Properly trained and equipped technicians and electricians know how to safely install, test, and repair PV systems, but there is always some risk of

injury when hazardous voltages and/or currents are present. Untrained individuals should not attempt to inspect, test, or repair any aspect of a PV system due to the potential for injury or death due to electric shock and arc flash, The National Electric Code (NEC) requires appropriate levels of warning signs on all electrical components based on the level of danger determined by the voltages and current potentials. The national electric code also requires the site to be secured from unauthorized visitors with either a six-foot chain link fence with three strands of barbed wire or an eight-foot fence, both with adequate hazard warning signs.

4. Fire Safety

The possibility of fires resulting from or intensified by PV systems may trigger concern among the general public as well as among firefighters. However, concern over solar fire hazards should be limited because only a small portion of materials in the panels are flammable, and those components cannot self-support a significant fire. Flammable components of PV panels include the thin layers of polymer encapsulates surrounding the PV cells, polymer backsheets (framed panels only), plastic junction boxes on rear of panel, and insulation on wiring. The rest of the panel is composed of non-flammable components, notably including one or two layers of protective glass that make up over three quarters of the panel's weight.

Heat from a small flame is not adequate to ignite a PV panel, but heat from a more intense fire or energy from an electrical fault can ignite a PV panel.[80] One real-world example of this occurred during July 2015 in an arid area of California. Three acres of grass under a thin film PV facility burned without igniting the panels mounted on fixed-tilt racks just above the grass.[81] While it is possible for electrical faults in PV systems on homes or commercial buildings to start a fire, this is extremely rare.[82] Improving understanding of the PV-specific risks, safer system designs, and updated fire-related codes and standards will continue to reduce the risk of fire caused by PV systems.

PV systems on buildings can affect firefighters in two primary ways, 1) impact their methods of fighting the fire, and 2) pose safety hazard to the firefighters. One of the most important techniques that firefighters use to suppress fire is ventilation of a building's roof. This technique allows superheated toxic gases to quickly exit the building. By doing so, the firefighters gain easier and safer access to the building, Ventilation of the roof also makes the challenge of putting out the fire easier. However, the placement of rooftop PV panels may interfere with ventilating the roof by limiting access to desired venting locations.

New solar-specific building code requirements are working to minimize these concerns. Also, the latest National Electric Code has added requirements that make it easier for first responders to safely and effectively turn off a PV system. Concern for firefighting a building with PV can be reduced with proper fire fighter training, system design, and installation. Numerous organizations have studied fire fighter safety related to PV. Many organizations have published valuable guides and training programs. Some notable examples are listed below.

- The International Association of Fire Fighters (IAFF) and International Renewable Energy Council (IREC) partnered to create an online training course that is far beyond the PowerPoint click-and-view model. The self-paced online course, "Solar PV Safety for Fire Fighters," features rich video content and simulated environments so fire fighters can practice the knowledge they've learned. www.iaff.org/pvsafetytraining
- Photovoltaic Systems and the Fire Code: Office of NC Fire Marshal
- Fire Service Training, Underwriter's Laboratory

- Firefighter Safety and Response for Solar Power Systems, National Fire Protection Research Foundation
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- Guidelines for Fire Safety Elements of Solar Photovoltaic Systems, Orange County Fire Chiefs Association
- Solar Photovoltaic Installation Guidelines, California Department of Forestry & Fire Protection, Office of the State Fire Marshall
- PV Safety & Firefighting, Matthew Paiss, Homepower Magazine
- PV Safety and Code Development: Matthew Paiss, Cooperative Research Network

Summary

The purpose of this paper is to address and alleviate concerns of public health and safety for utility-scale solar PV projects. Concerns of public health and safety were divided and discussed in the four following sections: (1) Toxicity, (2) Electromagnetic Fields, (3) Electric Shock and Arc Flash, and (4) Fire. In each of these sections, the negative health and safety impacts of utility-scale PV development were shown to be negligible, while the public health and safety benefits of installing these facilities are significant and far outweigh any negative impacts.

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NC CLEAN ENERGY TECHNOLOGY CENTER

APPENDIX J: VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION NHDE REPORT

Enclosed.

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

Web Project ID: WEB0000014420

Client Project Number:

PROJECT INFORMATION

TITLE: Flatfoot Solar

DESCRIPTION: Flatfoot Solar will be a 1MWac solar photovoltaic project. The site area will encompass approximately 8-10 acres of cleared farm and forested land. Approximately 4-5 acres on the western site area will need to be cleared. Project is expected to begin construction in late 2021/early 2022

EXISTING SITE CONDITIONS: Vacant, Wooded, and Farmed

QUADRANGLES: Stony Creek

COUNTIES: Sussex

Latitude/Longitude (DMS): 36° 56' 31.7354" N / 77° 27' 27.2722" W

Acreage: 81 acres

Comments:

REQUESTOR INFORMATION

Priority: N

Tier Level: Tier I

Tax ID: 64-A45, 65-A-37

Contact Name: Brendan Grajewski

Company Name: Hexagon Energy, LLC

Address: 722 Preston Avenue Suite 102

City: Charlottesville

State: VA

Zip: 22903

Phone: 4343264405

Fax:

Email: BGrajewski@hexagon-energy.com

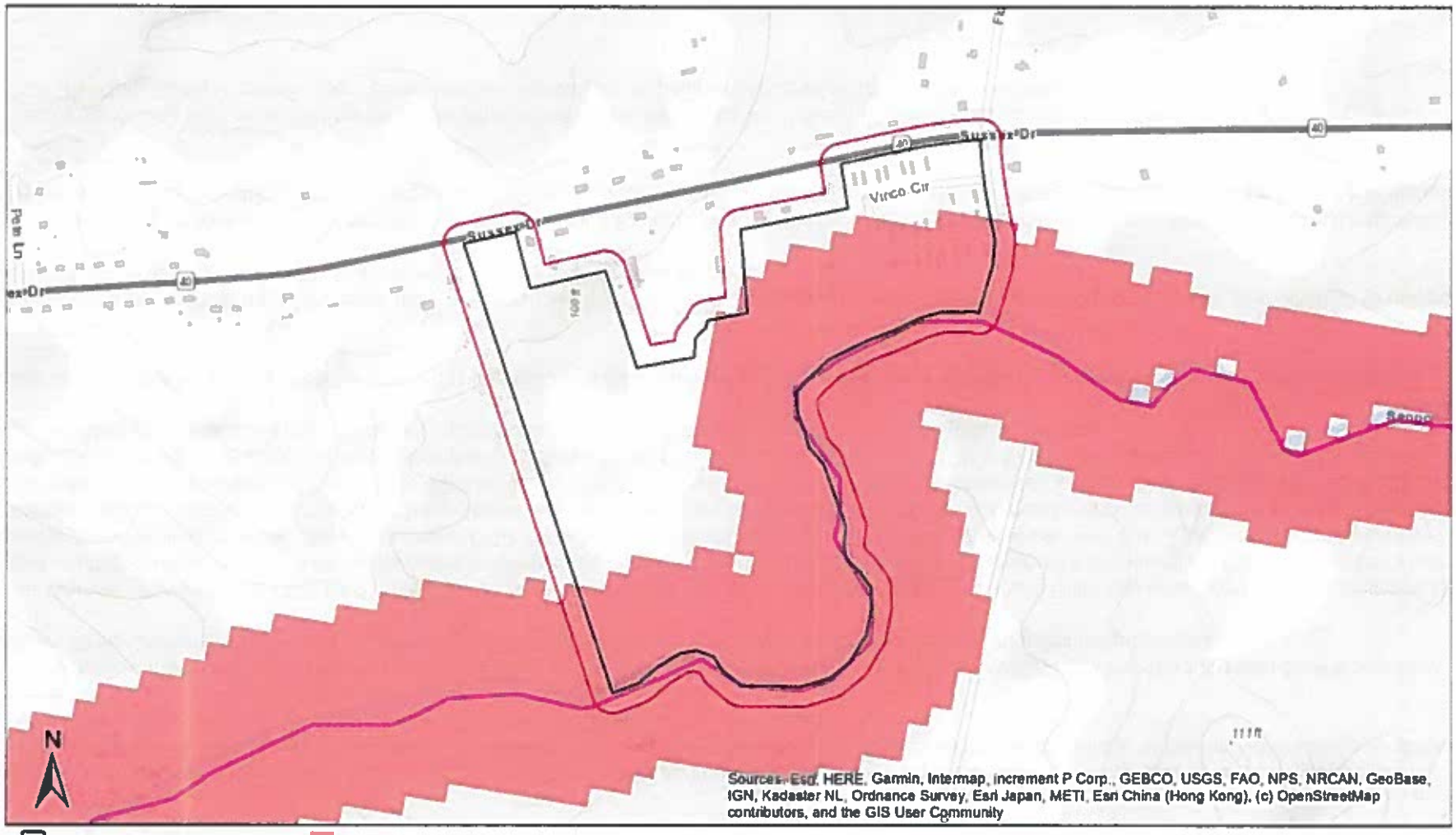
Conservation Site	Site Type	Brank	Acreage	Listed Species Presence	Essential Conservation Site?
NOTTOWAY RIVER - STONY CREEK SCU	SCU	B2	70	FL	YES

Natural Heritage Screening Features Intersecting Project Boundary

Intersecting Predictive Models
Roanoke Logperch

Predictive Model Results

Flatfoot Solar



Project Boundary

Buffered Project Boundary

Predictive Models

NH_Screening_Layer

SCU

1:7,808

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

Quads: Stony Creek

Counties: Sussex

Company: Hexagon Energy, LLC

Lat/Long: 365631 / -772727

Matthew J. Strickler
Secretary of Natural Resources

Clyde E. Cristman
Director

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 from 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 files, NATURAL HERITAGE RESOURCES HAVE BEEN DOCUMENTED within the submitted project boundary including a 100 foot buffer and/or PREDICTED HABITAT MODELS FOR NATURAL HERITAGE RESOURCES intersect the project area.

You have submitted this project to DCR for a more detailed review for potential impacts to natural heritage resources. DCR will review the submitted project to identify the specific natural heritage resources within the proposed project area including a 100 foot buffer. Using the expertise of our biologists, DCR will evaluate whether your specific project is likely to impact these resources. DCR's response will indicate whether any negative impacts are likely and, if so, make recommendations to avoid, minimize and/or mitigate these impacts. If the potential negative impacts are to species that are state- or federally-listed as threatened or endangered, DCR will also recommend coordination with the appropriate regulatory agencies: the Virginia Department of Wildlife Resources for state-listed animals, the Virginia Department of Agriculture and Consumer Services for state-listed plants and insects, and the United States Fish and Wildlife Service for federally listed plants and animals. If your project is expected to have positive impacts we will report those to you with recommendations for enhancing these benefits.

There will be a charge for this service for "for profit companies": $60, plus an additional charge of $35 for 1-5 occurrences and $60 for 6 or more occurrences.

Please allow up to 30 calendar days for a response, unless you requested a priority response of 5 business days at an additional surcharge of $500 or 15 calendar days at an additional surcharge of $300. An invoice will be provided with your response.

We will review the project based on the information you included in the Project Info submittal form, which is included in this report. Also any additional information including photographs, survey documents, etc. attached during the project submittal process and/or sent via email referencing the project title (from the first page of this report).

Thank you for submitting your project for review to the Virginia Natural Heritage Program through the NH Data Explorer. Should you have any questions or concerns about DCR, the Data Explorer, or this report, please contact the Natural Heritage Project Review Unit at 804-371-2708.

Matthew J. Strickler
Secretary of Natural Resources

Clyde E. Cristman
Director

Rochelle Altholz
Deputy Director of Administration and Finance

Russell W. Baxter
Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Nathan Burrell
Deputy Director of Government and Community Relations

Thomas L. Smith
Deputy Director of Operations

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

December 21, 2020

Brendan Grajewski
Hexagon Energy, LLC
722 Preston Avenue Suite 102
Charlottesville, Virginia 22903

Re: Flatfoot Solar

Dear Mr. Garjewski:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. 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 our files, the Nottoway River – Stony Creek Stream Conservation Unit (SCU) is located within and immediately adjacent to the project site. SCUs identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Nottoway River – Stony Creek SCU has been given a biodiversity ranking of B2, which represents a site of very high significance. The natural heritage resources associated with this site are:

Alasmidonta heterodon	Dwarf wedgemussel	G1G2/S1/LE/LE
Percina rex	Roanoke logperch	G1G2/S1S2/LE/LE
Aquatic Natural Community (Nottoway Fifth Order Stream)		G1G2/S1S2/NL/NL

The Dwarf wedgemussel grows to a length of approximately 30 mm. This species inhabits creeks of varying sizes, residing in muddy sand, sand, and gravel bottoms, in areas of slow to moderate current and little silt deposition (USFWS, 1993). Currently, this species exists in widely scattered, small populations in the Chowan, James, York, Rappahannock, and Potomac River drainages. Its native host fishes include Mottled sculpin (*Cottus bairdi*), Johnny darters (*Etheostoma nigrum*), Tessellated darters (*Etheostoma olmstedi*) and Sculpins (*Cottus* sp.) (Michaelson and Neves, 1995). Please note that this species is currently classified as endangered by the United States Fish and Wildlife Service (USFWS) and the Virginia Department of Game and Inland Fisheries (VDGIF).

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization, and dredging, and the invasion of exotic mollusk species.

The Roanoke logperch is endemic to the Roanoke and Chowan River drainages in Virginia (Burkhead and Jenkins, 1991) and inhabits medium and large, warm and usually clear rivers with sandy to boulder spotted

bottoms (NatureServe, 2009). Please note that this species is currently classified as endangered by the USFWS and the Virginia Department of Wildlife Resources (VDWR). The Roanoke logperch is threatened by channelization, siltation, impoundment, pollution, and de-watering activities (Burkhead & Jenkins, 1991).

The documented Aquatic Natural Community is based on Virginia Commonwealth University's INSTAR (*Interactive Stream Assessment Resource*) database which includes over 2,000 aquatic (stream and river) collections statewide for fish and macroinvertebrate. These data represent fish and macroinvertebrate assemblages, instream habitat, and stream health assessments. The associated Aquatic Natural Community is significant on multiple levels. First, this stream is a grade AB, as per the VCU-Center for Environmental Sciences (CES), indicating its relative regional significance, considering its aquatic community composition and the present-day conditions of other streams in the region. This stream reach also holds as a "Healthy" stream designation as per the INSTAR Virtual Stream Assessment (VSS) score. This score assesses the similarity of this stream to ideal stream conditions of biology and habitat for this region. Lastly, this stream contributes to high Biological Integrity at the watershed level (5^{th} order) based on number of native/non-native, pollution-tolerant/intolerant and rare, threatened or endangered fish and macroinvertebrate species present.

Threats to the significant Aquatic Natural Community and the surrounding watershed include water quality degradation related to point and non-point pollution, water withdrawal and introduction of non-native species.

In addition, Sappony Creek has been designated as a "Threatened and Endangered Species Water" by VDWR for the Atlantic Pigtoe.

To minimize adverse impacts to the aquatic ecosystem as a result of the proposed activities, DCR recommends the implementation of and strict adherence to applicable state and local erosion and sediment control/storm water management laws and regulations, establishment/enhancement of riparian buffers with native plant species and maintaining natural stream flow. Due to the legal status of the Dwarf wedgemussel and Roanoke logperch, DCR recommends coordination with USFWS and VDWR to ensure compliance with protected species legislation. Due to the legal status of Atlantic pigtoe, DCR recommends coordination with Virginia's regulatory authority for the management and protection of this species, the VDWR, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

DCR recommends the development of an invasive species management plan for these projects and the planting of Virginia native pollinator plant species that bloom throughout the spring and summer, to maximize benefits to native pollinators. DCR recommends planting these species in at least the buffer areas of the planned facility, and optimally including other areas within the project site. Guidance on plant species can be found here: http://www.dcr.virginia.gov/natural-heritage/solar-site-native-plants-finder. In addition, Virginia native species alternatives to the non-native species listed in the Virginia Erosion and Sediment Control Handbook (Third Edition 1992), can be found in the 2017 addendum titled "Native versus Invasive Plant Species", here: https://www.deq.virginia.gov/Portals/0/DEQ/Water/Publications/NativeInvasiveFAQ.pdf. Page 3 of the addendum provides a list of native alternatives for non-natives commonly used for site stabilization including native cover crop species (i.e. Virginia wildrye).

If tree removal is proposed for the project, it will fragment an Ecological Core (C3) as identified in the Virginia Natural Landscape Assessment (https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla), one of a suite of tools in Virginia ConservationVision that identify and prioritize lands for conservation and protection.

Ecological Cores are areas of unfragmented natural cover with at least 100 acres of interior that provide 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. Cores also provide benefits in terms of open space, recreation, water quality (including drinking water protection and erosion prevention), and air quality (including carbon sequestration and oxygen production), along with the many associated economic benefits of these functions. The

cores are ranked from C1 to C5 (C5 being the least ecologically relevant) using many prioritization criteria, such as the proportions of sensitive habitats of natural heritage resources they contain.

Fragmentation occurs when a large, contiguous block of natural cover is dissected by development, and other forms of permanent conversion, into one or more smaller patches. Habitat fragmentation results in biogeographic changes that disrupt species interactions and ecosystem processes, reducing biodiversity and habitat quality due to limited recolonization, increased predation and egg parasitism, and increased invasion by weedy species.

Therefore minimizing fragmentation is a key mitigation measure that will reduce deleterious effects and preserve the natural patterns and connectivity of habitats that are key components of biodiversity. DCR recommends efforts to minimize edge in remaining fragments, retain natural corridors that allow movement between fragments and designing the intervening landscape to minimize its hostility to native wildlife (natural cover versus lawns). Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer, available here: http://vanhde.org/content/map.

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

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

New and updated information is continually added to Biotics. Please re-submit a completed order form and project map for an update on this natural heritage information if the scope of the projects change and/or six months (June 21, 2021) has passed before it is utilized.

A fee of $ 125.00 has been assessed for the service of providing this information. Please find attached an invoice for that amount. Please return one copy of the invoice along with your remittance made payable to the Treasurer of Virginia, DCR Finance, 600 East Main Street, 24th Floor, Richmond, VA 23219. Payment is due within thirty days of the invoice date. Please note late payment may result in the suspension of project review service for future projects.

The VDWR maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dwr.virginia.gov.

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on these projects.

Sincerely,

S. René Hypes
Natural Heritage Project Review Coordinator

Cc: Ernie Aschenbach, DWR
Troy Andersen, USFWS
Mary Major, DEQ

APPENDIX K: VIRGINIA DEPARTMENT OF HISTORICAL RESOURCES V-CRIS INVENTORY AND REPORT FOR STONY CREEK BATTLEFIELD

Enclosed.

3-Mile V-CRIS Archaeological Resources Inventory

DHR_ID	Site Categories	Site Types	Time Periods	Evaluation Status	Restricted	ArchaeologySiteSurveyID	OBJECTID
44DW0004	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	8868	151341
44DW0007	null	null	Woodland (1200 B.C. - 1606 A.D.)	null	null	8718	154350
44DW0024	null	null	Archaic (8500 - 1201 B.C.)	null	null	8704	158158
44DW0025	null	null	Middle Archaic (6500 - 3001 B.C.), Late Archaic (3000 - 1201 B.C.)	null	null	8703	155018
44DW0031	null	null	Middle Archaic (6500 - 3001 B.C.), Late Archaic (3000 - 1201 B.C.), Woodland (1200 B.C. - 1606 A.D.)	null	null	6017	150198
44DW0033	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	8854	152731
44DW0039	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	8848	151142
44DW0040	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	8846	163434
44DW0082	null	null	Woodland (1200 B.C. - 1606 A.D.)	null	null	8626	143611
44DW0086	null	null	Archaic (8500 - 1201 B.C.), Woodland (1200 B.C. - 1606 A.D.)	null	null	8616	146851
44DW0139	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	8994	150920
44DW0140	null	null	Middle Archaic (6500 - 3001 B.C.)	null	null	8993	148554
44DW0141	null	null	Archaic (8500 - 1201 B.C.)	null	null	3770	147830
44DW0142	DSS Legacy	Grave/burial	20th Century (1900 - 1999)	null	null	6076	154404
44DW0172	null	null	Late Archaic (3000 - 1201 B.C.)	null	null	10472	149678

44DW0173	null	null	Woodland (1200 B.C. - 1606 A.D.)	null	null	10471	143762
44DW0180	null	null	Late Archaic (3000 - 1201 B.C.)	null	null	10465	149677
44DW0468	Domestic	Camp	Middle Archaic Period (6500 - 3001 B.C.E), Late Archaic Period (3000 - 1201 B.C.E), Early Woodland (1200 B.C.E - 299 C.E)	DHR Staff: Potentially Eligible	null	312808	465553
44SX0030	DSS Legacy	Camp	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	25149	155709
44SX0031	DSS Legacy	Camp	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	25147	138879
44SX0069	null	null	Middle Archaic (6500 - 3001 B.C.), Woodland (1200 B.C. - 1606 A.D.)	null	null	25276	147089
44SX0142	null	null	Middle Archaic (6500 - 3001 B.C.), Late Archaic (3000 - 1201 B.C.), Woodland (1200 B.C. - 1606 A.D.)	null	null	25199	153894
44SX0200	DSS Legacy	Camp	Archaic (8500 - 1201 B.C.)	null	null	25370	142397
44SX0208	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	25386	155156
44SX0209	null	null	null	null	null	25385	158724
44SX0210	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	1952	143720
44SX0211	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	3390	144870
44SX0212	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	25384	159281
44SX0226	null	null	Historic/Unknown, Paleo-Indian (15000 - 8501 B.C.)	null	null	25358	159622
44SX0227	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	25357	159621

44SX0228	null	null	Early Archaic (8500 - 6501 B.C.)	null	null	25356	153557
44SX0229	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	25354	154999
44SX0230	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	25353	154998
44SX0231	null	null	Paleo-Indian (15000 - 8501 B.C.)	null	null	25110	154997
44SX0232	null	null	Middle Archaic (6500 - 3001 B.C.)	null	null	25108	152305
44SX0233	null	null	Prehistoric/Unknown (15000 B.C. - 1606 A.D.), 19th Century (1800 - 1899), 20th Century (1900 - 1999)	null	null	5891	152304
44SX0234	DSS Legacy	Quarry	Prehistoric/Unknown (15000 B.C. - 1606 A.D.)	null	null	25107	155292
44SX0235	null	null	19th Century: 1st quarter (1800 - 1825)	null	null	25106	154617
44SX0236	null	null	Early Archaic (8500 - 6501 B.C.), Middle Archaic (6500 - 3001 B.C.), 19th Century: 2nd half (1850 - 1899), 20th Century: 1st half (1900 - 1949)	null	null	25105	150176
44SX0416	Domestic	Dwelling, single	Reconstruction and Growth (1866 - 1916)	null	null	308726	442748
44SX0417	Domestic	Artifact scatter	Early Archaic Period (8500 - 6501 B.C.E), Middle Archaic Period (6500 - 3001 B.C.E), Late Archaic Period (3000 - 1201 B.C.E), Reconstruction and Growth (1866 - 1916)	null	null	308727	442749
44SX0418	Domestic	Dwelling, single	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991), Post Cold War (1992 - Present)	null	null	308728	442750

44SX0419	Domestic	Dwelling, single	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)	null	null	308729	442751
44SX0420	Domestic	Dwelling, single	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)	null	null	308730	442752
44SX0421	Domestic	Dwelling, single	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)	null	null	308731	442753
44SX0422	Domestic	Dwelling, single	World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)	null	null	308732	442754
44SX0423	Domestic	Dwelling, single	World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991), Post Cold War (1992 - Present)	null	null	308733	442755
44SX0424	Domestic	Artifact scatter	Early Archaic Period (8500 - 6501 B.C.E), Middle Archaic Period (6500 - 3001 B.C.E), Late Archaic Period (3000 - 1201 B.C.E)	null	null	308734	442756
44SX0425	Domestic	Dwelling, single	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991), Post Cold War (1992 - Present)	null	null	308735	442757
44SX0426	Domestic	Dwelling, single	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)	null	null	308736	442758
44SX0427	Domestic	Outbuilding	Reconstruction and Growth (1866 - 1916)	null	null	308737	442759

44SX0428	Domestic, Industry/Processing/Extraction	Artifact scatter, Lithic scatter	Pre-Contact, Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945)	null	null	308738	442760

3-Mile V-CRIS Architectural Resource Inventory

DHR_ID	Other DHR IDs	Incorporated Towns	Jurisdictions	Property Names	Property Addresses	Historic District Name	Evaluation Status	Survey ID	Survey Update Date	OBJECTID
026-0122	44DW0021	null	Dinwiddie (County)	Millview (Historic/Current)	23906 Winfield Road - Alt Route 630	null	DHR Staff: Not Eligible	311555	8/16/17, 10:09:44 AM	745184
026-5236	null	null	Dinwiddie (County)	House, 24712 Mortar Branch Road (Function/Location)	24712 Mortar Branch Road	null	DHR Staff: Not Eligible	312748	8/27/17, 10:17:26 AM	749611
026-5238	null	null	Dinwiddie (County)	Farm, Mortar Branch Road (Function/Location)	Mortar Branch Road	null	DHR Staff: Not Eligible	312750	8/27/17, 10:19:19 AM	749614
026-5239	null	null	Dinwiddie (County)	House, 24827 Black Branch Road (Function/Location)	24827 Black Branch Road	null	DHR Staff: Not Eligible	312751	8/27/17, 10:19:46 AM	749615
026-5240	null	null	Dinwiddie (County)	House, 24905 Black Branch Road (Function/Location)	24905 Black Branch Road	null	DHR Staff: Not Eligible	312752	8/27/17, 10:20:17 AM	749616
026-5241	null	null	Dinwiddie (County)	House, 24902 Black Branch Road (Function/Location)	24902 Black Branch Road	null	DHR Staff: Not Eligible	312753	8/27/17, 10:20:51 AM	749617
026-5242	null	null	Dinwiddie (County)	House, 24904 Black Branch Road (Function/Location)	24904 Black Branch Road	null	DHR Staff: Not Eligible	312754	8/27/17, 10:21:20 AM	749618

026-5243	null	null	Dinwiddie (County)	Tucker House and Cemetery, 21613 Flatfoot Road (Function/Location)	21613 Flatfoot Road	null	DHR Staff: Not Eligible	312755	8/27/17, 10:21:52 AM	749619
026-5244	null	null	Dinwiddie (County)	The Pegram's Memorial and Family Cemetery, Flatfoot Road (Function/Location)	Flatfoot Road	null	DHR Staff: Not Eligible	312756	8/27/17, 10:22:23 AM	749620
026-5245	null	null	Dinwiddie (County)	House, 22011 Flatfoot Road (Function/Location)	22011 Flatfoot Road	null	DHR Staff: Not Eligible	312757	8/27/17, 10:23:00 AM	749621
026-5246	null	null	Dinwiddie (County)	House, 22309 Flatfoot Road (Function/Location)	22309 Flatfoot Road	null	DHR Staff: Not Eligible	312758	8/27/17, 10:23:28 AM	749622
026-5247	null	null	Dinwiddie (County)	House, 22306 Flatfoot Road (Function/Location)	22306 Flatfoot Road	null	DHR Staff: Not Eligible	312759	8/27/17, 10:23:56 AM	749623
026-5248	null	null	Dinwiddie (County)	House, 22501 Flatfoot Road (Function/Location)	22501 Flatfoot Road	null	DHR Staff: Not Eligible	312760	8/27/17, 10:24:25 AM	749627
026-5249	null	null	Dinwiddie (County)	House, 22505 Flatfoot Road (Function/Location)	22505 Flatfoot Road	null	DHR Staff: Not Eligible	312761	8/27/17, 10:25:02 AM	749624
026-5250	null	null	Dinwiddie (County)	House, 23317 Flatfoot Road (Function/Location)	23317 Flatfoot Road	null	DHR Staff: Not Eligible	312762	8/27/17, 10:25:31 AM	749625
026-5251	null	null	Dinwiddie (County)	Little Bethel Baptist Church, 23503 Flatfoot Road (Function/Location)	23503 Flatfoot Road	null	DHR Staff: Not Eligible	312763	8/16/17, 10:23:03 AM	752465

026-5252	null	null	Dinwiddie (County)	Little Bethel Baptist Church Cemetery, Flatfoot Road (Function/Location)	Flatfoot Road	null	DHR Staff: Not Eligible	312764	8/16/17, 10:23:34 AM	752466
026-5253	null	null	Dinwiddie (County)	House, 23706 Flatfoot Road (Function/Location)	23706 Flatfoot Road	null	DHR Staff: Not Eligible	312765	8/16/17, 10:24:03 AM	752467
026-5254	null	null	Dinwiddie (County)	House, 22919 McKenney Highway (Function/Location)	22919 McKenney Highway - Alt Route 40	null	DHR Staff: Not Eligible	312766	8/16/17, 10:24:30 AM	752468
091-0030	null	null	Sussex (County)	Sappony Baptist Church (Historic/Current)	Route 40, Route 681	null	null	206666	9/16/13, 4:55:24 PM	206286
091-5025	null	Stony Creek	Greensville (County), Sussex (County)	Sappony Church Battlefield (Historic), Stony Creek Depot Battlefield (Historic)	Concord Sappony Road - Alt Route 681, Sussex Drive - Alt Route 40	null	DHR Staff: Potentially Eligible	308618	4/23/17, 2:34:09 PM	717178
091-5181	null	null	Sussex (County)	Hunt Club, 11600 Booth Road (Function/Location)	11600 Booth Road - Alt Route 658	null	DHR Staff: Not Eligible	305163	4/23/17, 2:34:09 PM	693720
091-5182	null	null	Sussex (County)	Hunt Club, 11479 Booth Road (Function/Location)	11479 Booth Road - Alt Route 658	null	DHR Staff: Not Eligible	305164	4/23/17, 2:34:09 PM	693721

091-5183	null	null	Sussex (County)	House, 12312 Booth Road (Function/Location)	12312 Booth Road - Alt Route 658	null	DHR Staff: Not Eligible	305165	4/23/17, 2:34:09 PM	693722
091-5184	null	null	Sussex (County)	House, 11523 Sussex Drive (Function/Location)	11523 Sussex Drive - Alt Route 40	null	DHR Staff: Not Eligible	305166	4/23/17, 2:34:09 PM	693727
091-5185	null	null	Sussex (County)	House, 12085 Booth Road (Function/Location)	12085 Booth Road - Alt Route 658	null	DHR Staff: Not Eligible	305170	4/23/17, 2:34:09 PM	693728
091-5186	null	null	Sussex (County)	House, 12450 Booth Road (Function/Location)	12450 Booth Road - Alt Route 658	null	DHR Staff: Not Eligible	305171	4/23/17, 2:34:09 PM	693729
091-5187	null	null	Sussex (County)	House, 12443 Lee Avenue (Function/Location)	12435 Lee Avenue - Alt Route 40, 12443 Lee Avenue - Alt Route 40	null	DHR Staff: Not Eligible	305173	4/23/17, 2:34:09 PM	693731
091-5188	null	null	Sussex (County)	House, 12427 Lee Avenue (Function/Location)	12427 Lee Avenue - Alt Route 40	null	DHR Staff: Not Eligible	305174	4/23/17, 2:34:09 PM	693732
091-5189	null	null	Sussex (County)	Butler Lumber Company (Current Name)	13056 Parham Lane - Alt	null	DHR Staff: Not Eligible	307476	4/23/17, 2:34:09 PM	708379

					Route 1213					
091-5190	null	null	Sussex (County)	House, 12026 Palestine Road (Function/Location)	12026 Palestine Road - Alt Route 657	null	DHR Staff: Not Eligible	307477	4/23/17, 2:34:09 PM	708380
091-5191	null	null	Sussex (County)	House, 12038 Palestine Road (Function/Location), Maggie's Hair Salon (Descriptive)	12038 Palestine Road - Alt Route 657	null	DHR Staff: Not Eligible	307478	4/23/17, 2:34:09 PM	708381
091-5192	null	null	Sussex (County)	House, 12050 Palestine Road (Function/Location)	12050 Palestine Road - Alt Route 657	null	DHR Staff: Not Eligible	307479	4/23/17, 2:34:09 PM	708382
091-5193	null	null	Sussex (County)	House, 11565 Palestine Road (Function/Location)	11565 Palestine Road - Alt Route 657	null	DHR Staff: Not Eligible	307480	4/23/17, 2:34:09 PM	708383
091-5194	null	null	Sussex (County)	House, 11467 Palestine Road (Function/Location)	11467 Palestine Road - Alt Route 657	null	DHR Staff: Not Eligible	307481	4/23/17, 2:34:09 PM	708384
305-5001	null	Stony Creek	Sussex (County)	House, 12400 Lee Avenue (Function/Location)	12400 Lee Avenue - Alt Route 40	null	DHR Staff: Not Eligible	305172	4/23/17, 2:34:09 PM	693730
305-5002	null	Stony Creek	Sussex (County)	Agnes Helena Jones Elementary School (Current Name),	12508 Lee Avenue -	null	DHR Staff: Not Eligible	305175	4/23/17, 2:34:09 PM	693733

				Elemetary School, 12508 Lee Avenue (Function/Location)	Alt Route 40					
305-5003	null	Stony Creek	Sussex (County)	House, 12497 Lee Avenue (Function/Location)	12497 Lee Avenue - Alt Route 40	null	DHR Staff: Not Eligible	305176	4/23/17, 2:34:09 PM	693734
305-5027	null	Stony Creek	Sussex (County)	House, 12597 Flatfoot Road (Function/Location)	12597 Flatfoot Road - Alt Route 658	null	DHR Staff: Potentially Eligible	305203	4/23/17, 2:34:09 PM	693764

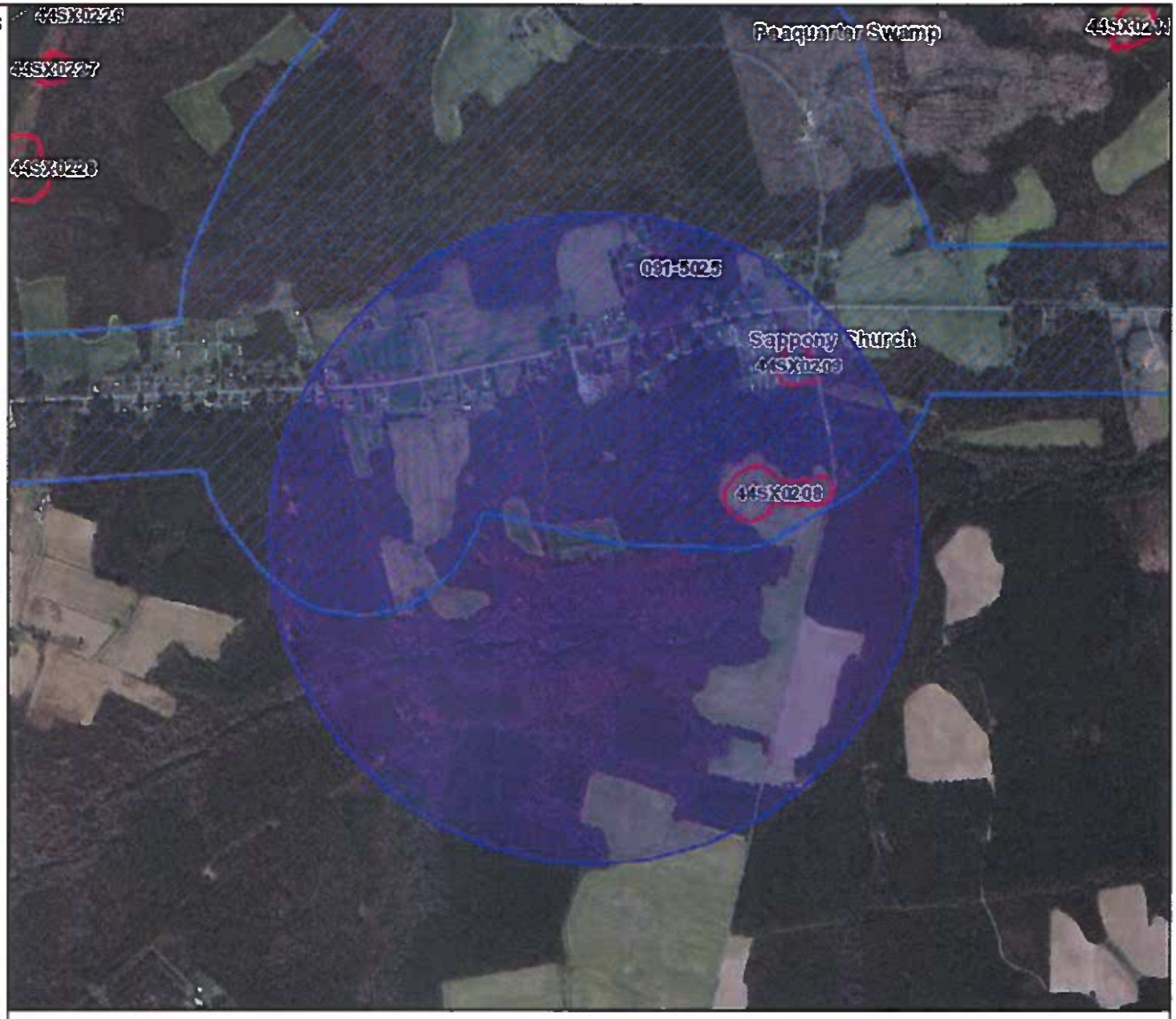
Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Resources
- Architecture Labels
- Individual Historic District Properties
- Archaeological Resources
- Archaeology Labels
- DHR Easements
- USGS GIS Place names
- County Boundaries



N

Feet

0 500 1000 1500 2000

1:18,056 / 1"=1,505 Feet

Title: Flatfoot Solar VCRIS Map **Date: 12/28/2020**

DISCLAIMER:Records of the Virginia Department of Historic Resources (DHR) have been gathered over many years from a variety of sources and the representation depicted is a cumulative view of field observations over time and may not reflect current ground conditions.The map is for general information purposes and is not intended for engineering, legal or other site-specific uses. Map may contain errors and is provided "as-is". More information is available in the DHR Archives located at DHR's Richmond office.

Notice if AE sites:Locations of archaeological sites may be sensitive the National Historic Preservation Act (NHPA), and the Archaeological Resources Protection Act (ARPA) and Code of Virginia §2.2-3705.7 (10). Release of precise locations may threaten archaeological sites and historic resources.

Property Information

Property Names

Name Explanation	Name
Historic	Sappony Church Battlefield
Historic	Stony Creek Depot Battlefield

Property Evaluation Status

DHR Staff: Potentially Eligible

Property Addresses

Current - Sussex Drive Route 40
Alternate - Concord Sappony Road Route 681

County/Independent City(s): Greensville (County), Sussex (County)

Incorporated Town(s): Stony Creek

Zip Code(s): 23867, 23882

Magisterial District(s): *No Data*

Tax Parcel(s): *No Data*

USGS Quad(s): CHERRY HILL, PURDY, STONY CREEK

Additional Property Information

Architecture Setting: Rural

Acreage: *No Data*

Site Description:

Petersburg's 10-month siege took place over a county-sized area east, south and southwest of the city. Petersburg National Battlefield preserves much of the siege times to the east - including the initial assaults, the Crater, and Fort Stedman. A swath of commercial and residential development has eradicated nearly all historic resources along Crater Road, the main road to the south. Many fortifications southwest of the city are preserved by the NPS or the City of Petersburg on land transferred by the NPS. Except for being sparsely dotted by modern residences, this large southwestern area remains remarkably unspoiled.

August 2016: The area of the battlefield surveyed at this time consists of approximately 371 acres located roughly ½ mile west of Stony Creek. The area is bordered by Route 40 to the north, Philistine Road to the south, and rural agricultural homes to the west and east.

August 2020: The area of the battlefield surveyed at this time consists of approximately 19.00 acres. The area is bordered by rural forested lands to the north, east, and west, and by Sussex Drive to the south. The tract is situated in the Upper Coastal Plain region and is comprised of a broad, flat upland to the north of Sappony Creek. Elevations range from 132 feet above mean sea level (AMSL) to 144 feet AMSL.? Much of the project area has been timbered, and the stumps cleared, with bulldozed piles of timber debris evident. A power line runs north to south across the western section of the project area, and a utility line runs roughly northwest to southeast across the southern portion of the project area.? A substation is located within an outparcel.

Surveyor Assessment:

Major General William H.F. "Rooney" Lee's cavalry division pursued Wilson's and Kautz's raiders who failed to destroy the Staunton River Bridge on June 25. Wilson and Kautz headed east and, on June 28, crossed the Nottoway River at the Double Bridges and headed north to the Stony Creek Depot on the Weldon Railroad. Here, they were attacked by Major General Wade Hampton's cavalry division. Later in the day, William H.F. Lee's Division arrived to join forces with Hampton, and the Federals were heavily pressured. During the night, Wilson and Kautz disengaged and pressed north on the Halifax Road for the supposed security of Reams Station, abandoning many fleeing slaves who had sought security with the Federal raiders.

August 2016: According to the 2009 Civil War Sites Advisory Commission (CWSAC) update, this resource is potentially eligible for listing on the National Register of Historic Places. Approximately 0.00 acres within the battlefield are protected or publicly accessible. The update also noted that portions of the landscape have been altered, but most of the essential features remain. The project area surveyed at this time falls within an avenue of approach for the battle and partially within the area determined potentially eligible for the National Register of Historic Places, although not within the core battlefield area.

August 2020: The project area falls within an avenue of approach for the battle and partially within the area determined potentially eligible for the National Register of Historic Places, however, not within the core battlefield area. The project area is situated in an avenue of approach for a Civil War battlefield. The battlefield is considered potentially eligible for listing on the National Register of Historic Places. However, the shovel testing and metal-detecting survey did not record any artifacts, earthworks, or other Civil-War related elements within the project area. The proposed development will not impact the viewshed of the battlefield, as the area is only partially with the battlefield boundaries and located on an avenue of approach that has been changed during the 20th century with residential development, overhead utility lines, a substation, and landscape changes. Considering this, Circa~ recommends that the project will not adversely affect the battlefield or the battlefield landscape, and no further survey work of the battlefield within the project area is warranted.

Surveyor Recommendation: Recommended Potentially Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category:	Defense
Resource Type:	Battle Site
NR Resource Type:	Site
Historic District Status:	*No Data*
Date of Construction:	Ca 1864
Date Source:	Written Data
Historic Time Period:	Civil War (1861 - 1865)
Historic Context(s):	Military/Defense
Other ID Number:	*No Data*
Architectural Style:	No discernible style
Form:	*No Data*
Number of Stories:	*No Data*
Condition:	Good
Threats to Resource:	Development

Architectural Description:

January 1992: no description provided.

August 2016: Within the battlefield boundaries, no archaeological resources and one architectural resource related to the Sappony Creek Battlefield have been previously identified. Because the current project area falls in the boundaries of a Civil War battlefield, Circa~ conducted a metal-detecting survey of the area within the battlefield boundaries along the south side of Route 40. Circa~ staff did not notice any previous metal-detecting activities from relic hunters in the area. Vegetation was extremely thick in the western section of the project area where the trees had been recently harvested. There was some difficulty in getting the head close to the ground in this area due to the vegetation in the 800-foot long section. In addition, a 500-foot wide wetland was not surveyed. Circa~ used the Mine-Wolf detector in this area as the depth to the object is greater (four feet) than the Fisher model. The remaining 2,250-foot long section of the area within the battlefield consisted of a plowed agricultural field. The metal-detecting survey recorded nine hits along Route 40. The artifacts consisted of two iron wire fragments, one aluminum can pull tab fragment, one aluminum foil fragment, and five aluminum cans. No artifacts clearly associated with or that date to the Civil War were recovered from the metal-detecting survey.

August 2020: Because a portion of the project area falls in the boundaries of a Civil War battlefield, Circa~ conducted a metal-detecting survey of the area within the battlefield boundaries along Route 40. Circa~ staff did not notice any previous metal-detecting activities from relic hunters in the area.

Using Fisher Model #1266-XB Deep Search and Mine-Wolf all-metal metal detectors, Circa~ archaeologists slowly walked within the boundaries of the battlefield, and they slowly swung the head of the metal detector perpendicular with each transect being walked. Each time the metal detector alerted the archaeologist to the presence of a ground surface or sub-ground surface metallic object, a non-metallic pin flag was placed on the suspect location. After total survey completion, each suspect area and the ground surface immediately surrounding the suspect area was again metal detected for additional hits. Following the completion of this procedure, each suspect area was excavated using a round shovel or trowel, and all soils were screened through ¼-inch hardware cloth until artifacts were recovered. All excavated soils and all areas surrounding the excavation were continually surveyed using the metal detector until the unit registered no alerts as to the presence of metallic artifacts. At that point, at that location, the metal-detector survey was concluded. The vegetation within the battlefield area is thick, and it was challenging to get the head of the machine near the ground surface.

The metal-detecting survey recorded three hits. The artifacts consisted of two metal pin flags and one iron bolt. No artifacts associated with or that date to the Civil War were recovered from the metal-detecting survey.

Secondary Resource Information

Historic District Information

Historic District Name:	*No Data*
Local Historic District Name:	*No Data*
Historic District Significance:	*No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: 2020-4715
Investigator: Dawn Muir
Organization/Company: Circa~ Cultural Resource Management, LLC
Photographic Media: Digital
Survey Date: 8/19/2020
Dhr Library Report Number: SX-042
Project Staff/Notes:

August 2020: In August 2020, Circa~ Cultural Resource Management, LLC (Circa~), conducted a Phase I cultural resources survey of the Shands Energy Center in Sussex County, Virginia. The project area, which encompasses approximately 19.00 acres, is bordered by rural forested lands to the north, east, and west, and by Sussex Drive to the south. The Area of Potential Effect (APE) for archaeological and architectural resources is the approximately 19.00-acre project area.

At Circa~, Carol D. Tyrer, Registered Professional Archaeologist (RPA), served as Project Manager for the project. Skye Hughes, MA, served as the Principal Investigator and was assisted in the field by Diana Johnson, Scotty McElroy, and Shayne Spears, Field Archaeologists. Dawn M. Muir, RPA, served as the Historian and Architectural Historian for the project and completed the historical context and architectural survey. Desiree Sattler, Archaeological Lab Technician, assisted in the processing of artifacts. Skye Hughes, Dawn M. Muir, and Carol D. Tyrer prepared the report. The successful completion of the Phase I survey for the proposed development was made possible by the contribution of many individuals. Jayne Guthorn with East Point Energy ensured that project information and maps were always available for the study. Dawn M. Muir entered the information into the V-CRIS system and Carol D. Tyrer photographed the resource.

Project Bibliographic Information:

Circa~
2020 Phase I Cultural Resources Survey of the Shands Energy Center, Sussex County, Virginia.
SX-042

Karen Hutchins-Keim, Jean M. Cascardi
Peer Review of Phase I Archaeological Survey of Shands Energy Center, LLC
[Letter report, November 25, 2020, Rummel, Klepper, and Kahl, LLP (RK&K)]
SX-043

Surveyor's NR Criteria Recommendations: A - Associated with Broad Patterns of History

Event Type: DHR Staff: Potentially Eligible

DHR ID: 091-5025
Staff Name: Adrienne Birge-Wilson
Event Date: 9/21/2016
Staff Comment

DHR File No.: 2016-0941

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: 2016-0941
Investigator: Dawn Muir-Frost
Organization/Company: Circa~ Cultural Resource Management, LLC
Photographic Media: Digital
Survey Date: 5/24/2016
Dhr Library Report Number: SX-037
Project Staff/Notes:

July 2016: In the spring of 2016, Circa~ Cultural Resource Management, LLC (Circa~) conducted a Phase I archaeological survey of the Sappony Property in Sussex County, Virginia. The project area encompasses approximately 371 acres. The Area of Potential Effect (APE) for archaeological resources is the approximately 371-acre project area. Architectural resources were not included in this survey and will be surveyed under a separate cover. However, the project area does fall within a Civil War Battlefield, which was included in the archaeological survey.

At Circa~, Carol D. Tyrer served as Project Manager and Principal Investigator for the project and was assisted in the field by Charlie Rutledge, Eric Mai, Matt Carr, and Mackenzie Kyger, Field Archaeologists. Dawn M. Muir-Frost served as the Historian for the project and completed the historic context. Mackenzie Kyger, Archaeological Lab Technician, assisted in the processing of artifacts. Dawn M. Muir-Frost and Carol D. Tyrer prepared the report. Carol D. Tyrer photographed the resources and Dawn M. Muir-Frost entered the information into the V-CRIS system.

Project Bibliographic Information:

Circa~
2020 Phase I Cultural Resources Survey of the Shands Energy Center, Sussex County, Virginia.
SX-042

Karen Hutchins-Keim, Jean M. Cascardi
Peer Review of Phase I Archaeological Survey of Shands Energy Center, LLC
[Letter report, November 25, 2020, Rummel, Klepper, and Kahl, LLP (RK&K)]

SX-043

Surveyor's NR Criteria Recommendations: A - Associated with Broad Patterns of History

Event Type: DHR Staff: Potentially Eligible

DHR ID: 091-5025

Staff Name: ABPP

Event Date: 1/24/2007

Staff Comment

Preliminary survey data from the American Battlefield Protection Program (ABPP) indicates that this historic Civil War battlefield is likely eligible for listing in the National Register of Historic Places and likely deserving of future preservation efforts. This survey information should be reassessed during future Section 106/NEPA compliance reviews.

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*

Investigator: CWSAC

Organization/Company: National Park Service

Photographic Media: *No Data*

Survey Date: 1/1/1992

Dhr Library Report Number: *No Data*

Project Staff/Notes:

CWSAC - VA067
Civil War Sites Advisory Commission Survey Form - no photos submitted - not dated or signed, but surveys occurred during the period between 1991 and 1993.

Project Bibliographic Information:

Circa~
2020 Phase I Cultural Resources Survey of the Shands Energy Center, Sussex County, Virginia.
SX-042

Karen Hutchins-Keim, Jean M. Cascardi
Peer Review of Phase I Archaeological Survey of Shands Energy Center, LLC
[Letter report, November 25, 2020, Rummel, Klepper, and Kahl, LLP (RK&K)]
SX-043

Surveyor's NR Criteria Recommendations: A - Associated with Broad Patterns of History

Bibliographic Information

Bibliography:

No Data

Property Notes:

No Data

Virginia Dept. of Historic Resources

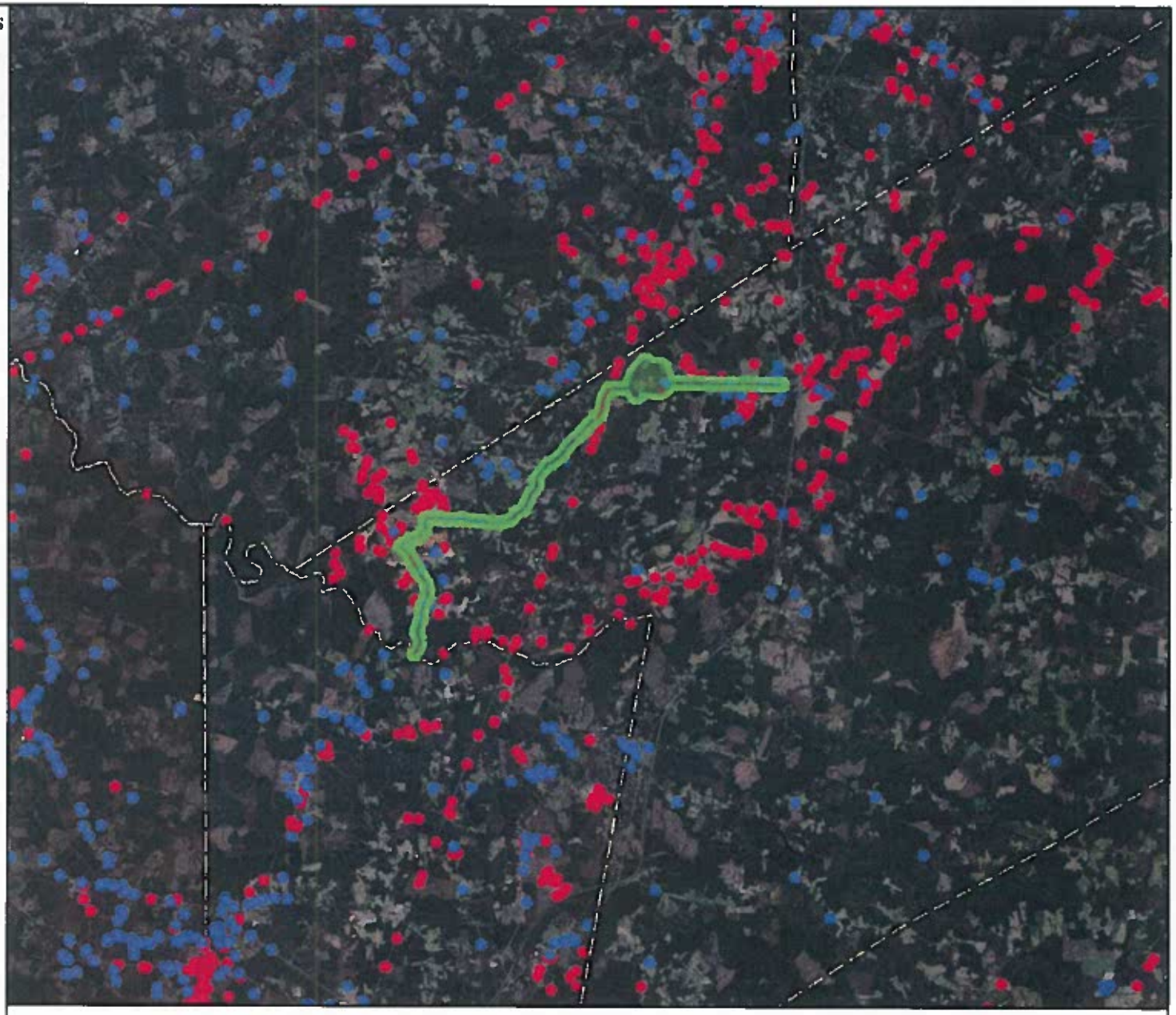
V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Points
- Archaeology Points

County Boundaries



N

Miles

0 1 2 3 4

1:288,895 / 1"=5 Miles

Title: Architecture Labels

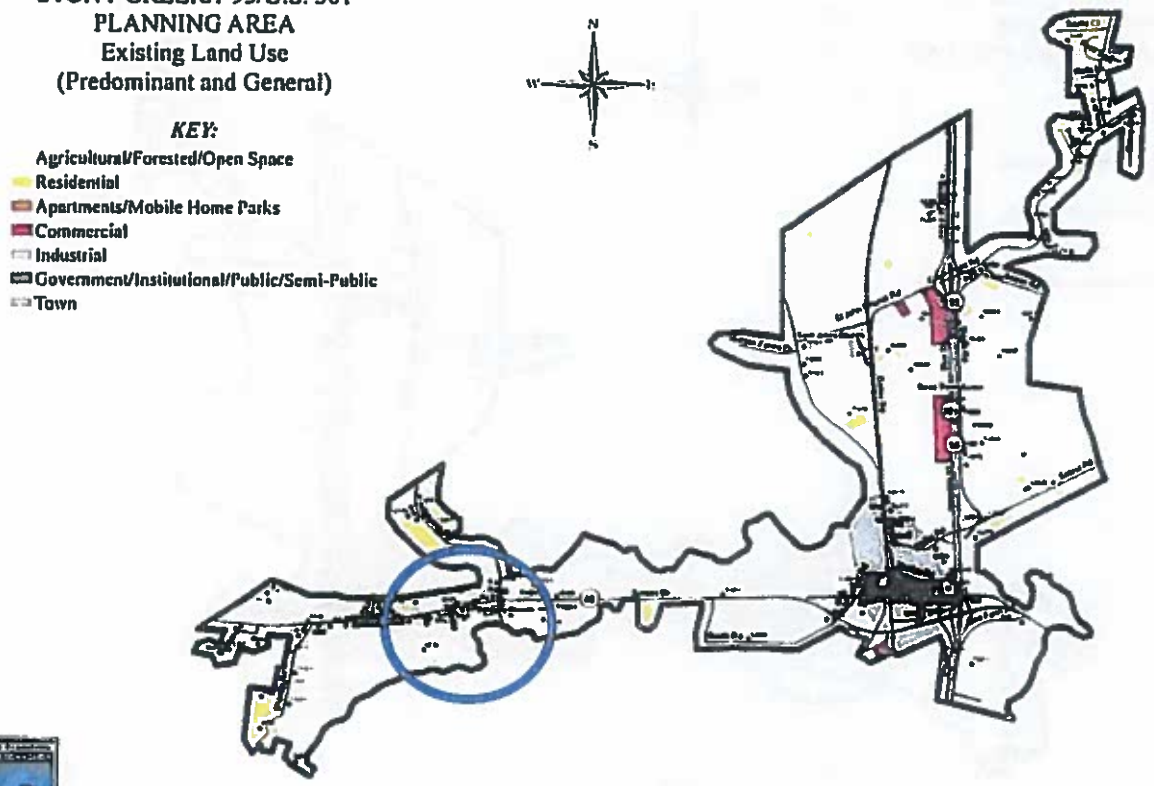
Date: 1/30/2021

DISCLAIMER:Records of the Virginia Department of Historic Resources (DHR) have been gathered over many years from a variety of sources and the representation depicted is a cumulative view of field observations over time and may not reflect current ground conditions.The map is for general information purposes and is not intended for engineering, legal or other site-specific uses. Map may contain errors and is provided "as-is". More information is available in the DHR Archives located at DHR's Richmond office.

Notice if AE sites:Locations of archaeological sites may be sensitive the National Historic Preservation Act (NHPA), and the Archaeological Resources Protection Act (ARPA) and Code of Virginia §2.2-3705.7 (10). Release of precise locations may threaten archaeological sites and historic resources.

Attachment B – Stony Creek Existing Land Use

EXHIBIT IX-C
STONY CREEK/I-95/U.S. 301
PLANNING AREA
Existing Land Use
(Predominant and General)

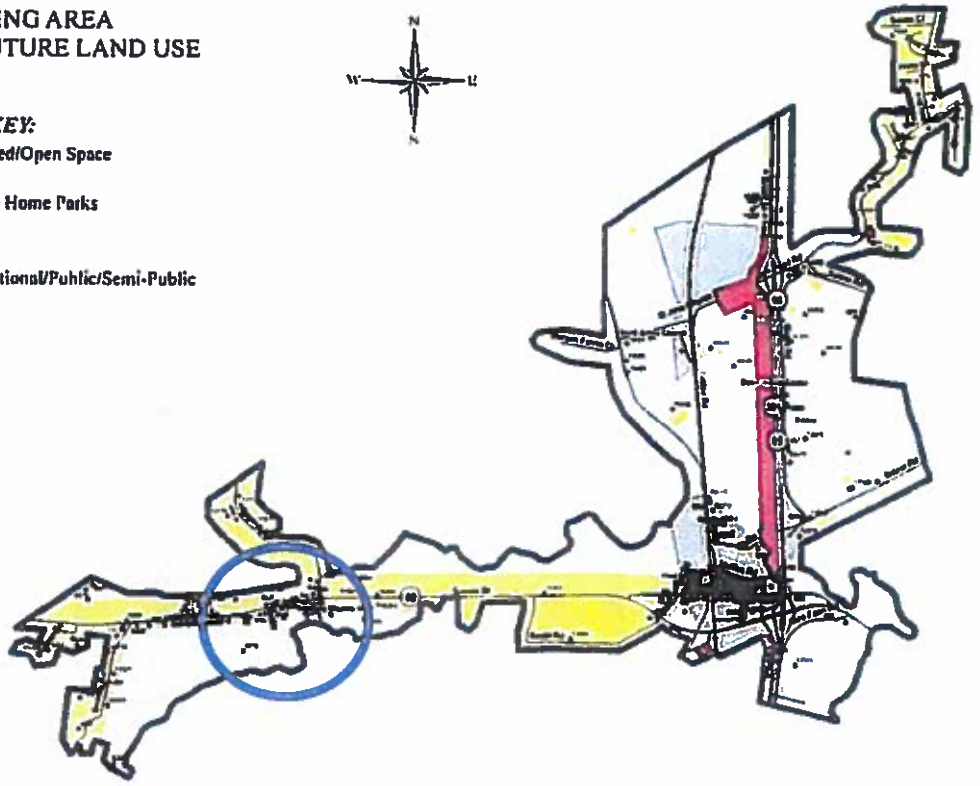


CPDC

BASE MAP SOURCE:
MSAG DATA CONSULTANTS ORANGE, VIRGINIA, JULY, 2004
SUSSEX COUNTY GIS DATABASE, 2008

Attachment B – Stony Creek Future Land Use

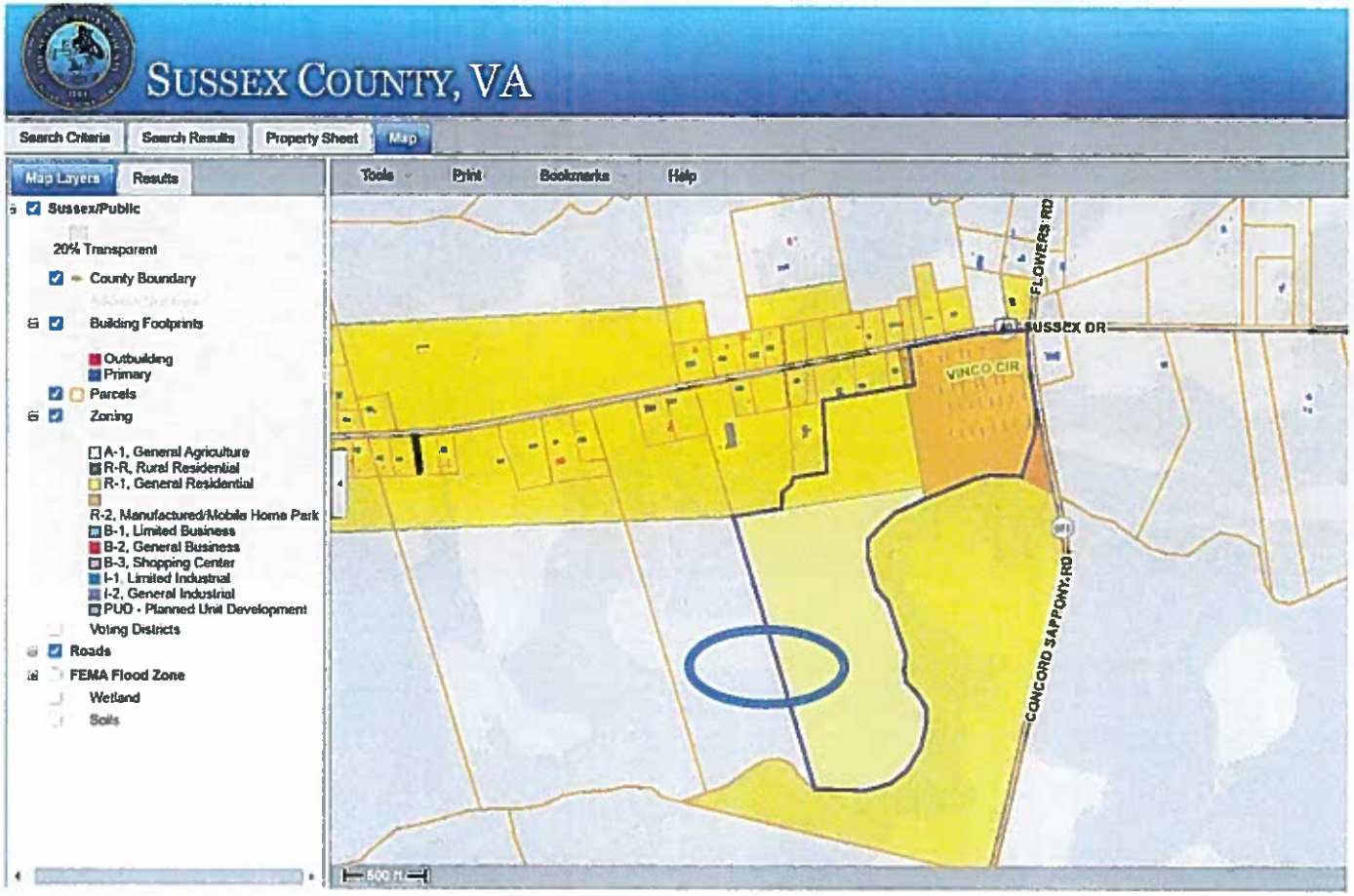
EXHIBIT X-B
STONY CREEK/I-95/U.S. 301
PLANNING AREA
PROJECTED FUTURE LAND USE



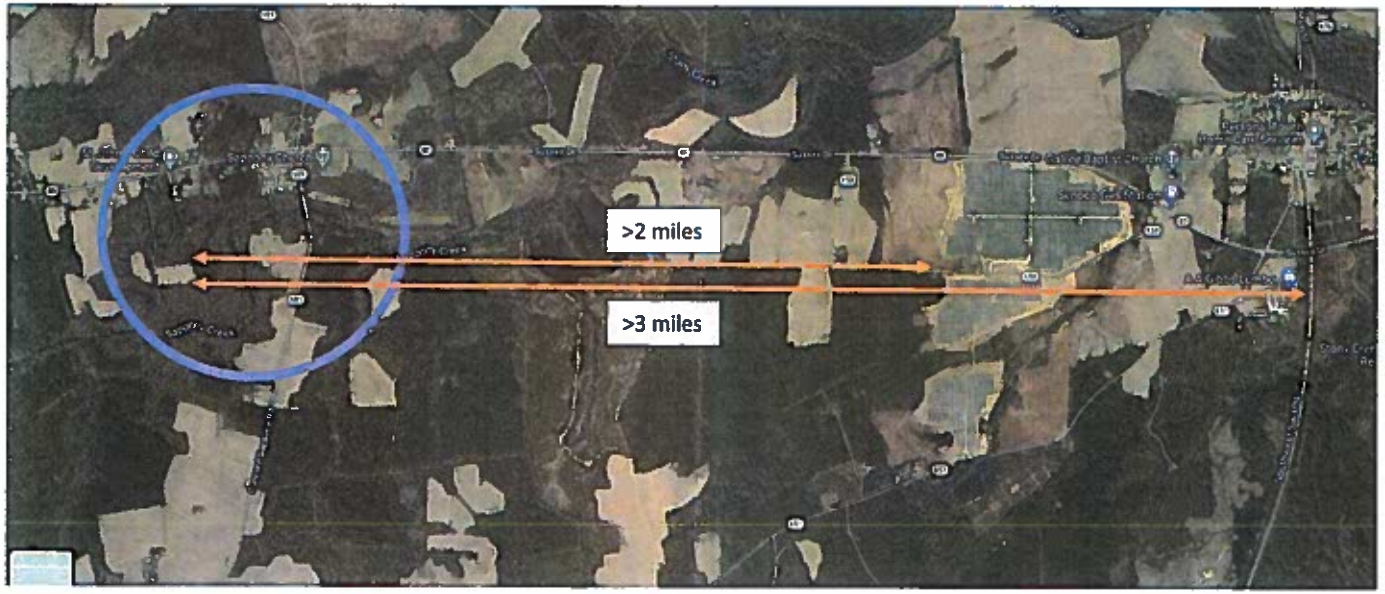
CPDC

BASE MAP SOURCE:
MSAG DATA CONSULTANTS, ORANGE, VIRGINIA, JULY, 2004
SUSSEX COUNTY GIS DATABASE, 2006

Attachment B – Zoning

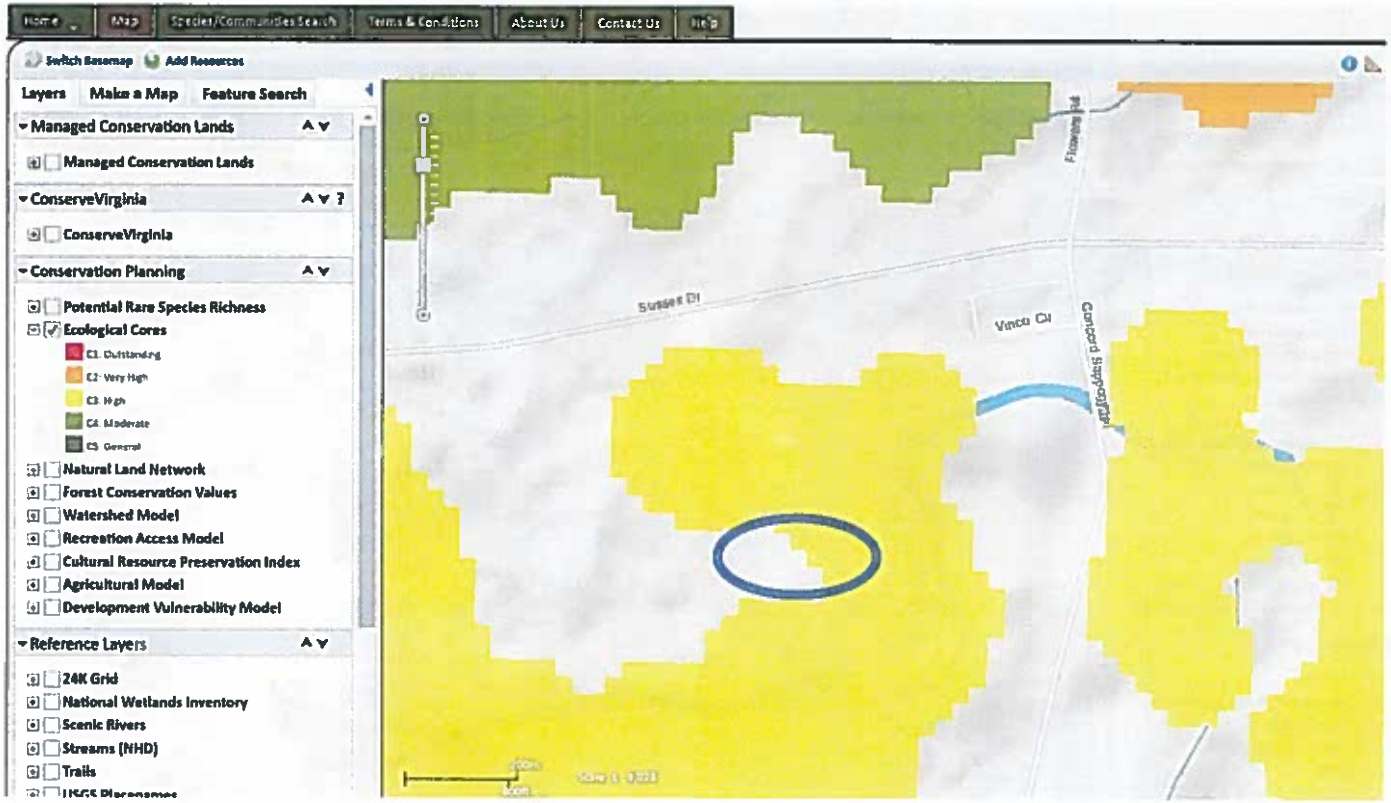


Attachment B – Stony Creek Region



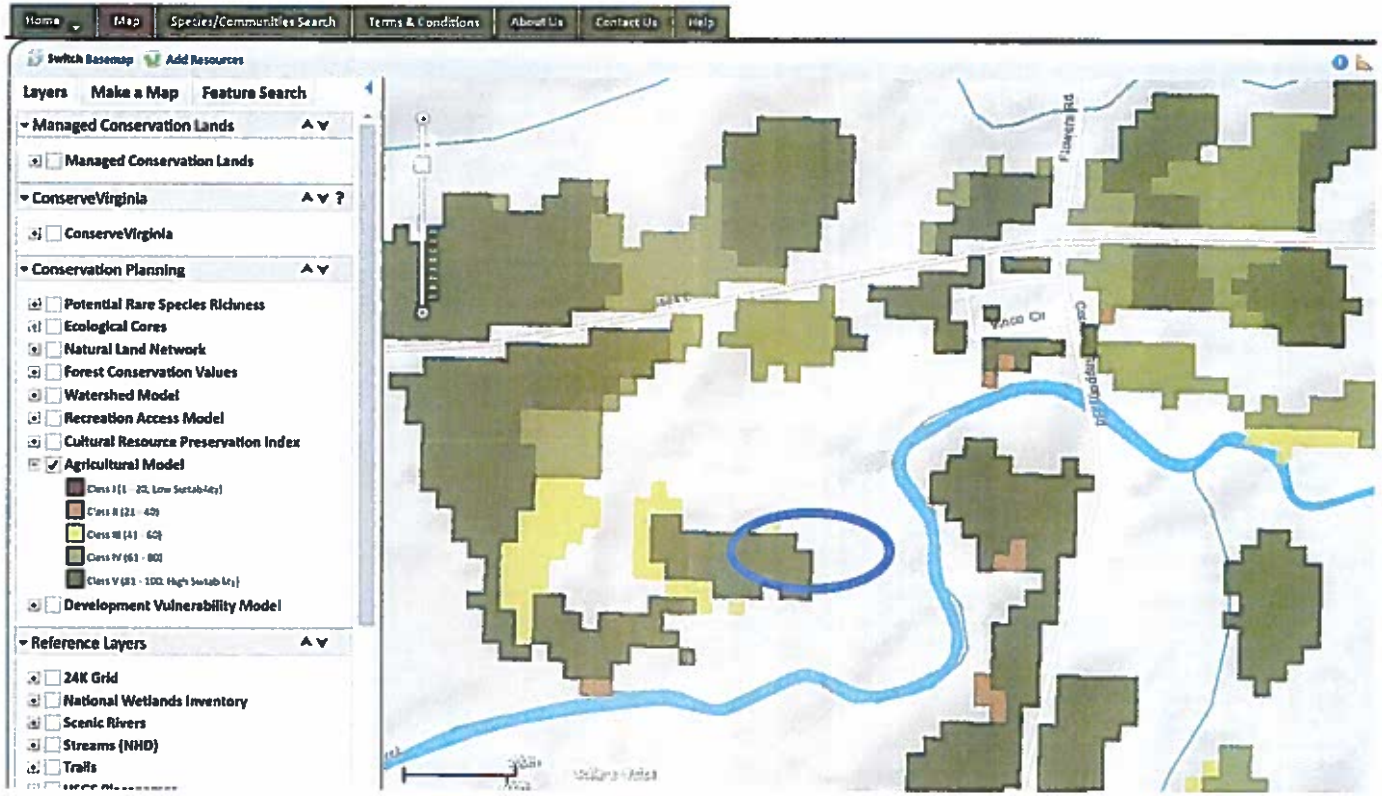
Attachment B – Ecological Cores

DCR | Virginia Department of Conservation and Recreation



Attachment B – Agricultural Value

DCR | Virginia Department of Conservation and Recreation



Attachment B – Forest Conservation Value

DCR | Virginia Department of Conservation and Recreation