HANOVER COUNTY PLANNING DEPARTMENT
REQUEST FOR CONDITIONAL USE PERMIT REVIEW
CUP2024-00007, STRATA CLEAN ENERGY
Due Date: 04/19/2024

REQUESTED REVIEWERS:

- Public Works
- Public Utilities
- GIS Department
- Fire Marshal
- VDOT
- Sheriff's Office
- Health Department
- Building Inspections
- Commissioner of Revenue
- Current Planning
- Development Review
- Code Compliance
- Assessor

FROM: Brendan Mchugh

Attached please find copies of the plans for the above-referenced project. Application materials may be found attached to the TRAKiT project. Please post all comments to the TRAKiT project number. If you do not have access to TRAKiT, please complete and return this form to the Planning Department by the due date. You may attach additional sheets, if necessary.

A meeting has been scheduled for Wednesday, April 17, 2024, at 9:00 am. The meeting will be located in the Planning Conference Room, located on the 2nd floor of the Administration Building.

AGENCY RESPONSE:

Recommend approval; No Further Review Necessary
Revisions Required/ Comments Attached
No Comment at this time; please route additional resubmittals
No Comment at this time; do not route resubmittals

DATE:_____ REVIEWED BY:_____

Attachments:
DPW:
DPU:
VDOT:

Hanover County, Virginia

Land Use Map

Legend

- Rural/Agricultural
- Town of Ashland
- Business Flexible
- Parks and Conserved Lands
- Destination Commerce
- Employment Center
- Multi-Family Residential
- Highway Commercial
- Industrial
- Limited Industrial
- Suburban Neighborhood Residential
- Suburban High Residential
- Suburban Center
- Neighborhood Commercial
- Natural Conservation
- Rural Crossroads
- Rural Village
- Suburban Transitional Residential

CUP2024-00007

Strata Clean Energy

solar facility

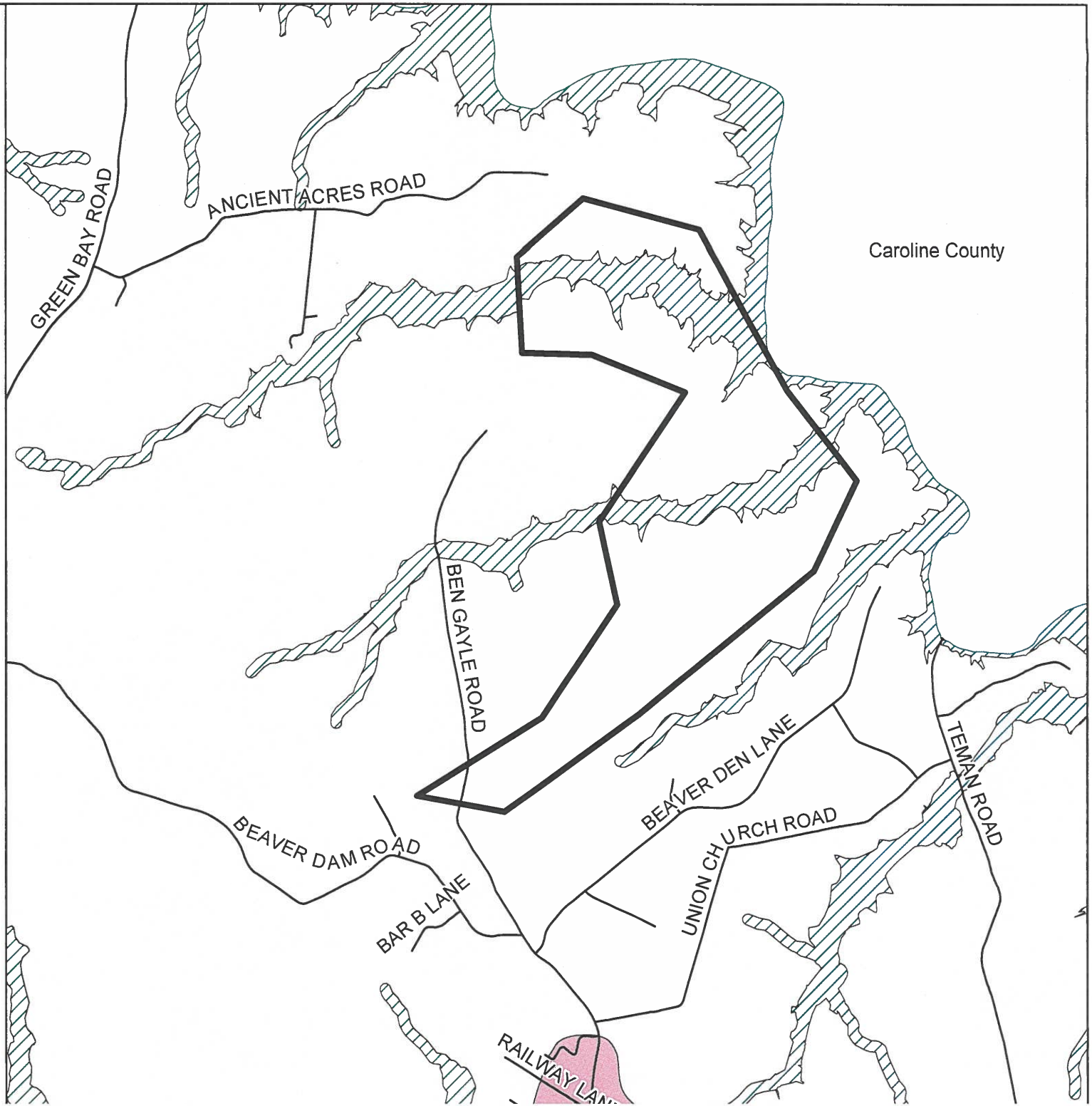
Rural/agricultural & Natural Conservation Land Use

GPIN's: 7828-73-9147, et al.
Beaverdam Magisterial District

N
W E
S

1 inch = 2,500 feet

March 26, 2024



Hanover County, Virginia

General Parcel Map

Legend

- Roads
- Water
- Structures
- Parcels
- Trees

CUP2024-00007

Strata Clean Energy

solar facility

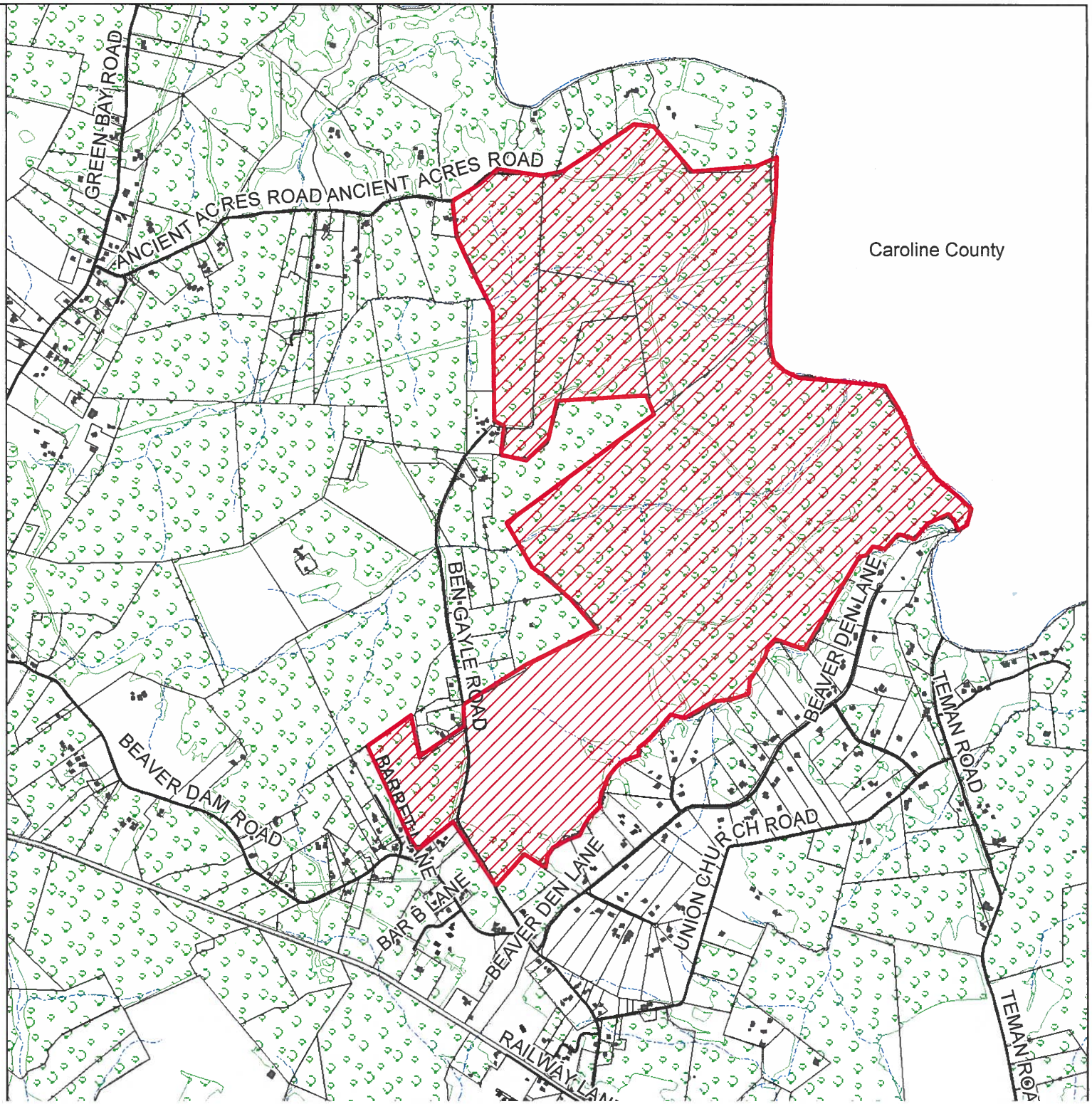
Zoned A-1

GPIN's: 7828-73-9147, et al.
Beaverdam Magisterial District

N
W E
S

1 inch = 2,500 feet

March 26, 2024



Hanover County, Virginia

Zoning Map

Legend

Roads	R-1
Water	R-2
Parcels	R-3
CUP	R-4
A-1	R-5
PUD	R-6
RRC	RM
RR-1	MX
RO-1	B-1
PSC	B-2
POB	B-3
PMH	B-4
HE	O-S
AR-1	B-O
AR-2	M-1
AR-6	M-2
RC	M-3
RS	

CUP2024-00007

Strata Clean Energy

solar facility

Zoned A-1

GPIN's: 7828-73-9147, et al.
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1 inch = 2,500 feet

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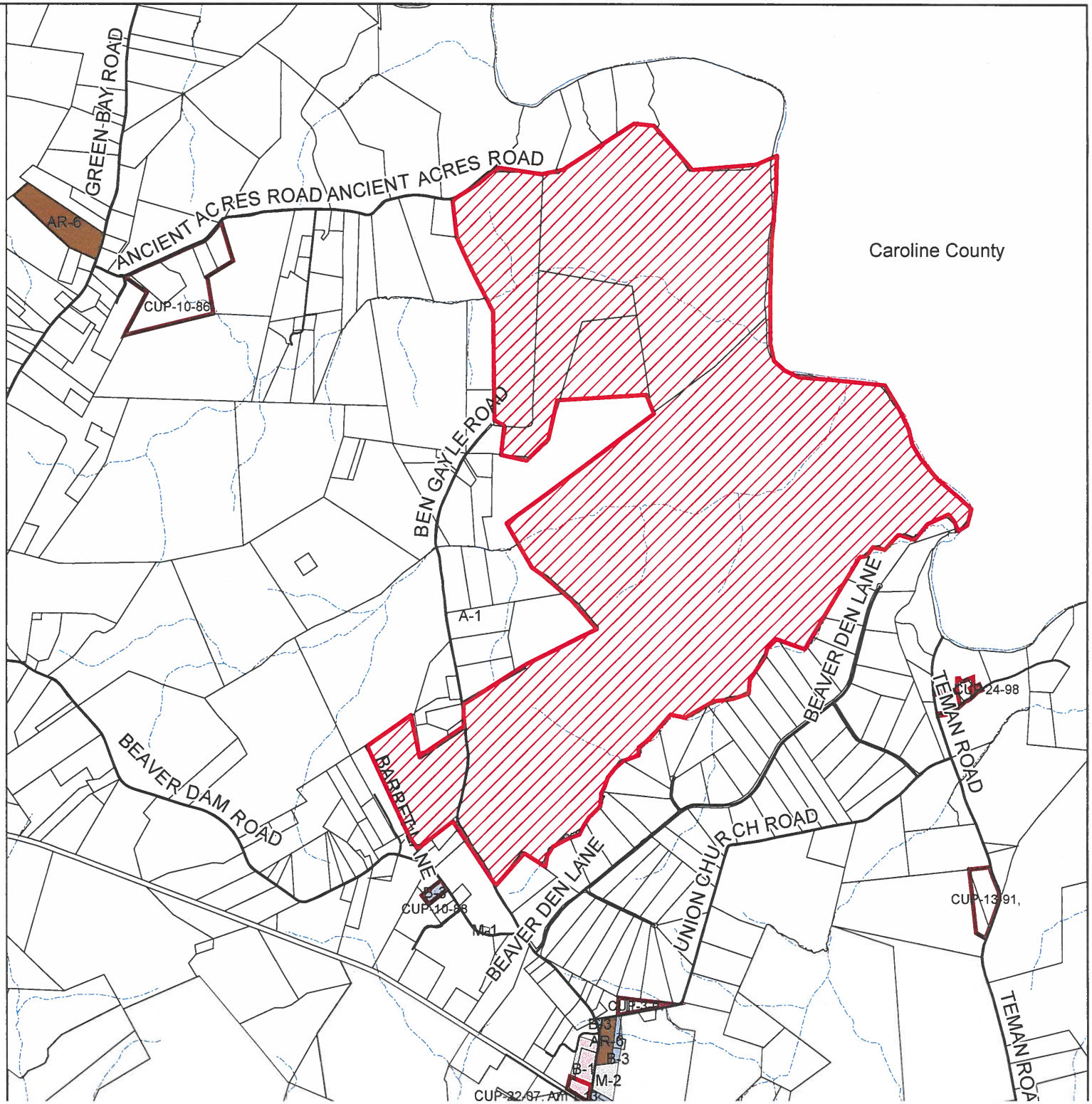

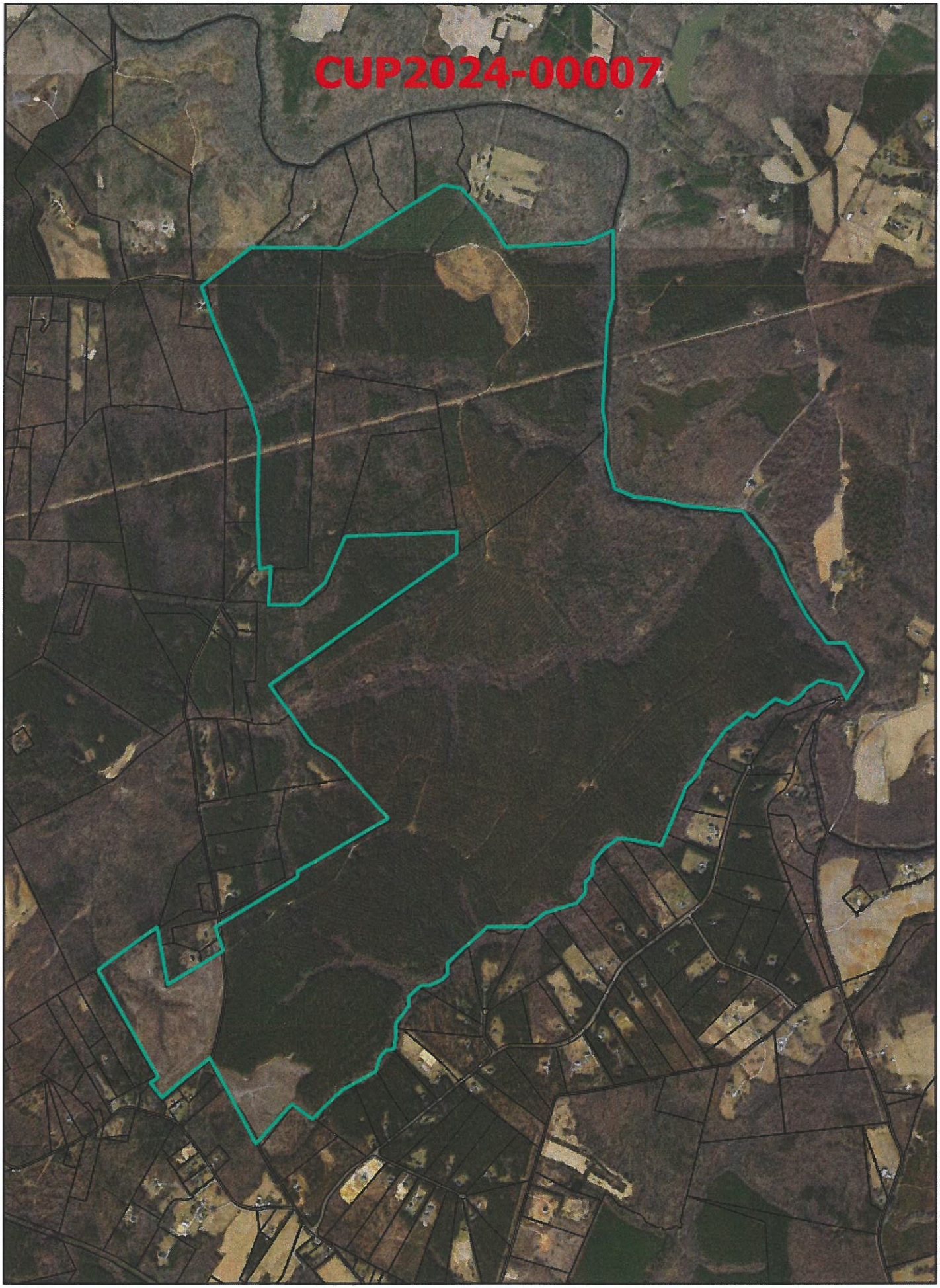
CUP2024-00007

Hanover County Planning Department Application

Request for a Conditional Use Permit

Case #: CUP2024-00007

Please type or print in **black** ink.

APPLICANT INFORMATION

Strata Clean Energy
R. Morgan Quicke - Sr. Manager, Local Affairs, Laura Wilson - Sr. Manager
800 Taylor Street, Suite 200, Durham, North Carolina 27701

Telephone No. 804-761-8487
Fax No. _____
Email Address morgan.quicke@stratacleanenergy.com

PARCEL INFORMATION

For multiple parcels, please also complete Page 4 ☑

GPIN(s)(Tax ID #'s) 7827-85-7713, 7828-73-9147, 7828-61-0451, 7828-61-8172, 7827-33-5426, 7828-52-0656

Total Area (acres/square feet) 1,477

Magisterial District Beaverdam

Location Description (Street Address, if applicable) ☑
Located off Ben Gayle Road (Route 682) and Ancient Acres Road (Route 681)

Total CUP Area (acres/square feet) 1,477

Current Zoning A-1

In accordance with Article 3, Division ☑ Section _____ § 26-292.5 of the Ordinance the following use is requested:

Solar Energy Facility - Principal - Utility Scale Solar

SIGNATURE OF OWNER ☑ POWER OF ATTORNEY ☐ CONTRACT PURCHASER ☐ *(attach contract)*

As owner or authorized agent of this property, I hereby certify that this application is complete and accurate to the best of my knowledge, and I authorize County representatives' entry onto the property for purposes of reviewing this request.

Signature _____ Date _____

Print Name SEE ATTACHMENTS

Signature _____ Date _____

Print Name _____

QUESTIONS/ LETTERS/ REPORTS SHOULD BE FORWARDED TO THE FOLLOWING**:

Name Morgan Quicke and Laura Wilson

Address: 800 Taylor Street, Suite 200
Durham, North Carolina 27701

Telephone No. 804-761-8487
Fax No. _____
Email Address morgan.quicke@stratacleanenergy.com

**It is the responsibility of the contact person to provide copies of all correspondence to other interested parties to the application.

RECEIVED
MAR 25 2024
HANOVER COUNTY
PLANNING DEPARTMENT

Hanover County Planning Department Application

Request for a Conditional Use Permit

Case #: CUP2024-00007

Please type or print in **black** ink.

APPLICANT INFORMATION

Owner/Applicant: Strata Clean Energy
Contact Name: R. Morgan Quicke - Sr. Manager, Local Affairs
Address: 800 Taylor Street, Suite 200, Durham, North Carolina 27701

Telephone No. 804-761-8487
Fax No.
Email Address morgan.quicke @stratacleanenergy.com

PARCEL INFORMATION — **For multiple parcels, please also complete Page 4** ☑

GPIN(s)(Tax ID #'s) 7827-85-7713, 7828-73-9147, 7828-61-0451, 7828-61-8172, 7827-33-5426, 7827-59-9346
Total Area (acres/square feet) 1,477
Magisterial District Beaverdam
Location Description (Street Address, if applicable) ☑
Located off Ben Gayle Road (Route 682) and Ancient Acres Road (Route 681)

Total CUP Area (acres/square feet) 1,477
Current Zoning A-1
In accordance with Article 3, Division ☑ Section
§ 26-292.5 of the Ordinance the following use is requested:
Solar Energy Facility - Principal - Utility Scale Solar

SIGNATURE OF OWNER ☑ **POWER OF ATTORNEY** ☐ **CONTRACT PURCHASER** ☐ *(attach contract)*

As owner or authorized agent of this property, I hereby certify that this application is complete and accurate to the best of my knowledge, and I authorize County representatives' entry onto the property for purposes of reviewing this request.

Signature Benjy W. Griffith III Date March 14, 2024
Print Name Benjy Griffith
Signature Date
Print Name

QUESTIONS/ LETTERS/ REPORTS SHOULD BE FORWARDED TO THE FOLLOWING:**

Name Morgan Quicke
Address: 800 Taylor Street, Suite 200
Durham, North Carolina 27701

Telephone No. 804-761-8487
Fax No.
Email Address morgan.quicke @stratacleanenergy.com

**It is the responsibility of the contact person to provide copies of all correspondence to other interested parties to the application.

RECEIVED
MAR 25 2024
HANOVER COUNTY
PLANNING DEPARTMENT

Hanover County Planning Department Application

Request for a Conditional Use Permit

Case #: CUP2024-00007

Please type or print in black ink.

APPLICANT INFORMATION

Owner/Applicant: _____
Contact Name: _____
Address: _____
_____

Telephone No. _____
Fax No _____
Email Address _____
_____

PARCEL INFORMATION For multiple parcels, please also complete Page 4 ☐

GPIN(s)(Tax ID #'s) 7828-52-0650
_____
Total Area (acres/square feet) _____
Magisterial District _____
Location Description (Street Address, if applicable) ☐
_____
_____

Total CUP Area (acres/square feet) _____
Current Zoning _____
In accordance with Article 3, Division ☐ Section _____
§ _____ of the Ordinance the following use is requested:
_____
_____
_____

SIGNATURE OF OWNER ☐ **POWER OF ATTORNEY** ☐ **CONTRACT PURCHASER** ☐ *(attach contract)*

As owner or authorized agent of this property, I hereby certify that this application is complete and accurate to the best of my knowledge, and I authorize County representatives' entry onto the property for purposes of reviewing this request.

Signature Betty J. Downing, Trustee Date 2/15/24
Print Name BETTY J. DOWNING, TRUSTEE
Signature W. Pettus Gilman Trustee Date 2/15/24
Print Name W. PETTUS GILMAN, TRUSTEE

QUESTIONS/ LETTERS/ REPORTS SHOULD BE FORWARDED TO THE FOLLOWING:**

Name _____
Address: _____
_____
_____

Telephone No. _____
Fax No. _____
Email Address _____
_____

**It is the responsibility of the contact person to provide copies of all correspondence to other interested parties to the application.

FOR APPLICATIONS WITH MULTIPLE PARCELS, PLEASE LIST:					
GPIN	**Property Owner(s)**	**Deed Book and Page Number**	**Area (acres/square feet)**	**Current Zoning**	**Requested Zoning**
7827-85-7713	Print Sign	3377-1061	860.71	A-1	A-1 CUP
7828-73-9147	Print Sign	3377-1061	341	A-1	A-1 CUP
7828-61-0451	Print Sign	3377-1061	79.9	A-1	A-1 CUP
7828-61-8172	Print Sign	3377-1061	37	A-1	A-1 CUP
7827-59-5426	Print Sign	3377-1061	52.6	A-1	A-1 CUP
7828-52-0650	Print Sign	559-221	106.1	A-1	A-1 CUP
	Print Sign				
	Print Sign				
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	Print Sign				
	Print Sign				
	Print Sign				
	Print Sign				
	Print Sign				
	Print Sign				
	Print Sign				

REQUIREMENTS/ ATTACHMENTS FOR ALL REQUESTS you must submit the following:

- ☑ a. **Signature of Property Owner or Contract Purchaser** (Page 3) – If the contract purchaser signs the application, please provide a copy of the signed contract, with all sensitive information redacted.
- ☑ b. **Acknowledgement of Application Fee Payment Procedure** (Page 6)
- ☑ c. **Adjacent property owners, Board of Supervisors, and Planning Commissioner notification form** (Page 7) – please list all property owners including those across roadways, watercourses, and/or railroads as well as the members of the Board of Supervisors and Planning Commission for the magisterial district in which the property is located. Adjacent property owners, Board members, and Planning Commissioners must be notified prior to submittal of this application. The form must include owners' names, address, and GPINs for all adjacent property owners. (This information is available from the County website or can be obtained from the Planning Department.) The form on Page 9 may be used to notify these property owners.
- ☑ d. **A plat of the subject property,** which accurately reflects the current property boundaries. If the full-size plat is larger than 8 ½" x 11", the plat must be folded no larger than 9"x12", and a reduction of the plat must be submitted which is 8 ½" x 11" in size. (Typically available from the County Clerk's Office in the Circuit Court building.)
- ☑ e. **Responses to questions on Page 10**
- ☑ f. **Historic Impact Information** (Page 11) (This information is available on the County website or may be obtained from the Planning Department.)
- ☑ g. **Traffic Impact Analysis Certification Form** (Page 12) In compliance with VDOT's new Traffic Impact Analysis Regulations (24 VAC 30-155 *et seq.*, commonly known as "Chapter 527"), Conditional Use Permits that meet certain thresholds require Traffic Impact Analyses (TIAs). The process for submitting TIAs is as follows: (1) you must submit the number of copies of the TIA required by VDOT to the Hanover County Planning Department with your comprehensive plan amendment/rezoning/conditional use permit submittal; (2) the Hanover County Planning Department will stamp "received" on all copies of the TIA, and will keep a copy for its files; and (3) you must deliver the remaining copies of the TIA to VDOT and pay the necessary TIA review fee directly to VDOT.
- ☑ h. **Sketch Plan Checklist (Page 13) and ten (10) copies of the sketch plan and architectural elevations**, folded no larger than 9" x 12", and **1 - 8 ½" x 11" reduction**. Individual sheets should be no larger than 24" x 36". For Filling and/or Grading CUP Applications, a plan should be submitted that meets the Public Works Department's requirements for an Erosion and Sedimentation Control (E&S) Plan. However, please note that submittal of this plan will **not** be considered as a submittal of an E&S plan application. For a checklist of items to be included on this plan, please contact Public Works at (804) 365-6181.
- ☐ i. For CUP applications for telecommunication facilities, a **Telecommunications application** must be completed and include all of the required attachments.
- ☑ j. **Community Meeting Guide** (Check the box if you have read and understand Pages 14 & 15. **Please note that applicants that schedule community meetings without coordinating with the staff may be required to reschedule the meeting, which may cause the application process to be delayed.**)

ACKNOWLEDGEMENT OF APPLICATION FEE PAYMENT PROCEDURE

Application fees are not accepted at the time of submittal. I hereby acknowledge that this application is not complete until the payment for all applicable application fees has been received by the Hanover County Planning Department. The Hanover County Planning Department shall notify me by mail, at the address listed below, (as well as by email and/or fax, if selected below) of the applicable fee(s) at such time that they determine that the application is complete and acceptable. I acknowledge that I am responsible for ensuring that such fees are received by the Hanover County Planning Department by the Tuesday the week following the application deadline. I further acknowledge that any application fee submitted after this date shall result in the application being considered filed for the next application deadline.

Should the applicable fees not be submitted within forty-five (45) days of the date of the notification letter, it shall be my responsibility to arrange for the retrieval of all application materials. The application and any supplementary materials for incomplete applications that are not retrieved within forty-five (45) days of the date of the notification letter shall be destroyed by the Hanover County Planning Department.

Should my application be accepted, my fee payment will be due by _____. (To be filled in by a Planning Staff member.)

Signature of applicant/authorized agent Laura Wilson Date 3/25/2024

Print Name Laura Wilson

Signature of applicant/authorized agent _____ Date _____

Print Name _____

Address to which notification letter is to be sent:

0 Taylor Street, Suite 200

urham, NC 27701

If you would like your letter emailed and/or faxed, please make selections, and provide the information below:

☑ Email morgan.quicke@stratacleanenergy.com ☐ Fax _____

FEES

After application is accepted for review, make checks payable to Treasurer, Hanover County:

Conditional Use Permit	$1500 + $75/acre*
Amendment (after final approval)	$1500

*Fractions of acreage are rounded up to the nearest whole number

Please note: Applicants who request tax-exempt status may have their application fee waived upon presentation of official documentation of such status.

FOR STAFF USE ONLY:

Fees: Base Fee _____

Acreage Fee _____

TOTAL _____

Accepted by: _____

HTE #: _____

NOTIFICATION OF ADJOINING PROPERTY OWNERS, BOARD OF SUPERVISORS, AND PLANNING COMMISSIONERS

Applicant's Statement:

I hereby certify that I have notified all adjacent property owners to the property, which is the subject of this request as well as the members of the Board of Supervisors and Planning Commission for the magisterial district in which the property is located. Adjacent property includes all property across roadways, watercourses, railroads, and/or municipal boundaries. I further certify that the names and addresses below are those of the adjacent property owners as listed in the tax records of the Commissioner of Revenue of Hanover County.

Applicant's Signature: Laura Wilson

COMMONWEALTH OF VIRGINIA)

COUNTY OF ~~HANOVER~~ Richmond) to-wit:

DANIEL SIMON
NOTARY PUBLIC
REGISTRATION # 8005576
COMMONWEALTH OF VIRGINIA
COMMISSION EXPIRES: 1/31/2026

The foregoing instrument was acknowledged before me this 21st day of March, 2024, by Laura W. Wilson (Name of Applicant).

My commission expires: 01/31/2026

Notary Public

Board of Supervisors Representative: Jeff Stoneman

Planning Commission Representative: Edmonia Iverson

List of Adjacent Property Owners:

GPIN	Name	Address
See Attached - North Anna River Solar APO List		

Attachment: North Anna River Solar APO List

GPIN	Name	Address
7827-32-9503	WALLER, MITCHELL G BERTHA C R/S	20170 BEAVER DAM ROAD BEAVERDAM, VA 23015-0000
7827-32-8284	MEREDITH, THOMAS ARTHUR	3209 ROSEWOOD AVENUE RICHMOND, VA 23221
7827-41-4489	BLACKSTONE, ELLEN C BLACKSTONE, THOMAS F R/S	20097 BEAVER DAM ROAD BEAVERDAM, VA 23015
7827-51-3636	EDWARDS, RAYMOND S THERESE M	9211 STEPHENS MANOR DRIVE MECHANICSVILLE, VA 23116-0000
7827-62-1018	BAILEY, PATRICK BRIAN BAILEY, SUSAN LARK AMOS R/S	15456 BEAVER DEN LANE BEAVERDAM, VA 23015
7827-62-5170	FEATHER, JOSHUA S FEATHER, SAMANTHA R/S	15452 BEAVER DEN LANE BEAVERDAM, VA 23015
7827-62-9339	GREGAS, MARK G CHRISTINE M	15448 BEAVER DEN LANE BEAVERDAM, VA 23015
7827-72-2705	SIMPSON, CHRISTOPHER SIMPSON, MICHELE R/S	15444 BEAVER DEN LANE BEAVERDAM, VA 23015
7827-72-5908	HALL, STEPHAN DUANE JR	15440 BEAVER DEN LANE BEAVERDAM, VA 23015
7827-73-3495	COLEMAN, JAMES E IV STACY M	16185 WATLEY CREEK COURT BEAVERDAM, VA 23015
7827-73-5858	BISHOFF, KEVIN M AMANDA D	16189 WATLEY CREEK COURT BEAVERDAM, VA 23015-0000
7827-84-2351	STOUT, ROBERT SHANE TIFFANY, CATHERINE MARY R/S	16188 WATLEY CREEK COURT BEAVERDAM, VA 23015
7827-84-6229	MONROE, GEORGE JR CARLENA	16184 WATLEY CREEK COURT BEAVERDAM, VA 23015
7827-94-3323	FRITZ, MICHAEL W FRITZ, PETRA R/S	15416 BEAVER DEN LANE BEAVERDAM, VA 23015
7827-94-6512	ROCCHICCIOLI, JUDITH	15412 BEAVER DEN LANE BEAVERDAM, VA 23015
7827-94-8789	WORKMAN, DAWN M	15408 BEAVER DEN LANE BEAVERDAM, VA 23015
7837-05-0171	WESTFALL, HOPE S	15404 BEAVER DEN LANE BEAVERDAM, VA 23015
7837-05-3322	PARKER, KELLI	15396 BEAVER DEN LANE BEAVERDAM, VA 23015
7837-05-7400	PARKER, KELLI	15396 BEAVER DEN LANE BEAVERDAM, VA 23015
7837-15-1616	NUTTER, MARK A MINDY	15392 BEAVER DEN LANE BEAVERDAM, VA 23015
7837-16-1167	DEMARIA, DAVID EVANS TERESA EVANS	15388 BEAVER DEN LANE BEAVERDAM, VA 23015

Attachment: North Anna River Solar APO List, cont.

7837-16-3781	ERWIN, ERIC A PAMELA C	15384 BEAVER DEN LANE BEAVERDAM, VA 23015
7837-27-1627	SULLIVAN, STUART JENNIFER	15380 BEAVER DEN LANE BEAVERDAM, VA 23015
7828-85-8640	WILSON, CHARLES M KAREN S R/S	14081 SPRING BRANCH LANE ASHLAND, VA 23005-7119
7828-75-3964	NICHOLS, RUBY C	10454 MOUNT HOPE CHURCH ROAD DOSWELL, VA 23047-0000
7828-65-7746	RUBY, WILLIAM R BAMBI H R/S	16537 BULLFIELD ROAD DOSWELL, VA 23047-0000
7828-65-3304	RUBY, WILLIAM R BAMBI H R/S	16537 BULLFIELD ROAD DOSWELL, VA 23047-0000
7828-55-6146	HENSCHEN, ADAM HENSCHEN, LEAH R/S	9045 POWHICKERY COURT MECHANICSVILLE, VA 23116
7828-46-0242	RAFALY, MICHELLE G GAUMAN, DAVID G JR	657 MERRY OAKS LANE PALMYRA, VA 22963
7828-33-9701	GLASCO, BRADLEY A	16335 ANCIENT ACRES ROAD BEAVERDAM, VA 23015
7828-33-6082	MELTON, EDWARD C II ANNE W R/S	16491 TYLER STATION ROAD BEAVERDAM, VA 23015-0000
7828-41-5462	CABE, BRADLEY WILSON CABE, JOLENE IVY DAVIS R/S	131 BUCKNER ROAD BUMPASS, VA 23024
7828-40-5785	CABE, JONATHAN CLARK	13396 CANTERBURY RD MONTPELIER, VA 23192
7827-49-6780	BALDWIN, JOHN J BALDWIN, HILLARY R R/S	20514 BEN GAYLE ROAD BEAVERDAM, VA 23015
7827-49-5253	HARRIS, CRAIG W	20500 BEN GAYLE ROAD BEAVERDAM, VA 23015
7827-48-5498	LOHR, GENEVIEVE G	7470 SEVEN SPRINGS ROAD MECHANICSVILLE, VA 23111
7827-57-2220	DICKENS, ADBULLAH WILBURN, ALICIA	20348 BEN GAYLE ROAD BEAVERDAM, VA 23015
7827-56-7215	JONES LIVING TRUST HC JR & LT JONES, TRUSTEES	4910 JONES ROAD GLEN ALLEN, VA 23059
7827-45-6462	MILLS, ROGER L KIMBERLY S	20280 BEN GAYLE ROAD BEAVERDAM, VA 23015
7827-34-9518	GANNON, LAURA P THOMAS W	20257 BEN GAYLE ROAD BEAVERDAM, VA 23015
7827-34-4328	BEACH, JR, RICHARD H	20261 BEN GAYLE ROAD BEAVERDAM, VA 23015
7827-44-0310	RAY, NENA LOUISE	20243 BEN GAYLE ROAD BEAVERDAM, VA 23015

Attachment: North Anna River Solar APO List, cont.

CAROLINE COUNTY

64-A-24	MASTROPAOLO MICHAEL J	6300 WATERWAY DR Falls Church, Virginia 22044
64-A-23	MARSHALL TERRILL A TRUSTEE	9728 WEST BEXHILL DR Kensington, MD 20895
64-A-22	SHOCKEY DONALD W & DEBRA	9082 RED HILL CIR Mechanicsville, Va 23116
64-A-22A	SHIFLETT NEIL A & THERESA J	20386 SHOCKEY LANE BEAVERDAM, VA 23015
64-A-21	SPALDING THEODORE A & ANTONIA G TRS	2319 W 9TH ST Austin, TX 78703
64-A-12A	LICKEY DENNIS O & RENEE B	20258 SHOCKEY LANE BEAVERDAM, VA 23015
64-A-11	GREEN DARYL E & CATHY H	4910 COURTHOUSE ROAD Spotsylvania Courthouse, VA 22553
64-A-6	ATKINSON MARK T & ATKINSON KATHY F	20106 SHOCKEY LANE BEAVERDAM, VA 23015
64-A-5	JOHNSON MARTIN B & MICHELLE P	420 TRIVETTE ROAD Beaverdam, VA 23015

STRATA CLEAN ENERGY

March 7, 2024

Dear Property Owner,

We hope this letter finds you well.

The purpose of this letter is to inform you that our company, Strata Clean Energy, is in the process of applying for a Conditional Use Permit with Hanover County, to permit and construct a solar facility on property that may be adjacent to your property, known as "North Anna River Solar".

North Anna River Solar is a 72-megawatt facility, proposed to be about 1.6 miles north of Beaverdam, on properties north of Ben Gayle Road (Route 682) and east of Ancient Acres Road (Route 681) on approximately 680 acres. The project is designed to limit impact to adjacent property owners, both during construction of the facility and throughout its long-term operation.

The site currently consists of tracts of mature timber, both hardwoods and pines, and the entire perimeter of the site will be densely screened by over 150' of existing timber with mature growth. The project will incorporate setbacks from residential structures of at least 500', but in most cases, over 1,000'. North Anna River Solar will be fully screened from public view, from both roads and houses throughout construction and operation of the facility.

Hanover County permits this type of use in this area as a Conditional Use, requiring a Conditional Use Permit after thorough and detailed review by Hanover County Staff, Public Open Houses, and a Public Approval process through the County's Planning Commission and Board of Supervisors. We intend to submit our application to Hanover County this month, and upon submittal, application documents will be available at the Hanover County Planning Department. The Hanover County Planning Department will notify all adjacent property owners of the time, day and place of the public hearings to be held on this application.

We want to assure you that we are interested in your input throughout this process and want to make sure that the design and construction of the North Anna River Solar project is respectful and responsible to the adjacent community.

We will be hosting several community events over the coming months to make sure you have opportunities to meet our team, learn about our proposed project, ask questions and voice concerns.

In the meantime, we look forward to speaking with you however you may wish whether that be in-person, by phone, by text, e-mail, or an on-line meeting. Contact information of the project team is listed below.

Morgan Quicke
Sr. Manager – Local Affairs
804-761-8487
Morgan.quicke@stratacleanenergy.com

Laura Wilson
Sr. Manager - Development
804-399-5872
laura.wilson@stratacleanenergy.com

NOTIFICATION OF ZONING APPLICATION SUBMITTAL

TO: Adjacent Property Owner

FROM: North Anna River Solar

DATE: 3/25/2024

The following application will be submitted for review to the Hanover County Planning Department:

- ☐ Rezoning
- ☑ Conditional Use Permit
- ☐ Special Exception

Applicant: Anna River Solar, LLC

Property Location: 1.6 miles north of Beaverdam. North of Ben Gayle Road (Route 682) and east of Ancient Acres Rd (Route 681)

GPIN(s): 7827-85-7713, 7828-61-0451, 7827-33-5426, 7828-61-8172,78-73-9147, 7828-52-0650

Requested Zoning District: A-1

Requested Use/Exception: The applicant would like to consruct a solar facility.

The application will be available for viewing at the Hanover County Planning Department. The Planning Department shall notify all adjacent property owners of the time, day, and place of the public hearings to be held on this application. Should you have any questions or comments, please contact the Planning Department at (804) 365-6171.

EXPLANATION: (Attach additional sheets, if necessary)

1. What type of use is being requested? The proposed land use is a utility-scale solar facility.

2. Briefly describe how you plan to develop the property for the proposed use and any associated uses.

The solar facility, consisting of ground-mounted photovoltaic panels and a utility switchyard will utilize approximately 341 acres

Approximately 800 acres of wetlands, 100-year floodplain, open space and buffer, will remain untouched.

The North Anna River Solar Facility will fully comply with all applicable federal, state, and county ordinances, regulations, and permitting requirements. Our commitment to regulatory compliance extends to environmental protection, land use planning, safety standards, and community engagement.

3. Describe why the proposed use is desirable and appropriate for the area. What measures will be taken to assure that the proposed use will not have a negative impact on the surrounding vicinity? (For example, this may include traffic or environmental impacts.)

The proposed facility has been strategically sited on managed timber land, zoned A-1, which allows for permitting through a CUP. The facility will have a dense vegetative buffer surrounding the entire site from day one, including throughout construction and operations. The project will be completely screened from adjacent roads, residences, and properties.

The significant portion of nearly 800 acres of undisturbed land will provide vital habitat for local wildlife to roam freely and will maintain ecological balance. Designate buffer zones around sensitive areas such as wetlands, floodplains, and wildlife habitats will minimize disturbances and protect ecosystem functions.

Solar facilities are a very passive land use; once constructed, operations and maintenance personnel will visit the facility very infrequently (~ once a month) which will have minimal impact traffic impact. The panels do not require water and do not generate any perceptible sound or emissions. The application narrative contains additional details on design, regulatory **

4. Are there any deed restrictions concerning the type of use proposed? If so, provide the date the said restrictions expire. (You may attach a copy of the restrictions.)

No

** compliance, and community engagement.

5. Is the subject property located in a Dam Break Inundation Zone? ☐ Yes ☑ No (Please contact the Department of Planning or Public Works for assistance in addressing this question.) If yes, please contact the Department of Public Works for further information.

HISTORIC SITE IMPACT ANALYSIS

Please identify any **known or suspected historic resources on both the subject property and adjacent properties**, to include both structural and non-structural resources, such as trenches, cemeteries, and archeological sites. Please include the GPIN (Tax Parcel Number) associated with the resource. Please attach additional sheets, if necessary. Should you need assistance completing this form, please contact the Planning Staff.

1. Historic Resource/File No. N/A GPIN _____
2. Historic Resource/File No. _____ GPIN _____
3. Historic Resource/File No. _____ GPIN _____

If you have identified known or suspected historic resources on the subject property or adjacent property, please provide the following information on each site:

a) Is the historic site listed as a National or State Registered Landmark? _____

b) Is the historic site open to the public? _____

c) Describe the impact the proposed request will have on the identified historic resources with regard to noise, traffic, dust, vibration, visual impact, and air pollution. _____

d) Describe voluntary measures that will be undertaken to help mitigate the impact that the proposed use may have on the identified historic resources. _____

If there are no known or suspected historic resources on the subject property or immediately adjacent, including structural and non-structural resources, trenches, cemeteries, and archeological sites, please sign and date.

Signature: _____ Date: 3/25/24

COMPLIANCE WITH VDOT & COUNTY TRAFFIC IMPACT ANALYSIS REQUIREMENTS

The following must be completed for all applications: The selection below is based on a projected daily trip generation of 321 vehicles per day and a site peak hour trip generation of 125 vehicles per hour, based on the stipulations of 24 VAC 30-155. The N/A edition (latest edition) of the ITE Trip Generation Manual was used in determining the trip generation (Code Number N/A and Page Number N/A).

Choose one of the two options below:

Note: trip generation estimates for a solar site are not provided in the ITE Trip Generation Manual. The attached spreadsheet summarizes daily and peak hour estimates based on site-specific information provided by the owner/developer.

☒ I certify that this proposal **DOES NOT EXCEED** 380 vehicle trips per day that would require submittal of a Traffic Impact Analysis.

☐ I certify that this proposal **DOES EXCEED** 380 vehicle trips per day that would require a Traffic Impact Analysis be submitted.

Choose one of the two options below:

☒ I certify that this proposal DOES NOT MEET any of the VDOT thresholds identified in the Traffic Impact Analysis Regulations Administrative Guidelines (24 VAC 30-155) that would require a Traffic Impact Analysis to be submitted in conjunction with this application.

☐ I certify that this proposal MEETS at least one of the VDOT thresholds identified in the Traffic Impact Analysis Regulations Administrative Guidelines (24 VAC 30-155) that would require a Traffic Impact Analysis to be submitted in conjunction with this application. A Traffic Impact Analysis, prepared in accordance with the Traffic Impact Analysis Regulations Administrative Guidelines (24 VAC 30-155), has been prepared and will be submitted to VDOT the same day.

W. Scott Dunn

(Signature of Applicant/Applicant's Representative)

12/18/2023

(Date)

W. Scott Dunn

(Applicant/Applicant's Representative – Print Name)

Anna River Solar Trip Generation Estimate				
Project:	Anna River Solar			
Location:	Hanover County, VA			
Size:	72MW/95DC			
Construction:	16 months			
Total Truck Trips for Project:	5760			
Peak # Employees:	125			
Project Period	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Number of Months	4	4	4	4
Workdays/Month (5/week = 20/moth)	80	80	80	80
Trucks/Day[1,2]	20	6	8	2
Truck Trips/Day	40	12	16	4
Employees on Site/Day	40	100	125	40
Employee Trips/Day (all drive;25% lunch)	100	250	313	100
Total Daily Traffic (Trucks and Employees)	120	256	321	102

[1] *90% of heavy vehicle traffic during Q1 are dump trucks*

[2] *Q2-Q4 heavy vehicle traffic is tractor trailers*

AM/PM Peak Trips

Daily Trips

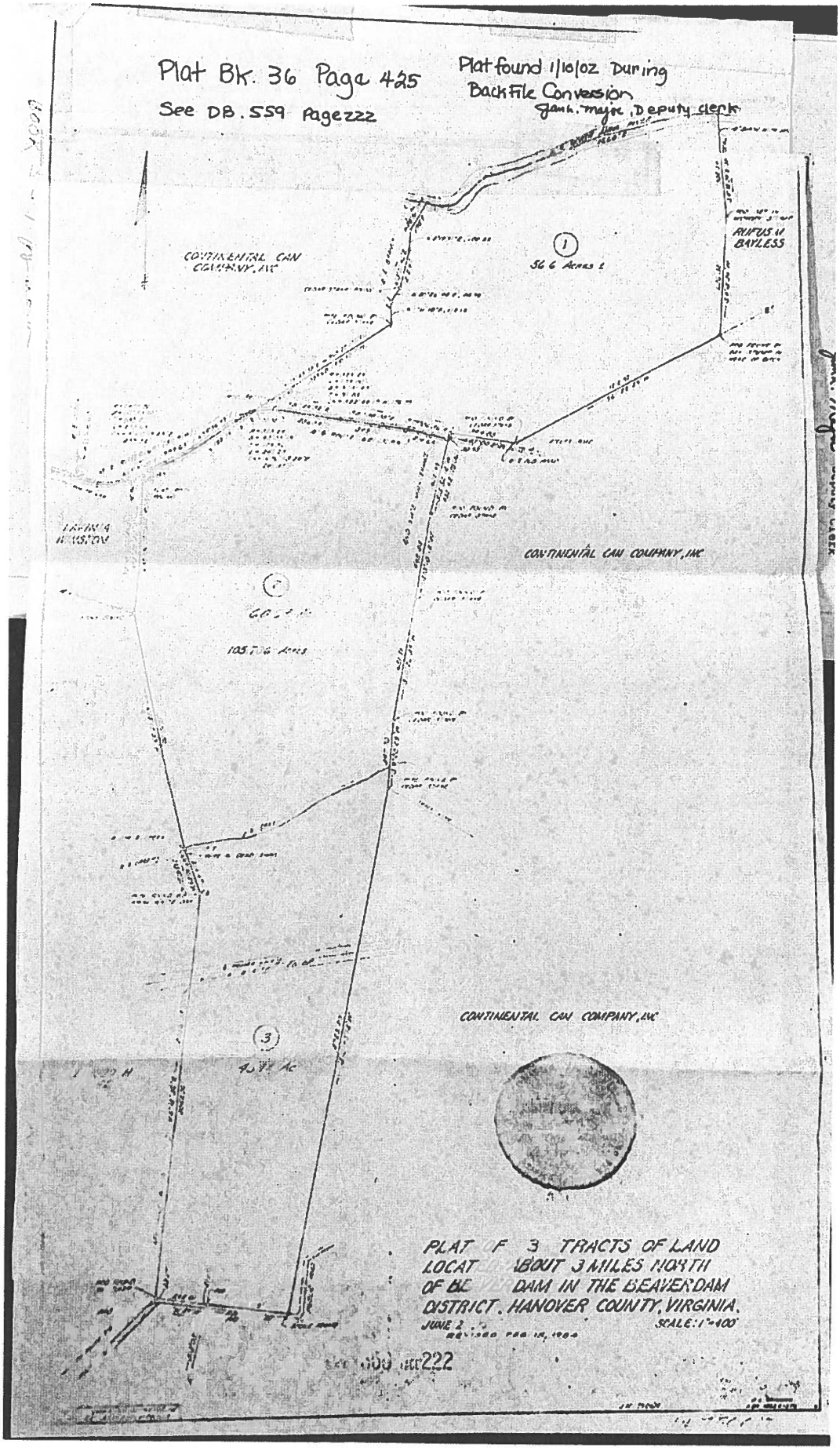
SKETCH PLAN CHECKLIST

Use this checklist to prepare the required sketch plan for submittal with this application. Place a mark next to each item to verify its inclusion on the sketch plan. Please make sure the information listed below is shown on the sketch plan. Failure to include all necessary information may result in the application not being accepted for processing.

Applicant:		Staff:
☑	1. The proposed title of the project, the name of the developer, and the name of the preparer of the plan.	☐
☑	2. The north point, scale, and date. The required scale of the sketch plan shall be as follows: a) For projects containing more than 200 acres, not more than 1" = 200' b) For projects containing 50 acres to 200 acres, not more than 1" = 100' c) For projects containing 10 acres to 50 acres, not more than 1" = 50' d) For projects containing 10 acres or less, not more than 1" = 30'	☐
☑	3. Existing zoning and zoning district boundaries. (Available on County zoning maps.)	☐
☑	4. The boundaries of the property involved; County and/or town boundaries; property lines; existing streets, buildings, and/or waterways; Chesapeake Bay Resource Protection Areas (see Department of Public Works); and major tree masses.	☐
☑	5. Topography of the project area, with contours of five (5) feet or less. (Maps are available in the Planning Department.)	☐
☐	6. Proposed changes in zoning, if any.	☐
☑	7. The general location and character of construction of proposed streets, alleys, driveways, curb cuts, entrances, and exits.	☐
☑	8. Location(s) of all proposed buildings and structures, accessory and main; major excavations; and the use category for each building.	☐
☑	9. General location, height, and material for all fences, walls, screen plantings, berms, and landscaping. The required perimeter buffer, if any, shall be shown.	☐
☑	10. Architectural elevation(s) for the proposed structures on site, which provide detail on the proposed building materials.	☐
☒ NA	11. Location(s) of any known or suspected historic resources, including cemeteries, trenches, and archeological sites as reflected in available County records.	☐

Plat Bk. 36 Page 425
See DB. 559 Page 222

Plat found 1/10/02 During
Backfile Conversion
Janh. Major, Deputy clerk



559 222

Recorded 1-18-00 - Subdiv. Plat Bk #8 Pg. 404 (1 of 2)

Deed # 704
Org. Returned: Grantor Grantee
Others

PLAT
SHOWING SECTION A
ANDERSON MILL
LOCATED IN THE BEAVERDAM DISTRICT OF
HANOVER COUNTY, VIRGINIA

DATED DECEMBER 21, 1999
REVISED JANUARY 10, 2000

SOURCE OF TITLE

THE PROPERTY EMBRACED WITHIN THE LIMITS OF THIS SUBDIVISION WAS CONVEYED TO VIRGINIA FOREST INVESTMENTS L.L.C. FROM BEAR ISLAND TIMBERLANDS BY DEED DATED OCT. 21, 1999 AND RECORDED IN DEED BOOK 1514 PAGE 404 IN THE CLERK'S OFFICE OF THE CIRCUIT COURT HANOVER COUNTY, VIRGINIA.

SUBDIVISION CERTIFICATE

THE SUBDIVISION OF LAND SHOWN ON THIS PLAT IS WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRES OF THE UNDERSIGNED OWNERS PROPRIETORS AND TRUSTEES, IF ANY. THE STREETS ARE DEDICATED TO THE EXTENT AND WIDTH SHOWN ON THIS PLAT.

David R. Hardy Sec
On behalf of Va. Forest Inv., L.L.C.

NOTARY'S CERTIFICATE

TO WIT: I Linda P. Britton A NOTARY PUBLIC IN AND FOR THE COUNTY OF Chesterfield STATE OF VIRGINIA, DO HEREBY CERTIFY THAT: David R. Hardy WHOSE NAME(S) IS(ARE) SIGNED TO THE SUBDIVISION CERTIFICATE, HAS(HAVE) ACKNOWLEDGED THE SAME BEFORE ME IN MY PRESENCE AND STATE AFORESAID. GIVEN UNDER MY HAND AND SEAL THIS 11 DAY OF January, 2000

NOTARY PUBLIC — MY COMMISSION EXPIRES: 11.30.2002

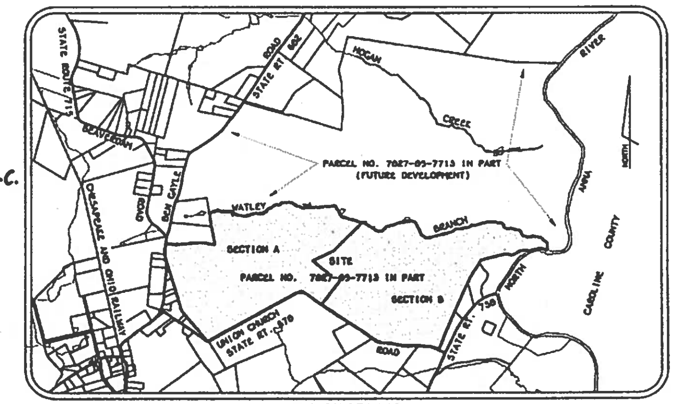
LEGEND:

- IRON ROD FOUND (I.R.F.) OR IRON PIPE FOUND (I.P.F.)
- CONCRETE MONUMENT FOUND
- IRON ROD OR PIPE SET
- CONCRETE MONUMENT SET
- POWER POLE
- T.J.B. TELEPHONE JUNCTION BOX
- O.U.L. OVERHEAD UTILITY LINE
- O/M OLD MARK
- N/F NOW OR FORMERLY
- R/W RIGHT-OF-WAY
- N.R. NON RADIAL

SURVEYOR'S CERTIFICATE

TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL OF THE REQUIREMENTS AS SET FORTH IN THE ORDINANCE FOR APPROVING PLATS OF SUBDIVISIONS FOR RECORDATION IN HANOVER COUNTY, VIRGINIA, HAVE BEEN COMPLIED WITH.

COMMONWEALTH OF VIRGINIA
1-10-2000
GORDON L. JONES
No. 001
LAND SURVEYOR



VINCINITY MAP
SCALE 1" = 2000'

APPROVED
HANOVER CO. PLANNING DIRECTOR
1-18-2000
DATE

COUNTY APPROVAL

GENERAL NOTES:

1. THE LAND DELINEATED HEREON IS LOCATED ON COUNTY TAX MAP NO. GPIN 7827-05-7713 IN PART.
2. PROPERTY IS ZONED: A1 AND PROPERTY LIES IN TRAFFIC ZONE NO. 506
3. CURRENT OWNER AND REFERENCES:
   VIRGINIA FOREST INVESTMENTS LLC
   DB. 1514 @ PG. 405
4. THIS PLAT WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND DOES NOT NECESSARILY SHOW ALL EASEMENTS, SERVITUDES AND COVENANTS OF RECORD.
5. BOUNDARY LINE INFORMATION SHOWN HEREON WAS TAKEN FROM PLATS PREPARED BY WINGATE & KESTNER P.L.C. NOVEMBER 16, 1999, DECEMBER 13, 1999 AND DECEMBER 16, 1999.
6. WETLAND DELINEATION SHOWN HEREON WAS DELINEATED BY LARRY W. MADISON & ASSOCIATES, PROFESSIONAL SOIL SCIENTIST.
7. CONTRACT OWNER & DEVELOPER
   MAPLEDALE L.L.C.
   2223 RICHMOND TAPPAHANNOCK HWY.
   MANQUIN, VA. 23106
   PHONE 804-769-1153
8. ANY SEPTIC SYSTEMS LOCATED IN THE CHESAPEAKE BAY PRESERVATION AREA WILL NEED TO BE PUMPED OUT EVERY FIVE YEARS.
9. THIS PARCEL LIES IN ZONE C, AS DEFINED ON THE NATIONAL FLOOD INSURANCE RATE MAP, PANEL NO. 510237 0050 A, DATED SEPTEMBER 2, 1981.
10. THIS SITE LIES WITHIN A CHESAPEAKE BAY PRESERVATION ACT RESOURCE MANAGEMENT AREA (RMA). THE LIMITS OF ANY RESOURCE PROTECTION AREA (RPA) LOCATED ON THIS SITE HAS ALSO BEEN SHOWN ON THE PLAT.
11. A PLAT SHOWING THE APPROVED LOCATIONS FOR PRIMARY AND SECONDARY DRAINFIELDS FOR EACH LOT IS ON FILE WITH HANOVER COUNTY HEALTH DEPARTMENT.
12. USE: RESIDENTIAL
13. WATER: INDIVIDUAL
14. SEWERAGE: INDIVIDUAL SEPTIC TANK
15. SUBDIVISION WILL NOT EXCEED 16% IMPERVIOUS COVER, THEREFOR B.M.P.'S WILL NOT BE REQUIRED.
16. AREA
   TOTAL AREA OF SUBDIVISION = 578.0 ACRES
   TOTAL NUMBER OF SECTIONS = 2
   SECTION A = 284.0±
   SECTION B = 293.6±
   UNION CHURCH ROAD = 4.1810 ACRES
   BEAVERDAM ROAD = 0.1876 ACRES
   AREA DEDICATED TO HANOVER COUNTY = 4.3686 ACRES

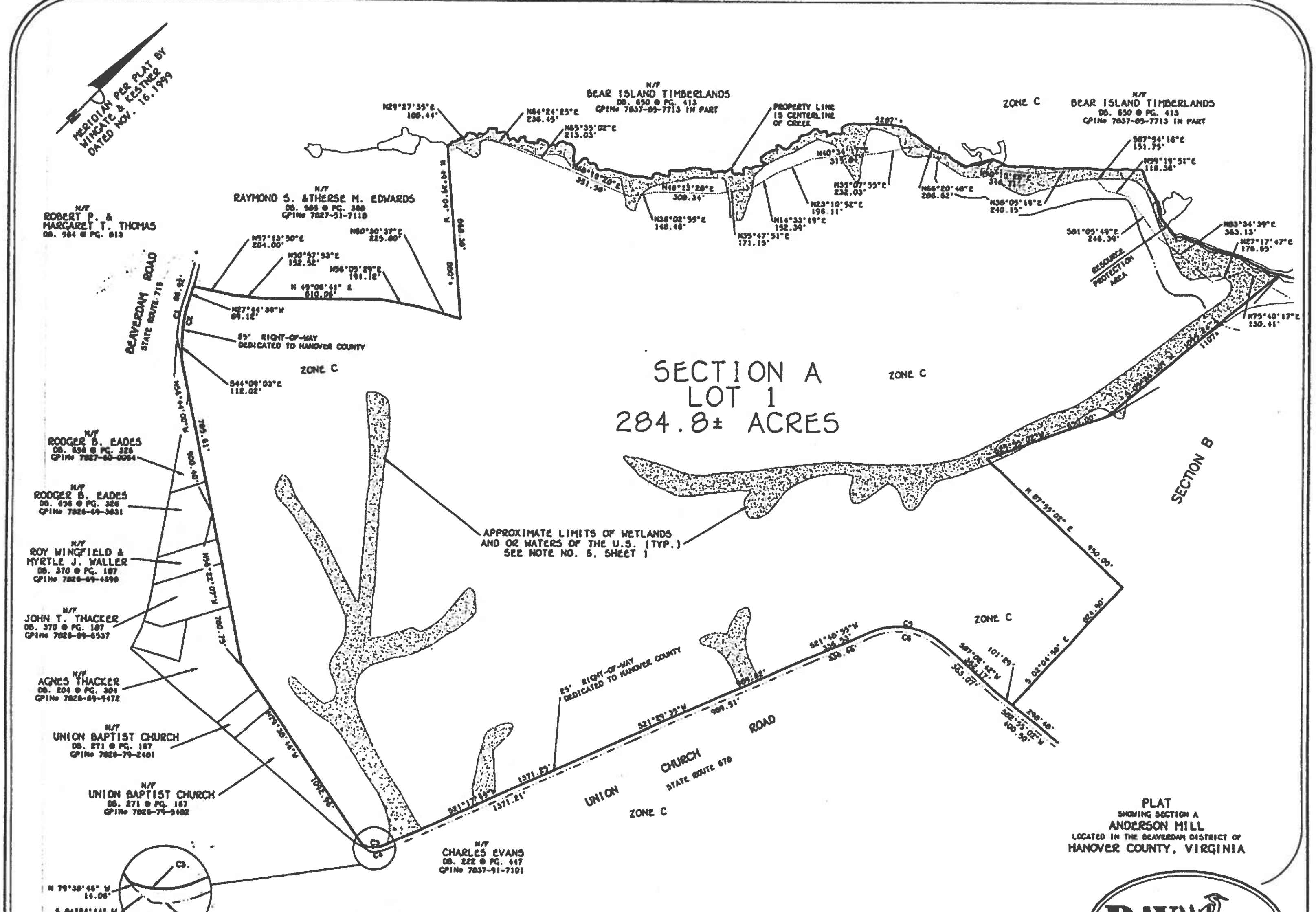
BAY DESIGN GROUP
Engineering, Surveying & Land Planning

SHEET 1 OF 2

RICHMOND: 9415-A ATLEE COMMERCE CENTER BLVD. ASHLAND, VA 23005 804-550-4055 (F)804-550-4057
MIDDLE PENINSULA: BUSINESS ROUTE 17 NORTH BOX 509 SALUDA VA 23149 804-758-5678 (F)804-758-5920 TIDEWATER: 7307 MARTIN STREET BOX 895 GLOUCESTER VA 23061 804-693-2993 (F)804-693-5598

COMPS: G.L.J.	CAD: L.W.K.	CHECK: G.L.J.
JOB NO.: 99197-02		REF. NO.: 99197PR

Recorded 1-18-00 Subdiv. Plat BK 8 PG 404 (2 of 2)



NUMBER	DELTA ANGLE	RADIUS	DEGREE OF CURVE - ARC	ARC LENGTH	TANGENT	CHORD LENGTH	CHORD DIRECTION
C1	18°24'27"	580.92	09°48'08"	186.40	93.84	185.78	S 35°58'50" E
C2	18°24'27"	625.92	09°09'14"	179.24	90.24	178.63	S 35°58'50" E
C3	47°23'12"	135.89	42°09'48"	112.39	59.63	109.21	N 44°59'21" E
C4	29°58'20"	160.89	35°38'42"	84.07	43.02	83.12	N 38°19'55" E
C5	65°13'47"	354.23	16°10'29"	403.28	226.67	381.85	S 54°25'49" W
C6	65°13'47"	329.23	17°24'11"	374.82	210.67	354.90	S 54°25'49" W

Scale: 1" = 300'

BAY DESIGN GROUP Engineering, Surveying & Land Planning

SHEET 2 OF 2

RICHMOND: 9413-A ATLEE COMMERCE CENTER BLVD. ASHLAND, VA 23005 804-550-1055 (F)804-550-4057
MIDDLE PENINSULA: BUSINESS ROUTE 17 NORTH BOX 509 SALUDA VA.23149 804-758-5878 (F)804-758-5920
TIDEWATER: 7307 MARTIN STREET BOX 895 GLOUCESTER VA 23061 804-693-2993 (F)804-693-5996

COMPS: G.L.L.	CAD: LJK	CHECK: G.L.L.
JOB NO: 99197-02		REF. NO: 99197dR

Recorded 1-18-00 Subdiv. Plat Bk 8 pg. 405 (1 of 2)

Used 705
Org. Returned: Grantor ___ Grantee ___
Others: ___

PLAT
SHOWING SECTION B
ANDERSON MILL
LOCATED IN THE BEAVERDAM DISTRICT OF
HANOVER COUNTY, VIRGINIA

DATED DECEMBER 21, 1999
REVISED JANUARY 10, 2000

SOURCE OF TITLE

THE PROPERTY EMBRACED WITHIN THE LIMITS OF THIS SUBDIVISION WAS CONVEYED TO VIRGINIA FOREST INVESTMENTS L.L.C. FROM BEAR ISLAND TIMBERLANDS BY DEED DATED OCT. 21, 1999 AND RECORDED IN DEED BOOK 1514 PAGE 409, IN THE CLERK'S OFFICE OF THE CIRCUIT COURT HANOVER COUNTY, VIRGINIA.

SUBDIVISION CERTIFICATE

THE SUBDIVISION OF LAND SHOWN ON THIS PLAT IS WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRES OF THE UNDERSIGNED OWNERS PROPRIETORS AND TRUSTEES, IF ANY. THE STREETS ARE DEDICATED TO THE EXTENT AND WIDTH SHOWN ON THIS PLAT.

David R. Hardy Jr.
On behalf of Va. Forest Inv. L.L.C.

NOTARY'S CERTIFICATE

TO WIT: I Linda B. Pitts A NOTARY PUBLIC IN AND FOR THE COUNTY OF Chesterfield STATE OF VIRGINIA, DO HEREBY CERTIFY THAT: David R. Hardy Jr.
WHOSE NAME(S) IS(ARE) SIGNED TO THE SUBDIVISION CERTIFICATE, HAS(HAVE) ACKNOWLEDGED THE SAME BEFORE ME IN MY PRESENCE AND STATE AFORESAID. GIVEN UNDER MY HAND AND SEAL THIS 11 DAY OF January 2000

Linda B. Pitts 11.30.2002
NOTARY PUBLIC MY COMMISSION EXPIRES

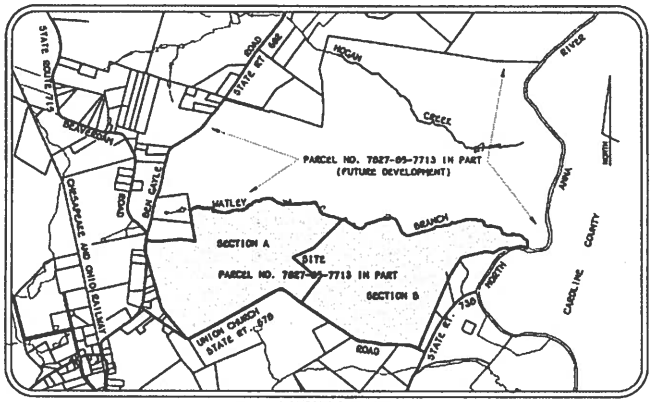
LEGEND:

- ● IRON ROD FOUND (I.R.F.) OR IRON PIPE FOUND (I.P.F.)
- ◆ CONCRETE MONUMENT FOUND
- ○ IRON ROD OR PIPE SET
- ■ CONCRETE MONUMENT SET
- ⊙ POWER POLE
- T.J.B. TELEPHONE JUNCTION BOX
- O.U.L. OVERHEAD UTILITY LINE
- O/M OLD MARK
- N/F NOW OR FORMERLY
- R/W RIGHT-OF-WAY
- N.R. NON RADIAL

SURVEYOR'S CERTIFICATE

TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL OF THE REQUIREMENTS AS SET FORTH IN THE ORDINANCE FOR APPROVING PLATS OF SUBDIVISIONS FOR RECORDATION IN HANOVER COUNTY, VIRGINIA, HAVE BEEN COMPLIED WITH.

COMMONWEALTH OF VIRGINIA
1-10-2000
GORDON L. JONES
No. 002774
SURVEYOR



VICINITY MAP
SCALE 1" = 2000'

APPROVED
HANOVER CO. PLANNING DIRECTOR
1-18-2000
DATE

COUNTY APPROVAL

GENERAL NOTES:

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   VIRGINIA FOREST INVESTMENTS LLC
   DB. 1514 @ PG. 409
4. THIS PLAT WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND DOES NOT NECESSARILY SHOW ALL EASEMENTS, SERVITUDES AND COVENANTS OF RECORD.
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6. WETLAND DELINEATION SHOWN HEREON WAS DELINEATED BY LARRY W. MADISON & ASSOCIATES, PROFESSIONAL SOIL SCIENTIST.
7. CONTRACT OWNER & DEVELOPER
   MAPLEDALE L.L.C.
   2263 RICHMOND TAPPAHANNOCK HWY.
   MANQUIN, VA. 23106
   PHONE 804-769-1153
8. ANY SEPTIC SYSTEMS LOCATED IN THE CHESAPEAKE BAY PRESERVATION AREA WILL NEED TO BE PUMPED OUT EVERY FIVE YEARS.
9. THIS PARCEL LIES IN ZONE C, AND ZONE A, AS DEFINED ON THE NATIONAL FLOOD INSURANCE RATE MAP, PANEL NO. 510037 0050 A, DATED SEPTEMBER 2, 1981. ZONE LINES SHOWN HEREON WERE SCALED FROM SAID MAP.
10. THIS SITE LIES WITHIN A CHESAPEAKE BAY PRESERVATION ACT RESOURCE MANAGEMENT AREA (RMA). THE LIMITS OF ANY RESOURCE PROTECTION AREA (RPA) LOCATED ON THIS SITE HAS ALSO BEEN SHOWN ON THE PLAT.
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14. SEWERAGE: INDIVIDUAL SEPTIC TANK
15. SUBDIVISION WILL NOT EXCEED 18% IMPERVIOUS COVER, THEREFOR B.M.P.'S WILL NOT BE REQUIRED.
16. AREA
    TOTAL AREA OF SUBDIVISION = 578.0 ACRES
    TOTAL NUMBER OF SECTIONS = 2
    SECTION A = 284.8±
    SECTION B = 293.8±
    UNION CHURCH ROAD = 4.1810 ACRES
    BEAVERDAM ROAD = 0.1875 ACRES

    AREA DEDICATED TO HANOVER COUNTY.
    = 4.3686 ACRES

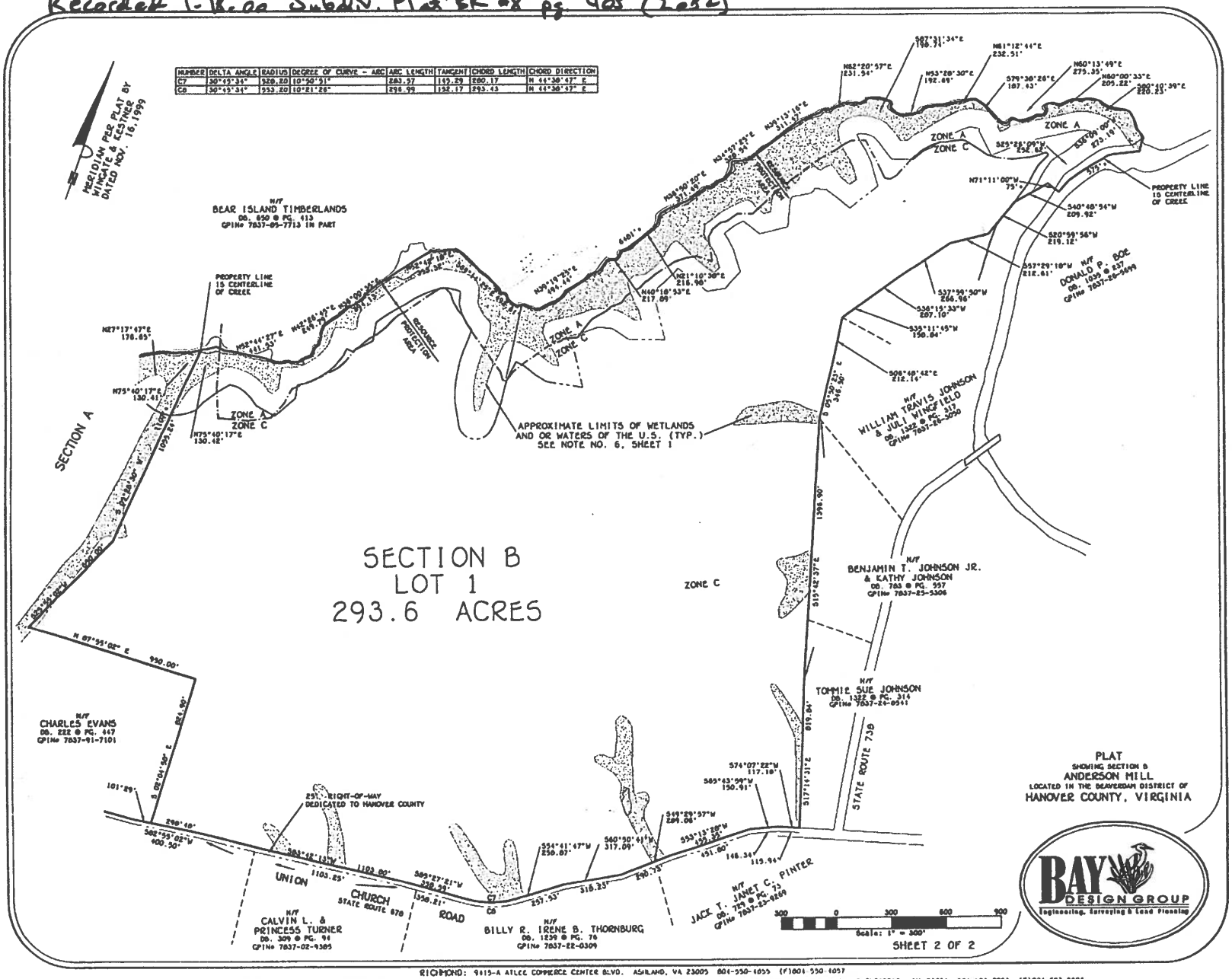
COMPS: E.L.J.	CAD: LJK	CHECK: E.L.J.
JOB NO: 99197-02		REF. NO. 99197pb1

BAY DESIGN GROUP
Engineering, Surveying & Land Planning

SHEET 1 OF 2

RICHMOND: 9415-A ATLEE COMMERCE CENTER BLVD. ASHLAND, VA 23005 804-550-4055 (F)804-550-4057
MIDDLE PENINSULA: BUSINESS ROUTE 17 NORTH POB 509 SAUDA VA 23149 804-758-5670 (F)804-758-5920 TIDEWATER: 7307 MARTIN STREET BOX 895 GLOUCESTER VA 23061 804-693-2993 (F)804 693 5596

Recorded 1-18-00 Subdiv. Plat BK #8 pg. 405 (2 of 2)

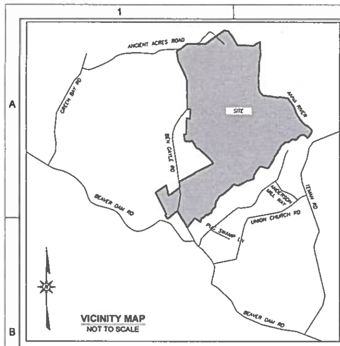


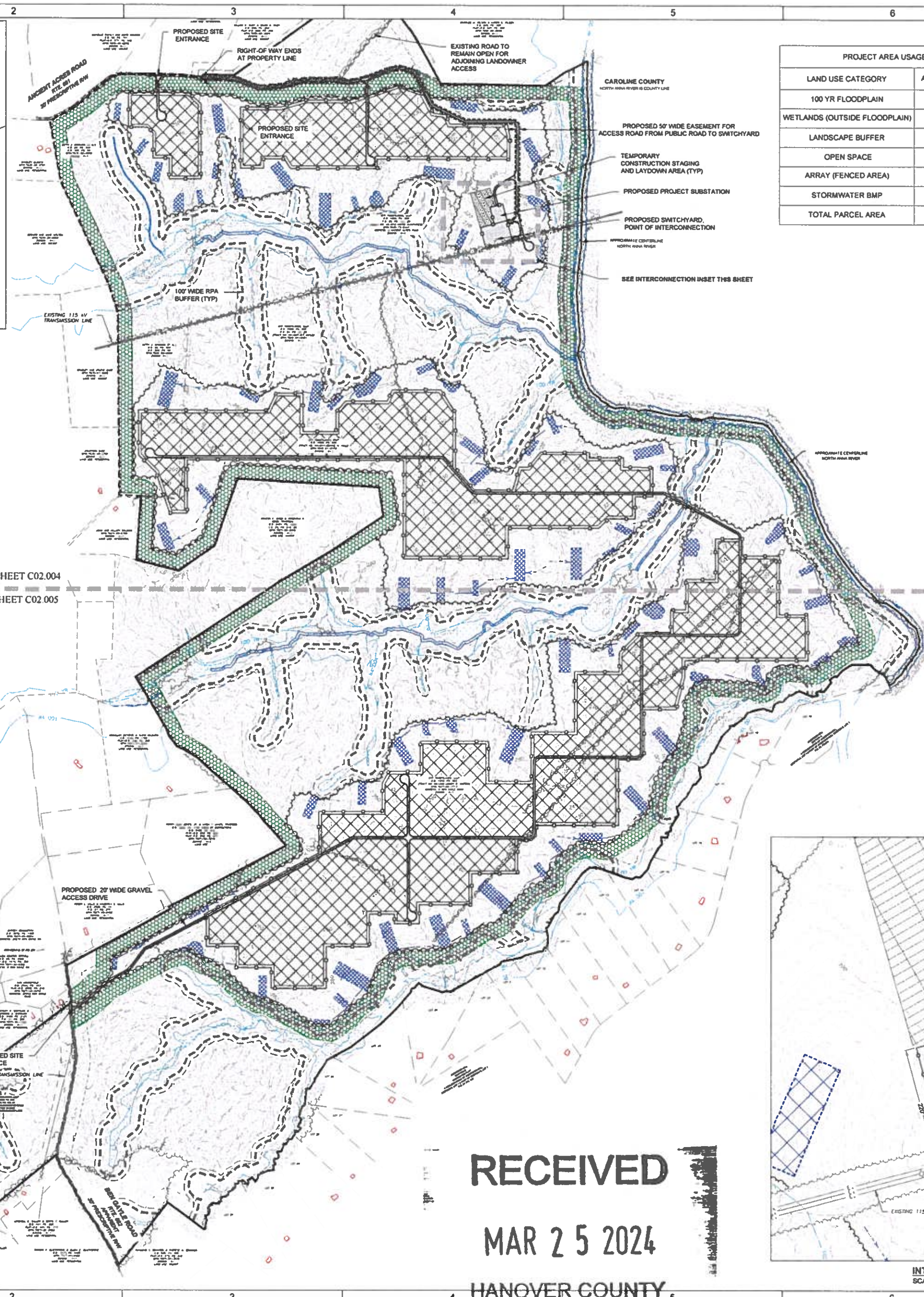
NUMBER	DELTA ANGLE	RADIUS	DEGREE OF CURVE - ARC	ARC LENGTH	TANGENT	CHORD LENGTH	CHORD DIRECTION
C7	30°45'34"	920.20	10°50'51"	283.57	145.29	280.17	N 44°36'47" E
C8	30°45'34"	953.20	10°21'28"	298.99	152.17	293.43	N 44°36'47" E

DRWN: G.L.J. CAD: LJK CHECK: G.L.J.
JOB NO.: 99197-02 REF. NO.: 99197pal

BAY DESIGN GROUP
Engineering, Surveying & Land Planning

RICHMOND: 9115-A ATLEE COMMERCE CENTER BLVD. ASHLAND, VA 23005 804-550-1655 (F)804 550-1657
MIDDLE PENINSULA: BUSINESS ROUTE 17 NORTH BOX 509 SAUDA VA 23149 804-758-5870 (F)804-758-5920 TIDEWATER: 7307 MARTIN STREET BOX 895 GLOUCESTER VA 23061 804-693-2993 (F)804 693-5596





PROJECT AREA USAGE TABLE

LAND USE CATEGORY	AREA (AC)	PERCENT OF TOTAL (%)
100 YR FLOODPLAIN	156	11
WETLANDS (OUTSIDE FLOODPLAIN)	196	13
LANDSCAPE BUFFER	148	10
OPEN SPACE	320	22
ARRAY (FENCED AREA)	337	23
STORMWATER BMP	318	21
TOTAL PARCEL AREA	1475	100

NOTES

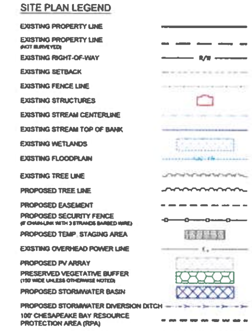
1. EXISTING PROPERTY INFORMATION

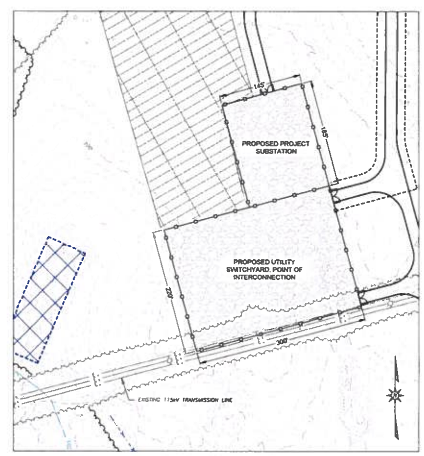
PIN	OWNER	DB/PG	ZONING	PARCEL ACREAGE	LAND USE
7828-73-8147	GFP TIMBERLANDS, LLLP	1550 / 600	A-1	341	VACANT
7828-61-8172	GFP TIMBERLANDS, LLLP	1550 / 600	A-1	37	VACANT
7828-61-0451	GFP TIMBERLANDS, LLLP	1550 / 600	A-1	79	VACANT
7827-33-5426	GFP TIMBERLANDS, LLLP	1550 / 600	A-1	52	VACANT
7827-85-7713	GFP TIMBERLANDS, LLLP	1550 / 600	A-1	860	VACANT
7828-52-0650	DOWNING AND GILMAN, TRUSTEES	389 / 59	A-1	106	VACANT
		TOTAL ACREAGE		1475	

SITE ADDRESS: BEN GAYLE ROAD, BEAVERDAM, HANOVER COUNTY, VA
RIVER BASIN: NORTHEAST CREEK - NORTH ANNA RIVER
WATERSHED: LOWER CHESAPEAKE
MINIMUM SETBACK REQUIREMENTS:
ZONING: PER SOLAR ORDINANCE
150' REQUIRED FROM ANY PROPERTY LINE OR ROAD

2. THE PURPOSE OF THIS PLAN IS FOR CONDITIONAL USE PERMIT FOR REVIEW AND APPROVAL BY HANOVER COUNTY TO CONSTRUCT A SOLAR ELECTRIC POWER PLANT. THE LOCATION OF PROPOSED IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO: FENCING, SOLAR ARRAY RACKING, MEDIUM VOLTAGE, OVERHEAD POLES & LINES, ETC., SHOWN IS APPROXIMATE AND MAY BE SUBJECT TO MODIFICATION DUE TO SITE CONDITIONS, ADDITIONAL PERMITTING REQUIREMENTS (VDOT, VDEQ, USACOE, ETC.), EQUIPMENT SPECIFICATIONS, AND/OR OTHER CONSTRAINTS. ANY REVISIONS WILL BE SUBMITTED FOR STAFF APPROVAL PRIOR TO CONSTRUCTION TO VERIFY COMPLIANCE WITH ZONING REQUIREMENTS AND CONDITIONS AS APPROVED.
3. TOPOGRAPHIC, BOUNDARY & EXISTING PLANIMETRIC DATA SHOWN ON THIS PLAN PER AN ALTA FIELD SURVEY PERFORMED BY TIMMONS GROUP, DATED AUGUST 13, 2021 (GFP TIMBERLANDS PARCELS) AND USGS 3DEP TOPOGRAPHY DATA, HANOVER COUNTY GIS, AND AERIAL IMAGERY (DOWNING AND SOOD PARCELS)
4. WATERS OF THE US SHOWN PER WETLANDS DELINEATION MAP BY PILOT ENVIRONMENTAL INC. DATED FEBRUARY 15, 2021 (GFP TIMBERLANDS PARCELS) AND USFWS NATIONAL WETLAND INVENTORY (DOWNING AND SOOD PARCELS).
5. THE PROPERTY SHOWN HEREON DOES CONTAIN SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD (I.E. 100-YR. EVENT) PER FEMA FIRM MAP PANEL NO. 51085C0035B EFFECTIVE DATE DECEMBER 2, 2008.
6. ALL RIGHT-OF-WAYS ARE PUBLIC, UNLESS NOTED OTHERWISE.
7. UTILITY LINES AND SERVICES SHOWN HEREON ARE APPROXIMATE PER AERIAL IMAGERY. LOCATION OF UNDERGROUND UTILITIES ARE APPROXIMATE AND MUST BE FIELD VERIFIED. CALL VA811 BEFORE DIGGING AT 811.
8. COPIES OF ALL PERMITS AND APPROVED PLANS MUST BE KEPT ON-SITE IN A PERMIT BOX THAT IS CONSPICUOUSLY LOCATED AND EASILY ACCESSIBLE DURING CONSTRUCTION.
9. PRIOR TO BEGINNING CONSTRUCTION, THE FOLLOWING PLAN APPROVALS SHALL BE OBTAINED: SITE PLAN, LAND DISTURBANCE PERMIT FROM HANOVER COUNTY, STORMWATER MANAGEMENT FROM VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VDEQ) AND LAND USE PERMIT FROM VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT).
10. ALL AREAS DESIGNATED AS TEMPORARY CONSTRUCTION STAGING AREAS WILL BE IMPROVED TO ALLOW ALL-WEATHER ACCESSIBILITY FOR MATERIAL DELIVERIES AND EMPLOYEE ACCESS. FOLLOWING CONSTRUCTION, THESE AREAS WILL BE REMOVED AND RESTORED PER THE APPROVED STORMWATER MANAGEMENT PLAN REQUIREMENTS.
11. PROPOSED 24' ACCESS GATE (TWO 12' SECTIONS) IS 8' TALL CHAIN LINK WITH 3 STRANDS OF BARBED WIRE. GATE WILL BE LOCKED WITH STANDARD KEYED OR COMBINATION LOCK. EMERGENCY PERSONNEL (AS DESIGNATED BY RICHMOND COUNTY) WILL BE PROVIDED A KEY OR COMBINATION FOR ACCESS.
12. NO LIGHTING IS PROPOSED FOR THIS SITE.
13. ALUMINUM SIGNS ("DANGER - HIGH VOLTAGE" AND "DANGER - NO TRESPASSING") MEASURING 14" X 10" IN SIZE, WILL BE PLACED ON PERMANENT SECURITY FENCING, ALTERNATING EVERY 100' AROUND THE ARRAY.
14. THE MAXIMUM HEIGHT OF GROUND MOUNTED SYSTEMS, EQUIPMENT AND STRUCTURES, AS MEASURED FROM THE GRADE OR BASE OF THE IMPROVEMENTS TO ITS HIGHEST POINT, SHALL NOT EXCEED TWENTY (20) FEET IN HEIGHT. EXCLUDED FROM THIS HEIGHT REQUIREMENT ARE ELECTRIC UTILITY POLES, PROJECT SUBSTATION AND UTILITY SWITCHYARD.
15. ALL PROPOSED TEMPORARY AND PERMANENT TRAFFIC SIGNAGE SHALL BE REVIEWED AND APPROVED BY VDOT AS PART OF THE LAND USE PERMIT.

SITE PLAN LEGEND





INTERCONNECTION INSET
SCALE: 1" = 100'

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PV ELECTRIC SUPPLY STATION
BEN GAYLE ROAD
BEAVERDAM, VIRGINIA
HANOVER COUNTY

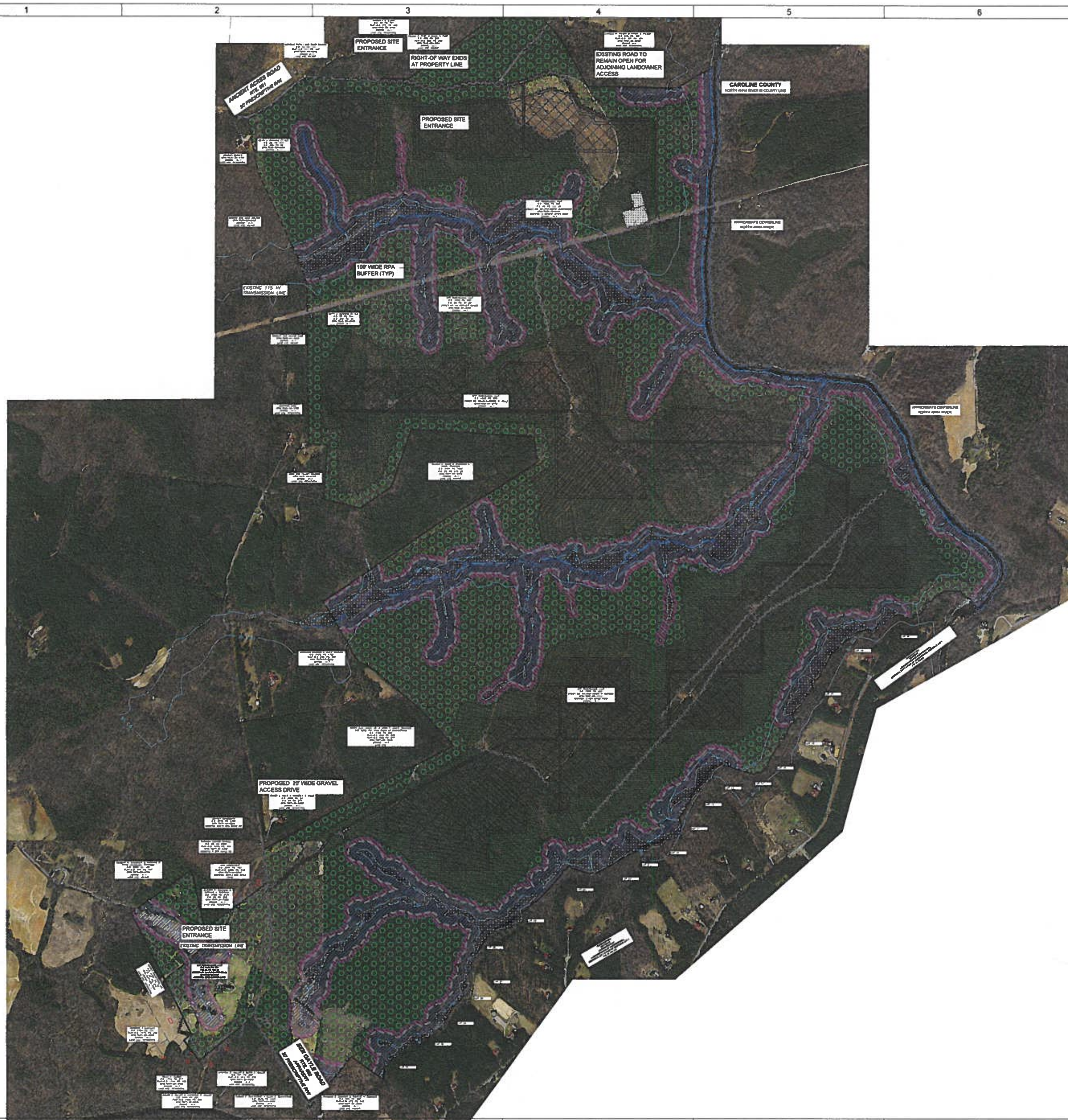
STRATA SOLAR, LLC ENGINEERING DEPT
PRELIMINARY
NOT FOR CONSTRUCTION

REV	DATE	REVISION DESCRIPTION	BY	APV
	03/15/2024	INITIAL ISSUE TO COUNTY	RBJ	KB

PROJ: 21-19-758
SHEET: 24.0" x 36.0"
SCALE: 1" = 600'

ZONING SITE PLAN

C02.001



PROJECT AREA USAGE TABLE		
LAND USE CATEGORY	AREA (AC)	PERCENT OF TOTAL (%)
100 YR FLOODPLAIN	156	11
WETLANDS (OUTSIDE FLOODPLAIN)	196	13
LANDSCAPE BUFFER	148	10
OPEN SPACE	320	22
ARRAY (FENCED AREA)	337	23
STORMWATER BMP	318	21
TOTAL PARCEL AREA	1475	100

SITE PLAN LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE (NOT SURVEYED)
- EXISTING RIGHT-OF-WAY
- EXISTING SETBACK
- EXISTING FENCE LINE
- EXISTING STRUCTURES
- EXISTING STREAM CENTERLINE
- EXISTING STREAM TOP OF BANK
- EXISTING WETLANDS
- EXISTING FLOODPLAIN
- EXISTING TREE LINE
- PROPOSED TREE LINE
- PROPOSED EASEMENT
- PROPOSED SECURITY FENCE
- PROPOSED TEMP. STAGING AREA
- EXISTING OVERHEAD POWER LINE
- PROPOSED PV ARRAY
- OPEN SPACE
- 100' CHESAPEAKE BAY RESOURCE PROTECTION AREA (RPA)
- 50' NON-RPA WETLAND OFFSET
- PROPOSED STORMWATER MANAGEMENT AREA

SCALE: 1" = 600'

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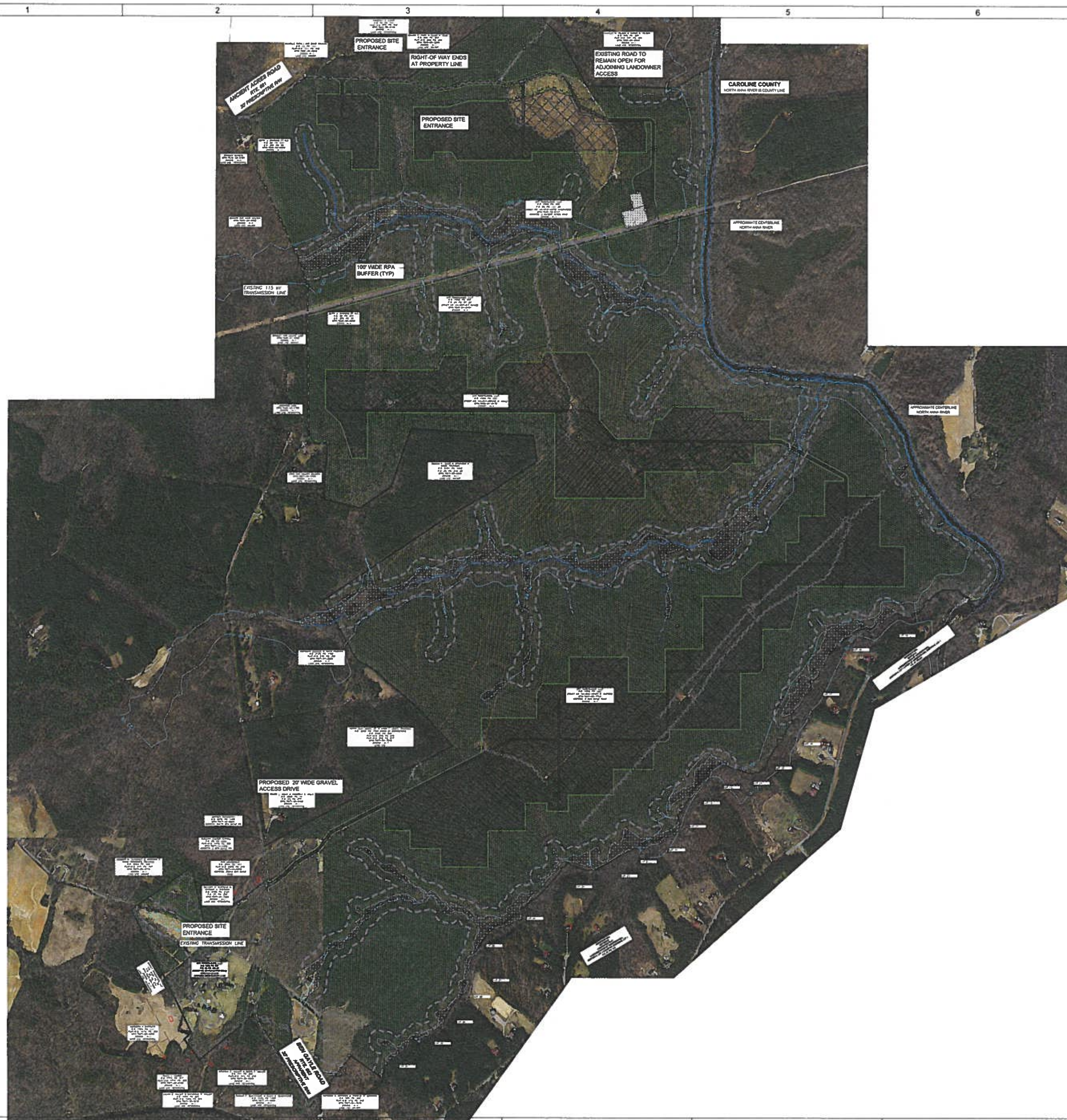
SCALE: 1" = 600'

NATURAL RESOURCE CONSERVATION PLAN

C02.002



SITE PLAN LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE (NOT SURVEYED)
- EXISTING RIGHT-OF-WAY
- EXISTING SETBACK
- EXISTING FENCE LINE
- EXISTING STRUCTURES
- EXISTING STREAM CENTERLINE
- EXISTING STREAM TOP OF BANK
- EXISTING WETLANDS
- EXISTING FLOODPLAIN
- EXISTING TREE LINE
- PROPOSED TREE LINE
- PROPOSED EASEMENT
- PROPOSED SECURITY FENCE
- EXISTING OVERHEAD POWER LINE
- PROPOSED PV ARRAY
- WILDLIFE CORRIDORS
- 100' CHESAPEAKE BAY RESOURCE PROTECTION AREA (RPA)
- 50' NON-RPA WETLAND OFFSET

SCALE: 1" = 600'

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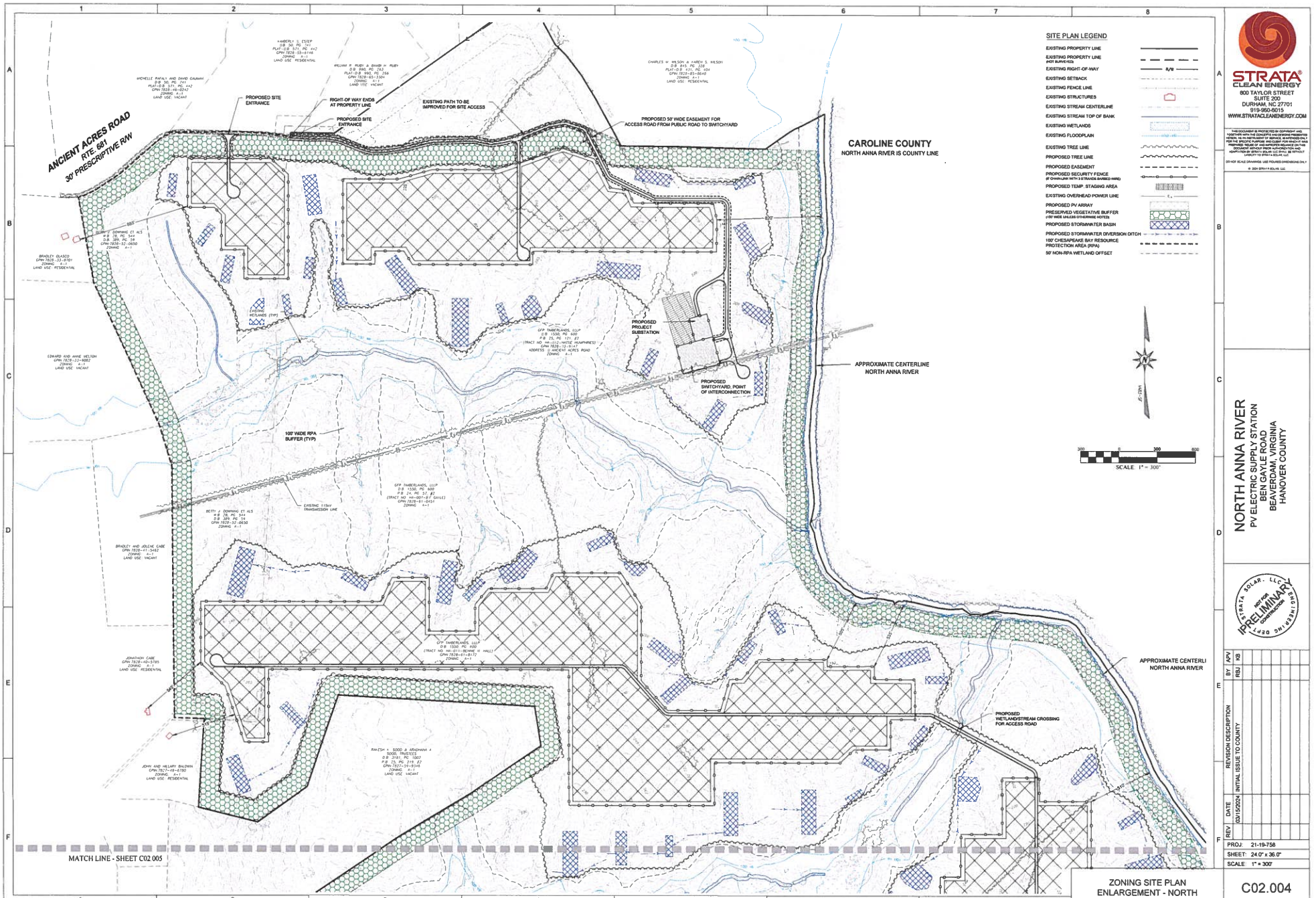
SHEET: 24.0" x 36.0"
SCALE: 1" = 600'

WILDLIFE CORRIDOR PLAN

C02.003



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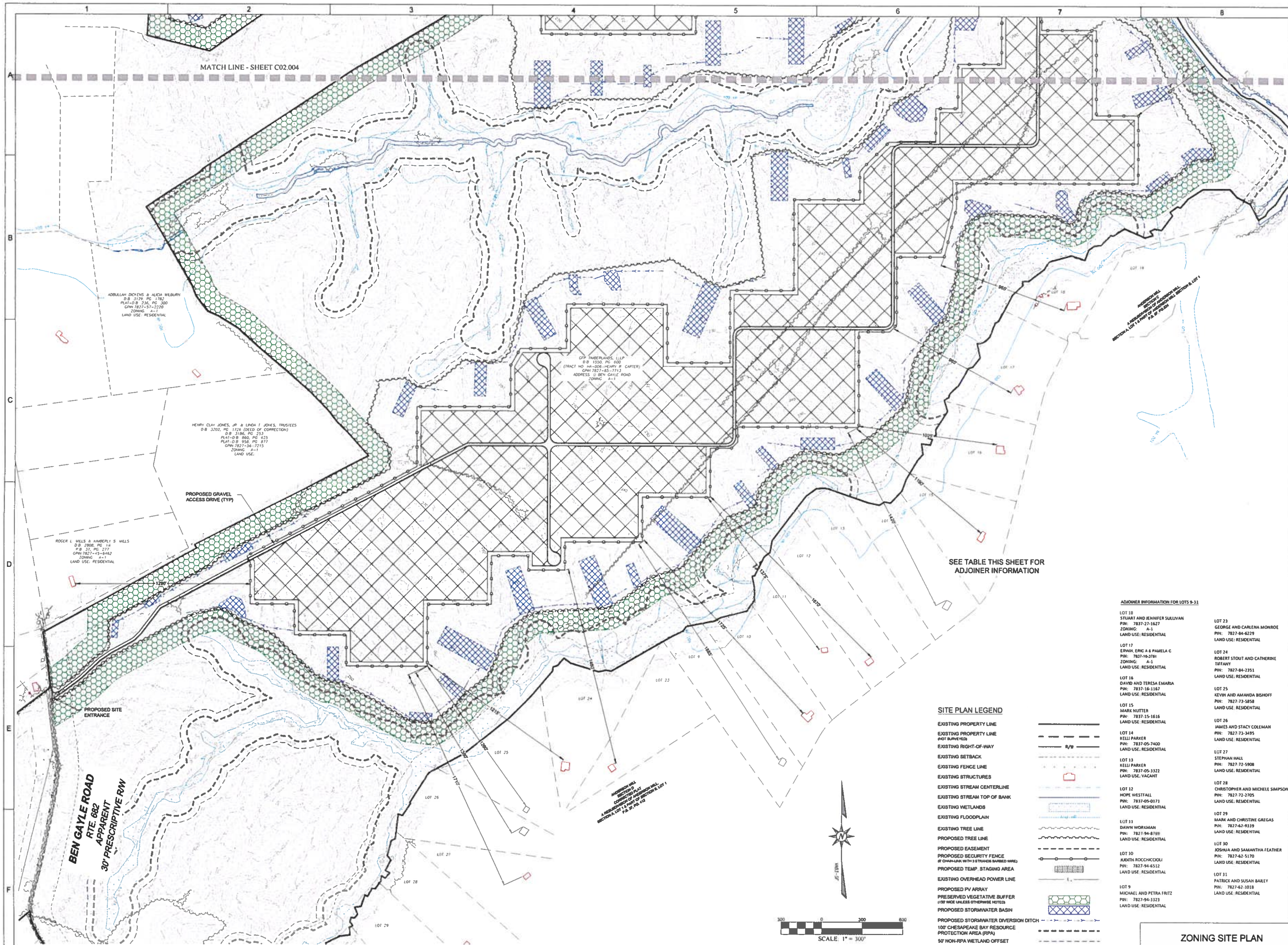
	02/15/2024	INITIAL ISSUE TO COUNTY	RBJ	KB

PROJ: 21-19-758
SHEET: 24.0" x 36.0"
SCALE: 1" = 300'

ZONING SITE PLAN ENLARGEMENT - NORTH

C02.004



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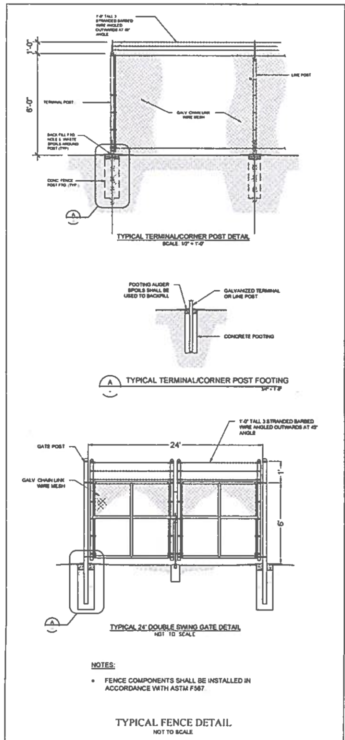
REV	DATE	REVISION DESCRIPTION	BY	APV
	03/15/2024	INITIAL ISSUE TO COUNTY	RBJ	KB

PROJ: 21-19-758
SHEET: 24.0" x 36.0"
SCALE: 1" = 300'

ZONING SITE PLAN ENLARGEMENT - SOUTH

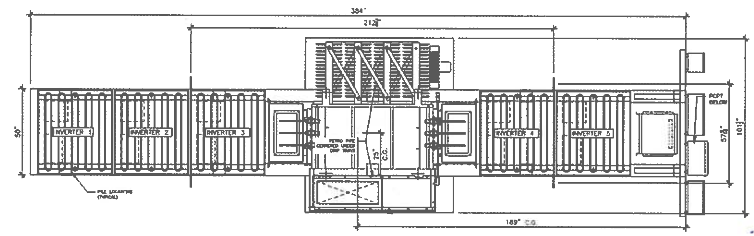
C02.005



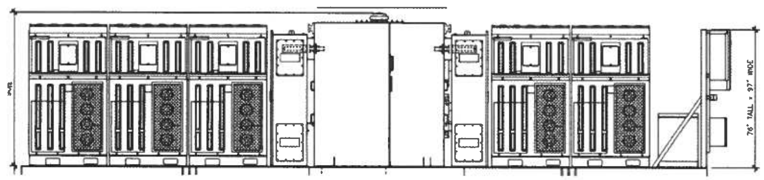
NOTES:

- FENCE COMPONENTS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM F567

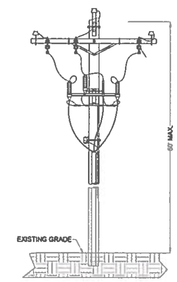
TYPICAL FENCE DETAIL
NOT TO SCALE



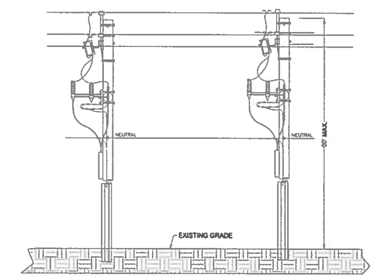
TYPICAL INVERTER LAYOUT PLAN
NOT TO SCALE



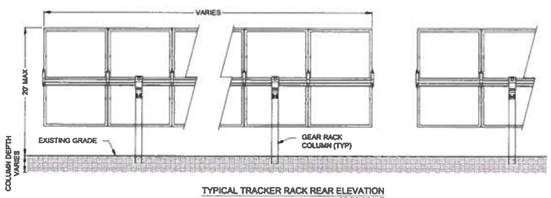
TYPICAL INVERTER ELEVATION
NOT TO SCALE



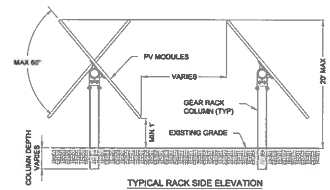
TYPICAL OVERHEAD DIP POLE
FRONT VIEW
NOT TO SCALE



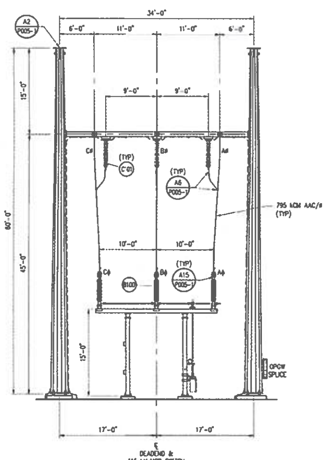
TYPICAL OVERHEAD DIP POLE
SIDE VIEW
NOT TO SCALE



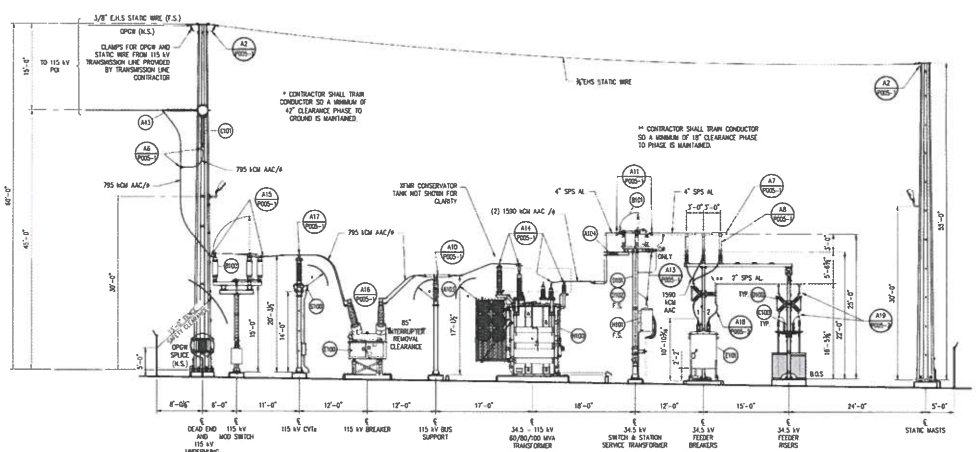
TYPICAL TRACKER RACK REAR ELEVATION
NOT TO SCALE



TYPICAL RACK SIDE ELEVATION
NOT TO SCALE



TYPICAL SUBSTATION ELEVATION
NOT TO SCALE



TYPICAL SUBSTATION ELEVATION
NOT TO SCALE

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PROJ: 21-19-758
SHEET: 24.0" x 36.0"
SCALE: AS SHOWN

PROJECT DETAILS

C02.006

Draft Conditions – North Anna River Solar

1. In accordance with Article 6, Division 3, Section 26-325, the site shall be developed and maintained in substantial conformity with the sketch plan, titled "North Anna River" dated March 15, 2024, and prepared by Strata Clean Energy.

2. A site plan, prepared in accordance with the requirements of Chapter 26, Article 6, Division 2, of the Hanover County Zoning Ordinance, shall be submitted for review and approval prior to the commencement of the requested use.

3. *Siting Agreement*: The owner of the property or operator of the subject photovoltaic electric generating facility will adhere to the terms identified in the siting agreement titled, "Solar Facility Siting Agreement," dated (to be determined).

4. *Decommissioning Plan:* Decommissioning of the facility will be in accordance with the plan titled, "Anna River Solar Electric Power Plant" prepared by the Timmons Group, dated March 2023.

5. *Landscaping*: Landscaping on the property with be in accordance with Sections 26-282.5(3) and 26-292.5(4) of the Hanover County Zoning Ordinance. Prior to site plan approval, the owner or developer must complete a performance agreement guaranteeing the completion of the landscaping improvements must provide security in the form of cash or surety bond or letter of credit approved by the County Attorney as to form and approved by the Director of Planning as to content.

6. *Land Disturbance*: Land disturbance activities and stabilization must be supervised by a third-party engineer or other qualified individual as approved by the Director of Planning, and bi-weekly reports of activities, as well as the final stabilization report, but be submitted to the Director of Planning for approval. All fees associated with any third-party review will be the responsibility of the registered land disturber. As provided by the ordinance, North Anna River Solar will coordinate with the Director of Planning during site plan approval if greater than 100 acres of land disturbance needs to be requested.

7. *Hours of Clearing and Grading:* All clearing and grading of the site, to include the construction and/or the upgrade of any access roads needed for the project, must be limited to the hours of 7 a.m. to 6 p.m., Monday through Saturday. These limitations must also apply to any activities associated with the decommissioning of the facility.

8. *Hours of Piling-Driving Activity:* All piling-driving activity must be limited to the hours of 7 a.m. to 6 p.m., Monday through Friday.

9. *Solar Panel Coating:* All solar panels must be covered with an anti-reflective coating.

10. *Ben Gayle Road/Ancient Acres Road Conditions:* Prior to site plan approval and following construction of the facility, the owner or developer must contact the Virginia Department of Transportation (VDOT) to inspect the pre-construction and post-construction conditions of Ben Gayle Road and Ancient Acres Road to ensure that the roads have been restored to pre-construction conditions. The applicant will be required to restore the roads to their pre-construction condition within six months of operation of the facility and must post a bond of $50,000 prior to site plan approval to ensure the required work is completed.

11. *Lighting:* Lighting on the property cannot exceed 15 feet in height. House side shields must be installed on the fixtures. Any temporary lighting needed at the time of construction must be directed downward and away from Normans Bridge Road and adjoining residences.

12. *Fire/EMS:* Within six months of operation of the facility, the owner or developer must coordinate with the County's Fire-EMS Department to provide materials, education, and/or training to their staff serving the solar energy facility regarding how to safely respond to on-site emergencies.

13. *CUP Expiration:* The CUP will expire three (3) years from the date of approval, unless substantial construction begins on the property, or an extension is granted by the Board of Supervisors

14. *Planning Inspection:* Prior to operation of the facility, the owner or developer must contact the Planning Department to complete a final planning inspection of the property to ensure that the facility is constructed in accordance with the approved site plan.

15. *Development Regulations:* All development and use of the property shall comply with all federal, state, and local statutes, ordinances, and regulations.

Introduction

Anna River Solar, LLC ("North Anna River" or the "Applicant") is submitting a Conditional Use Permit ("CUP") application **(Attachment A)** to Hanover County (the "County") to install a Utility-Scale Solar Energy Facility, along with the associated infrastructure necessary for the North Anna River Solar Project (the "Project"). The Project will be capable of generating up to 72 megawatts (MW) of electricity, enough to power approximately 18,000 Virginia homes. The Applicant will be the facility owner, site owner, and operator.

This CUP application outlines the Project's conformance with Chapter 26, Hanover County's Zoning Ordinance ("Zoning Ordinance") and the 2023 "Envision Hanover" Hanover County Comprehensive Plan (the "Comprehensive Plan"). Pursuant to Chapter 26, Zoning Ordinance, Article 3, District Regulation, Division 1, the Project falls under Solar Energy Facility, Principal – Utility Scale as an approved use within the A-1 District, if issued a Conditional Use Permit in accordance with the standards of section 26-292.5. North Anna River is located entirely on property zoned A-1.

The Project will provide a clean, reliable source of renewable energy while providing local jobs, increasing county revenues, and maintaining the rural character of the community. With a vegetative buffer of mature pine timber, the Project will be completely buffered from neighboring views and passing traffic. The Project has been sited and designed to be compatible and harmonious with the neighboring land uses, with the nearest residential structure over 500 feet away from project fenced in areas. Most adjacent residential structures are located over 1,000 feet from fenced in areas of the project.

The Project will provide impactful revenue: i) for property owners through purchase and/or lease payments; ii) for the County through Machinery and Tools Tax; iii) for the County through an increase in real estate tax revenue; iv) for the County through a siting agreement; v) for local businesses through material supply and service contracts (e.g. fuel, gravel, fencing, etc.) during construction; and vi) for the local community by providing construction and long-term operations jobs.

The Project will not require County municipal resources or services, social services, additional health resources or facilities, or public safety officers. This Project can provide a net benefit for the County while not increasing the demand for County services.

North Anna River respectfully requests the Planning Commission and Board of Supervisors review and approve the Project as: i) compliant with the requirements set forth in Chapter 26 of the Hanover County Zoning Ordinance and ii) and compliant with the adopted Hanover County Solar and Energy Storage Policy and in substantial accord with the requirements set forth in the Comprehensive Plan.

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Applicant Overview

The Applicant is a wholly owned subsidiary of Strata Clean Energy, LLC ("Strata"). Strata is a family owned, fully integrated solar and energy storage company with four primary business areas: i) project development; ii) engineering, procurement, and construction; iii) operations and maintenance services; and iv) power generation and supply. Strata is based in Durham, North Carolina, and employs over 400 full-time professional staff. Within Virginia, Strata currently employs 122 staff.

Strata partners with the local communities in which it works to ensure it is a long-term positive corporate steward. Our collaborative approach involves working with landowners, utility companies, and other stakeholders to develop, build, and operate safe and reliable clean energy projects. Strata strives to be a partner of choice with all stakeholders and has achieved success through adherence to our core values: Safety, Partnerships, Quality, Expertise, Transparency, Environmental Responsibility, and Accountability. For more information on Strata Clean Energy, please visit Strata's website at http://www.strataacleanenergy.com/.

Experience in Virginia

Since its founding in 2008, Strata has constructed and operates hundreds of utility-scale solar facilities across the United States. As one of the top solar engineering and construction service providers for Dominion Energy, Strata is intimately familiar with the unique characteristics of building projects across the Commonwealth. Detailed below is Strata's experience within Virginia.

In Virginia, Strata has constructed 12 solar projects ranging in size from 20 MW to 224 MW. Please see Table 1 below for additional details.

Table 1. Virginia Constructed Projects

Project Name	Location	Size MW	Operational Date
Gloucester	Gloucester	20.0	2019
Sappony	Sussex	20.0	2018
Buckingham	Buckingham	22.0	2018
Scott II	Powhatan	22.0	2018
Correctional	New Kent	22.5	2018
Remington	Fauquier	20.0	2017
Colonial Trail	Surry	142.5	2019
Spring Grove I	Surry	97.0	2020
Greensville	Greensville	80.0	2020
Rochambeau	James City	28.0	2021
Ft. Powhatan	Suffolk	224.0	2021
Myrtle	Suffolk	15.0	2021
	Total:	**713.0**	

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In Virginia, Strata is currently constructing 11 solar projects ranging from 26 MW to 175 MW. Please see Table 2 below for additional details.

Table 2. Virginia Projects under Construction

Project	Location	Size MW
Sycamore Solar	Pittsylvania	60.0
Norge Solar	Williamsburg	26.0
Solidago Solar	Isle of Wright	27.0
Bookers Mill Solar	Richmond	144.9
Winterberry Solar	Gloucester	27.2
Fountain Creek Solar	Greensville	97.0
Otter Creek Solar	Chase City	84.8
Camellia Solar	Gloucester	27.0
Berry Hill Solar	Westover	151.0
Walnut Solar	King and Queen	175.0
Cerulean Solar	Richmond	62.0
	Total:	**855.9**

In Virginia, Strata provides operations and maintenance as a third-party operator at 22 solar projects totaling approximately 1,533 MW. Please see Table 3 below for additional details.

Table 3. Virginia Projects Currently being Operated and Maintained

Project	Location	Size MW
Buckingham Solar	Cumberland	22.0
Butcher Creek Solar	Mecklenburg	103.8
Cherrydale Solar	Northampton	25.3
Clarke Solar	Clark	12.6
Colonial Trail West Solar	Surry	213
Correctional Solar	New Kent	22.5
Danville Solar	City of Danville	15.9
Desper Solar	Louisa	122.4
Sadler Solar	Greensville	100.0
Eastern Shore Solar	Accomack	105.4
Greensville Solar	Greensville	80.0
Myrtle Solar	Suffolk	15.0
Pocaty Solar	Chesapeake	78.5
Rochambeau Solar	Williamsburg	28.0
Scott I Solar	Powhatan	23.0
Scott II Solar	Powhatan	22.0
Southampton Solar	Southampton	140.8
Spring Grove Solar	Surry	97.0
Sussex Drive Solar	Sussex	28.3
Ward's Creek	Prince George	224.8
Whitehouse Solar	Louisa	26.8
Woodland Solar	Isle of Wight	25.5
	Total:	**1,532.6**

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Project Overview

Location and Description

The Project is located approximately 1.6 miles north of Beaverdam, in the Beaverdam District. The Project is located off Ben Gayle Road (Route 682) to the north and east, and Ancient Acres Road (Route 681) to the south. The Project is bordered by Caroline County to the East, along with the North Anna River.

The Project location is shown in Figure 1 below and is detailed in the Zoning Site Plan provided in **Attachment B**. The siting of the Project has been selected to be compatible and in harmony with the area in which it is located.

The Project will be on 6 parcels zoned A-1 (Agricultural); see Table 4 below for landowner details. The current land use is primarily managed timber. The Project is expected to have approximately 300 acres of solar panel coverage (occupying approximately 20 percent of the Project site) with the total Project Area within the fence line totaling 337 acres.

To ensure the Project will be shielded from view and preserve the rural nature of the area, existing vegetative buffers of at least 150 feet (approximately 148 acres of existing vegetation) will surround the entire Project. Additionally, about 672 acres are designated as conserved as open space and wildlife corridors. The Project was designed to maintain the area's rural character and preserve open space.

The Project will interconnect with a Rappahannock Electric Co-op (REC) 115 kilovolt (kV) line which is served by Dominion Energy (DE) through its 115kV transmission line. Please see additional discussion below under the Project Components section.

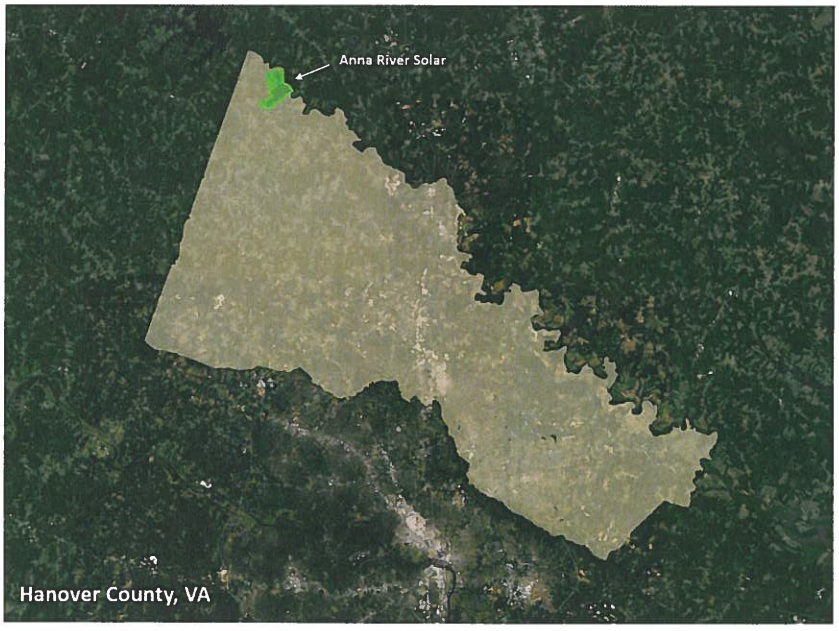

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Figure 1 – Regional Project Location Map

As detailed under the *Project Components* section below, the Project will consist of photovoltaic (PV) modules which generate electricity by safely converting the energy of the sun's photons into direct current (DC) electrons. The PV modules are mounted to a single axis tracking system which will allow for the modules to be properly positioned for maximum capture of the sun's energy. Electrical collection and communication lines collect the electricity before it is converted from direct current (DC) electricity into alternating current (AC) electricity by inverters. The specific manufacturer and model of equipment to be used will be determined later in the engineering process.

Access to the Project will be provided through the three (3) proposed entrances. All entrances will be constructed or upgraded in accordance with Virginia Department of Transportation (VDOT) requirements.

Construction of the Project is expected to take between 16 to 20 months and the commercial operation date is expected in the fourth quarter of 2028. Upon completion, the Project would be monitored and operated remotely through a supervisory control and data acquisition (SCADA) system. Please see the *Components* section below for additional details.

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Project Landowner Information

The Project landowners are either under a long-term lease or purchase option with the Applicant or a Strata subsidiary. The Project comprises 6 parcels totaling approximately 1,477.31 acres as detailed in Table 4 and shown in Figure 2.

Table 4. Project Parcels

Parcel GPIN	Zoning	Landowner Name	Agreement Type	Approximate Acreage[1]
7827-85-7713	A-1	Benjamin W. Griffith, III	Lease	860.71
7828-73-9147	A-1	Benjamin W. Griffith, III	Lease	341
7828-61-0451	A-1	Benjamin W. Griffith, III	Lease	79.9
7828-61-8172	A-1	Benjamin W. Griffith, III	Lease	37
7827-33-5426	A-1	Benjamin W. Griffith, III	Lease	52.6
7828-52-0650	A-1	Betty Jennings Downing	Purchase	106.1

[1]Acreages determined from the County GIS.

Each parcel's property boundary is depicted in Figure 2 below.

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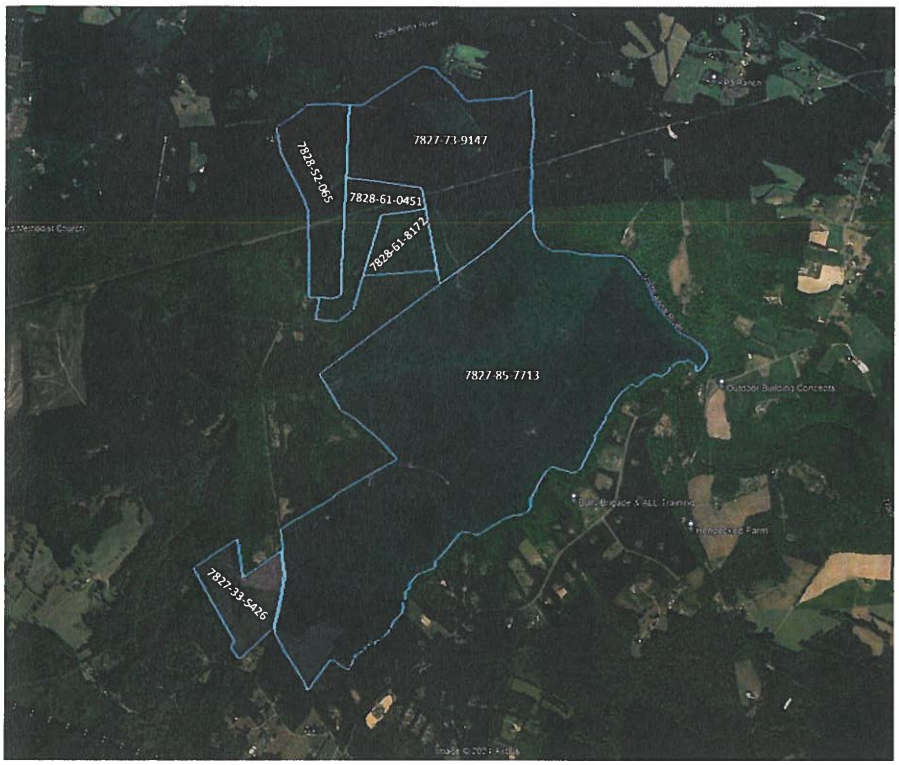

Figure 2 – Parcel Boundaries Under Site Control

Zoning Ordinance Conformance Summary

The Project has been designed to comply with the requirements in Section 26-292.5 of the Hanover County Zoning Ordinance addressing requirements for Principal – Utility Scale Solar Facilities. Ordinance 23-14, adopted October 25, 2023, states that the "Board of Supervisors has determined that solar energy facilities that are properly sited and regulated can provide benefits to the County and that amendments to the Zoning Ordinance providing for such siting and regulation are in the public interest."

In accordance with Section 26-6. – Definitions, North Anna River should be considered a *"Solar Energy Facility, Principal"* which is a facility that uses PV materials and technology for the wholesale generation and distribution of electricity from sunlight. On-site components may include solar panels and other accessory components including, but not limited to, transformers, transmission lines, and other improvements necessary to support the power generation, collection, and transmission. Energy produced by a Principal Solar Energy Facility is delivered for uses in location(s) other than where it is generated. Further, North Anna River Solar should be considered a *Solar Facility, Utility Scale,* as it is a solar photovoltaic electric power facility with a rated capacity of greater than 5 megawatts.

As specified by Section 26-20 of the Hanover County Zoning Ordinance, a CUP is required for each Solar Energy Facility – Utility Scale, proposed to be constructed, installed, or operated in Hanover County. Table 5 below provides information demonstrating the Project's conformance with key requirements of Section 26-292.5 in the Zoning Ordinance

Table 5. Project Conformance to Key Zoning Ordinance Requirements

Description	County Ordinance Requirements and Project Conformance (Section 26-292.5)
Buffers	**Requirement:** For photovoltaic panels, substations, and other equipment associated with the production and distribution of energy (other than poles and wires) the following minimum buffers are required: a. 150 feet from any property line or road. No panels, cabinets, or other associated equipment, exclusive of utility poles, wires, cables, and access roads, shall be located closer than twenty-five (25) feet from the buffer. b. 100 feet from RPA wetlands, rivers, streams, or other environmentally sensitive features and 50 feet from any wetland not associated with an RPA. No panels, cabinets, or other associated equipment, exclusive of utility poles, wires, cables, and access roads, shall be located closer than 10 (10) feet from the buffer. **Conformance:** The proposed North Anna River Solar Project complies with both the 150' buffer requirement from any property line or roads and complies with the 100' buffer from all RPAs (Resource Protection Areas), and, as currently designed, exceeds these requirements. Please refer to **Attachment B** for greater detail on buffers and setbacks.
Stormwater Management	**Requirement:** Stormwater management facilities shall not be located within the required buffer. **Conformance:** Stormwater management facilities will not be located within the buffer; the Project complies with this requirement.
Tree Protection Plan	**Requirement:** A tree protection plan certified by a Landscape Architect, Certified Horticulturist, or ISA Certified Arborist must be provided with the site plan. Prior to land disturbance, all tree protection measures shall be installed by the property owner and inspected by a representative of the

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	Planning Department. **Conformance:** Prior to site plan approval and land disturbance, North Anna River Solar will submit the required Tree Protection Plan as part of the Site Plan Approval process.
Landscaping	**Requirement:** Buffers shall be landscaped in accordance with the standards set forth in this subsection, depending upon the type and density of existing trees and shrubs. Existing healthy vegetation may be used to meet these requirements. The preservation of existing trees and shrubs within required buffers shall be maximized to the extent practicable. Improvements within the buffer shall be limited to those required to provide access, utilities, and drainage, and shall be installed generally perpendicular to the buffer to reduce impacts to the buffer. Unless otherwise specified, reference to the size of required trees and characteristic of required trees and shrubs are in accordance with Section 26-265. Shrub sizes are as follows: small shrubs are those that do not exceed 4 feet at maturity without pruning, medium shrubs are those that reach 4 to 8 feet at maturity without pruning, and large shrubs are those that reach greater than 8 feet at maturity. Maturity for shrubs is 7 years of age. A. Forested buffer planting standards: Forested buffers may be used to satisfy the buffer landscaping standards, provided the following conditions are met. 1. The buffer area is covered with at least 75% of naturally established vegetation; 2. The existing plant material is mature and in healthy condition; 3. The existing plant material consists of a mix of evergreen and deciduous trees which satisfy the following: a. Existing deciduous trees having a minimum 4-inch caliper measured two feet from the ground; b. Evergreen trees that are a minimum of ten feet in height; and c. Hardy shrubs that are a minimum of two feet in height and width with a full growth habit; 4. Any existing trees which are used to satisfy this requirement must have the entirety of their canopies located within the buffer area; and 5. There is an established understory of small trees and shrubs, both evergreen and deciduous, to provide significant buffering at the lower forested area.

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	Conformance: The proposed North Anna River Site consists of six parcels that have been and are currently used as timber investment property. The site will be screened by existing mature vegetation, conforming to the planting/landscaping requirement in the County ordinance.
Height Limitations	**Requirement:** No building, structures, solar panel arrays or other equipment utilized on site may exceed twenty (20) feet in height above finished grade. This restriction shall not apply to electric utility poles. Security fencing shall be limited to eight (8) feet in height. **Conformance:** The maximum height of the system, equipment, and structures (including panels) is not to exceed 20 feet as identified in the Zoning Site Plan in **Attachment B**
Access	**Requirement:** Access to the property shall meet the requirements established by the Virginia Department of Transportation for entrance location and design, and those identified by the Hanover County Fire – EMS as needed to ensure adequate emergency response. In no case shall aisle widths be less than twenty (20) feet. **Conformance**: Access to the site was designed to meet the requirements of the Hanover County Zoning Ordinance and the Hanover County Solar and Energy Storage Policy. As outlined in the Policy, the location and design of access roads interior to the site necessary for the passage of emergency services and necessitated county inspections shall also be established during site plan approval.
Underground Utilities	**Requirement:** All new transmission and distribution lines shall be placed underground except: a. Those lines which are solely the subject of the State Corporation Commission jurisdiction or otherwise required by the Commission. b. Where necessary to connect to the existing utility lines. c. When an exception is granted by the Director of Planning during the site plan review process. In order for an exception under this subsection to be granted, the applicant must demonstrate that placing the lines underground will create environmental hard, such as the disturbance of Chesapeake Bay Resource Protection Areas, or the placement of underground lines is not feasible due to topographical or other site conditions. Financial considerations do not constitute sufficient grounds for the Director to grant an exception.

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	Conformance: The proposed North Anna River Solar Facility adheres to the requirement that all new transmission and distribution lines be placed underground, except where necessary to connect to the existing utility lines. The point of interconnection for North Anna River Solar is on-site, interior to the property, about 1,000' from the nearest property line, and will be fully screened and buffered from outside view.
Security Fencing	**Requirement:** Security fencing and gates shall be provided and shall be designed and located in accordance with the following: a. All security fencing shall be located on the inner edge of the buffer (the edge furthest from the property line) when possible. b. Maximum height for fencing shall be eight (8) feet. c. Fencing shall include wildlife-friendly design features, where the Director of Planning deems them appropriate. **Conformance:** The proposed North Anna River Solar Facility adheres to all criteria outlined above regarding fencing standards and requirements.
Lighting	**Requirement:** Where required, site lighting shall meet the requirements of Article 5, Division 6, Lighting Requirements of the Hanover County Zoning Ordinance with regard to off-site light trespass. All fixtures shall utilize full cut off shielding. Lighting shall be reduced during nighttime hours to the minimum level necessary to maintain safety. **Conformance:** The Project will not produce light pollution that will be intrusive to neighbors or detract from the rural character of the County. The Project will not have exterior projecting lighting except at entrance gates. All lighting will be designed to provide security lighting and general nighttime lighting for operation and personnel. This lighting will be shielded and directed downward to minimize effects to the surrounding area and will be used on an as needed basis. Lighting will conform with all requirements of Article 5, Division 6, Lighting Requirements of the Hanover County Zoning Ordinance.
Land Disturbance and Inspection	**Requirement:** Land disturbance activity shall be limited to no more than 100 acres at a time unless a greater amount is permitted at the time of site plan review by the Director of Planning.

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	Conformance: The North Anna River solar project is committed to adhering to the zoning land disturbance requirement. To ensure compliance, we will, as directed in the ordinance, consult with the Director of Planning during the site plan review phase. Working with the Director's guidance and leveraging our extensive experience in solar Engineering Procurement and Construction (EPC), we will determine the best approach to prevent erosion and minimize environmental impact. Due to the unique nature of solar development, restricting land disturbance area can significantly prolong the construction timeline, leading to extended traffic disruptions and inconvenience to the community. This is site dependent and will be better determined during site plan review, when we have more complete information to guide this process. Our interests are aligned with the County's goal of minimizing environmental and community impacts. We look forward to working with the Director of Planning to ensure environmentally responsible development while allowing for efficient project construction.
Phasing	**Requirement:** Solar facility applications shall include a phasing plan if the project is to be phased. **Conformance:** The project will not be phased. It will be treated as a single project with one comprehensive site plan, and one construction process. As mentioned in the land disturbance section, the phasing of land disturbance is necessary to comply with the County land disturbance acreage limit. The land disturbance activities will be carefully phased to adhere to the limit. The Project Stage section (page 27) provides additional details on the project construction, which will progress through various stages including site preparation and PV system construction. However, all stages will be based on one comprehensive site plan and will be treated as a single effort.
Decommissioning	**Requirement:** All applicants for Solar facilities shall be accompanied by a comprehensive decommissioning plan, as required by the Hanover County Solar and Energy Storage Policy. The decommissioning plan must include provisions addressing the following: a. The removal of all materials and equipment including, but not

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	limited to, cabling and wiring, both above and below ground. b. The restoration of the property to its predevelopment condition including, but not limited to: 1. Soil remediation, including decompaction, to ensure agricultural soils are able to support crops or pastureland. 2. Reforestation of areas where tree clearing has occurred. c. An estimate of the gross cost for the complete removal of the Solar facility and all associated infrastructure, the costs of soil remediation and the cost of reforestation. 1. The cost estimate shall not include anticipated or contracted-for credits for the resale or salvage of the equipment and materials. 2. Cost estimates shall be itemized by decommissioning task. d. The means by which the Solar provider shall reimburse the County for an independent review and analysis of the cost estimate by a professional engineer. e. Financial surety to Hanover County in an amount sufficient to undertake the decommissioning activities should the owner default on its decommissioning responsibilities. The surety shall continue in effect during the operation of the Solar facility and until the time when the County certifies that decommissioning activities have been satisfactorily completed. f. The decommissioning cost estimate shall be updated every five (5) years and adjusted for inflation. The value of the surety shall be increased to an amount equal to the inflation-adjusted cost estimate. g. Decommissioning shall commence within six (6) months after the facility ceases to produce any electricity for the distribution system to which it was connected. The site shall be maintained in accordance with the required landscaping maintenance plan as long as the facility is producing electricity. **Conformance:** The proposed North Anna River Solar Facility will fully comply with the Decommissioning Requirements as outlined by Hanover County. Please see **Attachment C** for Decommissioning Plan and Estimate.
Size	**Requirement:** Utility Scale facilities may be no greater than 1000 acres. **Conformance:** The proposed North Anna River Solar Facility will be less than 1,000 acres. Please refer to **Attachment B** for breakdown of proposed acreages.

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Table 6 below provides information to support considerations listed under 4.3.a of the Hanover County Solar and Energy Storage Policy, regarding Utility Scale Standards

Table 6. Solar Energy Facility – Utility Scale Standards

Description	Project Discussion on Additional Considerations [1]
Megawatts	**Requirement:** Greater than 5 MW **Conformance:** The proposed North Anna River Solar Facility is a 72MWac facility.
Comprehensive Plan Designation	**Requirement:** Use may be considered throughout the County except the following: • Area designations intended primarily for commercial and industrial uses in the Suburban Service Area. • Areas that are designated Parks and Natural Conservation Areas on the Comprehensive Plan. • Areas that are approved Agricultural and Forestal Districts. **Conformance:** All portions of the proposed North Anna River Solar Facility are located within A-1 Zoned areas of Hanover County, located outside of the Suburban Services Area, located outside of areas designated Parks and Natural Conservation Areas on the Comprehensive Plan, and located outside of areas approved as Agricultural and Forestal Districts.
Zoning	**Requirement: May** only be permitted in the A-1, Agricultural District, and requires a Conditional Use Permit. **Conformance: All portions of the proposed North Anna River Solar Facility are in the A-1, Agricultural District of Hanover County.**
Maximum Size	**Requirement: No** facility shall be larger than 1000 acres (within the fenced area.) **Conformance:** The proposed North Anna River Solar Facility is less than 1,000 Acres. The fenced area is proposed at 337 acres.

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Distance Separation	**Requirement:** To avoid clustering of principal solar facilities, special consideration should be given to providing adequate spacing between solar energy facilities. **Conformance:** The proposed North Anna River Solar Facility is about 15 miles from the nearest known principal solar facility that has applied to Hanover County for a Conditional Use Permit.
Farmland Preservation	**Requirement:** Site shall be evaluated to determine the impacts to Prime Agricultural Lands and/or Lands of Statewide Significance. Solar energy facilities should limit the amount of facilities in these locations. **Conformance:** The proposed North Anna River Solar Facility is located on properties that are currently and have historically been used for managed timber operations. While there are portions of the project area that contain Prime Agricultural Lands, the property is not used as farmland, and no current farmland will be taken out of use. **Attachment D** contains soils maps for further review.
Evaluation Considerations	**Requirement:** Conformity with this Policy and the Comprehensive Plan. Adjacency to scenic roads, Federal Parks, County Parks, or National Register Historic Districts are generally discouraged without additional mitigation measures to address impacts. **Conformance:** The proposed Anna River Solar Facility conforms with the Hanover County Energy and Storage Facility Policy, and with the Envision Hanover Comprehensive Plan. The site is not located adjacent to scenic roads, Federal Parks, County Parks, or National Register Historic Districts.
Locations	**Requirement:** Alternative and innovative locations are encouraged. Locating on less desirable lands such as closed landfills or other constrained sites are encouraged. **Conformance:** While the proposed Anna River Solar Facility is not located on a closed landfill or other constrained site, we believe the location is strategic in that it is located on a compact site, with a transmission line running through the

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	property, will be setback at least 500' from the nearest residence, setback 500' from the North Anna River and will be entirely screened and buffered with existing mature timber consisting of hardwoods, planted pines and thick undergrowth.
[1] Unless otherwise noted, requirements are from the Section 4.3.a of the Hanover County Solar and Energy Storage Policy	

Table 7 below provides information to support additional considerations listed under 4.3.d of the Hanover County Solar and Energy Storage Policy under Environmental Considerations for Utility and Small-Scale Solar.

Table 7. Environmental Considerations for Utility and Small-Scale Solar

Description	Project Discussion on Additional Considerations [1]
Wetlands, Floodplains and Water Quality	**Requirement:** • Disturbance of Resource Protection Areas (RPA) and Non-RPA wetlands, and flood plains are to be avoided. • Riparian buffers of at least 100' wide should be provided and protected during construction. **Conformance:** The proposed Anna River Solar Facility will not disturb any Resource Protection Areas (RPA's), Non-RPA Wetlands, or Flood plains. Riparian buffers of at least 100' wide are provided, as shown on the Zoning Site Plan, **Attachment B**. Additional wetlands information can be found in **Attachment G**.
Threatened and Endangered (T&E) Species	**Requirement:** A Threatened and Endangered (T&E) species screen from the Department of Wildlife Resources (DWR) is recommended to confirm there are no T&E species present. If present, the project shall incorporate recommendations of DWR in minimizing any impact. **Conformance: The** Project has procured studies on the potential for species listed as threatened or endangered at the state and federal levels to be affected by the project. A threatened and endangered (T&E) species database screening was obtained from the Department of Wildlife Resources' (DWR) Virginia Fish and Wildlife Information Services (VaFWIS) as well as the Department of Conservation and Recreation's

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	(DCR) Natural Heritage Data Explorer (NHDE) Web Service and DCR's Biotics Data System, and the U.S. Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC). An on-site evaluation for potentially suitable T&E habitat was also completed for the Project. Ten state and federal natural resource databases were searched to determine the potential for the Project to affect listed species. Three species listed as threatened or endangered were identified in state and federal databases as likely to occur or having documented occurrences within or near the Project area: northern long-eared bat (*Myotis septentrionalis*, federally threatened, state threatened), tricolored bat (*Perimyotis subflavus*, federally proposed as endangered, state endangered), and an aquatic insect, the Virginia piedmont waterboatman (*Sigara depressa*, state endangered). The bald eagle (*Haliaeetus leucocephalus*), which is protected by federal law, was also identified as having potential to occur in the vicinity of the project. North Anna River Solar will continue to coordinate with the USFWS regarding bat species and is planning a summer acoustic presence/absence survey to determine whether the northern long-eared bat and tri-colored bat occur within the Project area. Based on the results of the summer acoustic presence/absence survey, the Project will follow guidelines provided by the USFWS to reduce the potential effect to bat species. No bald eagles were observed during the on-site habitat evaluation and the Project will continue to coordinate with the USFWS to ensure bald eagles are not affected by the project. The Virginia piedmont waterboatman is an aquatic insect whose suitable habitat will not be affected by the Project and the species itself is therefore not expected to be affected. No individuals of any state or federally listed species were observed during site visits to the Project. Based on the T&E studies completed to date (see Attachment H), the project is not expected to have adverse effects on T&E species. Please

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	refer to **Attachment F** for additional information.
Cultural and historical resources and scenic roads	**Requirement: To** the extent practical, such resources shall remain undisturbed. If project is in close proximity to unique resources such as a century farm, historic resource, or scenic road, special consideration shall be given to provide additional setbacks or screening to minimize impacts. Protection of viewsheds is strongly encouraged. **Conformance:** The North Anna River Solar Project has completed a desktop review of the Virginia Cultural Resources Information System (V-CRIS) maintained by the Virginia Department of Historic Resources (DHR) and has completed a Phase IA Cultural Resources Analysis to comply with this requirement. No cultural resources have been identified within the Project boundary. No cultural or archaeological resources listed or eligible for the National Register of Historic Places (NRHP) or Virginia Landmark Register (VLR) are expected to be impacted, based on the project-specific studies that have been conducted to date (see Attachment G). North Anna River Solar continues to coordinate with the DHR as we move the Project forward to ensure cultural and archaeological resources are identified, surveyed, and protected in accordance with state and federal regulations. Please refer to **Attachment E** for additional information.
[1] Unless otherwise noted, requirements are from the Section 4.3.d of the Hanover County Solar and Energy Storage Policy	

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Project Benefits

The Project will bring many fiscal, economic, employment, environmental, and energy policy benefits to Hanover County. Anna River Solar is expected to provide over $10,000,000 of direct revenue to Hanover County throughout the project's life through Machinery and Tools Tax, Siting Agreement, and increased land valuation. The Project will also generate direct and indirect positive impacts to the County's economic activity from the facility's construction and operation. Please see **Attachment I** for a detailed financial analysis for Anna River Solar.

Machinery and Tools Tax

Pursuant to Virginia Code §58.1-2606, Local taxation of real and tangible personal property of public service corporations; other persons, the project's capital equipment will be taxed as real property. The local tax rate on that capital equipment would be capped at Hanover County's real property tax rate of $0.81 per $100 of assessed value.

Siting Agreement

Pursuant to Chapter 22, Title 15.2, Article 7.3 of the Virginia Code, solar project applicants can enter a Siting Agreement with the County. Revenue from a Siting Agreement can provide financial compensation to the locality to address capital needs in the capital improvement plan, current fiscal budget, or fiscal fund balance policy, or aid in development of broadband. Anna River looks forward to negotiating a siting agreement in the proper course of business as deemed appropriate by the County.

Land Valuation

The Project will generate an increase in real estate tax revenue to the County as the land associated with the Project will be assessed at a higher value. Over the expected 35-year operational life of the Project, this will bring substantial revenue to the County compared to the current real estate tax revenue payments.

Job Creation

The Project will create jobs through development, construction, and operations. Solar energy is a growing industry in Virginia. Dominion Energy's renewable energy procurement goals under the Virginia Clean Economy Act will create thousands of good jobs in Virginia across a broad spectrum of professional, technical, construction, operations, and maintenance sectors. The Project will boost economic activity within the County. Utilization of local services, trades, supplies, and commodities will bring additional economic inflow to the community.

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Project Components

This section describes the Project components, construction, and operation activities. The specific manufacturer and models of the equipment to be used for the Project will be determined later in the detailed engineering process which follows approval of the CUP.

Modules

The Project consists of PV modules (panels) that generate electricity by safely converting the energy of the sun's photons into direct current (DC) electrons. The PV modules are uniformly dark in color, non-reflective, and designed to be highly absorptive of all light that strikes their glass surfaces. The PV modules deployed for use in the Project will comply with all industry standard quality testing. The PV modules will be electrically connected to the grounding system of the facility in accordance with all applicable industry standards, as well as local & state codes and regulations. The module make and model will be determined during the detailed engineering phase.

Modules consist of silicon solar cells, a metal frame, a glass sheet, a wire, and bus wire. They are designed to withstand humidity, heat, rain, marine environments, wind, hailstorms, and packed snow. The Applicant does not utilize modules that contain Cadmium Telluride (CdTe).

Support Structures

The support structure to which the solar PV modules are affixed – referred to as racking – allows for the modules to be properly positioned for maximum capture of solar radiation. The PV module arrays (a row of PV modules) are supported by a foundation of posts consisting of galvanized rolled steel – referred to as piles – that are either driven, screwed, or drilled into the ground, depending on the subsurface conditions. Piles that are driven into the soil use a pile/vibratory/rotary driving technique, similar to what is used to install freeway guardrails. Driven pier foundations offer multiple benefits, including quick installation timelines and minimal site disturbance. Most foundations would be driven to approximate depths of six to nine feet deep, depending upon required embedment depth.

Anna River anticipates it will use a single-axis tracker; however, specifics around final technology will be determined later during the detailed engineering phase. The maximum height of all equipment at the site will not exceed 20 feet. As discussed above, tracking solar arrays will tilt to track the sun from east to west throughout the day, which means the panels will only be at their maximum height in the morning and evening.

Inverters and Transformers

Inverters convert the DC electricity generated by the PV module array into AC electricity which is compatible for use with the electric grid's transmission network. After the inverters convert the power from DC to AC, the medium-voltage transformers step up the voltage to match the overhead transmission line voltage.

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The inverters, medium-voltage transformers, and other electrical equipment would be located throughout the Project site. Inverters are located within lockable modular metal cabinets which are typically supported by steel piles with gravel backfill up to the base of the cabinet. All electrical equipment would be either outdoor-rated or mounted within enclosures designed specifically for outdoor installation. The proposed equipment poses no electrical shock risk and is safe to touch.

Collector Substation

A Rappahannock Electric Co-Op Transmission Line traverses the site. The Project's substation and switchyard, which will interconnect the Project to the transmission network, will be located on an up to 10-acre parcel subdivided from Tax Map Number 7828-73-9147. The interconnection facilities including the subdivided parcel will be transferred to utility ownership. This substation and switchyard will be constructed in an internal area of the site, not visible from nearby road frontage.

Electrical Collection, Communication Lines, and Point of Interconnection

Electrical collection and communications lines are mounted on the racking, buried in conduits, or located on overhead utility poles. It is typical industry practice to bury any electrical lines located outside of fenced areas to approximately three feet in accordance with all applicable codes and regulations.

The Project will interconnect to the existing Rappahannock Electric Co-op [(REC) Chilesburg to Buckner 115kV line which is approximately 12.28 miles from the Dominion Energy St. Johns station.

The Project initiated the interconnection process by filing a request with PJM[1], the regional transmission organization, in March of 2019. PJM assigned the project a queue position. The project then filed an interconnection application with REC in March of 2020.

Following the submission of the interconnection requests, the Project underwent a series of studies to assess its feasibility and compatibility with existing infrastructure. The project has received a *Generation Interconnection Feasibility Study Report* from PJM in July 2019 and from REC in October 2020. *System Impact Study Reports were received* from PJM in February 2020 and from REC in February 2023. As of January 2024, the Project has completed a Facilities Study with REC and is currently undergoing a Facilities Study with PJM.

[1] PJM is the regional transmission operator that coordinates and directs the movement of electricity through all or parts of 14 midwestern and eastern states including the Commonwealth of Virginia.

Stormwater, Erosion, and Sediment Control Features

The Project will obtain all necessary permits and install stormwater, erosion, and sediment (E&S) control measures on site prior to conducting any land disturbance activities at the site. Some of the key E&S control measures utilized include:

- Sediment Basins: Constructed ponds for detaining runoff to allow for the settlement of suspended sediments. Sediment Basins are converted and remain as permanent dry detention basins to provide long term channel and flood protection by reducing the peak stormwater flows.
- Diversion/Conveyance Channels: Designed to intercept and direct runoff to sediment basins without erosion, these often include check dams to manage flow velocity and capture suspended sediment.
- Silt Fence: A filter fabric filter with steel posts located around the perimeter of all disturbance limits. This provides filtering and promotes on-site settlement of sediment-laden runoff.
- Mulching: Application of plant residues such as straw or coir protects the surface from rainfall impact and fosters the establishment of vegetation.
- Stabilization: Temporary stabilization measures are applied within seven days of land disturbance using fast-growing annual vegetation to provide soil cover, retain moisture, and inhibit erosion while construction is ongoing. Permanent stabilization is established and maintained following completion of construction to areas that have reached final grade and become the basis for the Project sites long term vegetation.

The Project site will be stabilized using vegetative cover. Vegetative cover will generally consist of native grasses, clover, and pollinator seed mixes where appropriate. Vegetative cover not only protects the site against erosion but also provides nourishment to the soil. The land surface within the Project fence line is to be vegetated, except for the roads, inverter pads, and stormwater management features. An example of established vegetative at an operational solar facility constructed by the Applicant in Virginia is shown in Figure 3 below. The Zoning Site Plan, included in this application as **Attachment B**, goes into further detail about planting, including the use of pollinator and wildlife-friendly native vegetation.

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Figure 3 - Established vegetative cover at an operational solar facility built by Strata in Virginia

Security

The Project site would be enclosed along the entire facility boundary for security with fencing that meets NESC requirements and any other applicable local, state, and federal laws and regulations. Fencing would consist of a 6-foot-high chain-link perimeter fence with three strands of barbed wire.

Signage for electrical safety would be placed along the perimeter of the Project site, warning the public of the high voltage and the need to keep out. Signage would also be placed within the Project site where appropriate. All signage will conform with the Hanover County sign ordinance.

Some localized security-related lighting, on-site security personnel, and/or remotely monitored alarm system(s) may be required during construction and/or operation. Remote-monitored cameras and alarm system(s), and perimeter and safety lighting that would be used on an as-needed basis for emergencies, protection against security breach, or unscheduled maintenance and troubleshooting (which may occasionally be required) would be installed. All lighting will comply with related County ordinances.

Maintenance and Security Lighting

Lighting will be designed to provide security and general nighttime lighting for operation and maintenance personnel, as may be required from time to time. Lighting will be shielded and directed downward to minimize any effects to the surrounding area and would be used only on an as-needed basis. Lighting will be provided at the entrance gates. Any lighting installed is to comply with any local, state, and federal laws and regulations.

Access Roads

To provide access throughout the Project site, unpaved onsite access roads consisting of grassy driving aisles and/or aggregate material will be constructed. These roads will be utilized during operations for maintenance, repair, replacement of equipment, and to provide emergency response access.

Project Stages

The four major life cycle stages of the Project include: (i) development; (ii) engineering, procurement, and construction ("EPC"); (iii) operations and maintenance ("O&M"); and (iv) decommissioning. Upon completion of construction, operations would commence. Decommissioning would occur once the Project fulfills its useful life.

Development

The Project has secured leases and/or purchase options for land to accommodate the Project and has submitted an interconnection request for the desired power generation capacity. Due diligence items including but not limited to title research, boundary survey, and field studies (environmental, cultural, geotechnical, etc.) will be carried out to support detailed engineering, land use approval, and environmental permitting.

Only after all permitting work is complete would the Project begin construction.

Construction Activities and Methods

The construction of the Project would consist of several stages, including site preparation (described below), development of staging areas and site access roads, solar array assembly and installation, and construction of electrical transmission facilities.

Site Preparation - Prior to Construction, Site Clearing, or Grading

Surveyors delineate and identify the project construction limits of disturbance. Stone construction entrances and area perimeter barriers (e.g., silt fence) are installed. Erosion and sediment control measures (including diversion channels and sediment basins and traps) are installed. Temporary and permanent stabilization measures (e.g., pre-seeding, hydroseeding, etc.) are applied.

Clearing and Grading

Construction of the Project would involve clearing and grubbing in areas where roads or buildings would be constructed, site preparation activities including installation of inverter pads. The primary grading activities would be the construction of roadways and inverter pads.

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Collection System Trenching

Shallow trenches are dug to accommodate below-ground medium-voltage cable which connects the solar array to the inverters. The topsoil from trench excavation would be set aside before the trench is backfilled and would ultimately comprise the uppermost layer of the trench. Excess material from the foundation and trench excavations would be used for site leveling.

PV System Construction Overview

Project construction would include several phases occurring simultaneously with the construction of: (1) PV systems assembly consisting of pile driving of support racks to a depth of approximately six to nine feet and the placement of panels on support racks, (2) trenching and installation of the collection system, and (3) the grading of access roads.

Post-Construction and Close-Out

Upon conclusion of the major construction activities, Applicant continues to work to achieve final and permanent stabilization of the Project site. As-built surveys are performed, and final punch list items are closed out. Applicant requests a final inspection and close-out of the land disturbance permit.

Operational Activities and Methods

The Project would operate seven days a week during daylight hours and is expected to operate for approximately 35 years. The Project would be an unmanned facility, monitored remotely. Appropriate levels of security lighting would be installed at the Project entrance. The site would be secured 24 hours per day by remote security services with motion-detection cameras.

Typical O&M duties include routine inspection of equipment, ensuring adequate store of spare parts, managing equipment repair or replacement as needed, vegetation management, permit compliance, and maintaining a close communication with the utility, among other requirements.

The solar panels, racking systems, inverters, transformers, and other electrical components will be inspected periodically. Electrical components will be tested routinely according to manufacturer's recommendations. In the event that remote monitoring indicates a problem – such as low performance in a section of the solar field – a crew would investigate and correct the problem on an as-needed basis. As needed, the solar panels would be washed by a water truck with purified water. In addition, the on-site meteorological stations would be cleaned and adjusted on a regular basis. The underground portion of the underground collection cable systems would also be inspected and repaired if problems occur.

Decommissioning Activities and Methods

The Project is decommissioned when it reaches the end of its operational life. The process involves disconnecting the Project from the transmission grid, dismantling, and removing all equipment (foundations, modules, cable, etc.) and debris from the site, and recycling or disposing

of materials in accordance with all applicable laws and environmental, health, and safety regulations in effect. Please see the Decommissioning Plan and Cost Estimate in **Attachment C**.

Decommissioning would first involve removing the panels for sale into a secondary solar PV panel market or recycling. Most of the components of the solar installation are made of materials that can be readily recycled. If the panels can no longer be used in a solar array, the aluminum can be resold, and the glass can be recycled. Other components of the solar installation, such as the rack structures and mechanical assemblies, can be recycled as they are made from galvanized steel. Equipment such as inverters, transformers, and switchgear can be either reused or have their components recycled. The equipment pads are made from concrete that can be crushed and recycled. Underground conduit and wire can be removed by uncovering trenches and backfilling when done. The electrical wiring is made from copper and/or aluminum and can be reused or recycled as well.

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TIMMONS GROUP
ENGINEERING | DESIGN | TECHNOLOGY

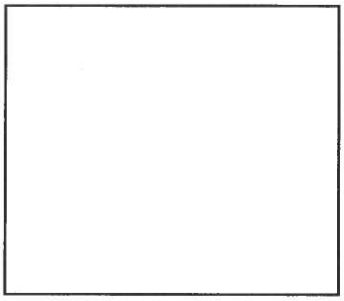
Anna River Solar

Decommissioning Plan

Ben Gayle Road

Beaverdam, Hanover County, Virginia

Date: 2/16/2024



This cost estimate was not based on detailed construction drawings but is typical for a project of this size and type. The listed equipment quantities are subject to change based on the actual installed facilities.

Prepared For:

STRATA CLEAN ENERGY

Anna River Solar Electric Power Plant
Decommissioning Plan

CLIENT NAME	Strata Clean Energy
PROJECT NAME	Anna River Solar Electric Power Plant
LOCATION	Ridge Road Beaverdam, VA Hanover County
PROJECT	Solar PV Electric Generating Facility

Rev.	Date	Description	Prepared	Checked	Approved
0	2/16/2024	Released for Client Use	NBF	KJ	AC

Table of Contents

1 Introduction

Anna River, LLC (hereinafter referred to as "Anna River") is proposing to construct an up to 72 MWac solar photovoltaic (PV) electric generating facility at Ben Gayle Road, Beaverdam, Hanover County, Virginia (Facility). The facility will span approximately 757 acres and will connect to the 115 kV electrical grid at a switchyard located within the project site. The switchyard and the interconnecting high voltage transmission line, crossing the Project site, is owned and operated by the Interconnecting Utility and will not be decommissioned. The operational life of the Facility is anticipated to be approximately 40 years. This Decommissioning Methodology (Plan) describes the procedures associated with decommissioning the Facility and has been created to support the Facility's application in seeking a construction certificate.

This Plan lays out the procedures for the decommissioning of restoring of the site to its original use at the end of the Facility's operational life. The Plan describes procedures for the removal of Facility components. The components of the Facility are described in detail in the project Exhibit and the preliminary layout is presented in the attached Appendix A.

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

This Plan lays out the procedures for restoring the site to its original use, based on the recent historical land use of the property or other economical land uses as desired by the relevant landowner, at the end of the Facility's operational life. The Plan describes procedures for the removal of Facility components. The components of the Facility are described in detail in the Appendix A.

2 Project Components

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

- Steel Piers and Racking
- PV Panels
- Inverters
- Electrical Collection Lines
- Access Roads
- Fencing, Gating, and Safety Features
- Operations and Maintenance (O&M) Building (TBD)
- Weather Stations
- Gen-tie Transmission Line
- Collector Substation

3 Regulatory Compliance

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

- Review of on-site jurisdictional status and potential impacts to wetlands and waterbodies to comply with the Clean Water Act.
- Consultation with the United States Fish and Wildlife Service to evaluate compliance with the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and any other relevant regulations at the time of decommissioning.
- Consultation with the Virginia Department of Environmental Quality for compliance with any pertinent state regulatory requirements.
- Completion of a Phase I Environmental Site Assessment in support of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) protection.
- Development and implementation of a Stormwater Pollution Prevention Plan (SWPPP).
- Hanover County building, road, discharge, or erosion control permits (as necessary).
- Hanover County Ordinance 23-14: Solar Energy Facilities dated: October 9, 2023
- Special state or local hauling permits (as necessary).

4 Decommissioning

The Project will be decommissioned at the end of its useful life. The Project is presumed to be at the end of its useful life if the facility generates no electricity for a continuous period of 12 months. At least 40 days prior to the commencement of decommissioning activities, Anna River will notify the Hanover County officials, and the facility will be disconnected from the Electrical Grid- within 6 month . The following general decommissioning activities will occur.

Once solar facility has been removed, it is expected that the site will be returned to as close to its original conditions as possible. Some minor grading may be required; topsoil (if removed) will be reapplied to allow for reseeding and growth. Site restoration will occur no more than six (6) months after notification of decommissioning.

Decommissioning Sequence:

1. Obtain required site permits from Authority Having Jurisdiction (AHJ)
2. Disconnect all utility grid power
3. Move all disconnects to the off position
4. Disconnect all above ground wirings, cables, and electrical connections

5. Remove all PV Modules
6. Remove Inverters, mounting equipment, and posts
7. Remove all electrical equipment, and their foundations
8. Remove DAS equipment, feeders, and conduit
9. Remove all above ground mounting equipment components and posts
10. Excavate and remove Underground feeders and conduit
11. Remove all MV feeders and utility poles
12. Remove access road
13. Remove all fencing
14. Fill/Grade/Seed as needed

The plan is the removal of all materials and equipment including, but not limited to, cabling and wiring, both above and below ground. In the rare situation where some components may be left in place under certain circumstances. Electrical lines that will not impact future use of the Project Area (at least 3 feet in depth) may be left in place per renewable industry practices. Steel piles, where full removal is unattainable, may be cut and left in place at a depth of 3 feet or greater below the ground surface. Additionally, landowners may desire that private access roads remain in place for their use. Anna River will obtain a written request from the landowner for a road or structure (such as the O&M building) to remain in place.

5 Materials, Recycling, and Disposal

Many components of the Facility, such as racking, wiring, piles, and panels, retain value over time. Panels, while slightly less efficient, may be reused elsewhere, or components may be broken down and recycled. Recycling of solar panels and equipment is rapidly evolving and can be handled through a combination of sources such as certain manufacturers, PV Cycle (an international waste program founded by and for the PV industry), or waste management companies. More than 90 percent of the semiconductor material and glass can be reused in new modules and products. Other waste materials that hold no value will be recycled or disposed of via a licensed solid waste disposal facility. If recycling of solar panels is not feasible, disposal will be accomplished in accordance with AHJ requirements, and the salvage value will be adjusted.

6 Site Restoration

Following the completion of decommissioning activities, it is anticipated that the site will primarily be converted back to the pre-construction land uses. Decommissioning of the Facility, including the removal of materials followed by site restoration, should be completed in approximately 12-18 months.

7 Decommissioning Cost Estimate

7.1 OPINION OF PROBABLE DECOMMISSIONING COST

Detailed Project Description: Anna River Solar is a 72 MWac located in Beaverdam, Hanover County, Virginia. (37.983994°, -77.646650°)

Table 7-1: Estimated Decommissioning Cost:

PV Module Removal	QUANTITY	UNITS	Unit Cost	Total	Comment
# Solar Panels W550	173,000	EA	$6.2	$1,072,600	Disassembly, Haul off-site
SUBTOTAL				$1,072,600	
Foundations Structural Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
# Panel Support Steel Piles	33,250	EA	$15	$498,750	Disassembly, Haul off-site
# Panel Racks	2,450	EA	$200	$490,000	Disassembly, Haul off-site
SUBTOTAL				$988,750	
Electrical Equipment Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
Inverter:(1) TMEIC Ninja 3.36 MW & (17) TMEIC Ninja 4.4 MW	18	EA	$1,500	$27,000	Disassembly, Haul off-site
MV Transformers, (1) 3.36 MVA & (17) 4.2 MVA	18	EA	$4,500	$81,000	Disassembly, Haul off-site
Tracker Motor	230	EA	$15	$3,450	Disassembly, Haul off-site
SUBTOTAL				$111,450	
Electrical Wires Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
MV Conductor: 1000, 750 and 500 kcmil (Avg price was used).	121,000	FT	$10	$1,210,000	Removal, Excavation
DC/LC Conductor	563,000	FT	$1	$563,000	Removal, Excavation
SUBTOTAL				$1,773,000	
Collector Substation Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
Circuit Breakers 34.5 kV	3	EA	$8,500	$25,500	Disassembly, Haul off-site
HV Circuit Breakers 115 kV	1	EA	$10,000	$10,000	Disassembly, Haul off-site
Substation Steel	1	LOT	$200,000	$200,000	Disassembly, Haul off-site
Foundation/Fence	1	LOT	$75,000	$75,000	Disassembly, Haul off-site
Main Power Transformers 115 - 34.5 kV 54/72/90 MVA	1	EA	$65,000	$65,000	Disassembly, Haul off-site
Substation Control House	1	EA	$35,000	$35,000	Disassembly, Haul off-site
Capacitor Bank (Size TBD)	1	EA	$25,000	$25,000	Disassembly, Haul off-site
SUBTOTAL				$435,500	

Fence/land, Removal/Restoration	QUANTITY	UNITS	Unit Cost	Total	Comment
Fence Perimeter	44,000	FT	$1	$44,000	Disassembly, Haul off-site
Civil Site Remediation (disturbed area)	422	Acre	$5,500	$2,321,000	Restoration and Seeding
Storm Water Management Ponds	86	EA	$3,000	$258,000	Limited Restoration
Mobilization, Engineering & Permitting				$150,000	Budgeted
SUBTOTAL				$2,773,000	

Summary of Estimate	
PV Module Removal	$1,072,600
Foundations Structural Removal	$988,750
Electrical Equipment Removal	$111,450
Electrical Wires Removal	$1,773,000
Collector Substation Removal	$435,500
Fence/land, Removal/Restoration	$2,562,000
ESTIMATED GRAND TOTAL	**$6,943,300**

Data Sources:

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

7.2 OPINION OF PROBABLE SALVAGE VALUE COST

There should be opportunity to reclaim metal scrap value from electrical equipment. Switching equipment and collector system contain a significant amount of conductive material such as copper and aluminum. Steel structures contain a significant amount of steel. Rubble from the foundation demolition and all other materials would be sent to landfill at cost. The scrap value of the substation is presented in Table 7-2.

Table 7-2 Estimated Salvage Value:

PV Module (At: $.33/W before Removal and Hauling)	QUANTITY	UNITS	Estimated New Cost/Unit	Estimated New Total Cost	Estimated Salvage Value 10% of New Cost
# Solar Panels 550W @ $.33/W =$181	173,000	EA	$181.00	$31,313,000	$3,131,300
SUBTOTAL					$3,131,300
Foundations Structural (at:$ .20/LB after Removal and Hauling)	**QUANTITY**	**UNITS**	**Estimated Weight LB.**	**Estimated Salvage Value**	**Estimated Salvage Value**
# Panel Support Steel Piles	33,250	EA	150	$0.26	$1,296,750.00
# Panel Racks	2,450	EA	1,200	$0.26	$764,400.00
SUBTOTAL					$2,061,150.00

Electrical Equipment	QUANTITY	UNITS	Estimated New Cost/Unit	Estimated New Total Cost	Estimated Salvage Value 20% of New Cost
MV Transformers, (1) 3.36 MVA & (17) 4.2 MVA	18	EA	$145,000	$2,610,000	$522,000
Electrical Collector Substation	**QUANTITY**	**UNITS**	**Estimated New Cost/Unit**	**Estimated New Total Cost**	**Estimated Salvage Value 20% of New Cost**
Circuit Breakers 34.5 kV	3	EA	$65,000	$195,000	$39,000
HV Circuit Breakers 115 kV	1	EA	$140,000	$140,000	$28,000
Substation Steel	1	LOT	$1,300,000	$1,300,000	$260,000
Foundation/Trench/Conduit/Cable*	1	LOT	$250,000	$250,000	$50,000
Main Power Transformers 115 - 34.5 kV 41.04/54.72/68.4	1	EA	$1,500,000	$1,500,000	$300,000
Substation Control House	1	EA	$500,000	$500,000	$100,000
Capacitor Bank (Size TBD)	1	EA	$350,000	$350,000	$70,000
SUBTOTAL				$4,235,000	$847,000
Electrical Wires/cables	**QUANTITY**	**UNITS**	**Estimated New Cost/Unit**	**Estimated New Total Cost**	**Estimated Salvage Value 10% of New Cost**
MV Conductor (10% removal) 1000, 750 and 500 Kcmil	121,000	FT	$10	$1,210,000	Removal, Excavation
DC/LC Conductor	563,000	FT	$1	$563,000	Removal, Excavation
SUBTOTAL				$1,773,000	
Fence	**QUANTITY**	**UNITS**	**Estimated Weight LB.**	**Estimated Salvage Value**	**Estimated Salvage Value/Including Removal**
Fence Perimeter (1.3 lb. per square ft, 6ft height)	44,000	FT	343,200	$0.45	$77,220.00
Fence Post every 10 ft (9 ft length, 2.3 lb./Ft)	4,400	FT	142,644	$0.45	$32,094.90
SUBTOTAL					$109,314.90

Summary of Salvage Values Estimate	
PV Module	$3,131,300
Foundations Structural	$2,061,150
Electrical Equipment	$522,000
Electrical Wires	$847,000
Electrical Collector Substation	$926,000
Fence	$109,315
ESTIMATED GRAND TOTAL	**$7,596,765**

7.3 DECOMMISSIONING COST

Per Hanover County's Ordinance the Estimated Salvage Value will not be credited in calculating the appropriate escrow, surety, or security for the cost of the decommissioning and reclamation of the project.

7.4 DECOMMISSIONING ASSUMPTIONS

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

1. Decommissioning year is based on a 10-year initial period for the financial security. The projected life of the project is 40 years.
2. This Cost Estimate is based on the Timmons Group data request forwarded February 10, 2023.
3. Common labor will be used for the majority of the tasks except for heavy equipment operation. Pricing is based on local Southeast US labor rates.
4. Permit applications required include the preparation of a Stormwater Pollution Protection Plan (SWPPP) and a Spill Prevention Control and Countermeasure (SPCC) Plan.
5. Road gravel removal was estimated on a time and material basis using a 16-foot width and an 8 inch thickness for the access roads. Substation aggregate is included in the substation quantities. Since the material will not remain on site, a hauling cost is added to the removal cost. Road aggregate can often be disposed of by giving to landowners for use on driveways and parking areas. Many landfills will accept clean aggregate for use as "daily cover" and do not charge for the disposal.
6. Grade Road Corridor reflects the cost of mobilizing and operating light equipment to spread and smooth the topsoil stockpiled on site to replace the aggregate removed from the road.
7. Erosion and sediment control along road reflects the cost of silt fence on the downhill side of the road and surrounding all on-site wetlands.
8. Topsoil is required to be stockpiled on site during construction, therefore this topsoil is available on site to replace the road aggregate, once removed. Subsoiling cost to decompact roadway areas is estimated as $750 per acre (based on previous bid prices), and revegetation on removed road area, which includes seed, fertilizer, lime, and care until vegetation is established is $2,750 per acre. Most of the project area is "over-seeded" since the decommissioning activities are not expected to eliminate the existing grasses and vegetation under the arrays or heavily compact the soils. Over-seeding does not include fertilizer and lime and is estimated at $5,500 per acre.

9. Fence removal includes loading, hauling, and recycling or disposal. Fences and posts weigh approximately 2.3 pounds per foot.
10. Array support posts are generally lightweight "I" beam sections installed with a piece of specialized tracked equipment. Crew productivity is approximately 240 posts per day, and the same crew and equipment should have a similar productivity removing the posts, resulting in a per post cost of approximately $15. We assume a cost of $15.00 per post to include hauling fees and contingencies.
11. A metal recycling facility (FEA Salvage and Recycling) is located in Powhatan, Virginia and is relatively close to the project site. Steel scrap pricing was acquired from www.scrapmonster.com.
12. The solar panels rated 550 watts can easily be disconnected, removed, and packed by a three-person crew at a rate we estimate at 12 panels per hour.
13. No topsoil is planned to be removed from the site during decommissioning and most of the site will not have been compacted by heavy truck or equipment traffic so the site turf establishment cost is based on RS Means unit prices for applying lime, fertilizer, and seed at the price of per acre plus an allowance for some areas to be decompacted.
14. There is an active market for reselling and recycling electrical transformers and inverters with several national companies specializing in recycling. We have assumed a 20% recovery of these units based on field experience with used transformers as opposed to trying to break them down into raw material components.
15. The underground collection lines are assumed to be aluminum conductor.
16. Care to prevent damage and breakage of equipment, PV modules, inverters, capacitors, and SCADA must be exercised, but removal assumes unskilled common labor under supervision.

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

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

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

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

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

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

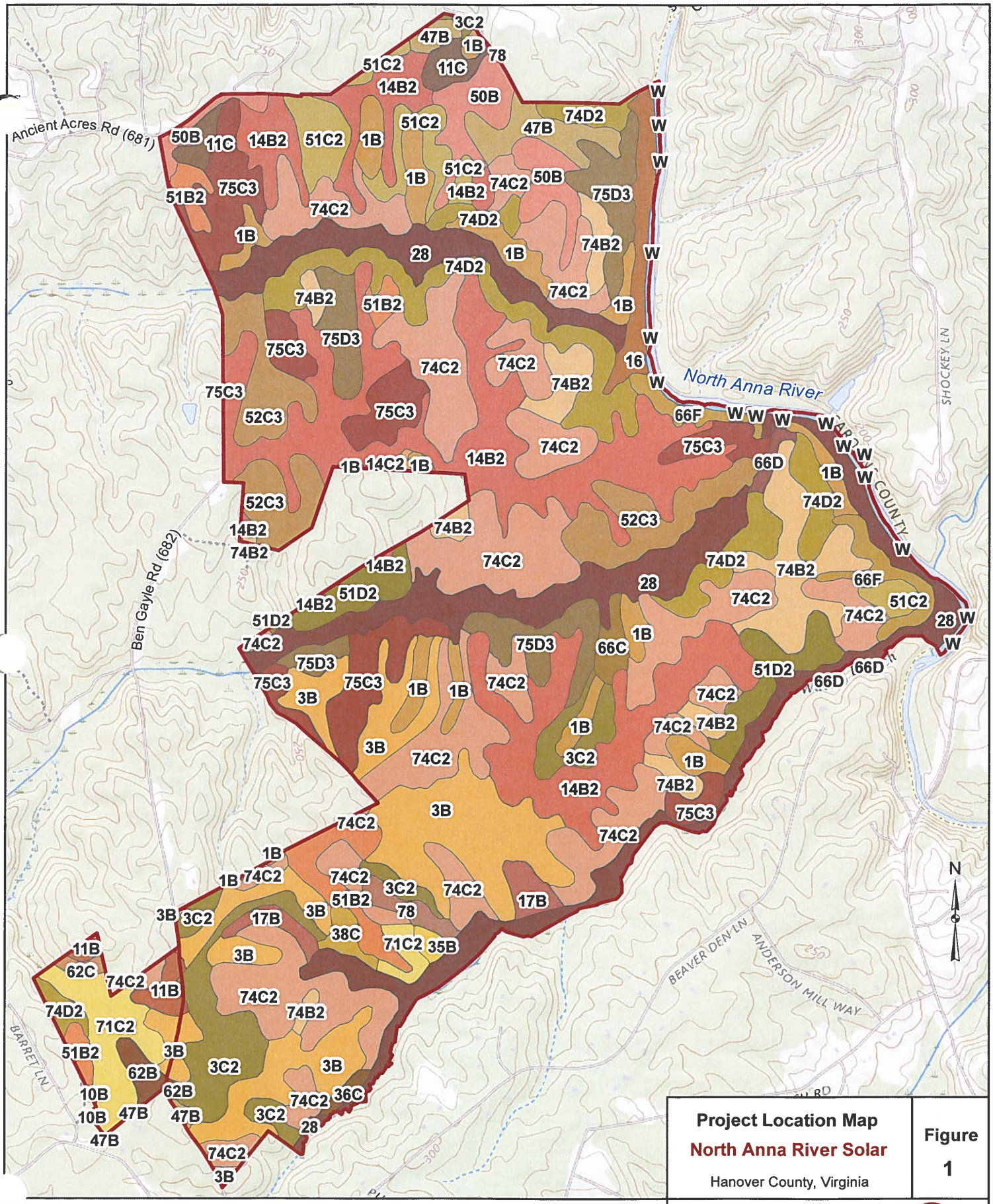
The base industry assumption is that since solar panels are expected to retain about 75% of their production capability after 35 years of use, a salvage value of 10% of original cost is a low estimate of their expected value and as we note in assumption. This considers possible technology improvements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

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

8 Financial Assurance

Anna River will post a financial surety with Hanover County as the obligee that is equal to the net cost of decommissioning the facility (decommissioning costs). Based on industry trends, the projected and actual costs of decommissioning are expected to go down over time based on improvements both to best practices in calculating these costs and the decommissioning process itself. Cerulean will reevaluate decommissioning costs with a qualified engineering consultant every five years during the life of the Project.

Appendix A – Site Plan



Project Location Map
North Anna River Solar
Hanover County, Virginia

Figure 1

Legend

Anna River Project Boundary

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the

0 750 1,500 3,000 Feet

STRATA CLEAN ENERGY

800 Taylor Street Ste. 200
Durham, NC 27703

March 2024

C:\Users\kseaford\OneDrive - Strata Solar Directory\Projects\Anna_River_VA\GIS\Fig_2_Soils_AnnaRiver_8x11_NAD83.mxd 3/13/2024 5:08:12 PM

Soils Map Legend

Map unit symbol	Map unit name	Acres in AOI	Percent of AOI
10B	Bourne fine sandy loam, 2 to 7% slopes	0.3	0.00%
11B	Bourne-Varina complex, 2 to 7% slopes	7.3	0.50%
11C	Bourne-Varina complex, 7 to 15% slopes	11.1	0.70%
14B2	Cecil fine sandy loam, 2 to 7% slopes, eroded	220.2	14.40%
14C2	Cecil fine sandy loam, 7 to 15% slopes, eroded	0.8	0.10%
16	Chewacla fine sandy loam	18.2	1.20%
17B	Colfax fine sandy loam, 2 to 7% slopes	11.8	0.80%
1B	Abell fine sandy loam, 2 to 7% slopes	57.2	3.70%
28	Fluvaquents, nearly level	151.2	9.90%
35B	Helena-Colfax complex, 2 to 7% slopes	2.6	0.20%
36C	Helena-Orange complex, 7 to 15% slopes	2.5	0.20%
38C	Iredell-Orange complex, 7 to 15% slopes	5	0.30%
3B	Appling fine sandy loam, 2 to 7% slopes	127.7	8.30%
3C2	Appling fine sandy loam, 7 to 15% slopes, eroded	56	3.70%
47B	Norfolk fine sandy loam, 2 to 7% slopes	20	1.30%
50B	Orangeburg-Faceville fine sandy loams, 2 to 7% slopes	35.6	2.30%
51B2	Pacolet fine sandy loam, 2 to 7% slopes, eroded	27.9	1.80%
51C2	Pacolet fine sandy loam, 7 to 15% slopes, eroded	34.1	2.20%
51D2	Pacolet fine sandy loam, 15 to 25% slopes, eroded	31.2	2.00%
52C3	Pacolet clay loam, 7 to 15% slopes, severely eroded	65.6	4.30%
62B	Spotsylvania-Bourne fine sandy loams, 2 to 7% slopes	5.9	0.40%
62C	Spotsylvania-Bourne fine sandy loams, 7 to 15% slopes	2.4	0.20%
66C	Udalfs-Ochrepts complex, sloping	6	0.40%
66D	Udalfs-Ochrepts complex, moderately steep	3.1	0.20%
66F	Udalfs-Ochrepts complex, steep	18.3	1.20%
71C2	Vance fine sandy loam, 7 to 15% slopes, eroded	30	2.00%
74B2	Wedowee fine sandy loam, 2 to 7% slopes, eroded	60.5	4.00%
74C2	Wedowee fine sandy loam, 7 to 15% slopes, eroded	285.4	18.70%
74D2	Wedowee fine sandy loam, 15 to 30% slopes, eroded	79.2	5.20%
75C3	Wedowee clay loam, 7 to 15% slopes, severely eroded	82.2	5.40%
75D3	Wedowee clay loam, 15 to 25% slopes eroded	53.6	3.50%
78	Worsham fine sandy loam	6.4	0.40%
W	Water	9.2	0.60%
Subtotals for Soil Survey Area		**1,528.30**	**99.90%**
Totals for Area of Interest		**1,529.10**	**100.00%**

Soils Map
North Anna River Solar
Hanover County, Virginia

Figure 2B

Soil Map Units from Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey.
Available online at https://websoilsurvey.nrcs.usda.gov/.
Accessed 3/11/2024.

STRATA CLEAN ENERGY

800 Taylor Street Ste. 200
Durham, NC 27703

March 2024

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Phase IA Cultural Resource Survey of the Anna River Solar Project, Hanover County, Virginia

OCTOBER 2022

PREPARED FOR

Strata Clean Energy, LLC

PREPARED BY

SWCA Environmental Consultants

PHASE IA CULTURAL RESOURCE SURVEY OF THE ANNA RIVER SOLAR PROJECT, HANOVER COUNTY, VIRGINIA

Prepared for

Strata Clean Energy, LLC
800 Taylor Street, Suite 200
Durham, North Carolina 27701
Attn: Kevin Seaford

Prepared by

SWCA Environmental Consultants
113 Edinburgh South Drive, Suite 120
Cary, North Carolina 27511
(919) 292-2200
www.swca.com

SWCA Project No. 71983

SWCA Cultural Resources Report No. 22-730

October 2022

ABSTRACT

SWCA Environmental Consultants (SWCA) conducted a Phase IA cultural resource survey on behalf of Strata Clean Energy, LLC (Strata), for the proposed Anna River Solar Project in Hanover County, Virginia. The project is located in the northern portion of Hanover County, north of Richmond, Virginia, east of Virginia State Route 682. The area of potential effects (APE) for the project (also referred to as the project area) is 1,402 acres (567 hectares) and consists of five large parcels (Hanover County Parcel Numbers 7827-33-5426, 7827-85-7713, 7828-61-8172, 7828-61-0451, and 7828-73-9147).

Strata is seeking to develop the project area into a solar facility. For the Certificate of Public Convenience and Necessity or Permit by Rule process through the Virginia Department of Environmental Quality Solar Permit by Rule, the project requires consultation and compliance with the Virginia Department of Historic Resources. Assessment of potential impacts to cultural resources is part of the required due diligence review process.

SWCA conducted the Phase IA field reconnaissance on April 18 and 19, 2022. Fieldwork consisted of background research on the project area and a site visit with extensive visual inspection, along with geomorphic, topographic, and stratigraphic analysis of the project area. The site visit also included an architectural windshield survey of selected historic structures within 0.5 mile (0.8 km) of the project area. The goal of the Phase IA is to determine high, moderate, and low potential locations for buried and intact soils and their associated cultural materials, as well as historic sites and historic architectural resources, in order to determine whether Phase IB survey is necessary. If Phase IB survey is necessary, the Phase IA survey establishes a site probability model of the project area to guide the Phase IB survey.

SWCA recommends that a Phase IB survey be conducted on 360 acres (146 hectares) to determine if archaeological sites are present within the project area. Specifically, the Phase IB survey should focus on the areas directly adjacent to the four drainages that either cross or border the project area (unnamed northern drainage, Hogan Creek, Watleg Branch, and North Anna River) as well as potential historic period sites identified on historical maps. Additionally, the Phase IB survey should document all historic-aged (i.e., 50 years or older) buildings or structures within 0.5 mile (0.8 km) of the APE to account for visual impacts of the proposed project. There are no historic-aged buildings or structures within the APE.

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CONTENTS

Appendices

Figures

Tables

INTRODUCTION

SWCA Environmental Consultants (SWCA) conducted a Phase IA cultural resource survey on behalf of Strata Clean Energy, LLC (Strata), for the proposed Anna River Solar Project in Hanover County, Virginia. The project is located in the Northern Coastal Plain near the community of Beaverdam in the northern portion of Hanover County, north of Richmond and east of Virginia State Route 682 (Figures 1–3). The area of potential effects (APE) for the project (also referred to as the project area) is 1,402 acres (567 hectares).

Heidi Luchsinger, Ph.D., RPA, AIPG-PM, served as geoarchaeologist and Principal Investigator, conducted the site visit, and was responsible for project management and report preparation. Nadia Waski, M.A., RPA, assisted with report preparation. Resumes are provided for key project staff in Appendix A. The goal for the Phase IA survey was to assess the project area for the potential to contain archaeological deposits and to evaluate the potential project's effect on the historic built environment.

This report outlines the methodology used during the Phase IA survey, as well as the results of the background research, site visit, and analysis conducted by SWCA in response to the proposed project.

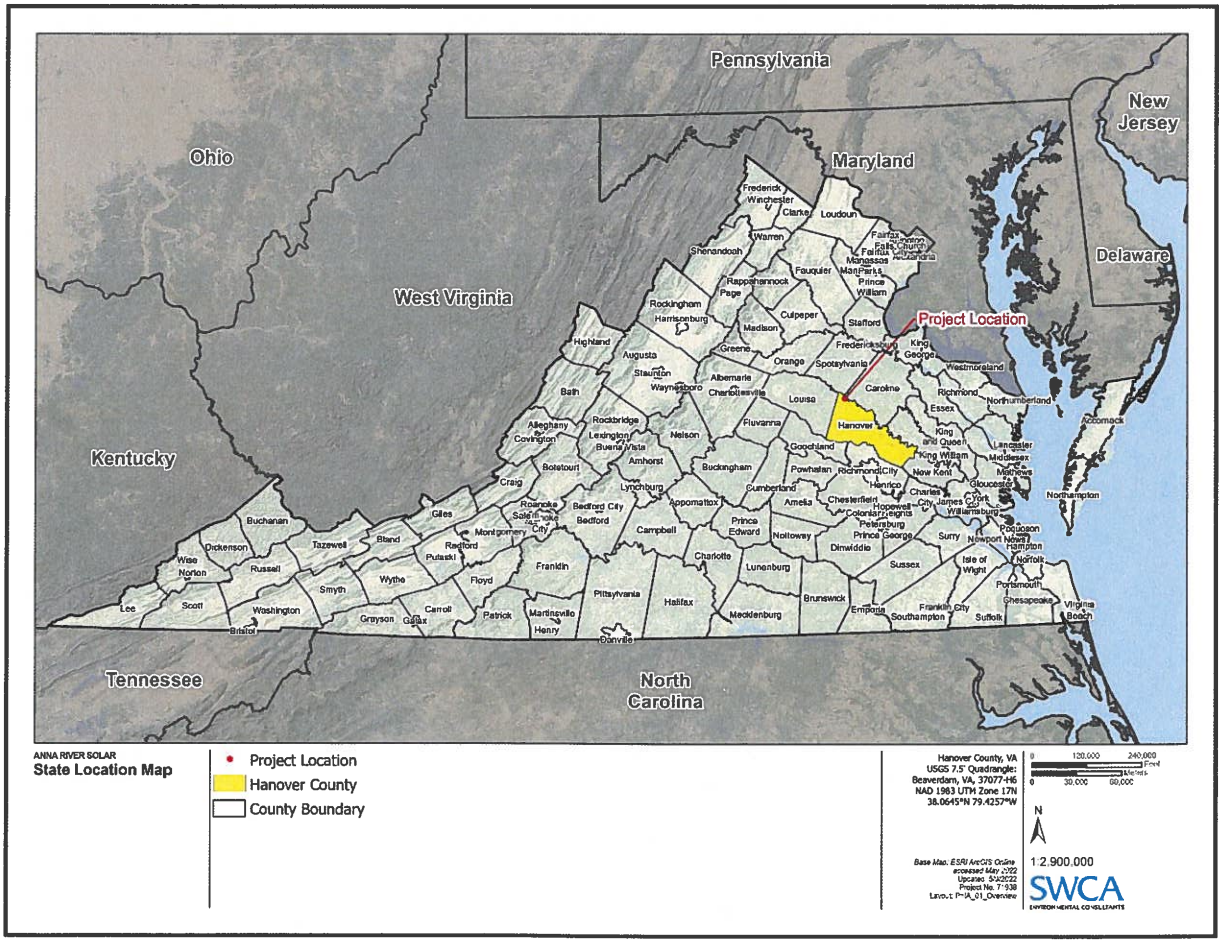

Figure 1. Map showing the proposed location of the project.

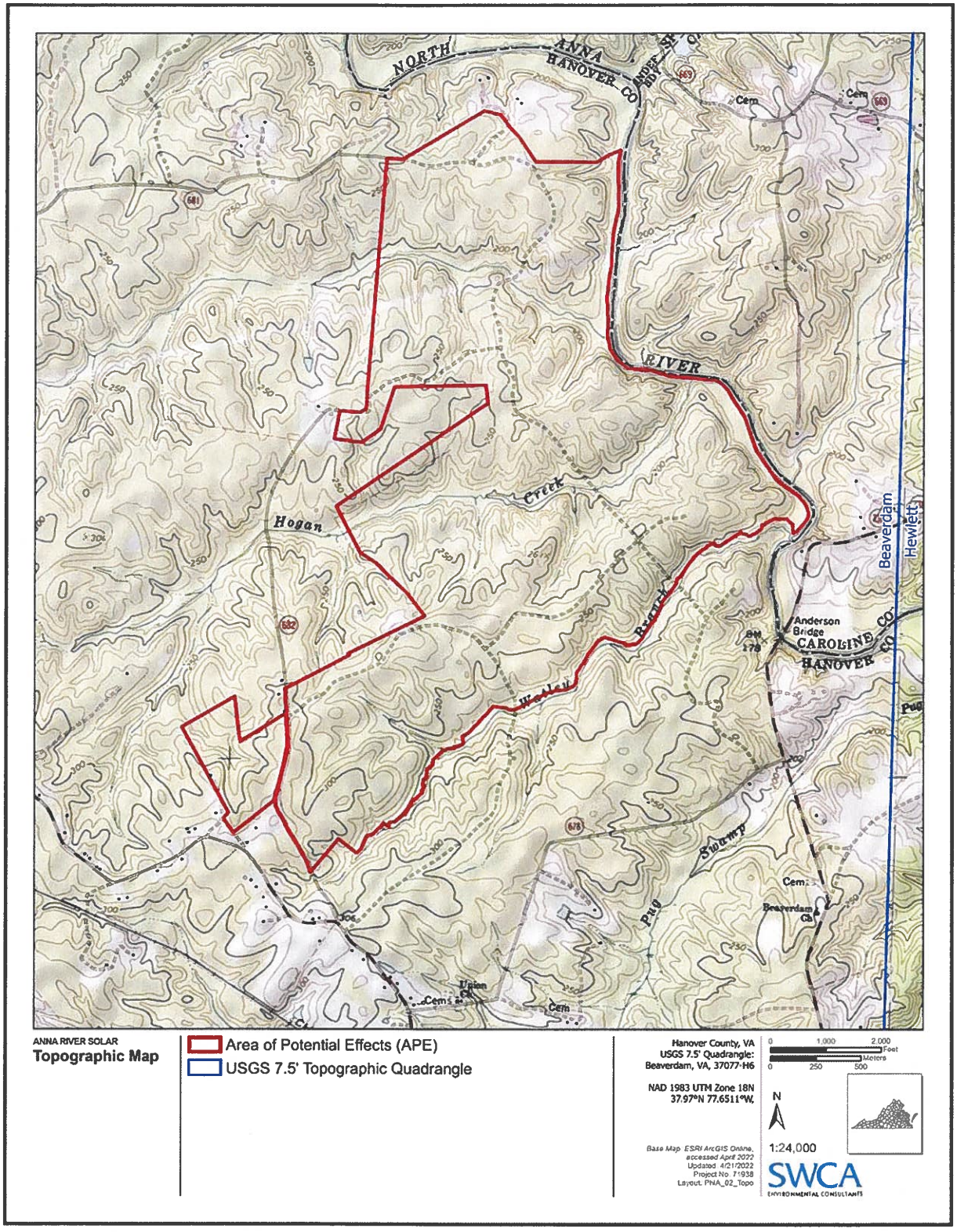

Figure 2. Project overview map.

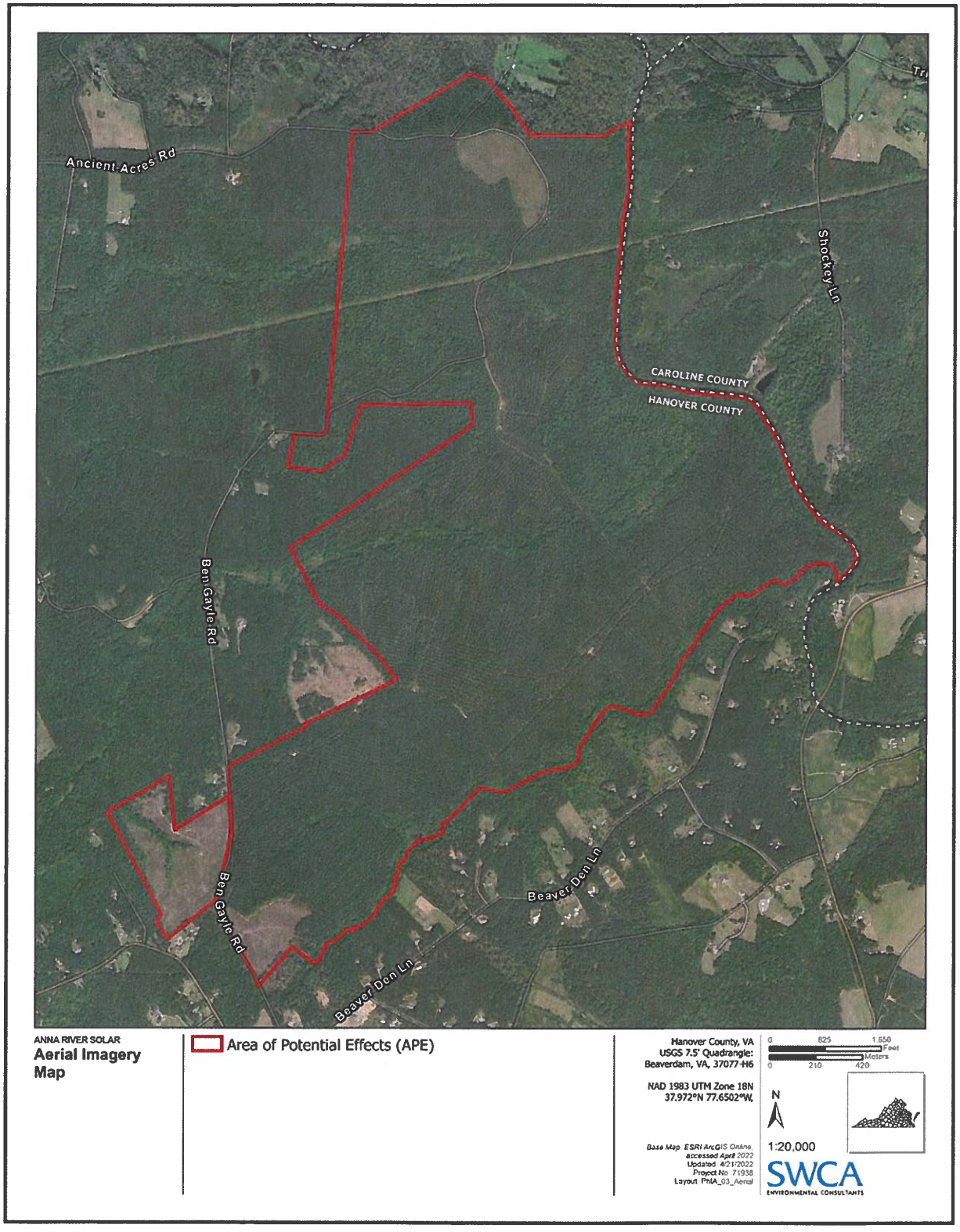

Figure 3. Aerial imagery showing project area.

METHODOLOGY

The goal of the Phase IA reconnaissance was to evaluate the probability of the project area to contain unrecorded cultural resources, and if necessary, develop a strategy to further investigate the project area in accordance with the Virginia Department of Historic Resources (VDHR) guidelines and regulations, published in *Guidelines for Conducting Historic Resources Survey in Virginia* (VDHR 2017) as well as other relevant federal and state guidelines and regulations.

A staged approach was undertaken to develop an archaeological probability assessment of the project area. Investigators initially reviewed the environmental setting of the project area to identify key locales within it that may influence the presence of archaeological sites (e.g., stream confluences, soil characteristics, sediment parent material, topographic positions) as well as modern and past land use that could influence preservation of archaeological deposits (e.g., surface disturbance, agriculture, and logging of the project area). After the review of the environmental setting and land use of the project area was completed, a literature review was conducted. The literature review focused on identifying previously recorded cultural resources and previous cultural resource survey within or directly adjacent to the project area from an online review of VDHR records and historical maps. Settlement patterns for precontact and historic groups were also reviewed for the Piedmont and Coastal Plain regions of Virginia.

Following the completion of the background research, SWCA conducted a site visit on April 18 and 19, 2022. Prior to the mobilization, survey targets for visual inspection were identified within the project area based on a preliminary site probability model. Targets included areas with past ground disturbance that required on-site verification; landforms with deposits with potentially high potential for containing buried archaeological resources; map-documented buildings or structures that are no longer present on modern cartographic sources; previously recorded archaeological sites, buildings, and structures within the project area; and other cultural and natural features that could help guide the determination of archaeological probability within the project area. Investigators photographically documented the survey targets and conducted extensive visual inspection along with geomorphic, topographic, and stratigraphic analysis of the project area to evaluate surface and subsurface conditions and the likelihood of the project area to contain cultural resources.

After the site visit, all data were analyzed, and an archaeological site probability model was produced based on the results of the background research and site visit.

ENVIRONMENTAL CONTEXT

This section presents the factors of the environment that have influenced the historic and precontact occupation of the project area. A discussion of relevant factors such as physiography, geomorphology, soils, flora, fauna, hydrology, and current and past land use is provided to aid in understanding the local environment. This information is then synthesized with the literature review, provided in the following section, to guide the site reconnaissance and the development of a site probability model for the project area.

Physiography

The proposed project is located in eastern Virginia within the York River watershed on the inner Coast Plain section of the Coastal Plain physiographic province of the Atlantic Plain. It is dissected into nearly level and gently undulating valleys and gently sloping to steep uplands (Natural Resources Conservation Service [NRCS] 2006:439). The project area is just west of the Fall Line located in the

western portion of Hanover County, the boundary between the Coastal Plain and the Piedmont. Stream valleys are generally narrow in their upper reaches but become broad and have widely meandering stream channels as they approach the coast (Virginia Department of Conservation and Recreation [DCR] 2016).

Geologically, this landscape formed during the last few million years as the result of the repeated rising and falling of sea level during several cycles of Pleistocene glaciation. The Coastal Plain is underlain by a wedge of Cretaceous and unconsolidated Tertiary sands and silts of the Chesapeake Group that increases in thickness from a feather edge at the Fall Zone to thousands of meters at the offshore edge of the North American continental shelf (Virginia DCR 2016; Virginia Division of Geology and Mineral Resources 2022). Elevations within the project area range from 167 feet (51 m) to 246 feet (75 m) above mean sea level.

Hydrology

The eastern edge of the project area borders and is defined by the North Anna River. Flowing southeast, the North Anna River joins the South Anna River 15 miles (24 km) from the project area, forming the Pamunkey River. This highly sinuous meandering river continues flowing predominantly to the southeast, then joins the York River at West Point, Virginia, approximately 53 miles (85 km) away, then flows into the Chesapeake Bay at Yorktown, Virginia, 80 miles (129 km) from the project area.

The project area is crossed from west to east by two drainages that flow into the North Anna River at the eastern boundary of the project area. The northernmost drainage is characterized by adjacent wetlands and is unnamed. Hogan Creek flows through the central portion of the project area and curves northward before flowing into the North Anna River. Both drainages flow through valleys with moderate to steep slopes, some with narrow floodplains and fairly flat surfaces overlooking the drainage. Intermittent erosional channels flow into both drainages, and based on field observation, the drainages do not appear to have any accumulated alluvium associated with them, as their channels are predominantly cutting into weathered bedrock.

The southern boundary of the project area borders and is defined by the Watleg Branch, which flows predominantly to the northeast before joining the North Anna River at the eastern edge of the project area and southeast of Hogan Creek. The northwestern side of this drainage valley is located within the project area and is characterized by both steep and fairly gradual slopes with varying amounts of preserved floodplain and alluvium. About half of this segment of the Watleg Branch is characterized as wetland. The same is true for the eastern boundary of the project area, which consists of the western floodplain for the North Anna River.

Soils

A search of the NRCS Web Soil Survey database (NRCS 2022) identified multiple soil series within the project area (Table 1). Within the project area, Class 2 soils consist of the Bourne-Varina complex and Abell, Appling, Bourne, Cecil, Norfolk, Oranceburg-Faceville, Pacolet, Spotsylvania-Bourne, and Wedowee fine sandy loams. These soils make up approximately 37.2 percent of the project area (see Table 1) and are characterized as being suitable for agricultural due to their fertile nature.

Most of the project area consists of soils developing on weathered bedrock (Figure 4).

Figure 4. Exposed stratigraphic profile of weathered bedrock surface soil in the vicinity of where the transmission line crosses Hogan Creek (facing east).

The predominant soil unit within the project area (20.30 percent) is Wedowee fine sandy loam, 7 to 15 percent slopes, which is characterized as being well drained and typically found on hilly landscapes. The soil unit is fine sandy loam forming on weathered granite and gneiss bedrock (i.e., residuum). Wedowee fine sandy loam soil typically demonstrates the profile listed below and shown in Figure 5:

- Ap: 0 to 10 cm (0 to 4 inches), sandy loam
- E: 10 to 18 cm (4 to 7 inches), coarse sandy loam
- Bt: 18 to 58 cm (7 to 23 inches), clay
- BC: 58 to 89 cm (23 to 35 inches), clay
- C: 89 to 203 cm (35 to 80 inches), sandy clay loam saprolite

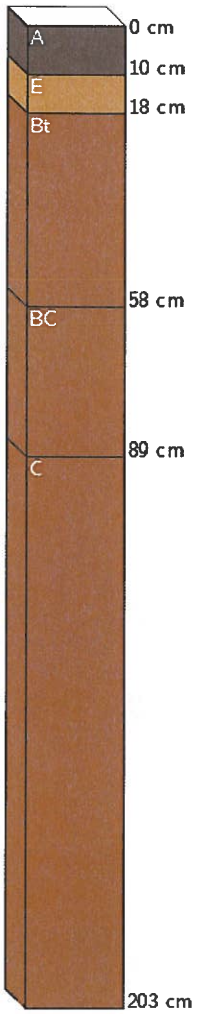

Figure 5. Typical soil profile of the Wedowee fine sandy loam.

Table 1. Soils within the Project Area

Map Unit Symbol	Map Unit Name	Percentage of Project Area	Landform	Drainage Class	Parent Material	Soil Class
1B	Abell fine sandy loam, 2 to 7 percent slopes	3.7%	Hillslopes	Moderately well drained	Alluvium	2e
3B	Appling fine sandy loam, 2 to 7 percent slopes	9.1%	Interfluves	Well drained	Residuum from granite and gneiss	2e
3C2	Appling fine sandy loam, 7 to 15 percent slopes	4.0%	Interfluves	Well drained	Residuum from granite and gneiss	4e
11B	Bourne-Varina complex, 2 to 7 percent slopes	0.4%	Marine terraces	Well drained	Loamy marine deposits	2e
11C	Bourne-Varina complex, 7 to 15 percent slopes	0.5%	Marine terraces	Moderately well drained	Loamy marine deposits	3e
14B2	Cecil fine sandy loam, 2 to 7 percent slopes	13.7%	Hillslopes	Well drained	Residuum from granite and gneiss	2e

Map Unit Symbol	Map Unit Name	Percentage of Project Area	Landform	Drainage Class	Parent Material	Soil Class
Cfs	Chewacla fine sandy loam, 0 to 2 percent slopes	1.1%	Floodplains	Somewhat poorly drained	Alluvium	4w
17B	Colfax fine sandy loam, 2 to 7 percent slopes	0.9%	Uplands	Somewhat poorly drained	Residuum from granite and gneiss	3w
28	Fluvaquents, 0 to 2 percent slopes	9.4%	Floodplains	Poorly drained	Alluvium	6w
35B	Helena-Colfax complex, 2 to 7 percent slopes	0.2%	Hillslopes	Moderately well drained	Mixed mafic residuum	3w
36C	Helena-Orange complex, 7 to 15 percent slopes	0.2%	Hillslopes	Moderately well drained	Mixed mafic residuum	4e
38C	Iredell-Orange complex, 7 to 15 percent slopes	0.4%	Uplands	Moderately well drained	Diabase, diorite, gabbro	6e
47B	Norfolk fine sandy loam, 2 to 7 percent slopes	1.6%	Coastal plains	Well drained	Marine deposits or fluviomarine deposits	2e
50B	Orangeburg-Faceville fine sandy loams, 2 to 7 percent slopes	2.2%	Marine terraces	Well drained	Loamy marine deposits	2e
51B2	Pacolet fine sandy loam, 2 to 7 percent slopes	1.7%	Hillslopes	Well drained	Residuum from granite and gneiss	2e
51C2	Pacolet fine sandy loam, 7 to 15 percent slopes	2.4%	Hillslopes	Well drained	Residuum from granite and gneiss	3e
51D2	Pacolet fine sandy loam, 15 to 25 percent slopes	2.5%	Hillslopes	Well drained	Residuum from granite and gneiss	6e
PaC2	Pacolet clay loam, 7 to 15 percent slopes	2.8%	Hillslopes	Well drained	Residuum from granite and gneiss	6e
62B	Spotsylvania-Bourne fine sandy loams, 2 to 7 percent slopes	0.4%	Hillslopes	Well drained	Loamy marine deposits	2e
62C	Spotsylvania-Bourne fine sandy loams, 7 to 15 percent slopes	0.1%	Hillslopes	Well drained	Loamy marine deposits	3e
70B	Udalfs-Ochrepts complex, 7 to 15 percent slopes	0.4%	Hillslopes	Well drained	Loamy marine deposits	6e
70D	Udalfs-Ochrepts complex, 15 to 25 percent slopes	0.2%	Hillslopes	Well drained	Loamy marine deposits	6e
70F	Udalfs-Ochrepts complex, 45 to 65% slopes	1.3%	Hillslopes	Well drained	Loamy marine deposits	7e
71C2	Vance fine sandy loam, 7 to 15 percent slopes	2.1%	Hillslopes	Well drained	Residuum from granite and gneiss	4e
74B2	Wedowee fine sandy loam, 2 to 7 percent slopes	4.4%	Hillslopes	Well drained	Residuum from granite and gneiss	2e
74C2	Wedowee fine sandy loam, 7 to 15 percent slopes	20.3%	Hillslopes	Well drained	Residuum from granite and gneiss	4e
74D2	Wedowee fine sandy loam, 15 to 30 percent slopes	5.5%	Hillslopes	Well drained	Residuum from granite and gneiss	6e
75C3	Wedowee clay loam, 7 to 15 percent slopes	3.7%	Hillslopes	Well drained	Residuum from granite and gneiss	6e
75D3	Wedowee clay loam, 15 to 25 percent slopes	3.9%	Hillslopes	Well drained	Residuum from granite and gneiss	7e

Map Unit Symbol	Map Unit Name	Percentage of Project Area	Landform	Drainage Class	Parent Material	Soil Class
78	Worsham fine sandy loam	0.5%	Upland	Poorly drained	Alluvium	4w
W	Water	0.2%	–	–	–	–

Source: NRCS (2022)

Geomorphology

A majority of the project area is underlain by moderately well to well drained weathered bedrock (e.g., granite, gneiss, diabase, diorite, gabbro, mixed mafic, and marine or fluviomarine deposits) that is exposed and has been weathered at the surface (i.e., residuum). Modern soils developing on these surfaces have formed from in situ weathering processes at these bedrock surfaces, which predate the period of human occupation by a long period. There is very little evidence for deposition on these surfaces except in potentially isolated localities (e.g., colluvium or eolian deposition) and those areas are also subject to erosional processes, so are likely intermittent and lack potential for buried sites.

Adjacent to the four drainages described above—the northern unnamed drainage, Hogan Creek, the Watleg Branch, and the North Anna River—there is deposition of alluvial deposits in varying degrees and to variable depths yet to be determined. In summary, the majority of the project area surface has changed little during the period of human occupation due to the lack of widespread depositional processes and any deposition on the majority of the project area that occurred in the past is virtually absent.

In addition to the composition of parent material and the depositional and post-depositional processes, it is also important to consider the soil fertility of a project area to assess the potential for past cultivation that may have been associated with archaeological sites and historic structures. As noted in Table 1, each mapped soil unit is designated with a soil class based on soil fertility and risk of erosion and flooding. The most fertile soils are in Soil Classes 1 and 2. These soils would have been the most productive for both precontact and historical cultivation. The Soil Class 2 soils make up approximately 37 percent of the surface soils in the project area and their productivity for cultivation is clearly evident today in the extensive use of the project area for silviculture.

Flora

The project area is located within the Virginia Coastal Plain physiographic province (Virginia DCR 2022). Compared to other provinces in Virginia, it has the most diverse wetlands spanning the boundary between the Piedmont and Atlantic coast. Nearly half (46 percent) of the Coastal Plain is covered by forest, with 45 percent of that consisting of deciduous hardwood species and 55 percent consisting of evergreen and mixed species, including plantations of loblolly pine (*Pinus taeda*) and other natural pine-hardwood species. A very small portion (13 percent) of the Coastal Plain consists of undisturbed natural lands, with the only large portions existing in the Great Dismal Swamp and on Fort A.P. Hill Military Reservation.

The original vegetation that covered the Virginia Coastal Plain has been cleared so extensively by modern activities that it is difficult to determine which native species were most widespread prior to clearing (Virginia DCR 2022). Species found in wetlands are more likely preserved since these areas remain mostly unaltered compared to upland forests. In the northern part of the Virginia Coastal Plain north of the James River, a significant portion of upland forest contains plantations of loblolly pine and secondary pine-hardwood forests as the result of repeated cutting and agricultural abandonment. Mature hardwood

species consist of American beech (*Fagus grandifolia*), oak, and American holly (*Ilex opaca* var. *opaca*), along with defined localities of oak-dominated forest and steep bluffs containing dense stands of chestnut oak (*Quercus montana*), beech, and mountain laurel (*Kalmia latifolia*).

Fauna

Ample resources, combined with a wide range of topographic and geological conditions, have created an abundance of endemic species and a great diversity of wildlife in the Southeastern Evergreen Forest region. The major wildlife species in the region include white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), squirrel (family Sciuridae), rabbit (*Oryctolagus cuniculus*), bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaida macroura*). Fish species in the region include bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and channel catfish (*Ictalurus punctatus*) (NRCS 2006:431).

Current Land Use

The project area consists of rows of planted conifers (Figures 6–9) mixed with deciduous species (Figure 10), particularly in the vicinity of wetlands and drainages, and is currently used as a hunting club. Most of the project area is being logged (Figures 11 and 12) or has been logged in the recent past (ca. 1940 to modern times).

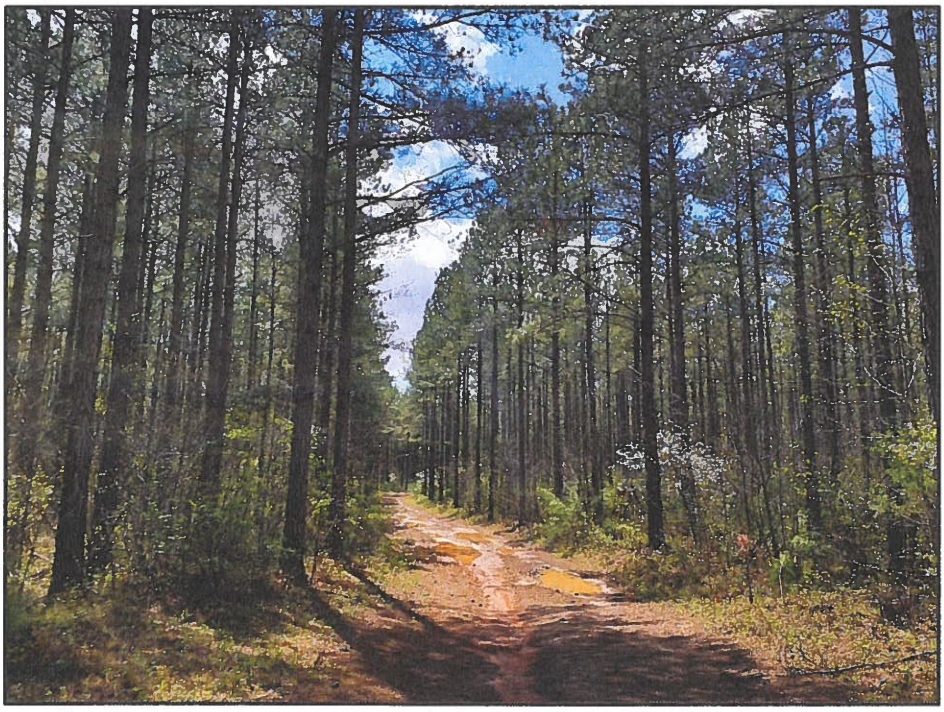

Figure 6. Overview of planted pines in the central portion of the project area, facing southwest.

Figure 7. Overview of planted pines and access road in the northeastern portion of the project area, facing southwest.

Figure 8. Overview of planted pines in the eastern portion of the project area, facing east.

Figure 9. Overview of planted pines in the southwestern portion of the project area, facing northeast.

Figure 10. Overview of planted pines mixed with deciduous with transmission line crossing the northern portion of the project area, facing west.

Figure 11. Overview of recent logging and land clearance, with young planted pines in the southwestern portion of the project area, facing east.

Figure 12. Overview of recent logging and land clearance, with young planted pines in the southwestern portion of the project area, facing northwest.

Additionally, heavy logging disturbances related to the recent clearing of planted pines was documented across the entire project area during SWCA's site reconnaissance and analysis of aerial imagery. Uprooted trees with sediment clinging to their roots were common (Figure 13).

Figure 13. Overview of surface disturbance due to tree fall in the southeastern portion of the project area, facing southeast.

Logging maps obtained from Michael Bobb, forester and land manager who actively manages the forests within the project area, identify each parcel by a parcel number, followed by the number of acres that have been logged and the year they were logged in the twentieth century (Figures 14 and 15). The maps indicate that nearly the entire project area was divided up into logging parcels that have been previously logged. The predominant land use within the project area consists of a pine tree plantation or areas that have been recently cleared of planted pines. Small portions of the project area are natural forest, mainly along natural drainages. Disturbances also include natural tree falls, multiple logging/access roads, and a transmission line that bisects the northern portion of the project area.

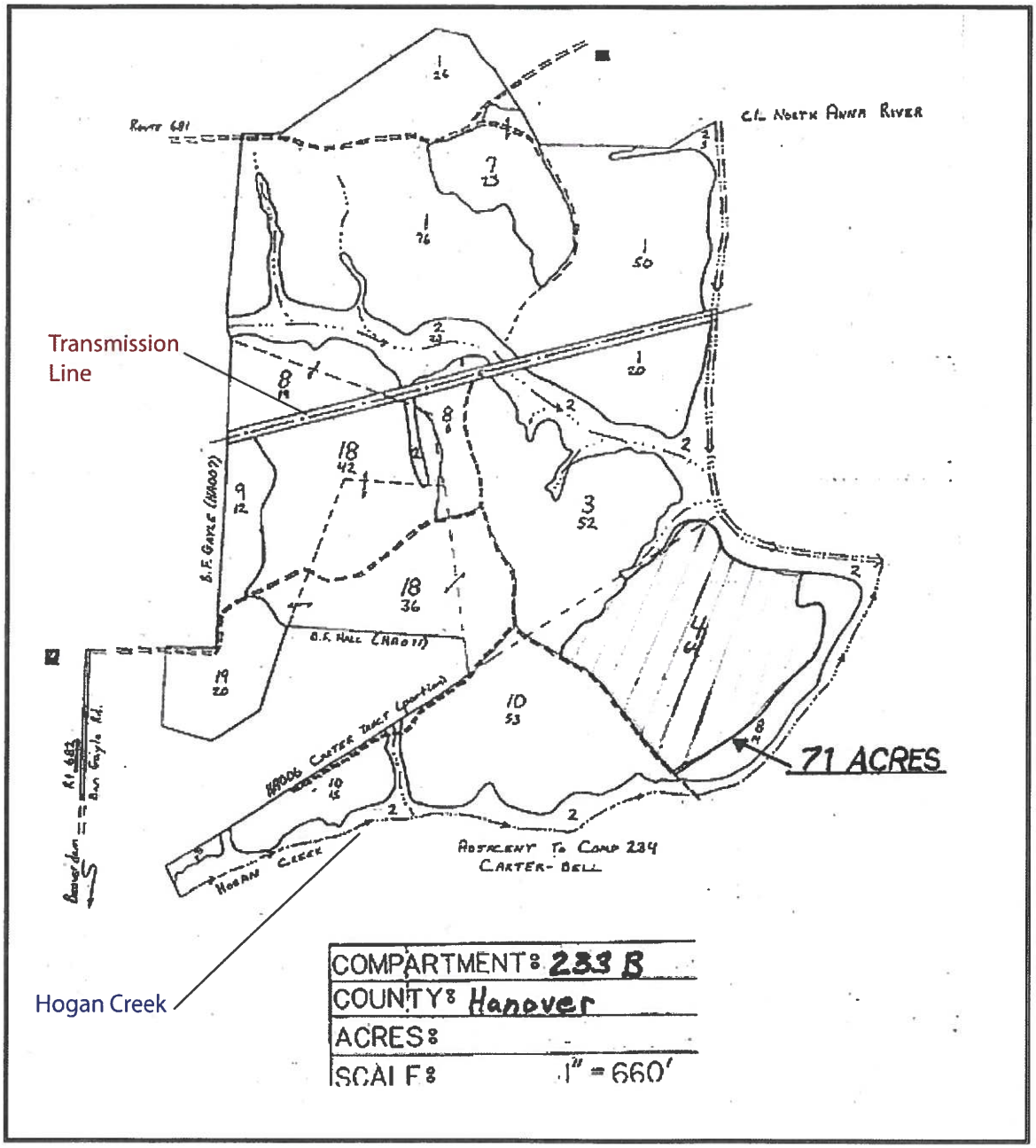

Figure 14. Land parcels north of Hogan Creek that have been logged during the twentieth century.

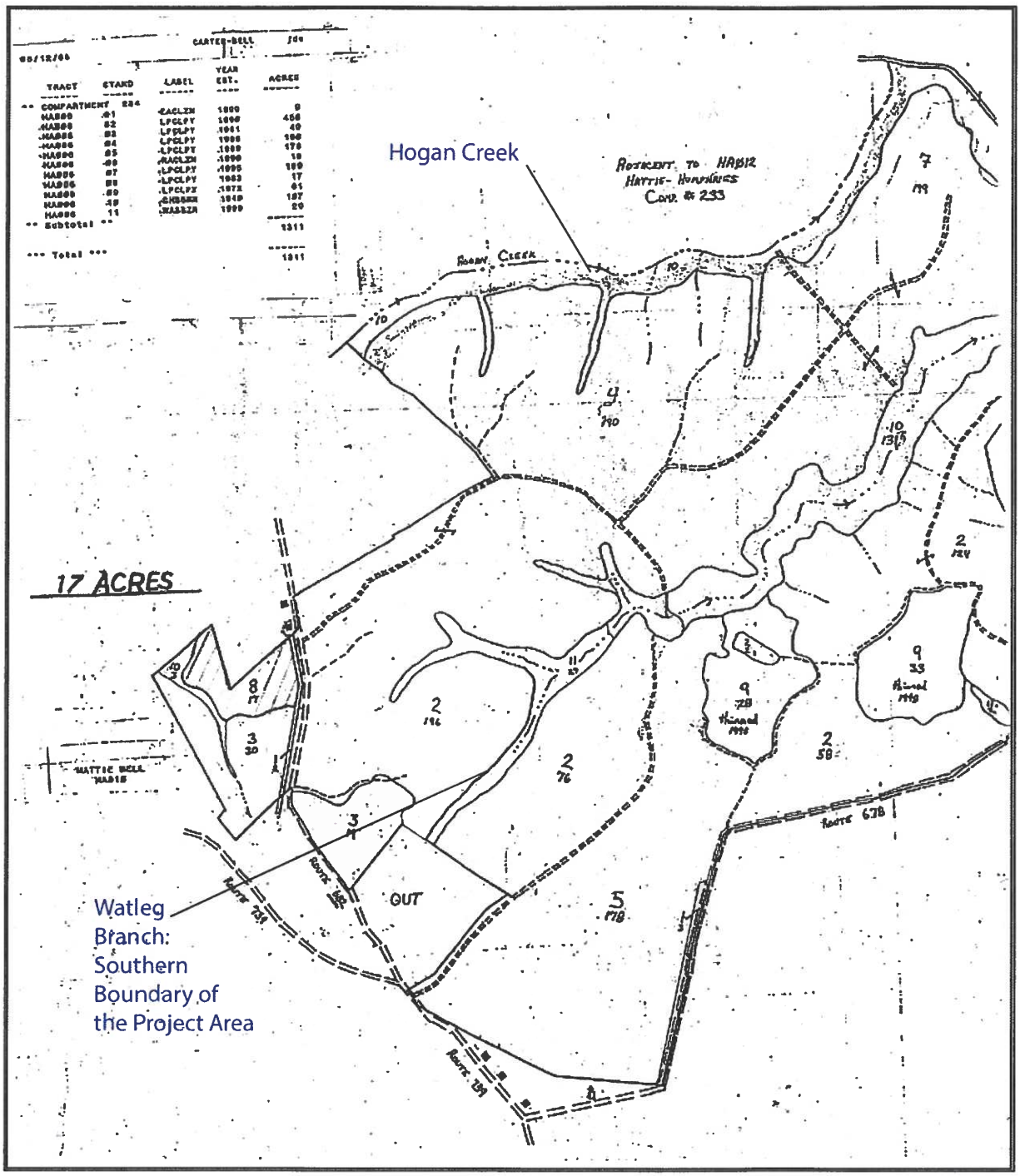

Figure 15. Land parcels south of Hogan Creek that have been logged during the twentieth century.

LITERATURE REVIEW

This section establishes a cultural context for the project area and provides an overview of the previous archaeological work conducted near the project area. Additionally, the results of a detailed review of historical maps and atlases are described to help identify the historical occupation of the project area and summarize the historical land use of the project area.

Cultural History

Data gathered by previous compliance surveys, research projects, and landowner or informant interviews can be used to investigate trends for a given region and make specific predictions for identifying cultural resources within the project area. Based on guidance provided in the VDHR's *Guidelines for Conducting Historic Resources Survey in Virginia* (VDHR 2017), an examination of trends within the project area and in the surrounding region was conducted. These trends include technological innovation, subsistence strategies, climatic change, and changes in population, to name a few. Per the VDHR (2017:100) definitions of geographic and cultural regions, the project area is located in the northern extreme of the Southern Coastal Plain region. The discussion below therefore focuses primarily on that region. Since the project area is located near the interface of two other regions, the Northern Coastal Plain and the Northern Piedmont, the discussion below will also draw from the culture history of these regions where appropriate.

The Northern and Southern Coastal Plains together constitute the larger Tidewater region of Virginia. The Tidewater region is the general term for the broad, sandy coastal plain rising west from the Atlantic Ocean to an elevation at which the rivers that drain eastern Virginia, indeed the entire southeast United States, cease to be navigable (VDHR 2017:101). This elevation is commonly known as the "Fall Line" or "Fall Zone" and marks the location of a mountain chain that formed ca. 440 million years ago and was subsequently reduced by erosion. Much of the precontact and historical occupation of the area was conditioned by the rivers that drain across the Tidewater region and empty into Chesapeake Bay or Albemarle Sound.

Paleoindian Period (11,500–8000 B.C.)

Native American occupation of eastern North America dates to at least 13,450 calendar years ago (approximately 11,500 B.C.), which marks the conventional temporal boundary associated with the Clovis tradition (Anderson et al. 2007; Goodyear 2006). Although there is increasing evidence of an earlier occupation in the region. The few sites that have been reported to contain early deposits, often referred to as "Pre-Clovis," have come under fierce scrutiny by the archaeological community. Monte Verde, in South America, represents one of the oldest generally accepted sites in the Western Hemisphere (Dillehay 2000:160–168). The Pre-Clovis discussion in eastern North America has focused on a handful of sites. Meadowcroft Rockshelter in southwestern Pennsylvania is considered by many archaeologists to be a Pre-Clovis site (Carr and Adovasio 2002:4). The Cactus Hill Site in Sussex County, Virginia, northeast of the project area, yielded lithic artifacts such as bifaces, polyhedral cores, and prismatic blades below intact Clovis horizons as early as 17,000 radiocarbon years before present, significantly earlier than the conventional Clovis temporal boundary. Additionally, the Topper Site in South Carolina's Piedmont region has also produced evidence of Pre-Clovis occupation below Clovis-aged deposits (Goodyear 1999, 2000). The Cactus Hill and Topper Sites both have the potential to be considered Pre-Clovis and could show that early groups were in the general region of the project. Expanded programs of survey and testing of landforms with Pleistocene-aged deposits are still needed in the region to better understand the Pre-Clovis tradition (Goodyear 2006).

The first widely accepted occupation of Virginia was by groups using a distinctive fluted projectile point (i.e., the Clovis type) (Griffin 1967; Justice 1987). These points are generally scarce and often occur as isolated finds in disturbed surface contexts. Geographic concentrations of fluted points, including the Clovis type and related Paleoindian projectile points, such as Cumberland, occur in the eastern half of the United States. Nearly 1,000 fluted projectile points have been reported from Virginia (Anderson and Faught 1998; Anderson et al. 2010). Other Paleoindian projectile point types found in Virginia are Mid-Paleo, Dalton, Hardaway-Dalton, and a type with affinities with Folsom (Barber and Barfield 1989; McAvoy and McAvoy 1997). In Virginia, most of these points were manufactured from cryptocrystalline lithic material. Stone tools associated with the Paleoindian period include scrapers, gravers, wedges, unifacial tools, hammerstones, abraders, and a variety of "banging, smashing, chopping, and hacking tools" (Gardner 1989:18).

Stratified sites containing Paleoindian occupations are rare. In Virginia, the Williamson Site and the Thunderbird and Fifty Sites of the Flint Run Complex in the Shenandoah Valley provide a unique picture of life during Paleoindian times (Barber and Barfield 1989; Carr 1975; Gardner 1974; Johnson 1996; McAvoy and McAvoy 2003). Research at these sites resulted in the development of the Flint Run Lithic Deterministic Model. The model focuses on high-quality lithic quarries that drove Paleoindian and Early Archaic groups' settlement patterns (Anderson and Sassaman 1996:23). The model was based on the assumption that there was a correlation of mobility ranges to the distribution of lithic raw material. Gardner (1974, 1977), who established the model, showed Paleoindian groups in the Shenandoah Valley were tethered to lithic quarries and returned to them in a cyclical pattern. Due to the common presence of high-quality lithic materials in Paleoindian artifact assemblages, researchers have applied the model throughout Virginia and much of the Eastern Woodlands.

Archaic Period (8000–1200 B.C.)

The Archaic period in Virginia is characterized by groups adapting to a changing climate and new Holocene biotic communities. The Archaic period was a time of major climatic change. Holocene environments continued to expand until the start of the Hypsithermal Climatic period (6000 B.C.), at which point the modern environment of the region was almost fully developed. Traditionally, the Archaic period has been divided into three sub-periods, the Early Archaic (8000–6500 B.C.), the Middle Archaic (6500–3000 B.C.), and the Late Archaic (3000–1200 B.C.), although there is major continuity between all three periods. Major themes in the Archaic period consist of a diversification of the resource base; increase in seasonal sedentism, especially in riverine estuarine locations; and like in much of the Eastern Woodlands, the advent of regionally specific trends in material culture and the antecedents to horticulture.

The Early Archaic period (8000–6500 B.C.) was a time of major transition, as biotic communities shifted and the climate warmed. In the Southern Coastal Plain Region, Early Archaic sites are relatively sparse. The reason for the low number of Early Archaic sites ranges from lack of survey and intensity of modern development to theories regarding sea level change and lack of resources in the region (Custer 1990; Gardner 1989). There is evidence that freshwater wetlands and similar features were key features in the Early Archaic landscape. Archaeologists have identified the Palmer projectile point as the first true Early Archaic projectile point, and it is typified by a small corner-notched blade with pronounced serrations and a ground base. The earlier Kirk Corner-Notched point represents the transition between the Paleoindian and Early Archaic periods (Coe 1964:81). Additionally, the use of hafted end scrapers and other formal tools such as perforators, drills, and gravers increased during the Early Archaic period (Coe 1964).

In the nearby Northern Piedmont Region, the transition from the Paleoindian period to the Early Archaic is marked by an expansion in settlement patterns beyond the systems centered on quarries containing high-quality lithic material. Early Archaic groups occupied areas along major river drainages and select upland locations in favorable environmental settings such as springs and freshwater wetlands (Custer

1990:27). These changes in settlement patterns likely reflect changes to subsistence strategies that allowed Early Archaic groups to exploit a broader variety of resources in the context of a post-Pleistocene climatic regime that featured more predictable seasonal resource availability.

The Middle Archaic period (6500–3000 B.C.) coincided with the Hypsithermal Climatic period and is characterized by Middle Archaic groups continuing to expand their resource bases to account for the changing climate and the change in biotic communities (Custer 1990). There is evidence that Late Archaic groups increasingly took advantage of the stabilization of the climate and sea level by adopting settlement patterns and subsistence practices that reduced risk of shortfall, resulting in rising populations. For example, ground stone artifacts such as mortars, pestles, manos, metates, nutting stones, and grooved axes begin to be observed more commonly in Middle Archaic artifact assemblages (Ford 1977). The increased importance of ground stone implements in the Southern Coastal Plain and surrounding regions is a local manifestation of a more general technological shift that is recognized as a hallmark of the Middle Archaic period throughout the Middle Atlantic region more broadly (Stewart and Cavallo 1991). Middle Archaic chipped stone artifact assemblages are typically identified by the presence of Stanly Stemmed, Morrow Mountain I and II Stemmed, Guilford Lanceolate, Halifax Side-Notched, St. Albans, LeCroy Bifurcated Stem, and Kanawha Stemmed hafted bifaces.

Late Archaic (3000–1200 B.C.), groups generally shared many features with those of earlier periods, such as settlement patterns defined by seasonal sedentism and large regional foraging territories that limited integration and interaction with neighboring bands (Mouer 1991). This reduced interaction in the context of continued population growth could explain the increased variety and regionalization in corner-notched and stemmed biface forms that characterize the Late Archaic (Coe 1964:123–124). Late Archaic sites are typically defined by the presence of Halifax Side-Notched, Lamoka, Merom Expanding Stemmed, Lackawaxen, and Brewerton Side- and Corner-Notched hafted bifaces (Justice 1987). Steatite bowls also begin to be produced in the Middle Atlantic and Northeastern United States during this period, the formal characteristics of which presaged pottery production during the Woodland period (Mouer 1991:47).

The population increases that characterize the Archaic as a whole are especially evident during the Late Archaic and were assuredly related in complex, recursive ways to changes in subsistence practices. A stronger dependence on seasonally abundant, reliable riverine resources (Mouer 1991) and the supplementation of hunted and gathered resources with cultivated native plants (Fritz and Smith 1988; Voigt and Pearsall 1989) were likely both a cause of and a reaction to the rising population that characterized the Late Archaic and preceding millennia. These subsistence innovations were undoubtedly made possible by the widespread, systemic hydrologic changes occasioned by the thawing glaciers of the earlier Pleistocene and the resultant expansion of aquatic and semi-aquatic habitats such as mudflats, salt marshes, and freshwater swamps.

Woodland Period (1200 B.C.–A.D. 1600)

The Woodland period is defined by an increase in sedentism, improvements in pottery technology, increased use of groundstone tools, increased reliance on horticulture, an increase in social ranking, and population nucleation. Like the Archaic period, archaeologists have divided the Woodland period into three subperiods: the Early Woodland (1200 B.C.–A.D. 300), the Middle Woodland (A.D. 300–1000), and the Late Woodland (A.D. 1000–1606).

The Early Woodland period (1200 B.C.–A.D. 300) in the Southern Coastal Plain region is characterized by the adoption of pottery, which had its antecedents in the Late Archaic period with the use of steatite vessels. Evidence for the earliest pottery use yet identified was found in the Piedmont region in the form of steatite tempered Marcey Creek ware (Egloff and Potter 1982). Considered experimental by some investigators, these were generally shallow, slab-built vessels (Dent 1995; McLearen 1991). This early

pottery mirrors the steatite vessels first created during the Late Archaic, and thus was likely used for similar purposes. The later, steatite-tempered Selden Island ware overlapped with Marcey Creek ware, after which other temper types enter the archaeological record (McLearen 1991).

Starting around 800 B.C., Stony Creek ware became prevalent in the Southern Coastal Plain and was used by precontact groups throughout the Early Woodland and into the Middle Woodland. Contemporaneous with Stoney Creek ware, groups in the interior Coastal Plain developed Prince George ware. Both Prince George ware and Stoney Creek ware had fabric-impressed, net-impressed, or cord-marked surface treatments. Stoney Creek ware was tempered with small particles, typically sand, while Prince George was tempered with pebbles (Egloff 1985; Egloff and Potter 1982).

Research into the settlement systems of the Early Woodland shows large settlements along the Fall Line, typically adjacent to larger rivers, like the James, and smaller settlements throughout the Coastal Plain region, often in riverine environments. Outside of riverine environments, research has shown that Early Woodland groups started to focus on the productive estuarine habitats found along the Chesapeake Bay.

Archaeologists characterize the Middle Woodland period (A.D. 300–1000) as a continuation of trends toward increased sedentism and intensification of subsistence strategies developed during the Early Woodland period. Precontact groups' reliance on estuarine environments increased along with a general preference for large rivers as the locations of sedentary communities instead of smaller tributaries, coupled with an overall increase in the resource base used by Middle Woodland groups. The neighboring Piedmont region presents some exceptions to this trend in the form of evidence of continued use of secondary streams and rivers within the James and Chickahominy Watersheds (Hantman and Klein 1992). With shellfish and other saltwater resources making up key portions of the Middle Woodland diet, archaeologists have found the largest sites along rivers near the transition zones between saltwater and freshwater biomes.

Diagnostic material culture of the Middle Woodland period in the Southern Coastal Plain region consists of the Hercules ware ceramic tradition. The ware is characterized by cord-marked and fabric-impressed surfaces as well as temper consisting of crushed granite and gneiss (Egloff 1985). Groups continued to use Stoney Creek and Prince George ware, which was first developed in the Early Woodland period.

The hallmarks of the Late Woodland period (A.D. 1000–1606) in the Southern Coastal Plain region are population growth, continued and intensifying reliance on domestic plants, and continued development of sociopolitical complexity. Archaeologists have identified a strong correlation between large Late Woodland settlements and prime agricultural land, such as floodplains and adjacent terraces and ridges. Material culture from the Late Woodland shows a dramatic increase in regionalization within the larger Coastal Plain region of Virginia. Pottery wares that dominate the archaeological record of the Late Woodland period in the Southern Coastal Plain region include Cashie, Gaston, and Roanoke wares (Turner 1992). Many of these wares are found at Late Woodland sites in the nearby Northern Coastal Plain, and are rarely found north of the James River, potentially indicating that groups in the Southern Coastal Plain region were more closely aligned with groups to the south. Cashie and Gaston wares are commonly found in the western portion of the Southern Coastal Plain, near the Fall Line, and consist of granule-tempered pottery with simple stamped surfaces (Egloff 1985). Roanoke ware, which is similar to the Colington series identified in North Carolina, is shell-tempered with single-stamped exteriors.

Based on accounts of early English settlers, archaeologists have been able to track the rise of the Powhatan chiefdom in the Tidewater region. There is evidence that as early as the mid- to late sixteenth century, the region had begun to come under the political control of a central group, the Powhatan, and shortly after the arrival of the English in 1607, the Powhatan chiefdom controlled virtually all of the Lower Tidewater Region, with some exceptions (Potter 1993).

Settlement to Society (A.D. 1607–1750)

Hanover County was inhabited by the Powhatan Confederacy with an estimated 10,000 in population (Hanover County Historical Society 2022). Initial interactions between Powhatan Confederacy's Tribes and the English began with the formation of a trade alliance. However, relationships became strained and eventually turned hostile. Several failed attempts were made in the seventeenth century to engage Native groups with trade and/or convert them to Christianity. It was not until the early eighteenth century that European settlers came to the general project area. Besides hostile Native groups, the lack of clear waterways to the Chesapeake and the central core of the English colony delayed the European settlement of the area.

During Captain John Smith's exploratory missions between 1607 and 1609 from Jamestown, he encountered Native Americans and at one point was held captive by the Youngtamund Tribe of present-day Hanover County. Smith's legendary capture, which eventually led to an escape with the help of Chief Powahatan's daughter Pocahontas, occurred in Hanover County on these explorations (Hanover County Economic Development [HCED] 2022a; McCoy et al. 2021:15).

On November 26, 1720, Hanover County was formed along the same boundary lines as St. Paul's Parish (Hanover County Historical Society 2021). Hanover County received its name to honor King George I, the first British monarch from the House of Hanover, who ruled the colonies at the time of the county's creation (McCoy et al. 2021:15).

Hanover County experienced slow growth in its early years through tobacco production. The Sweet Orinoco strain was the primary economic mainstay throughout the eighteenth century (Keller et al. 1990:6).

Colony to Nation (A.D. 1751–1789)

Hanover County's early years are associated with the Great Awakening movement, a series of religious revivals that led to the disestablishment of the Church of England in the colonies. Around 1740, a small group of evangelical Anglicans led by Samuel Morris began meeting privately in Hanover County to discuss the religious revivals occurring in the northern colonies led by Reverend George Whitefield (Kidd 2021). By 1745, Virginia's Lieutenant Governor, Sir William Gooch, was calling for the suppression of these evangelical revival groups due to their threat to the stability of the colony. As a new Baptist movement spread from New England to the Virginia Colony in the 1770s, an era of religious persecution began. With an introduction of Methodist practices in the mid- to late 1770s to the already strained religious landscape, tensions grew (McCoy et al. 2021:16).

Tensions between the colonies and the British Crown can be seen early on in Hanover County. At the Hanover Courthouse in December 1763, Patrick Henry argued the case, now known as "The Parsons' Cause," in which he maintained that the King was behaving as a tyrant by interfering with a law passed by the House of Burgesses (HCED 2022a). Inspired by their fellow patriots, such as Patrick Henry, Hanover County men joined the American Revolution to fight British rule. The 5th Virginia Regiment and the 14th Virginia Regiment both contained soldiers supplied from Hanover County (Family Search 2022). Hanover County was spared many of the battles and skirmishes of the American Revolution, although George Washington did pass through the county on his return from the Battle of Yorktown at the end of the war (HCED 2022a; McCoy et al. 2021:16).

Prior to the war, European financiers started to collect outstanding debts, which triggered a general collapse of the tobacco economy. During the War, trade with Europe, the largest consumer of tobacco, was disrupted.

Early National Period (A.D. 1789–1829)

After the revolution, there was an influx of farmers drawn to Hanover County. Census information indicates a population of 14,754 in 1790, 15,082 in 1810, and 16,253 in 1840 Draft 17 (United States Federal Population Census [U.S. Census] 1810, 1840).

Tobacco agriculture is labor intensive and rapidly depletes soil nutrients. This, combined with the ever-present turbulence of the tobacco market abroad, led to a change in the nineteenth century in Hanover County from monoculture to a more diversified agricultural economy. Planters began to focus on other crops such as cotton and grain. The gradual shift away from tobacco agriculture that took place in Greensville County took place across much of the Coastal Plain region of Virginia in the late eighteenth century. Besides agriculture, timber was a major export, as well as naval stores and livestock.

Antebellum Period (A.D. 1830–1860)

The major development in the county during the Antebellum period was the establishment of a reliable transportation system. The development of the railroad system allowed planters and farmers in Hanover County ready access to markets throughout Virginia, the East Coast, and abroad. The establishment of a road maintenance act by the Virginia General Assembly in 1835 gave each county the ability to hire road workers and tax residents to fund the establishment of dependable roads. Shortly thereafter, regional commerce grew, and farmers could transport cotton and tobacco from their farms to markets with relative ease.

This development in transportation was spurred on by the establishment of a regional railroad system. Within the county, the Petersburg Railroad Company, the Virginian Railway, and the Atlantic and Danville Railroad connected the region with the rest of Virginia, as well as markets in North Carolina. The establishment of railroads also spurred the development of associated business. The town of Ashland was established in the late 1840s as a mineral springs resort and grew rapidly.

The economy relied heavily on slavery-based agriculture, although other industries contributed to the growing county. Both grist mills and flour mills were constructed along the Pamunkey and Chickahominy Rivers (Keller et al. 1990:37; McCoy et al. 2021:17).

Civil War (A.D. 1861–1865)

Hanover County's location directly to the north of Richmond made it a valuable strategic objective for Union forces throughout the Civil War. The county's position in the larger theater of war in Virginia made critical infrastructure, such as railroads, important logistical lines for Confederate forces fighting in northern Virginia. The two main railroads in the county, the Virginia Central and the Richmond, Fredericksburg and Potomac Railroad, were heavily impacted by the Civil War, as Union forces repeatedly attempted to disrupt Confederate supply lines.

Major conflict occurred in the county as part of the 1862 Peninsula Campaign and the 1864 Overland Campaign. During both campaigns, Hanover County's proximity to Richmond made it the site of heavy fighting (Keller et al. 1990). During the Peninsula Campaign, the Army of the Potomac moved west along the peninsula between the York and James Rivers in an attempt to capture Richmond (American Battlefield Trust 2022). As Union forces attempted to surround Richmond and lay siege to the Confederate capital, southern forces from northern Hanover County advanced to threaten the Union army's flank. In order to avoid being outflanked and to keep a clear logistical path to the north, Brigadier General Fitz John Porter and a full corps of Union forces moved to challenge the Confederate advance. The two forces met at Hanover, approximately 20 miles (32 km) southeast of the project area. Union

forces defeated the Confederate flanking force, but due to ongoing conflict near Richmond and elsewhere in Virginia, federal forces were unable to capitalize on the victory. The culminating battle of the 1862 Peninsula Campaign was the Seven Days Battles where Confederate forces, under the newly appointed general, Robert E. Lee, drove back Union forces from around Richmond. The Seven Days Battles consisted of a series of six battles. Two of the fiercest, Mechanicsville and Gaines Mill, were fought in southeastern Hanover County (Keller et al. 1990).

In 1864, Union General Ulysses Grant attempted to capture Richmond, pushing through Hanover County from the north. The Army of the Potomac engaged Confederate forces in a series of battles, culminating in the Battle of Cold Harbor in June 1864. The majority of the Overland Campaign was fought in southern and eastern Hanover County, as Union forces attempted to capture Richmond.

In summary, Hanover County was a key battleground of the Civil War. The county was strategically important as it bordered the Confederate capital and was the site of several major engagements. The majority of the battles were fought in central Hanover County, along what would become the Interstate 95 (I-95) corridor. The project's location, in the very northwestern portion of the county, prevented it from seeing the direct engagement common in the central and eastern portions of the county during the Civil War.

Reconstruction and Growth (A.D. 1866–1916)

The social and cultural underpinnings of life in Hanover County for the past 100 years were greatly altered with the end of the Civil War and the freeing of enslaved people. Large-scale plantation-style agriculture was no longer feasible. Many plantations were broken up during this period to offset the financial difficulties caused by the war and following years. Fortunately for the few remaining tobacco farms in the region, the tobacco industry experienced a boom due to the growing demand for cigarettes after the war (Laird 2017). The boom was short-lived, only lasting from 1870 to 1885, but the residents of Hanover County were well positioned to take advantage of the demand for tobacco.

Large mills were constructed along the surrounding Pamunkey and Chickahominy Rivers to support the growing wheat and corn industries as well as the rise of sawmills in the County. Farming of new agricultural crops, including melons and tomatoes, began in the twentieth century (Keller et al. 1990:8).

In 1869, public education for children was established in Hanover County (Keller et al. 1990:30). The relocation of Randolph-Macon College to Ashland in 1868 facilitated educational opportunities and aided in the county's economic and population growth.

World War I to World War II (A.D. 1917–1945)

World War I and the widespread enlistment of young central Virginians coincided with the introduction and encouragement of higher efficiency techniques among local farmers. At war's end, returning veterans re-entered the workforce with options to leave rural homesteads to pursue wage labor farther afield thanks to transportation improvements (Manarin and Dowdey 2007:250). The 1918 development of Route 1 Highway, which traversed the county, led to substantial economic growth (Smith 2019:5-24). The highway served as an easy access route between Richmond to the south and Washington, D.C., to the north, bringing an increase in travelers and demand for goods and services. The areas surrounding the highway experienced improvements to accommodate the transport of both goods and people from the rural areas of the county towards Route 1. Timbering remained an integral part of the agrarian economy.

Depression-era Hanover County experienced a population decline, similar to what the rest of the state experienced. Although businesses and owners felt the direct effects of the Great Depression, industries had not overreached or been over expanded. As a result, consumer goods such as foods, textiles, and tobacco remained in high demand (Smith 2019:5-24).

World War II, like World War I before it, resulted in widespread enlistment of Hanover County's young men. The Civilian Airplane Defense Observation Corps and other initiatives absorbed many non-enlistees, who engaged in 24-hour aircraft spotting in various parts of the county. The role of women in the wartime economy expanded, as demonstrated by many counties' educational boards officially lifting the ban on married female teachers (McCartney 2009:315–316). In the agricultural economy, many farmers elected to switch to less labor-intensive soybean and corn (maize) cultivation as an adjustment to the legacy Depression-era production restrictions and wartime rationing that affected the wheat and tobacco markets (McCartney 2009:279). The G.I. Bill gave returning veterans access to vocational training in forestry and farm management and some opted to pursue baccalaureate education at Randolph-Macon College (McCartney 2009:317).

The New Dominion (A.D. 1946–Present)

During the post-war years, Hanover County's population grew due to a business boom and increased transportation. The population grew from 18,500 in 1940 to approximately 22,000 in 1950 (U.S. Census 1940, 1950). The population was 109,979 by April 2020 (U.S. Census 2020).

The development of I-95 through Hanover County during this time facilitated the county's growth. Farmers were provided with new means of getting their products to market and suburbanization farther out from larger localities was encouraged as farmland became more subdivided and developed (Smith 2019:5-25). Although farm acreage continued to decline, agriculture continued to be an important source of the county's income, with around 5 million dollars in farm-product sales in the mid-twentieth century (Smith 2019:5-25).

The expansion of tourist ventures brought a substantial number of new businesses and residents. The creation of Kings Dominion amusement park near Doswell in 1975 played a key role in the county's recent development. It currently has over 1,000 employees, making it one of the leading employers in Hanover County (HCED n.d.b). In 1971, tourism was further spurred by the opening of the Hanover County Municipal Airport (Smith 2019:5-26; McCoy et. al. 2021:20).

Previous Investigations

A cultural resources records search was conducted using the Virginia Cultural Resource Information System (VCRIS) in May 2022 (Figure 16). The records search indicated that one archaeological site is located within 1.6 km (1.0 mile) of the APE (Table 2). The site (44HN0311) is a nineteenth-century mill. Ruins consisting of a dam, mill race, and a mill house are present at the site. No cultural resources surveys have been conducted inside or within 1.6 km (1.0 mile) of the APE. No portion of the APE is within the American Battlefield Protection Program Civil War Battlefield Boundaries.

There are 31 previously recorded architectural resources within 1.6 km (1.0 mile) of the APE (Table 3). Of these, Beaverdam Depot (042-0081) is listed in the National Register of Historic Places (NRHP) and the Virginia Landmark Register (VLR). This resource is located 0.9 mile (1.45 km) to the southeast of the APE and was constructed in 1866 as a one-story brick building embellished with decorative brickwork. Segregated waiting rooms were added in the early twentieth century. The depot was listed on the VLR and NRHP in 1988 for architectural significance.

The remaining 30 resources have not been evaluated for NRHP eligibility. The majority consist of houses or farms ranging in date from ca. 1844 to the second quarter of the twentieth century. Nearly all the houses have secondary resources associated with them. A few non-residential resources include two twentieth-century churches (042-0493 and 042-5327), three commercial/service station buildings constructed ca. 1910 (042-0495, 046-0496, and 042-0498), one two-story Colonial Revival funeral home (042-0494), a cemetery (042-0684), and a two-story frame barn (042-5392).

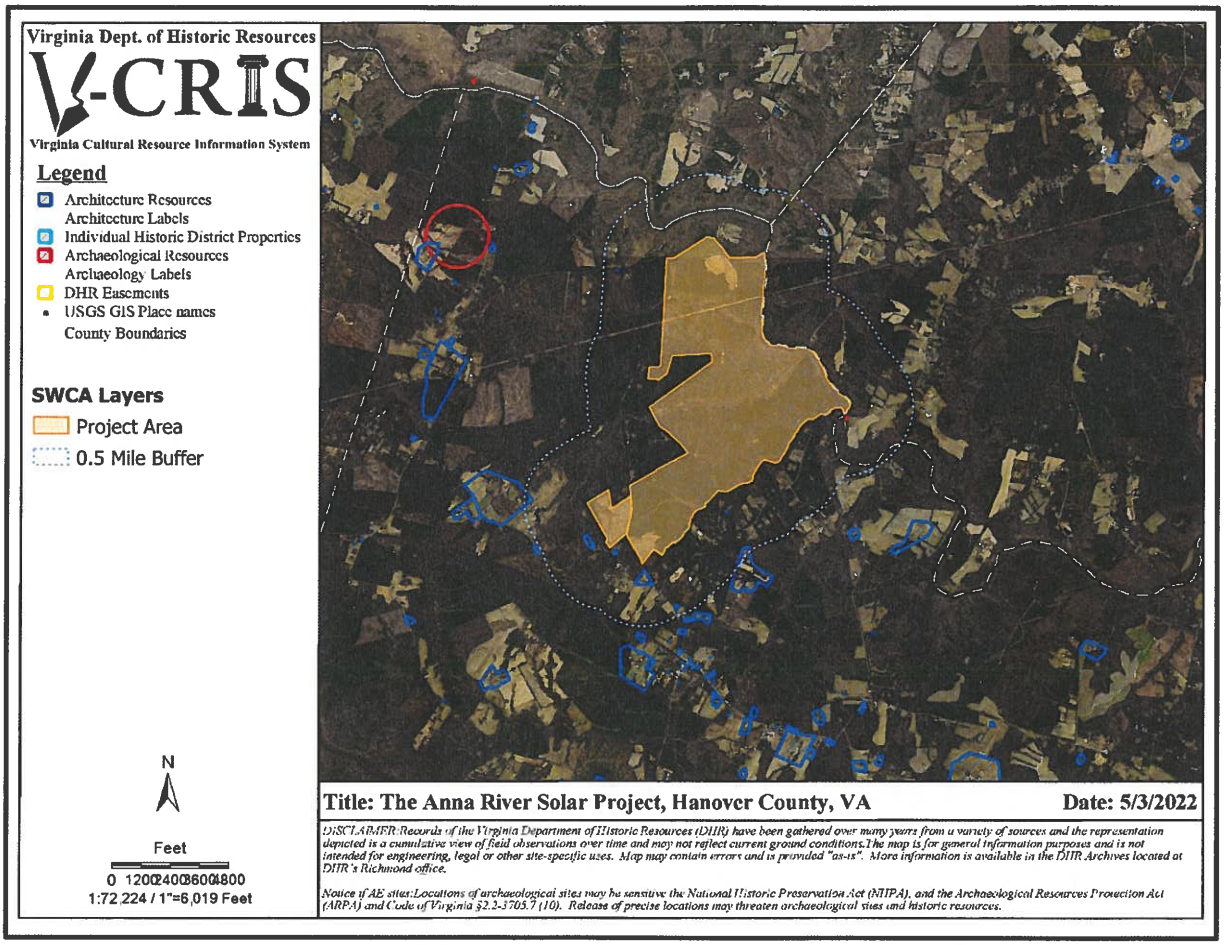

Figure 16. VCRIS map of previously recorded resources and architectural resources near the APE.

Table 2. Previously Documented Archaeological Resources within 1 Mile of the Area of Potential Effects

DHR Number	Site Type	Period	NRHP Eligibility
44HN0311	Mill	Nineteenth century (1800–1899)	Not evaluated

Source: VDHR (2022)

Table 3. Previous Recorded Architectural Resources within 1 Mile of the Area of Potential Effects

DHR Number	Name/Address	Date	Previous Evaluation Status
042-0081	Beaverdam Depot, Beaverdam Station, Route 715	1866	NRHP listing, 1988; VLR listing, 1988
042-0448	Aspen Grove, House, Route 715	ca. 1844	Not evaluated
042-0450	Log House, Route 681	Post-1875	Not evaluated
042-0493	Beaverdam Methodist Church, Route 760	ca. 1900	Not evaluated
042-0494	Powell Funeral Home, Route 715 at 739	ca. 1932	Not evaluated
042-0495	Beaverdam Motor Company, Route 715 at 739	ca. 1910	Not evaluated
042-0496	Beaverdam Bank, Tri-County Bank, Route 715 at 737	ca. 1910	Not evaluated
042-0497	Luckado House, Route 715 and Route 739	ca. 1920	Not evaluated
042-0498	Bank, Store, Route 715 and Route 739	Pre-1925	Not evaluated
042-0499	Moss House, Route 715	Post-1875	Not evaluated
042-0500	Thompson House, Beaverdam Road (Route 715)	ca. 1880	Not evaluated
042-0501	Clemmons House, Route 739 and Route 715	Post-1875	Not evaluated
042-0502	Terrell's Store, Route 739	ca. 1900	Not evaluated
042-0503	Terrell House, Route 739	ca. 1900	Not evaluated
042-0504	Corker Farm, Route 715	ca. 1900	Not evaluated
042-0505	Burress Farm, Farm, 16259 Trainham Road, Hall Farm	ca. 1900	Not evaluated
042-0611	Mineral Springs Farm, Route 678	ca. 1900	Not evaluated
042-0612	Francisco's Store and House, Francisco's Store/Appleby House, Route 715	ca. 1900	Not evaluated
042-0613	House, Log, Route 715	ca. 1900	Not evaluated
042-0683	North River Site, Route 715	Not listed	Not evaluated
042-0684	Phillips Cemetery	Not listed	Not evaluated
042-5322	House, 20368 Beaver Dam Road	ca. 1940	Not evaluated
042-5323	House, 20166 Beaver Dam Road	ca. 1920	Not evaluated
042-5324	House, 19514 Beaver Dam Road	ca. 1940	Not evaluated
042-5325	Farm, 20150 Teman Road	ca. 1920	Not evaluated
042-5334	House, 16263 Railway Lane	ca. 1900	Not evaluated
042-5371	House, 16270 Union Church Road (Route 678)	ca. 1900	Not evaluated
042-5372	Union Baptist Church and Cemetery	1944	Not evaluated
042-5373	House, Beaver Dam Road	ca. 1900	Not evaluated
042-5377	House, 16245 Trainham Road	ca. 1910	Not evaluated
042-5392	Thompson Barn, Beaver Dam Road, Route 715	ca. 1910	Not evaluated

Source: VDHR (2022)

Historical Map Review

A review of historical maps was undertaken to assess the project's potential to contain historic-aged resources and historic archaeological sites. Research was conducted online using databases maintained by VDHR, the Library of Congress, and the Library of Virginia in Richmond.

Similar to today, for much of the historic past, the project area was undeveloped. The distance from key transportation routes and major population centers limited the development of the project area in the historic period. These same factors also limited the project area's exposure to military engagement during the Revolutionary and Civil Wars.

Early maps show the project area and much of western Hanover County as vacant or undeveloped land. The 1794 The state of Virginia map, while not at the scale to depict residential development, shows growth at regional centers, such as Richmond, Fredericksburg, and Charlottesville, as well as the transportation networks connecting them. The North Anna River is depicted on the map, but there are no roads or settlements depicted near the river or the project area (Figure 17).

Figure 17. Approximate project location shown on 1794 The state of Virginia map.

Accurate depictions of western Hanover County and the project area are largely absent from the documentary record from the early to mid-nineteenth century, as the region was likely underdeveloped and rural. It was not until the Civil War that cartographic sources at the scale necessary to see development within an area the size of the project area became available.

The 1861 U.S. War Department *Map of Virginia* (Figure 18) shows the project area as undeveloped, with the closest settlement located at the crossroads community of Greenbay, which is 1.4 miles (2.3 km) to the west of the project. Additionally, the 1861 map shows crossings of the North Anna River to the northwest (Davenport's Bridge) and directly to the east (Anderson's Bridge) of the project area.

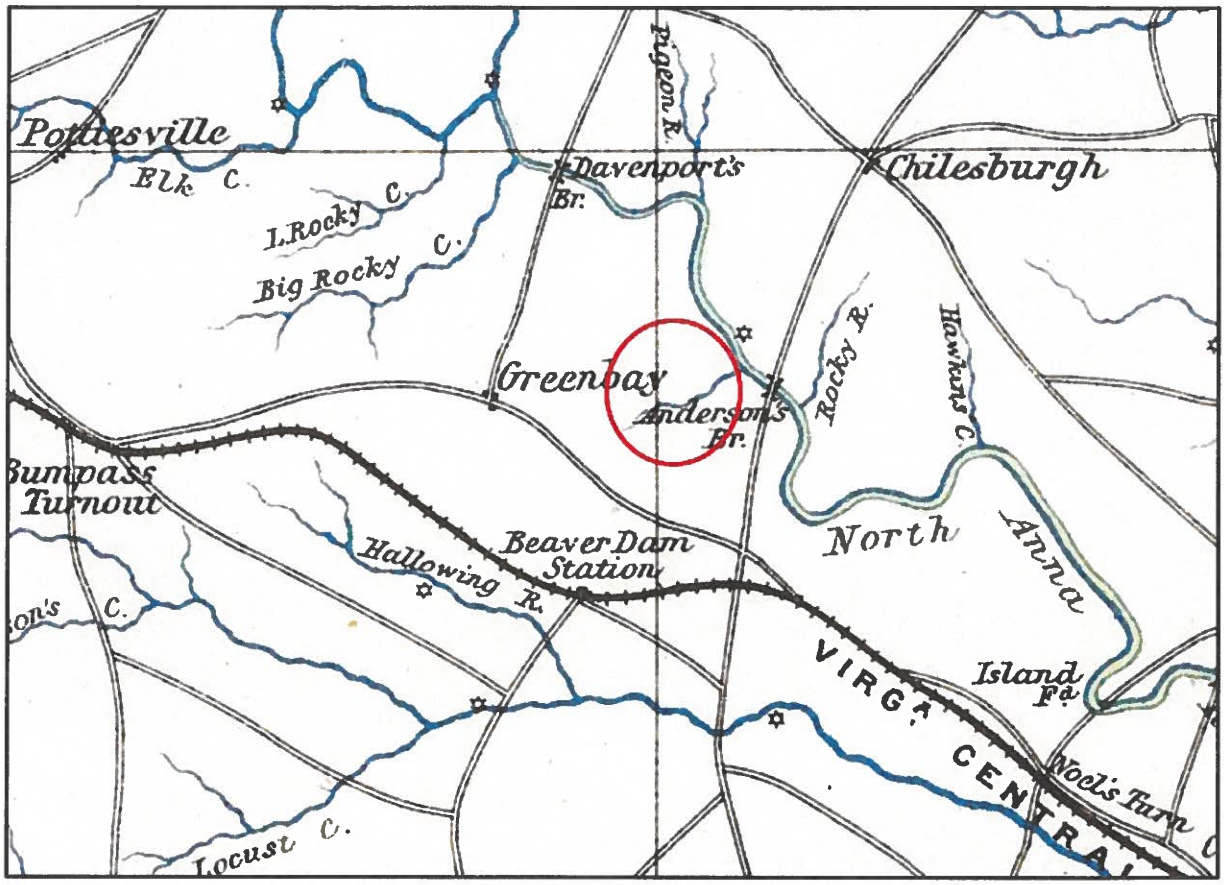

Figure 18. Approximate project location shown on 1831 U.S. War Department map of Virginia.

The Confederate States of America, Army Department of Northern Virginia Chief Engineer's office 1864 Map of Hanover County typifies the type of mapping done during this period. While the 1864 map does not depict the western portion of Hanover County, the general land use shown on the map is one of a scattered road network with residential development occurring either adjacent to major roadways or some distance from them. The buildings shown further away are typically surrounded by open spaces, which are inferred to be fields. Much of the western portion of the map, especially near the North Anna River, is shown as heavily forested. While this map does not show the portion of the county where the project is located, the population density, transportation network, and settlement pattern, of widely spaced dwellings, can be inferred across the project area.

The landscape of northwestern Hanover County by the end of the nineteenth century was largely unchanged. Development was largely focused along key transportation routes. Outside of these areas, large portions of the landscape appear to be undeveloped or forested land. This is evident on the 1892 Goochland, Virginia, U.S. Geological Survey (USGS) quadrangle and the 1905 Soil Survey Map of Hanover County (Figure 19).

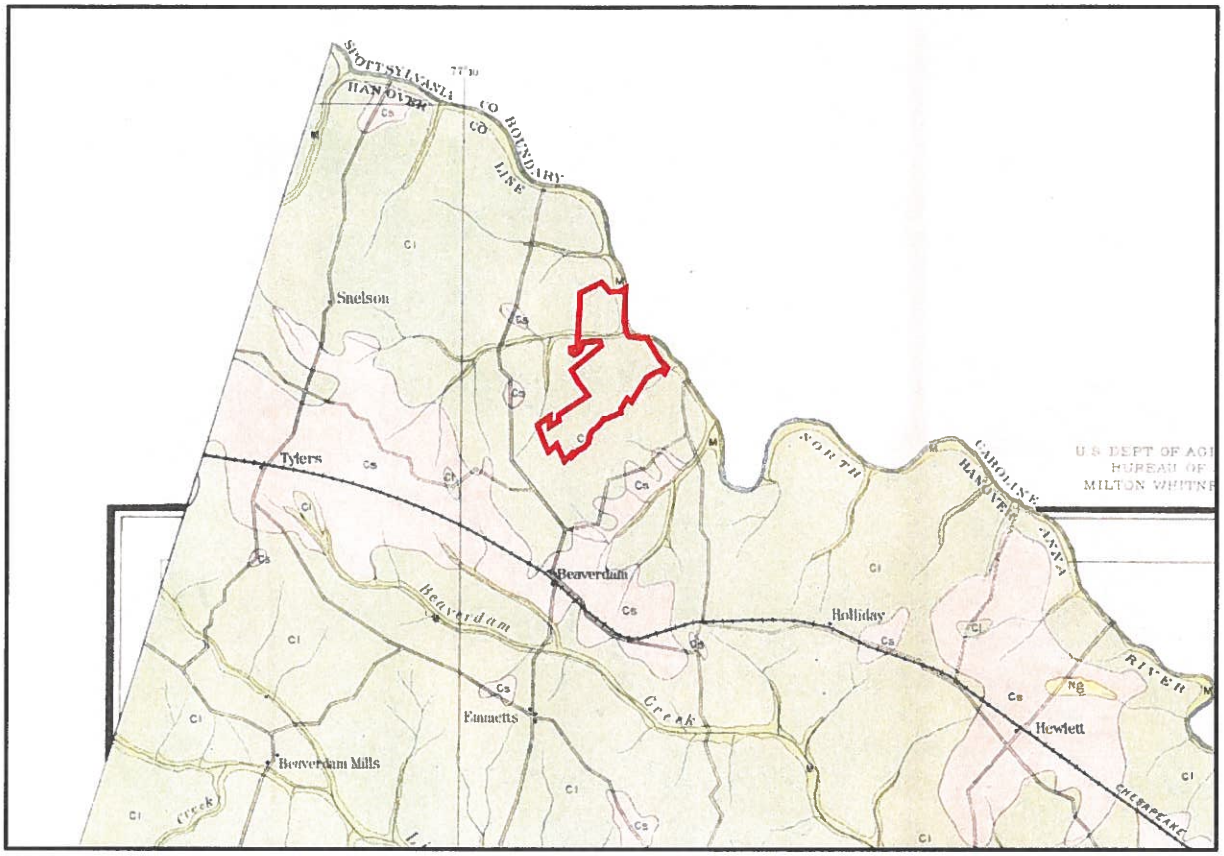

Figure 19. Approximate project area shown on 1905 Soil Survey Map of Hanover County.

The 1942 Beaverdam, Virginia, USGS quadrangle provides the most detailed depiction of the project area. The 1942 map shows isolated residences scattered across the landscape, with large portions of the region unimproved (Figure 20). The 1942 map also shows three buildings within the project area. This is the first map to show development within the project area.

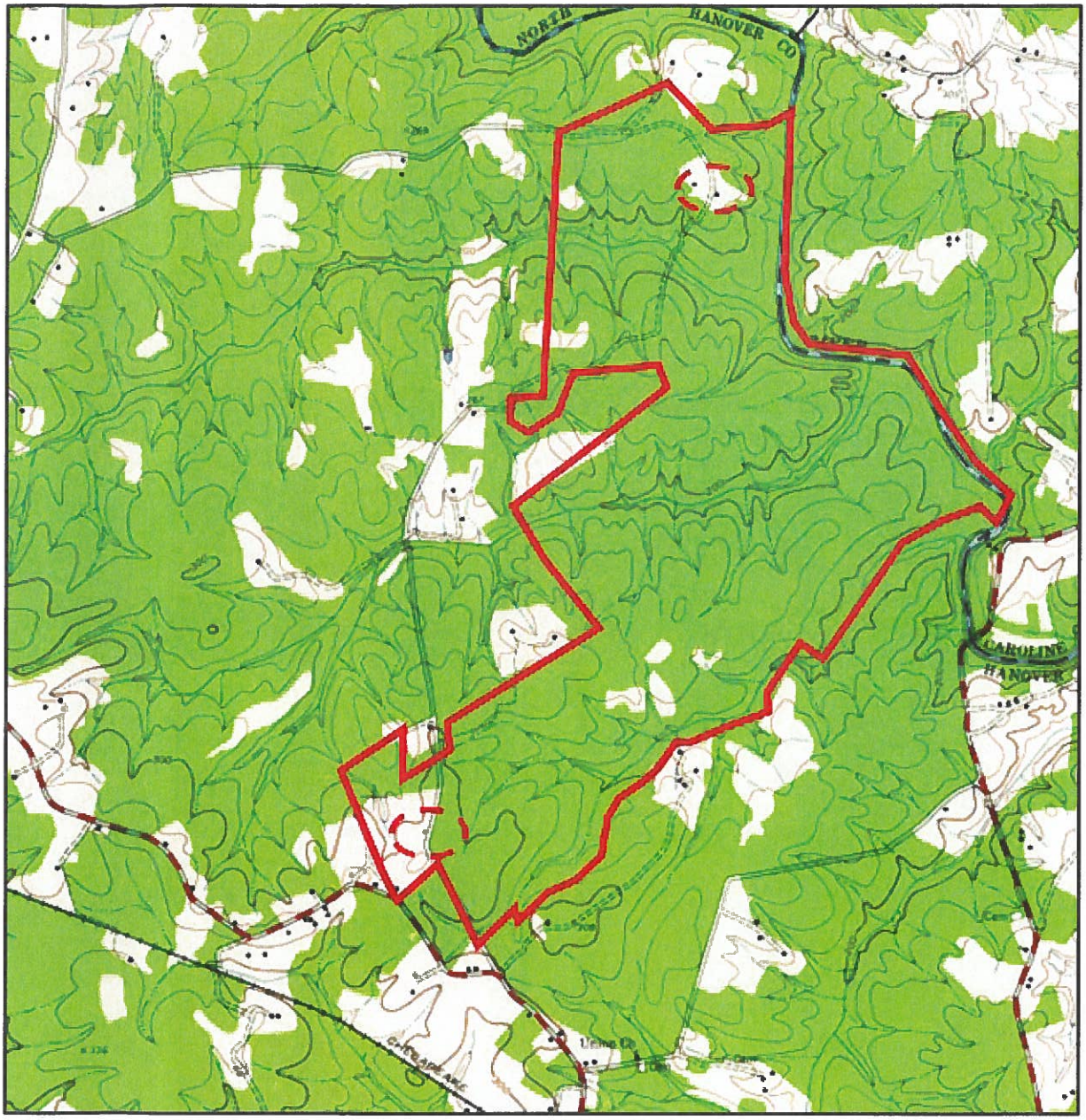

Figure 20. Approximate project location shown on 1942 Beaverdam, Virginia, USGS quadrangle. Buildings within the project area are highlighted with red dashed circles.

By the late twentieth century, the development shown on the 1942 map has decreased. On the 1969 Beaverdam, Virginia, USGS quadrangle, the two buildings in the northern portion of the project area are not depicted and the general landscape surrounding the project area is largely undeveloped. A review of modern aerials shows the project area completely devoid of any buildings or structures. While Hanover County experienced a boom in economic activity and population growth starting in 1950, the majority of that growth was centered around the southern and eastern portions of the county. The project area, and most of western Hanover County, retained its rural setting throughout the twentieth century.

In summary, the project area has had only limited development in the historic past. For most of the historic period, the project area was undeveloped. Its distance from key population centers and major transportation networks prevented it from seeing the development common in central and eastern Hanover County. There is no evidence the project area was a site of engagement during the Civil War and its location in Hanover County makes it unlikely to have seen major troop movement or encampments. The only buildings depicted in the project area are shown on the 1942 and 1969 USGS quadrangles and consist of three buildings. While it is possible these buildings date prior to the mid-twentieth century, a review of modern aerials shows that by 1994 they had been demolished. According to the logging maps provided by the current land manager, the project area has been used solely for rotational timber harvesting since the mid-twentieth century.

ARCHAEOLOGICAL SITE POTENTIAL

SWCA conducted a Phase IA reconnaissance on April 18 and 19, 2022. The objective was to evaluate the existing conditions within the project area for the likelihood of encountering archaeological sites and historic buildings and structures through background research and visual inspection and field analysis of the geomorphology, topography, and stratigraphy within the project area. Field observation of the sediments, soils, and landforms throughout this project area allowed for the refinement of high, moderate, and low potential locations for buried and intact soils and their associated cultural materials previously defined during background research and desktop research.

Precontact Site Potential

A review of sites near the project area and general trends of precontact settlement systems in the Coastal Plain of Virginia has identified several trends that can help identify probability areas within the APE. Environmental factors such as proximity to water, the presence of well-drained soils, slope, general topography, geomorphology, and other such variables have been found to correlate strongly with the presence of precontact sites. Further analysis of sites near the project and their location on the landscape allows for a probability assessment of the project area to be developed. In general, the project area lacks many of the key landforms and features in the landscape that are typically associated with substantial precontact sites in the Northern Coastal Plain region, such as major rivers flowing through the project area, confluences of streams, well-drained arable soils, and/or well-established terraces.

Alluvial terraces and floodplains along the eastern boundary adjacent to North Anna River and those bordering the northernmost unnamed drainage, Watleg Branch, and Hogan Creek have the highest probability to contain deeply buried precontact archaeological sites. However, much of the slopes adjacent to the upper portions of these drainages are steep and erosional with narrow floodplains. Erosional channels flow into the drainages, and based on field observation, the drainages do not appear to have any accumulated alluvium associated with these channels, as they are predominantly cutting into weathered bedrock. On the other hand, the width of the floodplains and associated terraces increases as slope decreases in the lower portions of the drainages. Site probability also increases on adjacent terraces and uplands overlooking these steep slopes and drainages.

In addition, most of the project area has been heavily impacted by recent timbering. Logging of land parcels within the project area lowers archaeological site potential for several reasons. Bulldozing and land clearance displaces the surface sediment and can relocate surface artifacts to other locations and destroy evidence of historic structures, all of which then becomes spread across the surface. Push piles were evident throughout the project area. Tree falls also cause surface disturbance by dislodging surface sediments that adhere to the fall tree's root structure; large basins caused by tree falls pock the surface throughout the project area. In addition, logging roads and deep ruts caused by the weight of large logging

truck were observed throughout the project area. Given these factors, as well as the shallow soil profile identified through geoarchaeological field analysis, it is unlikely that intact precontact archaeological sites are present within the project area unless they are deeply buried.

Historic Site Potential

Historic period site location influences follow parameters similar to those for precontact sites, with some additional influences. Proximity to water sources in early historic times influenced the locations for settlements. As time progressed, the availability of water transport allowed for expansion away from perennial water sources. In the historic period, people commonly settled along roadways and, after construction, at intersections. These early roadways created high-traffic areas where other structures, including hotels, taverns, and stores, were built. Based on the review of the historic context of the project area and the historical map review, several areas within the APE have the potential to contain historic period sites.

Occupation of the project area in the historic period can be traced through the documentary record to the early twentieth century. Given this, areas within the project area likely to contain historic period archaeological sites are those near the mapped location of buildings depicted in the documentary record. Additionally, a walkover survey of the entire low probability area, combined with the excavation of judgmental shovel testing, should be undertaken, outside of the portion of the project area that has been recently timbered. An analysis of the probability assessment and suggestions for future refinement for projects within the general vicinity of the project area will be provided in the Phase IB report.

Areas with the highest probability to contain historic period archaeological sites are directly adjacent to and on the upland areas adjacent to the four drainages mentioned previously. There is potential for sites buried in subsurface deposits within alluvial deposits located in the lower portions of these drainages where floodplains widen. Besides domestic or agricultural sites, there is a low potential for sites related to the Civil War. Due to the project area's remote location in Hanover County and the distance from Hanover County to major theaters of conflict during the Civil War, the potential for Civil War–era archaeological sites within the project area is minimal.

Areas with the highest probability to contain historic period archaeological sites and/or structures are located near the three buildings depicted on the 1942 Beaverdam, Virginia, USGS quadrangle. Two of the buildings are located in the northern portion of the APE and one is located near the southwestern boundary. During subsequent decades, development within the APE decreased; the two buildings in the northern portion of the APE are no longer present on the 1969 Beaverdam, Virginia, USGS quadrangle and the landscape remains undeveloped. There is a potential for subsurface deposits to be present at all three locations. None of the buildings were present on the modern aerial photograph dating to 1994, indicating that they had all been demolished by the early 1990s. Modern aerial imagery does not indicate any additional buildings or structures were constructed since this period. The majority of development in Hanover County throughout the twentieth century occurred in the southern and eastern portions of the county. Very little development occurred within the APE due to its distance from key population centers and major transportation networks.

Overall Archaeological Site Potential

Based on the results of the Phase IA reconnaissance, a site probability model based on geoarchaeological background research and field evaluation within the APE was developed and is presented in Figure 21. The recommended survey testing for cultural resources for the Anna River Solar Project is summarized in Table 4.

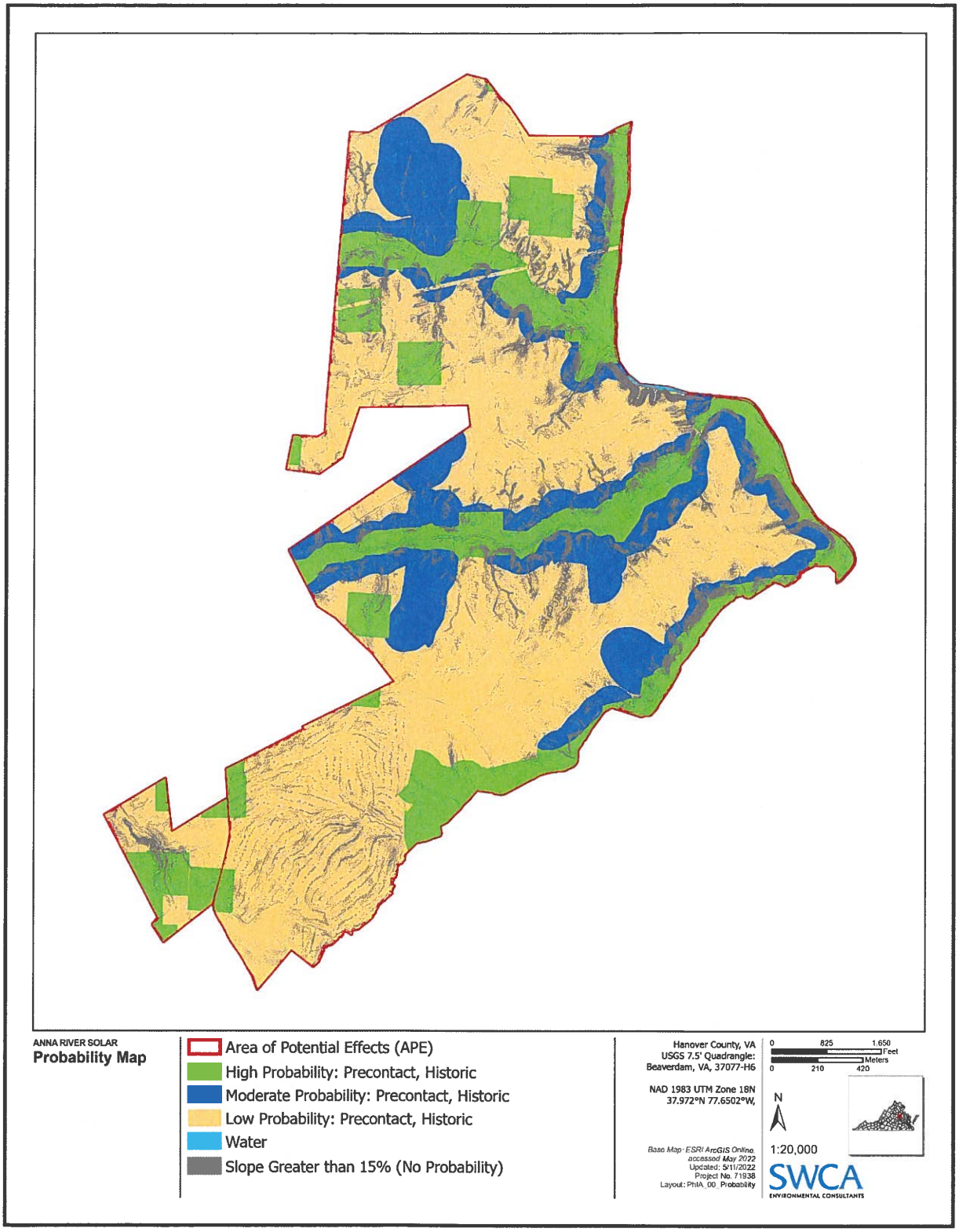

Figure 21. Site probability model for archaeological and historic sites.

Table 4. Recommended Testing of the Anna River Solar Project

Potential	Area (acres)	Reason	STP Sample	STP Area (acres)
High	244	Landforms where burial of cultural material has high potential: precontact and historic sites within alluvium, historic-aged structures noted on historical maps.	100%	244
Moderate	185	Undisturbed landforms that overlook water sources.	25%, chosen based on field conditions, pedestrian survey of remainder	46.25
Low	701	Upland areas disturbed by commercial logging.	10%, chosen based on field conditions, pedestrian survey of remainder	70
No Subsurface Testing	0	Wetlands and slopes above 15%.	Pedestrian survey where possible	No subsurface testing
Total	**1,130**			**360.25**

STP = shovel test pit

The project APE is considered to have a relatively low potential for intact archaeological deposits associated with the precontact occupation of the area in the uplands for the following reasons:

- The uplands have undergone either little to no deposition and are exposed weathered bedrock with shallow soil profiles.
- Extensive erosion, evident by widespread gullying downslope from uplands throughout the project area, indicates that potential past deposits on the uplands are now missing. Erosion has been accelerated by logging activities that have cleared the land.
- Extensive surface and plow zone disturbance from logging activities since at least the 1940s have occurred on nearly every upland surface.
- Although the widespread presence of well-drained arable soils could indicate the potential presence of Late Precontact sites, given the extent of surface disturbance activity to a significant depth, it is unlikely that such sites would have any integrity.
- There is an absence of major rivers flowing through the APE and their associated well-defined terraces.
- The APE is distant from major historical transportation routes.

There is high potential for intact buried archaeological deposits in areas adjacent to and overlooking the four main drainages that either cross (unnamed northern drainage and Hogan Creek) or border (Watleg Branch and North Anna River) the APE. However, site burial on the uplands would be minimal due to shallow soils.

Occupation of the project area in the historic period can be traced through the documentary record to the early twentieth century. Given this, areas within the APE likely to contain historic period archaeological sites are those near the mapped location of buildings depicted in the documentary record.

Additionally, a walkover survey of the entire low probability area, combined with the excavation of judgmental shovel testing, should be undertaken, outside of the portion of the project area that has been recently timbered. An analysis of the probability assessment and suggestions for future refinement for projects within the general vicinity of the APE will be provided in the Phase IB report.

HISTORIC RESOURCE POTENTIAL

SWCA recommends a historic architecture survey focusing on the buildings and structures that are 45 years or older. Due to the rural nature of Hanover County and the forested landscape surrounding the project, it is unlikely the project will visually affect any aboveground resources that are not directly adjacent to the APE.

SUMMARY AND CONCLUSIONS

In support of the Anna River Solar Project in Hanover County, Virginia, SWCA undertook a Phase IA reconnaissance to determine the likelihood of the APE containing cultural resources. The results of background research and a field visit indicated the APE has a mostly low to moderate probability of containing precontact archaeological sites and historic resources on the uplands due to repeated logging practices over recent decades, surface disturbance, and subsequent widespread erosion. Along the four drainages that either cross or border the APE, there is high potential for buried archaeological sites and moderate potential on landforms overlooking these drainages.

Based on geoarchaeological analysis of multiple environment factors within the APE, background research, and evaluation through a site visit, SWCA recommends that a Phase IB survey of total of 360 acres (146 hectares) be undertaken in order to determine if archaeological sites are present within the portions of the project that have low to high archaeological potential. Of those 360 acres (146 hectares), it is suggested that a sampling strategy should test high probability areas adjacent to the four drainages and buffer zones around the three mapped historic-aged structures at 100 percent (244 acres, 98.7 hectares), moderate probability areas overlooking the four drainages at 25% (46.25 acres, 18.6 hectares), and low probability upland areas affected by logging at 10% (70 acres, 28.3 hectares).

In the portions of the APE that have a low probability of containing archaeological resources, SWCA recommends that a visual inspection and judgmental shovel testing be conducted and that the ground disturbance caused by timbering be verified. This visual inspection should cover all of the low probability area outside of the area that has been recently timbered. During the Phase IB survey, areas with a high potential of containing archaeological sites should be sampled with shovel testing at 15-m (50-foot) intervals or, if suitable ground visibility is present, by systematic surface survey. The survey methodology should be consistent with VDHR guidelines for Phase I archaeological investigations (VDHR 2017).

It is also recommended that a historic architecture survey focusing on the 30 resources that have not been evaluated for NRHP eligibility be conducted.

REFERENCES CITED

American Battlefield Trust
2022 The Peninsula Campaign. Available at: https://www.battlefields.org/learn/articles/peninsula-campaign-0. Accessed June 2022.

Anderson, David G., David S. Brose, Dena F. Dincauze, Michael J. Shott, Robert S. Grumet, and Richard C. Waldbauer
2007 *The Earliest Americans Theme Study.* Archaeology Program, National Park Service, U.S. Department of the Interior, Washington, D.C. Available at: https://www.nps.gov/archeology/pubs/nhleam/index.htm. Accessed October 2022.

Anderson, David G., and Michael K. Faught
1998 The Distribution of Fluted Paleoindian Projectile Points: Update 1998. *Archaeology of Eastern North America* 26:163–187.

Anderson, David G., D. Shane Miller, Stephen J. Yerka, J. Christopher Gillam, Erik N. Johanson, Derek T. Anderson, Albert C. Goodyear, and Ashley M. Smallwood
2010 PIDBA (Paleoindian Database of the Americas) 2010: Current Status and Findings. *Archaeology of Eastern North America* 38:63–90.

Anderson, David G., and Kenneth E. Sassaman
1996 *The Paleoindian and Early Archaic in the Southeast.* University of Alabama Press, Tuscaloosa.

Barber, Michael B., and Eugene B. Barfield
1989 Paleoindian Chronology for Virginia. In *Paleoindian Research in Virginia: A Synthesis,* edited by J. M. Wittkofski and T. R. Reinhart, pp. 53–70. Special Publication No. 19 of the Archeological Society of Virginia. Dietz Press, Richmond, Virginia.

Carr, Kurt C.
1975 The Analysis of a Paleoindian Site in the Shenandoah Valley with an Emphasis on Chronology and Function. Unpublished Master's thesis, Department of Anthropology, Catholic University of America, Washington, D.C.

Carr, Kurt, and James Adovasio
2002 Paleoindians in Pennsylvania. In *Ice Age Peoples of Pennsylvania,* Vol. 2, pp. 1-50. Bureau of Historic Preservation and Pennsylvania Historical and Museum Commission, Harrisburg, Pennsylvania.

oe, Joffre L.
1964 *The Formative Cultures of the Carolina Piedmont.* Transactions of the American Philosophical Society, Vol. 54, No. 5. American Philosophical Society, Philadelphia, Pennsylvania.

Custer, John F.
1990 Early and Middle Archaic Cultures of Virginia: Culture Change and Continuity. In *Early and Middle Archaic Research in Virginia: A Synthesis,* edited by T. R. Reinhart and M. E. Hodges, pp. 1–60. Special Publication No. 22 of the Archeological Society of Virginia. Dietz Press, Richmond, Virginia.

Dent, I.R., Jr.
1995 *Chesapeake Prehistory*. Plenum Press, New York, New York.

Dillehay, Thomas D.
2000 *The Settlement of the Americas*. Basic Books, New York, New York.

Egloff, Keith
1985 Spheres of Cultural Interaction Across the Coastal Plain of Virginia in the Woodland Period. In *Structure and Process in Southeastern Archaeology,* edited by R. S. Dickens, Jr., and H. T. Ward, pp. 229–242. University of Alabama Press, Tuscaloosa.

Egloff, Keith, and Stephen Potter
1982 Indian Ceramics from Coastal Plain Virginia. *Archaeology of Eastern North America* 10:95–117.

Family Search
2022 Hanover County, Virginia Genealogy. Family Search. The Church of Jesus Christ of Latter-day Saints. Last edited August 31, 2022. Available at: https://www.familysearch.org/wiki/en/Hanover_County,_Virginia_Genealogy. Accessed October 2022.

Ford, Richard I.
1977 Evolutionary Ecology and the Evolution of Human Ecosystems: A Case Study from the Midwestern United States. In *Explanation of Prehistoric Change*, edited by J.N. Hill, pp. 153–184. University of New Mexico Press, Albuquerque.

Fritz, Gayle J. and Bruce D. Smith
1988 Old Collections and New Technology: Documenting Domestication of Chenopodium in Eastern North America. *Midcontinental Journal of Archaeology* 13(1):3-27.

Gardner, William M.
1974 The Flint Run Complex: Pattern and Process During the Paleoindian to Early Archaic. In *The Flint Run Paleoindian Complex: A Preliminary Report 1971-1973 Seasons,* edited by W. M. Gardner, pp. 5–47. Occasional Paper 1. Catholic University of America, Department of Anthropology, Archaeology Laboratory, Washington, D.C.

1977 Flint Run Paleo-Indian Complex and Its Implication for Eastern North American Prehistory. In *Amerinds and their Paleoenvironments in Northeastern North America*, edited by Walter Newman and Bert Salwen, pp. 257–263. Annals of the New York Academy of Sciences No. 288. New York Academy of Sciences, New York.

1989 An Examination of Culture Change in the Late Pleistocene and Early Holocene (circa 9200 to 6800 B.C.). In *Paleoindian Research in Virginia: A Synthesis,* edited by J. M. Wittkofski and T. R. Reinhart, p. 5–52. Special Publication No. 19 of the Archeological Society of Virginia. Dietz Press, Richmond, Virginia.

Goodyear, Albert C., III
1999 Results of the 1999 Allendale Paleoindian Expedition. *Legacy* 4(1-3):8–13.

2000 Topper Site: Results of the 2000 Allendale Paleoindian Expedition. *Legacy* 5(2):18–26.

2006 Evidence for Pre-Clovis Sites in the Eastern United States. In *Paleoamerican Origins: Beyond Clovis*, edited by Robson Bonnichsen, Bradley P. Lepper, Dennis Stanford, and Michael A. Waters, pp. 103–112. Texas A&M University Center for the Study of the First Americans and Texas A&M University Press, College Station.

Griffin, James B.
1967 Eastern North American Archaeology: Summary. *Science* 156:175–191.

Hanover County Economic Development (HCED)
2022a Historic Hanover County Virginia Tourism Map. Hanover County, Virginia. Available at: http://www.hanovervirginia.com/wp-content/uploads/Complete_Historic_Tourism_map.pdf. Accessed April 2022.

2022b Hanover County's Top Employers. Hanover County, Virginia. Available at: https://www.hanovervirginia.com/explore-hanover/leading-employers/. Accessed October 2022.

Hanover County Historical Society
2022 History. Available at: https://www.hanoverhistorical.org/history.html. Accessed October 2022.

Hantman, Jeffrey L., and Michael J. Klein
1992 Middle and Late Woodland Archaeology in Piedmont Virginia. In *Middle and Late Woodland Research in Virginia: A Synthesis,* edited by Theodore R. Reinhart and Mary Ellen N. Hodges, pp.137-164. Special Publication No. 29 of the Archeological Society of Virginia.

Johnson, Michael F.
1996 Paleoindians Near the Edge: A Virginia Perspective. In *The Paleoindian and Early Archaic Southeast*, edited by D. G. Anderson and K. E. Sassaman, pp. 187–212. University of Alabama Press, Tuscaloosa.

Justice, Noel D.
1987 *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States*. Indiana University Press, Bloomington.

Keller, Genevieve P., Ashley M. Neville, Heather E. Maginniss, Katharine T. Lacy, J. Timothy Keller, and Gregory Brittingham
1990 *Survey of Historic Resources, Hanover County, Virginia*. Land and Community Associates, Charlottesville, Virginia.

Kidd, Thomas
2021 The Great Awakening in Virginia. Encyclopedia Virginia. Virginia Foundation for the Humanities. Available at: https://encyclopediavirginia.org/entries/great-awakening-in-virginia-the/. Accessed October 2022.

Laird, Matthew R.
2017 *Phase I Archaeological Survey of the Emporia Readiness Center (Armory) Greensville County, Virginia*. James River Institute for Archaeology, Inc. Report on file at the Virginia Department of Historic Resources, Project Review File No. 2016-0996.

Manarin, Louis H., and Clifford Dowdey
2007 *The History of Henrico County*. County of Henrico, Henrico, Virginia.

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

2003 *The Williamson Clove Site, 44DW1, Dinwiddie County, Virginia: An Analysis of Research Potential in Threatened Areas*. Research Report Series No. 13. Virginia Department of Historic Resources, Richmond.

McCartney, Martha W.
2009 *Nature's Bounty, Nation's Glory: The Heritage and History of Hanover County, Virginia.* Heritage and History of Hanover County, Inc., Virginia.

McCoy, Curtis, Jonas Schnur, and Heather Dollins Staton
2021 *Phase IA Cultural Resource Survey of the Anna River Solar Project Area, Hanover County, Virginia*. Dovetail Cultural Resource Group. Draft report on file at SWCA RDU, Cary, NC.

McLearen, Douglas C.
1991 Late Archaic and Early Woodland Material Culture in Virginia. In *Late Archaic and Early Woodland Research in Virginia: A Synthesis*, edited by T.R. Reinhart and M.E.N. Hodges, pp. 89–138. Special Publication No. 23 of the Archaeological Society of Virginia. Dietz Press, Richmond, Virginia.

Mouer, Daniel
1991 The Formative Transition in Virginia. In *Late Archaic and Early Woodland Research in Virginia: A Synthesis,* edited by T. R. Reinhart and M. E. Hodges, pp.1–88. Special Publication No. 23 of the Archeological Society of Virginia. Dietz Press, Richmond, Virginia.

Natural Resources Conservation Service (NRCS)
2006 *Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin.* U.S. Department of Agriculture Handbook 296. Washington D.C. Available at: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_050898.pdf. Accessed April 2022.

2022 Web Soil Survey. Available at: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed April 2022.

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

Smith, Hope
2019 *Phase I Cultural Resources Survey of the +/-87.9-Hectare (+/-217.4-Acre) Project Tiger Project Area, Hanover County, Virginia.* Dutton + Associates, LLC, Richmond, Virginia.

Stewart, R. Michael, and J. Cavallo
1991 Delaware Valley Middle Archaic. *Journal of Middle Atlantic Archaeology* 7:19–41.

Turner, E. Randolph, III
1992 The Virginia Coastal Plain During the Late Woodland Period. In *Middle and Late Woodland Research in Virginia: A Synthesis,* edited by T. R. Reinhart and M. E. Hodges, pp. 97–136. Special Publication No. 29 of the Archeological Society of Virginia. Dietz Press, Richmond, Virginia.

United States Federal Population Census (U.S. Census)
1810 Third Census of the United States, 1810. National Archives and Record Administration, Washington, D.C. Available at: www.ancestry.com. Accessed April 2022.

1840 Sixth Census of the United States, 1840. National Archives and Record Administration, Washington, D.C. Available at: www.ancestry.com. Accessed April 2022.

1940 Sixteenth Census of the United States, 1940. National Archives and Record Administration, Washington, D.C. Available at: www.ancestry.com. Accessed April 2022.

1950 Department of Commerce. Bureau of the Census. 1913-1/1/1972. Population Schedules for the 1950 Census, 1950 - 1950. Washington, DC: National Archives at Washington, D.C. Available at: www.ancestry.com. Accessed April 2022.

2020 U.S. Census Bureau QuickFacts: Hanover County, Virginia. Available at: https://www.census.gov/quickfacts/hanovercountyvirginia. Accessed April 2022.

Virginia Department of Conservation and Recreation (DCR)
2016 *Overview of the Physiography and Vegetation of Virginia*. Virginia DCR Natural Heritage Program, Richmond. Available at: https://www.dcr.virginia.gov/natural-heritage/natural-communities/document/ncoverviewphys-veg.pdf. Accessed April 2022.

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

2022 Virginia Cultural Resource Information System (VCRIS). Electronic GIS maintained by the Virginia Department of Historic Resources, Richmond, Virginia. Accessed April 2022.

Virginia Division of Geology and Mineral Resources
2022 Geology and Mineral Resources. Available at: https://www.energy.virginia.gov/geology/geologymineralresources.shtml. Accessed April 2022.

Voigt, Eric E. and Deborah M. Pearsall (editors)
1989 New World Paleoethnobotany: Collected Papers in Honor of Leonard W. Blake. *The Missouri Archaeologist* 47.

APPENDIX A

Resumes of Key Project Staff

SWCA | Resume

HEIDI LUCHSINGER, MA, PHD, RPA, AIPG-PM

CULTURAL RESOURCES TEAM LEAD

YEARS OF EXPERIENCE

21

EXPERTISE

Phase I survey, Phase II testing and evaluation, Phase III data recovery

Geoarchaeology

Paleolandscape reconstruction

Predictive models

Core-based deep testing

Stratigraphic interpretation for archaeological site evaluation

Diachronic regional correlations of stratigraphy and the archaeological record

Late Quaternary paleoclimates

Archaeological micromorphology

Ceramic petrography

Lithic sourcing through petrography

EDUCATION

Ph.D., Anthropology; Texas A&M University; 2006

M.A., Anthropology; Texas A&M University; 2001

REGISTRATIONS / CERTIFICATIONS

Registered Professional Archaeologist, RPA No. 18388

Professional Member of the American Institute of Professional Geologist No. 3256

TRAINING

CPR, Defensive Driving

MEMBERSHIPS

Society for American Archaeology, Geoarchaeology Interest Group

Geological Society of America (Geoarchaeology Division, Quaternary Geology and Geomorphology Division)

Southeastern Archaeology Conference

Register of Professional Archaeologists

American Institute of Professional Geologists

American Cultural Resources Association

Heidi Luchsinger is a geoarchaeologist and Cultural Resources Team Lead based out of SWCA's Raleigh Office. Dr. Luchsinger has conducted fieldwork in Pennsylvania, Virginia, the Carolinas, Florida, Texas, Minnesota, Puerto Rico, Ireland, and Argentina. She has worked on federal projects in addition to generation, transmission, oil and gas, land development, and transportation projects including: the U.S. Army Corps of Engineers (USACE), Federal Emergency Management Agency (FEMA), Appalachian Power Company (APCo), Enbridge Inc., and Gulf Power. She has also worked on federally funded projects in South America. Her expertise is in interpreting the geological, depositional, post-depositional, and paleoenvironmental context of the archaeological record to assist in: identifying landforms within a project area with high potential for containing buried archaeological sites, evaluating site integrity, and making regional stratigraphic and archaeological correlations across a project area through chronometric dating, stratigraphic marker horizons, and core-based or deep testing. She specializes in the application of geoscience methods to interpreting the archaeological record which include: coring, stratigraphic analysis, physical and chemical sediment analysis, archaeological micromorphology, geomorphology (fluvial, eolian, coastal, and glacial), pedology, synthesis of local and regional paleoclimatic data, ceramic petrography, and lithic sourcing through petrography. She is also successful in writing and obtaining federal grants/funding (National Science Foundation, Fulbright Foundation, Geological Society of America, Society for American Archaeology) and has 17 years of teaching experience at two universities (Texas A&M University and East Carolina University). She has presented her research at both regional and international conferences as well as published her work in in various international publications both in English and Spanish.

SELECTED PROJECT EXPERIENCE (* denotes project experience prior to SWCA)

Confidential Project, Phase I Cultural Resource Survey, Mine Development Project, Western North Carolina (ongoing). Directed archaeological and historic architecture survey. *Role: Principal Investigator, Geoarchaeologist, and report author.*

Confidential Project, Phase IA Archaeological Survey, Land Development Project, North Carolina (ongoing). Directed archaeological and historic architecture survey. *Role: Principal Investigator, Geoarchaeologist, and report author.*

Confidential Project, Phase IA Archaeological and Historic Architecture Reconnaissance, Solar Development Project, Eastern Virginia. Directed archaeological and historic reconnaissance. *Role: Principal Investigator, Geoarchaeologist, and report author.*

Confidential Project, Phase I Cultural Resource Survey, Solar Development Project, Eastern Virginia. Directed archaeological and historic architecture survey. *Role: Principal Investigator, Geoarchaeologist, and report author.*

Confidential Project, Phase I Subsurface Testing of a Floodplain along a Major River in Northern Pennsylvania. Directed project for core-based testing, stratigraphic recording, and sediment sample collection. Analyzed and synthesized stratigraphic data from core-based testing of the project area, reconstructed the Late Pleistocene through Holocene landscape history for the river valley segment, and evaluated the need for further deep testing. *Role: Senior Geoarchaeologist and Field Director of core-based testing, stratigraphic analysis and geomorphic interpretation of core segments, and report authorship.*

***Confidential Project, Northern Minnesota.** Co-directed project for core-based testing, stratigraphic recording, radiocarbon sample collection, and archaeological monitoring during construction of 339-mile pipeline across northern Minnesota. *Role: Co-Project Manager, Field Director, and Co-geoarchaeologist for coring, sampling, stratigraphic recording, monitoring, geomorphic interpretation, and report preparation.*

***Confidential Project, Northern Florida.** In coordination with Phase II testing directed by the project managers, conducted fieldwork for sampling, thin section and geomorphological analysis, and prepared a report on the geoarchaeology of 8 excavation blocks representing 6 archaeological sites to evaluate the potential effects of construction of the transmission line. *Role: Archaeological micromorphologist and Co-geoarchaeologist for sampling, micromorphological analysis, geomorphic interpretation, and report preparation.*

***Cultural Resource Survey of the Río Nigua Flood Control Project, Salinas Municipality, Puerto Rico.** Subcontracted by SEARCH-SEARCH H_20 Inc. and U.S. Army Corps of Engineers (USACE). Analyzed stratigraphy, collected sediment blocks for thin section processing, and conducted micromorphological analysis to assist in interpretation of the archaeological context of deep testing locations. *Role: Geoarchaeologist and archaeological micromorphologist for sampling, analysis, and geomorphic interpretation.*

***Cultural Resource Investigations and Mitigation at the Smith Mountain Hydroelectric Project, Bedford, Franklin, and Pittsylvania Counties, Virginia.** Subcontracted by Geoarcheological Research Associates Inc., Terracon Consultants Inc., and Appalachian Power Company. Analyzed and synthesized stratigraphic and radiocarbon data core-based testing from two localities within the project area. *Role: Senior geoarchaeologist for geomorphic interpretation and report preparation.*

***Cultural Resource Phase I Subsurface Testing along the Columbia Canal, City of Columbia, South Carolina.** Subcontracted by Geoarcheological Research Associates Inc., Michael Baker International, and the Federal Emergency Management Agency (FEMA). Analyzed and synthesized stratigraphic and radiocarbon data core-based testing from two localities within the project area. *Role: Senior Geoarchaeologist and field director of core-based testing, stratigraphic analysis and collection of radiocarbon samples from core segments, geomorphic interpretation of core segments, and report preparation.*

***Cultural Resource Phase II Deep Testing for Archaeological Assessment of DD0100042, Río de la Plata, Dorado Municipality, Puerto Rico.** Subcontracted by SEARCH-SEARCH H_20 Inc. and U.S. Army Corps of Engineers (USACE). Analyzed stratigraphy, collected sediment blocks for thin section processing, and conducted micromorphological analysis to assist in evaluation of the archaeological context and site boundaries from deep testing locations. *Role: Geoarchaeologist and archaeological micromorphologist for sampling, analysis, and geomorphic interpretation.*

***Cultural Resource Phase III Data Recovery Excavation of the Las Cotorras Archaeological Site, D-18, Río de la Plata Flood Damage Reduction Project, Dorado Municipality, Puerto Rico.** Subcontracted by SEARCH-SEARCH H_20 Inc. and U.S. Army Corps of Engineers (USACE). Analyzed valley geomorphology and conducted micromorphological analysis to assist in evaluation of the archaeological context of the D-18 archaeological site. *Role: Archaeological micromorphologist.*

***Cultural Resource Phase I Survey of the Proposed North Corridor Commuter Rail Project (NCCR), Charlotte Area Transit System, Charlotte, North Carolina.** Directed pedestrian survey, field logistics, and report preparation. *Role: Project manager.*

***Cultural Resource Phase I Survey of Proposed Land Application Tracts, Onslow County, North Carolina.** Directed pedestrian survey, field logistics, and report preparation. *Role: Project manager.*

***Cultural Resource Phase I Survey and Evaluation, Replacement of Bridge 415 on SR2873 (Riverside Road) Over Fork Creek, Randolph County, North Carolina.** Directed pedestrian survey, field logistics, and report preparation. *Role: Project manager.*

***Cultural Resource Phase I Survey for the Tri-County Parkway Location Study, Loudoun and Prince Williams Counties, Virginia.** Directed pedestrian survey, field logistics, and report preparation. *Role: Project manager.*

***Cultural Resource Phase III Archaeological Data Recovery, Bridge No. 129 on SR 1565 over the Tar River, Grimesland, Pitt County, North Carolina.** Report preparation. *Role: Report author.*

***Cultural Resource Phase I Survey, Proposed Connector of Pacific Boulevard, Loudon County, Virginia.** Report preparation. *Role: Report author.*

SWCA | Resume

YEARS OF EXPERIENCE

6

EDUCATION

M.A., Historical Archaeology; University of Massachusetts Boston; 2018

B.A., Anthropology, m: History; University of Massachusetts Amherst; 2014

Certificate in Native American Indian Studies; University of Massachusetts Amherst; 2014

EXPERTISE

Archaeological excavation, testing, and data recovery

NHPA S.106 & NEPA compliance

Historical Archaeology

Northeast Archaeology

Tribal Consultation

Lithic and ceramic analysis

Historic artifact analysis

NRHP evaluations

Archival and documentary research

State & Local Government

Artifact Photography

REGISTRATIONS / CERTIFICATIONS

Adult First Aid/CPR/AED Certified No. 0IN475; American Red Cross; 2022

Safety Certified Field Supervisor; 2021

Registered Professional Archaeologist No. 17593; 2019

TECHNICAL SKILLS

Esri GIS mapping programs

Microsoft Office Suite

iCIMS

Google Earth

SHPO Databases

Canon DSLR Cameras

AWARDS

SWCA Gives Back "Have A Heart", 2020, 2021

NADIA WASKI, M.A., RPA,

ASSOCIATE PROJECT ARCHAEOLOGIST

Nadia Waski is an associate project archaeologist, conducting cultural resources compliance under the National Historic Preservation Act (Sections 106 and 110) and for state-level reviews. She has 4 years of professional experience in the public sector. She was trained in the Technical Services Division at the Massachusetts Historical Commission, where she transitioned into a preservation planner/archaeologist role. She also sat on the Massachusetts Board of Underwater Archaeology during her time at the state and participated in field investigations in accordance with the Massachusetts Unmarked Burial Law. She has well-established relationships with Tribal Historic Preservation Offices in the northeast region, local historical commissions, and state agencies in New England. Her area of expertise is in historical archaeology, lithics, and state and federal regulatory processes. Her focus is on Native American cultural history in the Northeast, specifically Native American culture of the Contact Period in the seventeenth and eighteenth centuries. Ms. Waski has supervised and conducted fieldwork across Massachusetts, Maine, Rhode Island, Vermont, New Hampshire, Connecticut, Georgia, New Mexico, and California. Since joining SWCA two years ago, she has worked on projects across the northeast, focusing on Native American site identification and analysis. Ms. Waski has been involved in permitting, managing, fieldwork, and report writing for SWCA projects across New England, the Midwest, southeast, southwest, and west. She also serves as SWCA Amherst Office's Gives Back Co-Champion and has coordinated numerous local community service and fundraising events.

PROJECT EXPERIENCE (* denotes project experience prior to SWCA)

Grid S19 Phase 1B Intensive Survey; National Grid USA Service; Millbury to Webster, Massachusetts (2022). *Role: Associated Project Archaeologist. Co-developed research design, state agency (Massachusetts Historical Commission) permit application, and co-authored due diligence report.*

Grid Gallium 1B Intensive Survey; National Grid USA Service; Vermont and New Hampshire (2022). CONFIDENTIAL. *Role: Assistant Project Manager. Co-developed research design, state agency (Massachusetts Historical Commission) permit application, completed fieldwork, processed/analyzed artifacts, interpreted results, and co-authored report.* Supervised a field crew during an intensive (locational) archaeological survey conducted for the A1//B2 transmission line proposed access roads.

Anpetu Wi Wind Project, Sioux County; North Dakota (2022). CONFIDENTIAL. *Role: Archaeological field technician.* Conducted Class III archaeological surveys at turbine an access road locations working with the Standing Rock Sioux Tribe (SRST) to identify cultural resources within areas of potential impact.

Grid A1/B2 Line Phase 1B Intensive Survey; National Grid USA Service; Warwick to Sterling, Massachusetts; Hinsdale and Winchester, New Hampshire (2022). *Role: Principal Investigator and Field Supervisor. Co-developed research design, state agency*

MEMBERSHIPS

Society for American Archeology, 2020

Council for Northeast Historical Archaeology, 2018

Massachusetts Archaeological Society, 2018

Council for Northeast Historical Archaeology, 2018

Conference on New England Archaeology, 2018

Society for Historical Archaeology; 2015

(Massachusetts Historical Commission) permit application, completed fieldwork, processed/analyzed artifacts, interpreted results, and co-authored report. Supervised a field crew during an intensive (locational) archaeological survey conducted for the A1//B2 transmission line proposed access roads.

Ivanpah-Control 115 kV Transmission Line, Inyo, Kern, and San Bernardino Counties, Southern California Edison; California (2022). CONFIDENTIAL. *Role: Archaeological field technician.* Conducted Phase II archaeological survey at China Lake Naval Base and Kern County to test site boundaries identified during a Class III survey. Participated in laboratory analysis post-fieldwork (ie. artifact photography, artifact processing and cataloguing).

Hampshire and Hampden Canal Reconnaissance Survey; Hampshire and Hampden County, Massachusetts (2022). *Role: Principal Investigator. Completed fieldwork, interpreted results, and co-authored report.* Conducted an archaeological reconnaissance survey to map, document, and inventory nineteenth century historic canal.

AMP Solar Archaeological Reconnaissance Survey; Pelham and Amherst, Massachusetts (2022). *Role: Principal Investigator. Completed fieldwork and authored technical reports.* Conducted archaeological reconnaissance surveys on two parcels to assess landscape for cultural resources.

Phase IA Anna River Solar Project; Strata Solar Development; Hanover County, Virginia (2022). *Role: Principal Investigator.* Conducted background research and co-authored survey report.

Rankin Estates Conservation Development; North Smithfield, Rhode Island (2022). CONFIDENTIAL. *Role: Principal Investigator. Coordination of fieldwork and interpretation of results.* Coordinate a crew of four and conduct a Phase 1 archaeological survey on a 270-acre parcel. The proposed project consists of the construction of 126 residences on a wooded lot.

SunZia (SZ) Corona Wind Project Micrositing; Corona, New Mexico (2021). CONFIDENTIAL. *Role: Field Supervisor.* Lead field crew to conduct cultural surveys to microsite turbine locations, related to the FAA filing for SZ Corona Wind project area.

456-522 Line Structure Replacement Project; Eversource Energy; Walpole to Dover, Norfolk County, Massachusetts (2021). *Role: Principal Investigator. Completed fieldwork, interpreted results, and co-authored report.* Conducted background research and supervised a crew of four to conduct a Phase I intensive (locational) archaeological survey for the proposed replacement of 25 structures.

Freetown-Fall River State Forest Trail Improvements; Massachusetts Department of Conservation and Recreation (DCR); Freetown and Fall River, Massachusetts (2021). *Role: Principal Investigator and Field Supervisor. Co-developed research design, state agency (Massachusetts Historical Commission) permit application, completed fieldwork, interpreted results, and co-authored report.* Conducted a Phase 1B intensive (locational) archaeological survey at three locations within the Freetown-Fall River State Forest, where new off-highway motorcycle (OHM) trails are proposed.

Boston Harrison Ave Phase I and II Archaeological Surveys; Epsilon Associates Inc; Boston, Suffolk County, Massachusetts (2020 and 2021). *Role: Principal Investigator and Field Supervisor. Co-developed research design, state agency (Massachusetts Historical Commission) permit applications, completed fieldwork, processed/analyzed artifacts, interpreted results, and co-authored reports.* Conducted background and documentary research, supervising field crew, completed artifact analysis, and authored permits and reports for both Phase I intensive (locational) archaeological survey and II site examination survey. The surveys were in the downtown of Boston and document artifacts and features related to nineteenth century immigrant life and business in the South Cove neighborhood.

East Zone 4 Restoration; Sevenson Environmental Services, Inc.; Fairhaven, Bristol County, Massachusetts (2021). *Role: Ecological Restoration Field Technician.* Assisted ecological restoration team in planting native species as part of rehabilitation efforts to the adjacent salt marshes.

Grid A1/B2 Line Phase 1B Intensive Survey; National Grid USA Service; Warwick to Sterling, Massachusetts (2021). *Role: Principal Investigator and Field Supervisor. Co-developed research design, state agency (Massachusetts Historical Commission) permit application, completed fieldwork, processed/analyzed artifacts, interpreted results, and co-authored report.* Supervised a field crew of six

during an intensive (locational) archaeological survey at about 260 structures along the main section and tap lines of the Massachusetts portion of the A1/B2 transmission line. Structure replacements are proposed along the entirety of the 76-kilometer (60-mile) corridor.

Grid A1/B2 Line Phase 1B Intensive Survey; National Grid USA Service; Vernon, Vermont (2021). *Role: Principal Investigator and Field Supervisor.* Supervised a field crew of six during an intensive (locational) archaeological survey at 18 structures along the Vermont section of the A1/B2 transmission line. Structure replacements are proposed along the entirety of the 76-kilometer (60-mile) corridor.

Grid A1/B2 Line Phase 1B Intensive Survey; National Grid USA Service; Hinsdale and Winchester, New Hampshire (2021). *Role: Principal Investigator and Field Supervisor.* Supervised a field crew of six during an intensive (locational) archaeological survey at 16 structures along the New Hampshire section of the A1/B2 transmission line. Structure replacements are proposed along the entirety of the 76-kilometer (60-mile) corridor.

AGT 2020 & 2021 O&M; Multiple States (2020 and 2021). CONFIDENTIAL. *Role: Project Archaeologist.* Conducted background research and cultural resource due diligence for submissions to state agencies on a variety of energy projects.

Grid 313 Line Structure 112 Replacement Project; National Grid USA Service; West Boylston, Worcester County, Massachusetts (2021). *Role: Principal Investigator.* Conducted background research and authored due diligence report.

94W42 Line Structures 1 and 4 Replacement Project; National Grid USA Service; Stoughton, Norfolk County, Massachusetts (2021). *Role: Principal Investigator.* Conducted background research and author due diligence report.

Grid E205E Line Structure 510 Replacement Project; National Grid USA Service; Gill, Franklin County, Massachusetts (2021). *Role: Principal Investigator.* Conducted background research and author due diligence report.

Grid N14 Line Conductor Clearance Refurbishment of Structures 126, 370, 372, and 375; National Grid USA Service; Monson and East Longmeadow, Hampden County, Massachusetts (2021). *Role: Principal Investigator.* Conducted background research and author due diligence report.

Grid O15 Line Conductor Clearance Refurbishment of Structures 175, 177, and 211; National Grid USA Service; Hampden and East Longmeadow, Hampden County, Massachusetts (2021). *Role: Principal Investigator.* Conducted background research and author due diligence report.

Grid Y177 Line Structure 29 and Flyover Switch 7711; National Grid USA Service; Rowe, Franklin County, Massachusetts (2021). *Role: Principal Investigator.* Conducted background research and author due diligence report.

59L5 Line Structures 45-50 and 46 Span Project; National Grid; Tewksbury, Middlesex County, Massachusetts (2021). *Role: Principal Investigator.* Conducted background research and writing of due diligence report.

M1 Line Structure 61 Replacement Project; National Grid; Bridgewater, Plymouth County, Massachusetts (2021). *Role: Principal Investigator.* Conducted a site visit and background research for due diligence report.

Berwick Hubbard Solar CR; Wood Environment & Infrastructure Solutions, Inc.; Berwick, York County, Maine (2021). *Role: Principal Investigator and Field Supervisor. Conducted fieldwork and co-authored report.* Supervised a field crew of three during a Phase 1 Reconnaissance Survey on 16 acres of property for a proposed solar array.

Saturn Solar Community Projects; Saturn Power (Saturn); Sheridan, Pomfret and Lewiston, New York (2021). *Role: Principal Investigator.* Conducted background research and writing of scope of services for historic resources survey report.

Bechtelsville Compressor Units Replacement Project; Enbridge; Berks County, Pennsylvania (2021). *Role: Principal Investigator.* Conducted background research and generated a Project Review Form (PRF) for the Pennsylvania State Historic Preservation Office (PASHPO).

Holbrook Compressor Station-Stream Restoration; Enbridge; Greene County, Pennsylvania (2021). *Role: Project Archaeologist.* Conducted background research and due diligence for a proposed stream restoration project at the Holbrook Compressor Station. Generated submission packet for the Pennsylvania State Historic Preservation Office (PASHPO).

Brookview Solar Site; Adams County, Pennsylvania (2021). CONFIDENTIAL *Role: Project Archaeologist.* Conducted background research and due diligence for the proposed construction of a solar array. Generated submission packet for the Pennsylvania State Historic Preservation Office (PASHPO).

Cadence Solar Cultural Resources Surveys; Union County, Ohio (2021). CONFIDENTIAL *Role: Project Archaeologist.* Authored over 20 site narratives for cultural resources identified during a walkover and site intensive (locational) archaeological survey. The surveys were conducted for a proposed solar development project.

Emily Dickinson Museum HVAC; Emily Dickinson Museum; Amherst, Hampshire County, Massachusetts (2021). *Role: Principal Investigator and Field Supervisor. Co-developed research design, state agency (Massachusetts Historical Commission) permit application, completed fieldwork, processed/analyzed artifacts, interpreted results, and co-authored report.* Supervised crew of four for a Phase II archaeological site examination survey, completed artifact analysis, and co-authored report.

ERM Durham Main Street Cell; ERM Consulting & Engineering, Inc.; Durham, Strafford County, New Hampshire (2021). *Role: Principal Investigator.* Conducted background research and authored a Cultural Resources Survey report for the proposed construction of a new communications tower facility.

Northbridge/Sutton New Main; Eversource Energy Service Co.; Massachusetts (2021). *Role: Principal Investigator.* Conducted background research and generated consultation to comply with state agency (Massachusetts Historical Commission) regulations.

Northampton Ice Pond; City of Northampton; Northampton, Hampshire County, Massachusetts (2021). *Role: Principal Investigator and Field Supervisor. Completed fieldwork and interpreted results.* Conducted an intensive (locational) archaeological survey at the location of a former late nineteenth century ice pond. The proposed project consists of improved access to the pond for maintenance: tree clearing, construction of a permanent access drive, retaining walls and a gated fence.

University of Massachusetts Amherst Pond; University of Massachusetts Amherst; Amherst, Hampshire County, Massachusetts (2020 and 2021). *Role: Principal Investigator.* Generated Memorandum of Agreement (MOA) for the dredging and restoration of a 4-acre pond on the UMASS Amherst Campus.

Main Street Equipment Facility; ERM Consulting & Engineering, Inc.; Norwich, New London County, CT (2021). *Role: Principal Investigator.* Conducted background research, completed site visit, and authored cultural resources survey report.

J147 Structure Replacement Project; Eversource Energy; Danville and Kingston, New Hampshire (2020). *Role: Principal Investigator and Field Supervisor.* Conducted a Phase IA archaeological sensitivity assessment at nine electrical structures along a 5.3-mile line in southern New Hampshire. Supervised a crew of six and contributed to survey report writing.

Pelham Avoidance and Site Protection Plan; Epsilon Associates Inc; Pelham, Hampshire County, Massachusetts (2020). *Role: Principal Investigator.* Updated and authored archaeological site avoidance and protection plan.

Ludlow Mills ASAPP; Westmass Area Development Corporation; Ludlow, Hampden County, Massachusetts (2020). *Role: Principal Investigator.* Updated and authored archaeological site avoidance and protection plan. Conducted fieldwork to mark project plans site boundaries.

McPherson-Geneva Line Exposure Whitewater Crossing Project; NuStar Energy, L.P.; Butler County, Kansas (2020). *Role: Principal Investigator.* Conducted background research and authored report for literature search and negative findings during an intensive cultural resources inventory.

McPherson-Geneva Line Exposure Pipe Creek Crossings Project; NuStar Energy, L.P.; Ottawa County, Kansas (2020). *Role: Principal Investigator.* Conducted background research and authored report for literature search and negative findings during an intensive cultural resources inventory.

National Grid A1/B2 CR Due Diligence; National Grid USA Service; Vernon, Windham County, Vermont, Hinsdale and Winchester, Cheshire County, New Hampshire, Warwick to Sterling, Massachusetts (2020). *Role: Principal Investigator.* Conducted a background literature review and research for Vermont, New Hampshire, and Massachusett sections of a proposed structure replacement project along the 76-kilometer long A1/B2 transmission line. Authored due diligence report for these states.

Sutton Gate Station; Eversource Energy; Massachusetts (2020). *Role: Principal Investigator.* Conducted background research for permitting compliance with Section 106 for the construction of new natural gas gate station.

Portland Natural Gas Transmission System (PNGTS) Red Gloves Cultural Resource Survey; ERM Consulting & Engineering, Inc.; Colebrook, New Hampshire (2020). *Role: Project Archaeologist.* Responsible for coordinating field schedules, project materials, and Dig Safe.

Grid 343 Line Structure Replacement Project; National Grid USA Service; West Boylston, Worcester County, Massachusetts (2020). *Role: Principal Investigator.* Conducted background research and author due diligence report.

Nahant Coastal Sustainability Institute; Epsilon Associates Inc; Nahant, Essex County, Massachusetts (2020). *Role: Project Archaeologist.* Conducted laboratory processing of artifacts and contributed to final report writing for the intensive (locational) archaeological survey completed at the site of the proposed building.

***Massachusetts Unmarked Burial Investigations; Massachusetts Historical Commission (MHC); Various Undisclosed Locations throughout Massachusetts.** *Role: Preservation Planner/Archaeologist.* Working alongside the Massachusetts Medical Examiner, Commission on Indian Affairs Executive Director, State Archaeologist, MHC's Principal Investigator for Unmarked Burials, Tribal members, and citizens. Excavations followed regulations to protect, minimize, or mitigate impacts on precontact and historical burials in Massachusetts.

***Project 400: Plymouth Colony Archaeological Survey; Andrew Fiske Memorial Center for Archaeological Research; Plymouth, Massachusetts.** *Role: Field Student and Graduate Research Assistant.* Conduct field investigations on Burial Hill and Cole's Hill to locate the original seventeenth-century ground surface and settlement. As part of field crew, excavated shovel test pits on Cole's Hill. After the field season, continued to work on processing artifacts and a collection of late-nineteenth- to early-twentieth-century Victorian era jewelry. Conducted analysis of lithics from the field season and authored the report section on the lithics excavated.

***Miller-Fielding Site; Mohegan Reservation; Uncasville, Connecticut.** *Role: Field Student.* Participated in field investigations at the Miller-Fielding site, a late-eighteenth-century Mohegan homestead. Fieldwork consisted of surface and subsurface testing, laboratory processing of artifacts, and working closely with members of the Mohegan Tribe of Indians of Connecticut Tribal Historic Preservation Office.

***Fallen Tree Site; American Museum of National History, North American Archaeology (NAARCH) Lab; St. Catherines Island, Georgia.** *Role: Field Technician and Lab Assistant.* Participated in field investigations that included the excavation of human burials at a Historic Period Guale mortuary complex. Lab work consisted of processing and cataloguing associated artifacts.

REPORTS/PUBLICATIONS (* denotes publishing prior to SWCA)

2022 *Cultural Resources Desktop Analysis for the National Grid Dunbarton345/230 kV Switching Station, Dunbarton, Merrimack County, New Hampshire.* SWCA Inc., Cultural Resources Report, author.

Cultural Resources Due Diligence and Site Assessment for Option 1 of the National Grid S19 Line ACR Project, Millbury to Webster, Massachusetts. SWCA Inc., Cultural Resources Report, co-author.

Cultural Resources Due Diligence and Site Assessment for Structure Replacements on the Eversource 389 Line in Norfolk County, Massachusetts. SWCA Inc., Cultural Resources Report, co-author.

Archaeological Reconnaissance Survey for the ASD Tower MA Solar Project, Pelham, Massachusetts. SWCA Inc., Cultural Resources Report, co-author.

Archeological Reconnaissance Survey for the ASD Shutesbury Road Solar Project, Amherst, Massachusetts. Cultural Resources Report, co-author.

Phase 1A Archaeological Desktop Review and Historic Architecture Reconnaissance Survey of the Anna River Solar Project, Hanover County, Virginia. SWCA Inc. Cultural Resources Report, co-author.

2021 *Cultural Resources Due Diligence Report for Structures 45-50 and 46 Span on the National Grid 59L5 Line, Tewksbury, Middlesex County, Massachusetts.* SWCA Inc. Cultural Resources Report, co-author.

Cultural Resources Due Diligence Report for the Structure 510 Replacement on the National Grid E205E Line in Gill, Franklin County, Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

Cultural Resources Due Diligence Report for the Replacement of Structures 1 and 4 on the National Grid 94W42 Line in Stoughton, Norfolk County, Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

Phase I Reconnaissance Survey for the Proposed Berwick Hubbard Solar 1, Berwick, York County, Maine. SWCA Inc. Cultural Resources Report, co-author.

Cultural Resources Due Diligence Report for the Replacement of Structure 29 and Flyover Switch 7711 on the National Grid Y177 Line in Rowe, Franklin County, Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

Phase 1 Archaeological Survey for the Cadence Solar Energy Center, Union County, Ohio. SWCA Inc. Cultural Resources Report, co-author.

Site Intensive Archaeological Survey for the Proposed Off-Highway Motorcycle Trail Improvements Project, Freetown and Fall River, Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

Cultural Resources Due Diligence Report for the Conductor Clearance Refurbishment of Structures 126, 370, 372, and 375 on the New England Power Company N14 Line, Monson and East Longmeadow, Hampden County, Massachusetts. SWCA Inc. Cultural Resources Report, author.

Cultural Resources Due Diligence Report for the Conductor Clearance Refurbishment of Structures 175, 177, and 211 on the New England Power Company O15S Line, Hampden and East Longmeadow, Hampden County, Massachusetts. SWCA Inc. Cultural Resources Report, author.

Archaeological Site Examination Survey for the Proposed 288 Harrison Avenue Residences, Boston, Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

Archaeological Site Examination Survey of the Emily Dickinson Homestead HVAC Improvements Project, Amherst, Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

Archaeological Intensive (Locational) Survey for Structure Replacements along the Eversource 456-522 Line in Walpole and Medfield, Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

2020 Cacchione, Victoria A. and Nadia E. Waski
"The Private Side of Victorian Mourning Practices in Nineteenth Century New England: The Cole's Hill Memorial Cache."
Northeast Historical Archaeology 49: 101-116.

Cultural Resources Due Diligence Report for Structure Replacements on the National Grid A1/B2 Line, Vermont, New Hampshire, and Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

Cultural Resources Due Diligence Report for Structure Replacements on the National Grid 343 Line in West Boylston, Worcester County, Massachusetts. SWCA Inc. Cultural Resources Report, author.

Site Intensive Archaeological Survey for the Proposed 288 Harrison Avenue Residences, Boston, Massachusetts. SWCA Inc. Cultural Resources Report, co-author.

A Literature Search and Intensive Cultural Resource Inventory for the McPherson-Geneva Line Exposure Whitewater River Crossing Project, Butler County, Kansas (Negative Findings Report). SWCA Inc. Cultural Resources Report, author.

A Literature Search and Intensive Cultural Resource Inventory for the McPherson-Geneva Line Exposure Pipe Creek Crossings Project, Ottawa County, Kansas (Negative Findings Report). SWCA Inc. Cultural Resources Report, author.

2018 *Waski, Nadia and Edward L. Bell
Bibliography of Archaeological Survey & Mitigation Reports: Massachusetts. Massachusetts Historical Commission.

**Tools of Teaching: Metal at Magunkaquog.* M.A. thesis, University of Massachusetts Boston.

2014 *"Lithics of the Deerfield/Hatfield Area: The Wick Collection." *Journal of Undergraduate Anthropology* 4: 8-14.

2017 *Beranek, Christa, David B. Landon, John M. Steinberg, and Brian Damiata editors with contributions by Victoria Cacchione, Alexandra Crowder, Annie Greco, Leigh Koszarsky, Ana Opishinski, Megan Sheehan, and Nadia Waski
Project 400: The Plymouth Colony Archaeological Survey Report on the 2016 Field Season, Cole's Hill, Brewster Garden, and Burial Hill, Plymouth, Massachusetts.

2016 *Beranek, Christa, David B. Landon, John M. Steinberg, and Brian Damiata editors with contributions by Caroline Gardner, Annie Greco, Leigh Koszarsky, Joseph Trebilcock, Katie Wagner, and Nadia Waski
Project 400: The Plymouth Colony Archaeological Survey Report on the 2015 Field Season, Burial Hill, Plymouth, Massachusetts.

Geosyntec consultants

2002 Summit Blvd, Suite 885
Atlanta, Georgia 30319
PH 404.267.1101
FAX 404.267.1102
www.geosyntec.com

MEMORANDUM

TO: Kevin Seaford – Strata Clean Energy,

FROM: LLC Geosyntec Consultants, Inc.

DATE: 4 March 2024

SUBJECT: Cultural and Historic Resources Review for Anna River Solar

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INTRODUCTION

Strata Clean Energy, LLC (Strata) engaged Geosyntec Consultants, Inc (Geosyntec) to provide support with environmental due diligence and preliminary planning of a new solar power generation facility project in Virginia, referred to as Anna River Solar. The scope of our work included a cultural and historical resources review of two (2) parcels, totaling approximately 182 acres located in Hanover County, Virginia.

METHODOLOGY

The background data search was completed using the Virginia Cultural Resource Information System (V-CRIS) maintained by the Virginia Department of Historic Resources (DHR). The data search encompassed the Project study area and a 0.5-mile buffer outside of the Project study area boundary. Any architectural or archaeological resources returned in the database results are detailed below.

FINDINGS

There were no listed architectural, archaeological, or historic properties returned within the Project study area or the 0.5-mile buffer surrounding the Project study area boundary (Figure 1).

The database search returned one architectural resource in the 0.5-mile buffer surrounding the Project study area boundary (Table 1). This resource has not been evaluated by DHR staff to determine if it eligible for listing status.

* * * * *

Table 1. V-CRIS database results for architectural resources within the Project study area and a 0.5-mile buffer surrounding the Project study area boundary.

DHR_ID	Jurisdictions	Property Names	Addresses	Historic District Name	NR Eligibility Status
042-0450	Hanover (County)	Log House, Route 681 (Historic)	Route 681	null	null

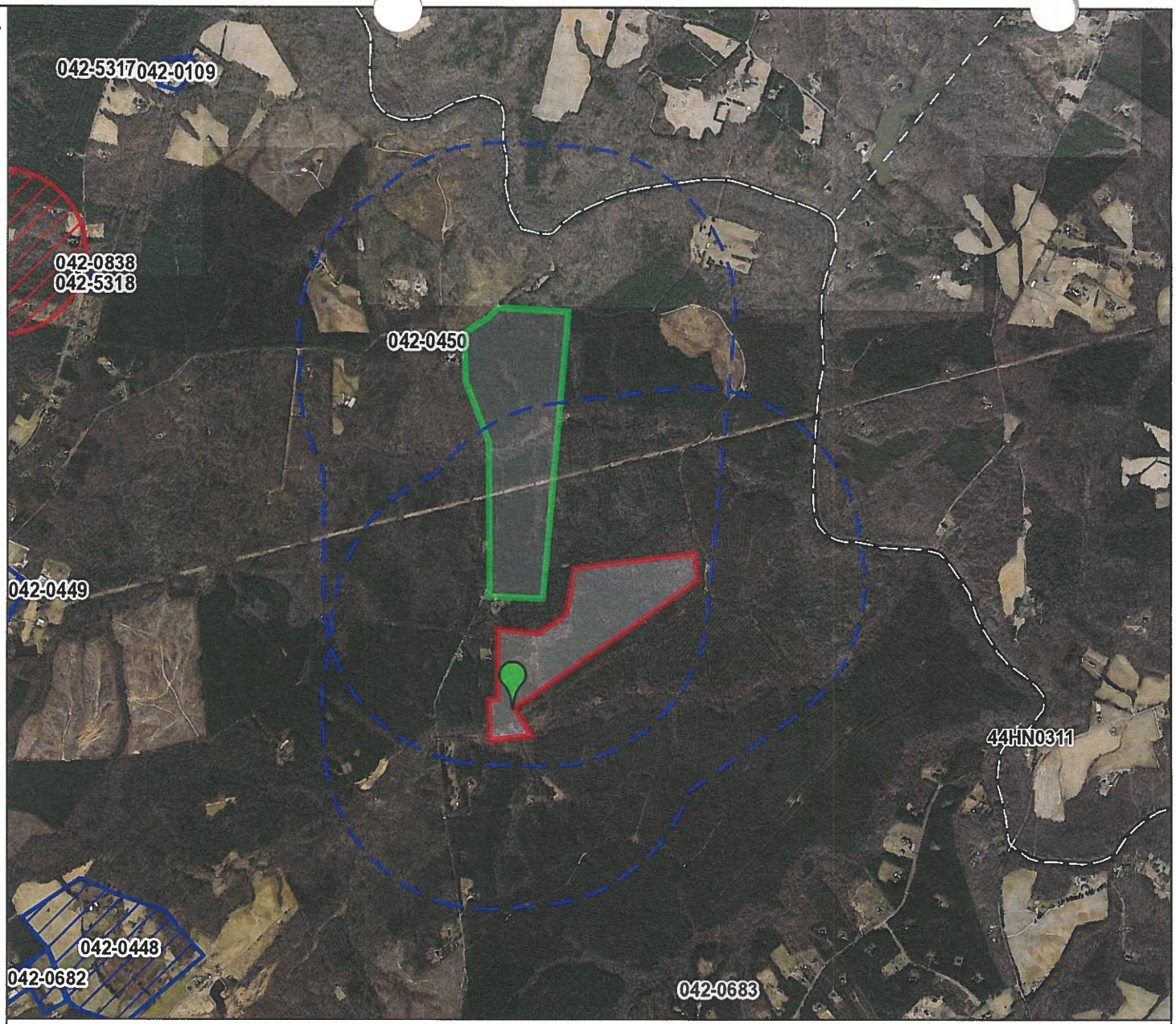
Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Resources
- Architecture Labels
- Individual Historic District Properties
- Archaeological Resources
- Archaeology Labels
- Archaeology Phase 1 Survey
- DHR Easements
- County Boundaries



N

Feet

0 600 1200 1800 2400

1:36,112 / 1"=3,009 Feet

Title: South Anna Additional Parcels

Date: 3/1/2024

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	Log House, Route 681

Property Addresses

Current - Route 681

Property Evaluation Status

Not Evaluated

County/Independent City(s): Hanover (County)
Incorporated Town(s): *No Data*
Zip Code(s): *No Data*
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BEAVERDAM

Additional Property Information

Architecture Setting: *No Data*
Acreage: *No Data*
Site Description:

No Data

Surveyor Assessment:

This is the only house of this nature found during the 1989 survey of Hanover County. The house reached its present nature in the late 19th century, probably with earlier sections. According to the owner, this house and farm was traditionally owned and farmed by African-American farmers.
February 2012: The following additional information was obtained from neighbor, Beryl Herzog. Log I-house built by Ralph Nichols. Mr. Nichols' wife was named Pearlie and together they had a daughter named Ruby.

Surveyor Recommendation: *No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Historic District Status: *No Data*
Date of Construction: Post 1875
Date Source: Site Visit
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Other
Form: *No Data*
Number of Stories: 2.0
Condition: *No Data*
Interior Plan: Central Passage, Single Pile
Threats to Resource: Vacant
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

Architecture Summary: Two, 2-story single pens of log connected by frame center-passage to form an I-house. Frame rear ell.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Interior End	Brick	*No Data*
Roof	Other	Metal	Standing Seam
Structural System and Exterior Treatment	Log	Wood	Notch, Square
Foundation	Piers	Stone	Rubble, Random
Chimneys	Exterior End	Brick	Bond, Common
Structural System and Exterior Treatment	Frame	Wood	Weatherboard

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: *No Data*
Investigator: Neville, A.
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 1/1/1990
Dhr Library Report Number: *No Data*
Project Staff/Notes:
No Data

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Land and Community Associates
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: *No Data*
Dhr Library Report Number: *No Data*
Project Staff/Notes:
No Data

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

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
- Archaeology Phase 1 Survey
- DHR Easements
- County Boundaries

Title: Architecture Labels

Date: 2/29/2024

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.

PILOT ENVIRONMENTAL, INC

February 22, 2021

Mr. Samuel Judd
Anna River Solar, LLC
800 Taylor Street, Suite 200
Durham, North Carolina 27701

Reference: Threatened and Endangered Species Review
Anna River Solar
Approximate 1,389-Acre Tract
Ben Gayle Road
Beaverdam, Hanover County, Virginia
Pilot Project 4891.1

Dear Mr. Judd:

Pilot Environmental, Inc. (Pilot) is pleased to submit this report of the Threatened and Endangered Species Review for the approximate 1,389-acre tract located on Ben Gayle Road near Beaverdam, Hanover County, Virginia. The site is depicted on the attached U.S. Geological Survey (USGS) Topographic Map (Drawing 1) and Aerial Photograph Map (Drawing 2).

Background

Congress passed the Endangered Species Act (ESA or "Act") in 1973. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service (USFWS) and the Commerce Department's National Marine Fisheries Service (NMFS). The USFWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of the Commerce Departments NMFS are mainly marine wildlife. Under the ESA, federally protected species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. For the purposes of the ESA, Congress defined species to include subspecies, varieties, and, for vertebrates, distinct population segments.

In order to meet conditions within the Code of Virginia for issuance of the permit by rule for small renewable energy projects, applicants are required to conduct preconstruction analyses of potential impacts of the proposed project on natural resources (Title 9-Environment, Agency 15-Virginia Department of Environmental Quality (VADEQ), Chapter 60, Section 40). The wildlife analysis should include (1) desktop surveys and maps of known wildlife species and habitat

features on the site or within two miles of the site and known or potential sea turtle nesting beaches located within one-half mile of the disturbance zone, and (2) consultation of the Coastal Avian Protection Zones (CAPZ) map to determine whether the proposed solar energy project site will be located in part or in whole within one or more CAPZ. The applicant shall assess and describe the expected beneficial and adverse impacts, if any, of the proposed project on wildlife identified by these studies and analyses.

Applicants are also required to conduct analyses of historic resources and natural heritage resources. Comprehensive architectural and archaeological surveys are required for compliance with these regulations. Pilot understands that the surveys and relevant agency consultations are being completed by others.

Scope of Services

Pilot was contracted to perform a Threatened and Endangered Species Review for the approximate 1,389-acre tract located on Ben Gayle Road near Beaverdam, Hanover County, Virginia. The site includes five parcels identified by the Hanover County Geographical Information System (GIS) as Parcel Identification Numbers (PINs) 7827-33-5426, 7827-85-7713, 7828-61-0451, 7828-61-8172 and 7828-73-9147. The site is being evaluated for proposed development with a solar farm. The purpose of the Threatened and Endangered Species Review is to identify the potential for impact to federally protected and state-listed threatened and endangered species. The scope of services included a field reconnaissance, a review of available literature, and a submittal of relevant site information to solicit comments from the Virginia Department of Conservation and Recreation (VDCR) and USFWS. The site boundary was provided to Pilot in a Google Earth digital file.

Pilot was also contracted to perform a Phase I Environmental Site Assessment and a Wetland Delineation on the site. Details of these investigations are included in separate reports.

Site Reconnaissance

Pilot personnel conducted the site visits in October and November, 2020. The site contains undeveloped, wooded land. An overhead powerline crosses the northern portion of the site. The utility easements appear to be regularly mowed/maintained and are dominated by low-lying grasses and forbs including fescue, Japanese stilt-grass, clover, and dogfennel.

The majority of the wooded land is actively managed and timbered loblolly pine forests. The wooded land ranges from recently timbered to 20 years old. Portions of the site have been commercially thinned. The loblolly pine stands contain a dense understory of blackberry, greenbrier, hardwood and pine saplings and broom-sedge.

The wooded land along the North Anna River consists of mature mixed hardwoods interspersed with pines. The canopies are moderately dense and are dominated by American beech, elm,

sycamore, maple, sweetgum, tulip poplar, and ash. The understories are densely vegetated with Chinese privet, hardwood saplings, Japanese stilt-grass, muscadine grape, greenbrier and Christmas fern.

Streams and wetlands are located throughout the site. The North Anna River flows along the eastern site boundary. The remaining streams range from narrow, intermittent features approximately two to four feet wide to perennial features up to 20 feet wide with silty/sandy substrate. Forested and emergent wetlands are located within the stream floodplains and swales throughout the site. Several of the wetland areas are a result of beaver dams. The wetlands exhibit saturated conditions with some inundated areas around the beaver dams.

Federally Listed Threatened and Endangered Species

Database Review

The project location was entered into the USFWS Information for Planning and Conservation (IPaC) online mapping system to obtain a resource list of threatened, endangered, proposed, and candidate species as well as designated or proposed critical habitat that may be affected by the proposed project. The Official Species List generated through IPaC is included as an attachment. Additionally, Pilot reviewed data available through the Virginia Department of Game and Inland Fisheries' (VDGIF) Wildlife Environmental Review Map Service (WERMS) and the Center of Conservation Biology (CCB) Mapping Portal. The WERMS data review area included a two-mile radius buffer from the site boundary. The following Species Conclusion Table was developed based on the Official Species List:

Species / Resource Name	Habitat/Species Presence in Action Area	Sources of Info	ESA Section 7 Determination	Project Elements that Support Determination
Northern Long-eared Bat (NLEB) (Myotis septentrionalis)		Dkey	Covered by 4(d) Rule	
Yellow Lance (Elliptio lanceolate)	Suitable habitat present	Based on correspondence with DCR and a review of Va DGIF WERMs, there are no known populations on or within two miles of the project area. The adjacent North Anna River could provide suitable habitat. DCR response and buffer recommendations are attached.	Not likely to adversely affect	Impacts to streams on the site will be avoided and minimized to the extent possible. Existing crossings and sediment and erosion control practices will be utilized to minimize impacts to downstream habitat. Additionally, the project will adhere to CBRPA buffer requirements. Provided that impacts to streams/CBRPA buffers will be minimized and erosion and sediment control measures are implemented and maintained, the project is not likely to adversely affect this species.
Critical Habitat	No critical habitat present	VAFO CH Map Tool	No effect	N/A

VDGIF Known Wildlife Species and Habitat

Pilot reviewed data on ArcGIS available through VDGIF WERMS for known wildlife species and habitats that may occur on or within two miles of the project area. The VDGIF WERMS identifies bald eagle "*Nest No. HA-00-01, Feb/March survey flights, DIGITIZED 04/25/00; designated abandoned 2005*" on the eastern portion of the site along the North Anna River. Additional federally protected nor state protected species were identified on or within two miles of the site. Documented occurrences of several non-listed species were identified within two miles of the site. The VDGIF WERMS Map and tables of observed species are included as attachments.

Eagle Act Determination

Pilot reviewed data available through VDGIF WERMS, the Virginia Field Office's Bald Eagle Map Tool, and the CCB VA Eagle Nest and Eagle Roost Locators to identify known bald eagle (*Haliaeetus leucocephalus*) populations, nesting sites, and roosts. The maps identify nesting sites approximately 40 miles northwest on Lake Anna and approximately 5.5 miles and southwest on the North Anna River. Bald eagle roost sites and concentration areas are not identified within 25 miles of the site. Therefore, the proposed project is not likely to disturb the bald eagle and no eagle act permit is required. Copies of the Virginia Field Office's Bald Eagle Concentration Areas, the CCB Bald Eagle Nest Locator, and the CCB Bald Eagle Roost Locator maps are included as attachments.

Northern Long-Eared Bat (*Myotis septentrionalis*) Determination

Pilot reviewed the VDGIF WERMS data and NLEB Winter Habitat and Roost Tree Application for known NLEB occurrences, hibernacula, and roost trees on or proximate to the site. Based on a review of the NLEB Winter Habitat and Roost Trees Map, the nearest confirmed hibernacula and/or maternity sites are located more than 80 miles west of the site. Based on a review of the VDGIF WERMS shapefiles (Feature Class: SppObs Enviro Review Listed), there are no known occurrences of NLEB within 2 miles of the site. Additionally, Pilot did not observe hibernacula on the site. Wooded areas and mature trees that could afford suitable summer roosting habitat are present on the site. Similar habitat was observed on adjoining properties. Based on the distances from known roost trees and availability of similar suitable habitat near the site, we have made the determination that the proposed project is not likely to adversely affect this species. Based on the USFWS NLEB Consistency letter for the project, any "take" of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). A copy of the NLEB Consistency Letter is included as an attachment.

Yellow Lance (*Elliptio lanceolate*) Determination

Based on correspondence with the VDCR, there is potential for yellow lance to occur in the North Anna River adjacent to the site. Pilot reviewed the VDGIF WERMS data for known occurrences. Based on a review of the VDGIF WERMS shapefiles (Feature Class: SppObs Enviro Review Listed), there are no known occurrences of yellow lance within 2 miles of the site. Based on the potential for suitable habitat to be located adjacent to the site, the VDCR recommends maintaining forested riparian buffers along the North Anna River and streams that are located on the site. Recommended buffers are 100-200 feet wide depending on the surrounding slopes.

Pilot understands that impacts to streams on the site will be avoided and minimized to the extent possible. Existing crossings and sediment and erosion control practices will be utilized to minimize impacts to downstream habitat. Additionally, the project will adhere to 100-foot Chesapeake Bay Resource Protection Area (CBRPA) buffer requirements. Provided that impacts to streams/CBRPA buffers will be minimized and erosion and sediment control measures are implemented and maintained, the project is not likely to adversely affect this species.

Sea Turtle Nesting Beaches

Pilot reviewed the VDGIF WERMS data for known or potential sea turtle nesting beaches located within one-half mile of the disturbance zone. Based on a review of the VDGIF WERMS shapefiles (Feature Class: SppObs Enviro Review Listed), potential sea turtle nesting beaches are not located on or within one-half mile of the site. The nearest documented occurrence is more than 70 miles east of the site (Drawing 4).

Coastal Avian Protection Zones (CAPZ)

Pilot consulted the Coastal Avian Protection Zones map generated on the Virginia Coastal Zone Management Program (CZM) data viewer to determine if the proposed project is located in part or in whole within one or more CAPZ. The site is not located within a CAPZ (Drawing 5). Therefore, mitigation for CAPZ is not proposed.

Virginia Department of Conservation and Recreation (VDCR) Correspondence

Pilot submitted a request to the VDCR for review and comment of the proposed project. The VDCR response does not identify known occurrences of federally or state listed species on the site. According to review by VDCR biologist, there is potential for yellow lance to occur in the North Anna River located adjacent to the site. Based on the potential for suitable habitat to be located adjacent to the site, DCR recommends maintaining forested riparian buffers along the North Anna River and streams that are located on the site. Recommended buffers are 100-200 feet wide depending on the surrounding slopes. The response indicates that the proposed project will fragment Ecological Core (C3) as identified in the Virginia Natural Landscape Assessment. Ecological Cores are areas of unfragmented natural cover with at least 100 acres of

interior that provide habitat for a wide range of species. A copy of the VDCR response letter dated December 15, 2020 with buffer recommendations is included as an attachment.

USFWS Correspondence

In accordance with the ESA, in the event that the section 7 determination for all species (except the NLEB under the final 4(D) rule) and critical habitat is either "no effect" or "not likely to adversely affect" and the Eagle Act determination is "no Eagle Act permit required", then federal agencies are not required to contact the USFWS or provide documentation for "no effect" and/or "no Eagle Act permit required" determinations. For "not likely to adversely affect" determinations," federal agencies are required to submit a copy of the online project review certification letter and the project review package with all requested information as indicated by the USFWS to complete consultation requirements. Non-federal applicants must submit a copy of the USFWS Self-Certification Letter and project review package to the USFWS for the Self-Certification Letter to be valid.

Pilot submitted the Self-Certification Letter with the project review package including the Species Conclusions Table provided above to the USFWS. To date, the USFWS has not provided comments or concerns pertaining to the proposed project. A copy of the Self-Certification Letter is included as an attachment. Pilot will prepare an addendum to this report should the USFWS provide comments within the 60-day review period.

Conclusions and Opinions

A "may affect, not likely to adversely affect" determination was concluded for the yellow lance due to the potential for the adjoining North Anna River to contain suitable habitat. Pilot understands that impacts to streams on the site will be avoided and minimized to the extent possible. Existing crossings and sediment and erosion control measures will be utilized to minimize impacts to potential downstream habitat. Additionally, the project will adhere to 100-foot Chesapeake Bay Resource Protection Area (CBRPA) buffer requirements. Provided that impacts to streams/CBRPA buffers will be minimized and erosion and sediment control measures are implemented and maintained, the project is not likely to adversely affect this species. The use of existing stream crossings is recommended to avoid potential disturbance to yellow lance habitat.

A "may affect, not likely to adversely affect" determination was concluded for the NLEB. Based on a review of the NLEB Winter Habitat and Roost Trees Map and VDGIF WERMS data, the nearest confirmed hibernacula and/or maternity sites are located more than 80 miles west/northwest of the site, and there are no known occurrences of NLEB within 2 miles of the site. Pilot did not observe hibernacula on the site. Wooded areas that could afford suitable summer roosting habitat are present on the site. Similar habitat was observed on adjoining properties. Based on the distance from known roost trees and availability of similar suitable habitat near the site, we have made the determination that the proposed project is not likely to adversely affect this

species. Therefore, if tree clearing is completed within the pup season (June 1 to July 31), reliance on the Final 4d Rule is necessary to fulfill section 7 requirements. Based on the USFWS NLEB Consistency letter for the project, any "take" of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

This assessment has revealed that it is not likely for the proposed solar development to adversely affect federally protected or state-listed threatened/endangered species, critical habitat, or other wildlife resources included in the assessment. If additional information concerning federally/state listed threatened or endangered species, agency involvement or comments, or proposed site development becomes available that makes a material difference in our findings and conclusions, Pilot reserves the right to revise the conclusions and opinions found within this report. Additional assessments or surveys are not recommended at this time.

Closing

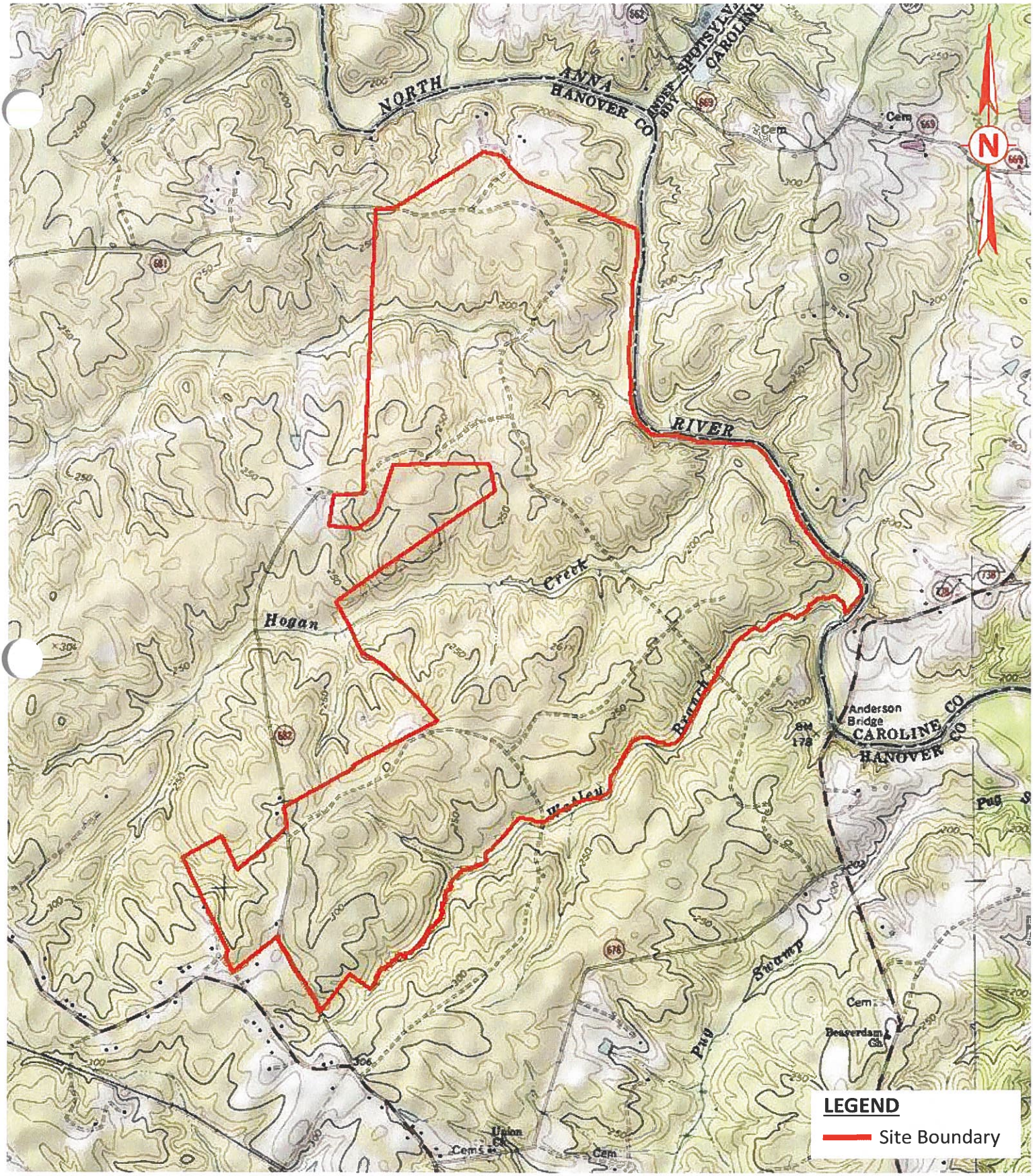
We appreciate the opportunity to provide our services to you. Please contact us at (336) 310-4527 if you have questions or require additional information.

Sincerely,

David S. Brame, PWS
Senior Project Manager

Michael T. Brame, PWS
Principal

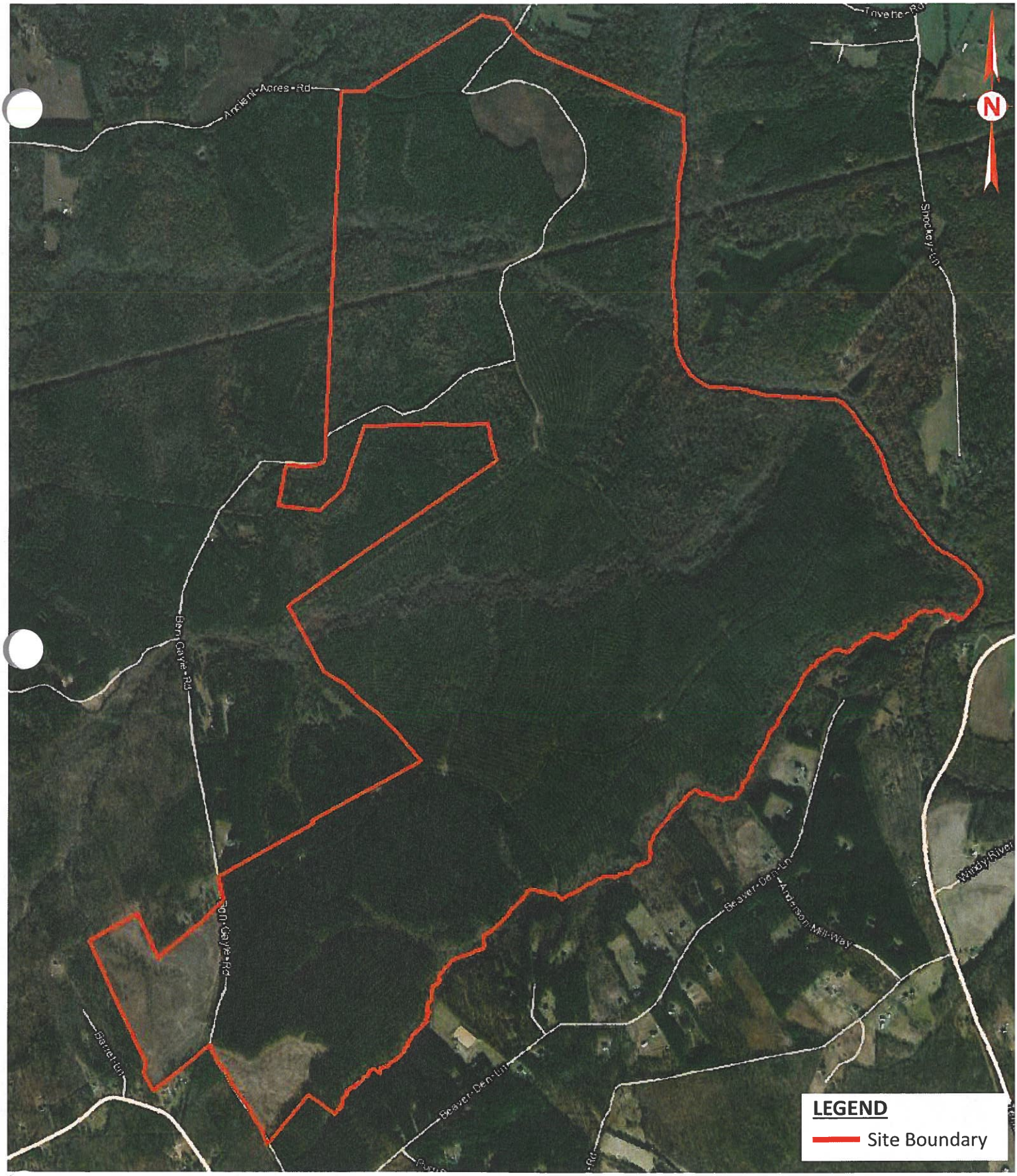
Attachments: Drawing 1 – USGS Topographic Map
Drawing 2 – Aerial Photograph Map
Drawing 3 – Wetland Map
Drawing 4 – Sea Turtle Occurrence Map
Drawing 5 – CAPZ Map
Official Species List dated February 19, 2021
WERMS Species Report (Map and Tables)
Virginia Field Office's Bald Eagle Concentration Areas Map
CCB Bald Eagle Nest Locator Map
CCB Bald Eagle Roost Locator Map
USFWS NLEB Consistency Letter dated February 19, 2021
VDCR Response Letter dated December 15, 2020
USFWS Self-Certification Letter dated February 19, 2021



Drawing 1
USGS Topographic Map
Beaverdam, VA Quadrangle
Scale: 1" = 2,000'

PILOT ENVIRONMENTAL, INC

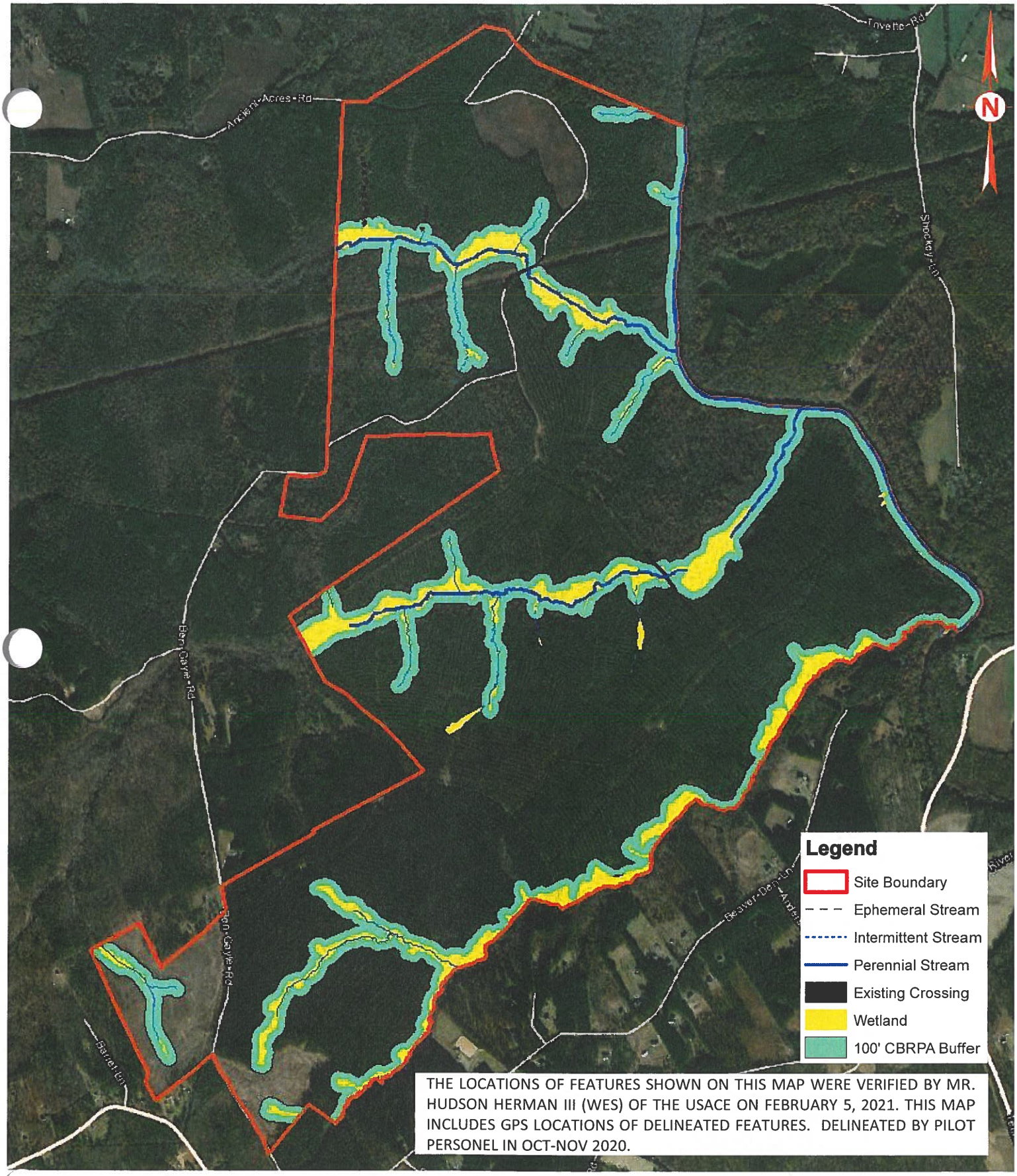
USGS Topographic Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1



Drawing 2
2019 Aerial Imagery from ESRI
Scale: 1" = 1,500'

PILOT ENVIRONMENTAL, INC

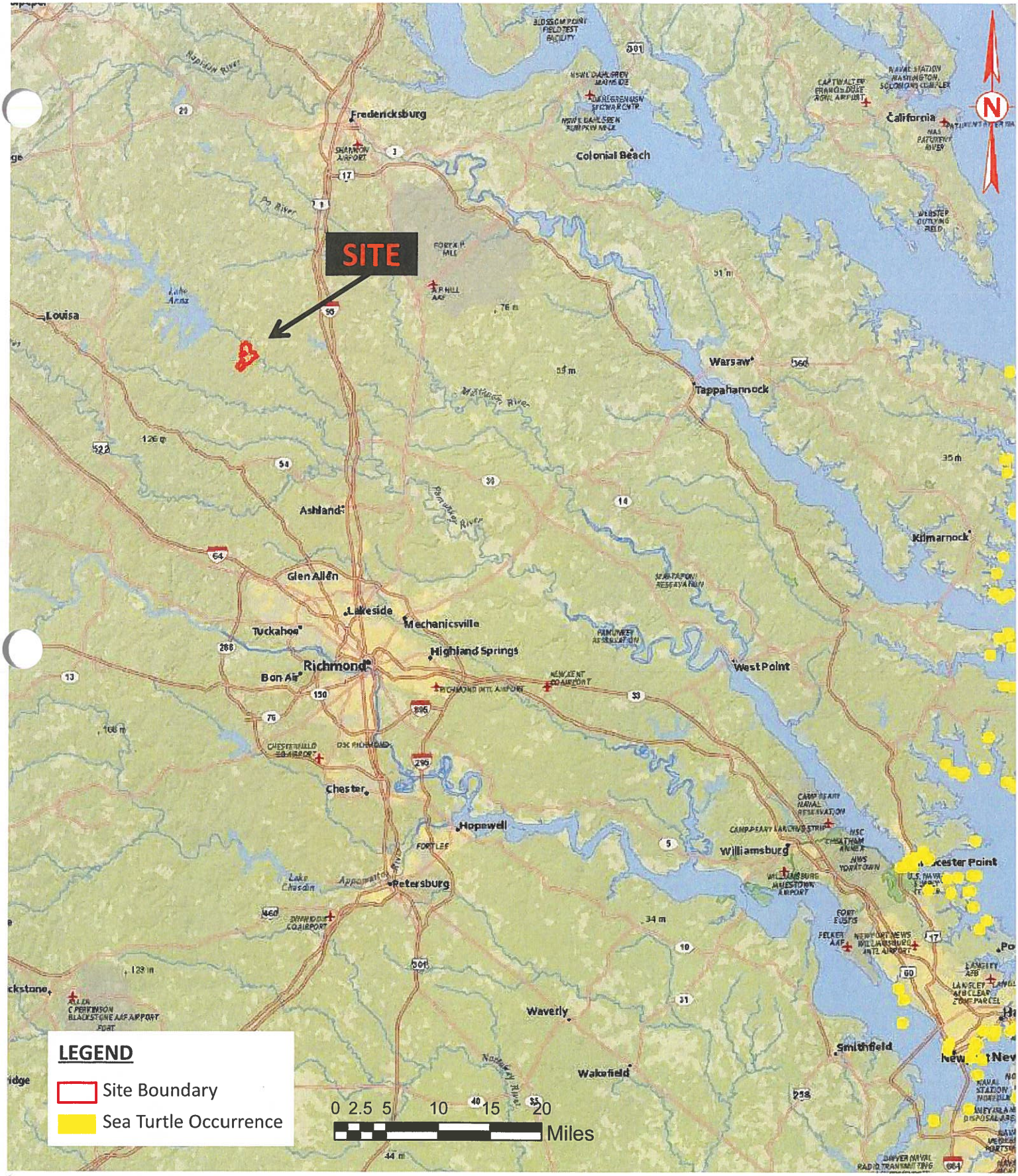
Aerial Photograph Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1



Drawing 3
2019 Satellite Imagery from ESRI and Pilot GPS Data
Scale: 1" = 1,500'
Date: 11.12.2020
Revised: 2.15.2021

PILOT
PILOT ENVIRONMENTAL, INC

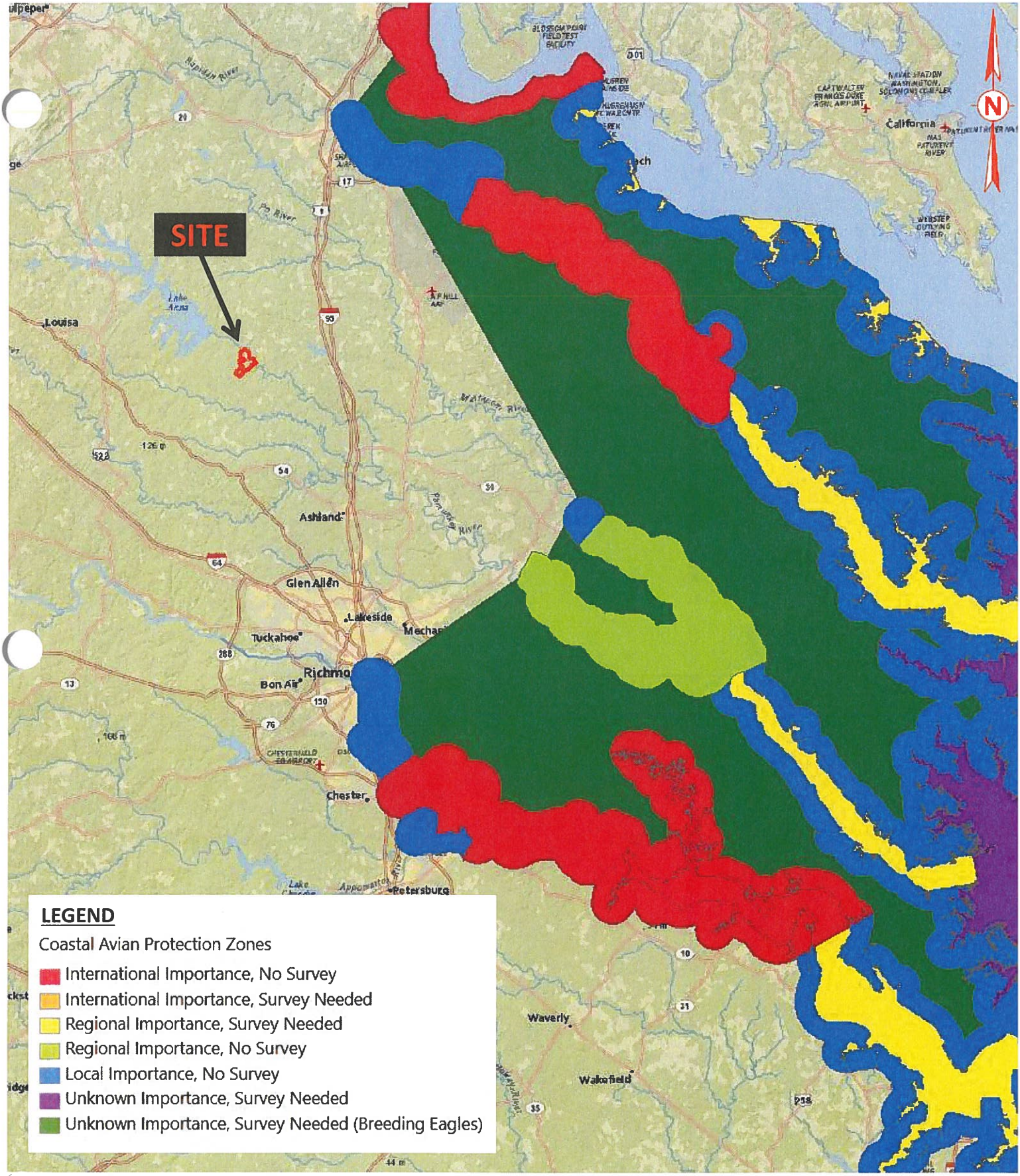
Wetland Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1



Drawing 4
VADGIF WERMS Data
Feature Class:
SppObs_Enviro_Review_Listed
Scale as Shown

PILOT ENVIRONMENTAL, INC

Sea Turtle Occurrence Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1



Drawing 5
Virginia Coastal Zone Management (CZM) Program – Coastal Aviation Protection Zones (CAPZ)

PILOT
PILOT ENVIRONMENTAL, INC

CAPZ Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032
http://www.fws.gov/northeast/virginiafield/

In Reply Refer To:
Consultation Code: 05E2VA00-2021-SLI-2197
Event Code: 05E2VA00-2021-E-06465
Project Name: Anna River Solar

February 19, 2021

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered

species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
(804) 693-6694

Project Summary

Consultation Code: 05E2VA00-2021-SLI-2197
Event Code: 05E2VA00-2021-E-06465
Project Name: Anna River Solar
Project Type: POWER GENERATION
Project Description: The site is an approximate 1,389-acre tract that is being evaluated for development with a solar farm.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.97190285,-77.64473799606418,14z

Counties: Hanover County, Virginia

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

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

Clams

NAME	STATUS
Yellow Lance *Elliptio lanceolata* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/4511	Threatened

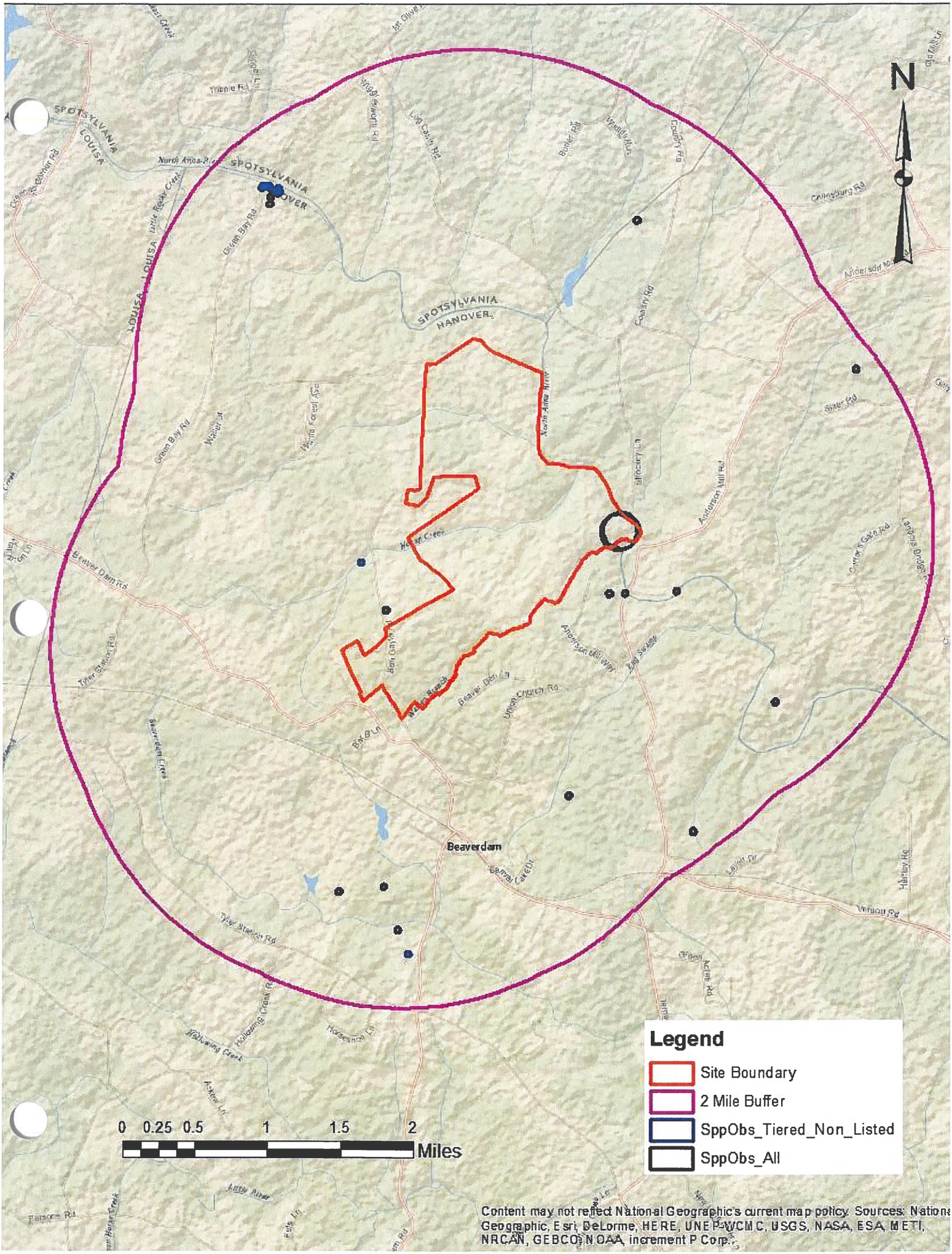
Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

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

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.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SPOTSYLVANIA
LOUISA
HANOVER
Beaverdam
Legend
Site Boundary
2 Mile Buffer
SppObs_Tiered_Non_Listed
SppObs_All
0 0.25 0.5 1 1.5 2
Miles
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SppObs_Tiered_Non_Listed

OBJEC'	SppObs	TaxaGrp	GENUS	SPECIES	SUBSPECI	COMMON_	FedStatus	StateStatu	ObsDate
3182	587598	Fish	Anguilla	rostrata		Eel, American			9/7/1994
3191	590681	Fish	Lampetra	appendix		Lamprey, American brook			9/7/1994
4002	585082	Fish	Anguilla	rostrata		Eel, American			8/26/1994
4123	589906	Fish	Lampetra	appendix		Lamprey, American brook			8/26/1994
5187	559208	Fish	Anguilla	rostrata		Eel, American			10/28/1997
5314	577644	Fish	Anguilla	rostrata		Eel, American			7/1/1996
5862	562918	Fish	Anguilla	rostrata		Eel, American			5/28/1998
6276	561777	Fish	Anguilla	rostrata		Eel, American			9/24/1998
6660	561834	Fish	Lampetra	appendix		Lamprey, American brook			9/24/1998
6663	588063	Fish	Anguilla	rostrata		Eel, American			9/14/1995
6685	586697	Fish	Lampetra	appendix		Lamprey, American brook			9/14/1995
7166	579763	Fish	Anguilla	rostrata		Eel, American			5/29/1997
7565	562333	Fish	Anguilla	rostrata		Eel, American			2/28/1997
11784	470939	Fish	Anguilla	rostrata		Eel, American			9/12/2005
11785	474425	Fish	Anguilla	rostrata		Eel, American			8/3/2000
12505	724731	Fish	Anguilla	rostrata		Eel, American			5/16/2002
13780	474435	Fish	Anguilla	rostrata		Eel, American			9/14/2000
16433	724753	Fish	Anguilla	rostrata		Eel, American			9/23/2002
18169	470921	Fish	Anguilla	rostrata		Eel, American			5/23/2005
19007	470932	Fish	Anguilla	rostrata		Eel, American			7/25/2005
19381	474415	Fish	Anguilla	rostrata		Eel, American			5/25/2000
22356	706234	Reptiles	Cemophora	coccinea	copei	Scarletsnake, northern			<null>
24296	792289	Fish	Anguilla	rostrata		Eel, American			5/27/2008
26153	988391	Fish	Anguilla	rostrata		Eel,			9/25/2007

OBJEC'	SppObs	TaxaGrp	GENUS	SPECIES	SUBSPECI	COMMON_	FedStatus	StateStatu	ObsDate
28744	792502	Fish	Anguilla	rostrata		American Eel, American			9/4/2008
31699	101168 8	Fish	Anguilla	rostrata		Eel, American			9/21/2012
31859	101168 6	Fish	Anguilla	rostrata		Eel, American			7/12/2012
33081	994721	Fish	Anguilla	rostrata		Eel, American			9/19/2011
33082	994722	Fish	Anguilla	rostrata		Eel, American			9/19/2011
34930	104133 3	Fish	Anguilla	rostrata		Eel, American			10/2/2014
34950	104164 8	Fish	Lampetra	appendix		Lamprey, American brook			10/2/2014
35359	102760 4	Fish	Anguilla	rostrata		Eel, American			6/5/2013
35429	102793 4	Fish	Lampetra	appendix		Lamprey, American brook			6/5/2013
35475	104133 6	Fish	Anguilla	rostrata		Eel, American			7/21/2014
35796	104165 0	Fish	Lampetra	appendix		Lamprey, American brook			7/21/2014
36013	994714	Fish	Anguilla	rostrata		Eel, American			7/18/2011
36030	994715	Fish	Anguilla	rostrata		Eel, American			7/18/2011
36299	101203 6	Fish	Lampetra	appendix		Lamprey, American brook			7/12/2012
36310	102760 6	Fish	Anguilla	rostrata		Eel, American			7/31/2013
36312	101168 7	Fish	Anguilla	rostrata		Eel, American			7/12/2012
36728	579626	Fish	Anguilla	rostrata		Eel, American			9/30/1996
36760	580182	Fish	Lampetra	appendix		Lamprey, American brook			9/30/1996
36804	102761 1	Fish	Anguilla	rostrata		Eel, American			9/9/2013
37702	727459	Fish	Anguilla	rostrata		Eel, American			9/23/2002
37718	727436	Fish	Anguilla	rostrata		Eel, American			5/16/2002
40098	792362	Fish	Anguilla	rostrata		Eel, American			7/17/2008

SppObs_All

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1687645	Fish	Notemigonus	crysoleucas		Shiner, golden			7/1/1971
1688256	Fish	Lepomis	auritus		Sunfish, redbreast			7/1/1971
1688421	Fish	Lepomis	macrochirus		Bluegill			7/1/1971
1688738	Fish	Acantharchus	pomotis		Sunfish, mud			7/1/1971
1688739	Fish	Cyprinella	analostana		Shiner, satinfin			7/1/1971
1688891	Fish	Notropis	amoenus		Shiner, comely			7/1/1971
1689599	Fish	Lepomis	gibbosus		Pumpkinseed			7/1/1971
1695867	Fish	Lepomis	auritus		Sunfish, redbreast			7/1/1980
1695935	Fish	Micropterus	salmoides		Bass, largemouth			7/1/1980
1695960	Fish	Ameiurus	nebulosus		Bullhead, brown			7/1/1980
1696012	Fish	Pomoxis	nigromaculatus		Crappie, black			7/1/1980
1696018	Fish	Cyprinella	analostana		Shiner, satinfin			7/1/1980
1696066	Fish	Noturus	insignis		Madtom, margined			7/1/1980
1696181	Fish	Etheostoma	olmstedi		Darter, tessellated			7/1/1980
1696226	Fish	Percina	peltata		Darter, shield			7/1/1980
1696263	Fish	Anguilla	rostrata		Eel, American			7/1/1980
1696315	Fish	Etheostoma	vitreum		Darter, glassy			7/1/1980
1696320	Fish	Nocomis	micropogon		Chub, river			7/1/1980
1696321	Fish	Lepomis	macrochirus		Bluegill			7/1/1980
1696443	Fish	Perca	flavescens		Perch, yellow			7/1/1980
1696800	Fish	Lepomis	gibbosus		Pumpkinseed			7/1/1980
1696828	Fish	Nocomis	leptocephalus		Chub, bluehead			7/1/1980
1696975	Fish	Petromyzon	marinus		Lamprey, sea			7/1/1980
1697108	Fish	Esox	niger		Pickerel, chain			7/1/1980
1697120	Fish	Percina	notogramma		Darter, stripeback			7/1/1980
1697175	Fish	Semotilus	corporalis		Fallfish			7/1/1980
1697334	Fish	Ameiurus	natalis		Bullhead, yellow			7/1/1980

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1697335	Fish	Notropis	procne		Shiner, swallowtail			7/1/1980
1702386	Fish	Semotilus	corporalis		Fallfish			7/1/1979
1702413	Fish	Cyprinella	analostana		Shiner, satinfin			7/1/1979
1702448	Fish	Nocomis	leptocephalus		Chub, bluehead			7/1/1979
1702499	Fish	Micropterus	salmoides		Bass, largemouth			7/1/1979
1702582	Fish	Chrosomus	oreas		Dace, mountain redbelly			7/1/1979
1702667	Fish	Noturus	insignis		Madtom, margined			7/1/1979
1702737	Fish	Lepomis	auritus		Sunfish, redbreast			7/1/1979
1702799	Fish	Pomoxis	nigromaculatus		Crappie, black			7/1/1979
1702816	Fish	Percina	peltata		Darter, shield			7/1/1979
1702832	Fish	Anguilla	rostrata		Eel, American			7/1/1979
1702897	Fish	Lepomis	macrochirus		Bluegill			7/1/1979
1702967	Fish	Notropis	amoenus		Shiner, comely			7/1/1979
1702995	Fish	Notemigonus	crysoleucas		Shiner, golden			7/1/1979
1703037	Fish	Perca	flavescens		Perch, yellow			7/1/1979
1703326	Fish	Esox	niger		Pickerel, chain			7/1/1979
1703438	Fish	Notropis	procne		Shiner, swallowtail			7/1/1979
1703593	Fish	Lepomis	gibbosus		Pumpkinseed			7/1/1979
1703628	Fish	Petromyzon	marinus		Lamprey, sea			7/1/1979
1703750	Fish	Percina	notogramma		Darter, stripeback			7/1/1979
1711341	Fish	Nocomis	leptocephalus		Chub, bluehead			7/1/1981
1711350	Fish	Cyprinella	analostana		Shiner, satinfin			7/1/1981
1711371	Fish	Semotilus	corporalis		Fallfish			7/1/1981
1711397	Fish	Notropis	rubellus		shiner, rosyface			7/1/1981
1711400	Fish	Etheostoma	olmstedi		Darter, tessellated			7/1/1981
1711476	Fish	Lepomis	macrochirus		Bluegill			7/1/1981
1711482	Fish	Nocomis	micropogon		Chub, river			7/1/1981
1711555	Fish	Micropterus	salmoides		Bass, largemouth			7/1/1981
1711594	Fish	Clinostomus	funduloides		Dace,			7/1/1971

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
					rosyside			
1711662	Fish	Anguilla	rostrata		Eel, American			7/1/1981
1711688	Fish	Notemigonus	crysoleucas		Shiner, golden			7/1/1971
1711713	Fish	Nocomis	leptocephalus		Chub, bluehead			7/1/1971
1711758	Fish	Pomoxis	nigromaculatus		Crappie, black			7/1/1981
1711845	Fish	Noturus	insignis		Madtom, margined			7/1/1981
1711886	Fish	Notropis	amoenus		Shiner, comely			7/1/1981
1711902	Fish	Cyprinella	analostana		Shiner, satinfin			7/1/1971
1711943	Fish	Anguilla	rostrata		Eel, American			7/1/1971
1712057	Fish	Erimyzon	oblongus		Chubsucker, creek			7/1/1971
1712059	Fish	Lepomis	gibbosus		Pumpkinseed			7/1/1981
1712075	Fish	Aphredoderus	sayanus	sayanus	Perch, pirate			7/1/1971
1712107	Fish	Lepomis	auritus		Sunfish, redbreast			7/1/1981
1712108	Fish	Lepomis	auritus		Sunfish, redbreast			7/1/1971
1712198	Fish	Umbra	pygmaea		Mudminnow, eastern			7/1/1971
1712262	Fish	Percina	peltata		Darter, shield			7/1/1981
1712689	Fish	Notropis	procne		Shiner, swallowtail			7/1/1981
1713647	Fish	Petromyzon	marinus		Lamprey, sea			7/1/1981
1713802	Fish	Esox	niger		Pickerel, chain			7/1/1981
1713855	Fish	Esox	niger		Pickerel, chain			7/1/1971
1718095	Amphibians	Plethodon	cinereus		Salamander, eastern red-backed			<null>
1737161	Fish	Notropis	rubellus		shiner, rosyface			8/26/1994
1737187	Fish	Lepomis	macrochirus		Bluegill			8/26/1994
1737320	Fish	Lepomis	auritus		Sunfish, redbreast			8/26/1994
1737348	Fish	Noturus	insignis		Madtom, margined			8/26/1994
1737524	Fish	Anguilla	rostrata		Eel, American			8/26/1994
1737528	Fish	Cyprinella	analostana		Shiner, satinfin			8/26/1994
1737683	Fish	Percina	peltata		Darter, shield			8/26/1994

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1737909	Fish	Hypenteliu m	nigricans		Sucker, northern hog			8/26/1994
1738269	Fish	Ameiurus	natalis		Bullhead, yellow			8/26/1994
1738270	Fish	Notropis	procne		Shiner, swallowtail			8/26/1994
1738884	Fish	Lampetra	appendix		Lamprey, American brook			8/26/1994
1742489	Fish	Petromyzon	marinus		Lamprey, sea			7/23/1973
1743808	Fish	Cyprinella	analostana		Shiner, satinfin			7/1/1996
1743833	Fish	Anguilla	rostrata		Eel, American			7/1/1996
1743919	Fish	Etheostoma	vitreum		Darter, glassy			7/1/1996
1743964	Fish	Micropterus	salmoides		Bass, largemouth			7/1/1996
1744173	Fish	Hypenteliu m	nigricans		Sucker, northern hog			7/1/1996
1744411	Fish	Notropis	rubellus		shiner, rosyface			7/1/1996
1744452	Fish	Semotilus	corporalis		Fallfish			7/1/1996
1744507	Fish	Lepomis	auritus		Sunfish, redbreast			7/1/1996
1744561	Fish	Noturus	insignis		Madtom, margined			7/1/1996
1744563	Fish	Percina	peltata		Darter, shield			7/1/1996
1744713	Fish	Notropis	amoenus		Shiner, comely			7/1/1996
1745184	Fish	Nocomis	micropogon		Chub, river			9/7/1994
1745185	Fish	Lepomis	macrochirus		Bluegill			9/7/1994
1745218	Fish	Notropis	procne		Shiner, swallowtail			7/1/1996
1745342	Fish	Hypenteliu m	nigricans		Sucker, northern hog			9/7/1994
1745387	Fish	Cyprinella	analostana		Shiner, satinfin			9/7/1994
1745396	Fish	Percina	peltata		Darter, shield			9/7/1994
1745409	Fish	Notropis	rubellus		shiner, rosyface			9/7/1994
1745462	Fish	Lampetra	appendix		Lamprey, American brook			9/7/1994
1745479	Fish	Semotilus	corporalis		Fallfish			9/7/1994
1745610	Fish	Anguilla	rostrata		Eel, American			9/7/1994
1745629	Fish	Lepomis	auritus		Sunfish,			9/7/1994

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
					redbreast			
1745984	Fish	Notropis	procne		Shiner, swallowtail			9/7/1994
1746073	Fish	Micropterus	salmoides		Bass, largemouth			9/7/1994
1746077	Fish	Noturus	insignis		Madtom, margined			9/7/1994
1746441	Fish	Notropis	amoenus		Shiner, comely			9/7/1994
1748282	Fish	Petromyzon	marinus		Lamprey, sea			10/11/1974
1754954	Fish	Hypenteliu m	nigricans		Sucker, northern hog			5/28/1998
1755026	Fish	Lythrurus	ardens		Shiner, rosefin			5/28/1998
1755180	Fish	Percina	peltata		Darter, shield			5/28/1998
1755274	Fish	Noturus	insignis		Madtom, margined			5/28/1998
1755295	Fish	Notropis	rubellus		shiner, rosyface			5/28/1998
1755305	Fish	Lepomis	microlophus		Sunfish, redear			5/28/1998
1755309	Fish	Lepomis	auritus		Sunfish, redbreast			5/28/1998
1755329	Fish	Semotilus	corporalis		Fallfish			5/28/1998
1755522	Fish	Lepomis	macrochirus		Bluegill			5/28/1998
1755574	Fish	Etheostoma	olmstedi		Darter, tessellated			5/28/1998
1755585	Fish	Nocomis	micropogon		Chub, river			5/28/1998
1755586	Fish	Etheostoma	vitreum		Darter, glassy			5/28/1998
1755614	Fish	Cyprinella	analostana		Shiner, satinfin			5/28/1998
1755634	Fish	Micropterus	salmoides		Bass, largemouth			5/28/1998
1755645	Fish	Anguilla	rostrata		Eel, American			5/28/1998
1756100	Fish	Notropis	amoenus		Shiner, comely			5/28/1998
1756211	Fish	Notropis	procne		Shiner, swallowtail			5/28/1998
1758341	Fish	Lepomis	macrochirus		Bluegill			9/14/1995
1758342	Fish	Nocomis	micropogon		Chub, river			9/14/1995
1758439	Fish	Hypenteliu m	nigricans		Sucker, northern hog			9/14/1995
1758643	Fish	Lepomis	auritus		Sunfish, redbreast			9/14/1995
1758676	Fish	Notropis	rubellus		shiner, rosyface			9/14/1995
1758755	Fish	Noturus	insignis		Madtom,			9/14/1995

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
					margined			
1758788	Fish	Micropterus	salmoides		Bass, largemouth			9/14/1995
1758908	Fish	Etheostoma	olmstedi		Darter, tessellated			9/14/1995
1758984	Fish	Anguilla	rostrata		Eel, American			9/14/1995
1759061	Fish	Lampetra	appendix		Lamprey, American brook			9/14/1995
1759145	Fish	Cyprinella	analostana		Shiner, satinfin			9/14/1995
1759181	Fish	Lythrurus	ardens		Shiner, rosefin			9/14/1995
1759705	Fish	Percina	peltata		Darter, shield			9/14/1995
1760118	Fish	Notropis	amoenus		Shiner, comely			9/14/1995
1760728	Fish	Notropis	procne		Shiner, swallowtail			9/14/1995
1761236	Fish	Hypentelium	nigricans		Sucker, northern hog			10/28/1997
1761268	Fish	Etheostoma	vitreum		Darter, glassy			10/28/1997
1761425	Fish	Lepomis	auritus		Sunfish, redbreast			10/28/1997
1761442	Fish	Notropis	rubellus		shiner, rosyface			10/28/1997
1761471	Fish	Nocomis	leptocephalus		Chub, bluehead			10/28/1997
1761553	Fish	Percina	peltata		Darter, shield			10/28/1997
1761578	Fish	Noturus	insignis		Madtom, margined			10/28/1997
1761734	Fish	Lythrurus	ardens		Shiner, rosefin			10/28/1997
1761737	Fish	Semotilus	corporalis		Fallfish			10/28/1997
1761923	Fish	Anguilla	rostrata		Eel, American			10/28/1997
1761935	Fish	Cyprinella	analostana		Shiner, satinfin			10/28/1997
1762162	Fish	Etheostoma	olmstedi		Darter, tessellated			10/28/1997
1762918	Fish	Hypentelium	nigricans		Sucker, northern hog			5/29/1997
1763073	Fish	Notropis	rubellus		shiner, rosyface			5/29/1997
1763076	Fish	Semotilus	corporalis		Fallfish			5/29/1997
1763129	Fish	Notropis	procne		Shiner, swallowtail			10/28/1997
1763130	Fish	Ameiurus	natalis		Bullhead, yellow			10/28/1997

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1763271	Fish	Etheostoma	vitreum		Darter, glassy			5/29/1997
1763520	Fish	Cyprinella	analostana		Shiner, satinfin			5/29/1997
1763584	Fish	Lythrurus	ardens		Shiner, rosefin			5/29/1997
1763776	Fish	Noturus	insignis		Madtom, margined			5/29/1997
1763832	Fish	Lepomis	auritus		Sunfish, redbreast			5/29/1997
1763892	Fish	Percina	peltata		Darter, shield			5/29/1997
1763898	Fish	Notropis	amoenus		Shiner, comely			5/29/1997
1763947	Fish	Notropis	procne		Shiner, swallowtail			5/29/1997
1764525	Fish	Anguilla	rostrata		Eel, American			5/29/1997
1764695	Fish	Nocomis	leptocephalus		Chub, bluehead			5/29/1997
1764756	Fish	Ameiurus	natalis		Bullhead, yellow			5/29/1997
1769146	Fish	Lepomis	auritus		Sunfish, redbreast			2/28/1997
1769156	Fish	Percina	peltata		Darter, shield			2/28/1997
1769173	Fish	Notropis	rubellus		shiner, rosyface			2/28/1997
1769239	Fish	Cyprinella	analostana		Shiner, satinfin			2/28/1997
1769434	Fish	Etheostoma	vitreum		Darter, glassy			2/28/1997
1769663	Fish	Semotilus	corporalis		Fallfish			2/28/1997
1769822	Fish	Notropis	amoenus		Shiner, comely			9/30/1996
1769836	Fish	Noturus	insignis		Madtom, margined			2/28/1997
1769861	Fish	Notropis	rubellus		shiner, rosyface			9/30/1996
1769878	Fish	Noturus	insignis		Madtom, margined			9/30/1996
1769893	Fish	Etheostoma	olmstedi		Darter, tessellated			9/30/1996
1769939	Fish	Hypentelium	nigricans		Sucker, northern hog			2/28/1997
1769943	Fish	Hypentelium	nigricans		Sucker, northern hog			9/30/1996
1770036	Fish	Cyprinella	analostana		Shiner, satinfin			9/30/1996
1770057	Fish	Lythrurus	ardens		Shiner, rosefin			2/28/1997
1770110	Fish	Nocomis	leptocephalus		Chub, bluehead			2/28/1997

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1770148	Fish	Lepomis	auritus		Sunfish, redbreast			9/30/1996
1770247	Fish	Percina	peltata		Darter, shield			9/30/1996
1770261	Fish	Anguilla	rostrata		Eel, American			2/28/1997
1770275	Fish	Anguilla	rostrata		Eel, American			9/30/1996
1770343	Fish	Notropis	rubellus		shiner, rosyface			9/24/1998
1770348	Fish	Percina	peltata		Darter, shield			9/24/1998
1770436	Fish	Cyprinella	analostana		Shiner, satinfin			9/24/1998
1770454	Fish	Lepomis	auritus		Sunfish, redbreast			9/24/1998
1770504	Fish	Hypenteliu m	nigricans		Sucker, northern hog			9/24/1998
1770517	Fish	Lythrurus	ardens		Shiner, rosefin			9/24/1998
1770539	Fish	Etheostoma	olmstedi		Darter, tessellated			2/28/1997
1770543	Fish	Etheostoma	olmstedi		Darter, tessellated			9/24/1998
1770628	Fish	Semotilus	corporalis		Fallfish			9/24/1998
1770637	Fish	Noturus	insignis		Madtom, margined			9/24/1998
1770785	Fish	Ameiurus	natalis		Bullhead, yellow			2/28/1997
1770786	Fish	Notropis	procne		Shiner, swallowtail			2/28/1997
1770993	Fish	Etheostoma	vitreum		Darter, glassy			9/30/1996
1771020	Fish	Lepomis	macrochirus		Bluegill			9/24/1998
1771021	Fish	Etheostoma	vitreum		Darter, glassy			9/24/1998
1771237	Fish	Notropis	procne		Shiner, swallowtail			9/30/1996
1771304	Fish	Anguilla	rostrata		Eel, American			9/24/1998
1771349	Fish	Lythrurus	ardens		Shiner, rosefin			9/30/1996
1771756	Fish	Notropis	procne		Shiner, swallowtail			9/24/1998
1771819	Fish	Lampetra	appendix		Lamprey, American brook			9/30/1996
1771820	Fish	Lampetra	appendix		Lamprey, American brook			9/24/1998
1780440	Birds	Haliaeetus	leucocephal us		Eagle, bald			3/1/2000
1786354	Mammals	Vulpes	vulpes	fulva	Fox, red			7/29/1997

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1801335	Birds	Haliaeetus	leucocephalus		Eagle, bald			4/5/2000
1814809	Birds	Haliaeetus	leucocephalus		Eagle, bald			3/19/2010
1821455	Birds	Parkesia	noveboracensis		Waterthrush, northern			5/1/2002
1821797	Birds	Passerella	iliaca		Sparrow, fox			5/1/2002
1829560	Fish	Cyprinella	analostana		Shiner, satinfin			9/23/2002
1830001	Fish	Noturus	insignis		Madtom, margined			9/23/2002
1830042	Fish	Anguilla	rostrata		Eel, American			9/23/2002
1830127	Fish	Etheostoma	olmstedi		Darter, tessellated			7/25/2002
1830280	Fish	Lepomis	auritus		Sunfish, redbreast			9/23/2002
1830282	Fish	Lepomis	auritus		Sunfish, redbreast			7/25/2002
1830336	Fish	Micropterus	salmoides		Bass, largemouth			9/23/2002
1830383	Fish	Aphredoderus	sayanus	sayanus	Perch, pirate			9/23/2002
1830394	Fish	Erimyzon	oblongus		Chubsucker, creek			9/23/2002
1830400	Fish	Lythrurus	ardens		Shiner, rosefin			9/23/2002
1830441	Fish	Semotilus	corporalis		Fallfish			9/23/2002
1830444	Fish	Cyprinella	analostana		Shiner, satinfin			7/25/2002
1830551	Fish	Micropterus	salmoides		Bass, largemouth			7/25/2002
1830600	Fish	Lythrurus	ardens		Shiner, rosefin			7/25/2002
1830630	Fish	Etheostoma	olmstedi		Darter, tessellated			9/23/2002
1830724	Fish	Noturus	insignis		Madtom, margined			7/25/2002
1830745	Fish	Lepomis	macrochirus		Bluegill			9/23/2002
1830752	Fish	Lepomis	macrochirus		Bluegill			7/25/2002
1830753	Fish	Nocomis	micropogon		Chub, river			7/25/2002
1830882	Fish	Petromyzon	marinus		Lamprey, sea			5/16/2002
1830890	Fish	Semotilus	corporalis		Fallfish			7/25/2002
1830986	Fish	Lepomis	auritus		Sunfish, redbreast			5/16/2002
1831146	Fish	Anguilla	rostrata		Eel, American			5/16/2002
1831222	Fish	Nocomis	leptocephalus		Chub, bluehead			7/25/2002
1831237	Fish	Percina	peltata		Darter, shield			5/16/2002
1831459	Fish	Ictalurus	punctatus		Catfish,			5/16/2002

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
					channel			
1831548	Fish	Erimyzon	oblongus		Chubsucker, creek			7/25/2002
1831611	Fish	Lythrurus	ardens		Shiner, rosefin			5/16/2002
1831874	Fish	Etheostoma	olmstedi		Darter, tessellated			5/16/2002
1831937	Fish	Notropis	procne		Shiner, swallowtail			7/25/2002
1832038	Fish	Ameiurus	natalis		Bullhead, yellow			9/23/2002
1832048	Fish	Notropis	procne		Shiner, swallowtail			5/16/2002
1832103	Fish	Noturus	insignis		Madtom, margined			5/16/2002
1832140	Fish	Ameiurus	natalis		Bullhead, yellow			5/16/2002
1832244	Fish	Cyprinella	analostana		Shiner, satinfin			5/16/2002
1843813	Birds	Spinus	tristis		Goldfinch, American			10/3/2004
1845607	Birds	Vireo	olivaceus		Vireo, red-eyed			10/3/2004
1847302	Fish	Micropterus	salmoides		Bass, largemouth			9/14/2000
1847404	Fish	Semotilus	corporalis		Fallfish			9/14/2000
1847447	Fish	Noturus	insignis		Madtom, margined			9/14/2000
1847456	Fish	Lepomis	auritus		Sunfish, redbreast			9/14/2000
1847531	Fish	Anguilla	rostrata		Eel, American			9/14/2000
1847774	Fish	Notropis	rubellus		shiner, rosyface			9/14/2000
1847802	Fish	Percina	peltata		Darter, shield			9/14/2000
1849574	Fish	Hypentelium	nigricans		Sucker, northern hog			5/23/2005
1849627	Fish	Lythrurus	ardens		Shiner, rosefin			5/23/2005
1849877	Fish	Notemigonus	crysoleucas		Shiner, golden			5/23/2005
1849994	Fish	Cyprinella	analostana		Shiner, satinfin			5/23/2005
1850036	Fish	Noturus	insignis		Madtom, margined			5/23/2005
1850091	Fish	Etheostoma	olmstedi		Darter, tessellated			5/23/2005
1850326	Fish	Lepomis	auritus		Sunfish, redbreast			5/23/2005
1850364	Fish	Percina	peltata		Darter, shield			5/23/2005
1850863	Fish	Anguilla	rostrata		Eel, American			5/23/2005

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1851401	Fish	Notropis	procne		Shiner, swallowtail			5/23/2005
1853763	Fish	Lepomis	auritus		Sunfish, redbreast			5/16/2002
1853885	Fish	Ictalurus	punctatus		Catfish, channel			5/16/2002
1853922	Fish	Anguilla	rostrata		Eel, American			5/16/2002
1853979	Fish	Nocomis	leptocephalus		Chub, bluehead			7/25/2002
1854002	Fish	Lythrurus	ardens		Shiner, rosefin			5/16/2002
1854109	Fish	Nocomis	micropogon		Chub, river			7/25/2002
1854110	Fish	Lepomis	macrochirus		Bluegill			7/25/2002
1854183	Fish	Erimyzon	oblongus		Chubsucker, creek			7/25/2002
1854184	Fish	Erimyzon	oblongus		Chubsucker, creek			9/23/2002
1854235	Fish	Aphredoderus	sayanus	sayanus	Perch, pirate			9/23/2002
1854263	Fish	Lepomis	macrochirus		Bluegill			9/23/2002
1854304	Fish	Cyprinella	analostana		Shiner, satinfin			5/16/2002
1854309	Fish	Cyprinella	analostana		Shiner, satinfin			7/25/2002
1854310	Fish	Cyprinella	analostana		Shiner, satinfin			9/23/2002
1854312	Fish	Semotilus	corporalis		Fallfish			9/23/2002
1854319	Fish	Semotilus	corporalis		Fallfish			7/25/2002
1854434	Fish	Lythrurus	ardens		Shiner, rosefin			7/25/2002
1854435	Fish	Lythrurus	ardens		Shiner, rosefin			9/23/2002
1854484	Fish	Ameiurus	natalis		Bullhead, yellow			5/16/2002
1854485	Fish	Notropis	procne		Shiner, swallowtail			5/16/2002
1854499	Fish	Ameiurus	natalis		Bullhead, yellow			9/23/2002
1854501	Fish	Notropis	procne		Shiner, swallowtail			7/25/2002
1854517	Fish	Percina	peltata		Darter, shield			5/16/2002
1854662	Fish	Micropterus	salmoides		Bass, largemouth			7/25/2002
1854663	Fish	Micropterus	salmoides		Bass, largemouth			9/23/2002
1854763	Fish	Anguilla	rostrata		Eel, American			9/23/2002
1854806	Fish	Lepomis	auritus		Sunfish, redbreast			7/25/2002
1854807	Fish	Lepomis	auritus		Sunfish, redbreast			9/23/2002

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1854849	Fish	Etheostoma	olmstedi		Darter, tessellated			9/23/2002
1854851	Fish	Etheostoma	olmstedi		Darter, tessellated			7/25/2002
1854976	Fish	Etheostoma	olmstedi		Darter, tessellated			5/16/2002
1854999	Fish	Noturus	insignis		Madtom, margined			5/16/2002
1855097	Fish	Petromyzon	marinus		Lamprey, sea			5/16/2002
1855174	Fish	Noturus	insignis		Madtom, margined			7/25/2002
1855175	Fish	Noturus	insignis		Madtom, margined			9/23/2002
1855873	Fish	Hypenteliu m	nigricans		Sucker, northern hog			7/25/2005
1855903	Fish	Semotilus	corporalis		Fallfish			7/25/2005
1855990	Fish	Cyprinella	analostana		Shiner, satinfin			7/25/2005
1856048	Fish	Noturus	insignis		Madtom, margined			7/25/2005
1856338	Fish	Lythrurus	ardens		Shiner, rosefin			7/25/2005
1856617	Fish	Notropis	amoenus		Shiner, comely			7/25/2005
1856852	Fish	Notropis	procne		Shiner, swallowtail			7/25/2005
1857345	Fish	Hypenteliu m	nigricans		Sucker, northern hog			5/25/2000
1857468	Fish	Etheostoma	olmstedi		Darter, tessellated			5/25/2000
1857575	Fish	Micropterus	dolomieu		Bass, smallmouth			5/25/2000
1857576	Fish	Semotilus	corporalis		Fallfish			5/25/2000
1857780	Fish	Cyprinella	analostana		Shiner, satinfin			5/25/2000
1857801	Fish	Lepomis	auritus		Sunfish, redbreast			5/25/2000
1857906	Fish	Micropterus	salmoides		Bass, largemouth			9/12/2005
1857969	Fish	Etheostoma	olmstedi		Darter, tessellated			7/25/2005
1858053	Fish	Lepomis	macrochirus		Bluegill			5/25/2000
1858066	Fish	Noturus	insignis		Madtom, margined			5/25/2000
1858272	Fish	Anguilla	rostrata		Eel, American			5/25/2000
1858304	Fish	Lepomis	auritus		Sunfish, redbreast			9/12/2005
1858320	Fish	Lepomis	auritus		Sunfish, redbreast			7/25/2005
1858337	Fish	Noturus	insignis		Madtom,			9/12/2005

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
					margined			
1858391	Fish	Ameiurus	natalis		Bullhead, yellow			5/25/2000
1858438	Fish	Lepomis	macrochirus		Bluegill			9/12/2005
1858664	Fish	Cyprinella	analostana		Shiner, satinfin			9/12/2005
1858755	Fish	Notropis	amoenus		Shiner, comely			9/12/2005
1858762	Fish	Anguilla	rostrata		Eel, American			9/12/2005
1858764	Fish	Anguilla	rostrata		Eel, American			7/25/2005
1858800	Fish	Percina	peltata		Darter, shield			7/25/2005
1861601	Fish	Percina	peltata		Darter, shield			9/12/2005
1863908	Fish	Semotilus	corporalis		Fallfish			8/3/2000
1864058	Fish	Percina	peltata		Darter, shield			8/3/2000
1864062	Fish	Lepomis	auritus		Sunfish, redbreast			8/3/2000
1864321	Fish	Etheostoma	vitreum		Darter, glassy			8/3/2000
1864322	Fish	Lepomis	macrochirus		Bluegill			8/3/2000
1864324	Fish	Hypenteliu m	nigricans		Sucker, northern hog			8/3/2000
1864419	Fish	Anguilla	rostrata		Eel, American			8/3/2000
1864562	Fish	Noturus	insignis		Madtom, margined			8/3/2000
1864619	Fish	Micropterus	salmoides		Bass, largemouth			8/3/2000
1864885	Fish	Lythrurus	ardens		Shiner, rosefin			8/3/2000
1865484	Fish	Ameiurus	natalis		Bullhead, yellow			8/3/2000
1904781	Fish	Semotilus	corporalis		Fallfish			1/1/1979
1904819	Fish	Notemigonu s	crysoleucas		Shiner, golden			1/1/1979
1904895	Fish	Cyprinella	analostana		Shiner, satinfin			1/1/1979
1904903	Fish	Lepomis	gibbosus		Pumpkinsee d			1/1/1979
1904996	Fish	Perca	flavescens		Perch, yellow			1/1/1979
1905095	Fish	Lepomis	auritus		Sunfish, redbreast			1/1/1979
1905098	Fish	Chrosomus	oreas		Dace, mountain redbelly			1/1/1979
1905114	Fish	Noturus	insignis		Madtom, margined			1/1/1979

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1905125	Fish	Percina	notogramma		Darter, stripeback			1/1/1979
1905193	Fish	Etheostoma	vitreum		Darter, glassy			1/1/1979
1905194	Fish	Nocomis	micropogon		Chub, river			1/1/1979
1905195	Fish	Lepomis	macrochirus		Bluegill			1/1/1979
1905210	Fish	Micropterus	salmoides		Bass, largemouth			1/1/1979
1905211	Fish	Ameiurus	nebulosus		Bullhead, brown			1/1/1979
1905340	Fish	Notropis	amoenus		Shiner, comely			1/1/1979
1905375	Fish	Anguilla	rostrata		Eel, American			1/1/1979
1905388	Fish	Etheostoma	olmstedi		Darter, tessellated			1/1/1979
1905466	Fish	Nocomis	leptocephalus		Chub, bluehead			1/1/1979
1905487	Fish	Petromyzon	marinus		Lamprey, sea			1/1/1979
1905702	Fish	Percina	peltata		Darter, shield			1/1/1979
1905900	Fish	Ameiurus	natalis		Bullhead, yellow			1/1/1979
1905901	Fish	Notropis	procne		Shiner, swallowtail			1/1/1979
1906080	Fish	Pomoxis	nigromaculatus		Crappie, black			1/1/1979
1906479	Fish	Esox	niger		Pickerel, chain			1/1/1979
1907041	Fish	Petromyzon	marinus		Lamprey, sea			1/1/1973
1914254	Fish	Notemigonus	crysoleucas		Shiner, golden			1/1/1971
1914378	Fish	Cyprinella	analostana		Shiner, satinfin			1/1/1971
1914437	Fish	Lepomis	macrochirus		Bluegill			1/1/1971
1914674	Fish	Notropis	amoenus		Shiner, comely			1/1/1971
1914744	Fish	Lepomis	auritus		Sunfish, redbreast			1/1/1971
1914880	Fish	Acantharchus	pomotis		Sunfish, mud			1/1/1971
1915242	Fish	Lepomis	gulosus		Warmouth			1/1/1971
1915435	Fish	Semotilus	corporalis		Fallfish			1/1/1981
1915852	Fish	Etheostoma	olmstedi		Darter, tessellated			1/1/1981
1915890	Fish	Lepomis	gibbosus		Pumpkinseed			1/1/1981
1915914	Fish	Lepomis	auritus		Sunfish, redbreast			1/1/1981
1916019	Fish	Notropis	rubellus		shiner, rosyface			1/1/1981

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
1916080	Fish	Noturus	insignis		Madtom, margined			1/1/1981
1916164	Fish	Anguilla	rostrata		Eel, American			1/1/1981
1916167	Fish	Cyprinella	analostana		Shiner, satinfin			1/1/1981
1916217	Fish	Micropterus	salmoides		Bass, largemouth			1/1/1981
1916313	Fish	Pomoxis	nigromaculatus		Crappie, black			1/1/1981
1916368	Fish	Nocomis	leptocephalus		Chub, bluehead			1/1/1981
1916654	Fish	Notropis	procne		Shiner, swallowtail			1/1/1981
1916666	Fish	Esox	niger		Pickerel, chain			1/1/1981
1916777	Fish	Percina	peltata		Darter, shield			1/1/1981
1916822	Fish	Petromyzon	marinus		Lamprey, sea			1/1/1981
1916850	Fish	Lepomis	macrochirus		Bluegill			1/1/1981
1916851	Fish	Nocomis	micropogon		Chub, river			1/1/1981
1916911	Fish	Notropis	amoenus		Shiner, comely			1/1/1981
1924640	Fish	Lepomis	gibbosus		Pumpkinseed			1/1/1973
1924712	Fish	Noturus	insignis		Madtom, margined			1/1/1973
1924801	Fish	Etheostoma	olmstedi		Darter, tessellated			1/1/1973
1924833	Fish	Perca	flavescens		Perch, yellow			1/1/1973
1924906	Fish	Lepomis	auritus		Sunfish, redbreast			1/1/1973
1924970	Fish	Micropterus	salmoides		Bass, largemouth			1/1/1973
1924994	Fish	Notropis	amoenus		Shiner, comely			1/1/1973
1925234	Fish	Notropis	hudsonius		Shiner, spottail			1/1/1973
1925734	Fish	Ameiurus	natalis		Bullhead, yellow			1/1/1973
1926384	Fish	Petromyzon	marinus		Lamprey, sea			1/1/1973
1928242	Fish	Nocomis	leptocephalus		Chub, bluehead			1/1/1973
1928308	Fish	Lepomis	macrochirus		Bluegill			1/1/1973
1928707	Fish	Semotilus	corporalis		Fallfish			1/1/1973
1928948	Fish	Cyprinella	analostana		Shiner, satinfin			1/1/1973
1929994	Fish	Anguilla	rostrata		Eel, American			1/1/1973
1930179	Fish	Petromyzon	marinus		Lamprey,			1/1/1974

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
					sea			
1930372	Fish	Notropis	procne		Shiner, swallowtail			1/1/1973
1931944	Amphibians	Anaxyrus	americanus	americanus	Toad, eastern American			<null>
1932605	Amphibians	Desmognathus	fuscus		Salamander, northern dusky			<null>
1941634	Fish	Clinostomus	funduloides		Dace, rosyside			1/1/1971
1941861	Fish	Erimyzon	oblongus		Chubsucker, creek			1/1/1971
1941865	Fish	Notemigonus	crysoleucas		Shiner, golden			1/1/1971
1941869	Fish	Aphredoderus	sayanus	sayanus	Perch, pirate			1/1/1971
1941897	Fish	Nocomis	leptocephalus		Chub, bluehead			1/1/1971
1942176	Fish	Cyprinella	analostana		Shiner, satinfin			1/1/1971
1942243	Fish	Lepomis	auritus		Sunfish, redbreast			1/1/1971
1942263	Fish	Anguilla	rostrata		Eel, American			1/1/1971
1942764	Fish	Umbra	pygmaea		Mudminnow, eastern			1/1/1971
1943413	Fish	Esox	niger		Pickerel, chain			1/1/1971
1958075	Reptiles	Cemophora	coccinea	copei	Scarletsnake, northern			<null>
1958589	Amphibians	Notophthalmus	viridescens	viridescens	Newt, red-spotted			<null>
1966125	Amphibians	Lithobates	sylvaticus		Frog, wood			<null>
1966538	Amphibians	Pseudacris	feriarum		Frog, upland chorus			<null>
1975944	Fish	Anguilla	rostrata		Eel, American			9/25/2007
1976163	Fish	Notemigonus	crysoleucas		Shiner, golden			9/25/2007
1976228	Fish	Erimyzon	oblongus		Chubsucker, creek			9/25/2007
1976270	Fish	Lepomis	auritus		Sunfish, redbreast			9/25/2007
1976458	Fish	Aphredoderus	sayanus	sayanus	Perch, pirate			9/25/2007
1976499	Fish	Esox	niger		Pickerel, chain			9/25/2007
1976542	Fish	Etheostoma	olmstedi		Darter, tessellated			9/25/2007
1976720	Fish	Lepomis	gibbosus		Pumpkinseed			9/25/2007
2006987	Reptiles	Lampropeltis	getula		Kingsnake, eastern			<null>

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
2009821	Fish	Anguilla	rostrata		Eel, American			9/4/2008
2009910	Fish	Petromyzon	marinus		Lamprey, sea			9/4/2008
2009932	Fish	Notropis	rubellus		shiner, rosyface			9/4/2008
2009958	Fish	Cyprinella	analostana		Shiner, satinfin			9/4/2008
2010040	Fish	Noturus	insignis		Madtom, margined			9/4/2008
2010186	Fish	Lythrurus	ardens		Shiner, rosefin			9/4/2008
2010439	Fish	Semotilus	corporalis		Fallfish			9/4/2008
2010858	Fish	Notropis	procne		Shiner, swallowtail			9/4/2008
2011286	Fish	Aphredoderus	sayanus	sayanus	Perch, pirate			6/14/2005
2011433	Fish	Lepomis	macrochirus		Bluegill			6/14/2005
2011827	Fish	Esox	niger		Pickerel, chain			6/14/2005
2012215	Fish	Notemigonus	crysoleucas		Shiner, golden			6/14/2005
2014697	Fish	Lepomis	auritus		Sunfish, redbreast			9/4/2008
2016086	Fish	Etheostoma	olmstedi		Darter, tessellated			9/4/2008
2016304	Fish	Percina	peltata		Darter, shield			9/4/2008
2030143	Fish	Lepomis	auritus		Sunfish, redbreast			5/27/2008
2030318	Fish	Lepomis	macrochirus		Bluegill			5/27/2008
2030456	Fish	Cyprinella	analostana		Shiner, satinfin			5/27/2008
2030620	Fish	Percina	peltata		Darter, shield			5/27/2008
2030667	Fish	Anguilla	rostrata		Eel, American			5/27/2008
2030773	Fish	Lythrurus	ardens		Shiner, rosefin			5/27/2008
2030887	Fish	Petromyzon	marinus		Lamprey, sea			5/27/2008
2030897	Fish	Noturus	insignis		Madtom, margined			5/27/2008
2031050	Fish	Etheostoma	olmstedi		Darter, tessellated			5/27/2008
2031243	Fish	Semotilus	corporalis		Fallfish			5/27/2008
2031370	Fish	Notropis	procne		Shiner, swallowtail			5/27/2008
2057735	Fish	Micropterus	punctulatus		Bass, spotted			9/19/2011
2057758	Fish	Notropis	amoenus		Shiner, comely			9/19/2011
2057781	Fish	Cyprinella	analostana		Shiner,			9/19/2011

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
					satinfin			
2057835	Fish	Anguilla	rostrata		Eel, American			9/19/2011
2057877	Fish	Anguilla	rostrata		Eel, American			9/19/2011
2058090	Fish	Notropis	procne		Shiner, swallowtail			9/19/2011
2058091	Fish	Notropis	procne		Shiner, swallowtail			9/19/2011
2058211	Fish	Percina	peltata		Darter, shield			9/19/2011
2058252	Fish	Lepomis	auritus		Sunfish, redbreast			9/19/2011
2058417	Fish	Noturus	insignis		Madtom, margined			9/19/2011
2058418	Fish	Noturus	insignis		Madtom, margined			9/19/2011
2059889	Fish	Lythrurus	ardens		Shiner, rosefin			9/19/2011
2061422	Fish	Lepomis	auritus		Sunfish, redbreast			9/21/2012
2061458	Fish	Hypenteliu m	nigricans		Sucker, northern hog			9/21/2012
2061561	Fish	Notropis	rubellus		shiner, rosyface			9/21/2012
2061658	Fish	Cyprinella	analostana		Shiner, satinfin			9/21/2012
2061790	Fish	Semotilus	corporalis		Fallfish			9/21/2012
2061837	Fish	Anguilla	rostrata		Eel, American			9/21/2012
2061897	Fish	Lepomis	macrochirus		Bluegill			9/21/2012
2062063	Fish	Notropis	procne		Shiner, swallowtail			9/21/2012
2062064	Fish	Ameiurus	natalis		Bullhead, yellow			9/21/2012
2062127	Fish	Notropis	amoenus		Shiner, comely			9/21/2012
2062332	Fish	Etheostoma	olmstedi		Darter, tessellated			9/21/2012
2062483	Fish	Lythrurus	ardens		Shiner, rosefin			9/21/2012
2062678	Fish	Noturus	insignis	ssp 1	Madtom, spotted-margin			9/21/2012
2062808	Fish	Micropterus	dolomieu		Bass, smallmouth			9/21/2012
2063194	Fish	Micropterus	salmoides		Bass, largemouth			7/12/2012
2063379	Fish	Lepomis	auritus		Sunfish, redbreast			7/12/2012
2063679	Fish	Anguilla	rostrata		Eel, American			7/12/2012
2064558	Fish	Percina	peltata		Darter,			9/21/2012

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
					shield			
2064565	Fish	Percina	peltata		Darter, shield			7/12/2012
2066079	Fish	Lepomis	macrochirus		Bluegill			9/21/2012
2066257	Fish	Notropis	rubellus		shiner, rosyface			9/21/2012
2066329	Fish	Lepomis	auritus		Sunfish, redbreast			9/21/2012
2066430	Fish	Noturus	insignis		Madtom, margined			7/17/2008
2066479	Fish	Cyprinella	analostana		Shiner, satinfin			9/21/2012
2066516	Fish	Lepomis	auritus		Sunfish, redbreast			7/17/2008
2066628	Fish	Etheostoma	olmstedi		Darter, tessellated			7/17/2008
2066629	Fish	Etheostoma	olmstedi		Darter, tessellated			6/5/2013
2066812	Fish	Lythrurus	ardens		Shiner, rosefin			9/21/2012
2066939	Fish	Nocomis	micropogon		Chub, river			6/5/2013
2066999	Fish	Cyprinella	analostana		Shiner, satinfin			7/17/2008
2067048	Fish	Semotilus	corporalis		Fallfish			7/17/2008
2067061	Fish	Anguilla	rostrata		Eel, American			7/17/2008
2067115	Fish	Cyprinella	analostana		Shiner, satinfin			6/5/2013
2067170	Fish	Micropterus	salmoides		Bass, largemouth			6/5/2013
2067201	Fish	Notropis	procne		Shiner, swallowtail			9/21/2012
2067232	Fish	Notropis	amoenus		Shiner, comely			9/21/2012
2067238	Fish	Percina	peltata		Darter, shield			6/5/2013
2067258	Fish	Notropis	rubellus		shiner, rosyface			6/5/2013
2067279	Fish	Lepomis	auritus		Sunfish, redbreast			6/5/2013
2067355	Fish	Lythrurus	ardens		Shiner, rosefin			7/17/2008
2067394	Fish	Noturus	insignis		Madtom, margined			6/5/2013
2067427	Fish	Hypenteliu m	nigricans		Sucker, northern hog			7/18/2011
2067480	Fish	Noturus	insignis		Madtom, margined			7/18/2011
2067481	Fish	Noturus	insignis		Madtom, margined			7/18/2011
2067512	Fish	Cyprinella	analostana		Shiner, satinfin			7/18/2011
2067528	Fish	Lepomis	auritus		Sunfish,			7/18/2011

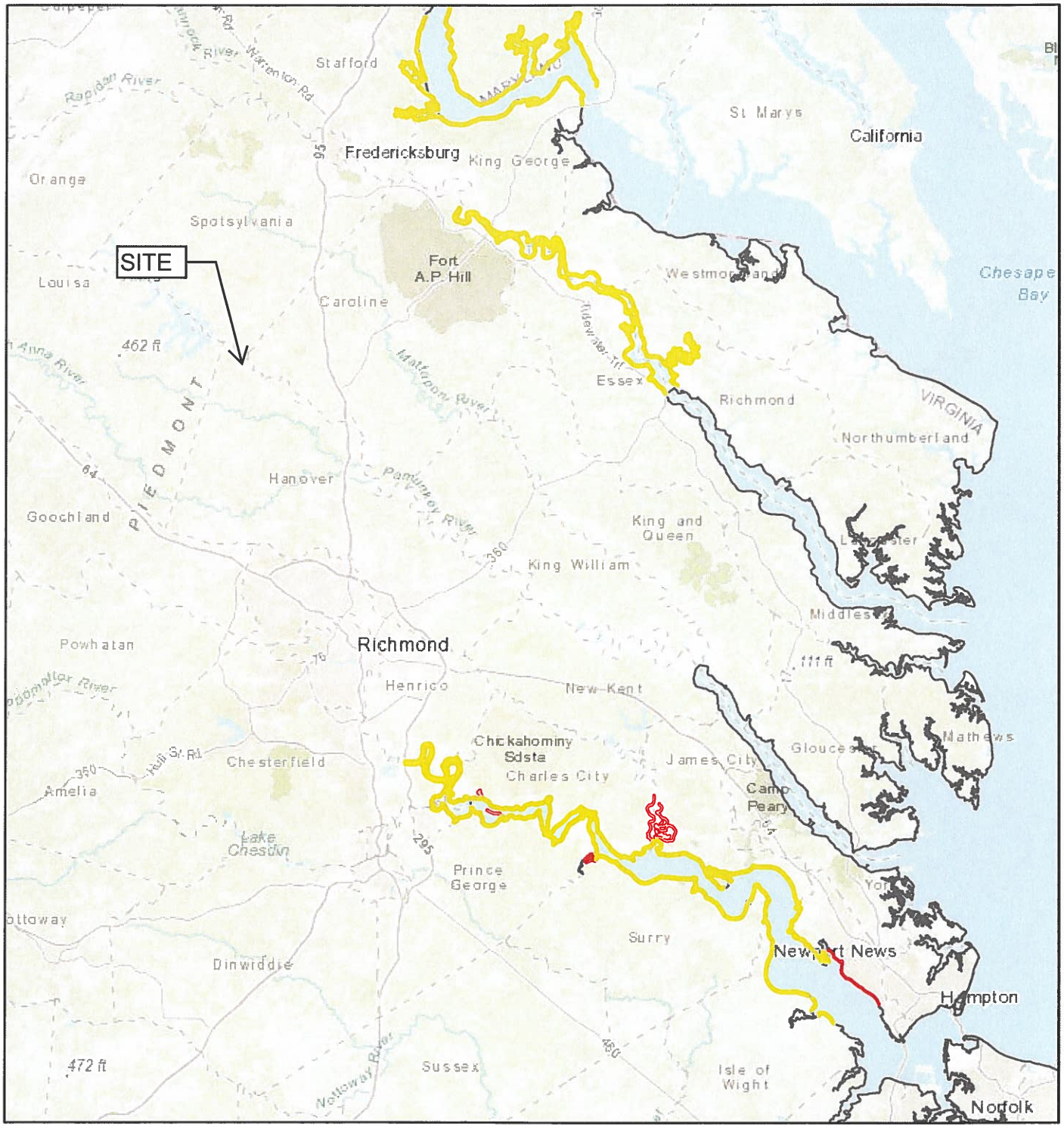
OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
2067529	Fish	Lepomis	auritus		redbreast Sunfish, redbreast			7/18/2011
2067586	Fish	Micropterus	salmoides		Bass, largemouth			7/18/2011
2067601	Fish	Lampetra	appendix		Lamprey, American brook			6/5/2013
2067734	Fish	Anguilla	rostrata		Eel, American			6/5/2013
2067744	Fish	Anguilla	rostrata		Eel, American			7/18/2011
2067745	Fish	Anguilla	rostrata		Eel, American			7/18/2011
2067835	Fish	Percina	peltata		Darter, shield			7/18/2011
2067848	Fish	Percina	peltata		Darter, shield			7/18/2011
2067881	Fish	Notropis	rubellus		shiner, rosyface			7/18/2011
2067969	Fish	Notropis	procne		Shiner, swallowtail			7/17/2008
2068041	Fish	Lythrurus	ardens		Shiner, rosefin			7/18/2011
2068182	Fish	Percina	notogramma		Darter, stripeback			7/18/2011
2068411	Fish	Gambusia	holbrooki		Mosquitofish, eastern			7/18/2011
2068418	Fish	Etheostoma	olmstedi		Darter, tessellated			9/21/2012
2068470	Fish	Notropis	hudsonius		Shiner, spottail			7/18/2011
2068471	Fish	Semotilus	corporalis		Fallfish			7/18/2011
2068503	Fish	Cyprinella	analostana		Shiner, satinfin			7/18/2011
2068553	Fish	Notropis	procne		Shiner, swallowtail			7/18/2011
2068554	Fish	Notropis	procne		Shiner, swallowtail			7/18/2011
2068562	Fish	Notropis	procne		Shiner, swallowtail			6/5/2013
2068583	Fish	Lythrurus	ardens		Shiner, rosefin			7/18/2011
2068636	Fish	Lythrurus	ardens		Shiner, rosefin			6/5/2013
2069239	Fish	Percina	peltata		Darter, shield			9/21/2012
2069742	Fish	Noturus	insignis	ssp 1	Madtom, spotted-margin			9/21/2012
2072094	Fish	Micropterus	salmoides		Bass, largemouth			8/15/2014
2072559	Fish	Pomoxis	nigromaculatus		Crappie, black			8/15/2014
2073397	Fish	Lepomis	macrochirus		Bluegill			8/15/2014

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
2073552	Fish	Etheostoma	olmstedi		Darter, tessellated			7/21/2014
2073875	Fish	Hypenteliu m	nigricans		Sucker, northern hog			7/21/2014
2073939	Fish	Notropis	amoenus		Shiner, comely			7/21/2014
2074154	Fish	Micropterus	salmoides		Bass, largemouth			7/21/2014
2074247	Fish	Cyprinella	analostana		Shiner, satinfin			7/21/2014
2074349	Fish	Noturus	insignis		Madtom, margined			7/21/2014
2074370	Fish	Semotilus	corporalis		Fallfish			7/21/2014
2074472	Fish	Notropis	rubellus		shiner, rosyface			7/21/2014
2074729	Fish	Anguilla	rostrata		Eel, American			7/21/2014
2074790	Fish	Lepomis	auritus		Sunfish, redbreast			7/21/2014
2074922	Fish	Lampetra	appendix		Lamprey, American brook			7/21/2014
2075061	Fish	Percina	peltata		Darter, shield			7/21/2014
2075260	Fish	Notropis	procne		Shiner, swallowtail			7/21/2014
2075451	Fish	Noturus	insignis		Madtom, margined			7/31/2013
2075467	Fish	Hypenteliu m	nigricans		Sucker, northern hog			7/31/2013
2075561	Fish	Lepomis	auritus		Sunfish, redbreast			7/31/2013
2075585	Fish	Cyprinella	analostana		Shiner, satinfin			7/31/2013
2075586	Fish	Micropterus	salmoides		Bass, largemouth			7/31/2013
2075701	Fish	Lythrurus	ardens		Shiner, rosefin			7/21/2014
2076023	Fish	Nocomis	micropogon		Chub, river			7/31/2013
2076371	Fish	Etheostoma	olmstedi		Darter, tessellated			7/31/2013
2076538	Fish	Anguilla	rostrata		Eel, American			7/31/2013
2076716	Fish	Notropis	rubellus		shiner, rosyface			7/31/2013
2076731	Fish	Percina	peltata		Darter, shield			7/31/2013
2078223	Fish	Ameiurus	natalis		Bullhead, yellow			7/31/2013
2078224	Fish	Notropis	procne		Shiner, swallowtail			7/31/2013
2079493	Fish	Lepomis	macrochirus		Bluegill			7/12/2012

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
2079671	Fish	Semotilus	corporalis		Fallfish			7/12/2012
2079705	Fish	Lepomis	auritus		Sunfish, redbreast			7/12/2012
2079855	Fish	Lythrurus	ardens		Shiner, rosefin			7/12/2012
2079889	Fish	Etheostoma	olmstedi		Darter, tessellated			7/12/2012
2079931	Fish	Percina	peltata		Darter, shield			7/12/2012
2079997	Fish	Micropterus	salmoides		Bass, largemouth			7/12/2012
2080097	Fish	Notropis	rubellus		shiner, rosyface			7/12/2012
2080116	Fish	Cyprinella	analostana		Shiner, satinfin			7/12/2012
2080424	Fish	Anguilla	rostrata		Eel, American			7/12/2012
2081142	Fish	Noturus	insignis	ssp 1	Madtom, spotted-margin			7/12/2012
2081406	Fish	Notropis	procne		Shiner, swallowtail			7/12/2012
2082967	Fish	Lampetra	appendix		Lamprey, American brook			7/12/2012
2085129	Fish	Lepomis	auritus		Sunfish, redbreast			9/9/2013
2085162	Fish	Anguilla	rostrata		Eel, American			9/9/2013
2085211	Fish	Notropis	rubellus		shiner, rosyface			9/9/2013
2085403	Fish	Cyprinella	analostana		Shiner, satinfin			9/9/2013
2085594	Fish	Percina	peltata		Darter, shield			9/9/2013
2085664	Fish	Lepomis	macrochirus		Bluegill			9/9/2013
2086127	Fish	Notropis	amoenus		Shiner, comely			9/9/2013
2086176	Fish	Lythrurus	ardens		Shiner, rosefin			9/9/2013
2087985	Fish	Notropis	procne		Shiner, swallowtail			9/9/2013
2088013	Fish	Notropis	amoenus		Shiner, comely			10/2/2014
2088045	Fish	Etheostoma	olmstedi		Darter, tessellated			10/2/2014
2088168	Fish	Nocomis	micropogon		Chub, river			10/2/2014
2088391	Fish	Petromyzon	marinus		Lamprey, sea			10/2/2014
2088433	Fish	Hypenteliu m	nigricans		Sucker, northern hog			10/2/2014
2088519	Fish	Noturus	insignis		Madtom, margined			10/2/2014

OBJECT	TaxaGrp	GENUS	SPECIES	SUBSPECIE	COMMON_N	FedStatus	StateStatu	ObsDate
2088555	Fish	Notropis	rubellus		shiner, rosyface			10/2/2014
2088565	Fish	Cyprinella	analostana		Shiner, satinfin			10/2/2014
2088640	Fish	Lepomis	auritus		Sunfish, redbreast			10/2/2014
2088665	Fish	Anguilla	rostrata		Eel, American			10/2/2014
2088824	Fish	Micropterus	salmoides		Bass, largemouth			10/2/2014
2088836	Fish	Lythrurus	ardens		Shiner, rosefin			10/2/2014
2089402	Fish	Notropis	procne		Shiner, swallowtail			10/2/2014
2089531	Fish	Percina	notogramma		Darter, stripeback			10/2/2014
2089532	Fish	Lampetra	appendix		Lamprey, American brook			10/2/2014
2089969	Fish	Percina	peltata		Darter, shield			10/2/2014
2127493	Reptiles	Storeria	occipitomaculata		Snake, red-bellied			8/17/2017

VA Bald Eagle Concentration Areas



February 19, 2021

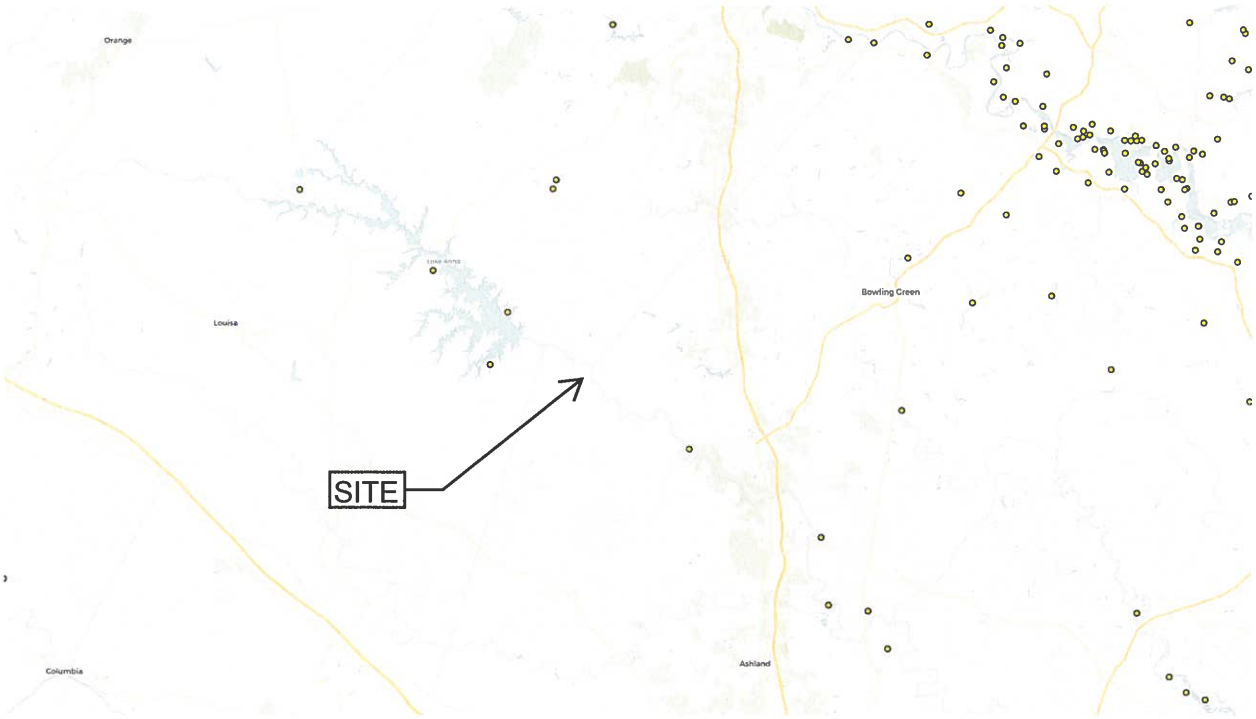
1:1,155,581

0 5 10 20 mi

0 12.5 25 50 km

Esri, HERE, Garmin, FAO, USGS, NGA, EPA, NPS

CCB Mapping Portal



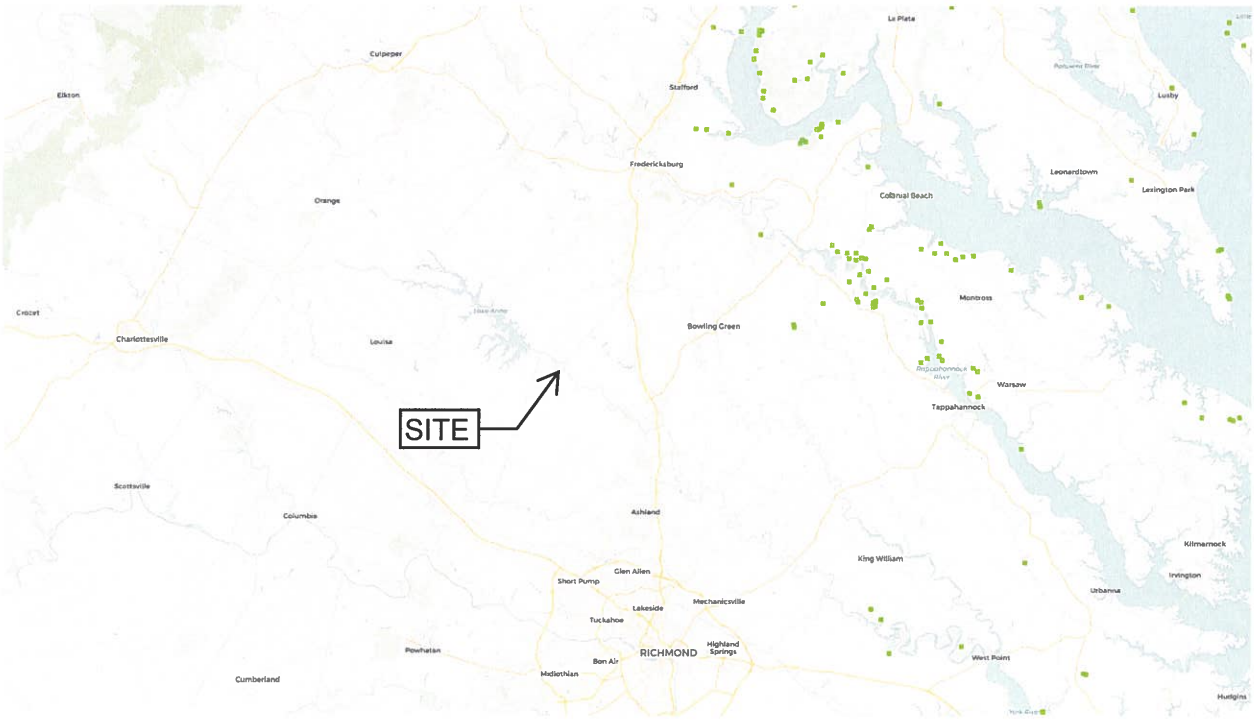
Layers: VA Eagle Nest Locator

Map Center [longitude, latitude]: [-77.60398864746094, 37.972620515491336]

Map Link:
https://ccbbirds.org/maps/#layer=VA+Eagle+Nest+Locator&zoom=11&lat=37.972620515491336&lng=-77.60398864746094&legend=legend_tab_7c321b7e-e523-11e4-aaa0-0e0c41326911&base=Street+Map+%28OSM%2FCarto%29

Report Generated On: 02/19/2021

CCB Mapping Portal



Layers: Eagle Roosts

Map Center [longitude, latitude]: [-77.54974365234375, 37.9593578107923]

Map Link:
https://ccbbirds.org/maps/#layer=Eagle+Roosts&zoom=10&lat=37.9593578107923&lng=-77.54974365234375&legend=legend_tab_59557df6-c07b-11e5-a485-0e31c9be1b51&base=Street+Map+%28OSM%2FCarto%29

Report Generated On: 02/19/2021

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032
http://www.fws.gov/northeast/virginiafield/

IPaC Record Locator: 035-99456181 February 19, 2021

Subject: Consistency letter for the 'Anna River Solar' project indicating that any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

Dear David Brame:

The U.S. Fish and Wildlife Service (Service) received on February 19, 2021 your effects determination for the 'Anna River Solar' (the Action) using the northern long-eared bat (*Myotis septentrionalis*) key within the Information for Planning and Consultation (IPaC) system. You indicated that no Federal agencies are involved in funding or authorizing this Action. This IPaC key assists users in determining whether a non-Federal action may cause "take"[1] of the northern long-eared bat that is prohibited under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the Action is not likely to result in unauthorized take of the northern long-eared bat.

Please report to our office any changes to the information about the Action that you entered into IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation.

If your Action proceeds as described and no additional information about the Action's effects on species protected under the ESA becomes available, no further coordination with the Service is required with respect to the northern long-eared bat.

The IPaC-assisted determination for the northern long-eared bat **does not** apply to the following ESA-protected species that also may occur in your Action area:

- Yellow Lance Elliptio lanceolata Threatened

You may coordinate with our Office to determine whether the Action may cause prohibited take of the animal species listed above.

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Anna River Solar

2. Description

The following description was provided for the project 'Anna River Solar':

> The site is an approximate 1,389-acre tract that is being evaluated for development with a solar farm.

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.97190285,-77.64473799606418,14z

Determination Key Result

This non-Federal Action may affect the northern long-eared bat; however, any take of this species that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o).

Determination Key Description: Northern Long-eared Bat 4(d) Rule
This key was last updated in IPaC on **May 15, 2017**. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for non-Federal actions is to assist determinations as to whether proposed actions are excepted from take prohibitions under the northern long-eared bat 4(d) rule.

If a non-Federal action may cause prohibited take of northern long-eared bats or other ESA-listed animal species, we recommend that you coordinate with the Service.

Determination Key Result

Based upon your IPaC submission, any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

Qualification Interview

1. Is the action authorized, funded, or being carried out by a Federal agency?

   No

2. Will your activity purposefully **Take** northern long-eared bats?

   No

3. [Semantic] Is the project action area located wholly outside the White-nose Syndrome Zone?

   Automatically answered
   No

4. Have you contacted the appropriate agency to determine if your project is near a known hibernaculum or maternity roost tree?

   Location information for northern long-eared bat hibernacula is generally kept in state Natural Heritage Inventory databases – the availability of this data varies state-by-state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited. A web page with links to state Natural Heritage Inventory databases and other sources of information on the locations of northern long-eared bat roost trees and hibernacula is available at www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

   Yes

5. Will the action affect a cave or mine where northern long-eared bats are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment (physical or other alteration) of a hibernaculum?

   No

6. Will the action involve Tree Removal?

   Yes

7. Will the action only remove hazardous trees for the protection of human life or property?

   No

8. Will the action remove trees within 0.25 miles of a known northern long-eared bat hibernaculum at any time of year?

   No

9. Will the action remove a known occupied northern long-eared bat maternity roost tree or any trees within 150 feet of a known occupied maternity roost tree from June 1 through July 31?

   No

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

1100

2. If known, estimated acres of forest conversion from April 1 to October 31

0

3. If known, estimated acres of forest conversion from June 1 to July 31

0

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

1100

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?

0

Matthew J. Strickler
Secretary of Natural Resources

Clyde E. Cristman
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

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

December 15, 2020

David Brame
Pilot Environmental, Inc.
743 Park Lawn Court
Kernersville, NC 27284

Re: 4891.1, Anna River Solar

Dear Mr. Brame:

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 a DCR biologist and predicted suitable habitat modeling, there is potential for Yellow lance (*Elliptio lanceolata*, G2G3/S2S3/LT/LT) to occur in the North Anna River adjacent to the project site. The Yellow lance occurs in mid-sized rivers and second and third order streams. To survive, it needs a silt-free, stable streambed and well-oxygenated water that is free of pollutants. This species has been the subject of taxonomic debate in recent years (NatureServe, 2009). Currently in Virginia, the Yellow lance is recognized from populations in the Chowan, James, York, and Rappahannock drainages. Its range also extends into Neuse-Tar river system in North Carolina. In recent years, significant population declines have been noted across its range (NatureServe, 2009). Please note that this species is currently classified as threatened by the United States Fish and Wildlife Service (USFWS) and the Virginia Department of Wildlife Resources (VDWR).

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 Yellow lance may be particularly sensitive to chemical pollutants and exposure to fine sediments from erosion (NatureServe, 2009).

DCR recommends maintaining forested riparian buffers along the river and any streams on the property. These buffers should be at least 100 feet wide on both sides of the waterways. If slopes are 11-25 % the buffers should be 150 feet wide and if slopes are greater than 25% buffers should be at least 200 feet wide. These buffers should be kept free of soil disturbances. Timber harvesting of 50% cover of the landward 50 feet of these buffers may be acceptable.

DCR recommends the development of an invasive species management plan for the project 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).

In addition, the proposed project will fragment two C3 Ecological Cores 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 activity 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 project changes and/or six months (June 15, 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 https://vafwis.dgif.virginia.gov/fwis/ or contact Ernie Aschenbach at 804-367-2733 or Ernie.Aschenbach@dwr.virginia.gov.

Should you have any questions or concerns, please contact me at 804-225-2429. Thank you for the opportunity to comment on this project.

Sincerely,

Tyler Meader
Natural Heritage Locality Liaison

CC: Troy Anderson, USFWS
Amy Ewing, VDWR
Mary Major, DEQ

Literature Cited

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: April 5, 2010).

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18: 6-9.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Virginia Field Office
6669 Short Lane
Gloucester, VA 23061

Date: 2/19/21

Self-Certification Letter

Project Name: Anna River Rolar

Dear Applicant:

Thank you for using the U.S. Fish and Wildlife Service (Service) Virginia Ecological Services online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the project named above in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA). This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

The species conclusions table in the enclosed project review package summarizes your ESA conclusions. These conclusions resulted in:

- "no effect" determinations for proposed/listed species and/or proposed/designated critical habitat; and/or
- Action may affect the northern long-eared bat; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR § 17.40(o) [as determined through the Information, Planning, and Consultation System (IPaC) northern long-eared bat assisted determination key]; and/or
- "may affect, not likely to adversely affect" determinations for proposed/listed species and/or proposed/designated critical habitat.

We certify that use of the online project review process in strict accordance with the instructions provided as documented in the enclosed project review package results in reaching the appropriate determinations. Therefore, we concur with the determinations described above for proposed and listed species and proposed and designated critical habitat. Additional coordination with this office is not needed.

Candidate species are not legally protected pursuant to the ESA. However, the Service encourages consideration of these species by avoiding adverse impacts to them. Please contact this office for additional coordination if your project action area contains candidate species.

Should project plans change or if additional information on the distribution of proposed or listed species, proposed or designated critical habitat becomes available, this determination may be reconsidered. This certification letter is valid for 1 year.

Information about the online project review process including instructions and use, species information, and other information regarding project reviews within Virginia is available at our website http://www.fws.gov/northeast/virginiafield/endspecies/project_reviews.html. If you have any questions, please contact Troy Andersen of this office at (804) 824-2428.

Sincerely,

Cynthia A. Schulz

Cindy Schulz
Field Supervisor
Virginia Ecological Services

Enclosures - project review package

Prepared for

Strata Clean Energy, LLC
800 Taylor St, Suite 200
Durham, NC 27701

THREATENED & ENDANGERED SPECIES DESKTOP ASSESSMENT

ANNA RIVER SOLAR PROJECT

Hanover County, Virgina

Prepared by

Geosyntec consultants

engineers | scientists | innovators
9211 Arboretum Parkway, Suite 200
Richmond, VA 23236

Project Number: GXE10492

March 4, 2024

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1 Introduction

Strata Clean Energy LLC (Strata) engaged Geosyntec Consultants, Inc. (Geosyntec) to provide support with environmental due diligence and preliminary planning of a new utility-scale photovoltaic solar energy facility referred to as the Anna River Solar Project (Project) in Hanover County, Virgina. The Project is located within the Pamunkey River (HUC8), North Anna River-Northeast Creek (HUC10), and North Anna River-Hawkins Creek (HUC12) watersheds and the site vicinity is shown on (Figure 1). The following report summarizes results of the desktop analysis for species protected at the state and federal levels.

The Project study area reviewed for the habitat desktop assessment totaled approximately 182 acres as provided by Strata. The majority of the land cover consists of agricultural fields and forested areas.

2 Threatened & Endangered Species Databases

Geosyntec consulted state and federal natural resource databases to determine the potential presence of species listed as threatened or endangered within the Project study area. These databases include the following:

- Center for Conservation Biology (CCB) Bald Eagle Nest Locator for Virginia;
- Department of Wildlife Resources (DWR) Virginia Fish and Wildlife Information Services (VAFWIS);
- DWR Little Brown Bat and Tri-colored Bat Winter Habitat and Roosts Application;
- DWR Northern-Long Eared Bat (NLEB) Winter Habitat and Roost Trees Application;
- National Marine Fisheries Service (NMFS) Atlantic Sturgeon Critical Habitat Map;
- U.S. Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC);
- USFWS Critical Habitat for Threated and Endangered Species Mapper;
- USFWS Virginia Field Office's Bald Eagle Map Tool; and
- Virginia Department of Conservation and Recreation (DCR) Natural Heritage Data Explorer (NHDE).
- NOAA ESA Section 7 Mapper Version 2.0

Results from the database searches and habitat survey are summarized below in Table 1. Copies of the database search results are enclosed in Appendix B.

Table 1: Threatened and Endangered Species Database Review Target Species

Species	Common Name	Status[1]	Database[2]
Haliaeetus leucocephalus	bald eagle	FP BGEPA	CCB
Myotis septentrionalis	northern long-eared bat	FE, ST	IPaC, VAFWIS
Perimyotis subflavus	tri-colored bat	FPE, SE	IPaC, VAFWIS
Sigara depressa	Virginia piedmont water-boatman	SE	DCR

[1] FE: Federally Endangered; FPE: Federally Proposed Endangered; FPT: Federally Proposed Threatened; ST State Threatened; LE: Listed Endangered

2 IPaC: Information for Planning and Consultation; VAFWIS: Virginia Fish and Wildlife Information Services; DCR NHDE: Department of Conservation and Recreation Natural Heritage Data Explorer; CCB: Center for Conservation Biology

2.1 USFWS IPaC

The Project study area was uploaded to the IPaC tool operated by the USFWS to generate an official species list of federally protected species with the potential to occur in the vicinity of the Project. IPaC identified tri-colored bat (*Perimyotis subflavus*), northern long-eared bat (*Myotis septentrionalis*) and several migratory birds as having the potential to occur in the Project study area. Results from the USFWS IPaC tool are summarized above in Table 1.

No federally protected critical habitat was documented within the Project vicinity. The nearest critical habitat for yellow lance (*Elliptio lanceolata)* is approximately 23.1 miles west of the Project, according to the USFWS Critical Habitat for Threatened and Endangered Species mapper.

2.2 Virginia DWR VAFWIS

The Virginia DWR VAFWIS indicated that 13 species are known or likely to occur within a 2-mile radius of the proposed Project. This includes one species listed as federal endangered and state threatened, four species listed as endangered on the federal and state levels, one species that are threatened on the federal and state levels, one federally proposed endangered and state endangered species, three species listed as endangered at the state level, and three species listed as threatened at the state level. Results from the DWR VAFWIS tool are summarized above in Table 1. No documented occurrences were noted within a 2-mile radius of the project.

2.3 Virgina DCR NHDE

The Virginia DCR's NHDE tool was utilized for the North Anna River-Hawkins Creek (HUC12) sub watershed that the proposed project is located in. The Virginia Piedmont Water Boatman (Sigara depressa) was identified as potentially occurring within the project area. This species is listed as endangered on the state level. Results from the NHDE tool are summarized above in Table 1.

3 Focus Species

Based on the results of the database searches described above and existing habitat conditions identified during the desktop review, suitable habitat for the below focus species may exist within the Project study area.

3.1 Tri-colored Bat

IPaC and VAFWIS identified tri-colored bat (*Perimyotis subflavus*) as a federally proposed endangered and state endangered species potentially occurring within the Project vicinity. Tri-colored bats primarily roost in leaf litter at the base of live or recently dead trees within woodland habitats. They are also more tolerant of warmer hibernacula temperatures than other species and prefer warmer caves. The nearest documented tri-colored bat hibernaculum is located 60.2 miles west of the Project area.

3.2 Northern Long-eared Bat

IPaC and VAFWIS identified northern long-eared bat (*Myotis septentrionalis*) as a federally and state-endangered species potentially occurring within the Project vicinity. Hibernation occurs primarily in caves, mines, and tunnels, typically those with large passages and entrances, relatively constant and cool temperatures, high humidity, and no air currents. NLEB seems to prefer intact interior forest habitat, with mature trees, uneven forest structure (resulting in multi-layered vertical structure), single and multiple tree-fall gaps, standing snags, and woody debris. However, NLEB are also known as generalists, utilizing diverse forest habitats for roosting, foraging, and raising young. They may use any trees generally $\geq$ 3 inches diameter at breast height (DBH) with cracked or exfoliating bark, broken limbs, cavities, or crevices. The nearest documented NLEB hibernaculum is located 4.2 miles from the Project.

3.3 Virginia Piedmont Water-boatmen

The Virginia Piedmont Water-boatmen (*Sigara depressa*) was identified in the DCR NHDE search as State endangered species. The Virginia Piedmont Water-boatmen are found in slow rivers, ponds, and household pools. They feed on aquatic plants and algae.

4 Migratory Bird Considerations

Migratory birds are protected by the Migratory Bird Treaty Act which prohibits the killing or harassment of migratory bird species, including unintentional take. Impacts to migratory birds from the proposed Project are most likely to occur during vegetation clearing. Four species of interest for the Project study area and their estimated occurrence times were identified by the IPaC (Appendix B); however, all migratory bird species are protected.

Geosyntec recommends clearing vegetation outside of the nesting season (early March to Mid-September) to prevent impacts to migratory birds, if possible. If clearing will occur within the nesting season, a pre-construction nest clearance survey may be needed. If an active nest is identified during the mowing/clearing, a 30-foot buffer should be preserved around the location and the area should be avoided until the end of nesting season or the chicks have fledged.

5 Conclusion

Based on review of state and federal databases, potential habitat for two protected focus species may occur within the Project study area: tri-colored bat and northern long-eared bat

The tri-colored bat was proposed as federally endangered on September 14, 2022, in the Federal Register. It was identified on IPaC and VAFWIS as a species with the potential to occur within the Project vicinity. Tri-colored bat habitat is likely to occur within the Project; therefore, a pedestrian habitat assessment is recommended, followed by coordination with USFWS should habitat be identified.

The northern long-eared bat was listed as federally endangered on November 29, 2022, in the Federal Register and it was listed as State endangered on March 31, 2023. It was identified on IPaC and VAFWIS as a species with the potential to occur within the Project vicinity. Northern long-eared bat habitat is likely to occur within the Project; therefore, a pedestrian habitat assessment is recommended, followed by coordination with USFWS should habitat be identified.

6 References

Cornell Lab or Ornithology. 2022. All About Birds. Cornell Lab of Ornithology, Ithaca, New York. https://www.allaboutbirds.org/guide/Bald_Eagle/overview. Accessed February 2024.

NatureServe Explorer https://explorer.natureserve.org/

United States Fish and Wildlife Service. Tricolored Bat. https://fws.gov/species/tricolored-bat-perimyotis-subflavus . Accessed February 2024.

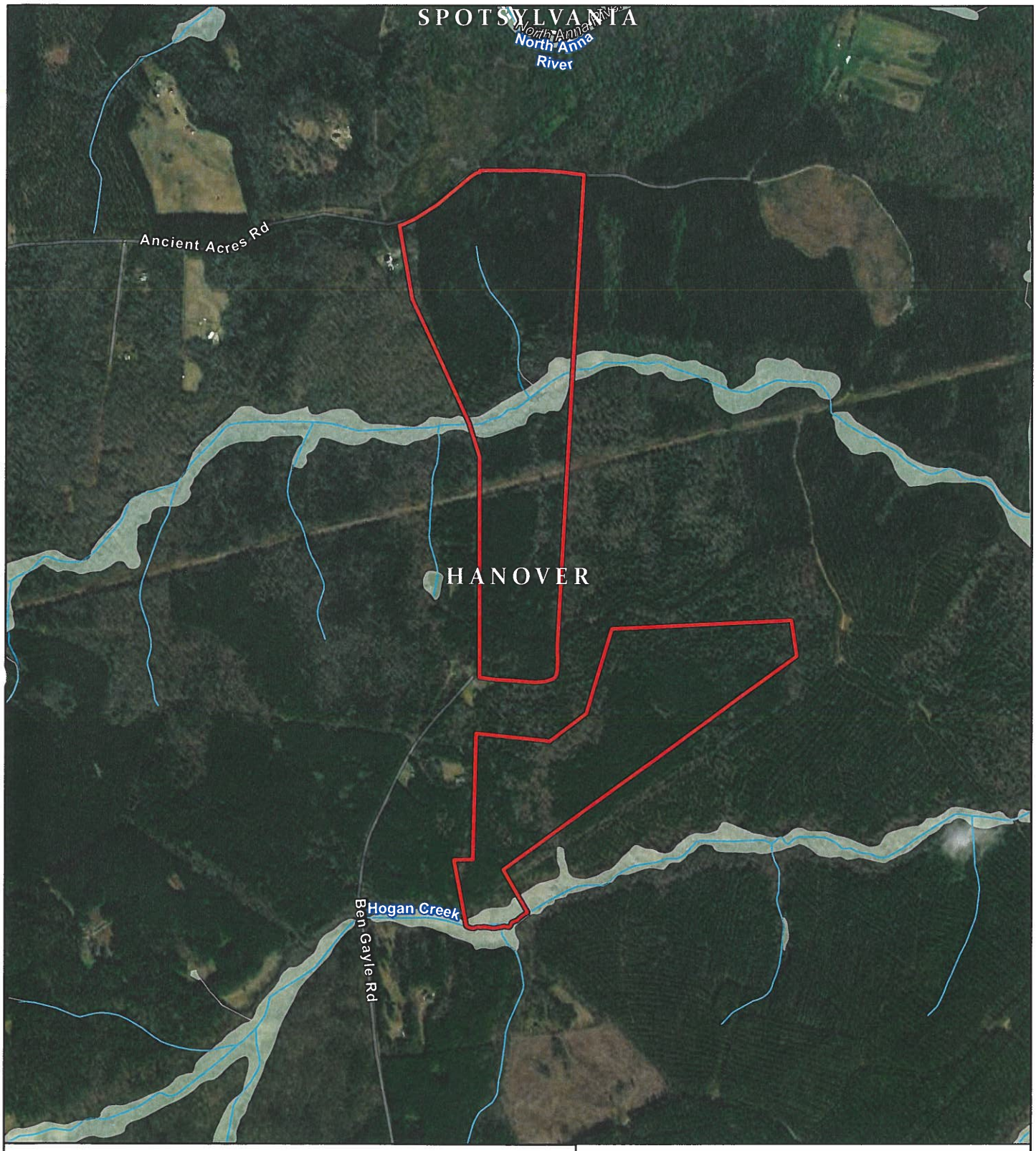
United States Fish and Wildlife. Water Boatmen. https://www.fws.gov/species/water-boatman-corixidae . Accessed February 2024.

FIGURES

APPENDIX A

Threatened and Endangered Species Database Results

FIGURES



NHD Streams
NWI Wetlands
Site
Virginia Counties

N

0 1,500 Feet

Project Location
Anna River Additional Parcels
Hanover County, Virginia

Geosyntec consultants

Richmond Office | February 2024

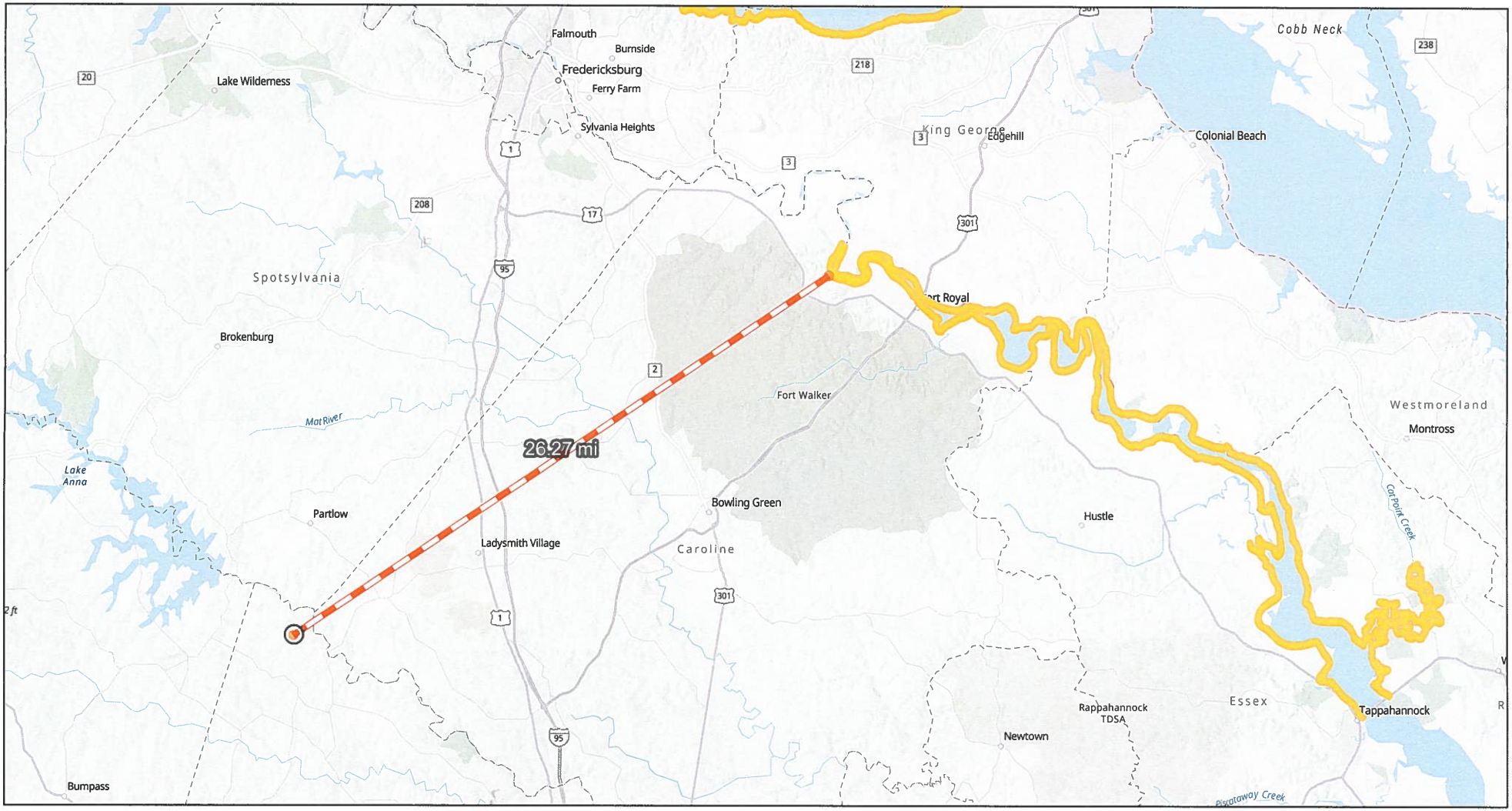
Figure 1

C:\Users\cora.every\Desktop\Project\Anna River Project_26Feb24.aprx 10/11/2023 10:02 PM

APPENDIX A

Threatened and Endangered Species Database Results

USFWS Bald Eagle Concentration Areas - Virginia



3/1/2024

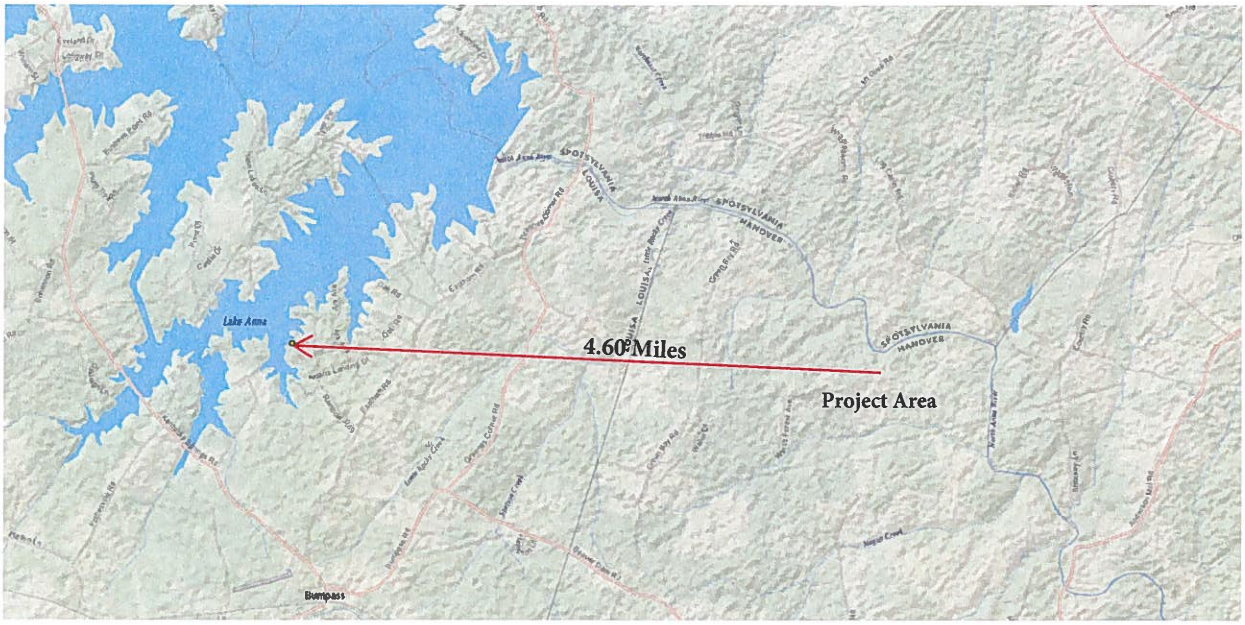
1:313,420

0 3 6 12 mi

0 5 10 20 km

Esri, NASA, NGA, USGS, VGIN, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

CCB Mapping Portal



Layers: VA Eagle Nest Locator

Map Center [longitude, latitude]: [-77.69986152648924, 37.99051460206857]

Map Link:
https://ccbbirds.org/maps/#layer=VA+Eagle+Nest+Locator&zoom=14&lat=37.99051460206857&lng=-77.69986152648924&legend=legend_tab_7c321b7e-e523-11e4-aaa0-0e0c41326911&base=NatGeo+World+Map+%28ESRI%29

Report Generated On: 02/29/2024

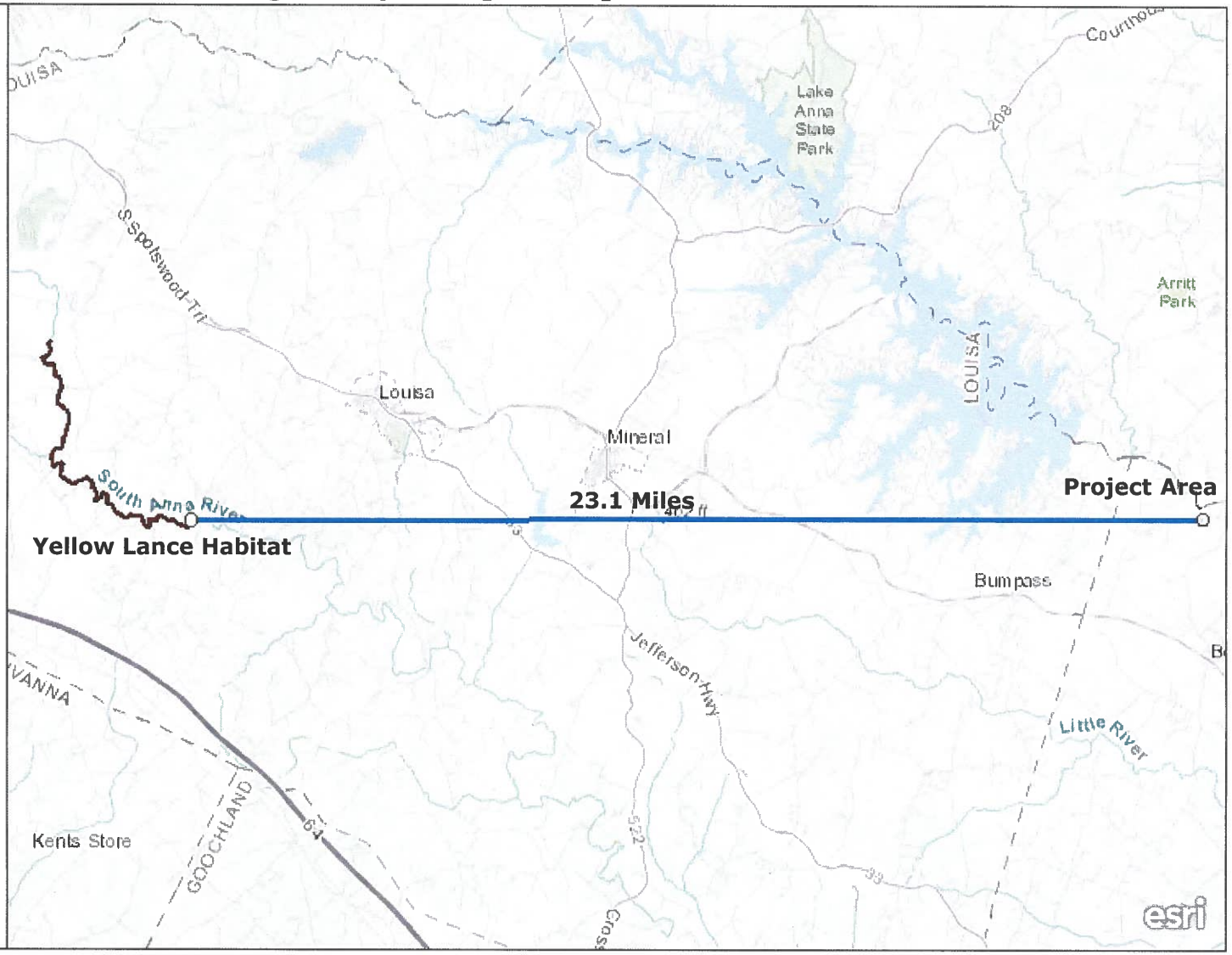
Critical Habitat for Threatened & Endangered Species [USFWS]

Final Polygon Features

Final Linear Features

Proposed Polygon Features

Proposed Linear Features



A specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection.

VITA, West Virginia GIS, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

IPaC resource list

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

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

Location

Hanover County, Virginia

Local office

Virginia Ecological Services Field Office

(804) 693-6694

6669 Short Lane
Gloucester, VA 23061-4410

Endangered species

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

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

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

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

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

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

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

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

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

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

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

Critical habitats

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

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

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

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

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

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

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles"

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

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/ documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

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

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

NAME	BREEDING SEASON
Chimney Swift Chaetura pelagica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

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

Probability of Presence(▪)

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

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

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

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

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

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

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

No Data (–)
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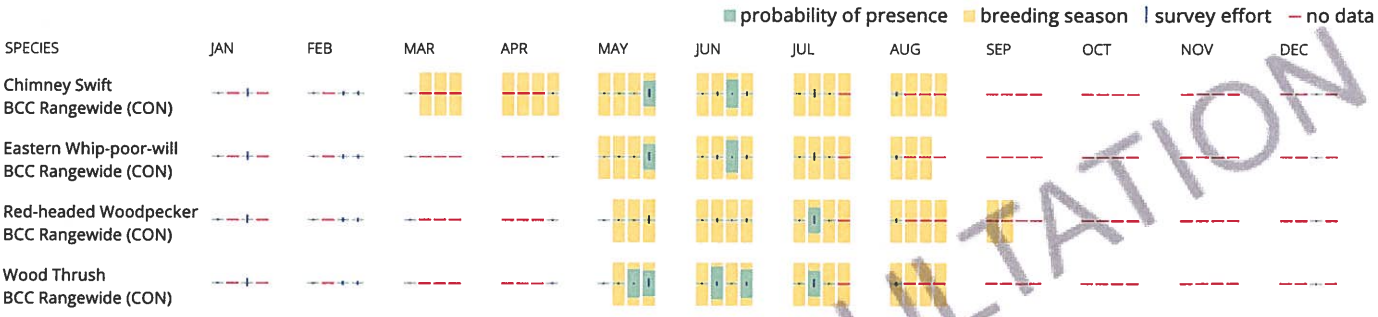

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

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There are no refuge lands at this location.

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

Wetland information is not available at this time

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Data exclusions

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IPaC resource list

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

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

Location

Hanover County, Virginia

Local office

Virginia Ecological Services Field Office

(804) 693-6694

6669 Short Lane
Gloucester, VA 23061-4410

Endangered species

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

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

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

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

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

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

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

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

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

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

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

Critical habitats

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

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

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

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What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

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

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles"

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

Additional information can be found using the following links:

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

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

NAME	BREEDING SEASON
Chimney Swift Chaetura pelagica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will Antrostomus vociferus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

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

Probability of Presence(■)

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

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

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

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

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

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

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No Data (–)
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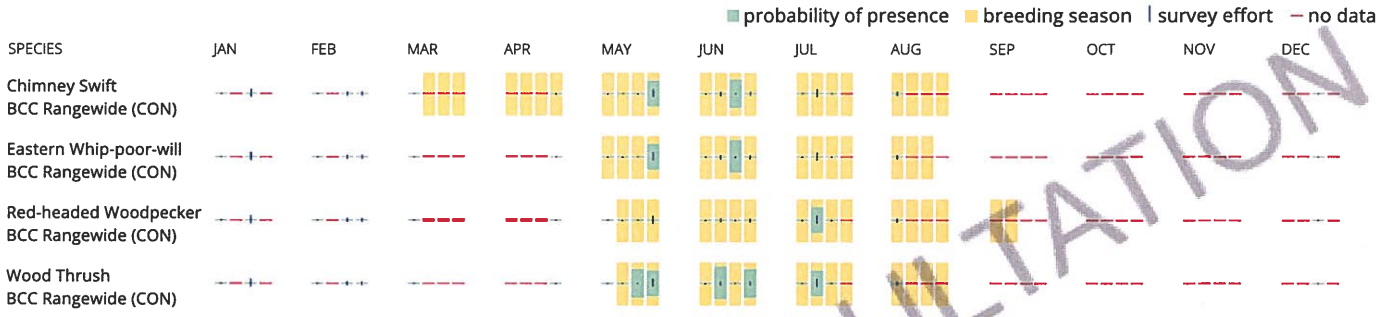

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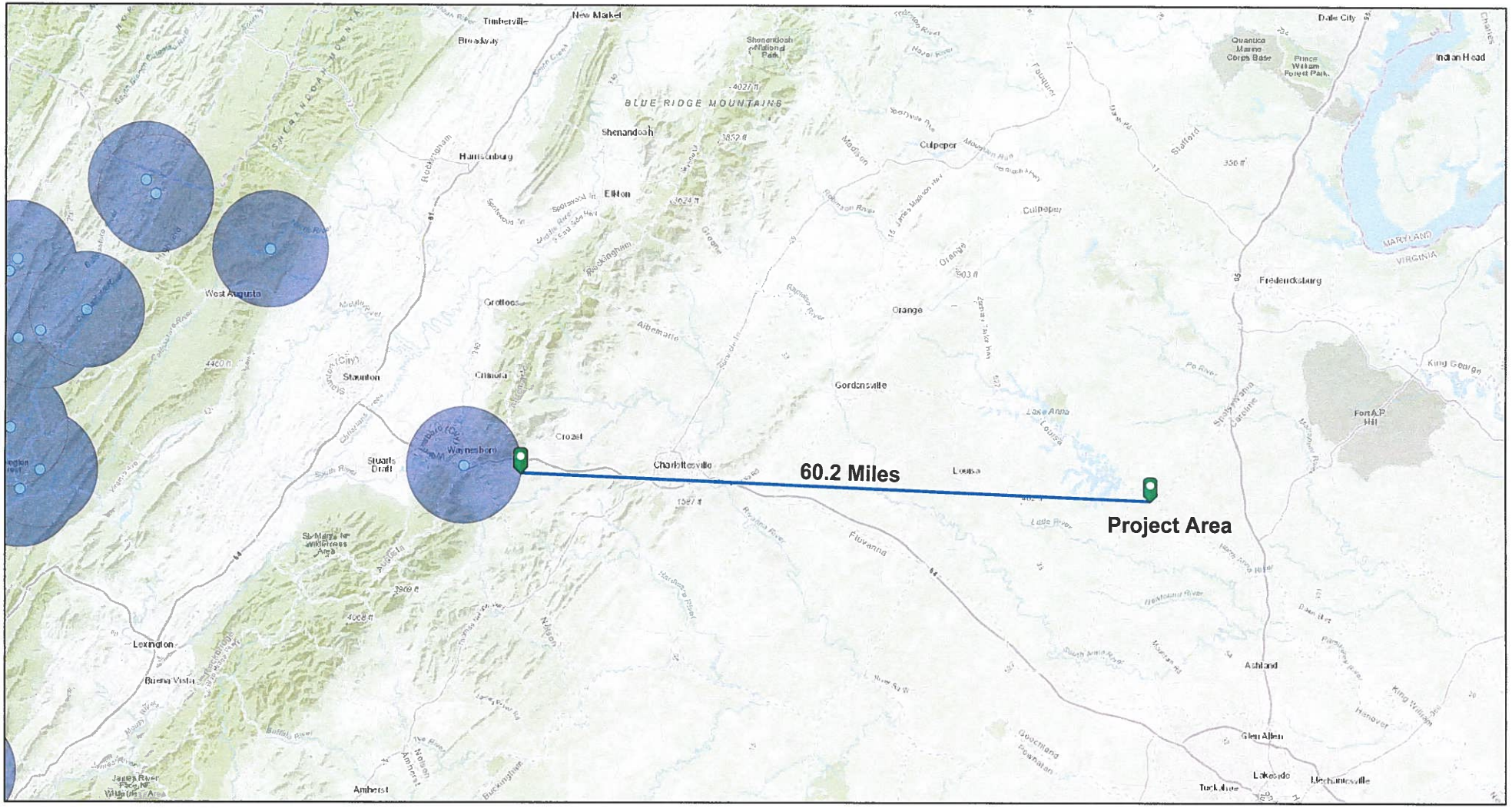
MYLU PESU Habitat



2/29/2024, 12:25:39 PM

Tri-colored and Little Brown Hibernaculum Half Mile Buffer

Tri-colored and Little Brown Hibernaculum 5.5 Mile Buffer

1:730,742

0 5 10 20 mi

0 10 20 40 km

Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

Dept. Game and Inland Fisheries

Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS |

Natural Heritage Resources

Your Criteria

Taxonomic Group: Select All

Global Conservation Status Rank: Select All

State Conservation Status Rank: Select All

Federal Legal Status: Select All

State Legal Status: Select All

Watershed (8 digit HUC): 02080106 - Pamunkey River

Subwatershed (12 digit HUC): YO23 - North Anna River-Hawkins Creek

Search Run: 3/1/2024 10:48:39 AM

Result Summary

Total Species returned: 1

Total Communities returned: 0

Click scientific names below to go to NatureServe report.

Click column headings for an explanation of species and community ranks.

Common Name/Natural Community	Scientific Name	Scientific Name Linked	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Statewide Occurrences	Virginia Coastal Zone
Pamunkey								
North Anna River-Hawkins Creek								
HETEROPTERA (TRUE BUGS)								
Virginia Piedmont Water Boatman	Sigara depressa	Sigara depressa	G1G2	S1S2	SOC	LE	4	Y

Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.

For Additional Information on locations of Natural Heritage Resources please submit an information request.

To Contribute information on locations of natural heritage resources, please fill out and submit a rare species sighting form.

NLEB Locations and Roost Trees

2/29/2024, 12:18:33 PM

NLEB Capture 3 Mile Buffer

1:182,685

0 1.75 3.5 7 mi

0 2.75 5.5 11 km

VITA, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

VA Dept. Game & Inland Fisheries
Virginia Geographic Information Network (VGIN), and the Census and Localities and Towns submitting data to the project | VITA, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS |

Site Location

37,59,18.4 -77,39,27.0
is the Search Point

Show Position Rings
◉ Yes ○ No
1/2 mile and 1/8 mile at the Search Point

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

Display at center	Search Point is not at map center

Base Map Choices
Topography

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

Map Overlay Legend

T & E Waters
Federal
State

Predicted Habitat WAP Tier I & II
Aquatic
Terrestrial

Trout Waters
Class I - IV
Class V - VI

Anadromous Fish Reach
Confirmed
Potential

Impediment

Position Rings 1/2 mile and 1/8 mile at the Search Point

2 mile radius Search Area

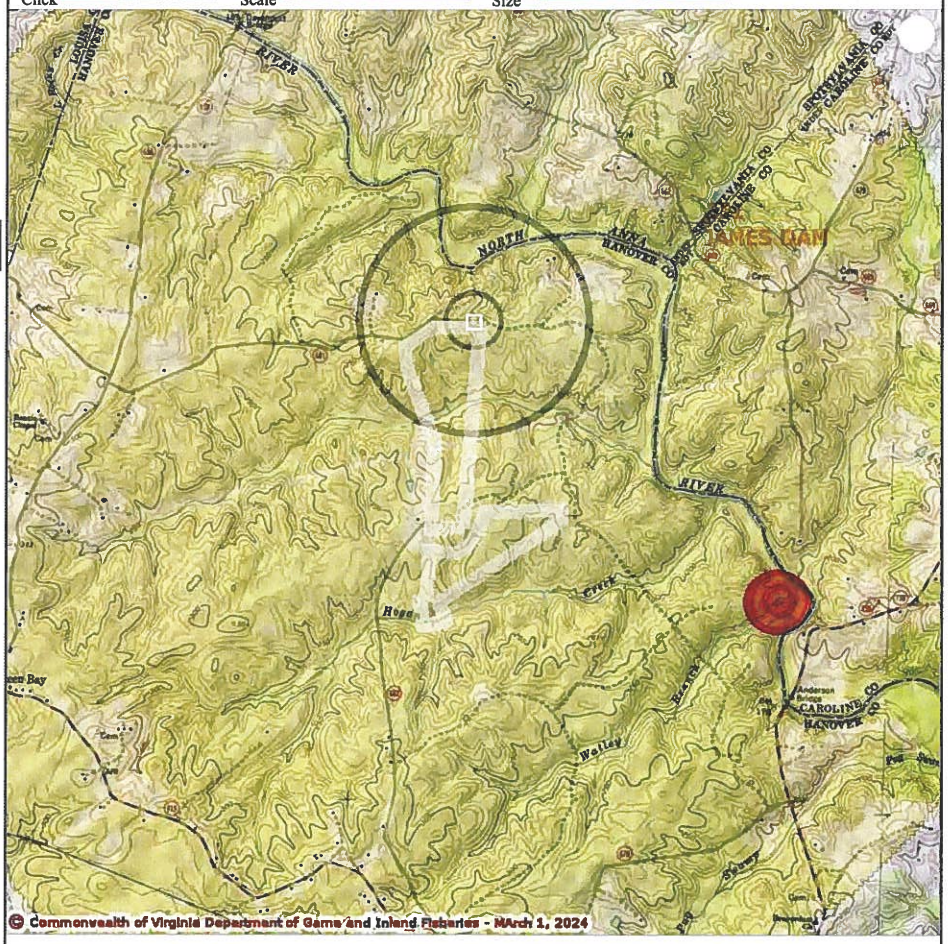
Bald Eagle Concentration Areas and Roosts

back 37,59,39.9 -77,40,10.1 Refresh Browser Page Help

Map Click Pan

Map Scale In Zoom Out

Screen Size Small Size Big



N

500 0 500 1000 1500 2000 Meters
2000 0 2000 4000 6000 8000 Feet

Point of Search 37,59,18.4 -77,39,27.0
Map Location 37,58,44.3 -77,39,25.9

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

Base Map source: Topographic maps from TOPO! copyright 2006 (see National Geographic Maps for details)

Map projection is UTM Zone 18 NAD 1983 with left 263419 and top 4210015. Pixel size is 8 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 800 columns by 800 rows for a total of 640000 pixles. The map display represents 6400 meters east to west by 6400 meters north to south for a total of 40.9 square kilometers. The map display represents 21000 feet east to west by 21000 feet north to south for a total of 15.8 square miles.

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

map assembled 2024-03-01 11:01:37 (qa/qc March 21, 2016 12:20 - tn=1818487.0 dist=3218 I)
$poi=37.9884500 -77.6575099

VaFWIS Search Report Compiled on 3/1/2024, 11:04:08 AM

Help

Known or likely to occur within a **2 mile buffer around polygon; center 37.9884500 -77.6575099** in **033 Caroline County, 085 Hanover County, 109 Louisa County, 177 Spotsylvania County, VA**

View Map of Site Location

555 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 29) (29 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
040228	FESE	Ia	Woodpecker, red-cockaded	Picoides borealis		BOVA
050023	FESE	Ia	Bat, Indiana	Myotis sodalis		BOVA
050022	FEST	Ia	Bat, northern long-eared	Myotis septentrionalis		BOVA
060003	FESE	Ia	Wedgemussel, dwarf	Alasmidonta heterodon		BOVA
010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		BOVA
060029	FTST	IIa	Lance, yellow	Elliptio lanceolata		BOVA
050020	SE	Ia	Bat, little brown	Myotis lucifugus		BOVA
050034	SE	Ia	Bat, Rafinesque's eastern big-eared	Corynorhinus rafinesquii macrotis		BOVA,HU6
050027	FPSE	Ia	Bat, tri-colored	Perimyotis subflavus		BOVA
040293	ST	Ia	Shrike, loggerhead	Lanius ludovicianus		BOVA
040385	ST	Ia	Sparrow, Bachman's	Peucaea aestivalis		BOVA
060081	FPST	IIa	Floater, green	Lasmigona subviridis		BOVA
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
100079	FC	IIIa	Butterfly, monarch	Danaus plexippus		BOVA
030063	CC	IIIa	Turtle, spotted	Clemmys guttata		BOVA,HU6
030012	CC	IVa	Rattlesnake, timber	Crotalus horridus		BOVA
010077		Ia	Shiner, bridle	Notropis bifrenatus		BOVA
100248		Ia	Fritillary, regal	Speyeria idalia idalia		BOVA,HU6
040213		Ic	Owl, northern saw-whet	Aegolius acadicus		BOVA
040052		IIa	Duck, American black	Anas rubripes		BOVA,HU6
040029		IIa	Heron, little blue	Egretta caerulea caerulea		BOVA
040036		IIa	Night-heron, yellow-crowned	Nyctanassa violacea violacea		BOVA
040181		IIa	Tern, common	Sterna hirundo		BOVA,HU6
040320		IIa	Warbler, cerulean	Setophaga cerulea		BOVA,HU6
040140		IIa	Woodcock, American	Scolopax minor		BOVA,HU6
060071		IIa	Lampmussel, yellow	Lampsilis cariosa		BOVA
040203		IIb	Cuckoo, black-billed	Coccyzus erythropthalmus		BOVA
040105		IIb	Rail, king	Rallus elegans		BOVA
060175		IIb	Slabshell, Roanoke	Elliptio roanokensis		BOVA

To view **All 555 species** View 555

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

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

View Map of All Query Results from All Observation Tables

Bat Colonies or Hibernacula: **Not Known**

Anadromous Fish Use Streams

N/A

Impediments to Fish Passage (1 records)

View Map of All Fish Impediments

ID	Name	River	View Map
551	JAMES DAM	TR-NORTH ANNA RIVER	Yes

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters

N/A

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests (2 records)

View Map of All Query Results Bald Eagle Nests

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
HA0001	1	Mar 1 2000	HISTORIC	Yes
HN0001	2	Mar 19 2010	HISTORIC	Yes

Displayed 2 Bald Eagle Nests

Species Observations (61 records - displaying first 20)

View Map of All Query Results Species Observations

obsID	class	Date Observed	Observer	N Species			View Map
				Different Species	Highest TE*	Highest Tier**	
633133	SppObs	Sep 26 2016	Paul Vidonic	13		III	Yes
633111	SppObs	Jul 20 2016	Paul Vidonic	13		III	Yes
633031	SppObs	Jul 22 2015	Paul Vidonic	14		III	Yes
624623	SppObs	Oct 2 2014	PAUL; VIDONIC	16		III	Yes
624566	SppObs	Jul 21 2014	PAUL; VIDONIC	14		III	Yes
620713	SppObs	Sep 9 2013	Paul; Vidonic	9		III	Yes
620024	SppObs	Jul 31 2013	Paul; Vidonic	12		III	Yes
620307	SppObs	Jun 5 2013	Paul; Vidonic	12		III	Yes
616693	SppObs	Sep 21 2012	PMV	15		III	Yes
616668	SppObs	Jul 12 2012	PMV	4		III	Yes
616669	SppObs	Jul 12 2012	PMV	13		III	Yes
613448	SppObs	Sep 19 2011	PMV	12		III	Yes
613425	SppObs	Jul 18 2011	PMV	19		III	Yes

603842	SppObs	Sep 4 2008	R. S. Andrews	11		III	Yes
606222	SppObs	Jul 17 2008	R. S. Andrews	8		III	Yes
606767	SppObs	May 27 2008	R. S. Andrews	11		III	Yes
426104	SppObs	Sep 25 2007	VCU - INSTAR	8		III	Yes
313695	SppObs	Sep 12 2005	JOHN BOLIN, III (PRINCIPLE PERMITTEE), VIRGINIA POWER	8		III	Yes
313694	SppObs	Jul 25 2005	JOHN BOLIN, III (PRINCIPLE PERMITTEE), VIRGINIA POWER	11		III	Yes
313693	SppObs	May 23 2005	JOHN BOLIN, III (PRINCIPLE PERMITTEE), VIRGINIA POWER	10		III	Yes

Displayed 20 Species Observations

Selected 61 Observations View all 61 Species Observations

Habitat Predicted for Aquatic WAP Tier I & II Species

N/A

Habitat Predicted for Terrestrial WAP Tier I & II Species

N/A

Virginia Breeding Bird Atlas Blocks (3 records)

View Map of All Query Results
Virginia Breeding Bird Atlas Blocks

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE*	Highest Tier**	
50135	Ladysmith, SW	8		III	Yes
49136	Lake Anna East, SE	61		III	Yes
49135	Lake Anna East, SW	1			Yes

Public Holdings:

N/A

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
033	Caroline	374	FESE	I
085	Hanover	384	FESE	I
109	Louisa	368	FESE	I
177	Spotsylvania	379	FESE	I

USGS 7.5' Quadrangles:
Beaverdam
Lake Anna East
Hewlett
Ladysmith

USGS NRCS Watersheds in Virginia:

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
YO22	Northeast Creek	39		I
YO23	North Anna River-Hawkins Creek	59	SE	I
YO25	Lower Little River	59	SE	I

Compiled on 3/1/2024, 11:04:08 AM I1818487.0 report=all searchType= P dist= 3218 poi= 37.9884500 -77.6575099 siteDD= 37.9884500 -77.6575198;37.9759100 -77.6583898;37.9758100 -77.6608098;37.9812400 -77.6608298;37.9853200 -77.6629598;37.9870100 -77.6633698;37.9883700 -77.6608098;37.9884500 -77.6575198;;37.9744200 -77.6609298;37.9742500 -77.6585798;37.9749200 -77.6574498;37.9770200 -77.6566198;37.9771900 -77.6509698;37.9763300 -77.6508298;37.9710400 -77.6600598;37.9700000 -77.6593598;37.9696400 -77.6611798;37.9712700 -77.6615798;37.9713400 -77.6610498;37.9744200 -77.6609298;

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 6, 2021

PRELIMINARY JURISDICTIONAL DETERMINATION

Southern Virginia Regulatory Section
NAO-2020-02396 (North Anna River)

GFP Timberlands, LLLP
c/o Al Bayme
6304 Peake Road
Macon, GA 32104

Dear Mr. Bayme:

This letter is in regard to your request for a preliminary jurisdictional determination for waters of the U.S. (including wetlands) on a ~1,389 acre project area located near Ben Gayle Road in Beaverdam Virginia (Hanover County) (tax map parcel #7827-33-5426, 7827-85-7713, 7828-61-0451, 7828-61-8172, 7828-739147).

The maps entitled "Drawings 5 and 5.1-5.4 Wetland Map Anna River Solar", by Pilot Environmental, Inc. dated revised 2/15/21 and received by the Corps on 2/15/21 (copy enclosed) provides the locations of waters and/or wetlands on the property listed above. The included table provides the name and size of each aquatic resource. The basis for this delineation includes application of the Corps' 1987 Wetland Delineation Manual (and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont) and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation and the presence of an ordinary high water mark. This letter is not confirming the Cowardin classifications of these aquatic resources.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination.

This preliminary jurisdictional determination and associated wetland delineation map may be submitted with a permit application.

Enclosed is a copy of the "Preliminary Jurisdictional Determination Form". Please review the document, sign, and return one copy to Herman W. Hudson III, either via email (Herman.W.Hudson@usace.army.mil) or via standard mail to US Army Corps of Engineers, Regulatory Office, ATTN: Herman W. Hudson III, 9100 Arboretum Pkwy, Suite 235, Richmond Virginia 23236 within 30 days of receipt and keep one for your records. This delineation of waters and/or wetlands can be relied upon for no more than five years from the date of this letter. New information may warrant revision.

If you have any questions, please contact Herman W. Hudson III either via telephone at (757) 201-7808 or via email (see above).

Sincerely,

Herman W. Hudson III

Herman W. Hudson III, PhD, PWS
Environmental Scientist
Southern Virginia Regulatory Section

Enclosure(s):
Appeals Form
Drawings 5 and 5.1-5.4 Wetland Map Anna River Solar
Preliminary Jurisdictional Determination Form
Supplemental Preapplication Information

Cc: David Brame (Agent, Pilot Environmental, Inc.)
Bryan Jones (Virginia Department of Environmental Quality)
Mike Flagg (Hanover County)

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Al Bayme (GFP Timberlands, LLLP)	File Number: NAO-2020-02396	Date: 4/6/21
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
	APPROVED JURISDICTIONAL DETERMINATION	**D**
X	**PRELIMINARY JURISDICTIONAL DETERMINATION**	**E**

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx **or Corps regulations at 33 CFR Part 331.**

A: **INITIAL PROFFERED PERMIT: You may accept or object to the permit.**

- **ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final** authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: **(Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons** or objections are addressed in the administrative record.)

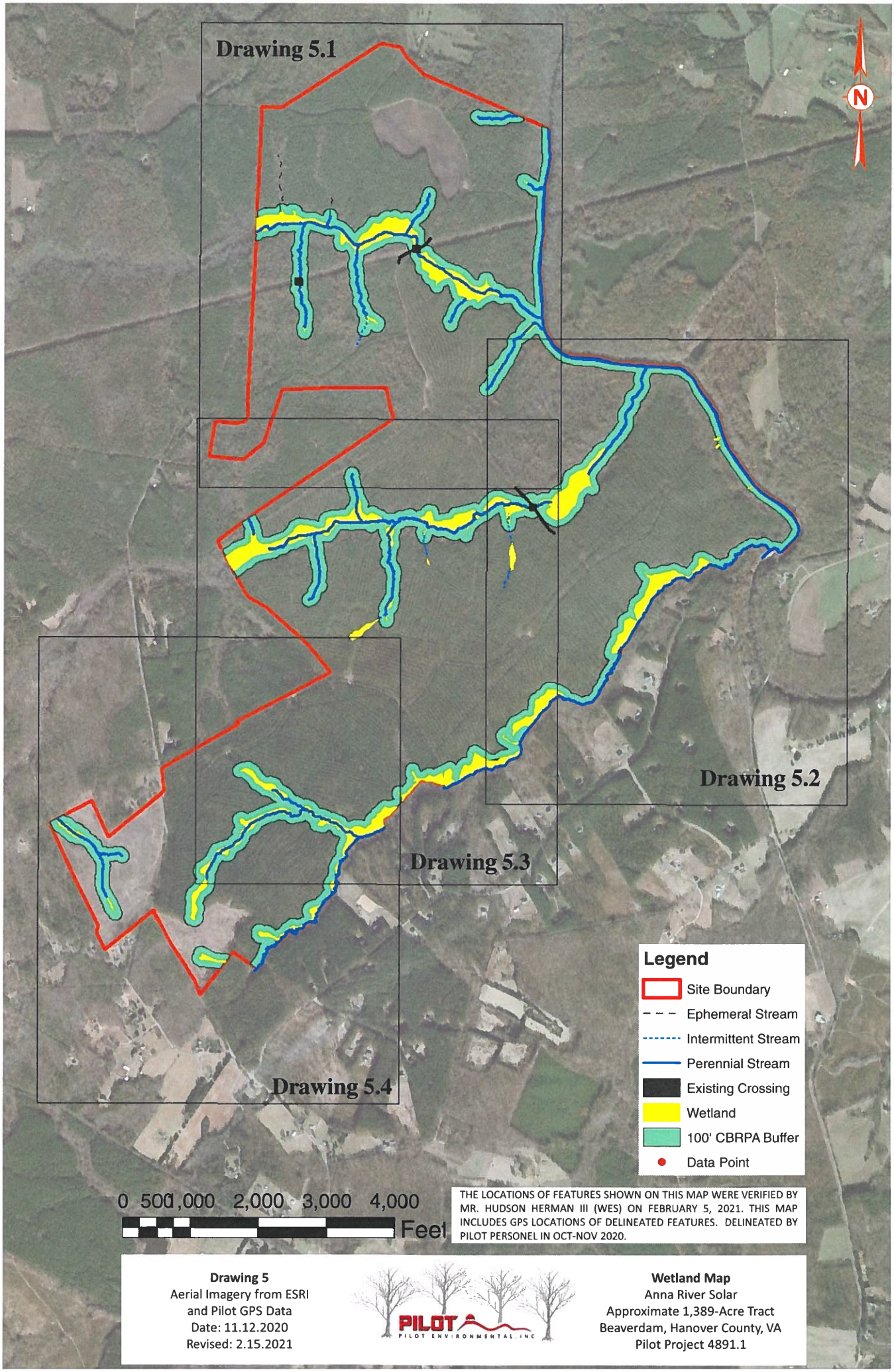
ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to **clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.**

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Herman W. Hudson III (Wes), PHD, PWS Environmental Scientist Southern Virginia Regulatory Section U.S. Army Corps of Engineers, Norfolk District Office: (757) 201-7808 Herman.W.Hudson@usace.army.mil	If you only have questions regarding the appeal process you may also contact: Mr. James W. Haggerty Regulatory Program Manager (CENAD-PD-OR) *U.S. Army Corps of Engineers* Fort Hamilton Military Community 301 General Lee Avenue Brooklyn, New York 11252-6700 Telephone number: 347-370-4650

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

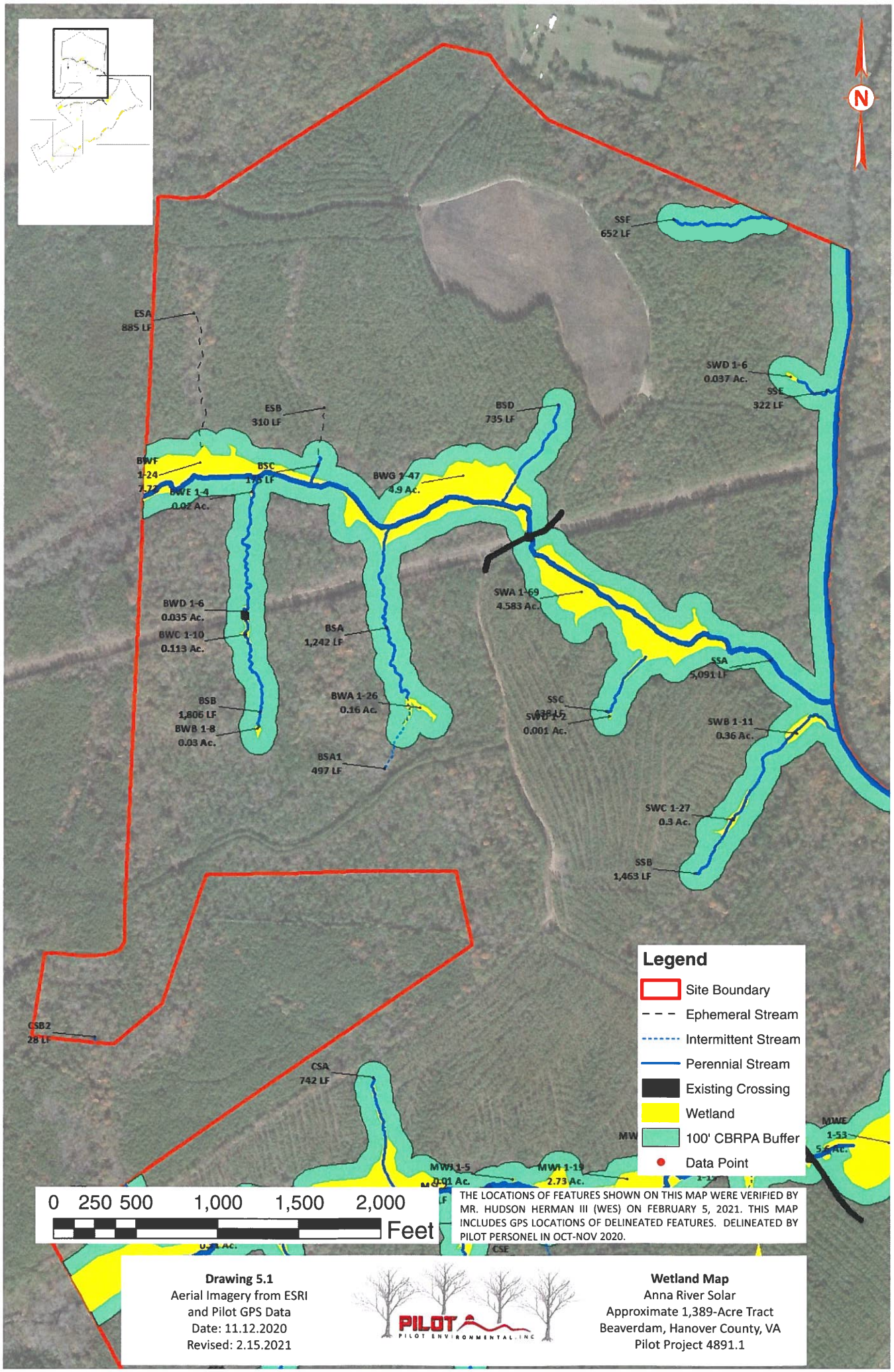


THE LOCATIONS OF FEATURES SHOWN ON THIS MAP WERE VERIFIED BY MR. HUDSON HERMAN III (WES) ON FEBRUARY 5, 2021. THIS MAP INCLUDES GPS LOCATIONS OF DELINEATED FEATURES. DELINEATED BY PILOT PERSONEL IN OCT-NOV 2020.

Drawing 5
Aerial Imagery from ESRI
and Pilot GPS Data
Date: 11.12.2020
Revised: 2.15.2021

PILOT ENVIRONMENTAL, INC

Wetland Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1

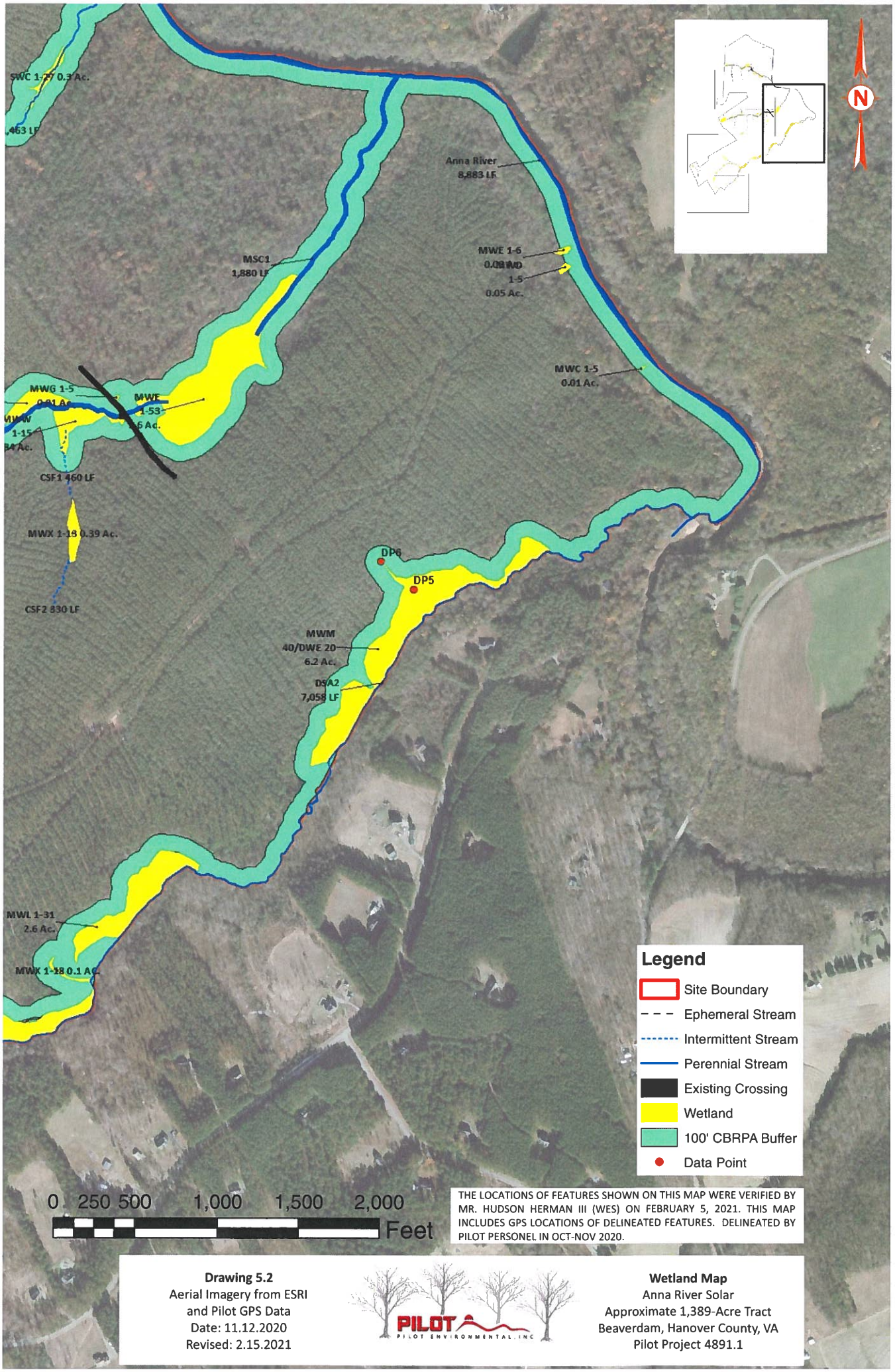


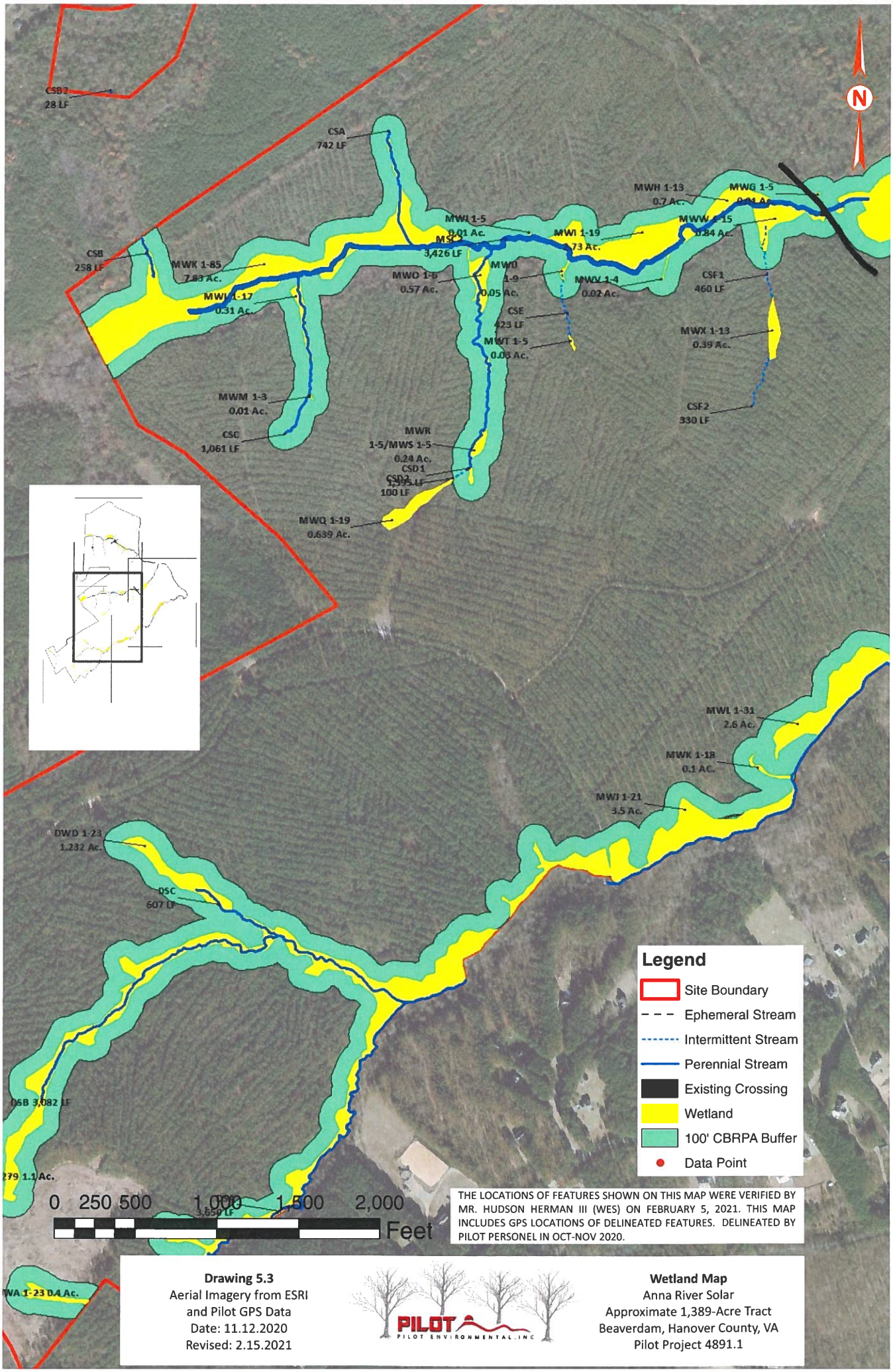
THE LOCATIONS OF FEATURES SHOWN ON THIS MAP WERE VERIFIED BY MR. HUDSON HERMAN III (WES) ON FEBRUARY 5, 2021. THIS MAP INCLUDES GPS LOCATIONS OF DELINEATED FEATURES. DELINEATED BY PILOT PERSONEL IN OCT-NOV 2020.

Drawing 5.1
Aerial Imagery from ESRI
and Pilot GPS Data
Date: 11.12.2020
Revised: 2.15.2021

PILOT ENVIRONMENTAL, INC

Wetland Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1


SWC 1-27 0.3 Ac.
463 LF
Anna River
8,883 LF
MSC1
1,880 LF
MWE 1-6
0.05 Ac.
1-5
MWC 1-5
0.01 Ac.
MWG 1-5
MWE
1-53
CSF1 460 LF
MWX 1-18 0.39 Ac.
CSF2 830 LF
DP6
DP5
MWM
40/DWE 20
6.2 Ac.
DSA2
7,058 LF
MWL 1-31
2.6 Ac.
MWX 1-28 0.1 AC.
N
Legend
Site Boundary
Ephemeral Stream
Intermittent Stream
Perennial Stream
Existing Crossing
Wetland
100' CBRPA Buffer
Data Point
0 250 500 1,000 1,500 2,000
Feet
THE LOCATIONS OF FEATURES SHOWN ON THIS MAP WERE VERIFIED BY MR. HUDSON HERMAN III (WES) ON FEBRUARY 5, 2021. THIS MAP INCLUDES GPS LOCATIONS OF DELINEATED FEATURES. DELINEATED BY PILOT PERSONEL IN OCT-NOV 2020.
Drawing 5.2
Aerial Imagery from ESRI
and Pilot GPS Data
Date: 11.12.2020
Revised: 2.15.2021
PILOT
PILOT ENVIRONMENTAL, INC
Wetland Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1

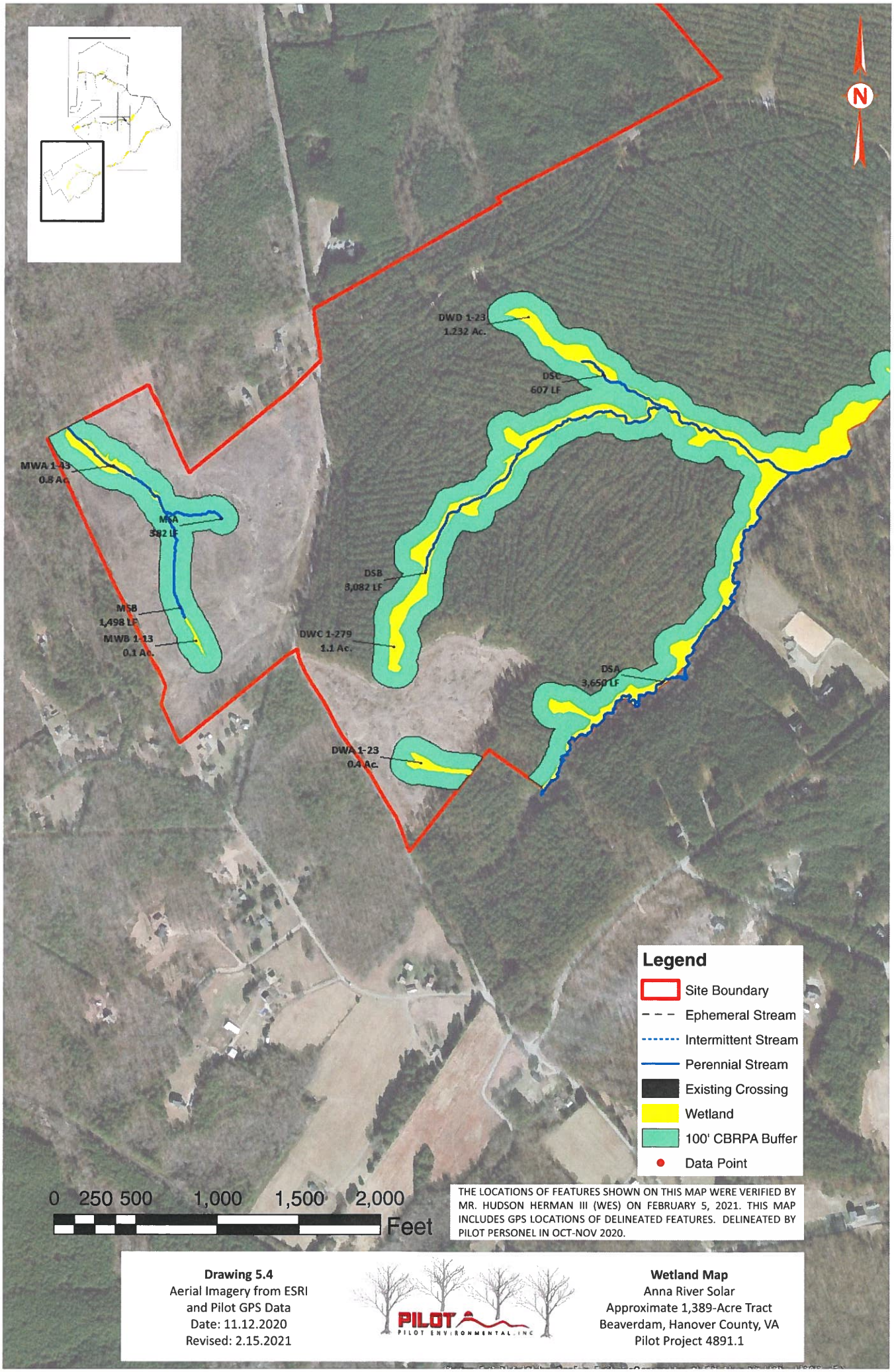


THE LOCATIONS OF FEATURES SHOWN ON THIS MAP WERE VERIFIED BY MR. HUDSON HERMAN III (WES) ON FEBRUARY 5, 2021. THIS MAP INCLUDES GPS LOCATIONS OF DELINEATED FEATURES. DELINEATED BY PILOT PERSONEL IN OCT-NOV 2020.

Drawing 5.3
Aerial Imagery from ESRI
and Pilot GPS Data
Date: 11.12.2020
Revised: 2.15.2021

PILOT ENVIRONMENTAL, INC

Wetland Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1



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Drawing 5.4
Aerial Imagery from ESRI
and Pilot GPS Data
Date: 11.12.2020
Revised: 2.15.2021

PILOT ENVIRONMENTAL, INC

Wetland Map
Anna River Solar
Approximate 1,389-Acre Tract
Beaverdam, Hanover County, VA
Pilot Project 4891.1

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION:

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD): Tuesday, April 06, 2021

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:
GFP Timberlands, LLLP
c/o Al Bayme
6304 Peake Road
Macon, GA 32104

C. DISTRICT OFFICE: Norfolk District (CENAO-REG)

FILE NAME: Anna River Solar

FILE NUMBER: NAO-2020-02396

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: **VIRGINIA** County/parish/borough: Hanover City:

Center coordinates of site (lat/long in degree decimal format):

Latitude: 37.971580 ° N Longitude: -77.646466 ° W

Universal Transverse Mercator:

Name of nearest waterbody: North Anna River

Identify (estimate) amount of waters in the review area:

Non-wetland waters: linear feet; width (ft); and/or acres.

Cowardin Class: See Attached Table

Stream Flow:

Wetlands: acres

Cowardin Class: See Attached Table

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal:

Non-Tidal:

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

☒ Field Determination. Date(s): 2/5/21

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

3. This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA:

Data reviewed for preliminary JD (check all that apply) - checked items should be included in case file and, where checked and requested, appropriately reference sources below.

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
Drawings 5 and 5.1-5.4 Wetland Map Anna River Solar

☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.

☒ Office concurs with data sheets/delineation report.

☐ Office does not concur with data sheets/delineation report.

☐ Data sheets prepared by the Corps:

☐ Corps navigable waters' study:

☐ U.S. Geological Survey Hydrologic Atlas:

☐ USGS NHD data.

☐ USGS 8 and 12 digit HUC maps.

☒ U.S. Geological Survey map(s). Cite scale & quad name: Beaverdam

☒ USDA Natural Resources Conservation Service Soil Survey.

Citation:

☒ National wetlands inventory map(s). Cite name:

☐ State/Local wetland inventory map(s):

☒ FEMA/FIRM maps:

☐ 100-year Floodplain Elevation: (National Geodetic Vertical Datum of 1929)

☐ Photographs: ☐ Aerial (Name & Date):

or ☐ Other (Name & Date):

☐ Previous determination(s):

File no. and date of response letter:

☐ Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Herman W. Hudson III

Signature
Regulatory Project Manager
(REQUIRED)

2021-04-06

Date

Signature of person requesting
Preliminary JD
(REQUIRED, unless obtaining the signature is impracticable)

04/08/2021

Date

SAMPLE

Site Number	Latitude	Longitude	Cowardin Class	Estimated amount of aquatic resource in review area	Class of aquatic resource

Waters_Name	State	Cowardin_Code	Meas_Type	Amount	Units
North Anna River	VIRGINIA	R5	Linear	8883	FOOT
BSA	VIRGINIA	R5	Linear	1242	FOOT
BSA1	VIRGINIA	R4	Linear	497	FOOT
BSB	VIRGINIA	R5	Linear	1806	FOOT
BSC	VIRGINIA	R5	Linear	175	FOOT
BSD	VIRGINIA	R5	Linear	735	FOOT
CSA	VIRGINIA	R5	Linear	742	FOOT
CSB	VIRGINIA	R5	Linear	258	FOOT
CSB2	VIRGINIA	R5	Linear	28	FOOT
CSC	VIRGINIA	R5	Linear	1061	FOOT
CSD1	VIRGINIA	R4	Linear	1595	FOOT
CSD2	VIRGINIA	R4	Linear	100	FOOT
CSE	VIRGINIA	R4	Linear	423	FOOT
CSF1	VIRGINIA	R4	Linear	460	FOOT
CSF2	VIRGINIA	R4	Linear	330	FOOT
DSA	VIRGINIA	R5	Linear	3650	FOOT
DSA2	VIRGINIA	R5	Linear	7058	FOOT
DSB	VIRGINIA	R5	Linear	3082	FOOT
DSC	VIRGINIA	R5	Linear	607	FOOT
MSA	VIRGINIA	R5	Linear	382	FOOT
MSB	VIRGINIA	R5	Linear	1498	FOOT
MSC1	VIRGINIA	R5	Linear	1880	FOOT
MSC2	VIRGINIA	R5	Linear	3426	FOOT
SSA	VIRGINIA	R5	Linear	5091	FOOT
SSB	VIRGINIA	R5	Linear	1463	FOOT
SSC	VIRGINIA	R5	Linear	438	FOOT
SSE	VIRGINIA	R5	Linear	322	FOOT
SSF	VIRGINIA	R5	Linear	652	FOOT
BWA 1-26	VIRGINIA	PFO	Area	0.16	ACRE
BWB 1-8	VIRGINIA	PFO	Area	0.03	ACRE
BWC 1-10	VIRGINIA	PFO	Area	0.113	ACRE
BWD 1-6	VIRGINIA	PFO	Area	0.035	ACRE
BWE 1-4	VIRGINIA	PFO	Area	0.02	ACRE
BWF 1-24	VIRGINIA	PFO	Area	7.72	ACRE
BWF 23-26	VIRGINIA	PFO	Area	0.02	ACRE
BWG 1-47	VIRGINIA	PFO	Area	4.9	ACRE

DWA 1-23	VIRGINIA	PFO	Area	0.4	ACRE
DWC 1-279	VIRGINIA	PFO	Area	1.1	ACRE
DWD 1-23	VIRGINIA	PFO	Area	1.23	ACRE
MWA 1-43	VIRGINIA	PFO	Area	0.8	ACRE
MWB 1-13	VIRGINIA	PFO	Area	0.1	ACRE
MWC 1-5	VIRGINIA	PFO	Area	0.01	ACRE
MWD 1-5	VIRGINIA	PFO	Area	0.05	ACRE
MWE 1-53	VIRGINIA	PFO	Area	5.6	ACRE
MWE 1-6	VIRGINIA	PFO	Area	0.06	ACRE
MWG 1-5	VIRGINIA	PFO	Area	0.01	ACRE
MWH 1-13	VIRGINIA	PFO	Area	0.7	ACRE
MWI 1-19	VIRGINIA	PFO	Area	2.73	ACRE
MWJ 1-21	VIRGINIA	PFO	Area	3.5	ACRE
MWJ 1-5	VIRGINIA	PFO	Area	0.01	ACRE
MWK 1-18	VIRGINIA	PFO	Area	0.1	ACRE
MWK 1-85	VIRGINIA	PFO	Area	7.83	ACRE
MWL 1-17	VIRGINIA	PFO	Area	0.31	ACRE
MWL 1-31	VIRGINIA	PFO	Area	2.6	ACRE
MWM 1-3	VIRGINIA	PFO	Area	0.01	ACRE
MWM 40/DWE 20	VIRGINIA	PFO	Area	6.2	ACRE
MWO 1-6	VIRGINIA	PFO	Area	0.57	ACRE
MWQ 1-19	VIRGINIA	PFO	Area	0.639	ACRE
MWR 1-5/MWS 1-5	VIRGINIA	PFO	Area	0.24	ACRE
MWT 1-5	VIRGINIA	PFO	Area	0.03	ACRE
MWU 1-9	VIRGINIA	PFO	Area	0.05	ACRE
MWV 1-4	VIRGINIA	PFO	Area	0.02	ACRE
MWW 1-15	VIRGINIA	PFO	Area	0.84	ACRE
MWX 1-13	VIRGINIA	PFO	Area	0.39	ACRE
SWA 1-69	VIRGINIA	PFO	Area	4.583	ACRE
SWB 1-11	VIRGINIA	PFO	Area	0.36	ACRE
SWC 1-27	VIRGINIA	PFO	Area	0.3	ACRE
SWD 1-2	VIRGINIA	PFO	Area	0.001	ACRE
SWD 1-6	VIRGINIA	PFO	Area	0.037	ACRE
ESA	VIRGINIA	R6	Linear	885	FOOT
ESB	VIRGINIA	R6	Linear	310	FOOT

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

April 6, 2021

Supplemental Preapplication Information
Project Number: NAO-2020-02396

1. A search of the Virginia Department of Historic Resources data revealed the following:

   ☒ No known historic properties are located on the property.

   ☐ Tribal consultation may be required.

   ☐ The following known architectural resources are located on the property:

   ☐ The following known archaeological resources are located on the property:

   ☐ The following known historic resources are located in the vicinity of the property (potential for effects to these resources from future development):

NOTE:
1) *The information above is for planning purposes only. In most cases, the property has not been surveyed for historic resources. Undiscovered historic resources may be located on the subject property or adjacent properties and this supplemental information is not intended to satisfy the Corps' requirements under Section 106 of the National Historic Preservation Act (NHPA).*
2) *Prospective permittees should be aware that Section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant.*

2. A search of the data supplied by the U.S. Fish & Wildlife Service, the Virginia Department of Conservation and Recreation and the Virginia Department of Game and Inland Fisheries revealed the following:

   ☐ No known populations of threatened or endangered species are located on or within the vicinity of the subject property.

   ☒ The following federally-listed species may occur within the vicinity of the subject property:

   Indiana Bat (*Myotis sodalis*), Northern Long-eared Bat (*Myotis septentrionalis*), Yellow Lance (*Elliptio lanceolata*)

   ☐ The following state-listed (or other) species may occur within the vicinity of the subject property:

Please note this information is being provided to you based on the preliminary data you submitted to the Corps relative to project boundaries and project plans. Consequently, these findings and recommendations are subject to change if the project scope changes or new information becomes available and the accuracy of the data

Prepared for

STRATA CLEAN ENERGY

Strata Clean Energy, LLC
800 Taylor St, Suite 200
Durham, NC 27701

WETLAND DESKTOP ASSESSMENT
ANNA RIVER SOLAR PROJECT
Hanover County, Virginia

Prepared by

Geosyntec consultants

engineers | scientists | innovators
9211 Arboretum Parkway, Suite 200
Richmond, VA 23236

Project Number: GXE10492

March 4, 2024

Table of Contents

TABLES

FIGURES

APPENDICES

1 Introduction

Strata Clean Energy, LLC (Strata) engaged Geosyntec Consultants, Inc. (Geosyntec) to provide support with environmental due diligence and preliminary planning of a new utility-scale photovoltaic solar energy facility referred to as the Anna River Solar Project (Project or Project study area). The Project is in Hanover County, Virginia, on the Beaverdam 2022 United States Geological Survey (USGS) 7.5-minute Quadrangles (Quads) (Figure 1). It is located within Hydrologic Unit Code (HUC12) 020801060802, North Anna River-Hawkins Creek (Figure 3). The following report summarizes results of the desktop analysis for wetland habitats within the Project study area. The Project study area reviewed for the wetland desktop assessment totaled approximately 181.8 acres as provided by Strata.

2 Desktop Review

Geosyntec reviewed internet databases and online sources during the desktop review. The base maps, resource reports, and databases listed below were reviewed to determine the current and historical landforms, landcovers, land uses, soil mapping, and sources of groundwater and surface water to identify potential wetland habitats within the Project study area.

- USGS Topographic Maps
- USGS 3D elevation program (3DEP)
- National Wetland Inventory (NWI)
- National Hydrographic Database (NHD)
- United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey
- Federal Emergency Management Agency (FEMA) National Flood Hazard Tool
- National Landcover Database (NLCD)
- USGS Protected Areas Dataset (PAD-US)

2.1 USGS Topographic Map and 3DEP Data Review

USGS 7.5-minute topographic maps for Virginia were reviewed to identify potential wetlands, streams, site development, and landform features within the Project study area. The Project study area is two irregular polygons located northwest of Doswell, Virginia. The site lies on the Beaverdam 2022, Virginia USGS Quad. Topographic elevations within the Project range between 190 to 270 feet above mean sea level (AMSL). Several named and unnamed surface waters were mapped within the Project (Figure 1). These areas can be seen in enhanced detail using the DEM dataset (Figure 2).

2.2 National Wetland Inventory & National Hydrology Dataset

Based on the NHD, the Project's southern boundary is bordered by Hogan Creek, which is a perennial waterway. In addition, NHD identifies an unnamed tributary crossing the Project study area, totaling 0.56 miles of NHD identified streams intersecting the Project. Potential wetlands are generally associated with NHD stream features.

The National Wetland Inventory dataset indicated approximately 7.8 acres of palustrine wetlands and 0.97 acres of riverine systems are within the Project study area. Further broken down, 5.12 of those acres are identified as Freshwater Forested/Shrub Wetlands and palustrine forested wetlands (PFO) and the remaining 2.68 acres identified as Freshwater Emergent Wetlands (PEM) (Figure 3).

2.3 USDA (NRCS) Web Soil Survey

Results from the Web Soil Survey indicate that only one soil series within the project contains major hydric components, Fluvaquents, nearly level (28). This frequently flooded soil accounts for approximately 11.5 acres, which equates to 6.3% of the Project. In Hanover County, Virginia, 28 is listed with no minor components (Figure 4).

These potential wetland areas generally coincide with USDA hydric soils, however potential wetlands were also identified in areas with low presence (3%) of hydric soils. This is in part because soil units are not mapped at a temporal or spatial scale appropriate to assume they capture all existing hydric soils.

2.4 FEMA Floodplain

The Project was reviewed with the National Flood Hazard Layer, produced by the FEMA, to determine the location of on-site floodplains. According to FEMA, small portions of the Project are located within Special Flood Hazard Area, Zone A. The areas of the Project labeled as Zone A are located around named waterway Hogan Creek and other unnamed tributary (Figure 5).

2.5 National Landcover Database

The Project was reviewed along with the NLCD, produced by Multi-Resolution Land Characteristics (MRLC) Consortium, to display land cover information. As shown in Figure 6, the portions of the Project with landcover class Woody Wetlands, are geographically very similar to NWI.

2.6 Public Lands

The PAD-US was queried to identify existing conservation easements, tribal lands, and publicly owned land within and adjacent to the Project study area. No protected areas were identified within the Project study area or the half mile buffer.

3 Desktop Review Interpretation

3.1 Wetlands

Potential wetland areas within the Project study area were identified through use of multiple datasets including the United States Fish and Wildlife Service (USFWS) NWI, 3DEP lidar derived terrain, USDA hydric soils data set, and current and historical aerial imagery. Identified wetland areas are shown in Figure 7 and are being provided in digital shapefile and keyhole markup language (kml) format. A conservative, inclusive approach was taken during the desktop assessment for identifying potential wetlands, as it is assumed this assessment will guide any in-field delineation efforts. Aerial imagery between 2011 and 2023 were reviewed. Potential wetlands

were delineated in areas with visible inundation across multiple years and in areas with a visible change in the plant community. Low lying areas with limited topography and thus lower downstream flow are more likely to form wetlands. In forested areas, terrain data, NHD, and NWI data had to be relied upon as inundation is not easily visible.

Based on the desktop assessment, 17.4 acres of potential wetlands were identified via desktop interpretation within the Project study area (Figure 7). The provided digital files distinguish potential wetlands based on location and wetland type (forested or emergent). Most of the potential wetlands are located within forested areas along streams and floodplains (Table 1).

Table 1: Preliminary Desktop Identified Potential Wetlands

Location	Acres	Percentage
Forested	14.7	84.5
Emergent	2.7	15.5
Total	**17.4**	**100**

3.2 Streams

Potential stream locations were identified within the Project study area with the use of United States Geologic Survey (USGS) NHD and the DEM dataset. Approximately 0.6 miles (2,957 linear feet) of named streams and unnamed tributaries identified by NHD are within the Project boundary including Hogan Creek. Additional stream features and network predictions were located with the use of digital elevation model to identify remanent channels and headcuts.

Based on the desktop assessment, 1.8 miles (9,750 linear feet) of potential streams were identified via desktop interpretation within the Project study area (Figure 7).

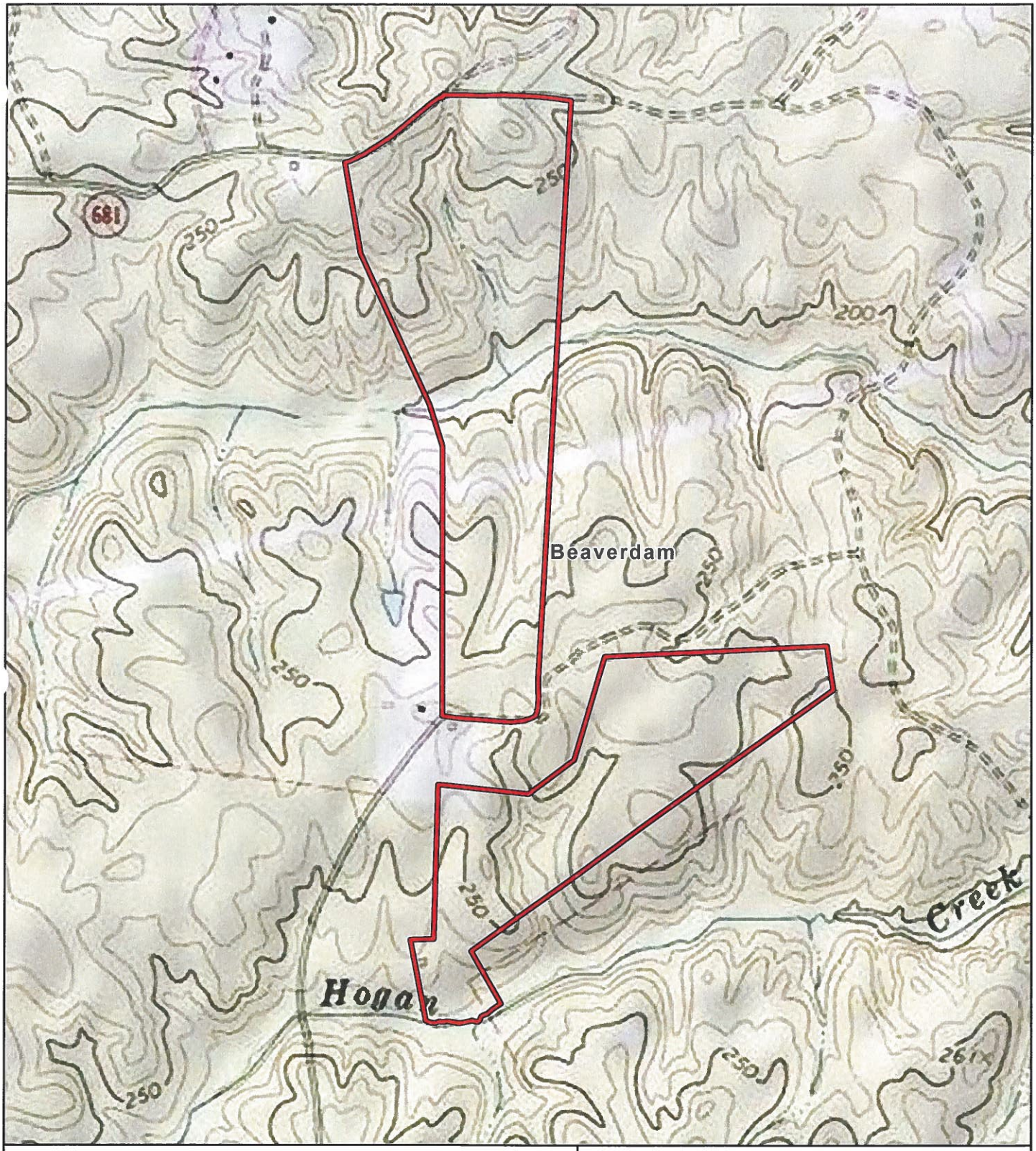
Table 2: Preliminary Desktop Identified Potential Streams

Type	Linear Miles	Linear Feet
NHD Identified	0.6	2,957
Additional	1.2	6,792
Total	**1.8**	**9,750**

4 Conclusion

Based on review of internet databases and online sources, Geosyntec identified approximately 17.4 acres of potential wetlands and 9,750 linear feet of potential streams within the Project study area.

FIGURES



Project Study Area

N

0 2,000 Feet

Desktop Study Area
Strata Clean Energy, LLC
South Anna Solar Project
Hanover County, Virginia

Geosyntec consultants

Drawn: CE | March 2024

Figure 1

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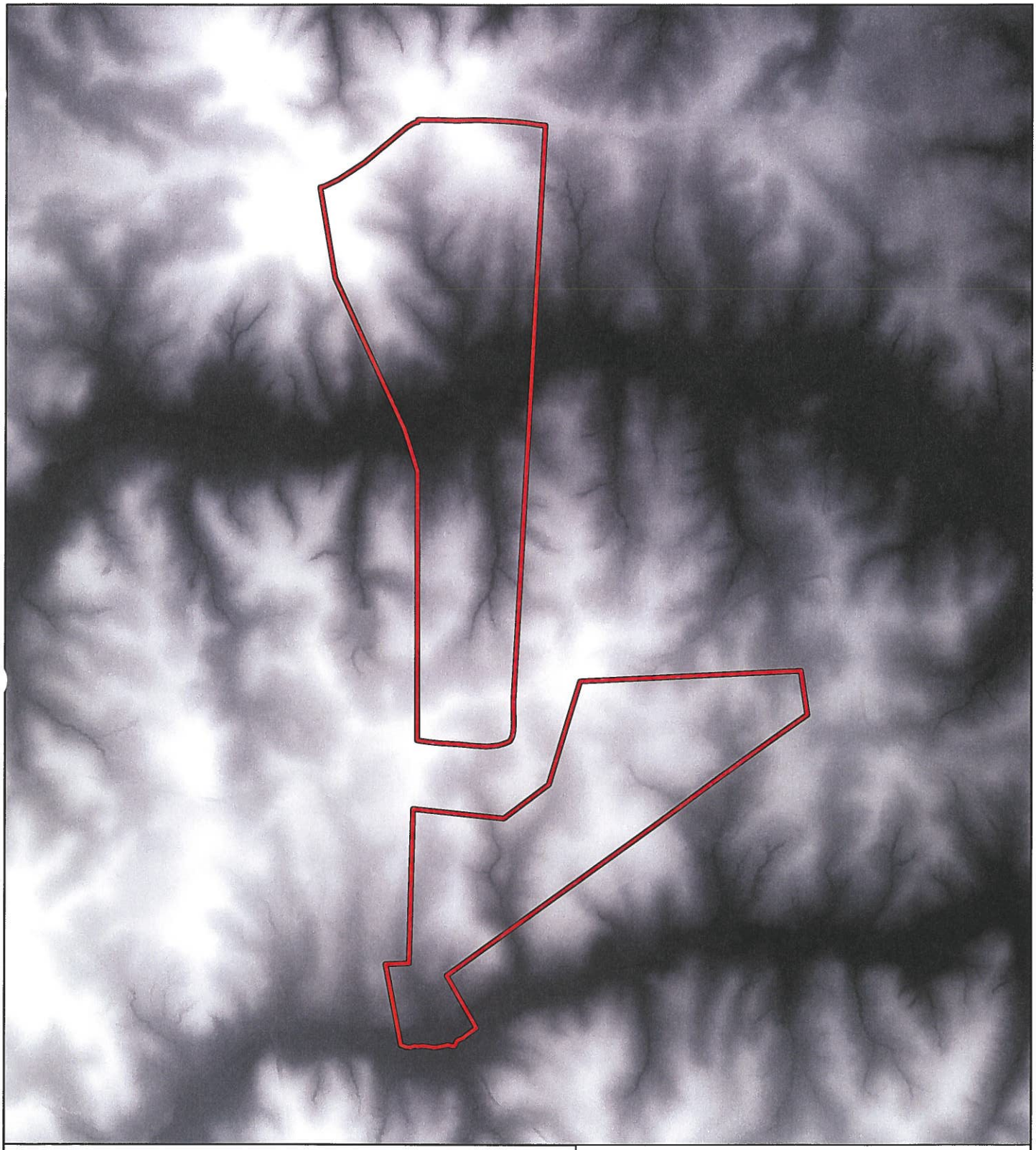
Basemap Sources: USA_Topo_Maps: Copyright:© 2013 National Geographic Society, i-cubed



Project Study Area

N

0 2,000 Feet

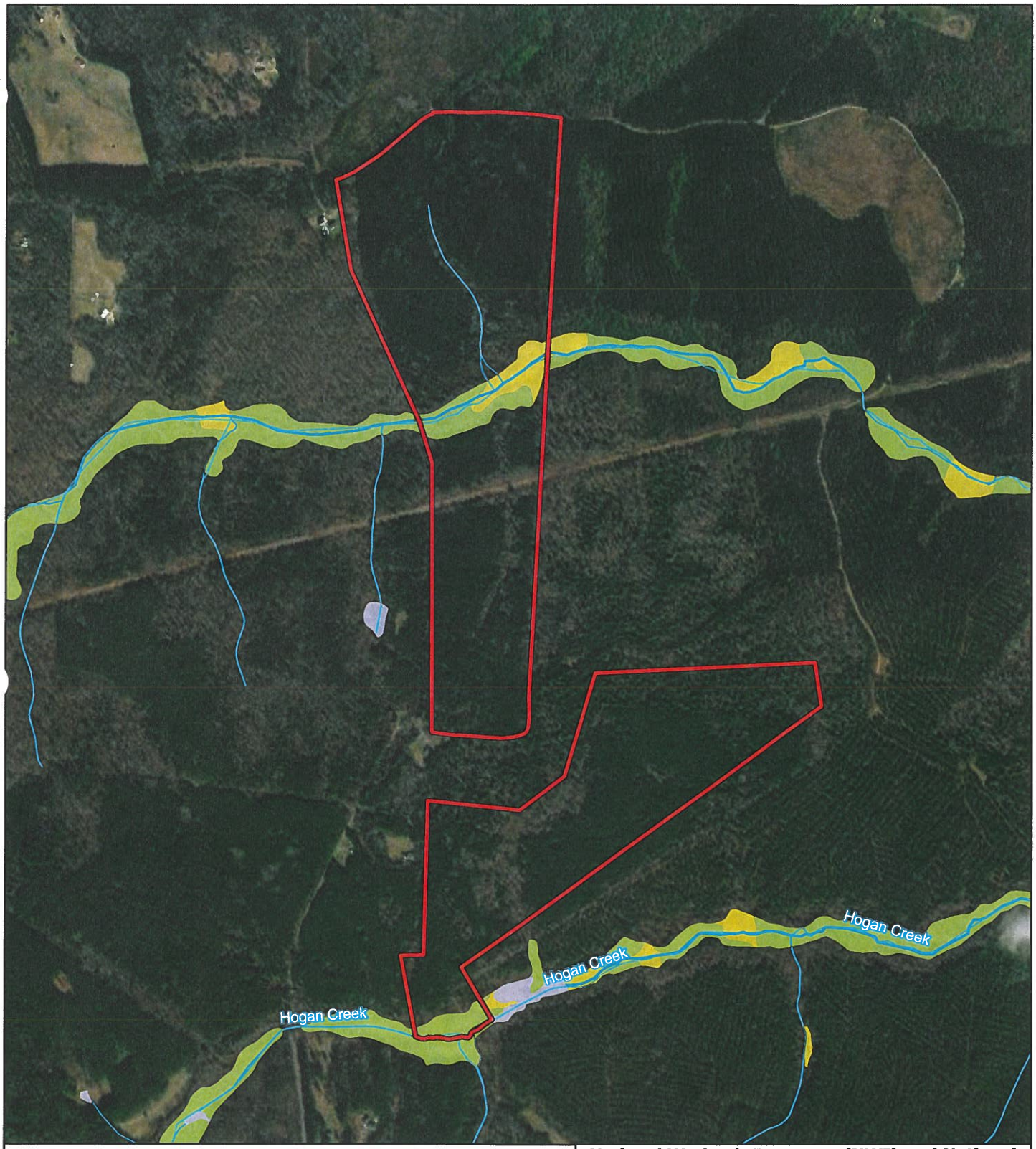
Digital Elevation Model
Strata Clean Energy, LLC
South Anna Solar Project
Hanover County, Virginia

Geosyntec consultants

Drawn: CE | March 2024

Figure 2

C:\Users\cora.every\Documents\Projects\South Anna\GIS\South Anna Solar_1March24.aprx 2/29/2024 4:52 PM
Basemap Sources: Terrain: Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community



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

Project Study Area
NHD Streams

N

0 2,000 Feet

National Wetlands Inventory (NWI) and National Hydrography Dataset (NHD)
Strata Clean Energy, LLC
South Anna Solar Project
Hanover County, Virginia

Geosyntec consultants

Figure 3

Drawn: CE | March 2024

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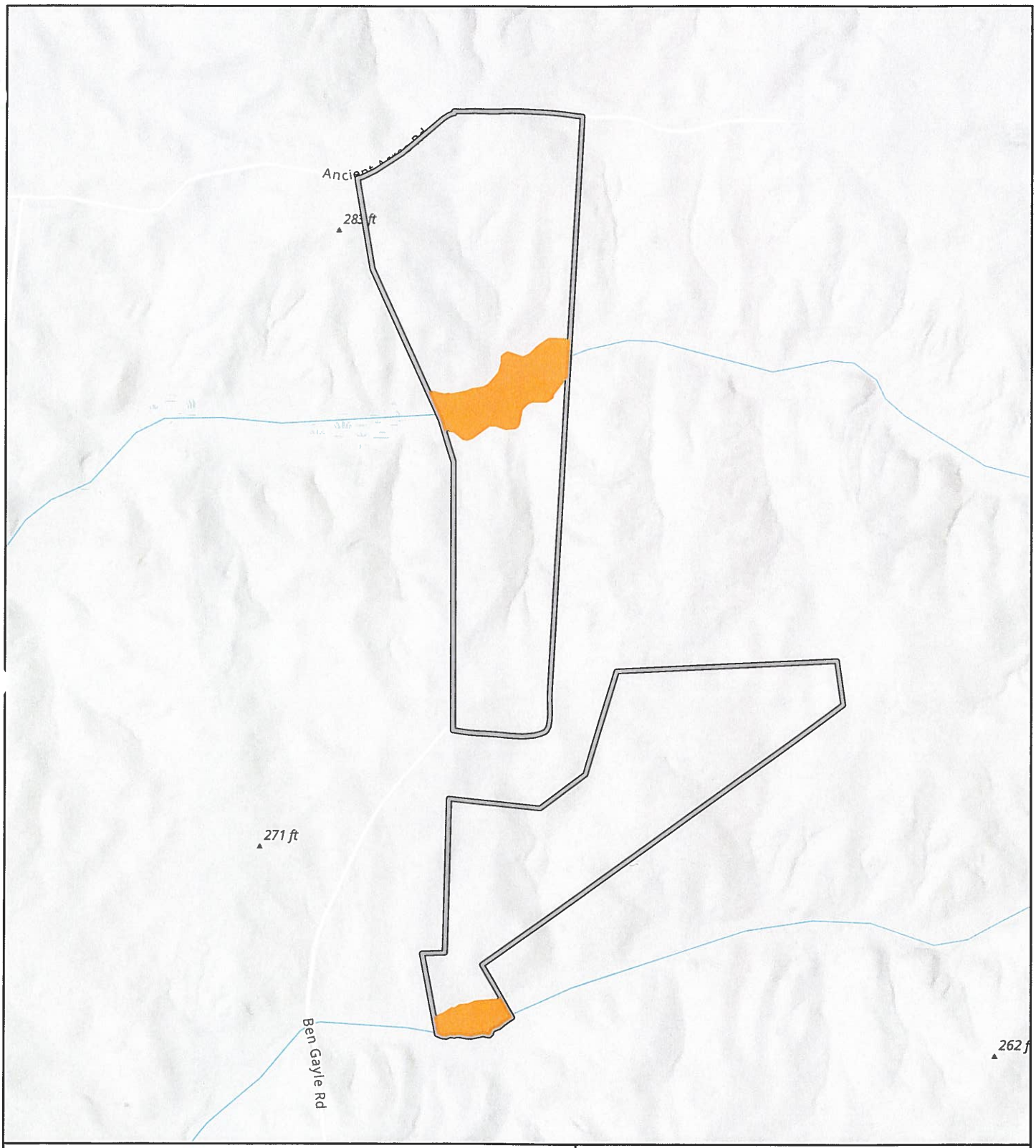
Basemap Sources: World Imagery: Maxar



USDA NRCS Hydric Soil Series
Strata Clean Energy, LLC
South Anna Solar Solar
Hanover County, Virginia

Geosyntec consultants

Figure 4

Drawn: CE | March 2024

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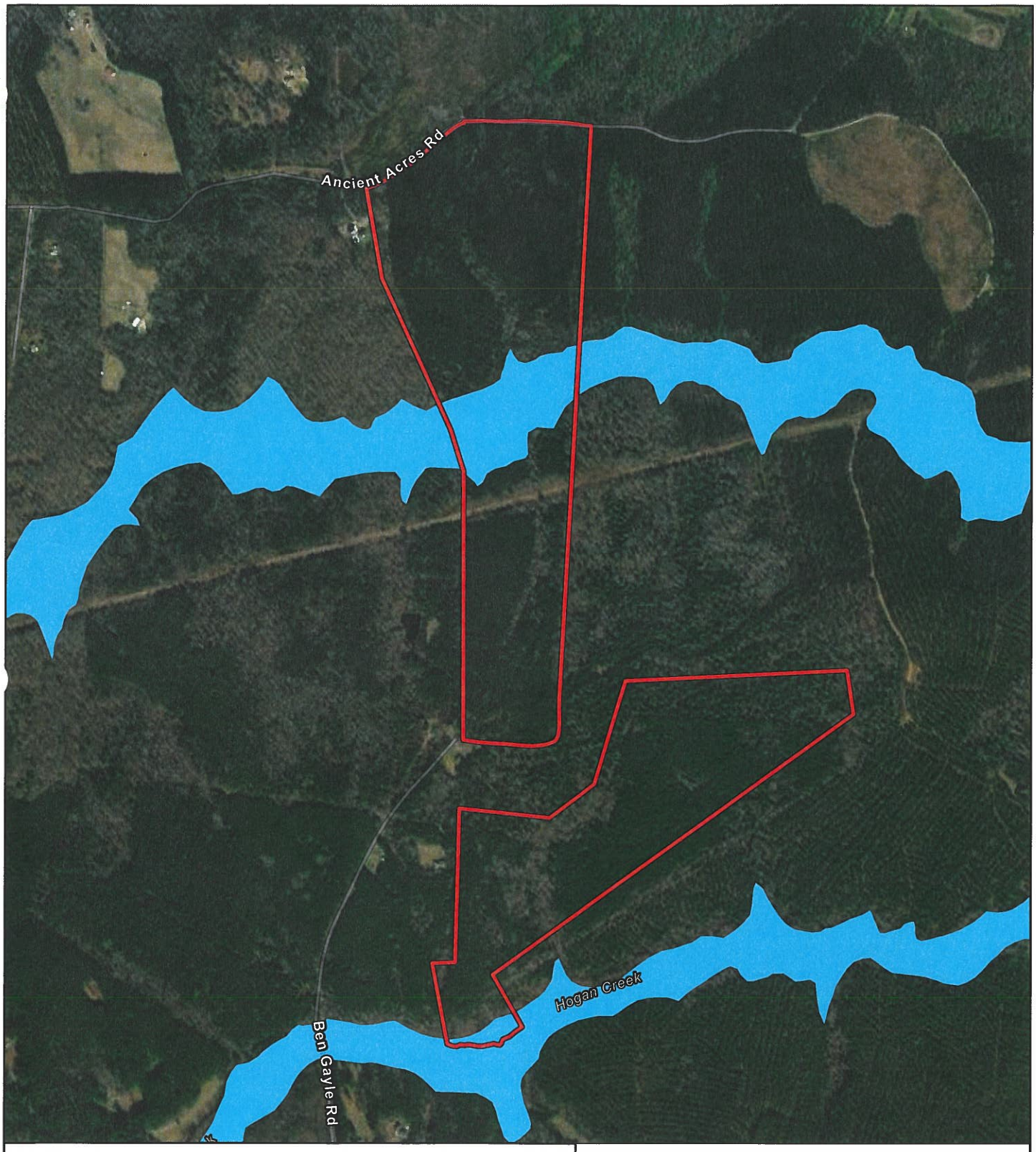
Basemap Sources: World Topographic Map: Esri Community Maps Contributors, VGIN, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS



Flood Zone Hazard Area

A

X

Project Study Area

N

0 2,000 Feet

FEMA National Flood Hazard FIRMette
Strata Clean Energy, LLC
South Anna Solar Project
Hanover County, Virginia

Geosyntec consultants

Figure 5

Drawn: CE | March 2024

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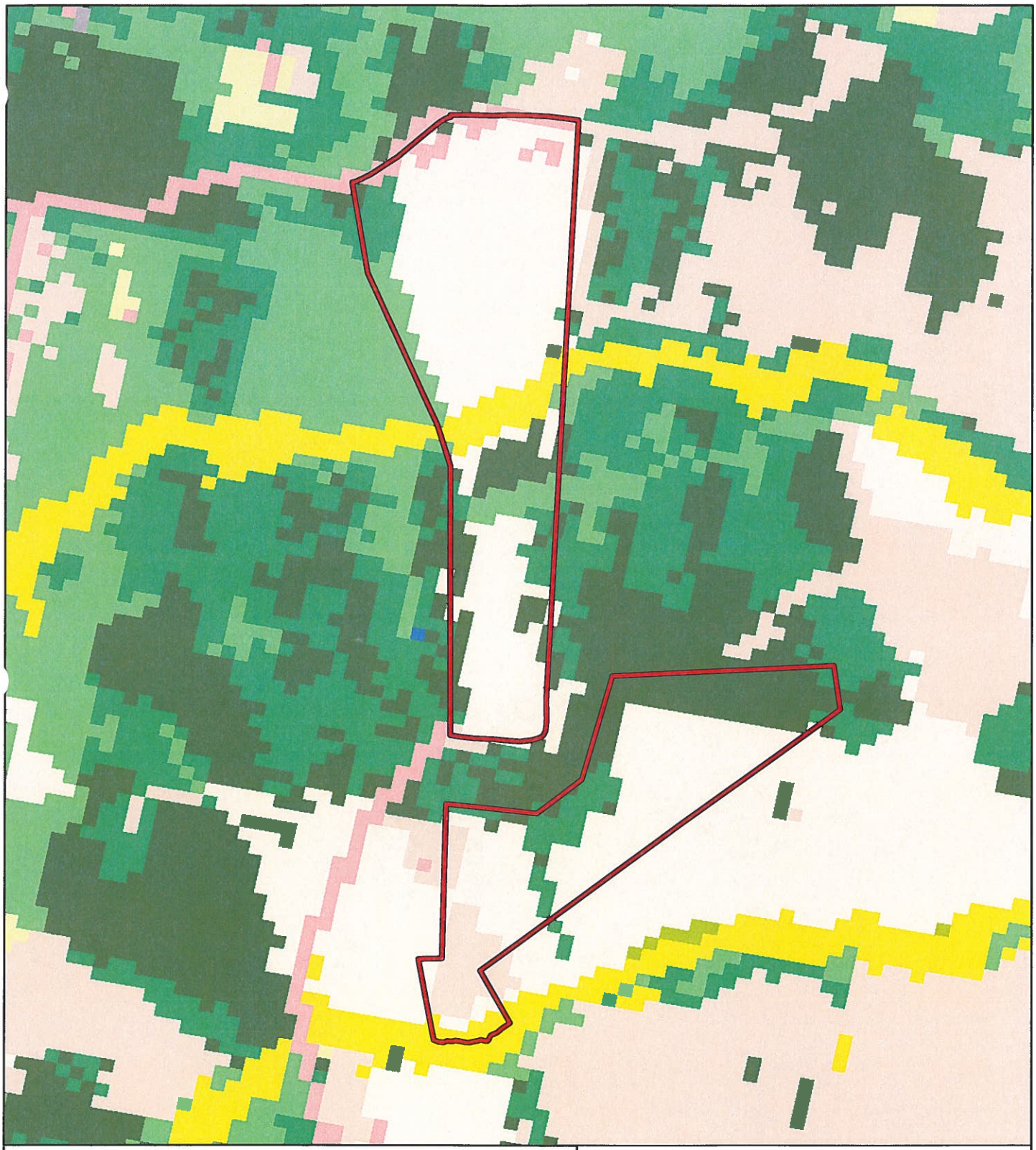
Basemap Sources: World Imagery: Maxar
Hybrid Reference Layer: Esri Community Maps Contributors, VGIN, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc,



National Landcover Database
Strata Clean Energy, LLC
South Anna Solar Solar
Hanover County, Virginia

Geosyntec consultants

Figure 6

Drawn: CE | March 2024

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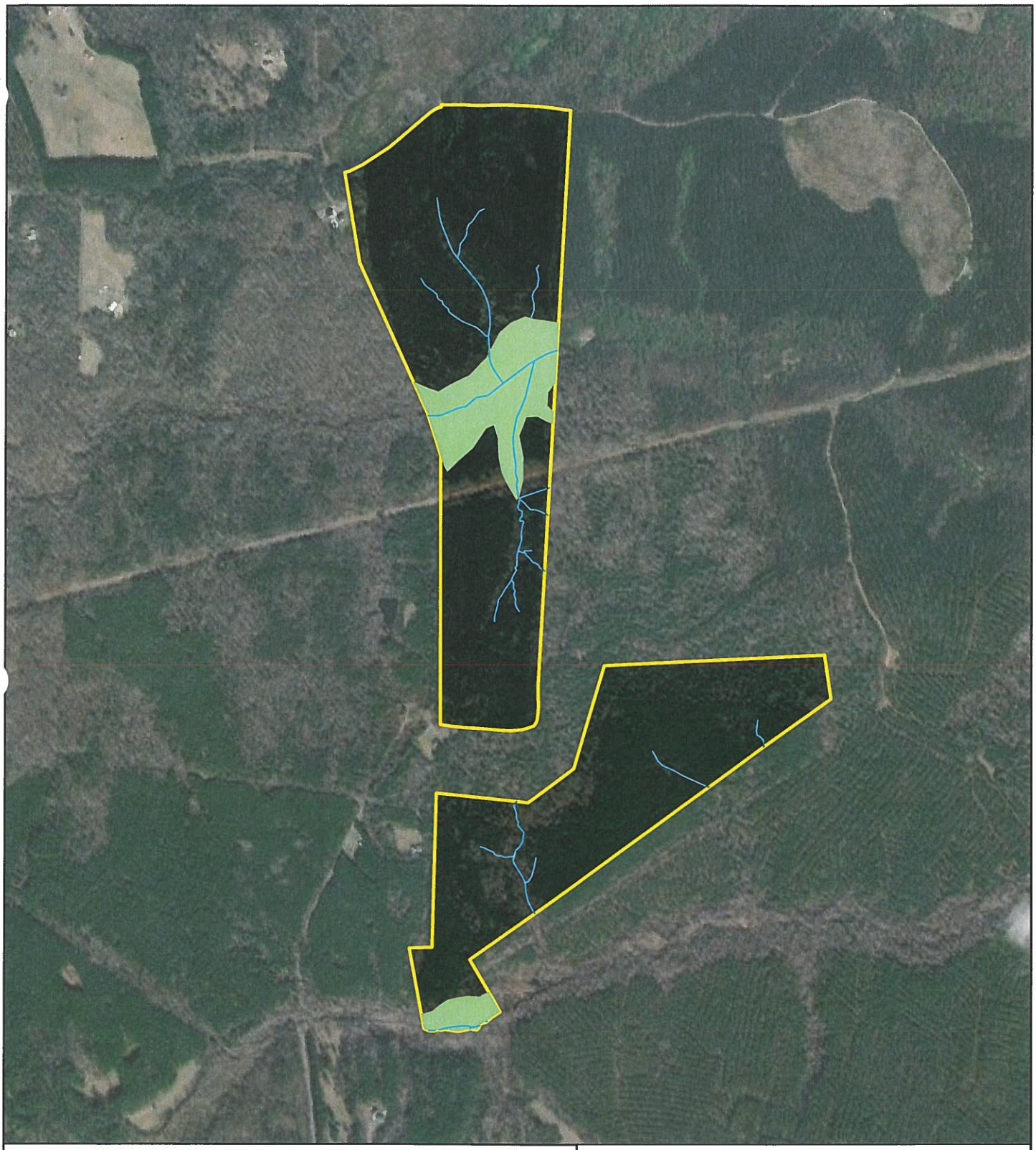
Basemap Sources: USA NLCD Land Cover:



Preliminary Wetland Desktop Assessment
Strata Clean Energy, LLC
South Anna Solar Project
Hanover County, Virginia

Geosyntec consultants

Drawn: CE | March 2024

Figure 7

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Basemap Sources: World Imagery: Maxar

APPENDIX A
Custom Soil Resource Report
for
Hanover County, Virginia

Soil Map—Hanover County, Virginia
(South Anna Project Area)

Map Scale: 1:12,300 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hanover County, Virginia
Survey Area Data: Version 18, Sep 5, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1B	Abell fine sandy loam, 2 to 7 percent slopes	15.9	8.7%
11C	Bourne-Varina complex, 7 to 15 percent slopes	4.7	2.6%
14B2	Cecil fine sandy loam, 2 to 7 percent slopes, eroded	48.7	26.8%
14C2	Cecil fine sandy loam, 7 to 15 percent slopes, eroded	4.7	2.6%
28	Fluvaquents, nearly level	11.5	6.4%
38C	Iredell-Orange complex, 7 to 15 percent slopes	1.2	0.7%
50B	Orangeburg-Faceville fine sandy loams, 2 to 7 percent slopes	5.6	3.1%
51B2	Pacolet fine sandy loam, 2 to 7 percent slopes, eroded	4.9	2.7%
51C2	Pacolet fine sandy loam, 7 to 15 percent slopes, eroded	1.1	0.6%
51D2	Pacolet fine sandy loam, 15 to 25 percent slopes, eroded	4.2	2.3%
52C3	Pacolet clay loam, 7 to 15 percent slopes, severely eroded	33.1	18.2%
74B2	Wedowee fine sandy loam, 2 to 7 percent slopes, eroded	3.4	1.9%
74C2	Wedowee fine sandy loam, 7 to 15 percent slopes, eroded	13.1	7.2%
74D2	Wedowee fine sandy loam, 15 to 30 percent slopes, eroded	3.2	1.8%
75C3	Wedowee clay loam, 7 to 15 percent slopes, severely eroded	26.4	14.5%
Totals for Area of Interest		**181.8**	**100.0%**

Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.

Most of the soils similar to the major components have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Some minor components, however, have properties and behavior characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Hanover County, Virginia

1B—Abell fine sandy loam, 2 to 7 percent slopes

Map Unit Setting

National map unit symbol: 3zxj
Elevation: 30 to 380 feet

Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Abell and similar soils: 85 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Abell

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Head slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Local alluvium

Typical profile

H1 - 0 to 15 inches: fine sandy loam
H2 - 15 to 27 inches: clay loam
H3 - 27 to 39 inches: clay
H4 - 39 to 60 inches: loam

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY810SC - Acidic upland forest, seasonally wet
Hydric soil rating: No

Minor Components

Fluvaquents

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Tread

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Worsham

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

11C—Bourne-Varina complex, 7 to 15 percent slopes

Map Unit Setting

National map unit symbol: 3zx1
Elevation: 0 to 500 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Not prime farmland

Map Unit Composition

Bourne and similar soils: 40 percent
Varina and similar soils: 35 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bourne

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 24 inches: sandy clay loam
H3 - 24 to 68 inches: sandy loam
H4 - 68 to 76 inches: clay

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None

Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Varina

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 7 inches: gravelly sandy loam
H2 - 7 to 65 inches: gravelly clay loam

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 30 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Fluvaquents

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Worsham

Percent of map unit: 3 percent
Landform: Depressions
Landform position (three-dimensional): Tread

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

14B2—Cecil fine sandy loam, 2 to 7 percent slopes, eroded

Map Unit Setting

National map unit symbol: 3zx6
Elevation: 200 to 1,400 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cecil and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cecil

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 53 inches: clay
H3 - 53 to 60 inches: clay loam

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

14C2—Cecil fine sandy loam, 7 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: 3zx7
Elevation: 200 to 1,400 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cecil and similar soils: 85 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cecil

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 53 inches: clay
H3 - 53 to 60 inches: clay loam

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Worsham

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Fluvaquents

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

28—Fluvaquents, nearly level

Map Unit Setting

National map unit symbol: 3zxz
Elevation: 0 to 340 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Not prime farmland

Map Unit Composition

Fluvaquents and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fluvaquents

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 4 inches: loam
H2 - 4 to 52 inches: sandy clay loam
H3 - 52 to 74 inches: gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

38C—Iredell-Orange complex, 7 to 15 percent slopes

Map Unit Setting
National map unit symbol: 3zyb
Elevation: 160 to 550 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Iredell and similar soils: 40 percent
Orange and similar soils: 30 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Iredell

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Typical profile
H1 - 0 to 9 inches: sandy loam
H2 - 9 to 34 inches: clay
H3 - 34 to 79 inches: sandy clay loam

Properties and qualities
Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C/D
Ecological site: F136XY710NC - Basic upland woodland, expansive clay, seasonally wet and dry
Hydric soil rating: No

Description of Orange

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Typical profile

H1 - 0 to 10 inches: fine sandy loam
H2 - 10 to 42 inches: clay
H3 - 42 to 60 inches: sandy loam

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F136XY710NC - Basic upland woodland, expansive clay, seasonally wet and dry
Hydric soil rating: No

Minor Components

Worsham

Percent of map unit: 4 percent
Landform: Depressions

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Fluvaquents
Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

50B—Orangeburg-Faceville fine sandy loams, 2 to 7 percent slopes

Map Unit Setting
National map unit symbol: 3zyz
Elevation: 170 to 500 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Orangeburg and similar soils: 55 percent
Faceville and similar soils: 35 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orangeburg

Setting
Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile
H1 - 0 to 16 inches: fine sandy loam
H2 - 16 to 70 inches: sandy clay loam

Properties and qualities
Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Faceville

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 10 inches: fine sandy loam
H2 - 10 to 17 inches: clay

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Coxville

Percent of map unit: 1 percent
Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: Yes

51B2—Pacolet fine sandy loam, 2 to 7 percent slopes, eroded

Map Unit Setting

National map unit symbol: 3zz1
Elevation: 200 to 1,400 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pacolet and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacolet

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 35 inches: clay
H3 - 35 to 60 inches: loam

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

51C2—Pacolet fine sandy loam, 7 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: 3zz2
Elevation: 200 to 1,400 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Pacolet and similar soils: 85 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacolet

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 35 inches: clay
H3 - 35 to 60 inches: loam

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Worsham

Percent of map unit: 2 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Fluvaquents

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

51D2—Pacolet fine sandy loam, 15 to 25 percent slopes, eroded

Map Unit Setting

National map unit symbol: 3zz3
Elevation: 200 to 1,400 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Not prime farmland

Map Unit Composition

Pacolet and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacolet

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 35 inches: clay
H3 - 35 to 60 inches: loam

Properties and qualities

Slope: 15 to 25 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Fluvaquents

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

52C3—Pacolet clay loam, 7 to 15 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 3zz4
Elevation: 200 to 1,400 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Not prime farmland

Map Unit Composition

Pacolet and similar soils: 85 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pacolet

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile
H1 - 0 to 5 inches: clay loam
H2 - 5 to 35 inches: clay
H3 - 35 to 60 inches: loam

Properties and qualities
Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Fluvaquents
Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

74B2—Wedowee fine sandy loam, 2 to 7 percent slopes, eroded

Map Unit Setting
National map unit symbol: 400f
Elevation: 300 to 1,200 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Wedowee and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wedowee

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 33 inches: clay
H3 - 33 to 60 inches: loam

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

74C2—Wedowee fine sandy loam, 7 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: 400g
Elevation: 300 to 1,200 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wedowee and similar soils: 85 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wedowee

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 33 inches: clay
H3 - 33 to 60 inches: loam

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Worsham

Percent of map unit: 2 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Fluvaquents

Percent of map unit: 1 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

74D2—Wedowee fine sandy loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: 400h
Elevation: 300 to 1,200 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Not prime farmland

Map Unit Composition

Wedowee and similar soils: 85 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wedowee

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 33 inches: clay
H3 - 33 to 60 inches: loam

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Worsham

Percent of map unit: 3 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Fluvaquents

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

75C3—Wedowee clay loam, 7 to 15 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 400j
Elevation: 300 to 1,200 feet
Mean annual precipitation: 35 to 48 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 147 to 179 days
Farmland classification: Not prime farmland

Map Unit Composition

Wedowee and similar soils: 85 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wedowee

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 5 inches: clay loam
H2 - 5 to 33 inches: clay
H3 - 33 to 60 inches: loam

Properties and qualities

Slope: 7 to 15 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Minor Components

Fluvaquents

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Worsham

Percent of map unit: 1 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Hanover County, Virginia
Survey Area Data: Version 18, Sep 5, 2023

ANNA RIVER SOLAR

ECONOMIC & FISCAL CONTRIBUTION TO HANOVER COUNTY, VIRGINIA

Prepared for

STRATA CLEAN ENERGY

MANGUM economics

4198 COX ROAD, SUITE 104
GLEN ALLEN, VIRGINIA 23060
804-322-7777

MANGUMECONOMICS.COM

DECEMBER 2023

About Mangum Economics, LLC

Mangum Economics is a Glen Allen, Virginia based firm that was founded in 2003. Since then, we have become known as a leader in industry analysis, economic impact assessment, policy and program evaluation, and economic and workforce strategy development. The Mangum Team specializes in producing objective and actionable quantitative economic research that our clients use for strategic decision making in a variety of industries and environments. We know that our clients are unique, and that one size does not fit all. As a result, we have a well-earned reputation for tailoring our analyses to meet the specific needs of specific clients, with a specific audience.

Most of our research falls into four general categories:

- **Information Technology:** Working with some of the largest names in the industry, to date the Mangum Team has produced analyses of the economic and fiscal impact of data centers at the state and local level across the country.
- **Energy:** The Mangum Team has produced analyses of the economic and fiscal impact of over 23 GW of proposed solar, wind, battery energy storage, and hydro projects spanning twenty states. Among those projects was Dominion Energy's 2.6 GW Coastal Virginia Offshore Wind project off of Virginia Beach. In addition, the Mangum Team has also performed economic and fiscal impact analyses for the natural gas, nuclear, oil, and pipeline industries.
- **Economic Development and Special Projects:** The Mangum Team has performed hundreds of analyses of proposed economic development projects. Most recently, we were called upon by Henrico County to provide an analysis of the proposed $2.3 billion Green City "net-zero eco district." The Mangum Team has also authored multiple economic development plans, including identifying industries that were likely recruitment targets because of the high-speed MAREA and BRUSA sub-sea cable landings in Virginia Beach.
- **Policy Analysis:** The Mangum Team also has extensive experience in identifying and quantifying the intended and unintended economic consequences of proposed legislative and regulatory initiatives.

The Project Team

Rebecca Kyle
Senior Research Analyst

Martina Arel, M.B.A.
Director – Economic Development & Energy Research

A. Fletcher Mangum, Ph.D.
Founder and CEO

Table of Contents

Executive Summary

This report assesses the economic and fiscal contribution that the proposed Anna River Solar project would make to Hanover County, Virginia. The primary findings from that assessment are as follows:

1) **Anna River Solar is a proposed 72-megawatt (MW) alternating current (AC) solar photovoltaic power generating facility. The project would be located north of Beaverdam, along Ben Gayle Road and Ancient Acres Road in Hanover County, Virginia. The total acreage to be leased for the project encompasses approximately 1,519 acres of land. The actively used, fenced-in portion of the solar site would be approximately 400 acres.**

2) **The proposed Anna River Solar project would make a significant economic contribution to Hanover County:**

   - The proposed Anna River Solar project would provide an estimated one-time pulse of economic activity to Hanover County during its construction phase supporting approximately:
     - 81 direct, indirect, and induced job years.[1]
     - $5.4 million in associated wages and benefits.
     - $16.9 million in economic output.
   - The proposed Anna River Solar project would provide an estimated annual economic impact to Hanover County during its ongoing operational phase supporting approximately:
     - 5 direct, indirect, and induced jobs.
     - $0.3 million in associated wages and benefits.
     - $0.8 million in economic output.

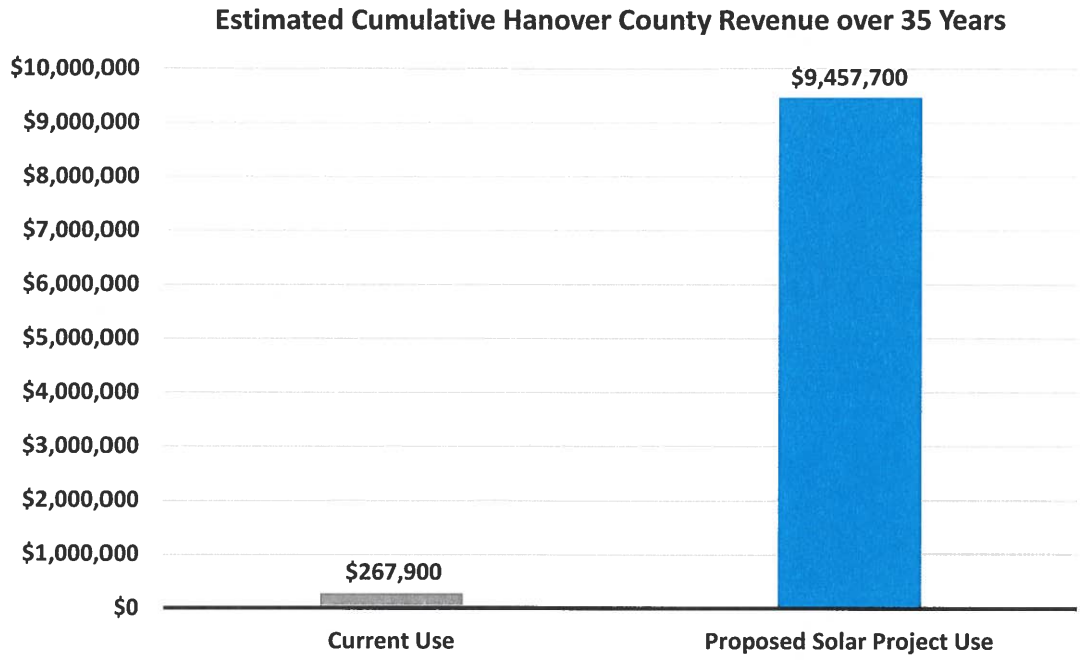
3) **The proposed Anna River Solar project would also make a significant fiscal contribution to Hanover County. The proposed project would generate approximately:**

   - $0.5 million in state and local tax revenue from the one-time pulse of economic activity associated with the project's construction.
   - $9.5 million in cumulative county revenue over the facility's anticipated 35-year operational life assuming revenues are generated from the reassessment of the real property and the taxation of the associated capital investments.

[1] Please note that construction sector jobs are not necessarily new jobs, but the investments made can also support an existing job during the construction of the project. Additionally, it is important to note that it is not possible to know with certainty what proportion of jobs would go to county construction contractors or be filled by county residents.

4) **The proposed Anna River Solar project would have a significantly greater fiscal impact on Hanover County than the property generates in its current use:**

- The proposed Anna River Solar project would generate approximately $9.5 million in cumulative county revenue over the facility's anticipated 35-year operational life, as compared to approximately $0.3 million in cumulative county revenue in the property's current use – a difference of approximately $9.2 million or a 56-fold increase over current revenues.



5) **The proposed Anna River Solar project would provide a boost to Hanover County's construction sector:**

- At 6,237 jobs, construction is Hanover County's fifth largest major industry sector and it pays the second highest average wages ($1,262 per week) that are 26 percent above the countywide average ($999 per week).[2]
- The construction sector also posted the fourth largest job gain of any industry sector in the county between the second quarter of 2022 and the second quarter of 2023 (a gain of 233 jobs).[3]
- The proposed Anna River Solar project would directly support approximately 65 jobs and $4.5 million in wages and benefits in Hanover County's construction sector.

[2] Data Source: U.S. Bureau of Labor Statistics.
[3] Data Source: U.S. Bureau of Labor Statistics.

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The estimates provided in this report are based on the best information available and all reasonable care has been taken in assessing the quality of that information. However, because these estimates attempt to foresee the consequences of circumstances that have not yet occurred, it is not possible to be certain that they will be representative of actual events. These estimates are intended to provide a good indication of likely future outcomes and should not be construed to represent a precise measure of those outcomes.

Introduction

This report assesses the economic and fiscal contribution that the proposed Anna River Solar project would make to Hanover County, Virginia. This report was commissioned by Strata Clean Energy and produced by Mangum Economics.

The Project

Anna River Solar is a proposed 72-megawatt (MW) AC solar photovoltaic power generating facility. The project would be located north of Beaverdam, along Ben Gayle Road and Ancient Acres Road in Hanover County, Virginia. The total acreage to be leased for the project encompasses approximately 1,519 acres of land. The actively used, fenced-in portion of the solar site would be approximately 400 acres.

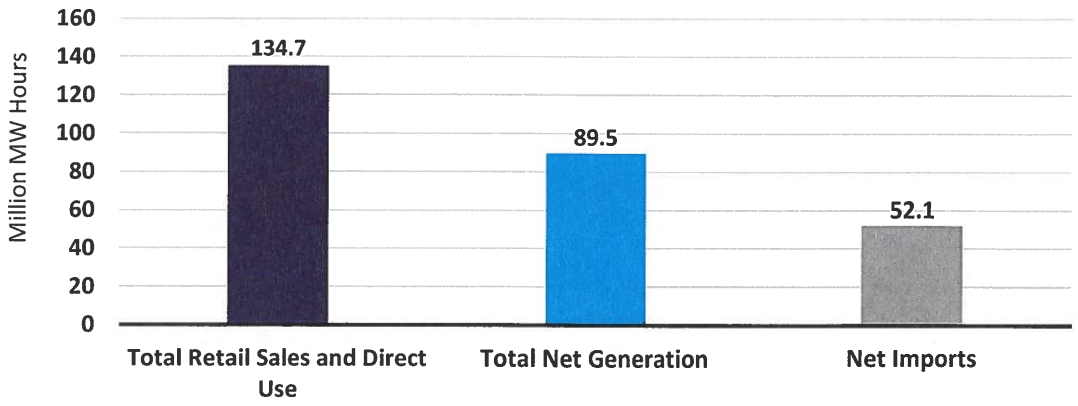
Electricity Production in Virginia

This section provides a backdrop for the proposed Anna River Solar project by profiling Virginia's electricity production sector and the role that solar energy could play in that sector.

Overall Market

As shown in Figure 1, in 2022 electricity sales and direct use in Virginia totaled 134.7 million megawatt hours. However, only 66 percent of that demand was met by in-state utilities, independent producers, and other sources. As a result, Virginia had to import the remaining electricity it consumed from producers in other states. As with all imports, this means that the jobs, wages, and economic output created by that production went to localities in those states, not to localities in Virginia.

Figure 1: Demand and Supply of Electricity in Virginia in 2022 (in millions of megawatt-hours)[4]



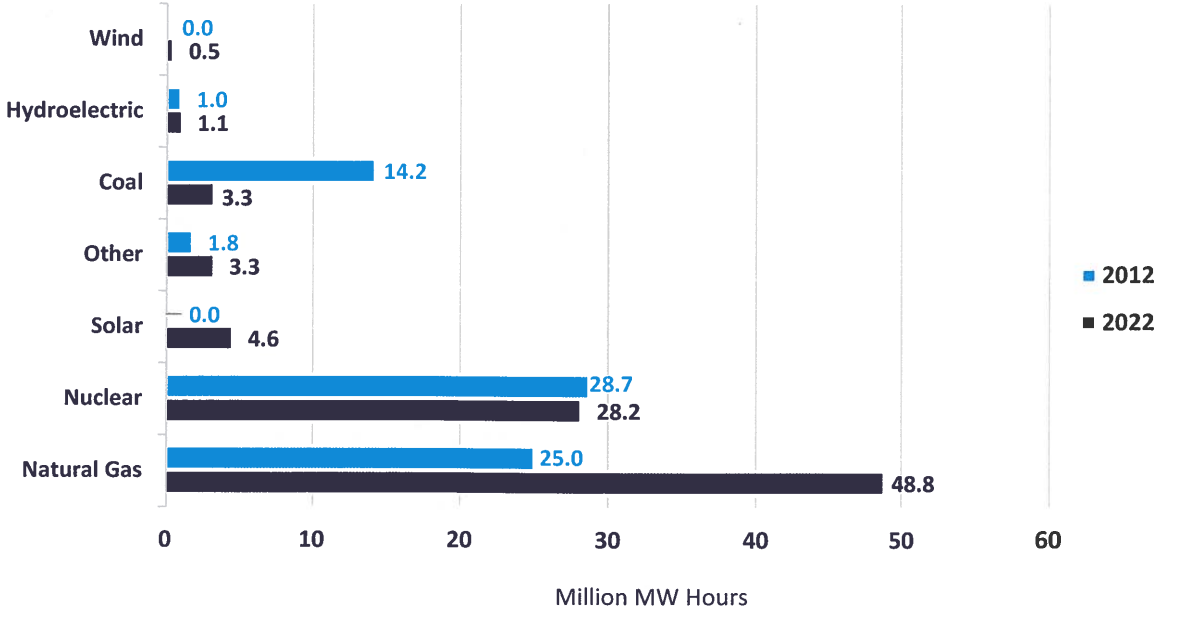
[4] Data Source: U.S. Energy Information Administration. In this chart, "Net Imports" also takes into account losses during transmission. As a result, it does not directly equal the residual of "Total Net Generation" minus "Total Retail Sales and Direct Use."

Sources of Production

Between 2012 and 2022, the total amount of electricity produced in Virginia increased from 70.7 to 89.5 million megawatt hours, while retail and direct consumption of electricity increased from 109.9 to 134.7 million megawatt hours. Consequently, imports of electricity increased by 5.3 million megawatt hours (or 11 percent) during this time.[5] Figure 2 provides a comparison of the energy sources that were used to produce electricity in Virginia in each of those years. As these data show, the most significant change between 2012 and 2022 was a decrease in the use of coal and an increase in the use of natural gas. Where coal was the state's third largest source of electricity in 2012, accounting for 14.2 million megawatt hours (or 20 percent) of production, by 2022 production had fallen by 10.8 million megawatt hours, making coal a fourth-place source of electricity with only 4 percent of production.

In contrast, the share of electricity produced using cleaner-burning low-emissions energy sources increased over the period. Where natural gas accounted for 25.0 million megawatt hours (or 35 percent) of Virginia's electricity production in 2012, by 2022 that proportion had almost doubled to 48.8 million megawatt hours (or 55 percent of production), making natural gas the state's largest source of electricity. In addition, solar, which entered the Virginia electricity production market in 2016, increased its share to 4.6 million megawatt hours in 2022.

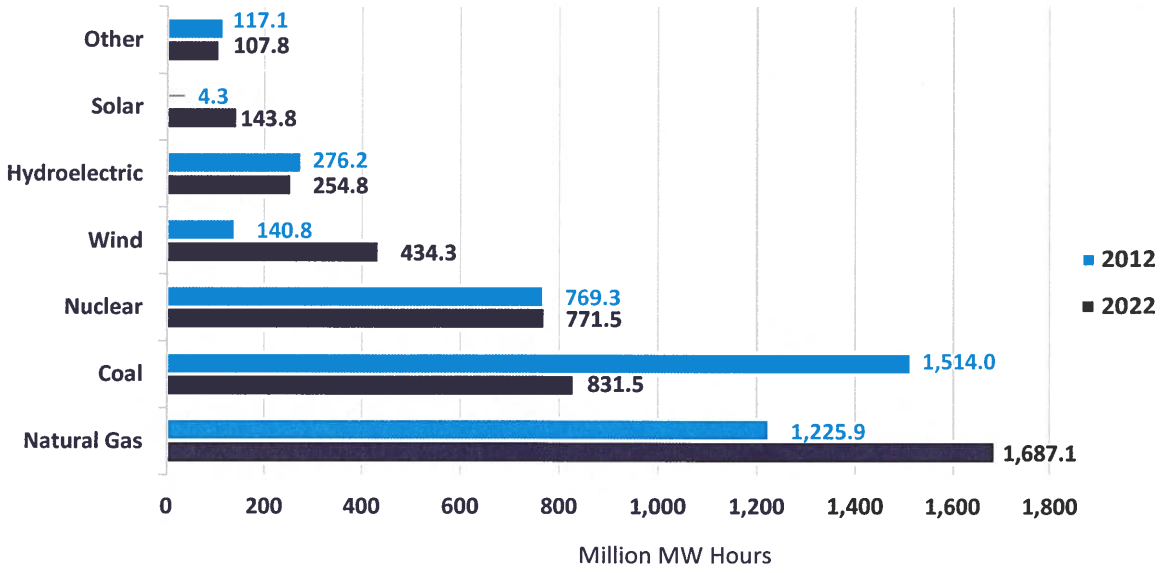
Figure 2: Electricity Generation in Virginia by Energy Source in 2012 and 2022 (in millions of megawatt-hours)[6]



[5] Imports also takes into account losses during transmission. As a result, totals do not equal sum of components.
[6] Data Source: U.S. Energy Information Administration. The "Other" category includes battery, wood, petroleum, other biomass, "other", and pumped storage.

Figure 3 provides similar data for the U.S. as a whole. A quick comparison of Figures 2 and 3 shows that although the degree of reliance on specific energy sources for electricity production is quite different between the U.S. and Virginia, the trend toward lower-emissions energy sources is the same. Nationally, between 2012 and 2022 the amount of electricity produced using coal declined by 682.5 million megawatt hours from 37 to 20 percent of production, while in contrast the amount of electricity produced using natural gas increased by 461.2 million megawatt hours from 30 to 40 percent of production. Nationwide, as in Virginia, the reliance on renewable energy sources such as solar increased during this time but at a slower pace than in Virginia. Between 2012 and 2022, the amount of electricity produced using solar increased by 139.5 million megawatt hours to 3 percent of total electricity production in the nation compared to 5 percent of total electricity production in Virginia.

Figure 3: Electricity Generation in the United States by Energy Source in 2012 and 2022 (in millions of megawatt-hours)[7]

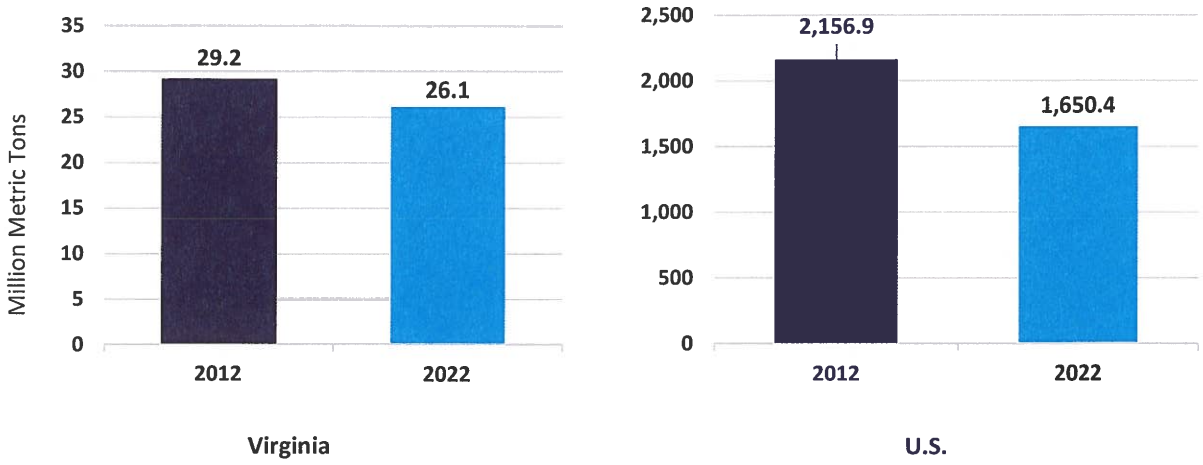


Impact on the Environment

In discussing the impact of these trends on the environment, it is important to realize that electricity production is one of the U.S.'s largest sources of greenhouse gas emissions. Figure 4 depicts carbon dioxide emissions from electricity production in 2012 and 2022 for both Virginia and the U.S. As these data indicate, between 2012 and 2022, as the share of electricity produced in Virginia by coal fell from 20 to 4 percent, carbon dioxide emissions from electricity production fell from 29.2 to 26.1 million metric tons. Where at the national level, as the share of electricity produced by coal fell from 37 to 20 percent, carbon dioxide emissions from electricity production fell from 2,156.9 to 1,650.4 million metric tons.

[7] Data Source: U.S. Energy Information Administration. "Other" includes battery, geothermal, other, other biomass, other gas, petroleum, pumped storage, and wood.

Figure 4: Carbon Dioxide Emissions from Electricity Production (millions of metric tons)[8]

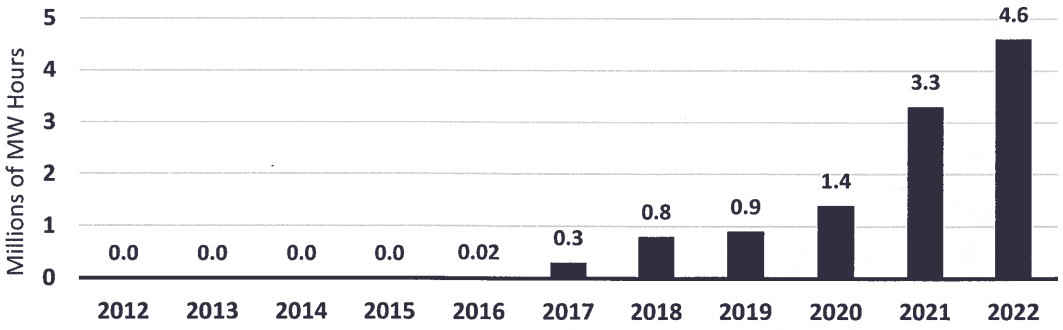


Virginia Solar Industry Trends

As of the second quarter of 2023, Virginia was ranked 10th in the nation for its total installed solar capacity. Over the next five years, Virginia is projected to add almost seven thousand megawatts of solar to its portfolio, ranking it 9th in the nation for projected growth. Total investment into the solar industry in Virginia as of the second quarter of 2023 amounts to $5.1 billion.[9]

Figure 5 depicts the progression of solar energy generation in Virginia from 2012 to 2022, with the capacity expressed in millions of megawatt-hours. Solar entered the electricity market in Virginia in 2016 with 0.02 million megawatt-hours. Generation has continued to grow throughout the period, reaching its peak, so far, in 2022, with solar generation totaling 4.6 million megawatt-hours. This chart demonstrates Virginia's growing engagement with solar energy, culminating in a noteworthy expansion by the end of the period shown.[10]

Figure 5: Solar Generation in Virginia (in millions of megawatt-hours) – 2012 to 2022[11]



[8] Data Source: U.S. Energy Information Administration.
[9] Data Source: Solar Energy Industries Association.
[10] Data Source: Solar Energy Industries Association.
[11] Data Source: U.S. Energy Information Administration.

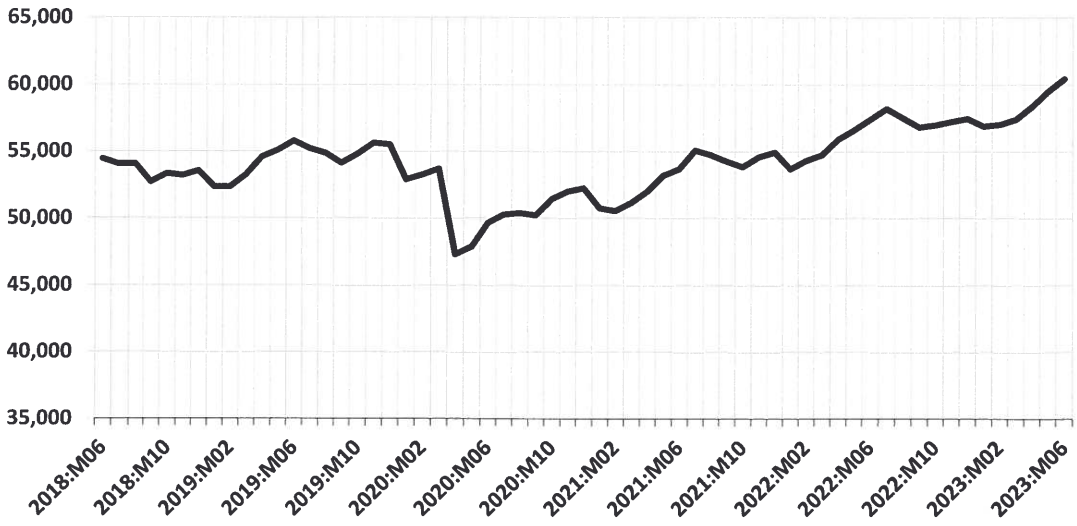
Local Economic Profile

This section provides context for the economic and fiscal impact assessments to follow by profiling the local economy of Hanover County.

Total Employment

Figure 6 depicts the trend in total employment in Hanover County during the five-year period from June 2018 through June 2023. Total employment was generally stable through 2019. Then, in April 2020 employment declined significantly as a result of the lockdowns imposed during the COVID-19 pandemic. Employment has since recovered and surpassed pre-pandemic levels. As of June 2023, total employment in the county stood at 60,414 jobs, which represents an overall increase in employment of 11.0 percent (or 5,964 jobs) over the five-year period. To put this number in perspective, over this same period, total statewide employment in Virginia increased by 3.5 percent.[12]

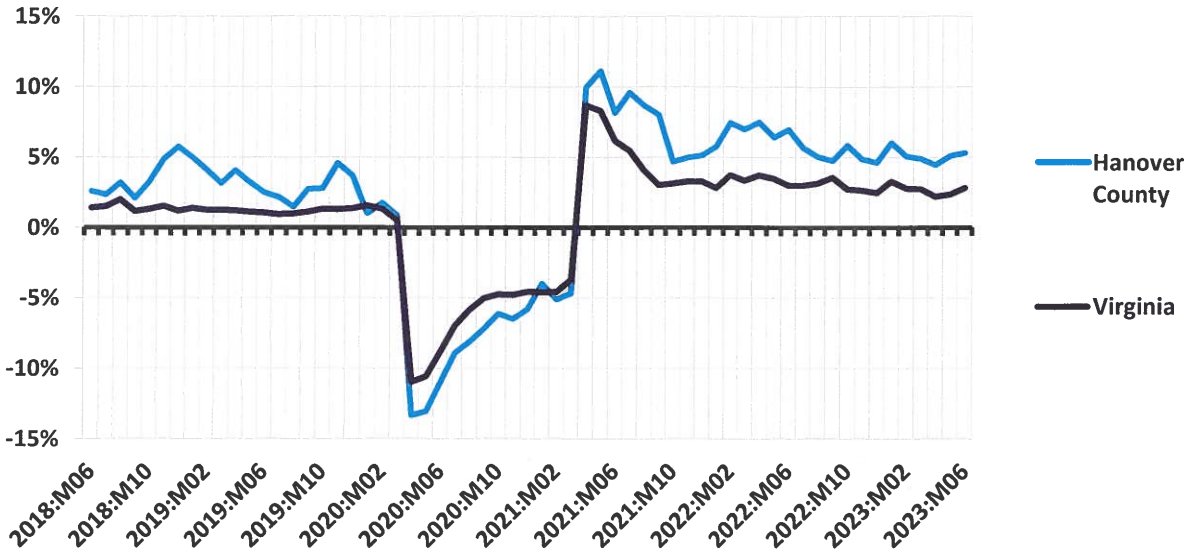
Figure 6: Total Employment in Hanover County – June 2018 to June 2023[13]



To control for seasonality and provide a point of reference, Figure 7 compares the year-over-year change in total employment in Hanover County to that of the state of Virginia over the same five-year period. Any point above the zero line in this graph indicates an increase in employment, while any point below the zero line indicates a decline in employment. As these data show, Hanover County outperformed the statewide average pre-COVID-19 pandemic, experienced a greater year-over-year decline in total employment during the pandemic but since then has continued to outperform the statewide average. As of March 2023, the year-over-year change in total employment in Hanover County was 5.3 percent as compared to 2.8 percent statewide in Virginia.

[12] Data Source: U.S. Bureau of Labor Statistics.
[13] Data Source: U.S. Bureau of Labor Statistics.

Figure 7: Year-Over-Year Change in Total Employment – June 2018 to June 2023[14]



Employment and Wages by Industry Supersector

To provide a better understanding of the underlying factors motivating the total employment trends depicted in Figures 6 and 7, Figures 8 through 10 provide data on private employment and wages in Hanover County by industry supersector.[15]

Figure 8 provides an indication of the distribution of private sector employment across industry supersectors in Hanover County in the second quarter of 2023. As these data indicate, the county's largest industry sectors that quarter were Trade, Transportation and Utilities (18,139 jobs), followed by Professional and Business Services (7,049 jobs), and Education and Health Services (7,039 jobs).

Figure 9 provides a similar ranking for average private sector weekly wages by industry supersector in Hanover County in the second quarter of 2023. As these data show, the highest paying industry sectors that quarter were Financial Activities ($1,336 per week), Construction ($1,262 per week), and Manufacturing ($1,202 per week). To provide a point of reference, the average private sector weekly wage across all industry sectors in Hanover County that quarter was $999 per week.

[14] Data Source: U.S. Bureau of Labor Statistics.
[15] A "supersector" is the highest level of aggregation in the coding system that the Bureau of Labor Statistics uses to classify industries.

Figure 8: Private Employment by Industry Supersector in Hanover County – Q2 2023[16]

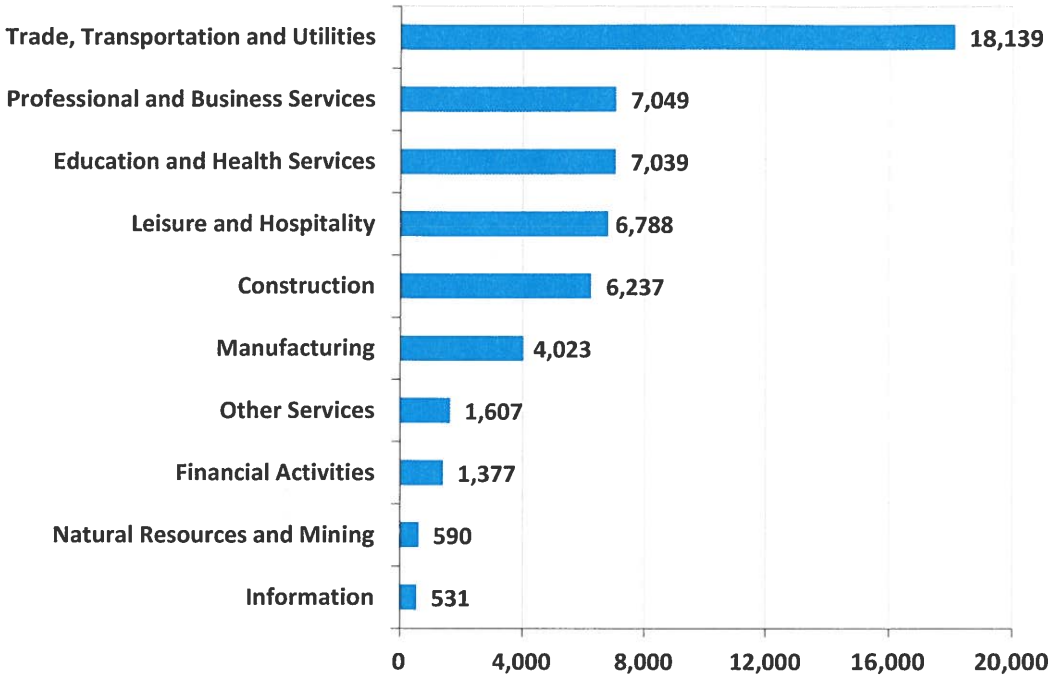
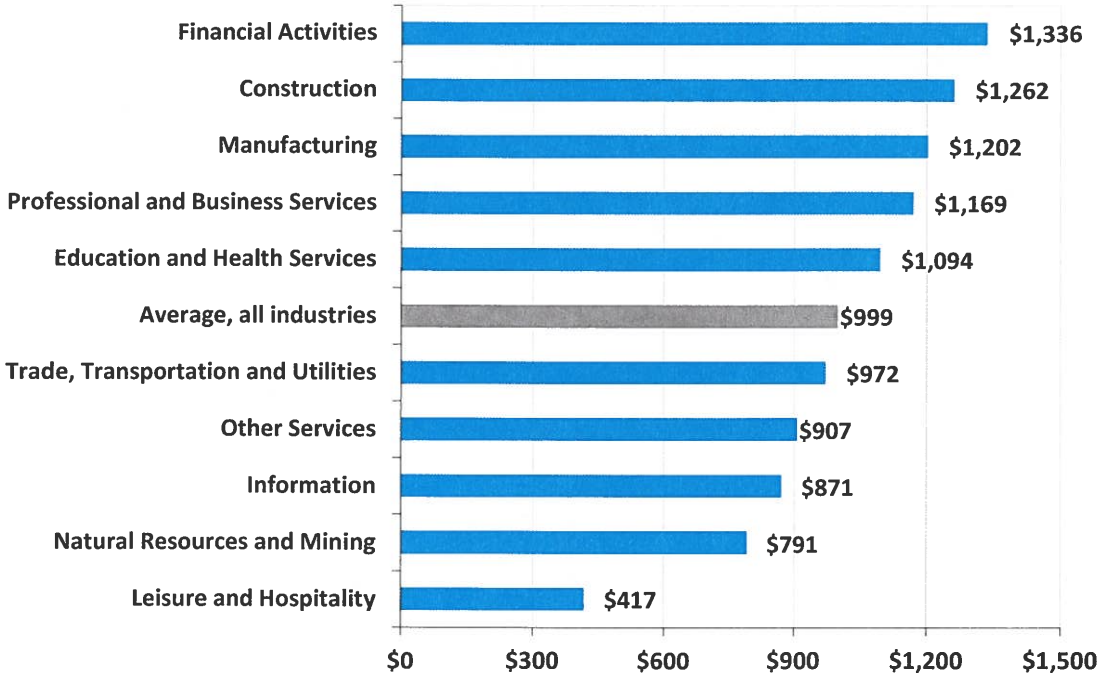


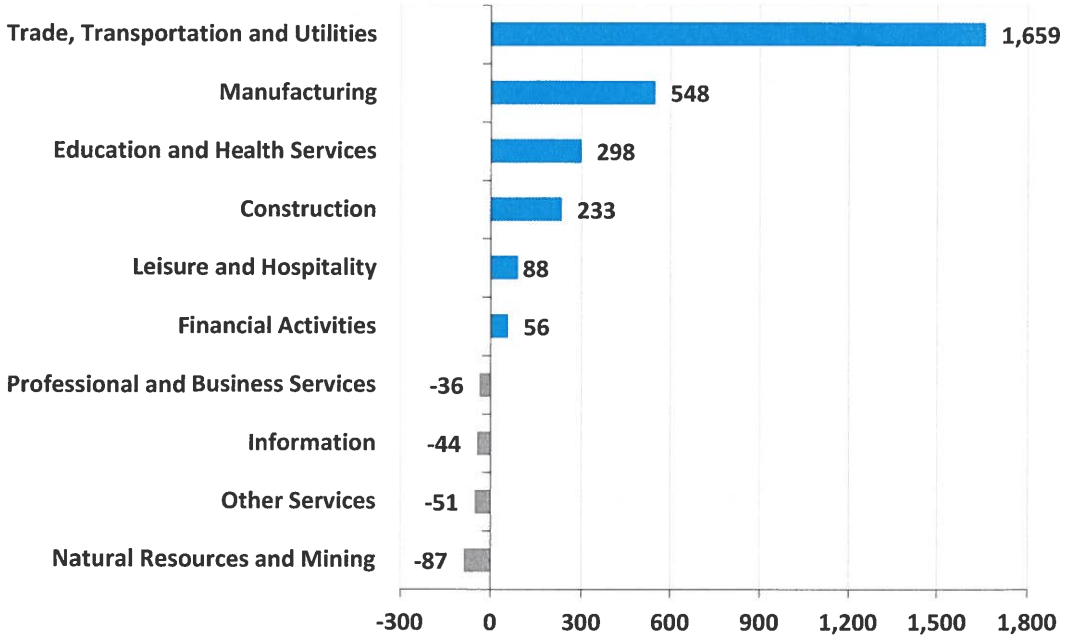
Figure 9: Average Private Weekly Wages by Industry Supersector in Hanover County – Q2 2023[17]



[16] Data Source: U.S. Bureau of Labor Statistics.
[17] Data Source: U.S. Bureau of Labor Statistics.

Figure 10 details the year-over-year change in private sector employment from the second quarter of 2022 to the second quarter of 2023 in Hanover County by industry supersector. Over this period, the largest employment gains occurred in the Trade, Transportation and Utilities (up 1,659 jobs), Manufacturing (up 548 jobs), and Education and Health Services (up 298 jobs) sectors. The largest employment losses occurred in the Natural Resources and Mining (down 87 jobs), Other Services (down 51 jobs), and Information (down 44 jobs) sectors.

Figure 10: Change in Private Employment by Industry Supersector in Hanover County from Q2 2022 to Q2 2023[18]

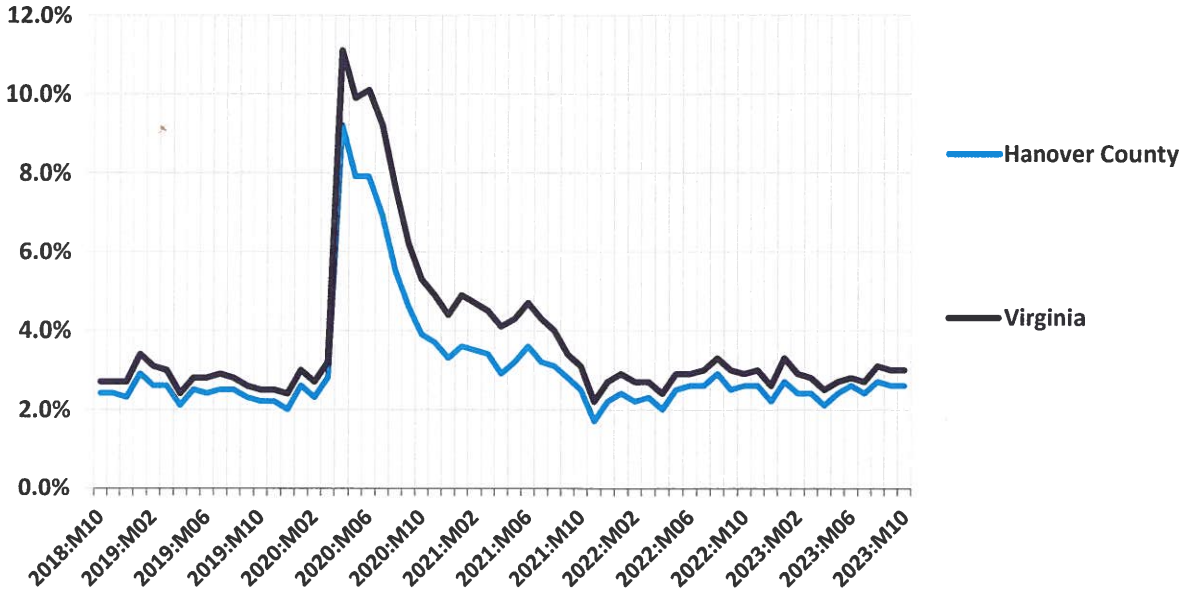


Unemployment

Figure 11 illustrates the trend in Hanover County's unemployment rate over the five-year period from October 2018 through October 2023 and benchmarks those data against the statewide trend for Virginia. As these data show, unemployment rates in Hanover County tracked closely with the statewide trend throughout the period but at rates below the statewide average. In April 2020 unemployment in the county and state significantly rose as a result of the labor dislocations caused by the COVID-19 pandemic. As of October 2023, unemployment stood at 2.6 percent in Hanover County compared to 3.0 percent in Virginia as a whole.

[18] Data Source: U.S. Bureau of Labor Statistics.

Figure 11: Unemployment Rate – October 2018 to October 2023[19]



[19] Data Source: U.S. Bureau of Labor Statistics.

Economic and Fiscal Impact

This section quantifies the economic and fiscal contribution that the proposed Anna River Solar project would make to Hanover County. The analysis separately evaluates the one-time pulse of economic activity that would occur during the construction phase of the project, as well as the annual economic activity that the project would generate during its ongoing operational phase.

Method

To empirically evaluate the likely local economic impact attributable to the proposed Anna River Solar project, the analysis employs a regional economic impact model called IMPLAN.[20] The IMPLAN model is one of the most commonly used economic impact simulation models in the U.S., and in Virginia is used by UVA's Weldon Cooper Center, the Virginia Department of Planning and Budget, the Virginia Employment Commission, and other state agencies and research institutes. Like all economic impact models, the IMPLAN model uses economic multipliers to quantify economic impact.

Economic multipliers measure the ripple effects that an expenditure generates as it makes its way through the economy. For example, as when the Anna River Solar project purchases goods and services – or when contractors hired by the facility use their salaries and wages to make household purchases – thereby generating income for someone else, which is in turn spent, thereby becoming income for yet someone else, and so on, and so on. Through this process, one dollar in expenditures generates multiple dollars of income. The mathematical relationship between the initial expenditure and the total income generated is the economic multiplier.

One of the primary advantages of the IMPLAN model is that it uses regional and national production and trade flow data to construct region-specific and industry-specific economic multipliers, which are then further adjusted to reflect anticipated actual spending patterns within the specific geographic study area that is being evaluated. As a result, the economic impact estimates produced by IMPLAN are not generic. They reflect as precisely as possible the economic realities of the specific industry, and the specific study area, being evaluated.

In the analysis that follows, these impact estimates are divided into three categories. First round direct impact measures the direct economic contribution of the entity being evaluated (e.g., own employment, wages paid, goods and services purchased by the Anna River Solar project). Second round indirect and induced impact measures the economic ripple effects of this direct impact in terms of business to business, and household (employee) to business, transactions. Total impact is simply the sum of the preceding two. These categories of impact are then further defined in terms of employment (the jobs that are created), labor income (the wages and benefits associated with those jobs), and economic output (the total amount of economic activity that is created in the economy).

[20] IMPLAN is produced by IMPLAN Group, LLC.

Construction Phase

This portion of the section assesses the economic and fiscal impact that the one-time pulse of activity associated with construction of the proposed Anna River Solar project would have on Hanover County.

Economic Impact Assumptions

The analysis is based on the following assumptions:

- Total capital investment in the Anna River Solar project is estimated to be approximately $154.4 million.[21]
- Of that total:
    - Architecture, engineering, site preparation, and other construction and development costs are estimated to be approximately $91.2 million.[22]
    - Capital equipment costs are estimated to be approximately $63.3 million.[23] It is anticipated that no capital equipment would be purchased from vendors in Hanover County.[24]
- For ease of analysis, all construction expenditures are assumed to take place in a single year.

Economic Impact

Applying these assumptions in the IMPLAN model results in the following estimates of one-time economic and fiscal impact. As shown in Table 1, construction of the proposed Anna River Solar project would directly provide a one-time pulse supporting approximately: 1) 65 job years, 2) $4.5 million in wages and benefits, and 3) $14.0 million in economic output to Hanover County.

Taking into account the economic ripple effects that direct investment would generate, the total estimated one-time impact on Hanover County could support approximately: 1) 81 job years, 2) $5.4 million in wages and benefits, 3) $16.9 million in economic output, and 4) $0.5 million in state and local tax revenue.

[21] Data Source: Strata Clean Energy. Investment estimate is subject to change based on final design and vendor contracts.
[22] Data Source: Strata Clean Energy.
[23] Data Source: Strata Clean Energy.
[24] Data Source: IMPLAN Group LLC.

Table 1: Estimated One-Time Economic and Fiscal Impact on Hanover County from Construction of the Anna River Solar Project[25]

Economic Impact	Employment – Job Years	Wages and Benefits	Output
1st Round Direct Economic Activity	65	$4,523,700	$13,977,600
2nd Round Indirect and Induced Economic Activity	16	$921,700	$2,948,100
Total Economic Activity	**81**	**$5,445,400**	**$16,925,700**
Fiscal Impact			
State and Local Tax Revenue			**$473,400**

**Totals may not sum due to rounding.*

Ongoing Operations Phase

This portion of the section assesses the annual economic and fiscal impact that the proposed Anna River Solar project would have on Hanover County during its anticipated 35-year operational phase.

Economic Impact Assumptions

The analysis is based on the following assumptions:

- The Anna River Solar project would spend approximately $0.6 million each year for maintenance and repair, vegetative control, and other operational expenditures.[26]

Economic Impact

Applying these assumptions in the IMPLAN model results in the following estimates of annual economic impact. As shown in Table 2, annual operation of the proposed Anna River Solar project would on average directly support approximately: 1) 4 jobs, 2) $0.3 million in wages and benefits, and 3) $0.6 million in economic output to Hanover County.

Taking into account the economic ripple effects that direct impact would generate, the total estimated annually supported impact on Hanover County would be approximately: 1) 5 jobs, 2) $0.3 million in wages and benefits, and 3) $0.8 million in economic output.

[25] Please note that construction sector jobs are not necessarily new jobs, but the investments made can also support an existing job during the construction of the project. Additionally, it is important to note that it is not possible to know with certainty what proportion of jobs would go to county construction contractors or be filled by county residents. A construction sector job, also referred to as a job year, is equal to one job over one year. It is used to denote employment on construction projects where the construction schedule is not exactly one year and to account for the fact that actual on-site employment may vary over the period.

[26] Data Source: Strata Clean Energy. Expenditure estimate is subject to change based on final design and vendor contracts.

Table 2: Estimated Annual Economic Impact on Hanover County from the Ongoing Operation of the Anna River Solar Project

Economic Impact	Employment	Wages and Benefits	Output
1st Round Direct Economic Activity	4	$254,200	$639,900
2nd Round Indirect and Induced Economic Activity	1	$54,700	$180,400
Total Economic Activity	**5**	**$308,900**	**$820,300**

**Totals may not sum due to rounding.*

Fiscal Impact Assumptions

The analysis is based on the following assumptions:

- Anna River Solar would involve an investment of approximately $154.4 million in capital equipment and improvements to the existing property.[27]
- The proposed Anna River Solar project would be situated on approximately 400 fenced-in acres within an approximate 1,519-acre tract of leased land.[28]
- Only the fenced-in acreage would be reassessed at a solar use assessment value of $8,000 per acre.[29]
- Tax rates and the locality ratio remain constant throughout the analysis.
- The initial interconnection request for Anna River Solar was filed in March 2020.[30]
- Anna River Solar would have an operational life of 35 years.[31]

Fiscal Impact

This portion of the section quantifies the direct fiscal contribution that the proposed Anna River Solar project would make to Hanover County. The analysis considers two sources of revenue. The first source is the additional revenue that Anna River Solar would generate for Hanover County over a 35-year period from the increased property assessments associated with reassessing the site as solar use property. The second source is revenue associated with taxes levied on the capital investment.

[27] Data Source: Strata Clean Energy. Investment estimate is subject to change based on final design and vendor contracts.
[28] Data Source: Strata Clean Energy.
[29] Data Source: Strata Clean Energy. Estimated potential future assessment value. Actual future assessment value may vary.
[30] Data Source: Strata Clean Energy.
[31] Data Source: Strata Clean Energy.

Reassessment of Property

Table 3 details the increased tax revenue associated with reassessing the 400-acre fenced-in site as solar use property. The county real estate tax revenue from the project after reassessment is estimated to be approximately $25,900 per year, for a cumulative total of approximately $0.9 million over the project's anticipated 35-year operational life expectancy. Adding one-time rollback taxes of approximately $36,200 increases that cumulative total to approximately $0.9 million. In contrast, the property currently generates approximately $7,660 per year in real estate tax revenue for the county, for a cumulative total of approximately $0.3 million over 35 years.[32]

Table 3: Estimated County Revenue Generated by the Proposed Anna River Solar Project over 35 Years from Real Estate Taxes

Estimated Increased Appraised Value of Property under Solar Use[33]	$3,200,000
Hanover County Real Estate Tax Rate (per $100)	0.81
Annual County Real Estate Tax – Solar Use	$25,900
Revenue over 35 Years[34]	$907,200
One-time Rollback Taxes	**$36,200**
Cumulative Revenue over 35 Years	**$943,400**

**Totals may not sum due to rounding.*

Taxation of Capital Investment

Table 4 separately details the additional annual revenue that the proposed Anna River Solar project would generate for Hanover County over a 35-year period from taxes levied on capital investment. This estimate is calculated as: 1) the taxable portion of capital investments based on the stepdown local tax exemption pursuant to Virginia Code §58.1-3660[35], times 2) the State Corporation Commission's utility assessment ratio for taxation of public utilities in Hanover County, times 3) the State Corporation Commission's current depreciation guidelines for solar facilities, times 4) Hanover County's real property tax rate of $0.81 per $100 of assessed value pursuant to Virginia Code §58.1-2606.

As the data in Table 4 indicate, based on these calculations the estimated additional county revenue from taxation of capital investments associated with the proposed Anna River Solar project would be approximately $0.2 million in the project's first year of operation, with that figure projected to increase to approximately $0.4 million in year 11 of the project as the value of the exemption is reduced, and

[32] Data Source: Derived from Hanover County's GIS. Excludes value of existing structures as they will not be affected.
[33] Calculated as 400 acres times $8,000 per acre.
[34] Rollback taxes are computed as the difference between the current land use value assessment tax and the tax on the fair market value for the affected acreage for five complete tax years plus the current year.
[35] Virginia Code §58.1-3660 stipulates that solar facilities over 5MW and under 150MW are subject to a stepdown exemption from local property taxes if the interconnection request has been filed on or after January 1, 2019. The amount of the exemption is 80 percent in the first five years, 70 percent in years six through ten, and 60 percent thereafter.

thereafter declining to approximately $45,000 in the project's 34th year of operation and thereafter as the value of the proposed capital investments is depreciated, for a cumulative total of approximately $8.5 million.

Table 4: Estimated County Revenue by Proposed Solar Investment Over 35 Years

Year	Total Capital Investment Subject to Exemption[36]	Depreciated Value of Taxable Capital Investment[37]	Additional Annual County Tax Revenue Solar Investment[38]
1	$154,440,200	$25,019,300	$202,700
2	$154,440,200	$25,019,300	$202,700
3	$154,440,200	$25,019,300	$202,700
4	$154,440,200	$25,019,300	$202,700
5	$154,440,200	$25,019,300	$202,700
6	$154,440,200	$37,529,000	$304,000
7	$154,440,200	$37,529,000	$304,000
8	$154,440,200	$37,529,000	$304,000
9	$154,440,200	$37,399,700	$302,900
10	$154,440,200	$36,765,900	$297,800
11	$154,440,200	$48,126,000	$389,800
12	$154,440,200	$47,180,900	$382,200
13	$154,440,200	$46,180,100	$374,100
14	$154,440,200	$45,112,600	$365,400
15	$154,440,200	$43,984,000	$356,300
16	$154,440,200	$42,788,600	$346,600
17	$154,440,200	$41,520,900	$336,300
18	$154,440,200	$40,181,000	$325,500
19	$154,440,200	$38,752,100	$313,900
20	$154,440,200	$37,245,400	$301,700
21	$154,440,200	$35,644,200	$288,700
22	$154,440,200	$33,948,400	$275,000
23	$154,440,200	$32,152,600	$260,400
24	$154,440,200	$30,245,600	$245,000
25	$154,440,200	$28,227,400	$228,600
26	$154,440,200	$26,081,200	$211,300

[36] Data Source: Strata Clean Energy.

[37] Accounts for the State Corporation Commission's depreciation guidelines for solar facilities and the utility assessment ratio for taxation of public utilities in Hanover County. Also accounts for the stepdown exemption from local property taxes pursuant to Virginia Code §58.1-3660 for projects over 5 MW and under 150 MW with an interconnection request on or after January 1, 2019. The amount of the exemption is 80 percent in the first five years, 70 percent in years six through ten, and 60 percent thereafter.

[38] Calculated pursuant to Virginia Code §58.1-2606 which stipulates that capital equipment owned by utilities is taxed as real property and the local tax rate on that capital equipment would be capped at Hanover County's real property tax rate of $0.81 per $100 of assessed value.

Year	Total Capital Investment Subject to Exemption[36]	Depreciated Value of Taxable Capital Investment[37]	Additional Annual County Tax Revenue Solar Investment[38]
27	$154,440,200	$23,812,800	$192,900
28	$154,440,200	$21,405,400	$173,400
29	$154,440,200	$18,859,000	$152,800
30	$154,440,200	$16,151,400	$130,800
31	$154,440,200	$13,288,000	$107,600
32	$154,440,200	$10,252,400	$83,000
33	$154,440,200	$7,033,200	$57,000
34	$154,440,200	$5,559,800	$45,000
35	$154,440,200	$5,559,800	$45,000
CUMULATIVE TOTAL			**$8,514,300**

**Totals may not sum due to rounding.*

Total Fiscal Impact

Table 5 combines the results from the calculations depicted in Tables 3 and 4 to provide an estimate of the cumulative fiscal contribution that the proposed Anna River Solar would make to Hanover County over its 35-year anticipated operational life. As these data indicate, that cumulative total is approximately $9.5 million.

Table 5: Estimated Cumulative County Tax Revenue from the Proposed Anna River Solar Project over 35 Years under

County Real Estate Tax	$943,400
County Revenue from Taxation of Capital Investments	$8,514,300
TOTAL Cumulative Revenue over 35 Years[39]	**$9,457,700**

**Totals may not sum due to rounding.*

[39] Please note that estimated revenue does not include voluntary payments associated with a siting agreement, which is subject to negotiation between Anna River Solar and Hanover County.

Current Use

This section provides a benchmark for the previous estimates of the economic contribution that the proposed Anna River Solar project would make to Hanover County by estimating the economic and fiscal contribution that the site makes to the county in its current use.

Economic Impact Assumptions

The analysis is based on the following assumptions:

- The proposed Anna River Solar project would be situated on an approximate 400-acre tract of timberland.[40]

Economic Impact

Applying these assumptions in the IMPLAN model results in the following estimates of annual economic impact. As shown in Table 6, in its current use the proposed Anna River Solar project site on average directly supports approximately: 1) < 1 job, 2) $10,300 in wages and benefits, and 3) $15,500 in economic output to Hanover County.

Taking into account the economic ripple effects that direct impact generates, on average, the total annually supported impact on Hanover County is approximately: 1) < 1 job, 2) $13,600 in wages and benefits, and 3) $21,000 in economic output.

Table 6: Total Estimated Annual Economic Impact of the Anna River Solar Project Site on Hanover County – Current Use[41]

Economic Impact	Employment	Wages and Benefits	Output
1st Round Direct Economic Activity	< 1	$10,300	$15,500
2nd Round Indirect and Induced Economic Activity	< 1	$3,300	$5,500
Total Economic Activity	**< 1**	**$13,600**	**$21,000**

**Totals may not sum due to rounding.*

[40] Data Source: Strata Clean Energy.
[41] Calculations based data from the U.S. Department of Agriculture and IMPLAN Group, LLC for Virginia.

Fiscal Impact Assumptions

The analysis is based on the following assumptions:

- The current use assessment value of the affected acreage is approximately $0.9 million.[42]

Fiscal Impact

Table 7 details the estimated tax revenue that the proposed Anna River Solar site generates for Hanover County in its current use. As the data in Table 7 indicate, the current county real estate tax revenue from the project site is estimated to be approximately $7,660 per year, for a cumulative total of approximately $0.3 million over 35 years.

Table 7: Estimated County Revenue Generated by the Proposed Anna River Solar Project Site over 35 Years from Real Estate Taxes – Current Use

Estimated Assessed Value of Property – Current Use[43]	$945,000
Hanover County Current Real Estate Tax Rate (per $100)	0.81
Estimated Annual County Real Estate Tax – Current Use	$7,660
Total Cumulative Revenue over 35 Years	**$267,900**

**Totals may not sum due to rounding.*

The estimates provided in this report are based on the best information available and all reasonable care has been taken in assessing the quality of that information. However, because these estimates attempt to foresee the consequences of circumstances that have not yet occurred, it is not possible to be certain that they will be representative of actual events. These estimates are intended to provide a good indication of likely future outcomes and should not be construed to represent a precise measure of those outcomes.

[42] Data Source: Derived from Hanover County's GIS. Excludes value of existing structures as they will not be affected.
[43] Data Source: Derived from Hanover County's GIS. Excludes value of existing structures as they will not be affected.