ATLANTIC COAST PIPELINE, LLC
ATLANTIC COAST PIPELINE

and

DOMINION TRANSMISSION, INC.
SUPPLY HEADER PROJECT

Supplemental Filing
May 5, 2017

APPENDIX D

Agency Correspondence for the Atlantic Coast Pipeline

APPENDIX D

Supplemental Summary of Public Agency Correspondence for the Atlantic Coast Pipeline

Agency/Contact Name(s)	Date of Correspondence	Format	Description
MULTIPLE AGENCIES			
U.S. Fish and Wildlife Service, North Carolina Wildlife Resources Commission			
Gabriela Garrison, John Ellis	4/17/17 [a]	Letter	Transmittal of the Freshwater Mussel Relocation Plan for the Atlantic Coast Pipeline in North Carolina.
Gabriela Garrison, John Ellis	4/17/17	Letter	Transmittal of the Neuse River Waterdog Survey Report for the Atlantic Coast Pipeline in North Carolina.
FEDERAL AGENCIES			
U.S. Fish and Wildlife Service			
Melinda Turner	5/3/17	Letter	Transmittal of update to the Migratory Bird Plan.
Liz Sout	5/3/17	Letter	Transmittal of update to the Migratory Bird Plan.
Sumalee Hoskins	5/3/17	Letter	Transmittal of update to the Migratory Bird Plan.
John Ellis	5/3/17	Letter	Transmittal of update to the Migratory Bird Plan.
U.S. Forest Service – Monongahela and George Washington National Forests			
Joby Timm	4/10/17	Letter	SUP Extension Permit for the George Washington National Forest (including various attachments).
Maria Martin	4/12/17	Email	Transmittal of computation analysis and geologic and structural mapping report (with attachments).
Troy Morris	4/13/17	Letter	Letter regarding the planned 2017 baseline benthic macroinvertebrate survey on the George Washington National Forest.
Clyde Thompson, Joby Timm	4/21/17	Letter	Transmittal of revised SF299 application for the Atlantic Coast Pipeline.
U.S. Army Corps of Engineers – Pittsburgh District			
Josh Shaffer, Alani Taylor	3/20/17	Minutes	Meeting to provide an update on the project and discuss draft supplemental filing and compensatory mitigation plans.
STATE/COMMONWEALTH AGENCIES			
WEST VIRGINIA AGENCIES			
West Virginia Division of Forestry			
Travis Miller	4/24/17	Letter	Transmittal of Seismic Refraction Study Report (including attachment).
West Virginia Division of Natural Resources			
Cliff Brown, Rich Bailey	4/12/17	Letter	Letter regarding rookeries.
VIRGINIA AGENCIES			
Virginia Department of Environmental Quality			
Julia Wellman	4/13/17	Letter	Letter providing an information response regarding the Federal Consistency Certification for the Atlantic Coast Pipeline (including attached memo dated 4/13/17).

APPENDIX D (CONTINUED)

Supplemental Summary of Public Agency Correspondence for the Atlantic Coast Pipeline

Agency/Contact Name(s)	Date of Correspondence	Format	Description
Virginia Department of Game and Inland Fisheries			
Amy Ewing	4/4/17	Email	Request for information on two potential water sources.
Amy Ewing	4/12/17	Letter	Letter regarding rookeries.
Amy Ewing	4/18/17	Email	Response regarding two potential water sources (Bath County Reservoir and Augusta Quarry).
Virginia Department of Historic Resources			
Roger Kirchen	3/22/17	Letter	Comments on Phase I Historic Architectural Survey Addendum 2 Report.
Roger Kirchen	3/24/17	Letter	Comments on Phase I Historic Architectural Survey Addendum 3 Report.
Roger Kirchen	4/6/17	Letter	Comments on Phase I Historic Architectural Survey Addendum 4 Report.
Roger Kirchen	4/26/17	Letter	Transmittal of Phase II Site Testing Report.
Roger Kirchen	4/28/17	Letter	Comments on Phase I Report for the George Washington National Forest.
NORTH CAROLINA AGENCIES			
North Carolina State Historic Preservation Office			
Renee Gledhill-Earley	3/24/17	Minutes	Meeting to discuss status of field surveys, microwave towers, and assessment of affects report.
Renee Gledhill-Earley	4/25/17	Letter	Update regarding National Regiser of Historic Places findings.
Renee Gledhill-Earley	4/26/17	Letter	Transmittal of Phase II Site Testing Report.
North Carolina Wildlife Resources Commission			
Gabriella Garrison	4/12/17	Letter	Letter regarding rookeries.

[a] Letter was incorrectly dated April 17, 2016, but the actual date was April 17, 2017.

Multiple Agencies

U.S. Fish and Wildlife Service, North Carolina Wildlife Resources Commission

Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, VA 23060

April 17, 2016

BY E-MAIL

Ms. Gabriela Garrison
North Carolina Wildlife Resources Commission
1701 Mail Service Center
Raleigh, NC 27699

Mr. John Ellis
U.S. Fish & Wildlife Service
Raleigh Field Office
551F Pylon Drive
Raleigh, NC 27606

Re: Freshwater Mussel (*Unionidae*) Relocation Plan for the Proposed Atlantic Coast Pipeline in North Carolina.

Dear Ms. Garrison and Mr. Ellis:

Atlantic Coast Pipeline, LLC (Atlantic) is pleased to provide the Freshwater Mussel (*Unionidae*) Relocation Plan for the proposed Atlantic Coast Pipeline (ACP) in North Carolina (attached). This plan outlines the scope and methods that Atlantic will implement for mussel relocation at designated waterbody crossings in North Carolina prior to construction of ACP.

Atlantic anticipates that mussel relocation efforts will occur within six months of proposed in-stream construction activities. Construction spreads 7 through 11 are located in North Carolina; and subject to receipt of the required permits and regulatory approvals, spreads 8, 10 and 11 are scheduled for 2018 construction, and spreads 7 and 9 are scheduled for 2019 construction. All relocation scheduling and surveys will be coordinated directly with NCWRC and USFWS prior to conducting field efforts. In the event that relocation at certain crossings is not feasible due to elevated water levels or other natural causes, Atlantic will coordinate with the NCWRC and USFWS. All mussel surveys within the Neuse and Tar basins will be coordinated with Mr. Tyler Black (NCWRC) and Ms. Sarah McRae (USFWS).

Project and Company Background

Atlantic is a company formed by four major U.S. energy companies – Dominion Resources, Inc., Duke Energy Corporation, Piedmont Natural Gas Co., Inc., and Southern Company Gas. Atlantic will own and operate the proposed ACP, an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. The ACP will deliver up to 1.5 million cubic feet per day (bcf/d) of natural gas to be used to generate electricity, heat homes, and run local businesses. The underground pipeline project will facilitate cleaner air, increase reliability and security of natural gas supplies, and provide a significant economic boost in Virginia and North Carolina. For more information about the ACP, visit the company's website at www.dom.com/acpipeline. Atlantic

has contracted with DTI, a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic.

Atlantic is requesting your review and concurrence for the attached Freshwater Mussel (*Unionidae*) Relocation Plan for the Proposed Atlantic Coast Pipeline in North Carolina.

Dominion looks forward to continued coordination with you on this project. Please contact Mr. Richard B. Gangle at (804) 273-3019 or Richard.B.Gangle@dom.com, if there are questions regarding this report. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc: Richard B. Gangle, Dominion
Sarah McRae, U.S. Fish and Wildlife Service
Tyler Black, North Carolina Wildlife Resources Commission
Vann Stancil, North Carolina Wildlife Resources Commission

Attachments:
Freshwater Mussel (*Unionidae*) Relocation Plan for the Proposed Atlantic Coast Pipeline in North Carolina

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

April 17, 2017

BY E-MAIL

Ms. Gabriela Garrison
North Carolina Wildlife Resources Commission
1701 Mail Service Center
Raleigh, NC 27699

Mr. John Ellis
U.S. Fish & Wildlife Service
Raleigh Field Office
551F Pylon Drive
Raleigh, NC 27606

Re: Dominion Transmission, Inc., Atlantic Coast Pipeline
Submittal of Neuse River Waterdog (*Necturus Lewisi*) Surveys for the Proposed Atlantic Coast Pipeline in North Carolina.

Dear Ms. Garrison and Mr. Ellis:

Atlantic Coast Pipeline, LLC (Atlantic) is pleased to provide the 2017 survey report for Neuse River Waterdog (*Necturus Lewisi*) Surveys for the Proposed Atlantic Coast Pipeline in North Carolina (attached). This survey report outlines the assessments, methodologies, and trapping results for waterbody crossings surveyed between December 2016 and January 2017 for Neuse River waterdogs.

Of the eight Project stream crossings identified during desktop analysis for survey during this mobilization, four were trapped and one site was eliminated due to unsuitable habitat characteristics. The Neuse River was re-sampled during this mobilization due to flooding and higher water temperatures that surpassed 10°C (50°F) during the initial surveys in March 2016. The three remaining crossings were inaccessible due to landowner restrictions. During this survey mobilization, overall trapping efforts yielded no adult Neuse River waterdogs.

Neuse River waterdogs were included in the Biological Assessment for the ACP as Under Review species. No impacts are expected to Neuse River waterdogs in UNT to Little Sapony, Marsh Swamp, Little Creek, Neuse River, and UNT to Johnson Swamp; therefore no additional conservation measures for the species will be implemented at these waterbodies due to the lack of presence of the species or lack of suitable habitat. Surveys remain to be completed at Beaverdam Swamp, Jacket Swamp, and Millstone Creek and will be accomplished during the appropriate survey window once access has been granted.

Project and Company Background

Atlantic is a company formed by four major U.S. energy companies – Dominion Resources, Inc., Duke Energy Corporation, Piedmont Natural Gas Co., Inc., and Southern Company Gas. Atlantic will own and

operate the proposed ACP, an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. The ACP will deliver up to 1.5 million cubic feet per day (bcf/d) of natural gas to be used to generate electricity, heat homes, and run local businesses. The underground pipeline project will facilitate cleaner air, increase reliability and security of natural gas supplies, and provide a significant economic boost in Virginia and North Carolina. For more information about the ACP, visit the company's website at www.dom.com/acpipeline. Atlantic has contracted with DTI, a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic.

Atlantic is requesting your review and concurrence of the attached 2017 Neuse River Waterdog (*Necturus Lewisi*) Surveys for the Proposed Atlantic Coast Pipeline in North Carolina. Atlantic looks forward to continued coordination with you on this project. Please contact Mr. Richard B. Gangle at (804) 273-3019 or Richard.B.Gangle@dom.com, if there are questions regarding this report. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc: Richard B. Gangle, Dominion
Sarah McRae, U.S Fish and Wildlife Service
Tyler Black, North Carolina Wildlife Resources Commission
Vann Stancil, North Carolina Wildlife Resources Commission
Judith Ratcliffe, North Carolina Department of Environmental and Natural Resources
Allison Weakley, North Carolina Natural Heritage Program

Attachments:
Neuse River Waterdog (*Necturus Lewisi*) Surveys for the Proposed Atlantic Coast Pipeline in North Carolina

Federal Agencies

U.S. Fish and Wildlife Service

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

May 3, 2017

Ms. Melinda Turner
U.S. Fish and Wildlife Service
Pennsylvania Ecological Services Field Office
110 Radnor Rd. Suite 101
State College, PA 16801

Re: Atlantic Coast Pipeline and Supply Header Project Submittal of updated Migratory Bird Plan

Dear Ms. Turner:

Attached for your information is the Migratory Bird Plan prepared for the Atlantic Coast Pipeline (ACP) and Supply Header Project (SHP) projects. Atlantic Coast Pipeline, LLC (Atlantic) and Dominion Transmission, Inc. (DTI) have prepared this Migratory Bird Plan at the request of the FERC as the lead federal agency.

Atlantic is a company formed by four major U.S. energy companies – Dominion, Duke Energy, Piedmont Natural Gas, and Southern Company Gas. The company was created to develop, own, and operate the proposed ACP, an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. For more information about the ACP, visit the company's website at www.dom.com/acpipeline. Atlantic has contracted with DTI, a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic.

In addition, DTI proposes to construct and operate approximately 37.5 miles of pipeline loop and modify existing compression facilities in Pennsylvania and West Virginia. This Project is referred to as the SHP and will enable DTI to provide firm transportation service of up to 1.5 million dekatherms per day (MMDth/d) to various customers, including Atlantic. Atlantic will be a Foundation Shipper in the SHP, and will utilize the SHP capacity to allow its shippers access to natural gas supplies from various DTI receipt points for further delivery to points along the ACP.

Atlantic and DTI are seeking authorization from the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act (NGA) to construct, own, operate, and maintain the proposed facilities. As required under Section 7 of the Endangered Species Act of 1973 (as amended), projects that require Federal authorization must undergo consultation with U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration National Marine Fisheries Service.

We look forward to continuing to work with you on the ACP and SHP projects. Please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding this submittal. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc:

Mr. Josh Shaffer, U.S. Army Corps of Engineers – Pittsburgh District
Mr. Adam Fannin, U.S. Army Corps of Engineers – Huntington District
Mr. Steve Gibson, U.S. Army Corps of Engineers – Norfolk District
Ms. Samantha Dailey, U.S. Army Corps of Engineers – Wilmington District

Attachments:

Atlantic Coast Pipeline and Supply Header Project - Migratory Bird Plan

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

May 3, 2017

Ms. Liz Stout
U.S. Fish and Wildlife Service
West Virginia Ecological Services Field Office
Elkins, WV 26241

Re: Atlantic Coast Pipeline and Supply Header Project Submittal of updated Migratory Bird Plan

Dear Ms. Stout:

Attached for your information is the Migratory Bird Plan prepared for the Atlantic Coast Pipeline (ACP) and Supply Header Project (SHP) projects. Atlantic Coast Pipeline, LLC (Atlantic) and Dominion Transmission, Inc. (DTI) have prepared this Migratory Bird Plan at the request of the FERC as the lead federal agency.

Atlantic is a company formed by four major U.S. energy companies – Dominion, Duke Energy, Piedmont Natural Gas, and Southern Company Gas. The company was created to develop, own, and operate the proposed ACP, an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. For more information about the ACP, visit the company's website at www.dom.com/acpipeline. Atlantic has contracted with DTI, a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic.

In addition, DTI proposes to construct and operate approximately 37.5 miles of pipeline loop and modify existing compression facilities in Pennsylvania and West Virginia. This Project is referred to as the SHP and will enable DTI to provide firm transportation service of up to 1.5 million dekatherms per day (MMDth/d) to various customers, including Atlantic. Atlantic will be a Foundation Shipper in the SHP, and will utilize the SHP capacity to allow its shippers access to natural gas supplies from various DTI receipt points for further delivery to points along the ACP.

Atlantic and DTI are seeking authorization from the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act (NGA) to construct, own, operate, and maintain the proposed facilities. As required under Section 7 of the Endangered Species Act of 1973 (as amended), projects that require Federal authorization must undergo consultation with U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration National Marine Fisheries Service.

We look forward to continuing to work with you on the ACP and SHP projects. Please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding this submittal. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc:

Mr. Josh Shaffer, U.S. Army Corps of Engineers – Pittsburgh District
Mr. Adam Fannin, U.S. Army Corps of Engineers – Huntington District
Mr. Steve Gibson, U.S. Army Corps of Engineers – Norfolk District
Ms. Samantha Dailey, U.S. Army Corps of Engineers – Wilmington District

Attachments:

Atlantic Coast Pipeline and Supply Header Project - Migratory Bird Plan

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

May 3, 2017

Ms. Sumalee Hoskins
U.S. Fish and Wildlife Service
Virginia Ecological Services Field Office
Gloucester, VA 23061

Re: Atlantic Coast Pipeline and Supply Header Project Submittal of updated Migratory Bird Plan

Dear Ms. Hoskins:

Attached for your information is the Migratory Bird Plan prepared for the Atlantic Coast Pipeline (ACP) and Supply Header Project (SHP) projects. Atlantic Coast Pipeline, LLC (Atlantic) and Dominion Transmission, Inc. (DTI) have prepared this Migratory Bird Plan at the request of the FERC as the lead federal agency.

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Atlantic and DTI are seeking authorization from the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act (NGA) to construct, own, operate, and maintain the proposed facilities. As required under Section 7 of the Endangered Species Act of 1973 (as amended), projects that require Federal authorization must undergo consultation with U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration National Marine Fisheries Service.

We look forward to continuing to work with you on the ACP and SHP projects. Please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding this submittal. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc:

Mr. Josh Shaffer, U.S. Army Corps of Engineers – Pittsburgh District
Mr. Adam Fannin, U.S. Army Corps of Engineers – Huntington District
Mr. Steve Gibson, U.S. Army Corps of Engineers – Norfolk District
Ms. Samantha Dailey, U.S. Army Corps of Engineers – Wilmington District

Attachments:

Atlantic Coast Pipeline and Supply Header Project - Migratory Bird Plan

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

May 3, 2017

Mr. John Ellis
U.S. Fish and Wildlife Service
North Carolina Ecological Services Field Office
P.O. Box 33726
Raleigh, NC 27636

Re: Atlantic Coast Pipeline and Supply Header Project Submittal of updated Migratory Bird Plan

Dear Mr. Ellis:

Attached for your information is the Migratory Bird Plan prepared for the Atlantic Coast Pipeline (ACP) and Supply Header Project (SHP) projects. Atlantic Coast Pipeline, LLC (Atlantic) and Dominion Transmission, Inc. (DTI) have prepared this Migratory Bird Plan at the request of the FERC as the lead federal agency.

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Atlantic and DTI are seeking authorization from the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act (NGA) to construct, own, operate, and maintain the proposed facilities. As required under Section 7 of the Endangered Species Act of 1973 (as amended), projects that require Federal authorization must undergo consultation with U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration National Marine Fisheries Service.

We look forward to continuing to work with you on the ACP and SHP projects. Please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding this submittal. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc:

Mr. Josh Shaffer, U.S. Army Corps of Engineers – Pittsburgh District
Mr. Adam Fannin, U.S. Army Corps of Engineers – Huntington District
Mr. Steve Gibson, U.S. Army Corps of Engineers – Norfolk District
Ms. Samantha Dailey, U.S. Army Corps of Engineers – Wilmington District

Attachments:

Atlantic Coast Pipeline and Supply Header Project - Migratory Bird Plan

U.S. Forest Service – Monongahela and George Washington National Forests

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

SPECIAL USE PERMIT

Authority: ORGANIC ADMINISTRATION ACT June 4, 1897

ATLANTIC COAST PIPELINE, LLC of 707 EAST MAIN STREET RICHMOND VA 23219 (hereinafter "the holder") is authorized to use or occupy National Forest System lands in the GEORGE WASHINGTON AND JEFFERSON NATIONAL FORESTS or George Washington unit of the National Forest System, subject to the terms and conditions of this special use permit (the permit).

This permit covers 9,806 acres or 15.9 miles in the North River, Warm Springs, and Pedlar Ranger Districts, ("the permit area"), as shown on the maps attached as Appendix A. This permit issued for the purpose of:

A one year or less temporary planning permit to conduct field routing, environmental, cultural resources, geotechnical core borings and civil surveys for a proposed interstate natural gas pipeline called the Atlantic Coast Pipeline. Surveys will be conducted along a 300-foot wide survey corridor within a 2,000-foot-wide study corridor for study areas 1, 9, 10, 11 and 12 and within a 300-foot survey corridor within a 6,000-foot wide study corridor for study areas 2, 3, 4, 5, 6, 7, 8. These survey areas are located in the George Washington National Forest (GWNF) in Bath, Highland and Augusta Counties, Virginia. The total study area is 9,806 acres and total survey area is 557.1 acres. All survey activities are to be coordinated with the appropriate Forest Service subject matter experts and conducted in accordance with the holder's "Planning Permit Activities" (letter from Hartz to Timm dated February 3, 2017) attached as Appendix B.

Geotechnical core borings will be conducted in accordance with the "Project Description" (dated October 2016) attached as Appendix C. The temporary logging road identified for access to the MP123.1 boring site (known as the White Way Timber Sale temporary road) and shown on the attached Appendix D shall be restored to the existing condition (i.e. revegetated and tank trapped) in accordance with the specifications attached as Appendix E. In the event it is necessary to clear additional vegetation associated with the geotechnical core borings, the holder shall provide documentation from the USFWS of their approval prior to conducting any further vegetation clearing.

TERMS AND CONDITIONS

I. GENERAL TERMS

A. AUTHORITY. This permit is issued pursuant to ORGANIC ADMINISTRATION ACT June 4, 1897 and 36 CFR Part 251, Subpart B, as amended, and is subject to their provisions.

B. AUTHORIZED OFFICER. The authorized officer is the Forest or Grassland Supervisor or a subordinate officer with delegated authority.

C. TERM. This permit shall expire at midnight on 04/11/2018, one year from the date of issuance.

D. RENEWAL. This permit is not renewable. Prior to expiration of this permit, the holder may apply for a new permit that would renew the use and occupancy authorized by this permit. Applications for a new permit must be submitted at least 6 months prior to expiration of this permit. Renewal of the use and occupancy authorized by this permit shall be at the sole discretion of the authorized officer. At a minimum, before renewing the use and occupancy authorized by this permit, the authorized officer shall require that (1) the use and occupancy to be authorized by the new permit is consistent with the standards and guidelines in the applicable land management plan; (2) the type of use and occupancy to be authorized by the new permit is the same as the type of use and occupancy authorized by this permit; and (3) the holder is in compliance with all the terms of this permit. The authorized officer may prescribe new terms and conditions when a new permit is issued.

E. AMENDMENT. This permit may be amended in whole or in part by the Forest Service when, at the discretion of the authorized officer, such action is deemed necessary or desirable to incorporate new terms that may be required by law, regulation, directive, the applicable forest land and resource management plan, or projects and activities implementing a land management plan pursuant to 36 CFR Part 215.

F. COMPLIANCE WITH LAWS, REGULATIONS, AND OTHER LEGAL REQUIREMENTS. In exercising the rights and privileges granted by this permit, the holder shall comply with all present and future federal laws and regulations and all present and future state, county, and municipal laws, regulations, and other legal requirements that apply to the permit area, to the extent they do not conflict with federal law, regulation, or policy. The Forest Service assumes no responsibility for enforcing laws, regulations, and other legal requirements that fall under the jurisdiction of other governmental entities.

G. NON-EXCLUSIVE USE. The use or occupancy authorized by this permit is not exclusive. The Forest Service reserves the right of access to the permit area, including a continuing right of physical entry to the permit area for inspection, monitoring, or any other purpose consistent with any right or obligation of the United States under any law or regulation. The Forest Service reserves the right to allow others to use the permit area in any way that is not inconsistent with the holder's rights and privileges under this permit, after consultation with all parties involved. Except for any restrictions that the holder and the authorized officer agree are necessary to protect the installation and operation of authorized temporary improvements, the lands and waters covered by this permit shall remain open to the public for all lawful purposes.

H. ASSIGNABILITY. This permit is not assignable or transferable.

I.. CHANGE IN CONTROL OF THE BUSINESS ENTITY.

1. Notification of Change in Control. The holder shall notify the authorized officer when a change in control of the business entity that holds this permit is contemplated.

a. In the case of a corporation, control is an interest, beneficial or otherwise, of sufficient outstanding voting securities or capital of the business so as to permit the exercise of managerial authority over the actions and operations of the corporation or election of a majority of the board of directors of the corporation.

b. In the case of a partnership, limited partnership, joint venture, or individual entrepreneurship, control is a beneficial ownership of or interest in the entity or its capital so as to permit the exercise of managerial authority over the actions and operations of the entity.

c. In other circumstances, control is any arrangement under which a third party has the ability to exercise management authority over the actions or operations of the business.

2. Effect of Change in Control. Any change in control of the business entity as defined in paragraph 1 of this clause shall result in termination of this permit. The party acquiring control must submit an application for a special use permit. The Forest Service is not obligated to issue a new permit to the party who acquires control. The authorized officer shall determine whether the applicant meets the requirements established by applicable federal regulations.

II.IMPROVEMENTS

A. LIMITATIONS ON USE. Nothing in this permit gives or implies permission to build or maintain any structure or facility or to conduct any activity, unless specifically authorized by this permit. Any use not specifically authorized by this permit must be proposed in accordance with 36 CFR 251.54. Approval of such a proposal through issuance of a new permit or permit amendment is at the sole discretion of the authorized officer.

B. PLANS. All plans for development, layout, construction, reconstruction, or alteration of improvements in the permit area, as well as revisions to those plans must be prepared by a professional engineer, architect, landscape architect, or other qualified professional based on federal employment standards acceptable to the authorized officer. These plans and plan revisions must have written approval from the authorized officer before they are implemented. The authorized officer may require the holder to furnish as-built plans, maps, or surveys upon completion of the work.

C. CONSTRUCTION. Any construction authorized by this permit shall commence by N/A and shall be completed by N/A.

III. OPERATIONS.

A. PERIOD OF USE. Use or occupancy of the permit area shall be exercised at least 1 days each year.

B. CONDITION OF OPERATIONS. The holder shall maintain the authorized improvements and permit area to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the authorized officer and consistent with other provisions of this permit. Standards are subject to periodic change by the authorized officer when deemed necessary to meet statutory, regulatory, or policy requirements or to protect national forest resources. The holder shall comply with inspection requirements deemed appropriate by the authorized officer.

C. INSPECTION BY THE FOREST SERVICE. The Forest Service shall monitor the holder's operations and reserves the right to inspect the permit area and transmission facilities at any time for compliance with the terms of this permit. The holder's obligations under this permit are not contingent upon any duty of the Forest Service to inspect the permit area or transmission facilities. A failure by the Forest Service or other governmental officials to inspect is not a justification for noncompliance with any of the terms and conditions of this permit.

IV. RIGHTS AND LIABILITIES

A. LEGAL EFFECT OF THE PERMIT. This permit, which is revocable and terminable, is not a contract or a lease, but rather a federal license. The benefits and requirements conferred by this authorization are reviewable solely under the procedures set forth in 36 CFR 251, Subpart C and 5 U.S.C. 704. This permit does not constitute a contract for purposes of the Contract Disputes Act, 41 U.S.C. 601. The permit is not real property, does not convey any interest in real property, and may not be used as collateral for a loan.

B. VALID OUTSTANDING RIGHTS. This permit is subject to all valid outstanding rights. Valid outstanding rights include those derived under mining and mineral leasing laws of the United States. The United States is not liable to the holder for the exercise of any such right.

C. ABSENCE OF THIRD-PARTY BENEFICIARY RIGHTS. The parties to this permit do not intend to confer any rights on any third party as a beneficiary under this permit.

D. SERVICES NOT PROVIDED. This permit does not provide for the furnishing of road or trail maintenance, water, fire protection, search and rescue, or any other such service by a government agency, utility, association, or individual.

E. RISK OF LOSS. The holder assumes all risk of loss associated with use or occupancy of the permit area, including but not limited to theft, vandalism, fire and any fire-fighting activities (including prescribed burns), avalanches, rising waters, winds, falling limbs or trees, and other forces of nature. If authorized temporary improvements in the permit area are destroyed or substantially damaged, the authorized officer shall conduct an analysis to determine whether the improvements can be safely occupied in the future and whether rebuilding should be allowed. If rebuilding is not allowed, the permit shall terminate.

F. DAMAGE TO UNITED STATES PROPERTY. The holder has an affirmative duty to protect from damage the land, property, and other interests of the United States. Damage includes but is not limited to fire suppression costs, damage to government-owned improvements covered by this permit, and all costs and damages associated with or resulting from the release or threatened release of a hazardous material occurring during or as a result of activities of the holder or the holder's heirs, assigns, agents, employees, contractors, or lessees on, or related to, the lands, property, and other interests covered by this permit. For purposes of clause IV.F and section V, "hazardous material" shall mean (a) any hazardous substance under section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601(14); (b) any pollutant or contaminant under section 101(33) of CERCLA, 42 U.S.C. § 9601(33); (c) any petroleum product or its derivative, including fuel oil, and waste oils; and (d) any hazardous substance, extremely hazardous substance, toxic substance, hazardous waste, ignitable, reactive or corrosive materials, pollutant, contaminant, element, compound, mixture, solution or substance that may pose a present or potential hazard to human health or the environment under any applicable environmental laws.

1. The holder shall avoid damaging or contaminating the environment, including but not limited to the soil, vegetation (such as trees, shrubs, and grass), surface water, and groundwater, during the holder's use or occupancy of the permit area. If the environment or any government property covered by this permit becomes damaged during the holder's use or occupancy of the permit area, the holder shall immediately repair the damage or replace the damaged items to the satisfaction of the authorized officer and at no expense to the United States.

2. The holder shall be liable for all injury, loss, or damage, including fire suppression, prevention and control of the spread of invasive species, or other costs in connection with rehabilitation or restoration of natural resources associated with the use or occupancy authorized by this permit. Compensation shall include but not be limited to the value of resources damaged or destroyed, the costs of restoration, cleanup, or other mitigation, fire suppression or other types of abatement costs, and all administrative, legal (including attorney's fees), and other costs. Such costs may be deducted from a

performance bond required under clause IV.I.

3. The holder shall be liable for damage caused by use of the holder or the holder's heirs, assigns, agents, employees, contractors, or lessees to all roads and trails of the United States to the same extent as provided under clause IV.F.1, except that liability shall not include reasonable and ordinary wear and tear.

G. HEALTH, SAFETY, AND ENVIRONMENTAL PROTECTION. The holder shall promptly abate as completely as possible and in compliance with all applicable laws and regulations any activity or condition arising out of or relating to the authorized use or occupancy that causes or threatens to cause a hazard to public health or the safety of the holder's employees or agents or harm to the environment (including areas of vegetation or timber, fish or other wildlife populations, their habitats, or any other natural resources). The holder shall prevent impacts to the environment and cultural resources by implementing actions identified in the operating plan to prevent establishment and spread of invasive species. The holder shall immediately notify the authorized officer of all serious accidents that occur in connection with such activities. The responsibility to protect the health and safety of all persons affected by the use or occupancy authorized by this permit is solely that of the holder. The Forest Service has no duty under the terms of this permit to inspect the permit area or operations and activities of the holder for hazardous conditions or compliance with health and safety standards.

H. INDEMNIFICATION OF THE UNITED STATES. The holder shall indemnify, defend, and hold harmless the United States for any costs, damages, claims, liabilities, and judgments arising from past, present, and future acts or omissions of the holder in connection with the use or occupancy authorized by this permit. This indemnification provision includes but is not limited to acts and omissions of the holder or the holder's heirs, assigns, agents, employees, contractors, or lessees in connection with the use or occupancy authorized by this permit which result in (1) violations of any laws and regulations which are now or which may in the future become applicable, and including but not limited to those environmental laws listed in clause V.A of this permit; (2) judgments, claims, demands, penalties, or fees assessed against the United States; (3) costs, expenses, and damages incurred by the United States; or (4) the release or threatened release of any solid waste, hazardous waste, hazardous materials, pollutant, contaminant, oil in any form, or petroleum product into the environment. The authorized officer may prescribe terms that allow the holder to replace, repair, restore, or otherwise undertake necessary curative actions to mitigate damages in addition to or as an alternative to monetary indemnification.

I. BONDING. The authorized officer may require the holder to furnish a surety bond or other security for any of the obligations imposed by the terms and conditions of this permit or any applicable law, regulation, or order.

V. RESOURCE PROTECTION

A. COMPLIANCE WITH ENVIRONMENTAL LAWS. The holder shall in connection with the use or occupancy authorized by this permit comply with all applicable federal, state, and local environmental laws and regulations, including but not limited to those established pursuant to the Resource Conservation and Recovery Act, as amended, 42 U.S.C. 6901 et seq., the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq., the Oil Pollution Act, as amended, 33 U.S.C. 2701 et seq., the Clean Air Act, as amended, 42 U.S.C. 7401 et seq., CERCLA, as amended, 42 U.S.C. 9601 et seq., the Toxic Substances Control Act, as amended, 15 U.S.C. 2601 et seq., the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, 7 U.S.C. 136 et seq., and the Safe Drinking Water Act, as amended, 42 U.S.C. 300f et seq.

B. VANDALISM. The holder shall take reasonable measures to prevent and discourage vandalism and disorderly conduct and when necessary shall contact the appropriate law enforcement officer.

C. PESTICIDE USE. Pesticides may not be used outside of buildings to control undesirable woody and herbaceous vegetation (including aquatic plants), insects, rodents, fish, and other pests and weeds without prior written approval from the authorized officer. A request for approval of planned uses of pesticides shall be submitted annually by the holder on the due date established by the authorized officer. The report shall cover a 12-month period of planned use beginning 3 months after the reporting date. Information essential for review shall be provided in the form specified. Exceptions to this schedule may be allowed, subject to emergency request and approval, only when unexpected outbreaks of pests or weeds require control measures that were not anticipated at the time an annual report was submitted. Only those materials registered by the U.S. Environmental Protection Agency for the specific purpose planned shall be considered for use on National Forest System lands. Label instructions and all applicable laws and regulations shall be strictly followed in the application of pesticides and disposal of excess materials and containers.

D. ARCHAEOLOGICAL-PALEONTOLOGICAL DISCOVERIES. The holder shall immediately notify the authorized officer of all antiquities or other objects of historic or scientific interest, including but not limited to historic or prehistoric ruins, fossils, or artifacts discovered in connection with the use and occupancy authorized by this permit. The holder shall leave these discoveries intact and in place until directed otherwise by the authorized officer. Protective and mitigative measures specified by the authorized officer shall be the responsibility of the holder.

E. NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION. In accordance with 25 U.S.C. 3002(d) and 43 CFR 10.4, if the holder inadvertently discovers human remains, funerary objects, sacred objects, or objects of cultural patrimony on National Forest System lands, the holder shall immediately cease work in the area of the discovery and shall make a reasonable effort to protect and secure the items. The holder shall immediately notify the authorized officer by telephone of the discovery and shall follow up with written confirmation of the discovery. The activity that resulted in the inadvertent discovery may not resume until 30 days after the authorized officer certifies receipt of the written confirmation, if resumption of the activity is otherwise lawful, or at any time if a binding written agreement has been executed between the Forest Service and the affiliated Indian tribes that adopts a recovery plan for the human remains and objects.

F. PROTECTION OF HABITAT OF THREATENED, ENDANGERED, AND SENSITIVE SPECIES. The location of sites within the permit area needing special measures for protection of plants or animals listed as threatened or endangered under the Endangered Species Act (ESA) of 1973, 16 U.S.C. 1531 et seq., as amended, or identified as sensitive or otherwise requiring special protection by the Regional Forester under Forest Service Manual (FSM) 2670, pursuant to consultation conducted under section 7 of the ESA, may be shown on the ground or on a separate map. The map shall be attached to this permit as an appendix. The holder shall take any protective and mitigative measures specified by the authorized officer. If protective and mitigative measures prove inadequate, if other sites within the permit area containing threatened, endangered, or sensitive species or species otherwise requiring special protection are discovered, or if new species are listed as threatened or endangered under the ESA or identified as sensitive or otherwise requiring special protection by the Regional Forester under the FSM, the authorized officer may specify additional protective and mitigative measures. Discovery of these sites by the holder or the Forest Service shall be promptly reported to the other party.

G. CONSENT TO STORE HAZARDOUS MATERIALS. The holder shall not store any hazardous materials at the site without prior written approval from the authorized officer. This approval shall not be unreasonably withheld. If the authorized officer provides approval, this permit shall include, or in the case of approval provided after this permit is issued, shall be amended to include specific terms addressing the storage of hazardous materials, including the specific type of materials to be stored, the volume, the type of storage, and a spill plan. Such terms shall be proposed by the holder and are subject to approval by the authorized officer.

H. CLEANUP AND REMEDIATION

1. The holder shall immediately notify all appropriate response authorities, including the National Response Center and the authorized officer or the authorized officer's designated representative, of any oil discharge or of the release of a hazardous material in the permit area in an amount greater than or equal to its reportable quantity, in accordance with 33 CFR Part 153, Subpart B, and 40 CFR Part 302. For the purposes of this requirement, "oil" is as defined by section 311(a)(1) of the Clean Water Act, 33 U.S.C. 1321(a)(1). The holder shall immediately notify the authorized officer or the authorized officer's designated representative of any release or threatened release of any hazardous material in or near the permit area which may be harmful to public health or welfare or which may adversely affect natural resources on federal lands.

2. Except with respect to any federally permitted release as that term is defined under Section 101(10) of CERCLA, 42 U.S.C. 9601(10), the holder shall clean up or otherwise remediate any release, threat of release, or discharge of hazardous materials that occurs either in the permit area or in connection with the holder's activities in the permit area, regardless of whether those activities are authorized under this permit. The holder shall perform cleanup or remediation immediately upon discovery of the release, threat of release, or discharge of hazardous materials. The holder shall perform the cleanup or remediation to the satisfaction of the authorized officer and at no expense to the United States. Upon revocation or termination of this permit, the holder shall deliver the site to the Forest Service free and clear of contamination.

I. CERTIFICATION UPON REVOCATION OR TERMINATION. If the holder uses or stores hazardous materials at the site, upon revocation or termination of this permit the holder shall provide the Forest Service with a report certified by a professional or professionals acceptable to the Forest Service that the permit area is uncontaminated by the presence of hazardous materials and that there has not been a release or discharge of hazardous materials upon the permit area, into surface water at or near the permit area, or into groundwater below the permit area during the term of the permit. This certification requirement may be waived by the authorized officer when the Forest Service determines that the risks posed by the hazardous material are minimal. If a release or discharge has occurred, the professional or professionals shall document and certify that the release or discharge has been fully remediated and that the permit area is in compliance with all federal, state, and local laws and regulations.

VI. LAND USE FEE AND ACCOUNTING ISSUES

A. LAND USE FEES. The holder shall pay an initial annual land use fee of $14,199.76 for the period from 4/11/2017 to 4/10/2018, and thereafter on N/A, shall pay an annual land use fee of $N/A. The annual land use fee shall be adjusted annually using the Cumulative Implicit Price Deflator-Gross Domestic Product (IDP-GDP) Adjustment Factor.

B. MODIFICATION OF THE LAND USE FEE. The land use fee may be revised whenever necessary to reflect the market value of the authorized use or occupancy or when the fee system used to calculate the land use fee is modified or replaced.

C. FEE PAYMENT ISSUES.

1. Crediting of Payments. Payments shall be credited on the date received by the deposit facility, except that if a payment is received on a non-workday, the payment shall not be credited until the next workday.

2. Disputed Fees. Fees are due and payable by the due date. Disputed fees must be paid in full. Adjustments will be made if dictated by an administrative appeal decision, a court decision, or settlement terms.

3. Late Payments

(a) Interest. Pursuant to 31 U.S.C. 3717 et seq., interest shall be charged on any fee amount not paid within 30 days from the date it became due. The rate of interest assessed shall be the higher of the Prompt Payment Act rate or the rate of the current value of funds to the Treasury (i.e., the Treasury tax and loan account rate), as prescribed and published annually or quarterly by the Secretary of the Treasury in the Federal Register and the Treasury Fiscal Requirements Manual Bulletins. Interest on the principal shall accrue from the date the fee amount is due.

(b) Administrative Costs. If the account becomes delinquent, administrative costs to cover processing and handling the delinquency shall be assessed.

(c) Penalties. A penalty of 6% per annum shall be assessed on the total amount that is more than 90 days delinquent and shall accrue from the same date on which interest charges begin to accrue.

(d) Termination for Nonpayment. This permit shall terminate without the necessity of prior notice and opportunity to comply when any permit fee payment is 90 calendar days from the due date in arrears. The holder shall remain responsible for the delinquent fees.

4. Administrative Offset and Credit Reporting. Delinquent fees and other charges associated with the permit shall be subject to all rights and remedies afforded the United States pursuant to 31 U.S.C. 3711 et seq. and common law. Delinquencies are subject to any or all of the following:

(a) Administrative offset of payments due the holder from the Forest Service.

(b) If in excess of 60 days, referral to the Department of the Treasury for appropriate collection action as provided by 31 U.S.C. 3711(g)(1).

(c) Offset by the Secretary of the Treasury of any amount due the holder, as provided by 31 U.S.C. 3720 et seq.

(d) Disclosure to consumer or commercial credit reporting agencies.

VII. REVOCATION, SUSPENSION, AND TERMINATION

A. REVOCATION AND SUSPENSION. The authorized officer may revoke or suspend this permit in whole or in part:

1. For noncompliance with federal, state, or local law.

2. For noncompliance with the terms of this permit.

3. For abandonment or other failure of the holder to exercise the privileges granted.

4. With the consent of the holder.

5. For specific and compelling reasons in the public interest.

Prior to revocation or suspension, other than immediate suspension under clause VII.B, the authorized officer shall give the holder written notice of the grounds for revocation or suspension. In the case of revocation or suspension based on clause VII.A.1, 2, or 3, the authorized officer shall give the holder a reasonable time, typically not to exceed 90 days, to cure any noncompliance.

B. IMMEDIATE SUSPENSION. The authorized officer may immediately suspend this permit in whole or in part when necessary to protect public health or safety or the environment. The suspension decision shall be in writing. The holder may request an on-site review with the authorized officer's supervisor of the adverse conditions prompting the suspension. The authorized officer's supervisor shall grant this request within 48 hours. Following the on-site review, the authorized officer's supervisor shall promptly affirm, modify, or cancel the suspension.

C. APPEALS AND REMEDIES. Written decisions by the authorized officer relating to administration of this permit are subject to administrative appeal pursuant to 36 CFR Part 214 as amended. Revocation or suspension of this permit shall not give rise to any claim for damages by the holder against the Forest Service.

D. TERMINATION. This permit shall terminate when by its terms a fixed or agreed upon condition, event, or time occurs without any action by the authorized officer. Examples include but are not limited to expiration of the permit by its terms on a specified date and termination upon change of control of the business entity. Termination of this permit shall not require notice, a decision document, or any environmental analysis or other documentation. Termination of this permit is not subject to administrative appeal and shall not give rise to any claim for damages by the holder against the Forest Service.

E. RIGHTS AND RESPONSIBILITIES UPON REVOCATION OR TERMINATION WITHOUT RENEWAL. Upon revocation or termination of this permit without renewal of the authorized use, the holder shall remove all structures and improvements, except those owned by the United States, within a reasonable period prescribed by the authorized officer and shall restore the site to the satisfaction of the authorized officer. If the holder fails to remove all structures and improvements within the prescribed period, they shall become the property of the United States and may be sold, destroyed, or otherwise disposed of without any liability to the United States. However, the holder shall remain liable for all costs associated with their removal, including costs of sale and impoundment, cleanup, and restoration of the site.

VIII. MISCELLANEOUS PROVISIONS

A. MEMBERS OF CONGRESS. No member of or delegate to Congress or resident commissioner shall benefit from this permit either directly or indirectly, except to the extent the authorized use provides a general benefit to a corporation.

B. CURRENT ADDRESSES. The holder and the Forest Service shall keep each other informed of current mailing addresses, including those necessary for billing and payment of land use fees.

C. SUPERSEDED PERMIT. This permit supersedes a special use permit designated ATLANTIC COAST PIPELINE, GWP433202T, dated 04/11/2016.

D. SUPERIOR CLAUSES. If there is a conflict between any of the preceding printed clauses and any of the following clauses, the preceding printed clauses shall control.

THIS PERMIT IS ACCEPTED SUBJECT TO ALL ITS TERMS AND CONDITIONS.

BEFORE ANY PERMIT IS ISSUED TO AN ENTITY, DOCUMENTATION MUST BE PROVIDED TO THE AUTHORIZED OFFICER OF THE AUTHORITY OF THE SIGNATORY FOR THE ENTITY TO BIND IT TO THE TERMS AND CONDITIONS OF THE PERMIT.

ACCEPTED:

4/6/17

LESLIE HARTZ, Environmental Authorized Representative — DATE
Atlantic Coast Pipeline, LLC

APPROVED:

4/10/17

JOBY P. TIMM, Forest Supervisor — DATE
George Washington & Jefferson National Forests

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0082. The time required to complete this information collection is estimated to average one hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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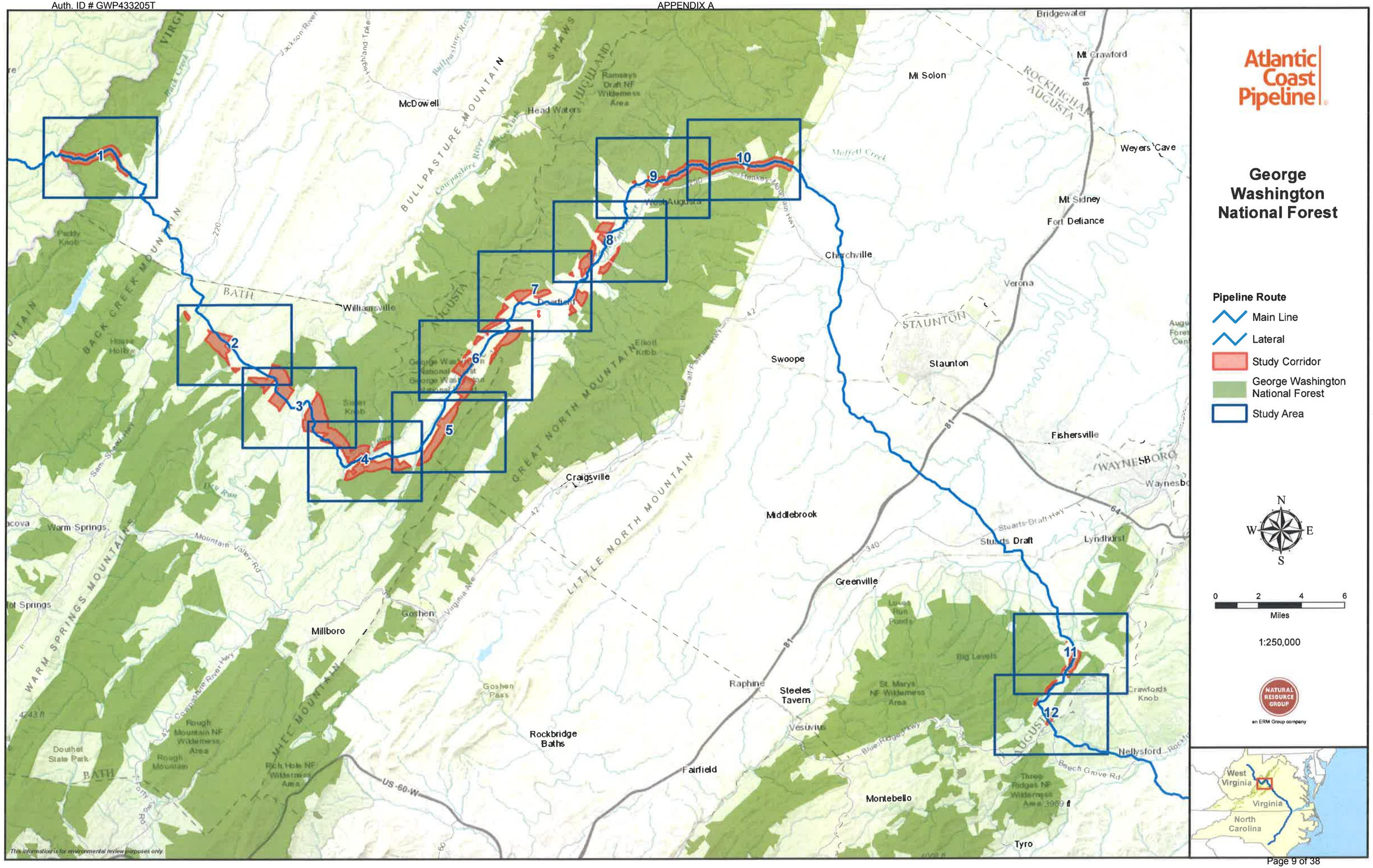
To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (800) 975-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer

The Privacy Act of 1974 (5 U.S.C. 552a) and the Freedom of Information Act (5 U.S.C. 552) govern the confidentiality to be provided for information received by the Forest Service.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Millboro
Goshen
Rockbridge Baths
Middlebrook
Greenville
Raphine
Steeles Tavern
Fairfield
Swoope
Churchville
Staunton
Verona
Mt Solon
Mt Crawford
Weyers Cave
Mt Sidney
Fort Defiance
Fishersville
Waynesboro
Stuarts Draft
Lyndhurst
Montebello
Nellysford
Tyro
Warm Springs
Head Waters
West Augusta
Bridgewater
BULLPASTURE MOUNTAIN
BACK CREEK MOUNTAIN
WARM SPRINGS MOUNTAIN
GREAT NORTH MOUNTAIN
LITTLE NORTH MOUNTAIN
SHAWS RIDGE
Ramseys Draft NF Wilderness Area
Rough Mountain NF Wilderness Area
Rich Hole NF Wilderness Area
St. Marys NF Wilderness Area
Three Ridges NF Wilderness Area
Douthat State Park
Goshen Pass
Big Levels
Crawfords Knob
Elliott Knob
Shaver Knob
Paddy Knob
House Hollow
Sam-Shaver Hwy
Mountain Valley Rd
Blue Ridge Pkwy
Beech Grove Rd
Stuarts Draft Hwy
Rockingham
Augusta
Staunton
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Atlantic Coast Pipeline

George Washington National Forest

Sheet 1 of 12

- Milepost
- Pipeline
- 2,000 Ft. Study Corridor
- Public Access Road
- Forest Access Road
- George Washington National Forest
- State Boundary
- County Boundary

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NATURAL RESOURCE GROUP
an ERM Group company

Management Prescription Unit
- 13: Mosaics of Wildlife Habitat
- 4D: Special Biological Area

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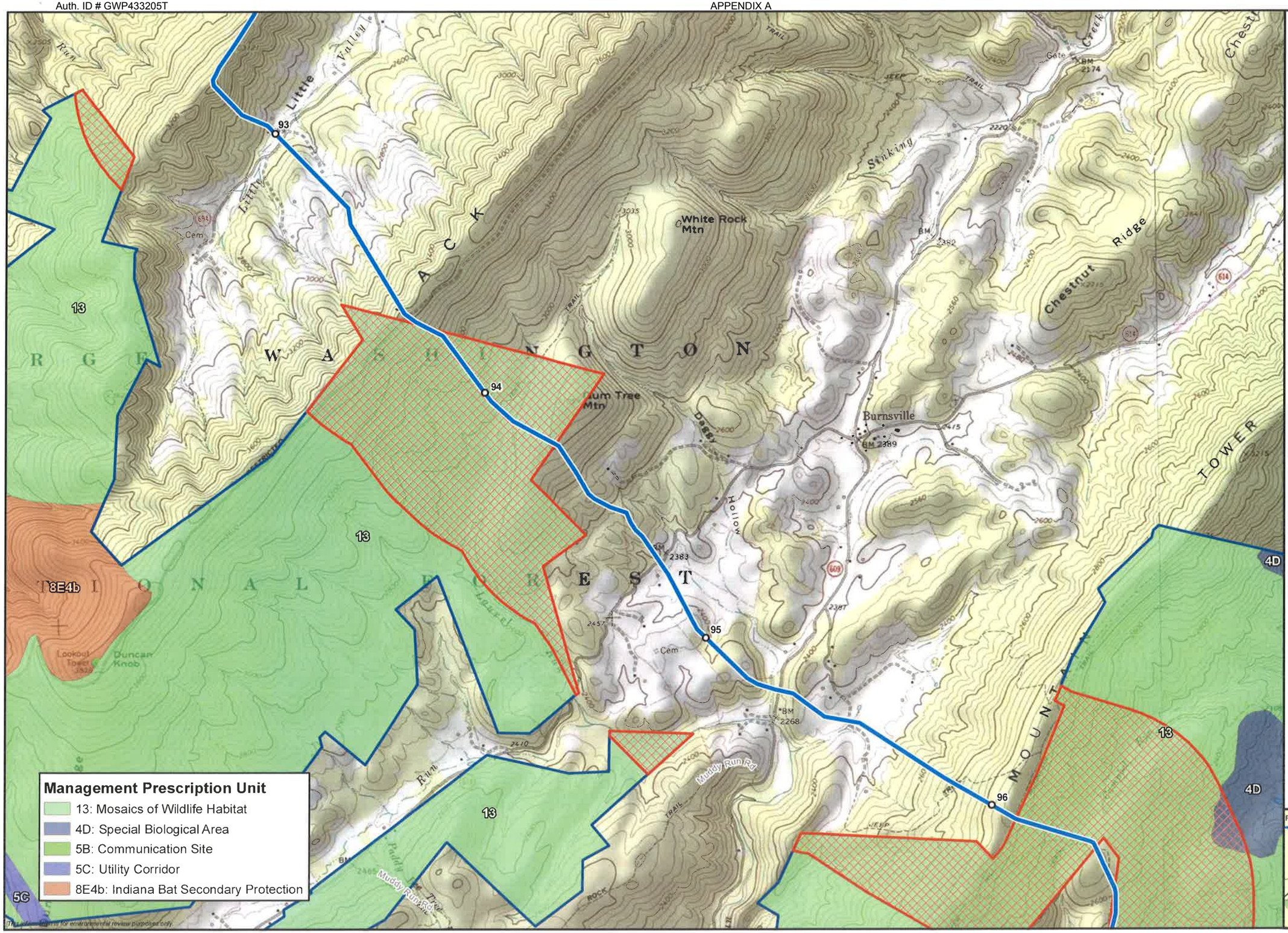

Atlantic Coast Pipeline

George Washington National Forest

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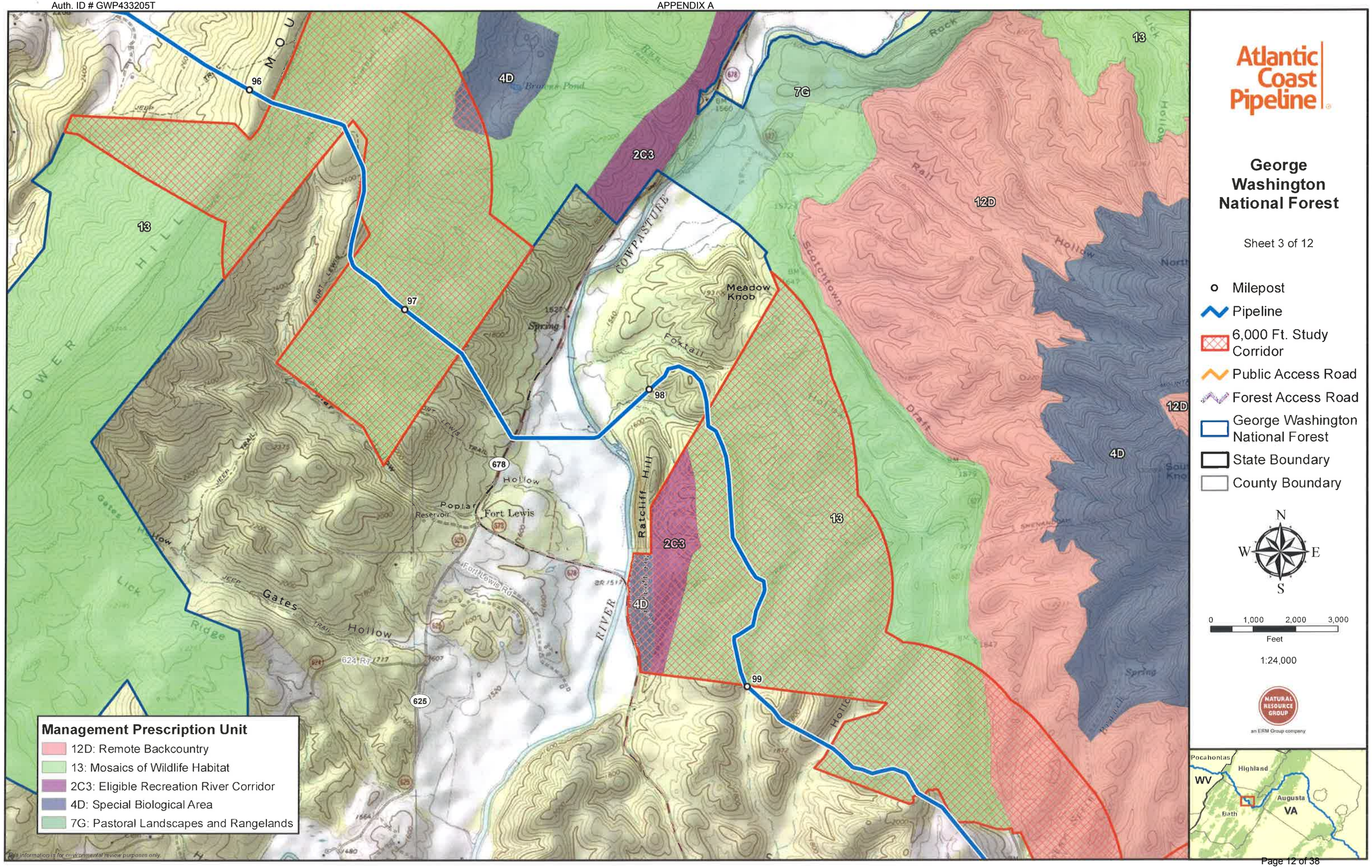

Atlantic Coast Pipeline

George Washington National Forest

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NATURAL RESOURCE GROUP
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Atlantic Coast Pipeline

George Washington National Forest

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NATURAL RESOURCE GROUP

an ERM Group company

Management Prescription Unit

- 12D: Remote Backcountry
- 13: Mosaics of Wildlife Habitat
- 4D: Special Biological Area

Pocahontas
Highland
WV
Augusta
VA
Bath

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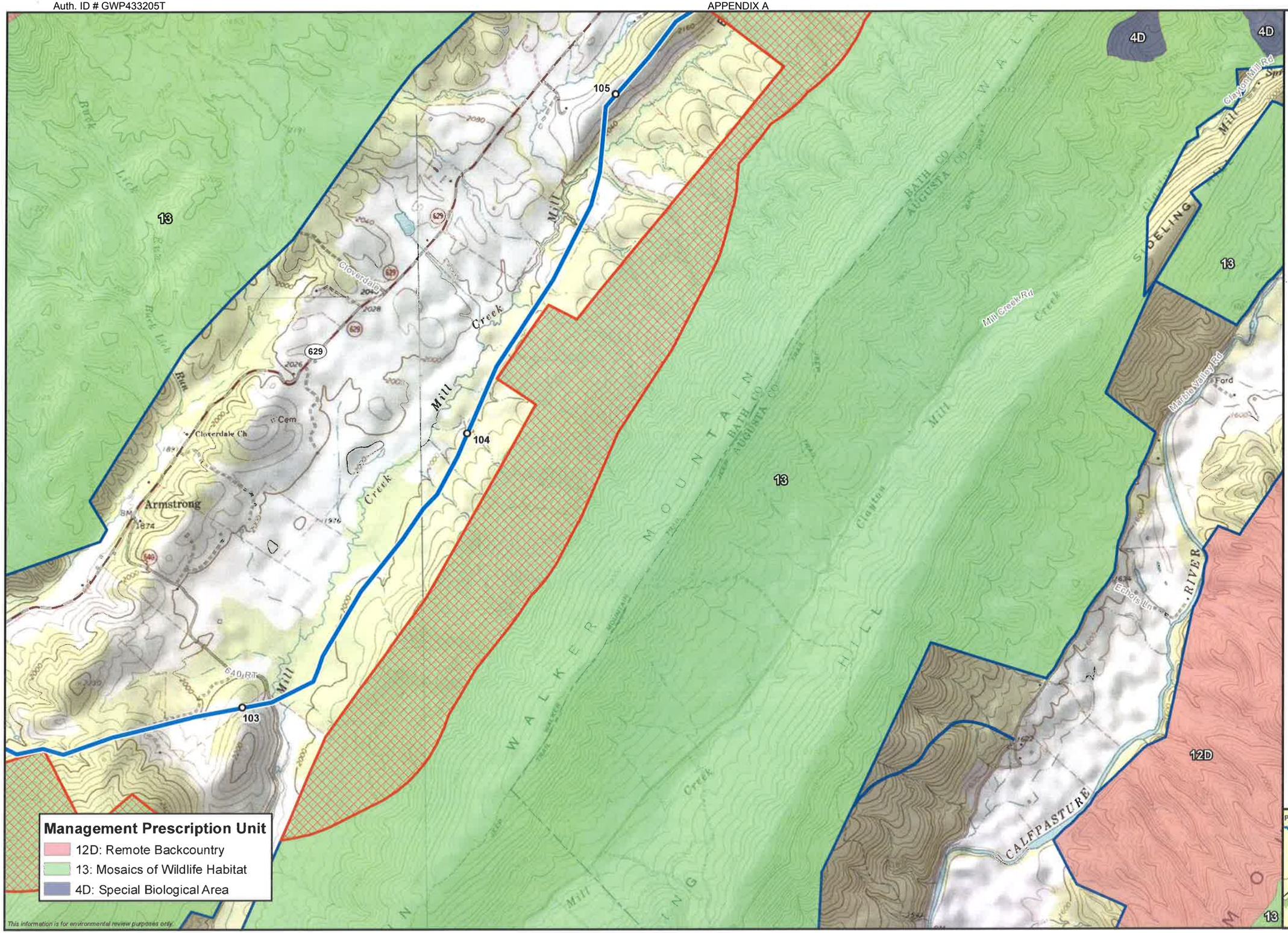

Atlantic Coast Pipeline

George Washington National Forest

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NATURAL RESOURCE GROUP
an ERM Group company

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NATURAL RESOURCE GROUP
an ERM Group company

Management Prescription Unit
- 12D: Remote Backcountry
- 13: Mosaics of Wildlife Habitat
- 4D: Special Biological Area

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Atlantic Coast Pipeline

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NATURAL RESOURCE GROUP

an ERM Group company

Management Prescription Unit

- 12D: Remote Backcountry
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- 4D: Special Biological Area
- 5A: Administrative Site

Pocahontas
Highland
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Augusta
VA
Bath

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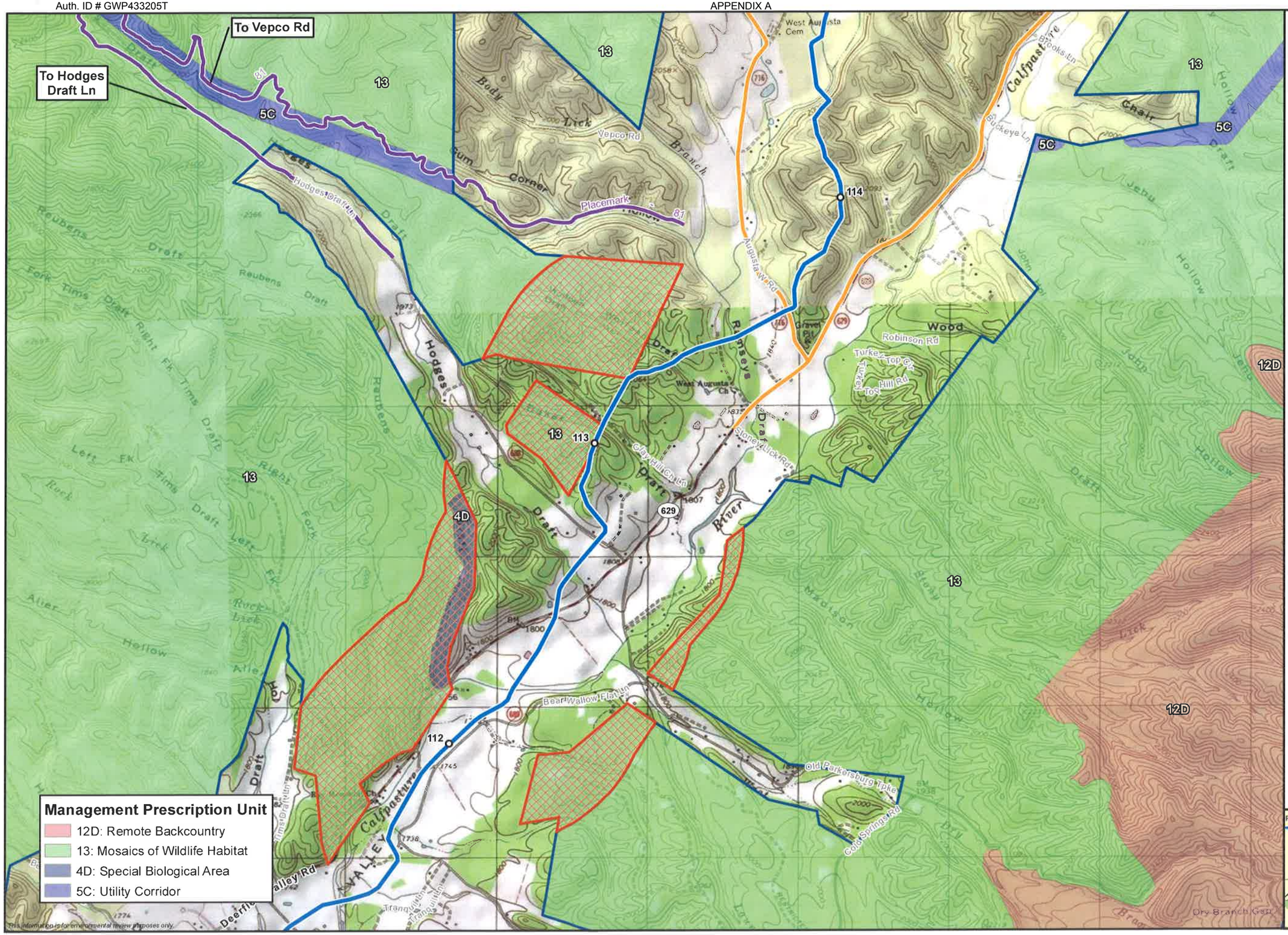

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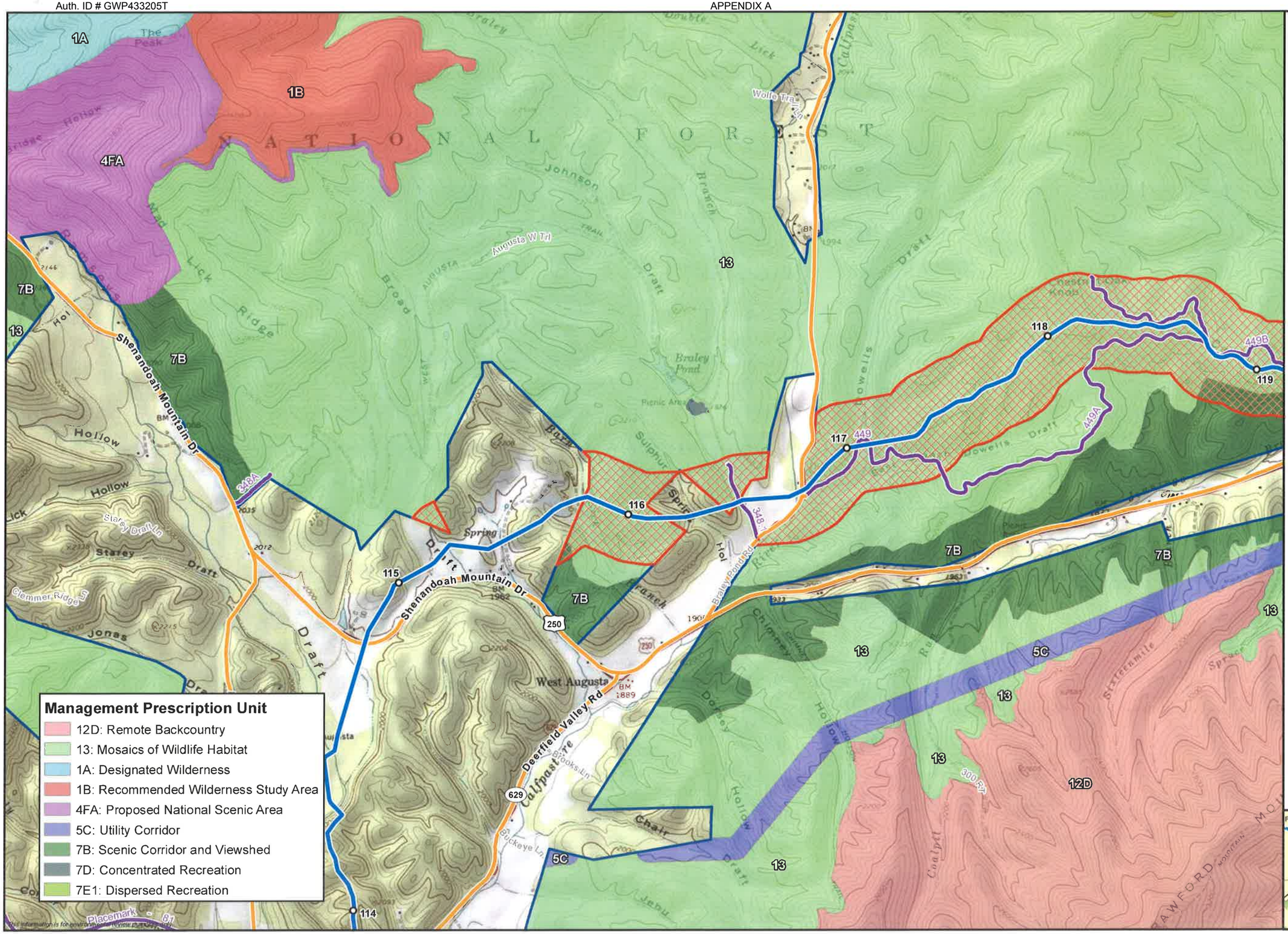

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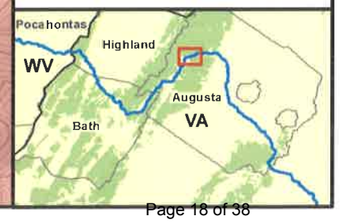

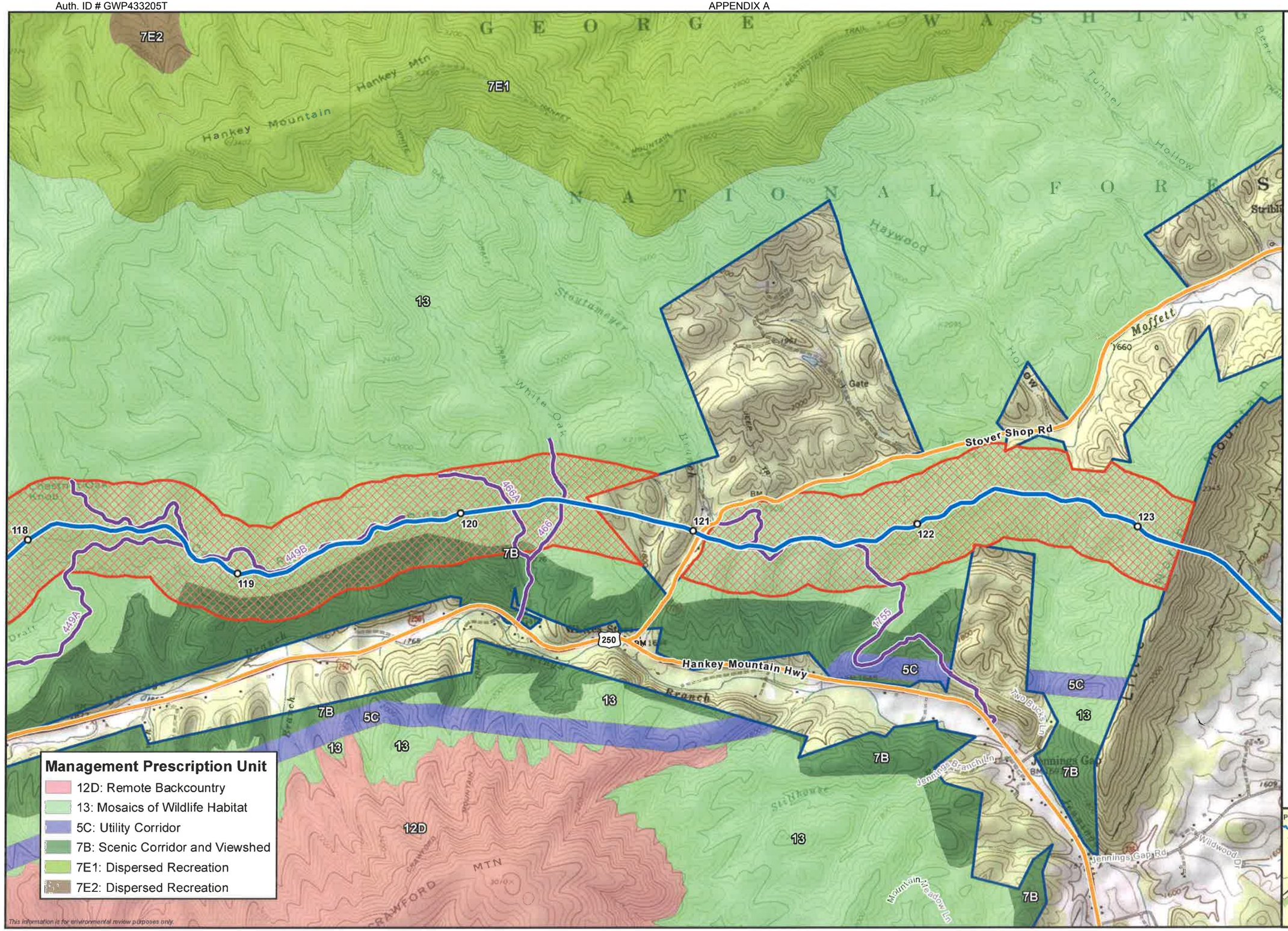

Atlantic Coast Pipeline

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- County Boundary

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NATURAL RESOURCE GROUP
an ERM Group company

Atlantic Coast Pipeline

George Washington National Forest

Sheet 11 of 12

- Milepost
- Pipeline
- 2,000 Ft. Study Corridor
- Public Access Road
- Forest Access Road
- George Washington National Forest
- State Boundary
- County Boundary

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NATURAL RESOURCE GROUP
an ERM Group company

Management Prescription Unit

- 13: Mosaics of Wildlife Habitat
- 4A: Appalachian Trail Corridor
- 4D: Special Biological Area
- 7E1: Dispersed Recreation
- 7F: Blue Ridge Parkway Corridor
- 7G: Pastoral Landscapes and Rangelands

This information is for environmental review purposes only.

Atlantic Coast Pipeline

George Washington National Forest

Sheet 12 of 12

- Milepost
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- 2,000 Ft. Study Corridor
- Public Access Road
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NATURAL RESOURCE GROUP

an ERM Group company

Management Prescription Unit

- 1A: Designated Wilderness
- 4A: Appalachian Trail Corridor
- 4D: Special Biological Area
- 7D: Concentrated Recreation
- 7E1: Dispersed Recreation
- 7F: Blue Ridge Parkway Corridor

This information is for environmental review purposes only.

Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060
dom.com

February 3, 2017

BY OVERNIGHT (OR EXPRESS) MAIL

Mr. Joby P. Timm, Forest Supervisor
U.S. Forest Service
George Washington National Forest
Forest Supervisor's Office
5162 Valleypointe Parkway
Roanoke, VA 24019

RE: Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline
George Washington National Forest
Application for Amendment to Special Use Authorization for Survey Activities

Dear Mr. Timm:

Atlantic Coast Pipeline, LLC (Atlantic) - a joint venture comprised of subsidiaries of Dominion Resources, Duke Energy, Piedmont Natural Gas, and Southern Company Gas - is proposing to construct and operate approximately 600 miles of natural gas transmission pipeline and associated laterals in West Virginia, Virginia, and North Carolina. This project, referred to as the Atlantic Coast Pipeline (ACP), will deliver natural gas from supply areas, including West Virginia, to demand areas in Virginia and North Carolina. Atlantic has contracted with Dominion Transmission, Inc. (from this point on DTI will be referred to as Atlantic) to permit and oversee the construction of the ACP and subsequently to operate and maintain Atlantic's facilities.

Atlantic filed an application with the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act. The ACP is subject to review by FERC under the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA), as well as other environmental and natural resource laws. Atlantic is currently conducting field routing, environmental, cultural resources, and civil surveys along the planned pipeline route to collect information needed by FERC and other regulatory agencies to review and permit the ACP.

Approximately 15.9 miles of the proposed ACP route crosses lands under the jurisdiction of the U.S. Forest Service within the George Washington National Forest (GWNF) (Warm Springs, North River, and Glenwood & Pedlar Ranger Districts)[1]. Atlantic has applied for and received a permit (Permit No. GWP433202T) under the U.S. Forest Service's (USFS's) Special Use Authorization regulations (36 CFR Part 251, Subpart B) for the purpose of conducting feasibility studies (i.e., use codes 411 and 412) within a corridor along this segment of the route[2]. We are requesting an amendment to the permit to extend the applicable time period to, where necessary, conduct and complete the stated activities under this permit. Atlantic has prepared the attached Standard Form 299 *Application for Transportation and Utility Systems and Facilities on Federal Lands.* The Form 299 identifies Atlantic's proposed studies, and provides detailed route maps depicting the study corridor across the GWNF. Atlantic has previously submitted a digital shape file of the study corridor associated with this request.

[1] The proposed ACP route also crosses the Monongahela National Forest for approximately 5.2 miles.

[2] Atlantic is today also submitting an application to amend its feasibility study permit on the Monongahela National Forest. Also, on October 20, 2016 Atlantic submitted an SF-299 application to conduct subsurface geotechnical investigations on the GWNF, and on November 12, 2015 submitted an Application for Transportation and Utility Systems and Facilities on Federal Lands for authorization to construct and operate its proposed Atlantic Coast Pipeline on National Forest Service lands. The latter application was amended on July 29, 2016 to incorporate various route changes.

Atlantic is requesting to amend its existing special use permit to complete activities such as environmental, cultural resources, and civil surveys along a 300-foot-wide survey corridor within the proposed study areas. Additionally, depending on the results of the environmental survey and consultation with USFS and U.S. Fish and Wildlife Service (FWS) biologists, presence/absence surveys for certain species may be required. These surveys are necessary to collect the environmental and cultural resources data needed to support permitting of the ACP, and to record the proposed centerline and other features using global positioning satellite (GPS) receivers.

Atlantic understands that a separate permit under the Archaeological Resources Protection Act (ARPA), in addition to the special use permit, will be required for the cultural resources survey on USFS lands. Atlantic's archaeological consultant (GAI) applied for and received an ARPA permit for the study area and will apply for an amendment to their ARPA permit under separate cover as necessary.

The proposed methodology for each survey is described below.

Planning Permit Activities

Environmental Survey

Atlantic's consultant will complete as needed wetland and waterbody delineation surveys to identify and record the jurisdictional boundaries of "waters of the United States" and to assess the values and functions of those waters. Fieldwork will be completed by up to three crews consisting of 2 to 3 biologists each performing pedestrian reconnaissance within the 300-foot-wide survey corridor. The biologists will navigate the survey corridor by following stakes or flags placed by routing or civil survey crews.

To delineate and map wetlands, biologists will document visual observations of vegetation composition, hydrology, and soils at selected sample locations, and take pictures of notable observations, including but not limited to, biological characteristics of wetlands, adjacent waterbodies, and adjacent uplands. To observe soil conditions, the biologists will use a 3-inch Dutch auger or tile spade to dig a soil pit to a depth of approximately 16 to 20 inches and a width of 3 to 10 inches sufficient to identify the presence or absence of hydric soil indicators and/or soil saturation. Soil pits will be dug in locations with apparent wetland characteristics (i.e., saturation, inundation, or hydrophytic vegetation), in areas adjacent to identified wetlands to confirm upland characteristics, and along the wetland boundary to verify accurate delineation of the wetland boundary in accordance with the U.S. Army Corps of Engineers' wetland delineation protocols (i.e., the 1987 Wetland Delineation Manual and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region). Spoil excavated from the soil pits will be replaced and packed by foot with vegetation replaced prior to leaving each sample location.

Once the wetland boundary has been established, biologists will record the boundary location using map-grade GPS capable of obtaining sub-meter accurate readings, and hang biodegradable survey ribbon around the perimeter of the wetland within the survey corridor. Ribbon will be tied to available vegetation, where present. No ribbon will be placed where vegetation is not available.

To document and map waterbodies, biologists will record observations and take representative photographs of the physical and biological characteristics of ephemeral, intermittent, and perennial waterbodies. One flag will be tied on each bank of the crossing along the pipeline centerline. The ordinary high water mark of waterbodies within the survey corridor will be located using map-grade GPS receivers capable of obtaining sub-meter accurate readings.

In addition to the demarcation of surface waters, biologists will assess the values and functions of wetlands and waterbodies by documenting visual observations of the physical, chemical, and biological

integrity of each feature on data forms. The biologists will rely on non-invasive inspections in the field (e.g., use of field guides and dichotomous keys) and will not collect specimens of the flora or fauna for identification.

In conjunction with the wetland and waterbody delineation surveys, the biologists will document habitat composition within and directly adjacent to the survey corridor. This survey will identify potentially suitable habitat for sensitive species, including federally listed threatened and endangered species known to occur in the vicinity of the survey corridor. Locations of potentially suitable habitat will be recorded using map-grade GPS receivers capable of sub-meter accurate readings. No flora or fauna will be collected while conducting this survey.

Data from the habitat survey will be used in conjunction with consultations with USFS and FWS biologists to determine if presence/absence surveys (e.g., mist net surveys for federally listed bats) are required for any individual species and to focus those surveys in areas with a likelihood of occurrence. Atlantic will coordinate with USFS and FWS biologists to determine the appropriate methodology for conducting presence/absence surveys prior to completing these investigations.

As part of the assessment of habitat composition, biologists will document any populations of invasive weed species that occur within the survey corridor. Locations of noxious weed species will be recorded using map-grade GPS receivers capable of sub-meter accurate readings. Data from this survey will be used to identify appropriate methods for preventing the spread of noxious weeds during construction.

Cultural Resources Survey

Atlantic's consultant will conduct cultural resources surveys as needed to document archaeological sites and other historic resources. Fieldwork will be conducted by up to three crews of 3 to 5 archaeologists each performing pedestrian reconnaissance and shovel testing within the 300-foot- wide survey corridor. The field methodology, data recording, and documentation efforts will meet all state and federal guidelines for Section 106 compliance, including those in accordance with GWNF approved protocols.

The entire length of the survey corridor will be subjected to visual inspection via pedestrian reconnaissance. Subsurface testing methods will vary according to the probability that archaeological resources are present in any given area. Detailed methodologies will be provided in the GAI ARPA permit application.

In some cases, additional (Phase II) testing may be necessary to determine the NRHP eligibility of sites. The methodology for site testing (e.g., unit excavation) will depend on the size and extent of cultural deposits at each site. Atlantic will coordinate with USFS archaeologists and the Virginia Department of Historic Resources (VDHR) to determine appropriate methods at each site prior to completing additional testing.

Survey/testing results will be documented in Technical Reports for review by the USFS, FERC, and VDHR. Any artifacts recovered from survey or site testing within the GWNF will be curated as directed by the USFS.

Civil Survey

Atlantic's consultant will conduct a civil survey to document the centerline, property boundaries, and other features along the route. Fieldwork will be conducted by up to three crews consisting of 3 or 4 land surveyors each. The crews will utilize sub-meter accurate GPS units, survey grade GPS or conventional survey equipment to collect data points along a 200-foot-wide survey corridor centered on the centerline.

As the survey crews traverse the pipeline route, minor amounts of vegetation will be brushed using hand tools to provide line of site and a travel path for survey equipment. Brush cutting will be limited to saplings or limbs less than 2 inches in diameter. The survey crews will traverse the brushed centerline collecting data points for the centerline and major crossing features such as fences, streams, utilities, roads, access roads, occupation lines, property lines, and land use lines. Data also will be collected on physical features such as elevation break points, buildings, delineated wetland points, wells, land features, and any miscellaneous obstructions within the survey corridor.

PK nails with paint markings will be placed on the edges and centerlines of roadways to identify the pipeline crossing location. PIs along the planned pipeline centerline will be recorded and marked with a spike nail and whiskers or biodegradable surveyor flagging. Flagging or plastic pin flags will be left along the proposed pipeline centerline at line of sight intervals to mark the centerline for future viewing by other groups such as permitting agencies. Flagging may be placed near any identified property corners within 200 feet of the centerline.

Access to the Survey Corridor

Atlantic and its consultants will access the survey corridor along the route in the GWNF from public roads and approximately 11.9 miles of USFS roads. The USFS roads are listed in the table below.

USFS Access Roads		
USFS Road No.	**Road Name(s)**	**Length (miles)**
281	Tower Mountain Road	2.8
348.1	Unnamed	0.4
449, 449A, 449B	Unnamed	4.6
466, 466A	Unnamed	1.6
1755	Unnamed	2.5
	Total	11.9

Survey crews will park vehicles along the sides of roads near the work area or as directed by the USFS. In general, vehicles will be parked near the beginning and planned ending point for survey each day. All vehicles will have a placard on the dashboard identifying the vehicle as part of the ACP and providing a contact phone number. All crewmembers will carry a photo identification to identify them as part of the ACP.

Schedule

Atlantic expects that a majority of the field surveys will be completed in the spring of 2017, though some follow-up survey (e.g., presence/absence surveys for certain species) may be required in the summer or fall of 2017.

Cost Recovery

Atlantic has established a cost recovery account with the USFS for the ACP. Costs incurred by the GWNF for the processing of this application should be charged to the cost recovery account.

Atlantic looks forward to continuing to work with you on this project. Please contact Mr. Richard Gangle at (804) 273-2814, if there are questions regarding this application. Please direct written responses to:

Richard Gangle
Energy Infrastructure Environmental Services
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Attachments:

- Standard Form 299, *Application for Transportation and Utility Systems and Facilities on Federal Lands*
- Topographic Map depicting the Proposed Study Corridor on USFS lands within the George Washington National Forest (with Management Prescription Units) – Color

cc: Alex Faught, Lands Program Manager, George Washington National Forest
Jennifer Adams, Project Coordinator, U.S. Forest Service
Richard Gangle, Dominion Resources Services, Inc.

Project Description
Atlantic Coast Pipeline Project
Proposed Geotechnical Investigations at Potential Slope Instability Sites
George Washington National Forest, Highland County, Virginia
October, 2016

The Atlantic Coast Pipeline Project (ACP) proposes to conduct geotechnical drilling investigations at two separate sites located within the George Washington National Forest (GWNF), where potential slope instability has been identified. These sites are located at Mileposts (MP) 120.3 and 123.1 of the proposed pipeline route, in Highland County, Virginia. The objective of these geotechnical drilling investigations is to identify and characterize the subsurface conditions at these potential slope instability sites in order to develop measures to ensure that construction of the ACP does not result in the activation of landslides at these locales.

Each drilling investigation location will include two boreholes. Each borehole will require a 15 foot by 25 foot drill pad area, within which the drilling rig will be set up. Both drilling investigation locations will also include a separate staging area which can be accessed along existing unimproved roads. Each drilling investigation location will also require access to the drill pads. These proposed locations have been sited to minimize ground disturbance and removal of vegetation, consistent with the objectives of the investigations. Locations of these features are shown on the attached maps.

Drill Pads

Each drilling investigation location will contain two drill pad sites. Pad dimensions are 25 feet long by 15 feet wide. Each drill pad site was sited in an area that will require minimal grading to provide a level rig set-up area. Vegetation will be cleared and topsoil segregated and stockpiled at the edge of the site. Erosion and sediment controls, consisting of 8-inch silt socks at the edge of the site and water bars as necessary, will be implemented progressively as work proceeds. A drill rig, similar to that shown in the attached photos, will be set up to take the samples.

Equipment Staging Areas

Both drilling investigation locations will include a 50-foot by 75-foot equipment staging area. The proposed staging locations are sited in previously disturbed areas that will require minimal vegetation clearing and no grading. From the staging areas, tracked equipment and four-wheeled ATVs will be utilized for road improvements and materials transport, respectively. Erosion and sediment controls, consisting of 8-inch silt socks at the edge of the site and water bars as necessary, will be installed at the equipment staging areas.

The staging areas will also be used to store and pump water for the drilling operations, with one or two 500-gallon tanks located at each site. A gasoline-powered pump will be used to pump water from the staging area to the drill pads via temporary hoses. All pumps will be set up

within secondary containment vessels to protect the soil from fluid spills or leaks. No fuel or other hazardous substances will be stored at the staging areas; support trucks will have an external fuel tank for fueling the drill rig. Spill pads and other related cleanup equipment and material will be kept on site to clean up any inadvertent leaks or spills of equipment/vehicle fluids.

Access

Access roads to the proposed drill pad and staging area locations are shown in the attached maps. With the exceptions noted below, access routes to the sites will utilize active and abandoned Forest Service roads. The abandoned roads are largely overgrown; consequently, downed and growing vegetation will need to be cleared to allow vehicles and equipment to reach the work sites. However, no widening, grading or graveling of these roads appears necessary, so no surface disturbance on or along roads is anticipated. It is possible that localized, minor ground disturbance may be required where cross-slope conditions will not permit safe passage of a light weight track mounted rig.

Proposed Access at MP 120.3

The MP 120.3 site is located approximately 0.6 mile north of Highway 250. Vehicular access to this site will follow the Buckhorn Creek Forest Service road to the north and into White Oak Draft to a proposed staging area located in an open space on the north side of the proposed ACP centerline (Figure 1). Between this staging area and the drill sites, an old logging road will be utilized. The length of the access route between the staging area and drill sites is approximately 1000 feet, of which 200 feet deviates from the old logging road. This segment would require clearing of vegetation only, for a width of about 8 feet. Approximately 800 feet of the old logging road would require clearing of downed and growing vegetation; no grading or graveling is anticipated, although minor, localized ground disturbance may be required where cross-slope conditions will not permit safe passage of a light weight track mounted rig. One stream crossing will be required where a low-water crossing already exists.

Proposed Access at MP 123.1

The MP 123.1 site is located approximately 2.3 miles east of Stover Shop Road (Route 728) along an active Forest Service logging road (Figure 2). If available, the equipment staging area will utilize a site where previous timber loading operations were situated, approximately 0.1 to 0.25 miles from the proposed drilling investigation sites. From the staging area, tracked equipment and four wheeled ATVs will be utilized associated with road improvements and materials transport, respectively. No stream crossings will be required and approximately 600 feet of new access road will be required upslope of the existing logging road to access the two drill pad sites and the staging area.

Environmental Surveys

With the exception noted below, cultural and biological surveys were carried out for all work areas associated with the proposed geotechnical investigations. No sensitive resources were identified in any of the proposed work areas.

At the MP 120.3 location, the portion of the old logging road that lies north of the ACP Project survey corridor (see Figure 1) was not surveyed for cultural or biological resources, as there are no plans to use it during pipeline construction. The proposed improvement of this road for the geotechnical investigations will be limited to clearing vegetation from overgrown segments. No grading or graveling is anticipated; proposed, although it is possible that minor, localized ground disturbance may be required where cross-slope conditions will not permit safe passage of a light weight track mounted rig. Use of the cleared roadway by vehicles and equipment would be similar to historical uses of the road. Consequently, the proposed improvement and use of this segment of road would not have the potential to affect historic properties, or other sensitive resources.

At the MP 123.1 the location the new access road, as well as the drill sites, are located within the area surveyed for cultural and biological resources (Figure 2). The staging area is located at the edge of the survey corridor in a previously disturbed area. No sensitive resources were identified during environmental field surveys at these locations.

Staging and Environmental Health and Safety Compliance

Prior to any clearing, grading or mobilization to the sites, work areas will be staked, flagged, and/or signed by ACP personnel. Limits of approved clearing along access roads will be flagged/staked. The perimeters of approved drill pad and staging area sites will be staked, and signs will be posted directing the contractor to approved access routes. No exclusion areas within or adjacent to the proposed work areas requiring special signage have been identified.

Prior to beginning work on any access roads, drill sites or staging areas, ACP personnel will hold one or more meetings with the contractor's personnel to review the environmental and safety requirements of the job. One or more ACP inspectors will be present during the work to oversee compliance with permit conditions and company requirements, and to interface with GWNF staff as necessary. All equipment and vehicles will be inspected prior to entering the GWNF to ensure they are free of soil that may contain invasive weed propagules, and free of fluid leaks.

The contractor will develop and maintain a site-specific Health and Safety Plan (HASP) in accordance with Occupational Safety & Health Administration (OSHA) requirements, as necessary. The HASP will address potential hazards, including requirements for worker protection based on the anticipated activities. At least 48 hours prior to commencing work at the site, the contractor will delineate the proposed locations of the individual explorations and contact Underground Service Alert (USA, Dig-Alert) to identify the location of any existing underground utilities in the immediate vicinity.

Investigatory Drilling

Four geotechnical borings (two borings at MP 120.3 and two borings at MP 123.1) are proposed to be advanced using a combination of 8-inch diameter hollow-stem auger (HSA) and core drilling (NQ or NX) methods to anticipated maximum depths of approximately 50 feet below ground surface (ft bgs) at MP 120.3 and 30 ft bgs at MP 123.1. Coordinates for the proposed locations, along with anticipated subsurface conditions and proposed depths are included in the following table:

Investigation Site (Boring ID)	Coordinates Latitude/Longitude (Decimal Degree WGS84)	Mapped Geologic Unit	Anticipated Maximum Depth (Feet)
MP120.3 (B-1)	38.291879 -79.235864	Devonian-age Brallier Formation Shale/Siltstone	50
MP120.3 (B-2)	38.291940 -79.235626	Devonian-age Brallier Formation Shale/Siltstone	50
MP123.1 (B-1)	38.28891103 -79.18890255	Devonian to Silurian-age Undivided Sandstone/Limestone/Shale	30
MP123.1 (B-2)	38.28914881 -79.18969272	Devonian to Silurian-age Undivided Sandstone/Limestone/Shale	30

The borings will be advanced utilizing a light-weight rubber track mounted Dietrich D-50 drill rig as shown in the attached photos. Based on results from previous geotechnical subsurface investigations performed elsewhere on the ACP Project, and a review of logs for the shallow test pits performed as part of the Order 1 Soil Survey within the immediate vicinity, it is we assumed that HSA drilling methods will only be advanced in the upper 10 to 15 ft bgs (the estimated depth of the overburden material and/or weathered bedrock). During HSA drilling, drive samples will be collected at 30 inch intervals using a 2.5-inch diameter, 24-inch long Standard Penetration Test (SPT) sampler to facilitate lithologic logging and sample collection for laboratory testing. SPT sampling will be performed through the entire overburden material profile and into the underlying bedrock, to the extent practical.

Following auger or SPT refusal, or upon encountering competent formation (bedrock) material, the investigation will switch to core drilling methods until the borehole is advanced at least 15 feet into intact bedrock. The core drilling process requires circulation of water mixed with a naturally occurring bentonite based drilling fluid additive to regulate the temperature of the core bit, to carry cuttings to the surface, and to promote borehole stability. During the coring process, drilling fluid is pumped through the drill rods and past the bit before returning to the surface with cuttings through the annular space between the drill rods and the wall of the boring. At the surface, the fluid and cuttings will discharge into a baffled sump tank to allow the cuttings to fall out prior to recirculating the drilling fluid back down the borehole. Water for this process will be hauled to the site and stored in one or two 500 gallon tanks at the staging areas. To convey water

to the drilling sites, temporary hoses will be extended from the staging area and water will be pumped using a portable gasoline powered pump. An example of this type of pump is presented in the photos attached.

Recovered cores will be logged with respect to geologic unit, material/rock type, and structural orientation and discontinuities will be recorded by a geologist in the field. Upon completion of logging, the cores will be photographed and retained in core boxes for subsequent sample selection and/or archiving.

Upon completion of drilling activities, borings may be selected for instrumentation as described in the following section. If instrumentation is not needed, the borings will be backfilled from the bottom up through a tremmie pipe using bentonite-cement grout.

Instrumentation

Upon completion of the core drilling and evaluation of the subsurface conditions, select boreholes may be identified for instrumentation consisting of either a piezometer to monitor groundwater levels or an inclinometer to record potential slope movement over time. It is anticipated that up to one inclinometer and piezometer may be installed at each of the two investigation sites.

Piezometers

Temporary piezometer may be installed in the exploratory borings if groundwater is encountered during drilling investigations. The standard configuration for piezometers will consist of a 1-inch diameter PVC pipe placed into the open boring with a section of slotted or perforated pipe (screened interval) placed below the depth where groundwater is encountered. The annular space around the screened interval will be backfilled with a permeable material generally consisting of coarse-grained sand. At the top of the sand, a bentonite seal will be placed and the remainder of the annular space will be backfilled with bentonite-cement grout to prevent conveyance of surface water into the ground. Where installed, access to the piezometer for periodic readings will be provided through a locked surface monument, landscape vault, or well box which will also be used as a benchmark for subsequent level surveys. It is anticipated that piezometers may be monitored through construction if deemed necessary. On completion of monitoring, the PVC pipe will be cutoff below the ground surface and will be backfilled with bentonite-cement grout.

Inclinometers

Inclinometers may be installed in selected borings to confirm or monitor the absence or the presence of progressive slope movement that may be imperceptible to the eye. Dependent on the findings of the borings, the inclinometer casing would initially be installed to a targeted depth within the selected borehole and the annular space between the wall of the boring and the

inclinometer casing will be backfilled using a lean cement grout mixture. The inclinometer casing provides access for insertion of a special tool that will obtain subsurface measurements and potential deflection of the casing over time in order to determine the depth of any movement surfaces. Following an initial baseline survey (zero reading), grooves inside the casing provide a track from which repeatable tilt measurements can be obtained and potential deflection can be recorded. Similar to the piezometers, access to the inclinometers for periodic readings will be provided through a locked surface monument, landscape vault, or well box which will also be used as a benchmark for subsequent level surveys. It is anticipated that inclinometers may be monitored through construction if deemed necessary. On completion of monitoring, the casing will be cut off below the ground surface and will be backfilled with bentonite-cement grout.

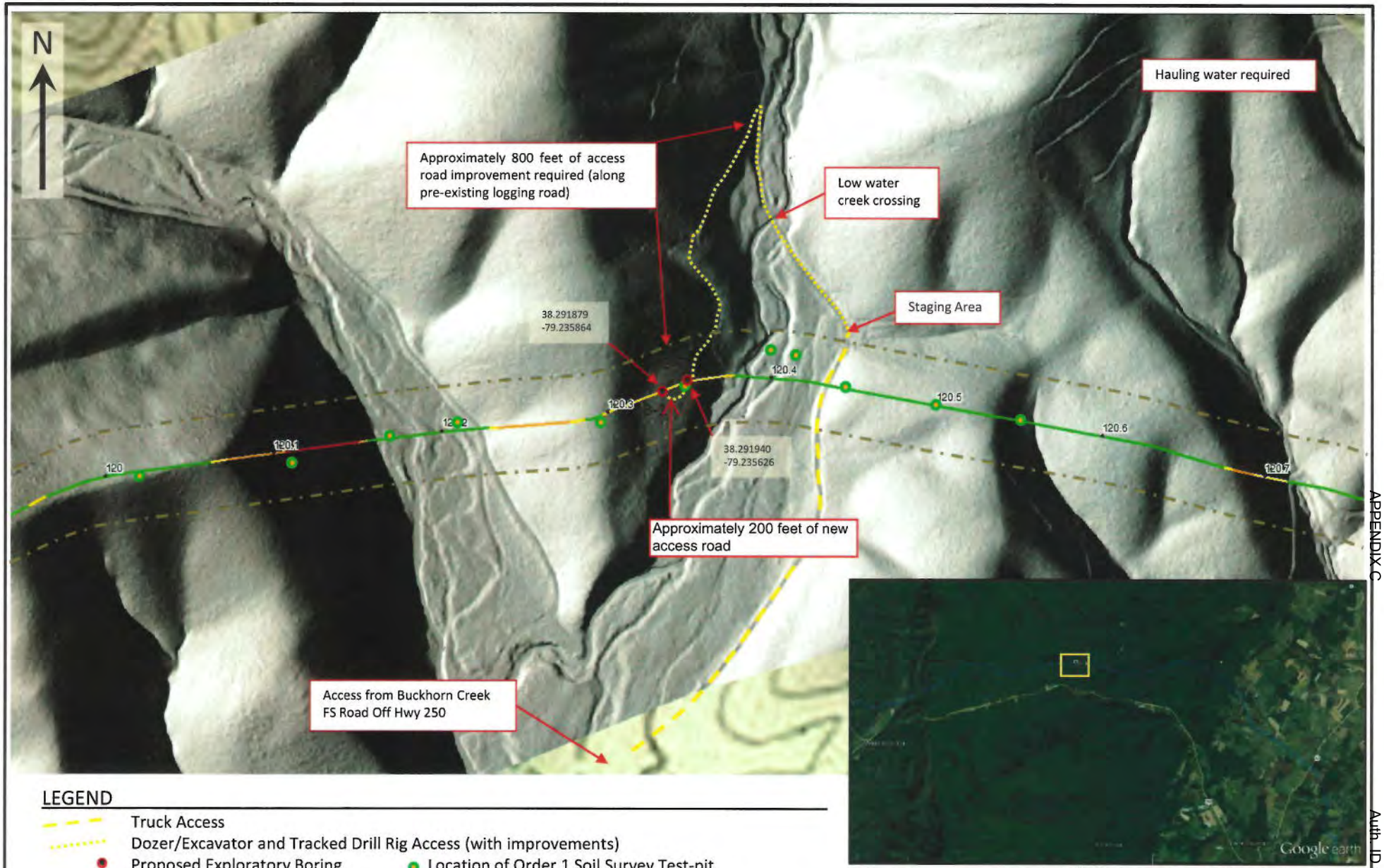
Restoration

Immediately following completion of drilling at each of the boring sites, restoration activities will be performed. Excess cuttings from the borings will be thinly spread within the limits of disturbance and the ground surface will be re-contoured to match that of pre-existing conditions to the extent feasible, stockpiled topsoil will be spread, and the area will be seeded as specified by the GWNF. Silt socks will be slit and straw will be spread over exposed soil. All non-biodegradable materials will be removed from the site. The new access road segments, staging areas, and drill pads will be rehabilitated and re-seeded.

Schedule

A tentative schedule for anticipated field activities described herein is provided below.

Approximate Field Day	Work Activity Description	Estimated Duration
1	Mobilize field crew to MP 120.3 location. Begin access road improvement and installation of erosion/sediment control	1 Day
2	Continue access road improvements and erosion/sediment control installation. Mobilize drill rig onto first drilling location, set up water system. Begin drilling.	1 Day
3	Investigation drilling, begin restoration at first drilling location when complete	2 Days
5	Complete drilling at MP120.3. Begin access road work at MP123.1	1 Day
6	Complete access road work and installation of erosion/sediment control at MP123.1, begin restoration at MP120.3. Mobilize drill rig to MP123.1, setup and begin drilling.	2 Days
8	Complete drilling at MP 123.1. Begin restoration at MP123.1.	1 Day
9	Demobilize drill rig and crew. Finish restoration activities.	1 Day
10	Demobilize remaining equipment and crew	1 Day



LEGEND

- Truck Access
- Dozer/Excavator and Tracked Drill Rig Access (with improvements)
- Proposed Exploratory Boring
- Location of Order 1 Soil Survey Test-pit

AP-1 REV 11 Centerline

- <30% slope
- 30 to 40% slope
- 40 to 58% slope
- >58% slope

120.3 Project Milepost

150-foot Project Buffer

SCALE

0 250 500 750 FT

Reference: ELEV_ACP_MP115_189_LidarHillshade280_P.tif
Original map scale 1:3000. Inset imagery date 9/18/15
Google Earth Pro.

PROPOSED GEOTECHNICAL INVESTIGATION PLAN
AP-1 Milepost 120.3

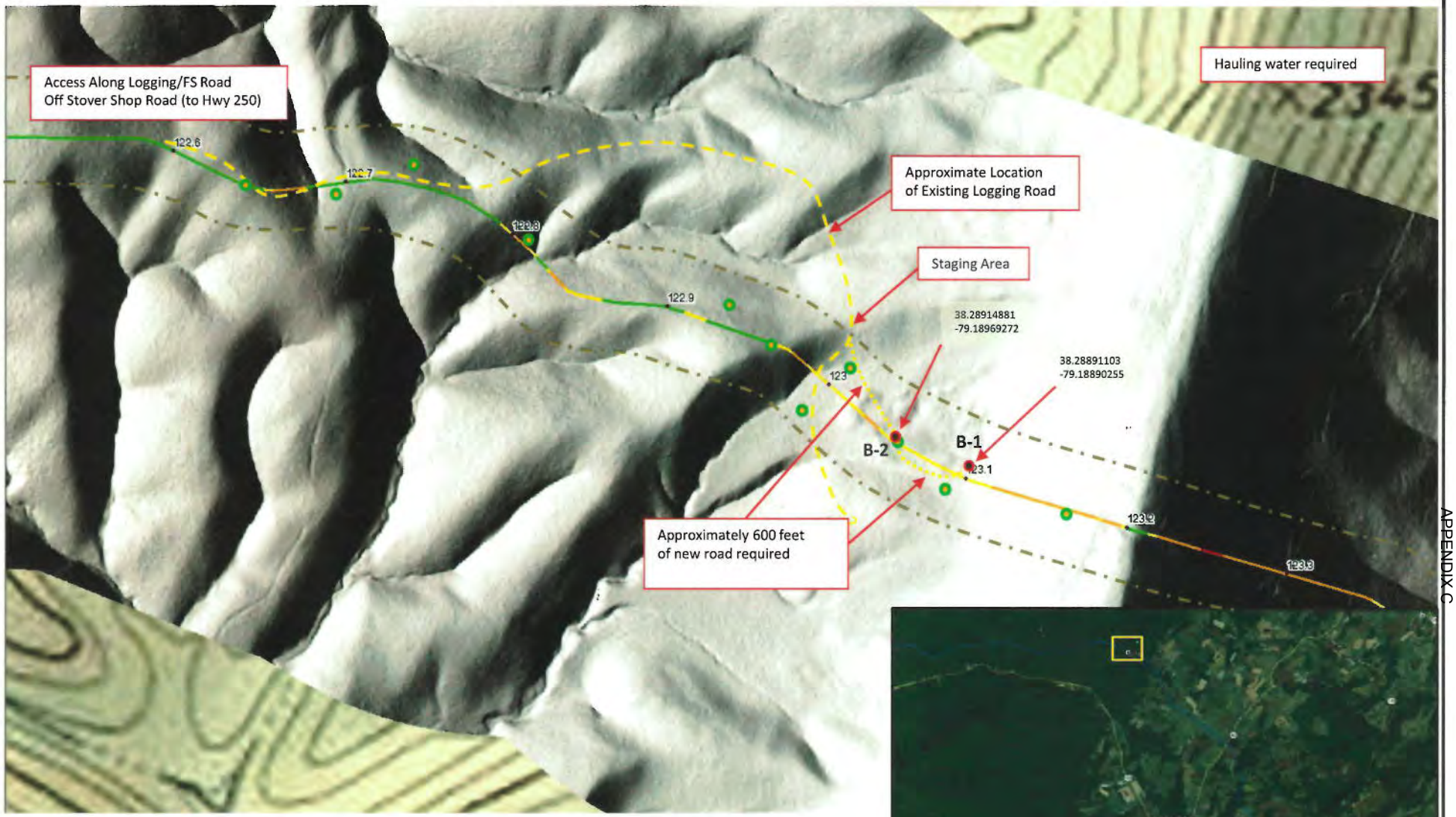
Atlantic Coast Pipeline – Highland County, Virginia

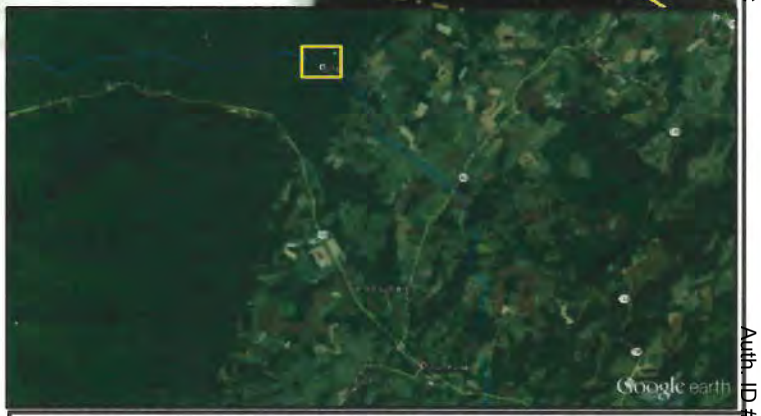
Geosyntec consultants

DATE: October 2016

PROJECT NO. TXG0007

Figure 1





LEGEND

- Truck Access
- Dozer/Excavator and Tracked Drill Rig Access (with improvements)
- Proposed Exploratory Boring
- Location of Order 1 Soil Survey Test-pit

AP-1 REV 11 Centerline

- <30% slope
- 30 to 40% slope
- 40 to 58% slope
- >58% slope

120.3 Project Milepost

150-foot Project Buffer

SCALE

0 250 500 750 FT

Reference: ELEV_ACP_MP115_189_LidarHillshade280_P.tif
Original map scale 1:3000. Inset imagery date 9/18/15
Google Earth Pro.

PROPOSED GEOTECHNICAL INVESTIGATION PLAN
AP-1 Milepost 123.1

Atlantic Coast Pipeline – Highland County, Virginia

Geosyntec consultants

DATE: October 2016

PROJECT NO. TXG0007

Figure 2

Geosyntec consultants

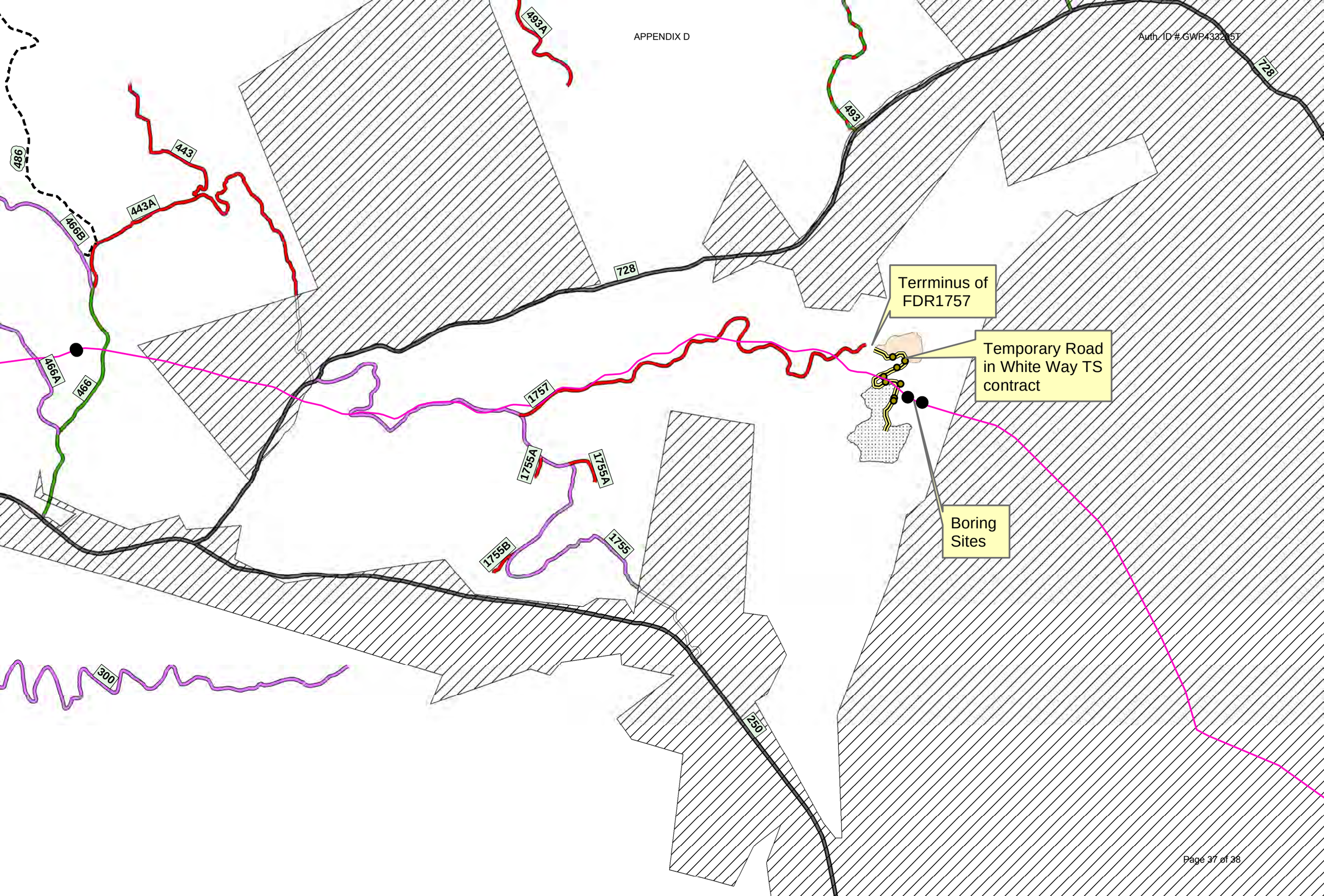
Attachment A –Photos of Proposed Equipment

	Photo 1 Image of a typical John Deere 650K dozer. Dozer may be used during site preparation and access road improvement activities.
	Photo 2 Image of a typical John Deere 85D mini excavator. Excavator may be used during site preparation and access road improvement activities.
	Photo 3 Image of a typical Diedrich track mounted D-50 drill rig is to be used during the geotechnical drilling investigation.

Geosyntec consultants

Attachment A –Photos of Proposed Equipment

	Photo 4 Image of a Diedrich D-50 track mounted drill rig (with raised mast) is to be used during the geotechnical drilling investigation
	Photo 5 Image of a typical tower pump. Pump is to be used for conveying water from water tanks to drilling locations.


493A
493
728
443
443A
486
466B
466A
466
728
1757
1755A
1755A
1755B
1755
300
250
Terrminus of FDR1757
Temporary Road in White Way TS contract
Boring Sites

Revegetation and tank trap requirements for proposed ACP boring site access
March 15, 2017

Affected area:

- Approximately 0.4 mile from end of FR1757;
- Estimated 1 acre of disturbance for revegetation purposes.

Revegetation Specifications

Fertilizer/Lime/Straw	Pounds/Acre
10-10-10	500 lbs.
Lime	500 lbs.
Straw	3,500 lbs. (70 bales)

Seed	Pounds/Acre
Orchard Grass	50 lbs.
Clover	10 lbs.
Millet	20 lbs.
Annual Rye	10 lbs.
Perennial Rye	10 lbs.

Tank trap at start of Temporary Road

Immediate view beyond tank trap.

From: Richard B Gangle (Services - 6)
Sent: Wednesday, April 12, 2017 7:40 AM
To: 'Maria Martin'
Cc: Jennifer Adams (jenniferpadams@fs.fed.us); Kent Karriker (kkarriker@fs.fed.us); Alex Faught (afaught@fs.fed.us); Peter Rocco; Colin P Olness (Energy - 2)
Subject: RE: ACP - Notes for 3/24/17 Steep Slopes Meeting

Please find attached two documents that contain information requested during the 3/24 meeting between USFS and ACP. The first document is the computation analysis package that was part of the slope stability assessment for the site design at MP 84.95 to 85.05. The second document is the geologic and structural mapping report for the site design at MP 84.95 to 85.05. Please let me know if you have any questions. Thanks

Richard Gangle
Energy Infrastructure Environmental Services
Dominion Resources Services, Inc.
Phone: 804-273-2814
Cell: 804-229-7026

From: Maria Martin [mailto:maria.martin@galileoaz.com]
Sent: Wednesday, April 05, 2017 2:02 PM
To: Richard B Gangle (Services - 6)

Geosyntec consultants

520 Pike Street, Suite 1375
Seattle, WA 98101
PH 206.496.1456
www.geosyntec.com

4 April 2017
TXG0007-012-2200

VIA EMAIL

Colin Olness, Contractor
Atlantic Coast Pipeline
99 Edmiston Way
Buckhannon, WV 26201

Subject: **Geologic and Structural Mapping Summary Report**
Geohazard Mitigation Site Specific Design Location
Atlantic Coast Pipeline
ACP Segment AP-1 MP 84.95 to 85.05
Highland County, Virginia

Dear Mr. Olness:

This geologic and structural mapping summary report has been prepared by Geosyntec Consultants, Inc. (Geosyntec) for Dominion Transmission, Inc. (DTI) to present the results of work performed along a steep slope section of the proposed Atlantic Coast Pipeline (ACP) Project (Project) between Milepost (MP) 84.95 and 85.05 within the George Washington National Forest (GWNF) in Highland County, Virginia (Figure 1). This work was performed in response to a request by the United States Forest Service (Forest Service), made during a meeting with DTI, Geosyntec and others, in Harrisonburg, Virginia on 24 March 2017, that additional geologic characterization of the slope conditions that support the geohazard mitigation site specific design for this site, be provided.

GEOLOGIC AND STRUCTURAL MAPPING

Geologic mapping was performed in the field along the steep slope between MP 84.95 and 85.05 on 25 March 2017 by a Geosyntec certified engineering geologist. The results of the mapping are presented on Figure 2. Prior to performing field activities a review of available geologic information [Dicken et al., 2005][1], available LiDAR and satellite imagery, and the proposed

[1] Dicken, C.L., Nicholson, S.W., Horton, J.D., Kinney, S.A., Gunther, G., Foose, M.P., and Mueller, J.A.L. 2005. Preliminary integrated geologic map databases for the United States: Delaware, Maryland, New York, Pennsylvania, and Virginia: U.S. Geologic Survey Open File Report 05-1323. Available at http://pubs.usgs.gov/of/2005/1325/, accessed 8 September, 2015

Geohazard Mitigation Site Specific Design for the slope segment was conducted [Geosyntec, 2017][2]. The objective of this geologic mapping task was to collect the following information to provide additional geologic characterization of the slope conditions in support of the geohazard mitigation site specific design:

- Consideration of slope inclination and length;
- Consideration of the geomorphic character of the slope;
- Assessment of slope condition based on observed overlying soil and underlying rock materials;
- Description of the underlying bedrock formation and surficial soils encountered on the slope;
- Collection of structural geologic data (bedding, joints, and other discontinuities within the formational material) to evaluate the potential for slope instability;
- Interpretation of the chronology of pre-existing natural conditions and potential changes from future disturbance impacts; and
- Collection of additional photographic documentation of the existing natural conditions.

Selected photographs that illustrate conditions described in the text of this summary report are presented in the Photograph Log in Appendix A. Station references in the Photograph Log are with reference to the project stationing system shown on Figure 2.

SUMMARY OF FINDINGS

Slope Conditions

The southwest facing slope extends up from an unnamed tributary to Warwick Run, where a small flowing creek was observed (Photograph 1) at an elevation of approximately 2595 feet above Mean Sea Level (AMSL), to a narrow ridgeline at an elevation of approximately 2847 feet AMSL. The approximately 495-foot-long slope varies in inclination from >58 to <30 percent with the steepest slope segment being within the lower approximately 40 to 50 feet adjacent to the small flowing creek, where the inclination is approximately 100 percent (Photograph 2) and

[2] Geosyntec Consultants, 2017. "Geohazard Mitigation Site Specific Design for ACP Ap-1 MP 84.95 to MP 85.05 Construction Alignment Sheet No. 113 Station 5346+00 to 5352+00", plan sheet set prepared for Atlantic Coast Pipeline Project, Dominion Transmission, dated March 2017.

the gentlest slope segment being near the ridgeline (Photograph 3). Over 60 percent of the total slope length is classified as extremely steep (>58 percent).

Locally moist to wet ground conditions were observed across the lower 50 feet of the slope, but no evidence of groundwater seeps or free flowing water was noted (other than at the small flowing creek). Bedrock outcrops were only exposed within the proposed permanent and temporary Right-of-Way (ROW) limits along the lower approximately 40 feet of slope, which starts approximately 10 feet to the northeast of the edge of the small flowing creek (Photographs 4 and 5). The upper approximately 450 feet of slope is mantled by a layer of soil, obscuring bedrock exposure and appearing as a smooth surface on LiDAR greyscale hillshade imagery and slope maps. The upper portion of the slope is covered with conifer and deciduous trees and appears to be well drained with no wet areas being observed (Photographs 6 and 7).

Bedrock Formation and Soil Description

Sedimentary bedrock associated with the Devonian-age Chemung Group (redefined as Foreknobs Formation) is exposed locally along the edge of the small flowing creek within the bottom approximately 40 feet of the slope. The observed bedrock material consists of yellowish brown siltstone and thinly interbedded gray to olive-brown shale (Photographs 8 and 9). Siltstone beds range from 3 to 6 inches thick with interbedded platy fissile shale. The bedrock is moderately to highly weathered and fractured along a series of parallel joint sets resulting in localized talus accumulation below the outcrops. Overlying the bedrock an approximately 6 to 12 inches thick mantle of soil consisting of dark yellowish brown silty fine sand to fine sandy silt (USCS classification of SM-ML) was observed (Photograph 10). Abundant organic material is present near the ground surface and within the upper 6 inches of the soil mantle (Photograph 11).

Geologic Structure

Twelve structural orientations were measured along bedding and joints across the bedrock outcrops on the lower segment of the slope. The structural orientations are presented in Table 1 and locations of the structural measurements are shown on Figure 2.

Table 1 – Measured Structural Orientations

Location ID	Structural Orientation	Dip Inclination and Direction	Discontinuity Type	Formation
01	N 57^0 W	22^0 NE	Bedding	Chemung Fm
02	N 34^0 W	8^0 NE	Bedding	Chemung Fm
03	N 25^0 W	5^0 NE	Bedding	Chemung Fm
04	N 15^0 E	19^0 SE	Bedding	Chemung Fm
05	N 23^0 E	66^0 NW	Joint	Chemung Fm

06	N 25^0 E	12^0 SE	Bedding	Chemung Fm
07	N 62^0 E	79^0 NW	Joint	Chemung Fm
08	N 50^0 E	80^0 NW	Joint	Chemung Fm
09	N 55^0 E	80^0 NW	Joint	Chemung Fm
10	N 36^0 E	20^0 SE	Bedding	Chemung Fm
11	N 52^0 E	15^0 SE	Bedding	Chemung Fm
12[1]	N 84^0 E	9^0 SE	Bedding	Chemung Fm

1: Structural orientation collected approximately 300 feet down drainage from centerline (38.30156 / -79.78491)

An evaluation of the structural measurements suggests that the proposed ROW extends across a relatively tight northeasterly plunging anticlinal fold within the siltstone and shale bedrock. Along the proposed pipeline centerline the apparent dip of bedding is into slope at an inclination of approximately 5 to 15 degrees to the northeast.

Geomorphology

Geomorphic evidence of past shallow seated slope instability and erosion was observed along the lower approximately 40 feet of the slope likely resulting from toe cutting and over steepened conditions along the Unnamed Tributary to Warwick Run, adjacent to the toe of the slope. Below an elevation of 2640 feet MSL (between approximate Station 5346+50 and 5346+90 on the site specific design drawing) previous instability and erosion has locally exposed the underlying bedrock material. Subsequent mass wasting has created an unconsolidated talus slope of weathered bedrock and colluvium below the bedrock outcrops (Photograph 12). Locally, tree trunk distortion was also observed, suggesting shallow soil creep in the unconsolidated colluvium (Photographs 13 and 14). Within the upper approximately 450 feet of the slope (approximate Station 5346+90 and 5351+45 on the site specific design drawing) no geomorphic evidence of slope instability was observed in the field or on the LiDAR greyscale hillshade imagery and slope maps.

SITE SPECIFIC DESIGN FOR GEOHAZARD MITIGATION

The geologic and structural mapping of the slope between MP 84.95 and 85.05 indicates that erosion and mass wasting of moderately to highly weathered, closely jointed siltstone and shale bedrock, has resulted in shallow seated instability across the lower 40 to 50 feet of the slope face between approximately Stations 5346+50 and 5346+90. It is anticipated that following isolation of the stream by damming and pumping, initial grading of the lower slope will remove the material that comprises the shallow seated instability to expose the underlying bedrock. The bedrock exhibits favorable structure and strength for machine excavation and the absence of observed seepage or flowing water discharging from the slope is favorable from the perspective of long-term stability. The fractured and weathered nature of the observed bedrock combined with the extremely steep inclination of the lower slope indicate that ongoing mass wasting on the

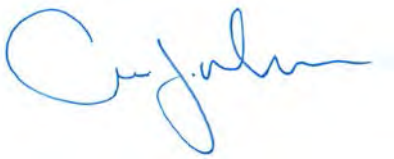
slope could result in future shallow seated instability and colluvium accumulations, in the absence of mitigation measures. The site specific design prepared for this slope includes the installation of soil nails, TECCO mesh and coir cloth between approximate Stations 5346+40 and 5347+10 across the lower portion of the slope. Implementation of the design measures will mitigate the potential for future instability as well as stabilize the pipeline trench backfill material.

CLOSING

Geosyntec appreciates the opportunity to provide Dominion Transmission, Inc. with this geologic structural mapping summary report, and we look forward to working together on this important project. If you have any questions or require additional information, please contact Alex Greene (agreene@geosyntec.com, 858.716.2911) or Tony Rice (trice@geosyntec.com, 206.496.1456).

Sincerely,

Geosyntec Consultants,



Alexander Greene, C.E.G
Principal Engineering Geologist

Logan Brant, Ph.D., P.E.
Senior Geotechnical Engineer

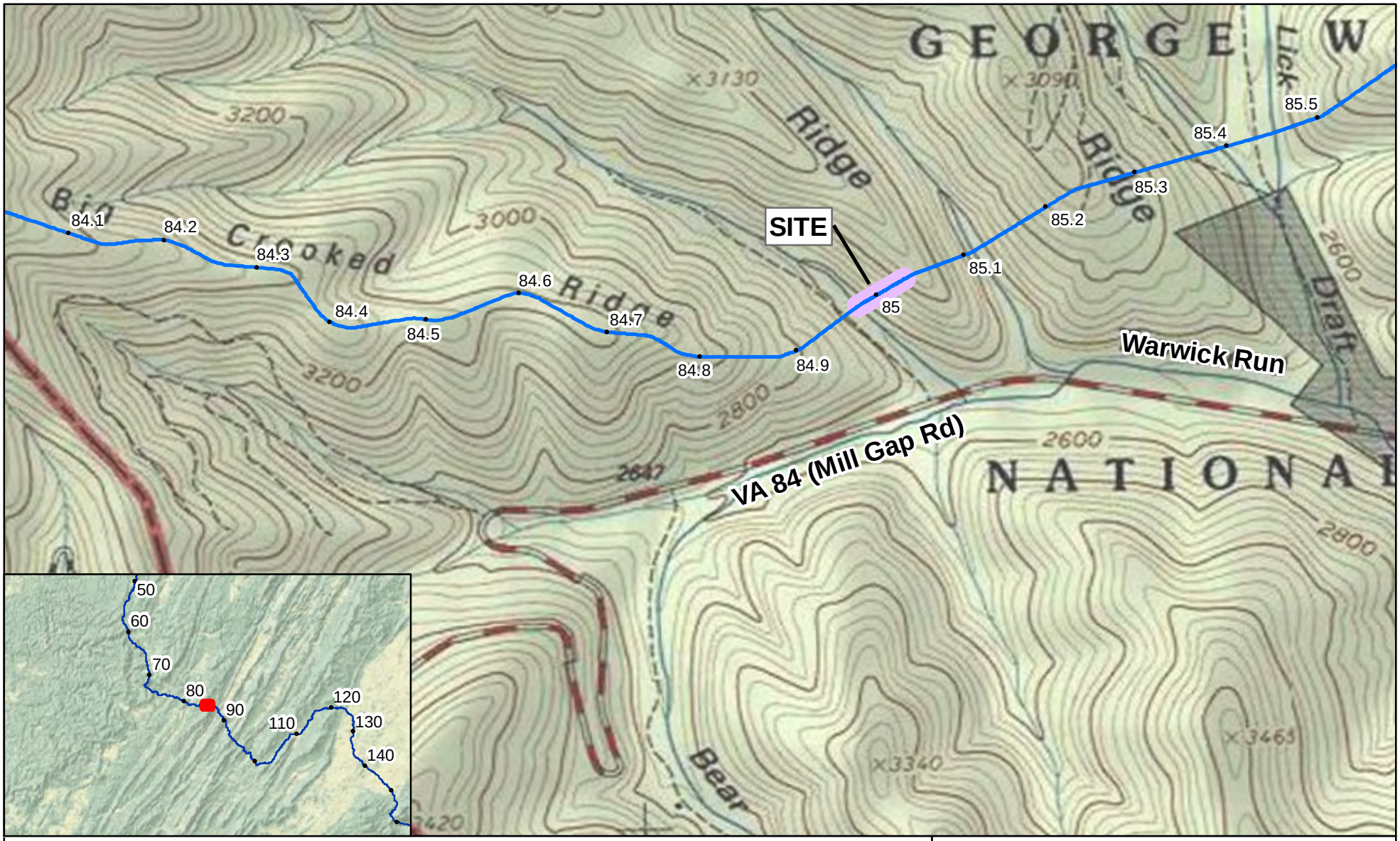
Attachments

Figure 1 – Site and Vicinity Map

Figure 2 – Geologic and Structural Mapping

Appendix A - Photographic Log

FIGURES



Legend

- ACP AP-1 Mileposts
- Steep Slope

N

1:12,000

0 1,180 Feet

SITE AND VICINITY MAP
ACP AP-1 MP 84.95 TO MP 85.05

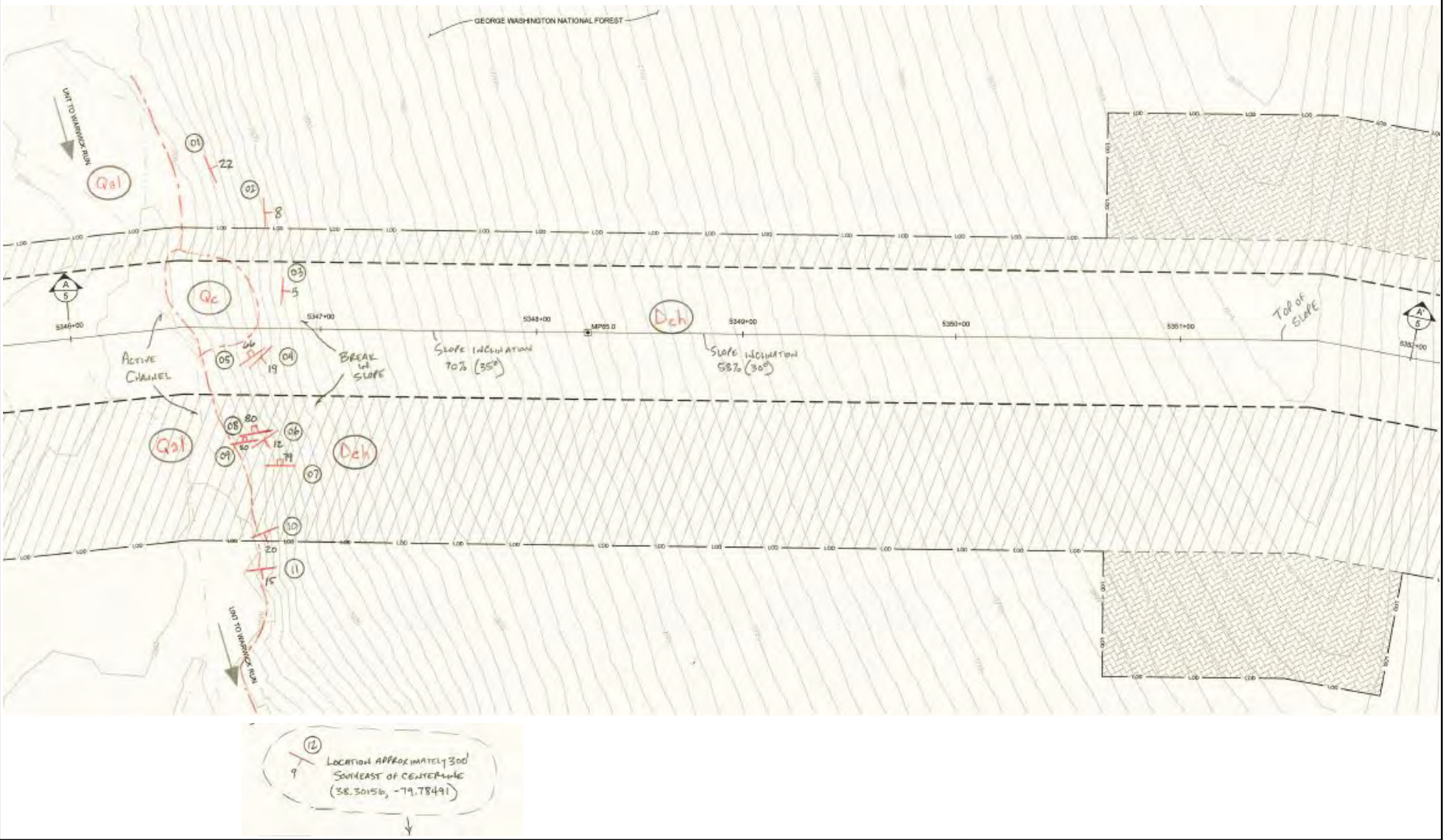
Highland County, Virginia

Geosyntec consultants

TXG0007.012.2200 | April 2017

Figure 1

C:\Users\zlifton\Desktop\ACP_GIS_home\Geology_MP85\MP_85_geology_Fig_1.mxd 4/4/2017 11:33:37 AM



Qal — Alluvium - Unconsolidated fluvial deposits

Qc — Colluvium - Unconsolidated slopewash and talus deposits

Dch — Chemung Formation - Devonian age interbedded shale and siltstone

04 19 — Strike and Dip of Bedding (Corresponding ID in Table 1 of report)

07 79 — Strike and Dip of Joint (Corresponding ID in Table 1 of report)

Geologic contact

N

0 20 40

SCALE IN FEET

GEOLOGIC AND STRUCTURAL MAPPING
ACP AP-1 MP 84.95 TO MP 85.05

Highland County, Virginia

Geosyntec consultants

TXG0007.012.2200 | April 2017

Figure 2

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APPENDIX A – PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 1:

View: Looking southeast towards Station 5346+50

Photo looks downstream along Unnamed Tributary to Warwick Run shows extremely steep conditions on the lower portion of slope along ACP centerline adjacent to small flowing creek. Note accumulation of unconsolidated colluvium below bedrock outcrops

PHOTOGRAPH 2

View: Looking southwest from Station 5346+75

Photo looks downslope towards small flowing stream at toe of slope showing extremely steep slope conditions along centerline with slope inclinations up to 100%

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 3:** View: Looking southwest from Station 5351+50 Photo shows stable moderately steep slope conditions along centerline with slope inclination of 30% to 40% below narrow ridgeline near top of slope near MP 85.03
	**PHOTOGRAPH 4:** View: Looking northeast Photo shows moderately to highly weathered interbedded siltstone and shale of the Chemung Formation along the toe of the slope approximately 75 feet southeast of ACP centerline

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 5:** View: Looking northeast Photo shows Chemung Formation bedrock along small flowing creek approximately 300 feet southeast (downstream) of ACP centerline
	**PHOTOGRAPH 6:** View: Looking northeast from Station 5347+00 Photo looks upslope showing stable extremely steep slope conditions along centerline with inclinations up to 70% towards gentler slope above where conifer and deciduous trees grow in well drained soils

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 7:** View: Looking southwest at Station 5350+00 Photo shows stable very steep slope conditions along centerline with slope inclinations of 40% to 58% along upper portion of slope where conifer and deciduous trees grow in well drained soils
	**PHOTOGRAPH 8:** View: Looking northeast Photo shows moderately weathered and fractured siltstone of the Chemung Formation near the toe of the slope approximately 50 feet southeast of ACP centerline

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 9:

View: Looking north

Photo shows moderately to highly weathered and closely jointed Chemung Formation bedrock near the toe of the slope approximately 25 feet southeast of ACP centerline

PHOTOGRAPH 10:

View: Looking southeast at Station 5346+75

Photo shows mantle of unconsolidated colluvium below bedrock outcrop on lower portion of slope

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 11:

View: Looking north at Station 5346+60

Photo shows abundant organic material on surface of colluvium deposit mantle across lower portion of slope along ACP centerline

PHOTOGRAPH 12:

View: Looking northeast from Station 5346+50

Photo shows colluvium deposit across lower portion of slope along ACP centerline with tree trunk distortion suggesting shallow soil creep

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 13:

View: Looking southeast at Station 5346+60

Photo shows tree trunk distortion on colluvium deposit near toe of slope suggesting shallow soil creep

PHOTOGRAPH 14:

View: Looking northwest at Station 5347+00

Photo shows steep slope conditions along centerline just above break in slope where slope inclination greater approximately 70% and tree trunk distortion suggests shallow soil creep

Geosyntec consultants

Geosyntec
consultants

COMPUTATION COVER SHEET

Client:	**ACP**	Project:	**ACP Geohazard Analysis Program**	Project/ Proposal No.:	**TXG0007**
				Task No.	**013**

Title of Computations: Geohazard Mitigation Design at ACP AP-1 MP 84.95 to 85.05

Computations by:	Signature		4/7/2017
	Printed Name	Mustafa Erten, Ph.D., P.E. (TX)	Date
	Title	Engineer	
Assumptions and Procedures Checked by: (peer reviewer)	Signature		4/7/2017
	Printed Name	Logan Brant, Ph.D., P.E. (VA)	Date
	Title	Senior Engineer	
Computations Checked by:	Signature		4/7/2017
	Printed Name	Logan Brant, Ph.D., P.E. (VA)	Date
	Title	Senior Engineer	
Computations backchecked by: (originator)	Signature		4/7/2017
	Printed Name	Mustafa Erten, Ph.D., P.E. (TX)	Date
	Title	Engineer	
Approved by: (pm or designate)	Signature		4/7/2017
	Printed Name	Logan Brant, Ph.D., P.E. (VA)	Date
	Title	Senior Engineer	

Approval notes: Supports drawing set Revision D, dated March 2017

Revision History:

No.	Description	Date	By	Checked by	Approval
D	Preliminary – Not for Construction	4/7/2017	MBE	LCB	LCB
A	Interim Design	12/22/2016	MBE	RS	LCB

TABLE OF CONTENTS

LIST OF APPENDICES

INTRODUCTION

Geosyntec Consultants (Geosyntec) prepared this calculation package to present the slope stability assessment and the soil nail and mesh system design performed for the site-specific geohazard mitigation of slope at MP 84.95 to 85.05 on the Atlantic Coast Pipeline (ACP) Segment AP-1 alignment. The slope is located in the George Washington National Forest in Highland County, Virginia.

This calculation package is organized to present: (i) methodology; (ii) slope classification; (iii) profile; (iv) subsurface stratigraphy and geotechnical parameters; (v) geohazard mitigation recommendations; and (vi) cut-fill volume calculations.

SLOPE CLASSIFICATION

Geosyntec has assigned one of six Best In Class (BIC) typical scenarios to each steep slope along the ACP and Supply Header Project (SHP) pipeline alignments. Only a few dozen of the most challenging and complex slopes were selected by Geosyntec for site specific designs. For many slopes, the extent and complexity of the incremental controls for geohazard mitigation are largely influenced by the slope inclination of the ground surface after regrading for pipeline construction, the orientation of the pipeline alignment with respect to the slope fall line, and the nature of the near surface soil and rock materials. Slope inclination and the orientation of the pipeline alignment are often variable along the slope; therefore, it may be necessary to subdivide each slope into several zones, each with approximately constant slope inclination and requiring similar incremental controls throughout that zone.

The two BIC typical scenarios that were encountered at this site were [Atlantic Coast Pipeline, 2017]:

1. BIC Scenario C1 – Steep slopes with increased potential for instability when disturbed (planar slope)
2. BIC Scenario A2 – Steep slopes without evidence of previous movement (sideslope)

METHODOLOGY

The soil nails were designed for the steepest portion of the slope using the online dimensioning tool named RUVOLUM®, which was developed by Geobrugg [Geobrugg, 2016]. As mentioned in the user's manual, this tool was developed to

design slope stabilization consisting of high tensile steel wire mesh, bearing plate, and nails [Geobrugg, 2016]. The approach that is implemented in this dimensioning tool is recommended for potential slippage of shallow soils up to approximately 6-ft depth. Geosyntec considered this methodology to be applicable for this site.

Stability above the soil nail and mesh system area at ACP AP-1 MP 84.95 to MP 85.05 was analyzed using the infinite slope approach considering effective stresses (also known as a drained analysis). In this approach, the slope is assumed to extend infinitely and the slip surface is parallel to the slope surface [Duncan and Wright, 2005]. The infinite slope approach is considered appropriate at this location because the thickness of the potentially unstable materials is small compared to the longitudinal dimension of the slope. For non-submerged slopes (zero pore pressures), the factor of safety against sliding (FS) is calculated by the following equation:

$$FS = \frac{2 \cdot c'}{\gamma \cdot z \cdot sin(2\beta)} + \frac{\tan \phi'}{\tan \beta} \qquad \text{Equation 1}$$

where c' is the cohesion of the soil, z is the depth of soil, ϕ' is the soil friction angle and β is the slope inclination. For a cohesionless soil (c'=0 psf), Equation 1 is simplified to the following form;

$$FS = \frac{\tan \phi'}{\tan \beta} \qquad \text{Equation 2}$$

PROFILE

Figure 1 is a plan of the slope showing pipeline alignment and the selected profile section (Section A-A') extending between station (STA) 5346+00 and STA 5352+00. Figure 2 shows elevation profile along the pipeline alignment for the existing, temporary, and the final ground surfaces and the locations of the test pits observed during the Order 1 Soil Survey near the area of interest [RETTEW and Geosyntec, 2016]. Figure 3 presents the existing, temporary, and final ground surface slope inclination profiles and the angle between the pipeline alignment and the slope fall line.

SUBSURFACE STRATIGRAPHY AND GEOTECHNICAL PARAMETERS

The estimated material properties and developed soil stratigraphy for this site can be found in Appendix A. Table 1 shows the material types observed at two test pits on the slope and their approximate stations (STA).

Table 1. Subsurface Stratigraphy along the Profile Section

Test Pit ID	Approximate STA	Depth (ft)	Material Type
P-112	5347+20	0 - 2	Sandy/Gravelly Silt (ML)
		> 2	Bedrock (Sandstone/Shale[1])
P-113	5351+50	0 - 1.2	Silty Gravel (GM)
		> 1.2	Bedrock (Sandstone/Shale[1])

[1] – Siltstone outcrop is also present at this site

A cohesion (c') value of 150 psf was assigned to the soil for the temporary condition during trench excavation and pipeline installation. The cohesion (c') was conservatively assumed as 0 psf for the final ground. We consider the use of $c' = 0$ for the final ground conservative because the soil is likely to exhibit some apparent cohesion caused by: i) root systems of the vegetation after ROW restoration and pre-existing vegetation; and ii) interstitial water tension in the partially saturated soil. Table 2 lists the geotechnical parameters that were used in the slope stability analysis. The development of geotechnical parameters is discussed in Appendix A.

Table 2. Selected Geotechnical Parameters

Soil Type	USCS	Total Unit Weight (pcf)	Cohesion (psf)	Friction Angle (°)
Silts and Sandy / Gravelly Silt	ML	110	150 (for temporary ground) 0 (for final ground)	32
Rock Armoring (R-4 Gradation)	GW or GP	130	0	50
Bedrock	-	150	Infinite Strength	

GEOHAZARD MITIGATION RECOMMENDATIONS

STA 5346+50 to STA 5347+10 – BIC Scenario C1

As shown in Figure 3, the existing slope inclination along this zone varies between 30 degrees and 52 degrees. Overall, this zone of the slope is classified as best-in-class (BIC) scenario C1 with additional site specific geohazard mitigation controls.

Installation of a soil nail and mesh system (BIC Incremental Control No. 2L) is recommended due to the extremely steep slope inclination. Geosyntec recommends, that after removal of vegetation and loose colluvial material on the extremely steep slope, to expose the bedrock surface. Excavation should not extend below the bedrock surface, except along the trench line. Geosyntec recommends, that following exposure of the bedrock surface, but prior to trench excavation on the extremely steep slope, the soil nail and mesh be installed outside the trench area, within the LOD. After the pipeline is installed and the trench is backfilled, the mesh should be extended over the trench area. The details of the soil nail and mesh system design can be found in Appendix B. The summary of the designed soil nail and mesh system is given in Table 3.

Table 3. Soil Nail and Mesh System Component Properties

Nail Type (Diameter):	DYWIDAG #9 Grade 75 THREADBAR®
Bearing Plate:	Spike Plate P66
Mesh Type:	TECCO G65/4
Nail Spacing:	8 ft x 8 ft (or 16 ft x 4 ft)
Nail Inclination from Horizontal:	30°
Hole Diameter:	6 inch
Mobilized Tensile Force in Each Nail:	13.3 kips
Minimum Embedment Depth into Bedrock:	6.0 ft
Minimum Soil Nail Length:	8.0 ft

Geosyntec recommends a geotechnical subsurface investigation program which includes advancing boreholes with rock coring immediately after right-of-way (ROW) grading at several locations on slopes where installation of soil nail and mesh system is proposed. The purpose of this site investigation program is to improve estimates of soil layer thickness, and to determine the soil type and the characteristics of the bedrock into which the soil nails will be embedded.

The site investigation program should be followed by a soil nail load test program to verify the soil nail capacity. At least two soil nail verification tests are recommended at

this slope. If there is available information about the bedrock, the verification test soil nails should be installed into the relatively less competent rock. The results of the verification load tests can be used for optimizing the soil nail lengths and other aspects of the designs as appropriate for actual site conditions.

The additional site specific geohazard mitigation incremental controls recommended for this zone are summarized below. This list does not include the conditional geohazard mitigation incremental controls that may be required at the time of construction and restoration.

- Sack-crete trench breakers (BIC Incremental Control No. 4C)
- Sleeve interface (geotextile wrap) to reduce interface friction on pipe at trench breakers (BIC Incremental Control No. 4D)
- Rock guard on pipe (BIC Incremental Control No. 8A)
- Trench backfill with crushed stone (2F), R-2 gradation (BIC Incremental Control No. 6F)
- Coir cloth over area within the limits of disturbance (LOD) (BIC Incremental Control No. 3C)
- Coir logs on the area within the limits of disturbance (LOD) (BIC Incremental Control No. 3E)

STA 5347+10 to STA 5351+50 – BIC Scenario A2

Figure 3 shows that the existing slope inclination in this zone along the pipeline alignment generally varies between 22 degrees and 34 degrees, with relatively shorter segments where slope inclination is as high as 40 degrees. Overall, this zone of the slope is classified as BIC scenario A2. The slope stability assessment was conducted for the temporary ground and the final ground surface conditions. As presented in Table 1, GM and ML types of soils were encountered in this zone. Since the stability of ML type of soils would be more critical than the GM type of soils, the slope stability assessment was conducted conservatively assuming the whole site consisted of ML type of soils.

Temporary Ground

During the trench excavation and pipeline construction, the existing ground surface in this area will be temporarily graded to an approximately planar working surface within the limits of disturbance (LOD) and this surface is called “temporary ground”. The slope inclination values for the temporary ground were estimated from the elevation

contours generated by the temporary ground surfaces developed on cross sections at every 100 ft.

Figure 3 shows that the slope inclination for the temporary ground along the pipeline alignment varies between 23 degrees and 29 degrees, slightly less than the existing slope inclination. Since the pipeline alignment is slightly oblique to the slope fall line, the slope inclination along the slope fall line is slightly larger than the slope inclination along the pipeline alignment. Figure 4 shows the slope inclinations with color shadings within the LOD. As shown with the blue color on Figure 4, the average slope inclination along the planar work surface near the pipeline alignment is anticipated to be approximately 31 degrees, which corresponds to the slope inclination along the slope fall line.

The infinite slope stability analysis using Equation 1 show that, using a conservative cohesion value of 150 psf and a soil depth of 10 ft, the factor of safety against sliding along the planar work surface is;

$$FS = \frac{2 \cdot c'}{\gamma \cdot z \cdot \sin(2\beta)} + \frac{\tan\phi'}{\tan\beta} = \frac{2 \cdot 150\ psf}{110\ pcf \cdot 10\ ft \cdot \sin(2x31°)} + \frac{\tan(32°)}{\tan(31°)} = 1.35$$

As shown with the yellow color in Figure 4, the maximum slope inclination along the side slopes of the temporary ground surface is anticipated to be approximately 37 degrees. For the temporary case, since the soil will also have some cohesion value, 37-degree slope inclination is considered appropriate. Using the same soil parameters as above, the infinite slope stability analysis using Equation 1 show that the factor of safety against sliding along the side slopes is calculated as;

$$FS = \frac{2 \cdot c'}{\gamma \cdot z \cdot \sin(2\beta)} + \frac{\tan\phi'}{\tan\beta} = \frac{2 \cdot 150\ psf}{62.4\ pcf \cdot 10\ ft \cdot \sin(2x37°)} + \frac{\tan(32°)}{\tan(37°)} = 1.11$$

The temporary spoils in the extra workspace (EWS) areas were expected to have side slopes of 30 degrees. Using the same soil parameters as above, the infinite slope stability analysis using Equation 1 show that the factor of safety against sliding of the temporary spoils is calculated as;

$$FS = \frac{2 \cdot c'}{\gamma \cdot z \cdot \sin(2\beta)} + \frac{\tan\phi'}{\tan\beta} = \frac{2 \cdot 150\ psf}{62.4\ pcf \cdot 10\ ft \cdot \sin(2x30°)} + \frac{\tan(32°)}{\tan(30°)} = 1.40$$

Geosyntec recommends installation of rock armoring (crushed stone with R-4 gradation) between the soil nail and mesh system and the upper slope area. This area is shown with brown shading in Figure 4 and the slope inclination is anticipated to be 45 degrees. Using the parameters given in Table 2 and using Equation 2, the factor of safety against sliding of the rock armoring is calculated as;

$$FS = \frac{\tan\phi'}{\tan\beta} = \frac{\tan(50°)}{\tan(45°)} = 1.19$$

Final Ground

After the pipeline construction, the existing ground surface will be reestablished during the restoration phase. This restored surface is called “final ground”. The average slope inclination for the final ground surface is estimated using the surface contours generated by smoothening the existing ground surface contours, assuming that local surface anomalies will be diminished during restoration and the slope inclinations will be more uniform along the LOD.

As shown in Figure 5, the average slope inclination along the steep slope area is estimated approximately 31 degrees. For this typical slope inclination and using the soil parameters for ML as given in Table 2 the factor of safety against sliding is calculated as;

$$FS = \frac{\tan\phi'}{\tan\beta} = \frac{\tan(32°)}{\tan(31°)} = 1.04$$

Table 4 shows the summary of factor of safety values calculated for the temporary ground and final ground surfaces.

Table 4. Summary of Factor of Safety Against Shallow Seated Sliding

Factor of Safety Against Shallow Seated Sliding				
Temporary Ground				Final Ground
Planar Work Surface	Side Slopes	Temporary Spoils in EWS	Rock Armoring	
1.35	1.11	1.40	1.19	1.04

Note: Pipeline will be buried below bedrock surface, so will not be affected by shallow seated sliding.

The recommended geohazard mitigation controls for this zone are listed below. This list does not include the remaining conditional geohazard mitigation controls that may be required at the time of construction and restoration.

- Foam trench breakers (BIC Incremental Control No. 4A)
- Temporary and permanent slope breakers for surface drainage (BIC Incremental Control No. 5A)

CUT-FILL VOLUME CALCULATIONS

The cut and fill volume calculations were conducted in order to estimate the volume of soil materials that will need to be stored or transported during different stages of the pipeline construction. The cut and fill volumes for the temporary ground conditions were estimated as given below by comparing the existing ground and the temporary ground surfaces in AutoCAD (Figure 6):

Cut Volume = 5,169 cu.yd.
Fill Volume = 3,333 cu. yd.
Net Volume = 1,836 cu.yd. (Soil Bulking Ignored)

The bulked cut volume was calculated by multiplying the cut volume with a net bulking factor of 1.4. This net bulking factor accounts for the net volume increase anticipated following excavation and subsequent replacement of fill. We consider 1.4 to be a conservative value when used for the anticipated mix of soil and sedimentary bedrock, based on comparison with recommendations published by FHWA (1988) and by WVDOT (1998) in their design directive (DD) 406.

The volume of net grade spoils generated during grading for the temporary ground condition is calculated as:

(Bulked Cut Volume) – (Fill Volume) = (Excess Grade Spoils)
1.4 x 5,169 cu. yd. – 3,333 cu.yd. = 3,904 cu.yd.

Some of this material may be temporarily or permanently relocated to the extra workspace areas near the ridge, however, it is likely that much of this material will need to be hauled off and disposed of off-site. The volume of soils that will be cut during trench excavation is calculated as 2,531 cu.yd. by comparing the temporary ground surface with and without a trench in AutoCAD. After applying a net bulking factor of 1.4, the bulked trench excavation volume is calculated as 3,543 cu.yd.

In Table 5, the estimated volumes of non-native trench backfill materials to be placed into the trench are summarized.

Table 5. Non-Native Trench Backfill Materials

Item	Quantity	Assumed Thickness / Length (ft)	Assumed Cross Sectional Area (ft^2)	Volume (cu.yd.)
Foam Trench Breakers	14	6	118	367
Sack-crete Trench Breakers	3	6	70	47
Crushed Stone Trench Backfill	1	50	70	130
42-inch Pipe	1	600	10	222
Riprap Armor	1	30	28	31
Sack-crete Trench Backfill	1	30	42	47
			TOTAL (cu.yd.)	844

The net fill volume of excess ditch spoils created during trench excavation and pipeline installation is calculated as:

(Bulked Trench Excavation Volume) + (Non-Native Trench Backfill Material Volume) – (Trench Volume) = (Excess Ditch Spoils)
3,543 cu.yd. + 844 cu.yd. – 2,531 cu.yd. = 1,856 cu.yd.

As shown below, nearly all of the 1,856 cu.yd. of excess ditch spoils can be used on-site to restore the final ground:

(Excess Ditch Spoils) – (Cut/Fill Net Volume) = (Excess Ditch Spoils after Restoration) =
1,856 cu.yd. – 1,836 cu. yd. = 20 cu.yd.

Where possible, excess grade spoils should be relocated to the ridge within the LOD, with a maximum side slope of 27 degrees. However, as the work at this site is currently described, some excess grade spoils will need to be hauled off and disposed of off-site. Further input and discussions with ACP and the Contractor are essential to optimize the current design and minimize the quantity of excess spoils.

Table 6 presents the summary of cut and fill volume calculations.

Table 6. Summary of Soil Volume Calculation Results

Stage	Volume (cu.yd.)
Net Fill Volume of Excess Grade Spoils Requiring Removal Off-Site during Grading or Relocation to the Ridge within the LOD	3,904
Net Fill Volume of Excess Ditch Spoils After Backfilling the Trench	1,856
Net Fill Volume Requiring Spreading Across Construction ROW and Extra Workspace during Restoration	20

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FIGURES

Written by:	**Mustafa Erten**	Date:	**4/7/2017**	Reviewed by:	**Logan Brant**	Date:	**4/7/2017**

Client:	**ACP**	Project:	**Geohazard Mitigation Design at ACP AP-1 MP 84.95 to 85.05**	Project No.:	**TXG0007**	Task No.:	**013**

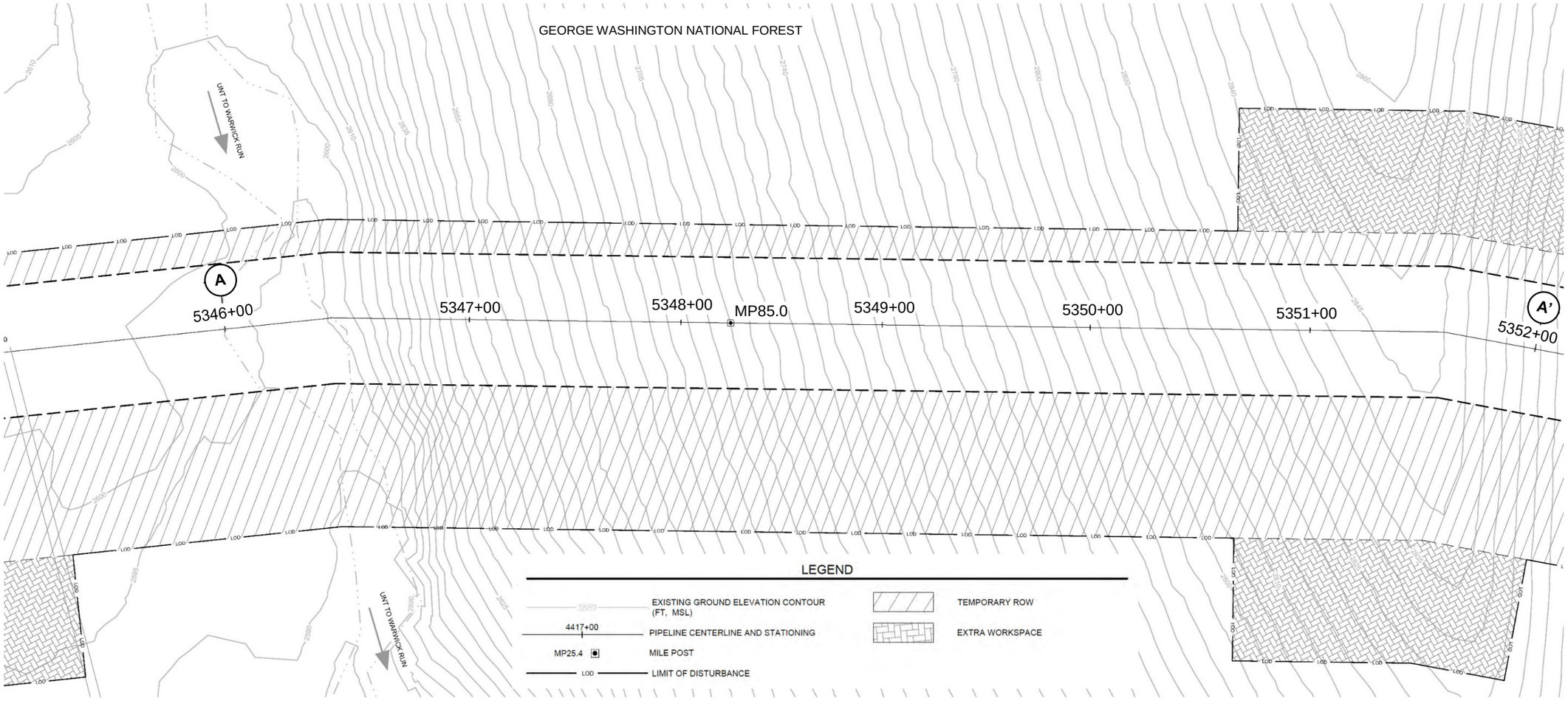

Figure 1. Plan View

Written by:	Mustafa Erten	Date:	4/7/2017	Reviewed by:	Logan Brant	Date:	4/7/2017

Client:	ACP	Project:	Geohazard Mitigation Design at ACP AP-1 MP 84.95 to 85.05	Project No.:	TXG0007	Task No.:	013

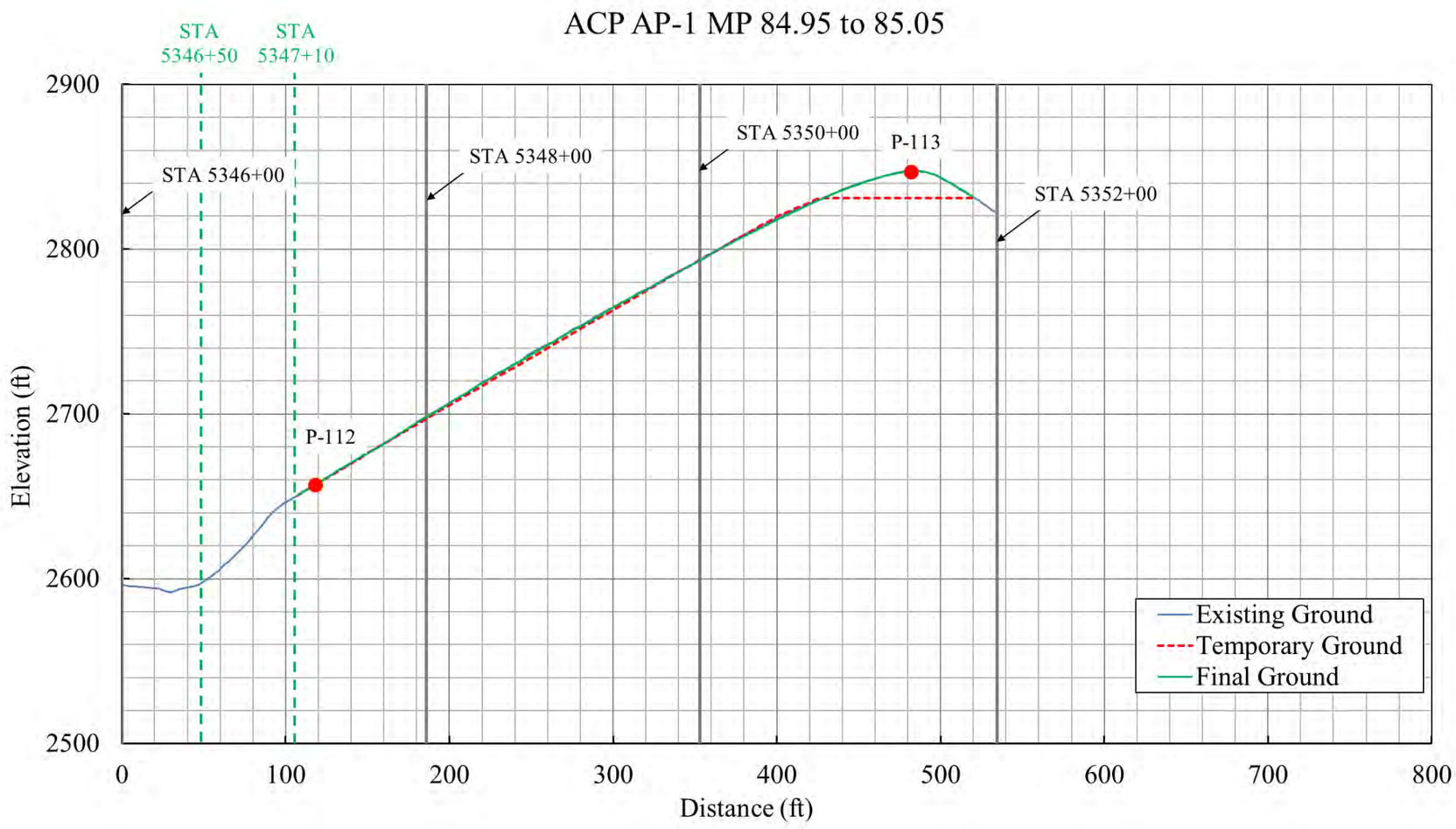

Figure 2. Elevation Profile of the Existing Ground, Temporary Ground, Final Ground and the Test Pit Locations

Written by:	**Mustafa Erten**	Date:	**4/7/2017**	Reviewed by:	**Logan Brant**	Date:	**4/7/2017**

Client:	**ACP**	Project:	**Geohazard Mitigation Design at ACP AP-1 MP 84.95 to 85.05**	Project No.:	**TXG0007**	Task No.:	**013**

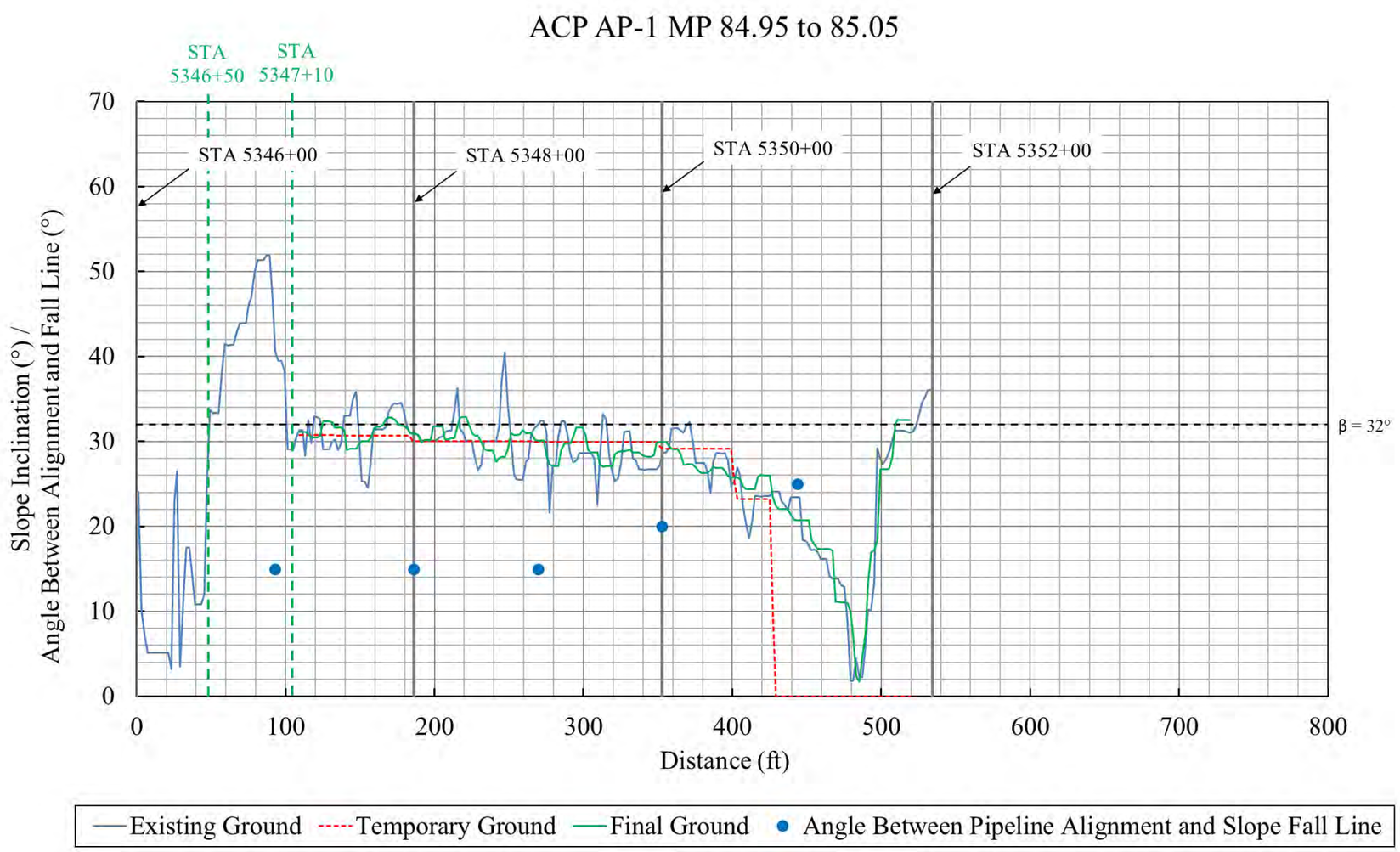

Figure 3. Slope Inclination Profile of the Existing Ground, Temporary Ground, Final Ground and the Angle Between Pipeline Alignment and Slope Fall Line

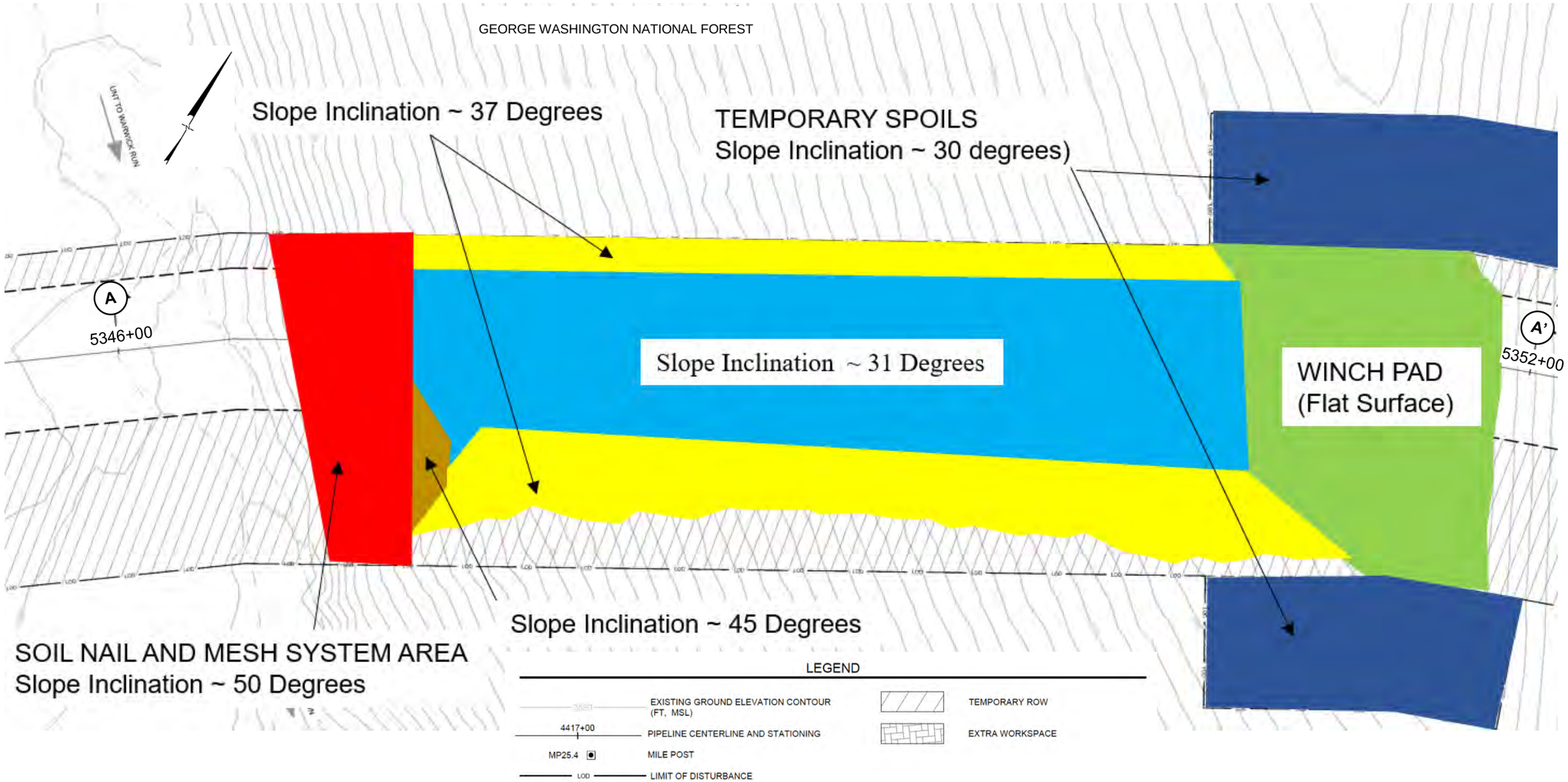

Figure 4. Anticipated Average Slope Inclination Values for the Temporary Ground

Written by:	**Mustafa Erten**	Date:	**4/7/2017**	Reviewed by:	**Logan Brant**	Date:	**4/7/2017**

Client:	**ACP**	Project:	**Geohazard Mitigation Design at ACP AP-1 MP 84.95 to 85.05**	Project No.:	**TXG0007**	Task No.:	**013**

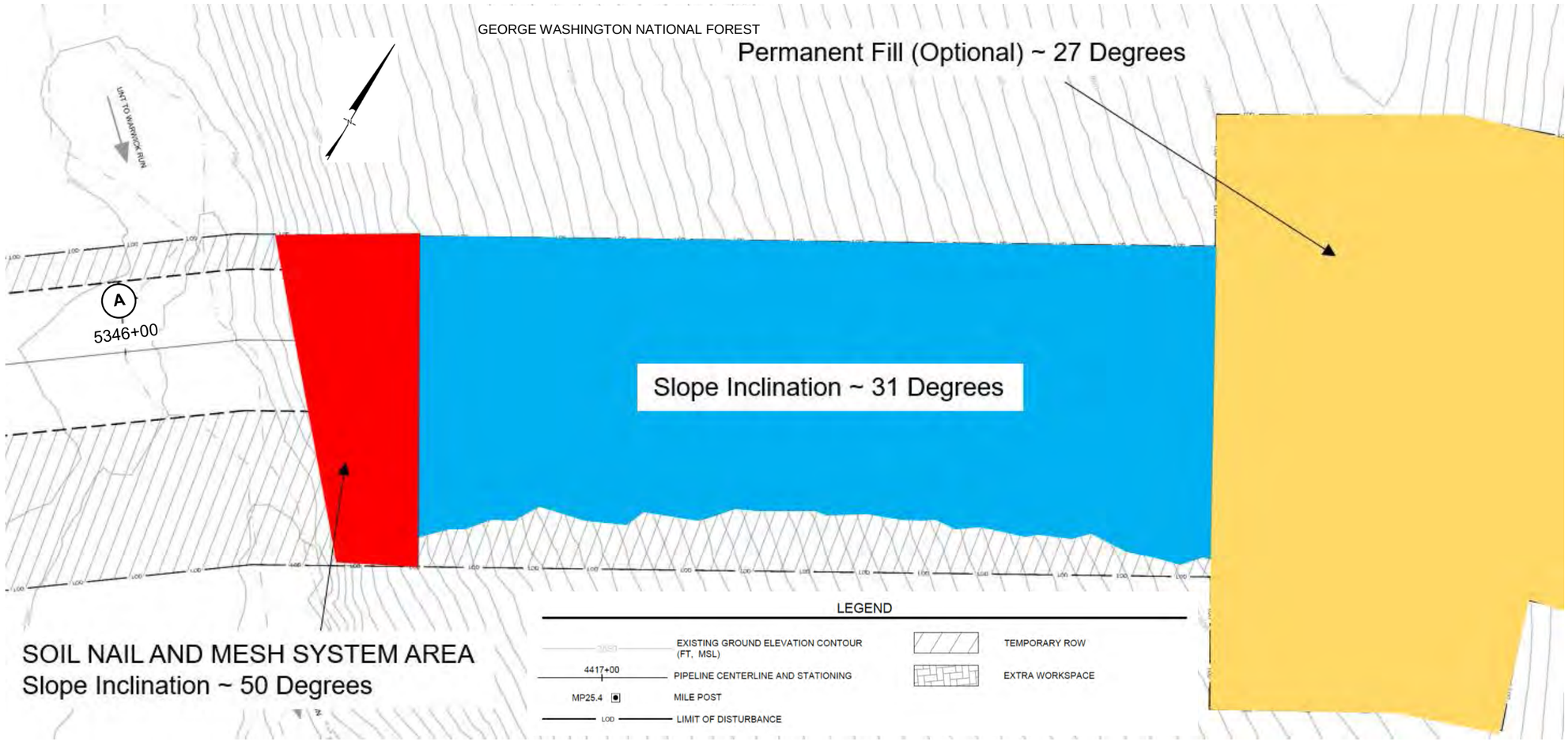

Figure 5. Anticipated Average Slope Inclination Values for the Final Ground

Written by:	Mustafa Erten	Date:	4/7/2017	Reviewed by:	Logan Brant	Date:	4/7/2017

Client:	ACP	Project:	Geohazard Mitigation Design at ACP AP-1 MP 84.95 to 85.05	Project No.:	TXG0007	Task No.:	013

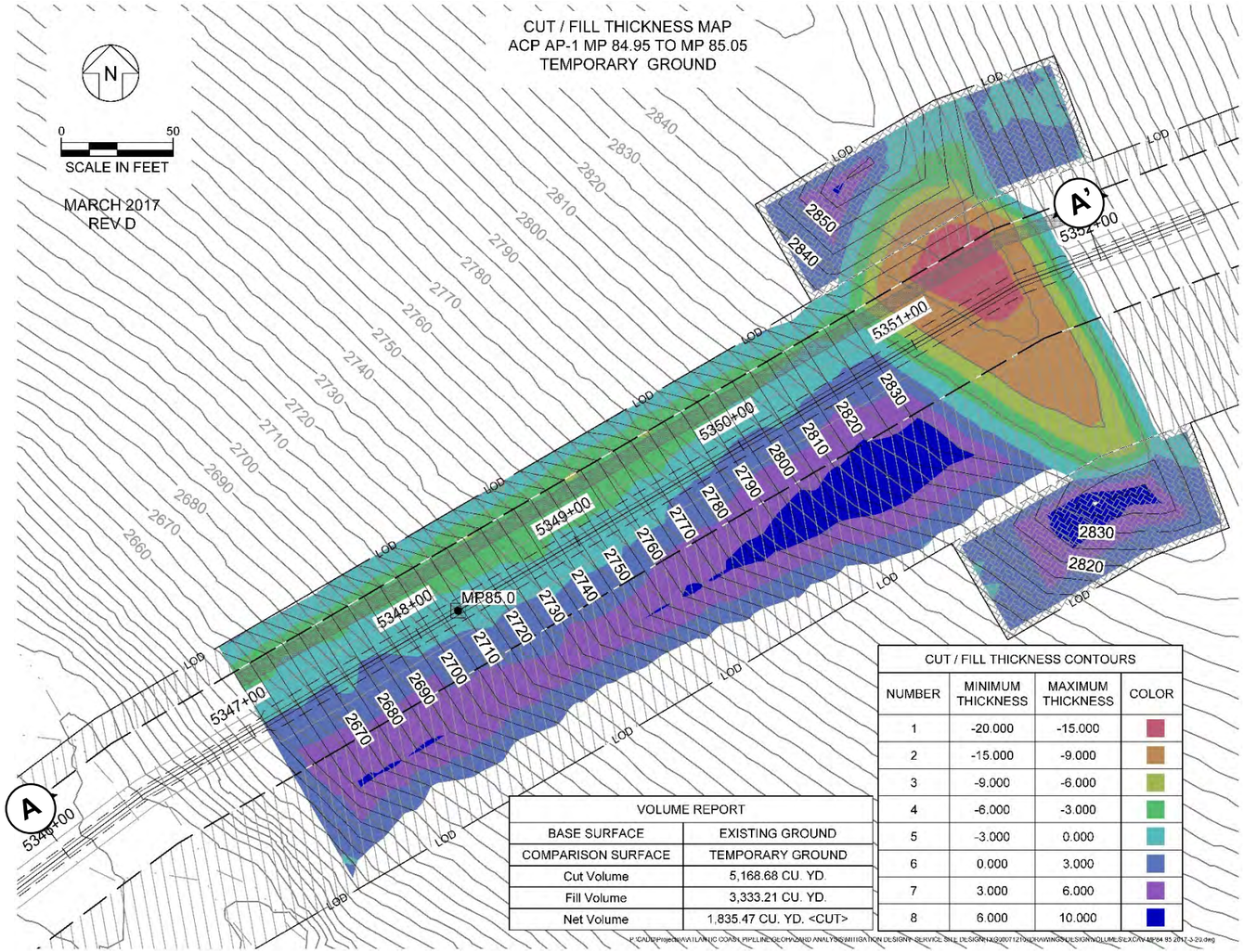

Figure 6. Cut-Fill Volume Calculations

Appendix A

Geotechnical and Topographical Inputs for Site-Specific Geohazard Mitigation Design at ACP AP-1 MP 84.95 to MP 85.05

APPENDIX A - GEOTECHNICAL AND TOPOGRAPHICAL INPUTS FOR SITE-SPECIFIC GEOHAZARD MITIGATION DESIGN AT ACP AP-1 MP 84.95 TO MP 85.05

INTRODUCTION

This document summarizes and interprets the available geotechnical and topographical information used as inputs in the site specific geohazard mitigation design for pipeline construction and right-of-way restoration on the slope at the Atlantic Coast Pipeline (ACP) Segment AP-1 Milepost (MP) 84.95 to MP 85.05 (Site) in the Highland County, Virginia.

The information used to generate inputs to the design have been interpreted from the following sources:

- Ground reconnaissance conducted by Geosyntec Consultants (Geosyntec) on 23 April 2016;
- Geologic and structural mapping by Geosyntec on 25 March 2017;
- Test pits observed during Order 1 Soil Survey in June 2016;
- United States Department of Agriculture (USDA) soil surveys;
- United States Geological Survey (USGS) topographic and geologic maps; and
- Ground surface contours provided by GAI Consultants.

SURFACE TOPOGRAPHY

The slope at ACP AP-1 MP 84.95 to 85.05 rises approximately 255 feet (ft) in elevation over a horizontal distance of about 450 ft, for an average slope inclination of about 57%. The proposed pipeline alignment is approximately parallel to the fall line.

Adjacent to the toe of the slope is an unnamed tributary (UNT) to Warwick Run. Above the tributary, the slope projects upward rapidly for the first 50 ft along the alignment at a slope inclination of 96% and along a generally uniform rate of 57% for the remainder of the slope.

Geomorphology

Geosyntec visited the Site on 23 April 2016 and 25 March 2017 to conduct a ground reconnaissance survey. The reconnaissance survey identified geomorphic evidence of past shallow seated slope instability and erosion was observed along the lower approximately 40 feet of the slope likely resulting from toe cutting and over steepened

conditions along the UNT to Warwick Run, adjacent to the toe of the slope. Below an elevation of 2,640 feet Mean Sea Level (MSL) (between approximate Station 5346+50 and 5346+90) previous instability and erosion has locally exposed the underlying bedrock material. Subsequent mass wasting has created an unconsolidated talus slope of weathered bedrock and colluvium below the bedrock outcrops. Locally, tree trunk distortion was also observed, suggesting shallow soil creep in the unconsolidated colluvium. Within the upper approximately 450 feet of the slope (approximate Station 5346+90 and 5351+45 on the site specific design drawing) no geomorphic evidence of slope instability was observed in the field or on the LiDAR greyscale hillshade imagery and slope maps.

GEOLOGY

Regional Geology

The Site lies within the northeastern margin of the Appalachian Highlands Valley and Ridge Physiographic Province of Virginia, within the Middle Physiographic Section. This section consists of long, linear, subparallel ridged composed of erosion-resistant sandstone and quartzite and intervening valleys of shale and / or carbonate rock. Trellis and rectilinear drainage is most common [GSA 1989].

Geologic Formation

The Site (Highland County) is locally underlain by an approximately 2,200-ft thick sequence of Early Paleozoic sedimentary rocks of the Foreknobs Formation of the Chemung Group. The unit is comprised of sandstone, siltstone, and minor interbedded shales [VDMR 2001]. This information was verified in the field during geologic mapping which observed sedimentary bedrock exposed locally along the edge of the small flowing UNT within the bottom approximately 40 feet of the slope. The observed bedrock material consists of yellowish brown siltstone and thinly interbedded gray to olive-brown shale. Siltstone beds range from 3 to 6 inches thick with interbedded platy fissile shale. The bedrock is moderately to highly weathered and fractured along a series of parallel joint sets resulting in localized talus accumulation below the outcrops.

SUBSURFACE CONDITIONS

Available information on the subsurface conditions at the site is largely based on field observation and laboratory testing related to the Order 1 Soil Survey conducted by Geosyntec Consultants and their subcontractors. For the soil survey, two test pits were excavated in the vicinity of this slope that is the interest of this assessment [RETTEW

and Geosyntec, 2016]. Test Pit P-112 was located just above the steepest segment near the toe, in an area with a slope inclination of 62%. Test Pit P-113 was located on the narrow ridge at the crest of the slope.

Soil

The soil profiles at both test pit locations were logged by Soil Scientists using the classification system in Soil Survey Manual by U.S. Department of Agriculture [1993]. The soil profiles at both test pits were identified as predominantly silt loam with various proportions of rock fragments. The rock fragment content increased from 10 to 90 percent with depth. In this classification system, rock fragments are defined as any soil particle larger than 2 mm in diameter (the coarse/medium sand threshold used by geotechnical engineers).

Table 1 summarizes the USDA Soil name, percentage of the rock fragments of the soils, and depth to bedrock in each test pit.

Table 1. USDA Soil Classification of Test Pits at ACP AP-1 MP 85

Test Pit ID	USDA Soil Name	USDA Map Symbol	Rock Fragments	Depth to Bedrock (ft)
P-112	Weikert-Berks-Rough Complex	55G	10%-85%	2.0
P-113	Weikert-Berks-Rough Complex	55G	40%-90%	1.2

The review of USDA's database indicates that the 55G type of Weikert-Berks-Rough complex are mapped on the steep slope areas where the slope inclination was in the range of 55% and 80%. Weikert-Berks-Rough complex is composed of silt or silty clay loam with significant gravel content. For this soil type, typically the liquid limit (LL) values vary between 20 and 25, on average. The plasticity index (PI) values vary between 4 and 8, on average.

Table 2 summarizes the results of the laboratory tests that were performed on soil samples collected from this soil unit by USDA.

Table 2. USDA Laboratory Test Results

Soil Unit	Soil (coverage)	Depth (in)	Liquid Limit	Plasticity Index	Gravel > 4.75mm (%)	Sand 4.75mm – 0.075mm (%)	Fines < 0.075mm (%)	Clay Content < 0.002mm (%)	USCS Symbol
55G	Weikert (40%)	0-4	16-20-31	2-4-11	20-35	0-45	35-70	10-15-25	CL, CL-ML, SC-SM, SC
		4-16	16-25-31	2-8-11	40-55	5-45	15-45	10-20-25	SC, SC-SM, GC, GC-GM
	Berks (30%)	0-4	16-20-30	2-4-10	15-35	0-45	40-70	10-15-25	SC-SM, SC, SM, CL, CL-ML, ML, GC-GM
		4-11	16-25-35	2-7-14	15-60	0-75	10-75	10-20-32	SC, SC-SM, CL, CL-ML,GC-GM, GC
		11-22	16-25-35	2-7-14	35-60	0-55	10-50	10-20-32	SC, SC-SM, GC-GM, GC
		22-27	16-25-35	2-7-10	35-70	0-60	5-45	10-20-25	SC, SM, SC-SM, GC-GM, GC, GM, GP-GC, GP-GM
	Rough (15%)	0-1	16-20-30	16-20-30	40-55	5-40	20-45	10-15-25	GC, GM, GC-GM
		1-5	16-25-30	16-25-30	40-65	0-50	10-45	10-20-25	GW-GM, SM, SC, SC-SM, GM, GC, GC-GM
		5-7	16-25-30	3-7-11	45-65	0-50	5-35	10-20-25	GC, GC-GM, GM, GM,GC

Note: liquid limit and plasticity index values provided are low – representative – high.

The same two test pits were also logged by a Geotechnical Engineer to record soil descriptions for engineering purposes. These descriptions were prepared in accordance with ASTM D2488. Group symbols based on the USCS were also developed for each soil. The geotechnical engineering description of the soil was gravelly silt (ML) at Test Pit P-112 and was silty gravel (GM) at Test Pit P-113.

Table 3 summarizes the geotechnical engineering soil descriptions in each test pit.

Table 3. Geotechnical Engineering Soil Descriptions of Test Pits

Test Pit ID	Geotechnical Engineering Soil Description	USCS Group
P-112	Gravelly Silt	ML
P-113	Silty Gravel	GM

Geotechnical laboratory testing was not conducted on soil samples recovered from these specific test pits (P-112 and P-113).

Bedrock

The site is underlain by the Foreknobs Formation of the Chemung Group which is composed of shale and sandstone with a few thin, quartz-pebble conglomerates and red-beds. The test pit logs by soil scientists also confirm that the bedrock type that was encountered at the site was sedimentary rocks (usually sandstone or siltstone).

Bedrock was encountered at relatively shallow depths in both test pits, 2.0 ft bgs at P-112 and 1.2 ft bgs at P-113, respectively. The bedrock at these two test pits are sedimentary rock, including sandstone and shale. At P-112, where the ground surface inclination was 62%, the bedrock dipped 6° into the slope. At P-113, the bedrock was aligned with the shallow ground surface slope at the ridge top with a dip of 6°. Table 4 summarizes the bedrock observations in both test pits.

Table 4. Bedrock Observations in Test Pits

Test Pit ID	Bedrock Type	Bedrock Depth (ft)	Bedding Plane Dip	Bedding Plane Strike
P-112	Sandstone / Shale	2.0	6° N	N 37° W
P-113	Sandstone / Shale	1.2	6° S	S 71° E

Groundwater

Groundwater table (GWT) was not observed at P-112 and P-113. Surface water was observed in the stream adjacent to the toe of the slope.

RECOMMENDED DESIGN GEOTECHNICAL PARAMETERS

Geosyntec has estimated site-specific design parameters to support the geohazard mitigation design of the slope at ACP AP-1 MP 84.95 to MP 85.05.

Soil

The soil observed in the test pits are typically the product of in situ weathering of the parent rock (i.e., residual soil). These soils may therefore retain some cohesion. Additionally, they are partially saturated, thus exhibit apparent cohesion caused by interstitial pore water tension. Moreover, at shallow depths (e.g., < 2 ft), they also exhibit apparent cohesion caused by the root mat of deciduous trees, shrubs, and grasses. Upon saturation, however, the apparent cohesion caused by interstitial tension is likely to decrease or disappear. Also, the removal of vegetation to establish the right of way will decrease the effect of the root mat. The selection of parameters for slope stability evaluation should thus consider these effects.

Stark et al. [2013] provides relationships to estimate the drained secant friction angle of fine grained soils as a function of the clay fraction, effective confining pressure (σ_n'), and ball-milled derived LL values for the slope stability calculations. Using the average LL value of 36 for the ML types of soils as encountered at this site, the corresponding ball-milled derived LL value was calculated as 48 using the relationship suggested in Stark et al. [2013].

Using Figure 1 (adopted from Stark et al., 2013), the drained secant friction angle for ML was estimated to be 32 degrees for fully softened condition for clay content (CF) less than 20%, and effective normal stress of 1044 psf (50 kPa). As discussed by Stark et al. [2013], the selection of fully softened shear strength parameters would be proper for overconsolidated soils; however, they may be conservative for first times slides, for which a cohesion term is appropriate.

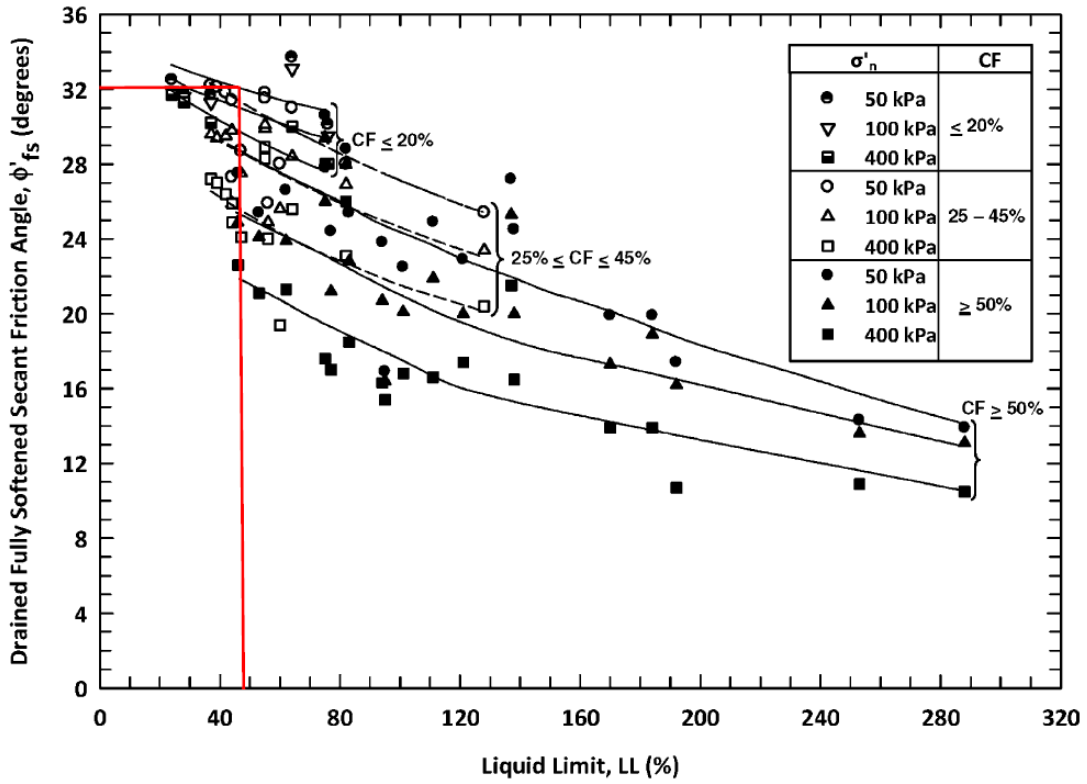

Figure 1. Empirical Correlation for Drained Fully Softened Secant Friction Angle Based on LL, CF, and σ'_n (Adapted from Stark et al. [2013].

Table 5 shows the assumed unit weight and shear strength parameters for soils. The unit weight values selected are upper bound typical values for ML soils above groundwater table, as given in Coduto [2001].

Bedrock

Since the bedrock strength is not believed to control the minimum factor of safety against slope stability, infinite strength was assigned for the bedrock.

Table 5. Selected Soil Design Parameters

Soil Type	USCS	Total Unit Weight (pcf)	Cohesion (psf)	Friction Angle (°)
Silts and Sandy / Gravelly Silt	ML	110	0	32

Groundwater

Based on the available information, Geosyntec assumed the groundwater at top of the bedrock below the soil layer for the purpose of geotechnical analyses. The groundwater level can fluctuate due to seasonal change and periodic precipitations.

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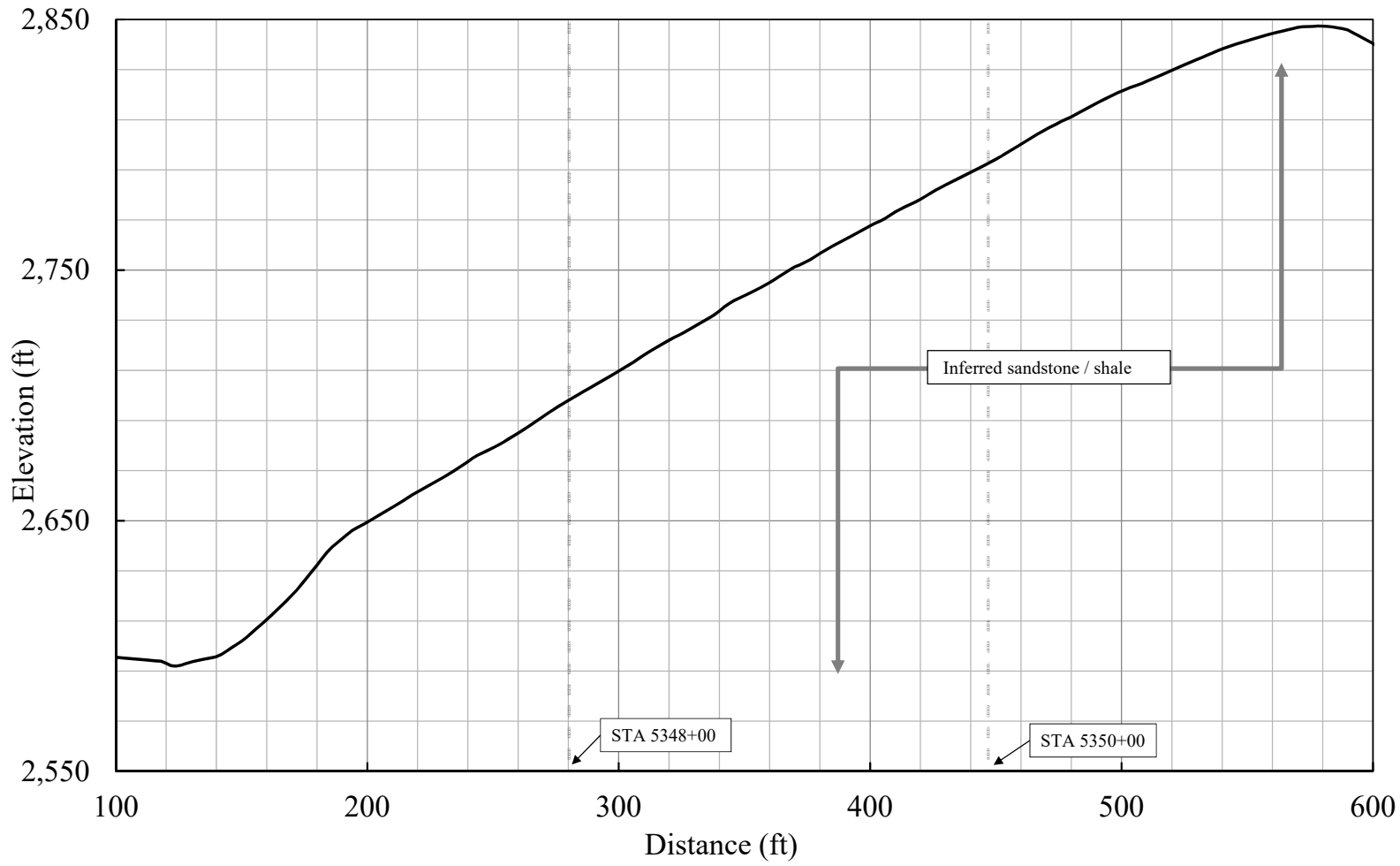


Notes:

1. Groundwater flow is anticipated to flow along the soil bedrock interface.
2. Profile alignment follows the centerline alignment of pipeline
3. Bedrock outcrops displayed are inferred units based on topographic expression, available LiDAR data, aerial photos, field photos, and field notes.
4. Where inferred bedrock outcrops are not observed in photographs, a veneer of soil or vegetation is assumed to obscure the outcrop.

Inferred Subsurface Profile
MP 84.95 to MP 85.05
ACP AP-1

Geosyntec consultants Houston, TX	Project No. TXG007-13 March 2017	**Attachment** **A**

Appendix B

Soil Nail System Design

APPENDIX B - SOIL NAIL AND MESH SYSTEM DESIGN CALCULATIONS

INTRODUCTION

Geosyntec has proposed the installation of a soil nail and mesh system for certain area(s) along steep slopes. The structural components of the soil nail and mesh system were determined using the online dimensioning tool RUVOLUM® (http://applications.geobrugg.com), developed by Geobrugg [Geobrugg, 2016][1]. The tool can be used for dimensioning the slope stabilization system consisting of the following components; high tensile steel wire mesh, bearing (or spike) plates, and steel bars. The nail lengths were determined by hand calculation assuming that the mobilized tensile stress on the nail will be fully transmitted to the bedrock through the grout and bedrock interface.

DESIGN CASES EVALUATED

The soil nails were designed for two different spacing configurations and two different slope inclinations. The two spacing configurations were 8 ft (horizontal) perpendicular to the alignment by 8 ft (measured on final slope) parallel to the alignment (8 ft x 8 ft) and 16 ft (horizontal) perpendicular to the alignment by 4 ft (measured on final slope) parallel to the alignment (16 ft x 4 ft). The first configuration (8 ft x 8 ft) is for the general area inside the limits of the permanent right-of-way (ROW). Since the nails cannot be installed within the footprint of the pipeline trench, which is approximately 12-ft wide, the second nail spacing (16 ft x 4 ft) was also considered. The slope inclinations that were used in the design were 37 degrees, 45 degrees and 48 degrees.

INPUT PARAMETERS

The input parameters that were implemented in the dimensioning tool are given in Table 1. The site specific soil parameters were selected after reviewing the available information for each slope, as presented in Appendix B. The thickness of the soil layer above bedrock is variable, but in most cases in this portion of the project are on the order of several feet. The default pre-tension force assigned by the dimensioning tool for the selected system was implemented in design.

[1] Geobrugg [2016], "Dimensioning tool for the TECCO / SPIDER slope and rock stabilization system Version 2016 – Software Manual"

Table 1. Input Parameters for RUVOLUM®

Unit Weight of Soil:	110 pcf
Shear Strength Parameters:	φ' = 31°, c' = 0 psf
Slope Inclination:	37°, 45°, or 48°
Pre-tension Force:	6.7 kips

RESULTS

Using RUVOLUM®, it was determined that the maximum thickness of the soil layer that could be supported by the assumed soil nail and mesh system components was 6.0 ft for the 37 degree slope, 3.5 ft for the 45 degree slope, and 3.0 ft for the 48 degree slope. If larger soil layer thicknesses are identified during construction, the option of regrading to remove soil should be evaluated. If regrading is not possible, the engineer should re-evaluate the design.

For the recommended design, the mobilized tensile force in soil nails were calculated as 13.3 kips, 12.8 kips, and 13.1 kips for the slope inclinations of 37, 45, and 48 degrees, respectively. The nail lengths need to be chosen so that the mobilized tensile force can be transmitted into the stable bedrock through the bond strength between the grout and the bedrock. The minimum embedment depth into bedrock is calculated using the following relationship:

$$Embedment\ Depth\ into\ Bedrock\ (ft) = \frac{Mobilized\ Tensile\ Force}{q_u \cdot \pi \cdot D \cdot \phi_{PO}} \qquad \text{Eq (1)}$$

where q_u = Bond Strength = 15 psi for weathered shale [FHWA 2015][2]

ϕ_{PO} = Resistance Factor for Pullout = 0.65 [FHWA 2015][2]

D = Diameter of Nail Hole = 6 inches

Using Eq (1), a minimum 6.0-ft nail embedment into bedrock is calculated for all nail bars for the mobilized tensile force of 13.3 kips.

The components properties of the recommended soil nail and mesh system are summarized in Table 2. For designing all configurations, DYWIDAG 28 mm Grade 75

[2] U.S. Department of Transportation Federal Highway Administration (FHWA) [2015], "Geotechnical Engineering Circular No. 7: Soil Nail Walls - Reference Manual", FHWA-NHI-14-007

was specified in the dimensioning tool. DYWIDAG #9 Grade 75 THREADBAR® given in Table 2 is the US equivalent of DYWIDAG 28 mm Grade 75, with slightly larger diameter; therefore, the substitute is conservative.

Table 2. Soil Nail and Mesh System Component Properties

	Slope Inclination (degree)		
	30 - 37	**37 - 45**	**45 - 48**
Nail Type (Diameter):	DYWIDAG #9 Grade 75 THREADBAR®	DYWIDAG #9 Grade 75 THREADBAR®	DYWIDAG #9 Grade 75 THREADBAR®
Bearing Plate:	Spike Plate P66	Spike Plate P66	Spike Plate P66
Mesh Type:	TECCO G65/4	TECCO G65/4	TECCO G65/4
Nail Spacing:	8 ft x 8 ft (or 16 ft x 4 ft)	8 ft x 8 ft (or 16 ft x 4 ft)	8 ft x 8 ft (or 16 ft x 4 ft)
Nail Inclination from Horizontal:	30°	30°	30°
Hole Diameter:	6 inch	6 inch	6 inch
Mobilized Tensile Force in Each Nail:	13.3 kips	12.8 kips	12.7 kips
Minimum Embedment Depth into Bedrock:	6.0 ft	6.0 ft	6.0 ft
Maximum Soil Layer Thickness:	6.0 ft	3.5 ft	3.0 ft

CONSTRUCTION SPECIFICATIONS

According to the FHWA [2015], the maximum loads suggested for the verification and the proof tests are a function of the bond strength between the grout and the bedrock. Due to the high uncertainty in the bedrock type and properties at the site, for verification and proof load testing, Geosyntec suggests following the recommendation given in FHWA [2003][3] where the verification test load (VTL) and the proof test load (PTL) are indicated as 200% and 150%, respectively, of the design test load (DTL). Following this

[3] U.S. Department of Transportation Federal Highway Administration (FHWA) [2003], "Geotechnical Engineering Circular No. 7: Soil Nail Walls - Reference Manual", FHWA0-IF-03-017

recommendation, the VTL and PTL are conservatively selected as 27 kips and 20 kips for all nails, based on DTL of 13.3 kips.

Appendix C

Geologic and Structural Mapping Summary Report

Geosyntec consultants

520 Pike Street, Suite 1375
Seattle, WA 98101
PH 206.496.1456
www.geosyntec.com

4 April 2017
TXG0007-012-2200

VIA EMAIL

Colin Olness, Contractor
Atlantic Coast Pipeline
99 Edmiston Way
Buckhannon, WV 26201

Subject: **Geologic and Structural Mapping Summary Report**
Geohazard Mitigation Site Specific Design Location
Atlantic Coast Pipeline
ACP Segment AP-1 MP 84.95 to 85.05
Highland County, Virginia

Dear Mr. Olness:

This geologic and structural mapping summary report has been prepared by Geosyntec Consultants, Inc. (Geosyntec) for Dominion Transmission, Inc. (DTI) to present the results of work performed along a steep slope section of the proposed Atlantic Coast Pipeline (ACP) Project (Project) between Milepost (MP) 84.95 and 85.05 within the George Washington National Forest (GWNF) in Highland County, Virginia (Figure 1). This work was performed in response to a request by the United States Forest Service (Forest Service), made during a meeting with DTI, Geosyntec and others, in Harrisonburg, Virginia on 24 March 2017, that additional geologic characterization of the slope conditions that support the geohazard mitigation site specific design for this site, be provided.

GEOLOGIC AND STRUCTURAL MAPPING

Geologic mapping was performed in the field along the steep slope between MP 84.95 and 85.05 on 25 March 2017 by a Geosyntec certified engineering geologist. The results of the mapping are presented on Figure 2. Prior to performing field activities a review of available geologic information [Dicken et al., 2005][1], available LiDAR and satellite imagery, and the proposed

[1] Dicken, C.L., Nicholson, S.W., Horton, J.D., Kinney, S.A., Gunther, G., Foose, M.P., and Mueller, J.A.L. 2005. Preliminary integrated geologic map databases for the United States: Delaware, Maryland, New York, Pennsylvania, and Virginia: U.S. Geologic Survey Open File Report 05-1323. Available at http://pubs.usgs.gov/of/2005/1325/, accessed 8 September, 2015

Geohazard Mitigation Site Specific Design for the slope segment was conducted [Geosyntec, 2017][2]. The objective of this geologic mapping task was to collect the following information to provide additional geologic characterization of the slope conditions in support of the geohazard mitigation site specific design:

- Consideration of slope inclination and length;
- Consideration of the geomorphic character of the slope;
- Assessment of slope condition based on observed overlying soil and underlying rock materials;
- Description of the underlying bedrock formation and surficial soils encountered on the slope;
- Collection of structural geologic data (bedding, joints, and other discontinuities within the formational material) to evaluate the potential for slope instability;
- Interpretation of the chronology of pre-existing natural conditions and potential changes from future disturbance impacts; and
- Collection of additional photographic documentation of the existing natural conditions.

Selected photographs that illustrate conditions described in the text of this summary report are presented in the Photograph Log in Appendix A. Station references in the Photograph Log are with reference to the project stationing system shown on Figure 2.

SUMMARY OF FINDINGS

Slope Conditions

The southwest facing slope extends up from an unnamed tributary to Warwick Run, where a small flowing creek was observed (Photograph 1) at an elevation of approximately 2595 feet above Mean Sea Level (AMSL), to a narrow ridgeline at an elevation of approximately 2847 feet AMSL. The approximately 495-foot-long slope varies in inclination from >58 to <30 percent with the steepest slope segment being within the lower approximately 40 to 50 feet adjacent to the small flowing creek, where the inclination is approximately 100 percent (Photograph 2) and

[2] Geosyntec Consultants, 2017. "Geohazard Mitigation Site Specific Design for ACP Ap-1 MP 84.95 to MP 85.05 Construction Alignment Sheet No. 113 Station 5346+00 to 5352+00", plan sheet set prepared for Atlantic Coast Pipeline Project, Dominion Transmission, dated March 2017.

the gentlest slope segment being near the ridgeline (Photograph 3). Over 60 percent of the total slope length is classified as extremely steep (>58 percent).

Locally moist to wet ground conditions were observed across the lower 50 feet of the slope, but no evidence of groundwater seeps or free flowing water was noted (other than at the small flowing creek). Bedrock outcrops were only exposed within the proposed permanent and temporary Right-of-Way (ROW) limits along the lower approximately 40 feet of slope, which starts approximately 10 feet to the northeast of the edge of the small flowing creek (Photographs 4 and 5). The upper approximately 450 feet of slope is mantled by a layer of soil, obscuring bedrock exposure and appearing as a smooth surface on LiDAR greyscale hillshade imagery and slope maps. The upper portion of the slope is covered with conifer and deciduous trees and appears to be well drained with no wet areas being observed (Photographs 6 and 7).

Bedrock Formation and Soil Description

Sedimentary bedrock associated with the Devonian-age Chemung Group (redefined as Foreknobs Formation) is exposed locally along the edge of the small flowing creek within the bottom approximately 40 feet of the slope. The observed bedrock material consists of yellowish brown siltstone and thinly interbedded gray to olive-brown shale (Photographs 8 and 9). Siltstone beds range from 3 to 6 inches thick with interbedded platy fissile shale. The bedrock is moderately to highly weathered and fractured along a series of parallel joint sets resulting in localized talus accumulation below the outcrops. Overlying the bedrock an approximately 6 to 12 inches thick mantle of soil consisting of dark yellowish brown silty fine sand to fine sandy silt (USCS classification of SM-ML) was observed (Photograph 10). Abundant organic material is present near the ground surface and within the upper 6 inches of the soil mantle (Photograph 11).

Geologic Structure

Twelve structural orientations were measured along bedding and joints across the bedrock outcrops on the lower segment of the slope. The structural orientations are presented in Table 1 and locations of the structural measurements are shown on Figure 2.

Table 1 – Measured Structural Orientations

Location ID	Structural Orientation	Dip Inclination and Direction	Discontinuity Type	Formation
01	N 57^0 W	22^0 NE	Bedding	Chemung Fm
02	N 34^0 W	8^0 NE	Bedding	Chemung Fm
03	N 25^0 W	5^0 NE	Bedding	Chemung Fm
04	N 15^0 E	19^0 SE	Bedding	Chemung Fm
05	N 23^0 E	66^0 NW	Joint	Chemung Fm

06	N 25^0 E	12^0 SE	Bedding	Chemung Fm
07	N 62^0 E	79^0 NW	Joint	Chemung Fm
08	N 50^0 E	80^0 NW	Joint	Chemung Fm
09	N 55^0 E	80^0 NW	Joint	Chemung Fm
10	N 36^0 E	20^0 SE	Bedding	Chemung Fm
11	N 52^0 E	15^0 SE	Bedding	Chemung Fm
12[1]	N 84^0 E	9^0 SE	Bedding	Chemung Fm

1: Structural orientation collected approximately 300 feet down drainage from centerline (38.30156 / -79.78491)

An evaluation of the structural measurements suggests that the proposed ROW extends across a relatively tight northeasterly plunging anticlinal fold within the siltstone and shale bedrock. Along the proposed pipeline centerline the apparent dip of bedding is into slope at an inclination of approximately 5 to 15 degrees to the northeast.

Geomorphology

Geomorphic evidence of past shallow seated slope instability and erosion was observed along the lower approximately 40 feet of the slope likely resulting from toe cutting and over steepened conditions along the Unnamed Tributary to Warwick Run, adjacent to the toe of the slope. Below an elevation of 2640 feet MSL (between approximate Station 5346+50 and 5346+90 on the site specific design drawing) previous instability and erosion has locally exposed the underlying bedrock material. Subsequent mass wasting has created an unconsolidated talus slope of weathered bedrock and colluvium below the bedrock outcrops (Photograph 12). Locally, tree trunk distortion was also observed, suggesting shallow soil creep in the unconsolidated colluvium (Photographs 13 and 14). Within the upper approximately 450 feet of the slope (approximate Station 5346+90 and 5351+45 on the site specific design drawing) no geomorphic evidence of slope instability was observed in the field or on the LiDAR greyscale hillshade imagery and slope maps.

SITE SPECIFIC DESIGN FOR GEOHAZARD MITIGATION

The geologic and structural mapping of the slope between MP 84.95 and 85.05 indicates that erosion and mass wasting of moderately to highly weathered, closely jointed siltstone and shale bedrock, has resulted in shallow seated instability across the lower 40 to 50 feet of the slope face between approximately Stations 5346+50 and 5346+90. It is anticipated that following isolation of the stream by damming and pumping, initial grading of the lower slope will remove the material that comprises the shallow seated instability to expose the underlying bedrock. The bedrock exhibits favorable structure and strength for machine excavation and the absence of observed seepage or flowing water discharging from the slope is favorable from the perspective of long-term stability. The fractured and weathered nature of the observed bedrock combined with the extremely steep inclination of the lower slope indicate that ongoing mass wasting on the

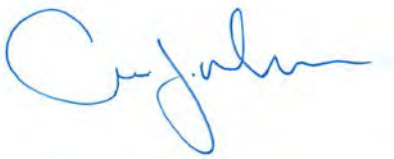
slope could result in future shallow seated instability and colluvium accumulations, in the absence of mitigation measures. The site specific design prepared for this slope includes the installation of soil nails, TECCO mesh and coir cloth between approximate Stations 5346+40 and 5347+10 across the lower portion of the slope. Implementation of the design measures will mitigate the potential for future instability as well as stabilize the pipeline trench backfill material.

CLOSING

Geosyntec appreciates the opportunity to provide Dominion Transmission, Inc. with this geologic structural mapping summary report, and we look forward to working together on this important project. If you have any questions or require additional information, please contact Alex Greene (agreene@geosyntec.com, 858.716.2911) or Tony Rice (trice@geosyntec.com, 206.496.1456).

Sincerely,

Geosyntec Consultants,



Alexander Greene, C.E.G
Principal Engineering Geologist

Logan Brant, Ph.D., P.E.
Senior Geotechnical Engineer

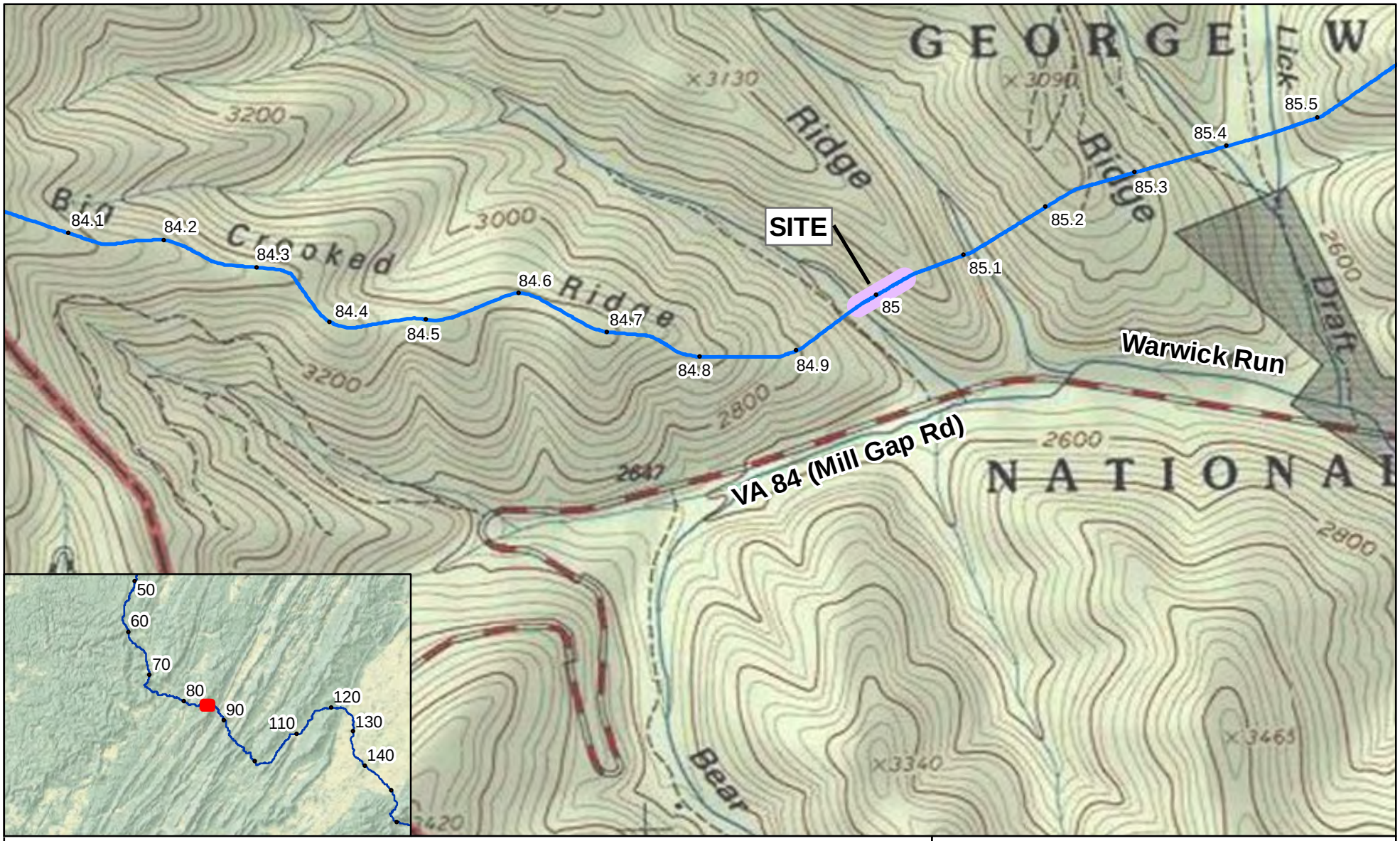
Attachments

Figure 1 – Site and Vicinity Map

Figure 2 – Geologic and Structural Mapping

Appendix A - Photographic Log

FIGURES



Legend

- ACP AP-1 Mileposts
- Steep Slope

N

1:12,000

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SITE AND VICINITY MAP
ACP AP-1 MP 84.95 TO MP 85.05

Highland County, Virginia

Geosyntec consultants

TXG0007.012.2200 | April 2017

Figure 1

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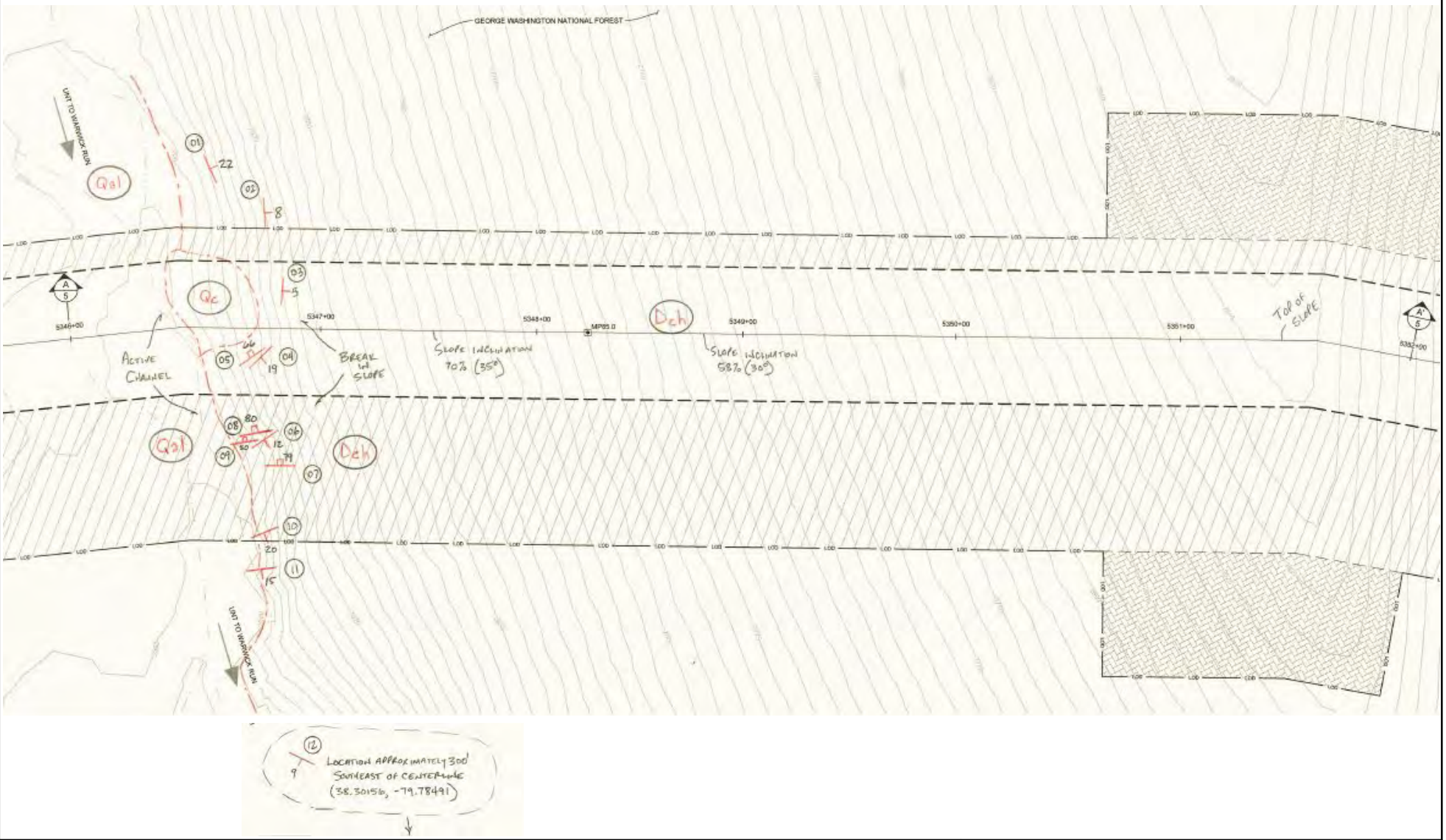

Qal — Alluvium - Unconsolidated fluvial deposits

Qc — Colluvium - Unconsolidated slopewash and talus deposits

Dch — Chemung Formation - Devonian age interbedded shale and siltstone

04 19 — Strike and Dip of Bedding (Corresponding ID in Table 1 of report)

07 79 — Strike and Dip of Joint (Corresponding ID in Table 1 of report)

Geologic contact

N

0 20 40

SCALE IN FEET

GEOLOGIC AND STRUCTURAL MAPPING
ACP AP-1 MP 84.95 TO MP 85.05

Highland County, Virginia

Geosyntec consultants

TXG0007.012.2200 | April 2017

Figure 2

C:\Users\zlifton\Desktop\ACP_GIS_home\Geology_MP85\MP_85_geology_Fig_2.mxd 4/4/2017 11:15:40 AM

APPENDIX A – PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 1:

View: Looking southeast towards Station 5346+50

Photo looks downstream along Unnamed Tributary to Warwick Run shows extremely steep conditions on the lower portion of slope along ACP centerline adjacent to small flowing creek. Note accumulation of unconsolidated colluvium below bedrock outcrops

PHOTOGRAPH 2

View: Looking southwest from Station 5346+75

Photo looks downslope towards small flowing stream at toe of slope showing extremely steep slope conditions along centerline with slope inclinations up to 100%

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 3:** View: Looking southwest from Station 5351+50 Photo shows stable moderately steep slope conditions along centerline with slope inclination of 30% to 40% below narrow ridgeline near top of slope near MP 85.03
	**PHOTOGRAPH 4:** View: Looking northeast Photo shows moderately to highly weathered interbedded siltstone and shale of the Chemung Formation along the toe of the slope approximately 75 feet southeast of ACP centerline

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 5:** View: Looking northeast Photo shows Chemung Formation bedrock along small flowing creek approximately 300 feet southeast (downstream) of ACP centerline
	**PHOTOGRAPH 6:** View: Looking northeast from Station 5347+00 Photo looks upslope showing stable extremely steep slope conditions along centerline with inclinations up to 70% towards gentler slope above where conifer and deciduous trees grow in well drained soils

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 7:** View: Looking southwest at Station 5350+00 Photo shows stable very steep slope conditions along centerline with slope inclinations of 40% to 58% along upper portion of slope where conifer and deciduous trees grow in well drained soils
	**PHOTOGRAPH 8:** View: Looking northeast Photo shows moderately weathered and fractured siltstone of the Chemung Formation near the toe of the slope approximately 50 feet southeast of ACP centerline

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 9:

View: Looking north

Photo shows moderately to highly weathered and closely jointed Chemung Formation bedrock near the toe of the slope approximately 25 feet southeast of ACP centerline

PHOTOGRAPH 10:

View: Looking southeast at Station 5346+75

Photo shows mantle of unconsolidated colluvium below bedrock outcrop on lower portion of slope

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 11:

View: Looking north at Station 5346+60

Photo shows abundant organic material on surface of colluvium deposit mantle across lower portion of slope along ACP centerline

PHOTOGRAPH 12:

View: Looking northeast from Station 5346+50

Photo shows colluvium deposit across lower portion of slope along ACP centerline with tree trunk distortion suggesting shallow soil creep

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 13:

View: Looking southeast at Station 5346+60

Photo shows tree trunk distortion on colluvium deposit near toe of slope suggesting shallow soil creep

PHOTOGRAPH 14:

View: Looking northwest at Station 5347+00

Photo shows steep slope conditions along centerline just above break in slope where slope inclination greater approximately 70% and tree trunk distortion suggests shallow soil creep

Geosyntec consultants

Geosyntec consultants

520 Pike Street, Suite 1375
Seattle, WA 98101
PH 206.496.1456
www.geosyntec.com

4 April 2017
TXG0007-012-2200

VIA EMAIL

Colin Olness, Contractor
Atlantic Coast Pipeline
99 Edmiston Way
Buckhannon, WV 26201

Subject: **Geologic and Structural Mapping Summary Report**
Geohazard Mitigation Site Specific Design Location
Atlantic Coast Pipeline
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GEOLOGIC AND STRUCTURAL MAPPING

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Geohazard Mitigation Site Specific Design for the slope segment was conducted [Geosyntec, 2017][2]. The objective of this geologic mapping task was to collect the following information to provide additional geologic characterization of the slope conditions in support of the geohazard mitigation site specific design:

- Consideration of slope inclination and length;
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Slope Conditions

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the gentlest slope segment being near the ridgeline (Photograph 3). Over 60 percent of the total slope length is classified as extremely steep (>58 percent).

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Bedrock Formation and Soil Description

Sedimentary bedrock associated with the Devonian-age Chemung Group (redefined as Foreknobs Formation) is exposed locally along the edge of the small flowing creek within the bottom approximately 40 feet of the slope. The observed bedrock material consists of yellowish brown siltstone and thinly interbedded gray to olive-brown shale (Photographs 8 and 9). Siltstone beds range from 3 to 6 inches thick with interbedded platy fissile shale. The bedrock is moderately to highly weathered and fractured along a series of parallel joint sets resulting in localized talus accumulation below the outcrops. Overlying the bedrock an approximately 6 to 12 inches thick mantle of soil consisting of dark yellowish brown silty fine sand to fine sandy silt (USCS classification of SM-ML) was observed (Photograph 10). Abundant organic material is present near the ground surface and within the upper 6 inches of the soil mantle (Photograph 11).

Geologic Structure

Twelve structural orientations were measured along bedding and joints across the bedrock outcrops on the lower segment of the slope. The structural orientations are presented in Table 1 and locations of the structural measurements are shown on Figure 2.

Table 1 – Measured Structural Orientations

Location ID	Structural Orientation	Dip Inclination and Direction	Discontinuity Type	Formation
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12[1]	N 84^0 E	9^0 SE	Bedding	Chemung Fm

1: Structural orientation collected approximately 300 feet down drainage from centerline (38.30156 / -79.78491)

An evaluation of the structural measurements suggests that the proposed ROW extends across a relatively tight northeasterly plunging anticlinal fold within the siltstone and shale bedrock. Along the proposed pipeline centerline the apparent dip of bedding is into slope at an inclination of approximately 5 to 15 degrees to the northeast.

Geomorphology

Geomorphic evidence of past shallow seated slope instability and erosion was observed along the lower approximately 40 feet of the slope likely resulting from toe cutting and over steepened conditions along the Unnamed Tributary to Warwick Run, adjacent to the toe of the slope. Below an elevation of 2640 feet MSL (between approximate Station 5346+50 and 5346+90 on the site specific design drawing) previous instability and erosion has locally exposed the underlying bedrock material. Subsequent mass wasting has created an unconsolidated talus slope of weathered bedrock and colluvium below the bedrock outcrops (Photograph 12). Locally, tree trunk distortion was also observed, suggesting shallow soil creep in the unconsolidated colluvium (Photographs 13 and 14). Within the upper approximately 450 feet of the slope (approximate Station 5346+90 and 5351+45 on the site specific design drawing) no geomorphic evidence of slope instability was observed in the field or on the LiDAR greyscale hillshade imagery and slope maps.

SITE SPECIFIC DESIGN FOR GEOHAZARD MITIGATION

The geologic and structural mapping of the slope between MP 84.95 and 85.05 indicates that erosion and mass wasting of moderately to highly weathered, closely jointed siltstone and shale bedrock, has resulted in shallow seated instability across the lower 40 to 50 feet of the slope face between approximately Stations 5346+50 and 5346+90. It is anticipated that following isolation of the stream by damming and pumping, initial grading of the lower slope will remove the material that comprises the shallow seated instability to expose the underlying bedrock. The bedrock exhibits favorable structure and strength for machine excavation and the absence of observed seepage or flowing water discharging from the slope is favorable from the perspective of long-term stability. The fractured and weathered nature of the observed bedrock combined with the extremely steep inclination of the lower slope indicate that ongoing mass wasting on the

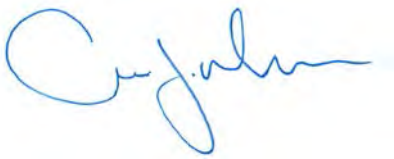
slope could result in future shallow seated instability and colluvium accumulations, in the absence of mitigation measures. The site specific design prepared for this slope includes the installation of soil nails, TECCO mesh and coir cloth between approximate Stations 5346+40 and 5347+10 across the lower portion of the slope. Implementation of the design measures will mitigate the potential for future instability as well as stabilize the pipeline trench backfill material.

CLOSING

Geosyntec appreciates the opportunity to provide Dominion Transmission, Inc. with this geologic structural mapping summary report, and we look forward to working together on this important project. If you have any questions or require additional information, please contact Alex Greene (agreene@geosyntec.com, 858.716.2911) or Tony Rice (trice@geosyntec.com, 206.496.1456).

Sincerely,

Geosyntec Consultants,



Alexander Greene, C.E.G
Principal Engineering Geologist

Logan Brant, Ph.D., P.E.
Senior Geotechnical Engineer

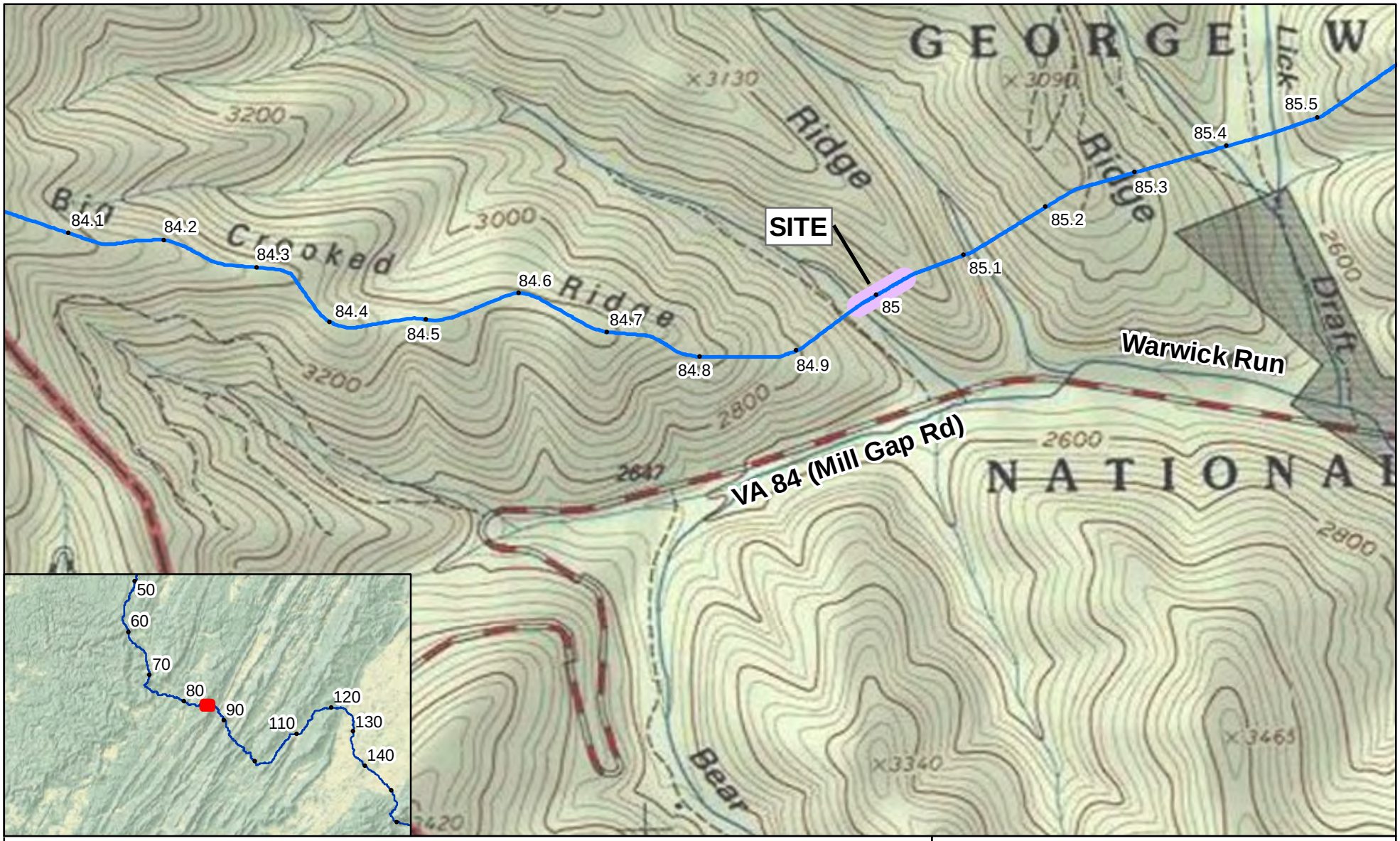
Attachments

Figure 1 – Site and Vicinity Map

Figure 2 – Geologic and Structural Mapping

Appendix A - Photographic Log

FIGURES



Legend

- ACP AP-1 Mileposts
- Steep Slope

N

1:12,000

0 1,180 Feet

SITE AND VICINITY MAP
ACP AP-1 MP 84.95 TO MP 85.05

Highland County, Virginia

Geosyntec consultants

TXG0007.012.2200 | April 2017

Figure 1

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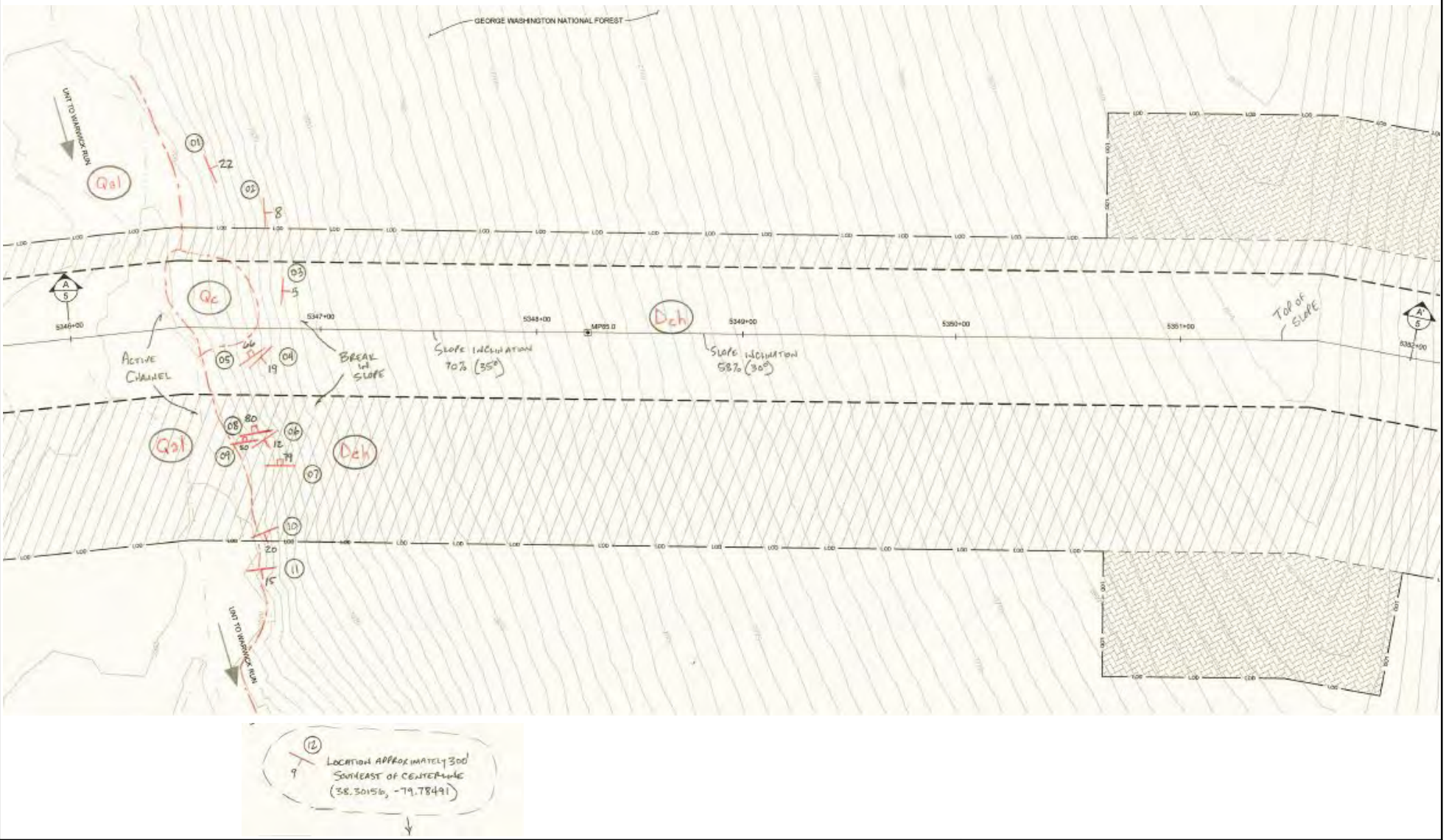

Qal — Alluvium - Unconsolidated fluvial deposits

Qc — Colluvium - Unconsolidated slopewash and talus deposits

Dch — Chemung Formation - Devonian age interbedded shale and siltstone

04 19 — Strike and Dip of Bedding (Corresponding ID in Table 1 of report)

07 79 — Strike and Dip of Joint (Corresponding ID in Table 1 of report)

Geologic contact

N

0 20 40

SCALE IN FEET

GEOLOGIC AND STRUCTURAL MAPPING
ACP AP-1 MP 84.95 TO MP 85.05

Highland County, Virginia

Geosyntec consultants

TXG0007.012.2200 | April 2017

Figure 2

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APPENDIX A – PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 1:

View: Looking southeast towards Station 5346+50

Photo looks downstream along Unnamed Tributary to Warwick Run shows extremely steep conditions on the lower portion of slope along ACP centerline adjacent to small flowing creek. Note accumulation of unconsolidated colluvium below bedrock outcrops

PHOTOGRAPH 2

View: Looking southwest from Station 5346+75

Photo looks downslope towards small flowing stream at toe of slope showing extremely steep slope conditions along centerline with slope inclinations up to 100%

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 3:** View: Looking southwest from Station 5351+50 Photo shows stable moderately steep slope conditions along centerline with slope inclination of 30% to 40% below narrow ridgeline near top of slope near MP 85.03
	**PHOTOGRAPH 4:** View: Looking northeast Photo shows moderately to highly weathered interbedded siltstone and shale of the Chemung Formation along the toe of the slope approximately 75 feet southeast of ACP centerline

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 5:** View: Looking northeast Photo shows Chemung Formation bedrock along small flowing creek approximately 300 feet southeast (downstream) of ACP centerline
	**PHOTOGRAPH 6:** View: Looking northeast from Station 5347+00 Photo looks upslope showing stable extremely steep slope conditions along centerline with inclinations up to 70% towards gentler slope above where conifer and deciduous trees grow in well drained soils

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

	**PHOTOGRAPH 7:** View: Looking southwest at Station 5350+00 Photo shows stable very steep slope conditions along centerline with slope inclinations of 40% to 58% along upper portion of slope where conifer and deciduous trees grow in well drained soils
	**PHOTOGRAPH 8:** View: Looking northeast Photo shows moderately weathered and fractured siltstone of the Chemung Formation near the toe of the slope approximately 50 feet southeast of ACP centerline

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 9:

View: Looking north

Photo shows moderately to highly weathered and closely jointed Chemung Formation bedrock near the toe of the slope approximately 25 feet southeast of ACP centerline

PHOTOGRAPH 10:

View: Looking southeast at Station 5346+75

Photo shows mantle of unconsolidated colluvium below bedrock outcrop on lower portion of slope

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PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 11:

View: Looking north at Station 5346+60

Photo shows abundant organic material on surface of colluvium deposit mantle across lower portion of slope along ACP centerline

PHOTOGRAPH 12:

View: Looking northeast from Station 5346+50

Photo shows colluvium deposit across lower portion of slope along ACP centerline with tree trunk distortion suggesting shallow soil creep

Geosyntec consultants

PHOTOGRAPHIC LOG

SITE: ACP Segment AP-1 MP 84.95 to 85.05
DATE: Geologic structural mapping performed 25 March 2017

PHOTOGRAPH 13:

View: Looking southeast at Station 5346+60

Photo shows tree trunk distortion on colluvium deposit near toe of slope suggesting shallow soil creep

PHOTOGRAPH 14:

View: Looking northwest at Station 5347+00

Photo shows steep slope conditions along centerline just above break in slope where slope inclination greater approximately 70% and tree trunk distortion suggests shallow soil creep

Geosyntec consultants

Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, VA 23060

April 13, 2017

BY EMAIL

Troy Morris
U.S. Forest Service
George Washington and Jefferson National Forest
5162 Valleypointe Parkway
Roanoke, VA 24019

Re: Atlantic Coast Pipeline – Baseline Benthic Macroinvertebrate Survey - 2017

Dear Mr. Morris:

Since 2014, Atlantic Coast Pipeline, LLC (Atlantic) has been conducting field routing, environmental, cultural resources, and civil surveys along the proposed pipeline route to collect information needed by the Federal Energy Regulatory Commission and other regulatory and land managing agencies to review and permit the Atlantic Coast Pipeline (ACP) Project. Section 7 of the Endangered Species Act requires Federal agencies to verify that any actions authorized, funded, or carried out by the agencies do not jeopardize the continued existence of federally listed threatened or endangered species, or result in the destruction or adverse modification of designated critical habitat for a federally listed species.

In 2016 and March 2017, baseline benthic macroinvertebrate surveys were completed at six mainline waterbody crossings within the George Washington National Forest (GWNF) following procedures described in the 2016 Baseline Benthic Macroinvertebrate Study Plan submitted to the Forest May 17, 2016. Additional surveys planned for Spring 2017 consist of GWNF crossings delineated within the last year. These include five mainline waterbody crossings and three access road crossings where improvements are proposed. Sampling of the eight waterbodies will be completed in Spring 2017 following guidelines outlined by the 2016 Baseline Benthic Macroinvertebrate Study Plan. The Study Plan describes the scope and methods the ACP Project will continue to implement to complete recommended baseline benthic macroinvertebrate surveys within the GWNF, including implementation of the USFS Rapid Bioassessment Protocol and recommended low flow stream guidance. The eight waterbodies planned for survey are listed below.

- Barn Lick Branch
- Dowell's Draft
- Buckhorn Creek
- UNT to Buckhorn Creek
- Stoutameyer Branch
- UNT to Warwick Run

- East Branch Dowells Draft
- UNT to Buckhorn Creek

Surveys will be conducted within the collection window for macroinvertebrates from March 15 to May 30, 2017.

Project and Company Background

Atlantic is a company formed by four major U.S. energy companies – Dominion, Duke Energy, Piedmont Natural Gas, and Southern Company Gas. The company was created to develop, own, and operate the proposed ACP, an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. For more information about the ACP, visit the company's website at www.dom.com/acpipeline. Atlantic has contracted with Dominion Transmission, Inc. (DTI), a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic.

Atlantic looks forward to continuing to coordinate with you on this project. Please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding the project. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc: Richard B. Gangle, Dominion
Jennifer Adams, U.S. Forest Service
Dawn Kirk, U.S. Forest Service

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

BY OVERNIGHT (OR EXPRESS) MAIL

April 21, 2017

Mr. Clyde Thompson
Forest Supervisor
U.S. Forest Service
Monongahela National Forest
Forest Supervisor's Office
200 Sycamore Street
Elkins, WV 26241

Mr. Joby P. Timm
Forest Supervisor
U.S. Forest Service
George Washington and Jefferson National Forest
Forest Supervisor's Office
5162 Valleypointe Parkway
Roanoke, VA 24019

RE: Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
Application for Transportation and Utility Systems and Facilities on Monongahela National Forest and George Washington National Forest - Amended

Dear Mr. Thompson & Mr. Timm:

Enclosed is an amendment to the Atlantic Coast Pipeline, LLC's (Atlantic's) Application for Transportation and Utility Systems and Facilities on both the Monongahela National Forest (MNF) and George Washington National Forest (GWNF) (Standard Form 299). Atlantic seeks a right-of-way grant and special use authorization to construct and operate approximately 5.2 miles and 15.9 miles of underground natural gas pipeline on the MNF and GWNF, respectively.

On November 12, 2015 Atlantic submitted its initial Standard Form-299 application. That application was subsequently amended on June 17, 2016, and again on April 17, 2017. The latter amendment reduced the proposed permanent right-of-way width from 75 to 53.5 feet. On April 18, 2017 the Forest Service filed a letter with the Federal Energy Regulatory Commission requesting that Atlantic reduce its proposed permanent right-of-way width to 50 feet. Accordingly, this amendment reduces the proposed permanent right-of-way width from 53.5 to 50 feet.

Atlantic Coast Pipeline, LLC (Atlantic) is a company formed by four major U.S. energy companies – Dominion Resources, Inc. (Dominion; NYSE: D), Duke Energy Corporation (Duke Energy; NYSE: DUK), Piedmont Natural Gas Co., Inc. (Piedmont; NYSE: PNY), and Southern Company Gas (NYSE: GAS). The company was created to develop, own, and operate the proposed Atlantic Coast Pipeline (ACP), an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. Atlantic has contracted with Dominion Transmission, Inc. (DTI), a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic.

Please contact Mr. Richard Gangle at (804) 273-2814, if there are questions regarding this application, and direct written responses to:

Richard Gangle
Energy Infrastructure Environmental Services
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc (w/enclosure):

Kent Karriker, Ecosystems Group Leader, Monongahela National Forest
Todd Hess, Realty Specialist/Special Use Manager, Monongahela National Forest
Alex Faught, Lands Program Manager, George Washington National Forest Jennifer Adams, Project Coordinator, U.S. Forest Service
Richard Gangle, Dominion

Enclosure:
Amended Application for Transportation and Utility Systems and Facilities on the MNF and GWNF

STANDARD FORM 299 (05/2009)
Prescribed by DOI/USDA/DOT
P.L. 96-487 and Federal
Register Notice 5-22-95

APPLICATION FOR TRANSPORTATION AND UTILITY SYSTEMS AND FACILITIES ON FEDERAL LANDS

FORM APPROVED
OMB Control Number: 0596-0082
Expiration Date: 10/31/2012

FOR AGENCY USE ONLY

NOTE: Before completing and filing the application, the applicant should completely review this package and schedule a preapplication meeting with representatives of the agency responsible for processing the application. Each agency may have specific and unique requirements to be met in preparing and processing the application. Many times, with the help of the agency representative, the application can be completed at the preapplication meeting.

Application Number

Date Filed

1. Name and address of applicant *(include zip code)*	2. Name, title, and address of authorized agent if different from item 1 *(include zip code)*	3. Telephone (area code)
Atlantic Coast Pipeline, LLC c/o Leslie Hartz 707 East Main Street Richmond, Virginia 23219	Dominion Transmission, Inc. c/o Richard Gangle 5000 Dominion Boulevard Glen Allen, VA 23060	Applicant 804-771-4468 Authorized Agent 804- 273-2814

4. As applicant are you? *(check one)*

a. ☐ Individual
b. ☒ Corporation*
c. ☐ Partnership/Association*
d. ☐ State Government/State Agency
e. ☐ Local Government
f. ☐ Federal Agency

** If checked, complete supplemental page*

5. Specify what application is for: *(check one)*

a. ☐ New authorization
b. ☐ Renewing existing authorization No.
c. ☐ Amend existing authorization No.
d. ☐ Assign existing authorization No.
e. ☐ Existing use for which no authorization has been received *
f. ☒ Other*

** If checked, provide details under item 7*

6. If an individual, or partnership are you a citizen(s) of the United States? ☐ Yes ☐ No

7. Project description (describe in detail): (a) Type of system or facility, *(e.g., canal, pipeline, road);* (b) related structures and facilities; (c) physical specifications *(Length, width, grading, etc.)*; (d) term of years needed: (e) time of year of use or operation; (f) Volume or amount of product to be transported; (g) duration and timing of construction; and (h) temporary work areas needed for construction *(Attach additional sheets, if additional space is needed.)*

Atlantic Coast Pipeline, LLC (Atlantic) is amending its application to construct and operate a natural gas transmission pipeline across U.S. Forest Service (USFS) lands in West Virginia and Virginia. The project, referred to as the Atlantic Coast Pipeline (ACP), will deliver natural gas from supply areas in the Appalachian region, including West Virginia, to demand areas in Virginia and North Carolina. Dominion Transmission, Inc. (DTI) will build and operate the ACP on behalf of Atlantic. On November 12, 2015 Atlantic submitted its initial SF-299 application. That application was subsequently amended on June 17, 2016, and again on April 17, 2017. The current amendment reduces the proposed permanent right-of-way width from 53.5 feet to 50 feet.

Approximately 21.1 miles of the proposed route crosses lands under the jurisdiction of the U.S. Forest Service. Of this length, approximately 5.2 miles would lie within the Monongahela National Forest (Marlinton Ranger District), and approximately 15.9 miles would lie within the George Washington National Forest (Warm Springs, North River, and Glenwood & Pedlar Ranger Districts). Additional information is included in the attached Project Description. Atlantic has also submitted a draft Construction Operation and Maintenance Plan, which is currently under review by the Forests.

8. Attach a map covering area and show location of project proposal

9. State or Local government approval: ☐ Attached ☐ Applied for ☒ Not Required

10. Nonreturnable application fee: ☐ Attached ☒ Not required

11. Does project cross international boundary or affect international waterways? ☐ Yes ☒ No *(If "yes," indicate on map)*

12. Give statement of your technical and financial capability to construct, operate, maintain, and terminate system for which authorization is being requested.

DTI maintains 7,800 miles of pipeline in six states — Ohio, West Virginia, Pennsylvania, New York, Maryland and Virginia, and stores and transports large quantities of natural gas for large customers, such as major utilities and power plants. The company has significant experience in the design, construction, ownership, and operation of large, long-term pipeline projects requiring significant capital investment. DTI also operates one of the largest underground natural gas storage systems in the United States with links to other major pipelines and to markets in the Midwest, Mid-Atlantic and Northeast regions of the United States.

13a. Describe other reasonable alternative routes and modes considered.

Atlantic has included analyses of other reasonable alternatives in its application to the Federal Energy Regulatory Commission (FERC) for a Certificate of Public Convenience and Necessity (Exhibit F-1, Resource Report 10), filed on September 18, 2015, and has supplemented its filing with additional information at the request of FERC and the USFS.

b. Why were these alternatives not selected?

See response to 13a above.

c. Give explanation as t o why it is necessary to cross Federal Lands.

Federal lands extend continuously along the Appalachian Range in VA and WV and are oriented perpendicular to any reasonable path between the proposed pipeline's receipt and delivery points (Harrison County WV, to southeastern VA and NC). Consequently, avoidance of Federal lands is not feasible.

14. List authorizations and pending applications filed for similar projects which may provide information to the authorizing agency. *(Specify number, date, code, or name)*

Atlantic filed an application to the Federal Energy Regulatory Commission (FERC) for a Certificate of Public Convenience and Necessity for the proposed ACP on September 18, 2015.

15. Provide statement of need for project, including the economic feasibility and items such as: (a) cost of proposal (construction, operation, and maintenance); (b) estimated cost of next best alternative; and (c) expected public benefits.

The ACP will provide natural gas from supply areas in the Appalachian region to demand areas in Virginia and North Carolina. Information on the ACP's economic feasibility is provided in its Application for a Certificate of Public Convenience and Necessity, filed with the FERC on September 18, 2015.

16. Describe probable effects on the population in the area, including the social and economic aspects, and the rural lifestyles.

The effects of the proposed ACP on the population in the area is described by Atlantic in its application to the FERC for a Certificate of Public Convenience and Necessity (Exhibit F-1, Resource Report 5).

17. Describe likely environmental effects that the proposed project will have on: (a) air quality; (b) visual impact; (c) surface and ground water quality and quantity; (d) the control or structural change on any stream or other body of water; (e) existing noise levels; and (f) the surface of the land, including vegetation, permafrost, soil, and soil stability.

The effects of the proposed ACP on these resources is described in Atlantic's application to the FERC for a Certificate of Public Convenience and Necessity (Exhibit F-1, Resource Reports 2 through 9), and has since supplemented its filing with additional information at the request of FERC and the USFS.

18. Describe the probable effects that the proposed project will have on (a) populations of fish, plantlife, wildlife, and marine life, including threatened and endangered species; and (b) marine mammals, including hunting, capturing, collecting, or killing these animals.

The effects of the proposed ACP on these resources is described in Atlantic's application to the FERC for a Certificate of Public Convenience and Necessity (Exhibit F-1, Resource Report 3), and has since supplemented its filing with additional information at the request of FERC and the USFS.

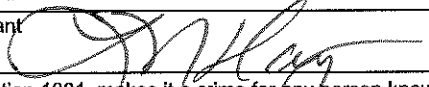
19. State whether any hazardous material, as defined in this paragraph, will be used, produced, transported or stored on or within the right-of-way or any of the right-of-way facilities, or used in the construction, operation, maintenance or termination of the right-of-way or any of its facilities. "Hazardous material" means any substance, pollutant or contaminant that is listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq., and its regulations. The definition of hazardous substances under CERCLA includes any "hazardous waste" as defined in the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, 42 U.S.C. 6901 et seq., and its regulations. The term hazardous materials also includes any nuclear or byproduct material as defined by the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 et seq. The term does not include petroleum, including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under CERCIA Section 101(14), 42 U.S.C. 9601(14), nor does the term include natural gas.

Materials necessary to operate construction equipment and vehicles, such as fuel, oil, and hydraulic fluid, some of which may be classified as hazardous, will be used on the right-of-way to construct, operate, and maintain the proposed facilities. A Spill Prevention, Control and Countermeasure Plan, which identifies measures for protecting lands from potential contamination by spills of hazardous substances, is included in Atlantic's application to the FERC for a Certificate of Public Convenience and Necessity (Exhibit F-1, Resource Report 1, Appendix 1-F).

20. Name all the Department(s)/Agency(ies) where this application is being filed.

Monongahela National Forest, George Washington National Forest.

I HEREBY CERTIFY, That I am of legal age and authorized to do business in the State and that I have personally examined the information contained in the application and believe that the information submitted is correct to the best of my knowledge.

Signature of Applicant	Date
	4/20/17

Title 18, U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

GENERAL INFORMATION
ALASKA NATIONAL INTEREST LANDS

This application will be used when applying for a right-of-way, permit, license, lease, or certificate for the use of Federal lands which lie within conservation system units and National Recreation or Conservation Areas as defined in the Alaska National Interest lands Conservation Act. Conservation system units include the National Park System, National Wildlife Refuge System, National Wild and Scenic Rivers System, National Trails System, National Wilderness Preservation System, and National Forest Monuments.

Transportation and utility systems and facility uses for which the application may be used are:

1. Canals, ditches, flumes, laterals, pipes, pipelines, tunnels, and other systems for the transportation of water.

2. Pipelines and other systems for the transportation of liquids other than water, including oil, natural gas, synthetic liquid and gaseous fuels, and any refined product produced therefrom.

3. Pipelines, slurry and emulsion systems, and conveyor belts for transportation of solid materials.

4. Systems for the transmission and distribution of electric energy.

5. Systems for transmission or reception of radio, television, telephone, telegraph, and other electronic signals, and other means of communications.

6. Improved right-of-way for snow machines, air cushion vehicles, and all-terrain vehicles.

7. Roads, highways, railroads, tunnels, tramways, airports, landing strips, docks, and other systems of general transportation.

This application must be filed simultaneously with each Federal department or agency requiring authorization to establish and operate your proposal.

In Alaska, the following agencies will help the applicant file an application and identify the other agencies the applicant should contact and possibly file with:

Department of Agriculture
Regional Forester, Forest Service (USFS)
Federal Office Building,
P.O. Box 21628
Juneau, Alaska 99802-1628
Telephone: (907) 586-7847 *(or a local Forest Service Office)*

Department of the Interior
Bureau of Indian Affairs (BIA)
Juneau Area Office
Federal Building Annex
9109 Mendenhall Mall Road, Suite 5
Juneau, Alaska 99802
Telephone: (907) 586-7177

Department of the Interior
Bureau of Land Management
222 West 7th Avenue
P.O. Box 13
Anchorage, Alaska 99513-7599
Telephone: (907) 271-5477 (or a local BLM Office)

U.S. Fish & Wildlife Service (FWS)
Office of the Regional Director
1011 East Tudor Road
Anchorage, Alaska 99503
Telephone: (907) 786-3440

National Park Service (NPA)
Alaska Regional Office, 2225
Gambell St., Rm. 107
Anchorage, Alaska 99502-2892
Telephone: (907) 786-3440

Note - Filings with any Interior agency may be filed with any office noted above or with the Office of the Secretary of the Interior, Regional Environmental Office, P.O. Box 120, 1675 C Street, Anchorage, Alaska 9513.

Department of Transportation
Federal Aviation Administration
Alaska Region AAL-4, 222 West 7th Ave., Box 14
Anchorage, Alaska 99513-7587
Telephone: (907) 271-5285

NOTE - The Department of Transportation has established the above central filing point for agencies within that Department. Affected agencies are: Federal Aviation Administration (FAA), Coast Guard (USCG), Federal Highway Administration (FHWA), Federal Railroad Administration (FRA).

OTHER THAN ALASKA NATIONAL INTEREST LANDS

Use of this form is not limited to National Interest Conservation Lands of Alaska.

Individual department/agencies may authorize the use of this form by applicants for transportation and utility systems and facilities on other Federal lands outside those areas described above.

For proposals located outside of Alaska, applications will be filed at the local agency office or at a location specified by the responsible Federal agency.

SPECIFIC INSTRUCTIONS
(Items not listed are self-explanatory)

7 Attach preliminary site and facility construction plans. The responsible agency will provide instructions whenever specific plans are required.

8 Generally, the map must show the section(s), township(s), and range(s) within which the project is to be located. Show the proposed location of the project on the map as accurately as possible. Some agencies require detailed survey maps. The responsible agency will provide additional instructions.

9 , 10, and 12 The responsible agency will provide additional instructions.

13 Providing information on alternate routes and modes in as much detail as possible, discussing why certain routes or modes were rejected and why it is necessary to cross Federal lands will assist the agency(ies) in processing your application and reaching a final decision. Include only reasonable alternate routes and modes as related to current technology and economics.

14 The responsible agency will provide instructions.

15 Generally, a simple statement of the purpose of the proposal will be sufficient. However, major proposals located in critical or sensitive areas may require a full analysis with additional specific information. The responsible agency will provide additional instructions.

16 through 19 Providing this information is as much detail as possible will assist the Federal agency(ies) in processing the application and reaching a decision. When completing these items, you should use a sound judgment in furnishing relevant information. For example, if the project is not near a stream or other body of water, do not address this subject. The responsible agency will provide additional instructions.

Application must be signed by the applicant or applicant's authorized representative.

EFFECT OF NOT PROVIDING INFORMATION: Disclosure of the information is voluntary. If all the information is not provided, the application may be rejected.

DATA COLLECTION STATEMENT

The Federal agencies collect this information from applicants requesting right-of-way, permit, license, lease, or certification for the use of Federal lands. The Federal agencies use this information to evaluate the applicant's proposal. The public is obligated to submit this form if they wish to obtain permission to use Federal lands.

SUPPLEMENTAL		
NOTE: The responsible agency(ies) will provide instructions	CHECK APPROPRIATE BLOCK	
I - PRIVATE CORPORATIONS	ATTACHED	FILED*
a. Articles of Incorporation	☐	☐
b. Corporation Bylaws	☐	☐
c. A certification from the State showing the corporation is in good standing and is entitled to operate within the State	☐	☐
d Copy of resolution authorizing filing	☐	☐
e. The name and address of each shareholder owning 3 percent or more of the shares, together with the number and percentage of any class of voting shares of the entity which such shareholder is authorized to vote and the name and address of each affiliate of the entity together with, in the case of an affiliate controlled by the entity, the number of shares and the percentage of any class of voting stock of that affiliate owned, directly or indirectly, by that entity, and in the case of an affiliate which controls that entity, the number of shares and the percentage of any class of voting stock of that entity owned, directly or indirectly, by the affiliate.	☐	☐
f. If application is for an oil or gas pipeline, describe any related right- of-way or temporary use permit applications, and identify previous applications.	☐	☒
g. If application is for an oil and gas pipeline, identify all Federal lands by agency impacted by proposal.	☒	☐
II - PUBLIC CORPORATIONS		
a. Copy of law forming corporation	☐	☒
b. Proof of organization	☐	☒
c. Copy of Bylaws	☐	☐
d. Copy of resolution authorizing filing	☐	☒
e. If application is for an oil or gas pipeline, provide information required by item "I - f" and "I - g" above.	☐	☒
III - PARTNERSHIP OR OTHER UNINCORPORATED ENTITY		
a. Articles of association, if any	☐	☐
b. If one partner is authorized to sign, resolution authorizing action is	☐	☐
c. Name and address of each participant, partner, association, or other	☐	☐
d. If application is for an oil or gas pipeline, provide information required by item "I - f" and "I - g" above.	☐	☐

*If the required information is already filed with the agency processing this application and is current, check block entitled "Filed." Provide the file identification information *(e.g., number, date, code, name)*. If not on file or current, attach the requested information.

NOTICES

Note: This applies to the Department of Agriculture/Forest Service (FS)

This information is needed by the Forest Service to evaluate the requests to use National Forest System lands and manage those lands to protect natural resources, administer the use, and ensure public health and safety. This information is required to obtain or retain a benefit. The authority for that requirement is provided by the Organic Act of 1897 and the Federal Land Policy and Management Act of 1976, which authorize the secretary of Agriculture to promulgate rules and regulations for authorizing and managing National Forest System lands. These statutes, along with the Term Permit Act, National Forest Ski Area Permit Act, Granger-Thye Act, Mineral Leasing Act, Alaska Term Permit Act, Act of September 3, 1954, Wilderness Act, National Forest Roads and Trails Act, Act of November 16, 1973, Archeological Resources Protection Act, and Alaska National Interest Lands Conservation Act, authorize the Secretary of Agriculture to issue authorizations or the use and occupancy of National Forest System lands. The Secretary of Agriculture's regulations at 36 CFR Part 251, Subpart B, establish procedures for issuing those authorizations.

BURDEN AND NONDISCRIMINATION STATEMENTS

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0082. The time required to complete this information collection is estimated to average 8 hours hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call toll free (866) 632-9992 (voice). TDD users can contact USDA through local relay or the Federal relay at (800) 877-8339 (TDD) or (866) 377-8642 (relay voice). USDA is an equal opportunity provider and employer.

The Privacy Act of 1974 (5 U.S.C. 552a) and the Freedom of Information Act (5 U.S.C. 552) govern the confidentiality to be provided for information received by the Forest Service.

ATLANTIC COAST PIPELINE PROJECT

PROJECT DESCRIPTION AND SUPPLEMENTAL INFORMATION AMENDED APPLICATION FOR TRANSPORTATION AND UTILITY SYSTEMS AND FACILITIES ON U.S FOREST SERVICE LANDS WITHIN THE MONONGAHELA NATIONAL FOREST AND THE GEORGE WASHINGTON NATIONAL FOREST

April 10, 2017

INTRODUCTION

Atlantic Coast Pipeline, LLC (Atlantic) is a company formed by four major U.S. energy companies – Dominion Resources, Inc. (Dominion; NYSE: D), Duke Energy Corporation (Duke Energy; NYSE: DUK), Piedmont Natural Gas Co., Inc. (Piedmont; NYSE: PNY), and Southern Company Gas (NYSE: GAS). The company was created to develop, own, and operate the proposed Atlantic Coast Pipeline (ACP), an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. Atlantic has contracted with Dominion Transmission, Inc. (DTI), a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic.

Atlantic is seeking authorization from the Federal Energy Regulatory Commission (FERC or Commission) under Section 7(c) of the Natural Gas Act to construct, own, operate, and maintain the following proposed facilities for the ACP system:

Mainline Pipeline Facilities:

- AP-1: approximately 333 miles of underground 42-inch outside diameter natural gas transmission pipeline in Harrison, Lewis, Upshur, Randolph, and Pocahontas Counties, West Virginia; Highland, Bath, Augusta, Nelson, Buckingham, Cumberland, Prince Edward, Nottoway, Dinwiddie, Brunswick, and Greensville Counties, Virginia; and Northampton County, North Carolina.

- AP-2: approximately 186 miles of underground 36-inch outside diameter natural gas transmission pipeline in Northampton, Halifax, Nash, Wilson, Johnston, Sampson, Cumberland, and Robeson Counties, North Carolina.

Lateral Pipeline Facilities:

- AP-3: approximately 83 miles of underground 20-inch outside diameter natural gas lateral pipeline in Northampton County, North Carolina; and Greensville and Southampton Counties and the Cities of Suffolk and Chesapeake, Virginia.

- AP-4: approximately 0.4 mile of underground 16-inch outside diameter natural gas lateral pipeline in Brunswick County, Virginia.

- AP-5: approximately 1 mile of underground 16-inch outside diameter natural gas lateral pipeline in Greensville County, Virginia.

Compressor Station Facilities:

- Compressor Station 1 (Marts Compressor Station): a new, natural gas-fired compressor station at approximately Milepost (MP) 7.5 of the AP-1 mainline in Lewis County, West Virginia.

- Compressor Station 2 (Buckingham Compressor Station): a new, natural gas-fired compressor station at approximately MP 191.5 of the AP-1 mainline in Buckingham County, Virginia.

- Compressor Station 3 (Northampton Compressor Station): a new natural gas-fired compressor station at approximately MP 300.1 of the AP-1 mainline and MP 0.0 of the AP-2 mainline and 0.0 of the AP-3 lateral in Northampton County, North Carolina.

Other Aboveground Facilities:

- Nine new metering and regulating stations at receipt and/or delivery points along the new pipelines (including one at Compressor Station 1 and one at Compressor Station 2).

- Forty-one valve sites at select points along the new pipelines at intervals specified by U.S. Department of Transportation (USDOT) regulations at Title 49 CFR Part 192.

- Eleven sets of pig launcher and/or receiver sites at 11 sites along the new pipelines (including launcher/receiver sites at Compressor Stations 2 and 3).

A short segment of the ACP is proposed to cross lands under the jurisdiction of the National Park Service (NPS); however, these lands are not included in this application. A separate application has been filed with the NPS to cross these lands.

Application Item 7 Project Description

a) Type of system or facility: This application is for the construction, operation, and maintenance of an interstate natural gas pipeline of varying diameters, with appurtenant facilities, as described herein. On U.S. Forest Service (USFS) lands, the ACP consists of a 42-inch, buried steel pipe across portions of the Monongahela National Forest (MNF) and George Washington National Forest (GWNF). The pipeline route crosses the MNF for a total of 5.2 miles, all within the Marlinton Ranger District. It crosses the GWNF for a total of 15.9 miles in the Warm Springs, North River, and Glenwood & Pedlar Ranger Districts, in Virginia.

b) Related structures and facilities: No compressor stations, meter and regulating stations, pig launchers/receivers or mainline valves are proposed on USFS lands. No communications equipment outside of existing authorized communication buildings or not on an existing authorized communication tower is proposed on USFS lands. Minor appurtenant facilities on USFS lands include pipeline markers at road crossings and cathodic protection test stations. No aerial pipeline markers will be installed on USFS lands.

c) Physical specifications: Atlantic is requesting a 50-foot wide permanent right-of-way across the MNF and the GWNF. This is a change from Atlantic's April 17, 2017 amended application for a 53.5-foot wide permanent right-of-way.

d) Terms of years needed: Thirty (30) years. Atlantic anticipates requesting a grant renewal near the end of the initial term, as the life of the Project exceeds thirty years.

e) Time of year of use or operation: Once installed, the pipeline will be in use year-round.

f) Volume or amount of product to be transported: The current design of the AP-1 Mainline crossing USFS lands is up to 1.5 million dekatherms per day of natural gas.

g) Duration and timing of construction: Subject to receipt of the required permits and regulatory approvals, Atlantic and DTI anticipate that construction of the Projects will commence in November of 2017. Initial construction activities (e.g., preparation of contractor yards and access roads) are expected to begin in November, 2017. The ACP pipelines will be built along 17 spreads, five of which lie on USFS lands. It is anticipated that all facilities will be placed in service by the fourth quarter of 2019. A detailed schedule is included in the Construction, Operation and Maintenance (COM) Plan, currently under review by the Forests.

h) Temporary work areas needed for construction: On USFS lands, Atlantic proposes to utilize a nominal 125-foot-wide construction right-of-way for installation of the 42-inch pipeline, with a 40-foot-wide spoil side and an 85-foot-wide working side. For most pipeline construction activities, this right-of-way width would accommodate large equipment, pipe stringing and set up, welding, the trench, and the temporary storage of topsoil and trench spoil.

i) Additional temporary workspace (ATWS) is proposed on USFS lands at certain locations, such as road crossings, and where additional spoil or topsoil storage, log landings or equipment staging is needed. Accordingly, the total width of the construction right-of-way will exceed the nominal 125 foot width in these areas. Conversely, the nominal 125-foot construction right-of-way width is proposed to be reduced to 75 feet in wetlands and certain other ecologically sensitive areas.

j) The ACP will mostly use existing USFS roads to access the pipeline right-of-way. A number of new roads would be required, and most roads will require widening or other improvement to accommodate construction vehicles and equipment. Access for operations and maintenance purposes will utilize a smaller subset of the construction access roads. Other temporary construction facilities may include construction staging areas, log landings, and contractor yards for staging construction equipment.

The locations of temporary work areas and access roads needed for construction are included in Atlantic's COM Plan.

Application Item 8 Project Maps

The attached Figures 1 through 3 contain maps showing the overall project location and the proposed route across MNF and GWNF lands, respectively.

Application Item 15 Statement of Need for the Project

The ACP will serve the growing energy needs of multiple public utilities and local distribution companies in Virginia and North Carolina. Based on current customer commitments, approximately 79.2 percent of the natural gas transported by the ACP will be used as a fuel to generate electricity

for industrial, commercial, and residential uses. The remainder of the natural gas will be used directly for residential (9.1 percent), industrial (8.9 percent), and commercial and other uses such as vehicle fuel (2.8 percent). By providing access to low-cost natural gas supplies, the ACP will increase the reliability and security of natural gas supplies in Virginia and North Carolina.

A more detailed description of the purpose and need for the ACP is included in Atlantic's application to the FERC for a Certificate of Public Convenience and Necessity (Exhibit F-1, Resource Report 1), filed September 18, 2015, as updated on April 15, 2016.

Supplemental Information from Page 4 of Application

1-t) If application is for an oil or gas pipeline, describe any related right-of-way or temporary use permit applications, and identify previous applications:

> Atlantic applied to the Bureau of Land Management (BLM) for a right-of-way/temporary use permit on July 14, 2015 for this same project, because the proposed pipeline route at that time crossed both USFS and U.S. Fish and Wildlife Service lands. Siuce that time, Atlantic has proposed a route change that avoids crossing U.S. Fish and Wildlife Service lands. Other than the crossing of National Park Service land, which requires a separate right-of-way application, the only Federal lands now crossed by the proposed pipeline route are those of the USFS. Consequently, BLM is no longer authorized to issue a right- of-way grant. That application has therefore been withdrawn, and this application to cross Forest Service lands is submitted directly to the USFS herewith.
>
> New or amended permit applications to conduct civil and environmental surveys on USFS lands were submitted to the MNF on September 30, 2014, May 21, 2015, February 16, 2016, and February 3, 2017. Survey permit applications were submitted to the GWNF on September 29, 2014, March 17, 2015, October 20, 2015, February 16, 2016, May 4, 2016, and February 2, 2017.

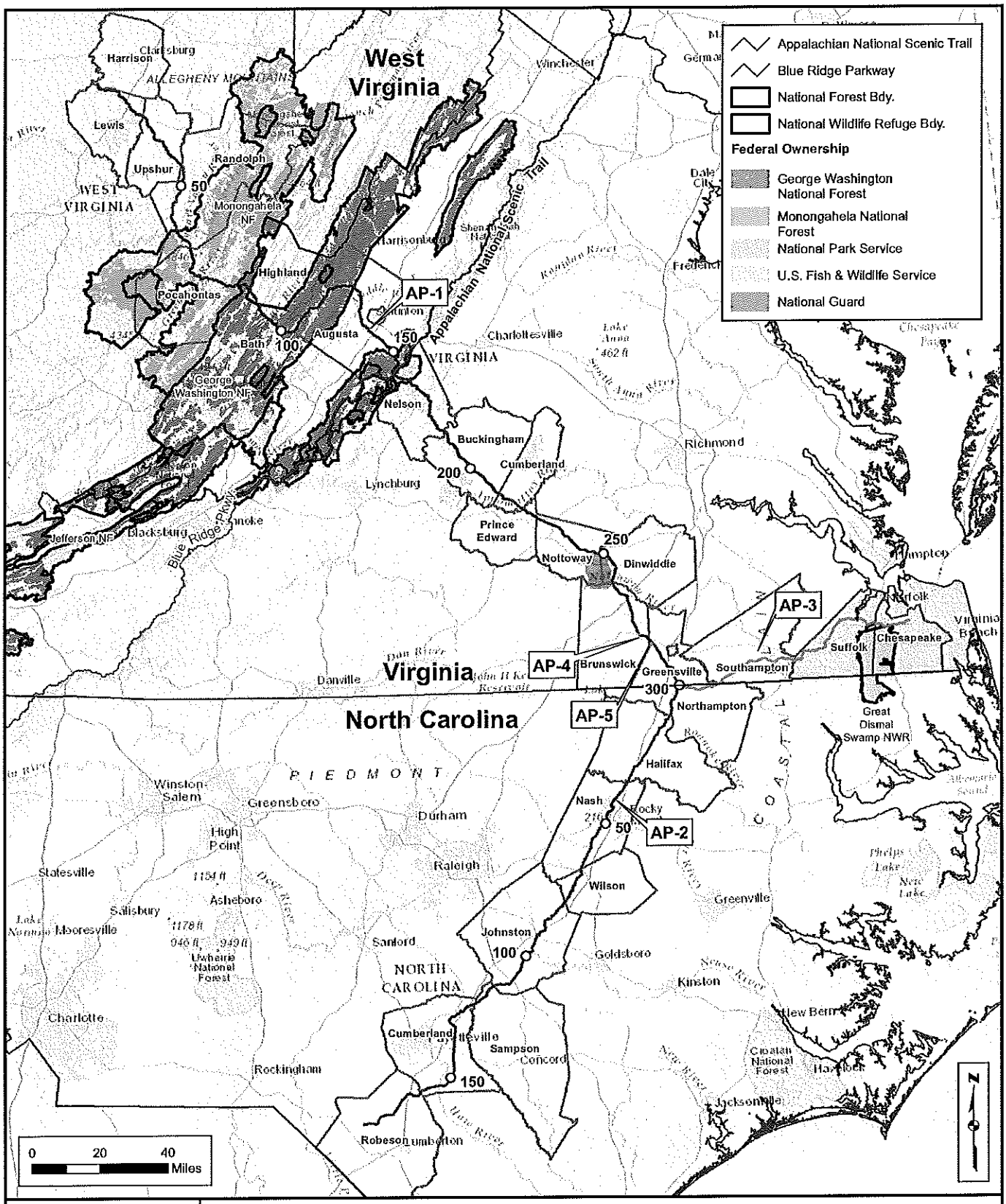
1-gIf application is for an oil or gas pipeline, identify all Federal lands by agency impacted by proposal:

> A short segment, approximately 520 feet, of the ACP is also proposed to cross lands under the jurisdiction of the NPS; however, these lands are not included in this application. A separate application has been filed with the NPS to cross its lauds.

II-a -Copy of law forming corporation - Submitted with original November 12, 2015 application.

11-b - Proof of Organization -Submitted with original November 12, 2015 application.

11-d - Copy of Resolution Authorizing Filing – Submitted with original November 12, 2015 application.

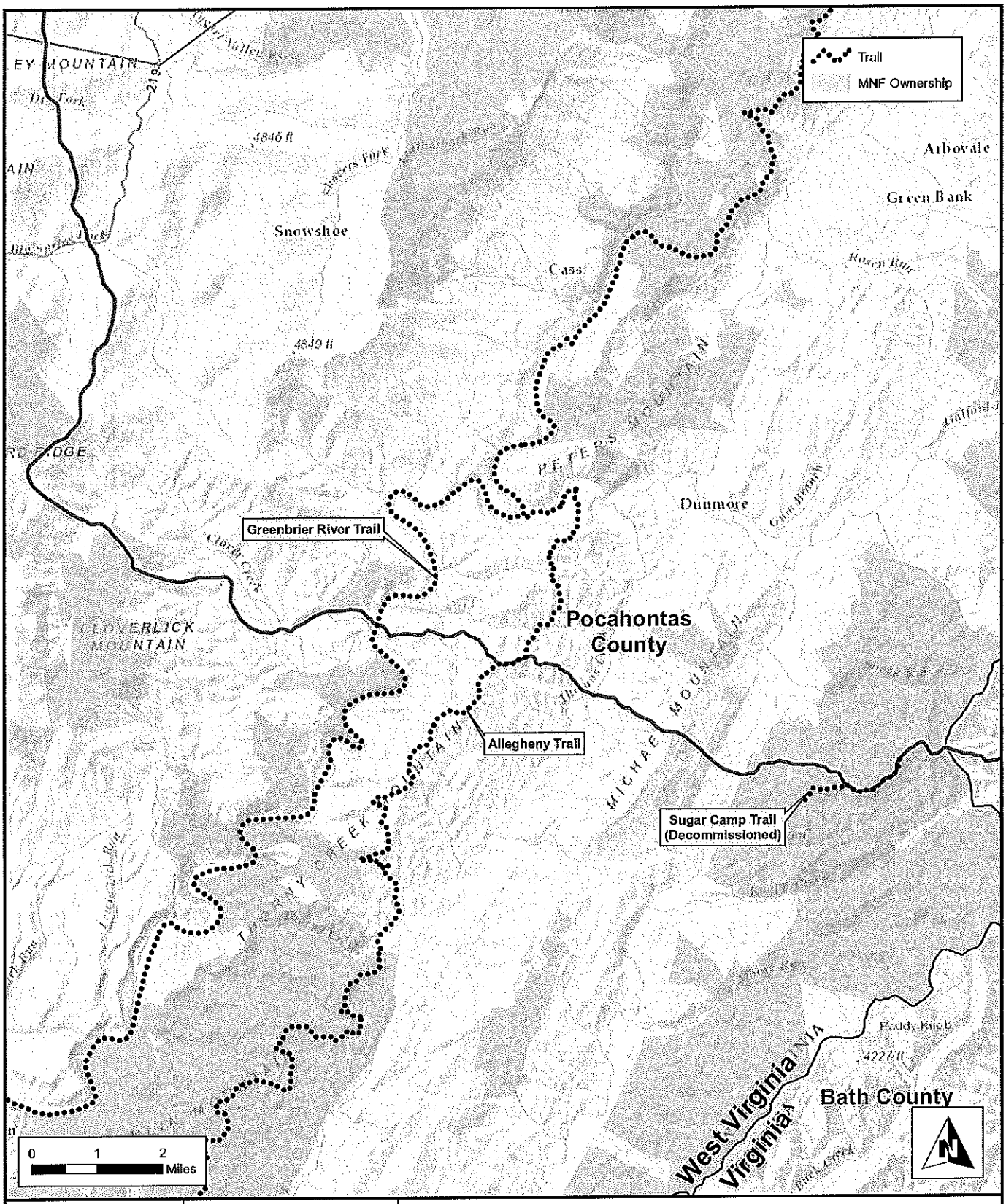


Atlantic Coast Pipeline

Figure 1
Atlantic Coast Pipeline
Project Location

ERM

FILE: M:\Clients\D-F\DOM\SRPP_ArcGIS\National_Forests\COM\COM_Figures_acp_com_general_location.mxd, REVISED: 04/06/2017, SCALE: 1:2,500,000 DRAWN BY: NRG GIS



Atlantic Coast Pipeline

ACP Mainline

Atlantic Coast Pipeline

Figure 2

Crossing of the Monongahela National Forest

ERM

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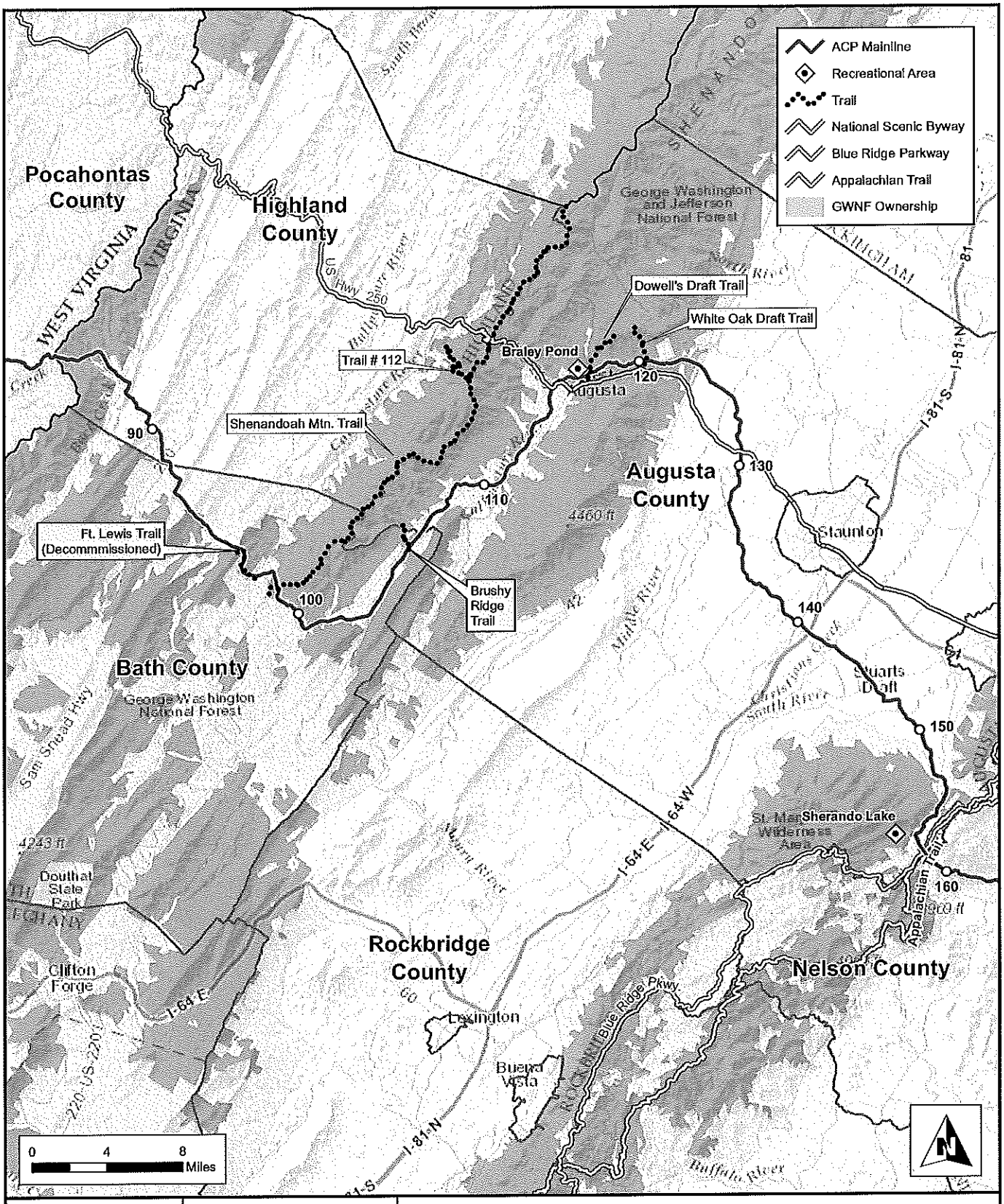

Atlantic Coast Pipeline

ACP Mainline

Atlantic Coast Pipeline

Figure 3

Crossing of the George Washington National Forest

ERM

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U.S. Army Corps of Engineers - Pittsburgh District

ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
MEETING MINUTES

MEETING WITH (COMPANY/AGENCY):
U.S. Army Corps of Engineers (USACE) Pittsburgh District
Atlantic Coast Pipeline (ACP) Coordination Meeting

DATE:	LOCATION:
March 20, 2017	Pittsburgh District Office Pittsburgh, Pennsylvania

ATTENDEES AND THEIR AFFILIATION:
Josh Shaffer - USACE Pittsburgh District (LRP)
Alani Taylor - USACE Pittsburgh District (LRP)
Spencer Trichell - Dominion Resources, Inc.
Linda Morrison - Dawson & Associates, Inc. – Dominion Contractor
Wade Hammer - Environmental Resources Management – Dominion Contractor
T.J Mascia - Resource Environmental Solutions, LLC – Dominion Contractor
Kevin Roush - Resource Environmental Solutions, LLC – Dominion Contractor

PREPARED BY:
Wade Hammer

MEETING MINUTES:

Meeting Purpose: To provide an update for the project and discuss draft supplemental filing and compensatory mitigation plans to complete the PCN application.

Projects Update FERC Process: Josh Shaffer (LRP project manager) opened the meeting by asking if the draft Supplement submitted by Atlantic on February 24, 2017 to LRP included the final ACP route alignment or would there be any additional changes to the route. Spencer Trichell (Dominion permitting lead) responded that only approximately 0.8 mile of the route remains to be surveyed in West Virginia (WV), and that there is unlikely to be much change to the route in WV within LRP boundaries. Josh explained that the USACE Districts have clear direction from USACE Headquarters when another federal agency, like FERC for this project, is the lead for the National Environmental Policy Act (NEPA). That guidance requires that the Districts have the final effects determination from FERC to complete the Section 106 process before the Districts can issue or verify a permit. Ultimately the District needs to receive from FERC as the lead federal agency the completed Section 106 and Section 7 documentation, including any finalized Memorandum of Understandings/Agreements that are required, to finalize the District's decision record and make a permit decision. Josh recommended active communication to get ahead of any possible Section 106 documentation delay and requested status updates as they are available. He also stated that it would be very helpful to the Districts if FERC would provide an expected timeline on when these final consultations will be concluded with final documentation delivered to the Districts in order for the Districts to then finalize its permit decisions. Linda Morrison asked if there is a scheduled coordination call between FERC and the Districts and Josh responded that there is not a regularly scheduled coordination call.

Draft PCN Supplement Review: Josh then stated that following review of the draft Supplement, he had a list of items that he wanted to request and discuss. The following list of items was requested by Josh to be submitted to the District:

1. Updated GIS/kmz files that provide the project limits of disturbance, pipeline alignment, and wetlands and waterbodies within the survey corridor.
2. The ORM upload form was mentioned as an item that the LRP would need to be completed and entered in order for the District to verify the NWP 12 permits. Wade Hammer suggested that the ORM requires a unique entry for each field, so while the data in the draft Supplemental Application compiles the impacts by single and complete project, the ORM would need to be loaded by separate polygons.

FERC Schedule Update: Spencer covered updates to the schedule, including that the Final EIS is scheduled by FERC to be issued by June 30, 2017 and construction is scheduled by Atlantic to begin on November 16, 2017, with tree clearing after the bat time of year restriction window. With 90 days after the final EIS as the targeted FERC certificate date, that would place the FERC certification at September 28, 2017. In addition, the draft Biological Assessment (BA) (version 5) was submitted to the FERC with a copy to U.S. Fish and Wildlife Service (USFWS) and the Districts on January 27, 2017. The USFWS has indicated the draft BA is in good condition, but had a few minor changes requested during a meeting the previous week (March 16, 2017). Atlantic is hopeful that once these minor changes are made that the FERC and USFWS will start consultation very soon, tentatively planning that by the end of March consultation will begin. If that holds true, after adding the 135 day consultation process, that puts the completion of Section 7 consultation at or around August 15, 2017.

WV WQC Update: Spencer then covered updates regarding the state process, advising that the WV Department of Environmental Protection (WVDEP) 401 Water Quality Certificate has been determined to be complete in March 2017 and Atlantic anticipates that the public notice will be going out within the week.

Mitigation Plan

Wetland Compensatory Mitigation Ratios: Wetland compensatory mitigation ratios were discussed and Josh advised that the following ratios are required to be included in the project's mitigation plan submitted to LRP:

- PFO loss 3:1
- PSS loss 2:1
- PEM loss 1:1
- PFO Permanent Conversion to PSS or to PEM 2:1
- PSS Permanent Conversion to PEM 1.5:1

Restoration: Josh advised that details of the proposed restoration techniques need to be included in the application. In particular the items that need to be spelled out clearly are: calculated area that will be impacted by the 75 foot temporary construction right-of-way (ROW), how stockpile trench soil will be stored and reused for restoration, restoration of pre-construction elevations, particulars on tree clearing with stumps left in place and only pulled for safety issues in some areas, and how the areas are to be reseeded with a native wetland seed mix. Josh advised that with restoration of the 75 foot temporary construction ROW as described above, no further compensatory mitigation is required for impacts to wetlands within this area.

Conceptual Mitigation Plan: T.J. Mascia discussed the Project's plan for conceptual mitigation. He discussed that Dominion was working on completing a project wide plan. T.J. expressed that there might be a need for a Permittee-Responsible Mitigation (PRM) site and that a watershed approach to this site

was being investigated within LRP boundaries in WV. T.J advised that they are also looking at the service area for an In-Lieu Fee (ILF), but may consider a PRM site as a better fit. T.J. also discussed the option of combining bank credits along with PRM for the compensatory mitigation plan and asked for Josh's feedback on this approach. Josh advised that the WV ILF Program has a lot of funding and needs to build mitigation sites, and is ok with looking at a larger PRM site rather than depleting bank credits and building smaller PRM mitigation sites for the compensatory mitigation plan.

The discussion moved onto the conceptual mitigation plan specifics. Josh emphasized that there are 12 components required for the mitigation plan per the 2008 Mitigation Rule that need to be addressed in Atlantic's plan. Josh advised that the District can move forward to finalize the NWP verification decision with a conceptual PRM mitigation plan in place, conditioning the NWP verification that within 60 to 90 days a final plan is to be submitted and prior to proceeding with the work, and that the construction of the mitigation PRM site can occur concurrent with Project construction. Josh stated that the final PCN Application Supplement could have a placeholder for the conceptual PRM mitigation plan to be submitted later with phased submittal of information to complete the NWP 12 PCN Application. T.J. asked if there was one PRM site needed for LRP and another PRM site needed for Huntington District (LRH), both within WV, could a larger PRM site be constructed to mitigate for impacts for both Districts, but located only within one District's regulatory boundaries. Josh advised that he would need to discuss such an proposed concept with Adam Fannin, LRH Project Manager, stating that it might be a possibility to identify and use one site across two Districts, but the other District would need be involved with the discussion and ultimately approve this option and it would need to comply with the Mitigation Rule.

Access Road Improvements: The next topic for discussion was permanent stream impacts specifically with respect to access roads improvements and whether those improvements are considered an impact or maintenance of an existing serviceable fill. The following scenarios were discussed with the District and the District's guidance regarding how to categorize proposed access road improvements is summarized as follows:

1. The replacement of an existing culvert with the same size culvert or upgrading the culvert size to meet current standards is considered maintenance (not a permanent impact).
2. The clean out of an existing culvert is considered maintenance (not a permanent impact).
3. Ford Crossings – If an existing ford crossing is used where the firm bed of a waterbody is crossed, and where improvements of riprap are only added on the bank approaches, but not below the OHWM no permit would be needed for the crossing (not a temporary or permanent impact). Alternatively, if the ford is improved and the stream bed is placed in a culvert, this is a permanent impact and would require a permit.
4. The addition of a new culvert where there is no existing culvert is considered a permanent impact and would require a permit (not maintenance).

District NWP 12 Verification Decision Timetable: The timing of the next application submittal was discussed. It was explained that ERM would need approximately a month to compile the next supplemental PCN filing. It was estimated that Dominion would be aiming to submit the next supplemental documents in June or July 2017, with the final EIS scheduled to be issued by June 30, 2017. The September 28, 2017 FERC schedule deadline for all federal agencies to make their permit decisions was discussed and the timing of WVDEP issuance of the required Individual WQC for the project. Josh advised that the District would issue a provisional NWP 12 verification if the state has not acted on the WQC in time for the District to meet FERC's federal agency permitting deadline. Josh also noted that the LRP will need to receive the FERC effects determinations for Section 106 NHPA and Section 7 ESA

before a verification letter can be issued. A monthly Project coordination call with the four Districts was also discussed as being helpful to the USACE to keep updated on the status of the multiple actions needed to complete the permitting process. Spencer advised that he would be meeting with the other Districts and would discuss potentially holding a monthly call with them and get back to Josh.

State/Commonwealth Agencies

West Virginia Agencies

West Virginia Department of Forestry

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

April 24, 2017

Travis Miller
State Lands Manager
WV Department of Forestry
61 Fifth St. Bldg. 1, Suite 101
Buchannon, WV 26201

RE: Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
Transmittal – Seismic Refraction Survey Report for the Seneca State Forest ACP ROW

Dear Mr. Miller:

Atlantic Coast Pipeline, LLC (Atlantic) provides the Seismic Refraction Survey report in the enclosure. Please contact me if you have any questions, 304.203.9011, colin.p.olness@dom.com.

Sincerely,

Colin Olness, P.E.
Atlantic Coast Pipeline

SEISMIC REFRACTION STUDY

For the Atlantic Coast Pipeline
Seneca State Forest, West Virginia

PREPARED FOR:

Ms. Kathleen Harrison, PG
Geosyntec Consultants, Inc.
3990 Old Town Ave., Suite 101-A
Sand Diego, CA 92110

March 14th, 2017

Draper Aden Associates
Engineering • Surveying • Environmental Services

DAA Project Number: **16010129-010203**

Draper Aden Associates
Engineering • Surveying • Environmental Services

2206 South Main Street
Blacksburg, Virginia 24060
(540) 552-0444 • Fax (540) 552-0291
www.daa.com

March 14th, 2017

RE: Atlantic Coast Pipeline – Seismic Refraction Study, Seneca State Forest, West Virginia,
DAA Project Number: 16010129-010203

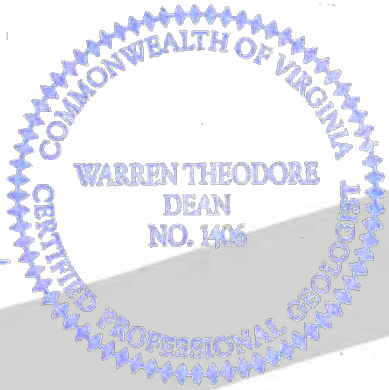
Ms. Kathleen Harrison, PG
Geosyntec Consultants, Inc.
3990 Old Town Ave., Suite 101-A
Sand Diego, CA 92110

Dear Ms. Harrison,

Draper Aden Associates has completed the seismic refraction study in the Seneca State Forest for the Atlantic Coast Pipeline project. This study was undertaken to evaluate the depth to bedrock at a total of 26 soil test pit locations along the proposed pipeline route. The following report documents our methodologies and findings.

We value our professional relationship with Geosyntec, and hope that you will contact us with any similar needs in the future. If you have any questions regarding this report, or if we can be of any further service to you please do not hesitate to contact us.

Sincerely,



Warren T. "Ted" Dean, P.G.
Program Manager I

3RD PARTY REVIEW

This report has been subjected to technical and quality reviews by:

Christopher M. Printz, PG		March 14th, 2017
Name:	Signature	Date
Senior Project Geologist		

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EXECUTIVE SUMMARY

Draper Aden Associates was retained by Geosyntec Consultants, Inc. (Geosyntec) to conduct a seismic refraction study for the proposed Atlantic Coast Pipeline (ACP) throughout portions of the ACP corridor that crosses through the Seneca State Forest (SSF) in West Virginia. Specifically, this study was initiated to identify the bedrock depth in soil test pits excavated during completion of an Order 1 Soil Survey that did not encounter bedrock within their protocol depths. The soil test pits were hand-dug approximately every 350 feet through the SSF along the proposed pipeline route to bedrock, or to a depth of 50 inches, whichever was encountered first, and 26 of those pits did not encounter bedrock within the excavated depth. Data for seismic refraction profiles were collected between November 7th and November 10th, 2016 for each of these 26 soil test pit locations with the purpose of determining the depth to bedrock.

The study area is spread across a broad geographic area, and as such, it is underlain by a variety of lithologies. The majority of the study area is located within the Valley and Ridge geologic and physiographic province, which consists of elongate parallel mountain ridges and valleys that are underlain by folded and faulted Paleozoic sedimentary bedrock. These parallel ridges and valleys are the result of differential weathering of layered clastic and carbonate bedrock on a regional scale. The ridges tend to be comprised of sandstone and conglomerates, which are resistant to physical weathering and the valleys tend to be comprised of carbonates and fine grained clastic materials that are more susceptible to physical weathering.

In folded and faulted terrains of varying lithologies, there exists the potential for strongly variable weathering profiles on a local or sub-regional scale, especially with carbonate rocks. Joints, fractures, and bedding planes provide greater surface area for physical weathering, so more highly fractured rock will tend to weather into soil more readily than non-fractured rock. These structural features are avenues for water infiltration and therefore can increase the rate of chemical dissolution and weathering of carbonate rocks. Therefore, localized differential weathering can result in a highly variable overburden thickness. An idealized cross-section of variable soil thickness from differential weathering is provided.

The soil test pit locations were grouped into five map sheets that cover a distance of approximately 3.5 miles, from mile markers 77 to 80.5. The locations of the test pits and geophones for each

seismic line are provided in large format maps, and the cross-sections for each seismic line depict the pit locations on each profile as well as the depth to rock at each pit location.

The literature suggest a wide range of potential P-wave velocity values for weathered and unweathered sedimentary rocks, suggesting that velocities for weathered, fractured, or decomposed rock range from 610 meters per second (2,000 feet per second) to 3,049 meters per second (10,000 feet per second), and that P-wave velocities of saturated shale and sandstone range from 1,100 meters per second (3,600 feet per second) to 5,100 meters per second (17,000 feet per second), with velocities of limestone up to 6,000 meters per second (20,000 feet per second). It should be noted that saturated conditions tend to facilitate P-wave propagation, and thus the velocities of dry rocks will be somewhat lower than those described in these references.

The cross-sections for each seismic line are presented as tomographic velocity-depth models which give modeled P-wave velocities in feet per second, color contoured as a function of depth. Based on our previous experience, the top of weathered rock is interpreted as the P-wave velocity at which the velocity contours begin to compress and become closer together. The top of unweathered rock is interpreted to be the P-wave velocity at which the velocity contours become even more tightly compressed. For weathered bedrock this usually occurs at velocities between 2,000 feet per second and 3,500 feet per second, and for unweathered rock between 3,500 feet per second and 7,000 feet per second. The interpreted weathered rock surface is indicated in each of the sections by a dashed black line, and the top of rock is indicated in each of the sections by a solid black line. For those cases where the interpretation of these surfaces is ambiguous or where more than one interpretation for either surface is possible, a conservative approach was applied where 2,000 feet per second was used as the weathered rock surface and 3,500 feet per second as the rock surface. The study area crosses numerous geologic settings and lithology types, so there is a wide range in velocities represented in the seismic sections.

1.0 INTRODUCTION

Draper Aden Associates was retained by Geosyntec Consultants, Inc. (Geosyntec) to conduct a seismic refraction study for the proposed Atlantic Coast Pipeline (ACP) throughout portions of the ACP corridor that crosses through the Seneca State Forest (SSF) in West Virginia. Specifically, this study was initiated to identify the bedrock depth in soil test pits excavated during completion of an Order 1 Soil Survey that did not encounter bedrock within their protocol depths. The soil test pits were hand-dug approximately every 350 feet through the SSF along the proposed pipeline route to bedrock, or to a depth of 50 inches, whichever was encountered first, and 26 of those pits did not encounter bedrock within the excavated depth. Data for seismic refraction profiles were collected between November 8th and Novermber 10th, 2016 for each of these 26 soil test pit locations with the purpose of determining the depth to bedrock.

2.0 SITE GEOLOGY

The study area is spread across a broad geographic area, and as such, it is underlain by a variety of lithologies. The majority of the study area is located within the Valley and Ridge geologic and physiographic province, which consists of elongate parallel mountain ridges and valleys that are underlain by folded and faulted Paleozoic sedimentary bedrock. These parallel ridges and valleys are the result of differential weathering of layered clastic and carbonate bedrock on a regional scale. The ridges tend to be comprised of sandstone and conglomerates, which are resistant to physical weathering and the valleys tend to be comprised of carbonates and fine grained clastic materials that are more susceptible to physical weathering.

In folded and faulted terrains of varying lithologies, there exists the potential for strongly variable weathering profiles on a local or sub-regional scale, especially with carbonate rocks. Joints, fractures, and bedding planes provide greater surface area for physical weathering, so more highly fractured rock will tend to weather into soil more readily than non-fractured rock. These structural features are avenues for water infiltration and therefore can increase the rate of chemical dissolution and weathering of carbonate rocks. Therefore, localized differential weathering can result in a highly variable overburden thickness. An idealized cross-section of variable soil thickness from differential weathering is provided in Figure 1 (From Fookes, 1997).

3.0 SEISMIC REFRACTION

3.1 Principles of Seismic Refraction

Seismic compressional waves (P-waves) are emitted through use of an energy source, such as a sledgehammer on a steel plate, which produces pulses of seismic energy. The ground motion from the seismic energy is recorded by an array of geophones spaced at regular intervals along a desired survey line. As the survey progresses, the source location moves along the extent of the survey line and beyond to obtain travel times from seismic waves to geophones at the surface. These travel times are recorded in the field by a seismograph, and analyzed using seismic refraction processing software during data analysis.

For analysis of seismic refraction data there are a set of assumptions. The first assumption is that the subsurface is composed of a stack of geologic layers separated by planar surfaces. This assumption is usually valid since the principle application of seismic refraction is to look for the bedrock surface or the boundaries between sedimentary layers. The second assumption is that seismic velocities increase with depth. This assumption is valid when exploring for the bedrock surface or in unconsolidated sediments when fine-grained materials are underlain by coarse-grained materials. The third assumption is that the velocity within each layer is uniform (Griffiths and King, 1988).

The primary data of interest in seismic refraction studies are the travel times of the seismic waves as they first arrive at the geophones, called first arrivals or first breaks. As the waves travel through the subsurface they propagate in all directions. For those geophones closest to the source, the first arrivals are often from direct waves as they travel along the ground surface. However, those waves traveling downward eventually reach a higher-velocity surface along which they travel faster than those waves traveling through the upper layer, and waves refracted from the higher-velocity layer begin to arrive at the geophones before the direct waves. In the travel time graphs, the point at which the refracted waves begin to arrive before the direct waves is characterized by a change in slope of the arrival times.

3.2 Field Methods

The seismic refraction survey was conducted using a series of twenty-four 4.5-Hz geophones, spaced 5 feet apart for a total seismic line spread of 115 feet for each of the 26 test pits.

Each line spread was oriented to minimize topographic variation, as several locations occurred along steep slopes or difficult terrain. Orienting the line spreads in this manner allowed for safer working conditions, and ease of access along the survey area. This approach was also condusive towards the processing and modeling of seismic refraction data as the terrain over which seismic data were collected factored into the modeling process. Steep terrain tends to make it more difficult for the seismic modeling to converge to a satisfactory solution.

The geophones were connected via a seismic cable to a Geometrics Geode seismograph. Refraction data were collected from five shot point (energy source) locations located along each spread. The source consisted of a sledgehammer striking a metal plate at each of the shot point locations. Seismic refraction data were "stacked" to a minimum of five hammer strikes per shot point location. The shot point locations were distributed within and beyond the extents of the geophone spread, with a central shot point in the middle of the spread. In instances where a test pit location could not be definitively identified due to ground disturbance, the seismic refraction line was centered on the GPS coordinate of the pit, or on surface features indicative of previous disturbance in the vicinity of the test pit coordinates. Some of the pits were spaced close enough together to allow two pits to be covered with a single seismic refraction line. The seismic survey identification numbers (e.g. SSF-P003-161111) were named using the following convention: forest location (i.e.SSF), followed by the first four alphabetic and numeric characters of the soil survey pit I.D. number, (e.g. P-003), and the seismic survey date (year, month, day). Table 1 cross references the seismic survey pit I.D. and the soil survey pit I.D.

The locations of the pits were recorded with a Trimble 6H Pro GPS receiver capable of sub-meter accuracy. In addition, the location of the first and last geophones were recorded as well as several intermediate geophone locations, usually every fifth geophone. The locations of the geophones that were not recorded with GPS were interpolated from the recorded points.

3.3 Seismic Data Processing

The refraction data were processed using the SeisImager software program. The SeisImager program allows the user to identify the first arrivals for each shot point, with subsequent interpretation of the corresponding slope breaks in the arrival time graph. These data serve as the

input to tomographic modeling. Seismic refraction tomography is an iterative modeling process by which the observed travel times are compared to an initial earth model or tomograph. The tomographic process then calculates the travel times that would occur if the earth model were correct. The earth model is then adjusted to minimize the difference between the observed travel times and the modeled travel times. When a close match is obtained between the calculated travel times and the observed travel times, the earth model can be accepted as a reasonable representation of actual conditions. For this study, the acceptable tolerance between the calculated and observed travel times was defined as a root mean squared (RMS) error of 2 milliseconds or less. All of the seismic sections for this study met or exceeded this criterion.

The geophone locations were plotted onto LIDAR topography data provided by Geosyntec. The elevations of each geophone were extracted from the LIDAR data and were incorporated into the seismic data processing, so that the model would consider the topography in the inversion modeling process and the resulting profiles would reflect the local relief.

4.0 SEISMIC REFRACTION RESULTS

The test pit locations were grouped into five map sheets that cover a distance of about 3.5 miles, from mile markers 77 to 80.5 (Figure 2). Map Sheet 1 contains Test Pits SSF-P003 to SSF-P013 (Figure 3), Map Sheet 2 contains Test Pits SSF-P021 to SSF-P024 (Figure 4), Map Sheet 3 contains Test Pits SSF-P046 to SSF-P052 (Figure 5), Map Sheet 4 contains Test Pits SSF-P055 to SSF-P066A (Figure 6), and Map Sheet 5 contains Test Pits SSF-P066A to SSF-P074 (Figure 7).

The literature suggest a wide range of potential P-wave velocity values for weathered and unweathered sedimentary rocks. Reddy (2011) cites velocities for weathered, fractured, or decomposed rock as ranging from 610 meters per second (2,000 feet per second) to 3,049 meters per second (10,000 feet per second). Bourbié et. al. (1987) describe the P-wave velocity of saturated shale to range from 1,100 meters per second (3,600 feet per second) to 2,500 meters per second (8,200 feet per second) and saturated sandstone to range from 2,000 meters per second (6,500 feet per second) to 3,500 meters per second (11,500 feet per second). Griffiths and King (1988) give the velocities of saturated shale and sandstone to range from approximately 1,200 meters per second (3,900 feet per second) to 5,100 meters per second (17,000 feet per second),

and velocities of limestone up to 6,000 meters per second (20,000 feet per second). It should be noted that saturated conditions tend to facilitate P-wave propagation, and thus the velocities of dry rocks will be somewhat lower than those described in these references.

The cross-sections for each seismic line are presented in Figures 8 through 20 in order from west to east. The seismic sections are provided as tomographic velocity-depth models which give modeled P-wave velocities in feet per second, color contoured as a function of depth. Based on our previous experience, the top of weathered rock is interpreted as the P-wave velocity at which the velocity contours begin to compress and become closer together. The top of unweathered rock is interpreted to be the P-wave velocity at which the velocity contours become even more tightly compressed. For weathered bedrock this usually occurs at velocities between 2,000 feet per second and 3,500 feet per second, and for unweathered rock between 3,500 feet per second and 7,000 feet per second. The interpreted weathered rock surface is indicated in each of the sections by a dashed black line, and the top of rock is indicated in each of the sections by a solid black line. For those cases where the interpretation of these surfaces is ambiguous or where more than one interpretation for either surface is possible, a conservative approach was applied where 2,000 feet per second was used as the weathered rock surface and 3,500 feet per second as the rock surface. Specifically, the tomographs from SSF-P012-161107 and SSF-P013-161107 display very low velocities with little of the characteristic compressing of the velocity contours that would clearly indicate transitional surfaces.

As discussed in Section 2.0, the study area crosses numerous lithologies, so there is a wide range in modeled velocities represented in the seismic sections, from 4,000 feet per second in SSF-P013-161107 to 20,000 feet per second in SSF-P051-161108. All of the interpreted depth to weathered rock and depth to rock data are summarized in Table 1.

Table 1. Depth to Rock and Weathered Rock from the Seismic Refraction Data.

Pit ID	Soil Survey Pit ID	Lat	Long	Depth to Weathered Rock (ft)	Depth to Rock (ft)
SSF-P003-161108	P-003-160620-1025-rll	38.33213320° N	79.95957879° W	8.4	10.9
SSF-P004-161108	P-004-160620-1035-rll	38.33206863° N	79.95801419° W	9.1	12.4
SSF-P005-161108	P-005-160620-1425-rll	38.33187374° N	79.95681183° W	8.5	13.4
SSF-P007-161108	P-007-160620-1245-dat	38.33278809° N	79.95512679° W	10.3	13.8
SSF-P008-161108	P-008-160620-1057-dat	38.33278035° N	79.95446275° W	6.4	9.7
SSF-P012-161107	P-012-160620-1115-mgw	38.33120042° N	79.94954333° W	9.5	24.3
SSF-P013-161107	SSF-13-161014-1059-jcr	38.33150912° N	79.94865162° W	10.8	47.6
SSF-P021-161107	SSF-21-161013-0910-jsw	38.32995901° N	79.93944018° W	12.4	17.9
SSF-P022-161107	P-022-160614-1050-jsw	38.32891138° N	79.93936420° W	11.8	17.4
SSF-P024-161107	P-024-160614-1440-jsw	38.32747023° N	79.93781545° W	6.7	12.5
SSF-P046-161108	P-046-160614-1050-def	38.32301183° N	79.91622354° W	5.6	9.4
SSF-P051-161108	SSF-51-161012-1048-def	38.31950739° N	79.91247481° W	6.6	9.3
SSF-P052-161110	SSF-52-161014-1606-jcr	38.31793159° N	79.90590257° W	8.6	10.4
SSF-P055-161110	P-055-160613-1110-rll	38.31740233° N	79.90287278° W	5.9	10.9
SSF-P057-161110	P-057-160613-1041-jdf	38.31594958° N	79.90158511° W	4.6	12.5
SSF-P058-161110	P-058-160613-1057-jdf	38.31522124° N	79.90040648° W	7.0	9.1
SSF-P059A-161108	SSF-59A-161015-1115-mel	38.31504950° N	79.89895919° W	6.4	13.9
SSF-P061-161108	P-061-160614-1000-rll	38.31403568° N	79.89735666° W	6.9	14.2
SSF-P063-161108	P-063-160614-0950-rll	38.31294532° N	79.89506633° W	7.6	14.4
SSF-P064-161108	P-064-160614-1020-rll	38.31281389° N	79.89441189° W	7.5	9.2
SSF-P066A-161108	SSF-66a-161014-1045-def	38.31187879° N	79.89244542° W	10.4	13.6
SSF-P066-161108	P-066-160614-1040-rll	38.31133599° N	79.89174002° W	10.2	14.1
SSF-P069-161110	P-069-160614-1158-sdd	38.30994805° N	79.88963641° W	12.1	17.6
SSF-P070-161110	P-070-160614-1102-sdd	38.30974838° N	79.88793743° W	7.2	9.2
SSF-P073-161110	P-073-160616-1402-sdd	38.30925425° N	79.88440910° W	9.2	12.3
SSF-P074-161110	P-074-160616-1238-sdd	38.30868251° N	79.88345297° W	22.9	26.7

Note: 1) Order 1 Soil Survey, Atlantic Coast Pipeline, Seneca State Forest, WV, January 18, 2017, prepared by RETTEW Associates, Inc. and Geosyntec Consultants.

5.0 LIMITATIONS

This study was conducted by qualified geologists with over 36 years of collective experience in the collection, processing, and interpretation of geophysical data, including registered professional geologists. All geophysical data collection and processing are interpretive. Confirmation of these geophysical results would require invasive sampling.

6.0 REFERENCES

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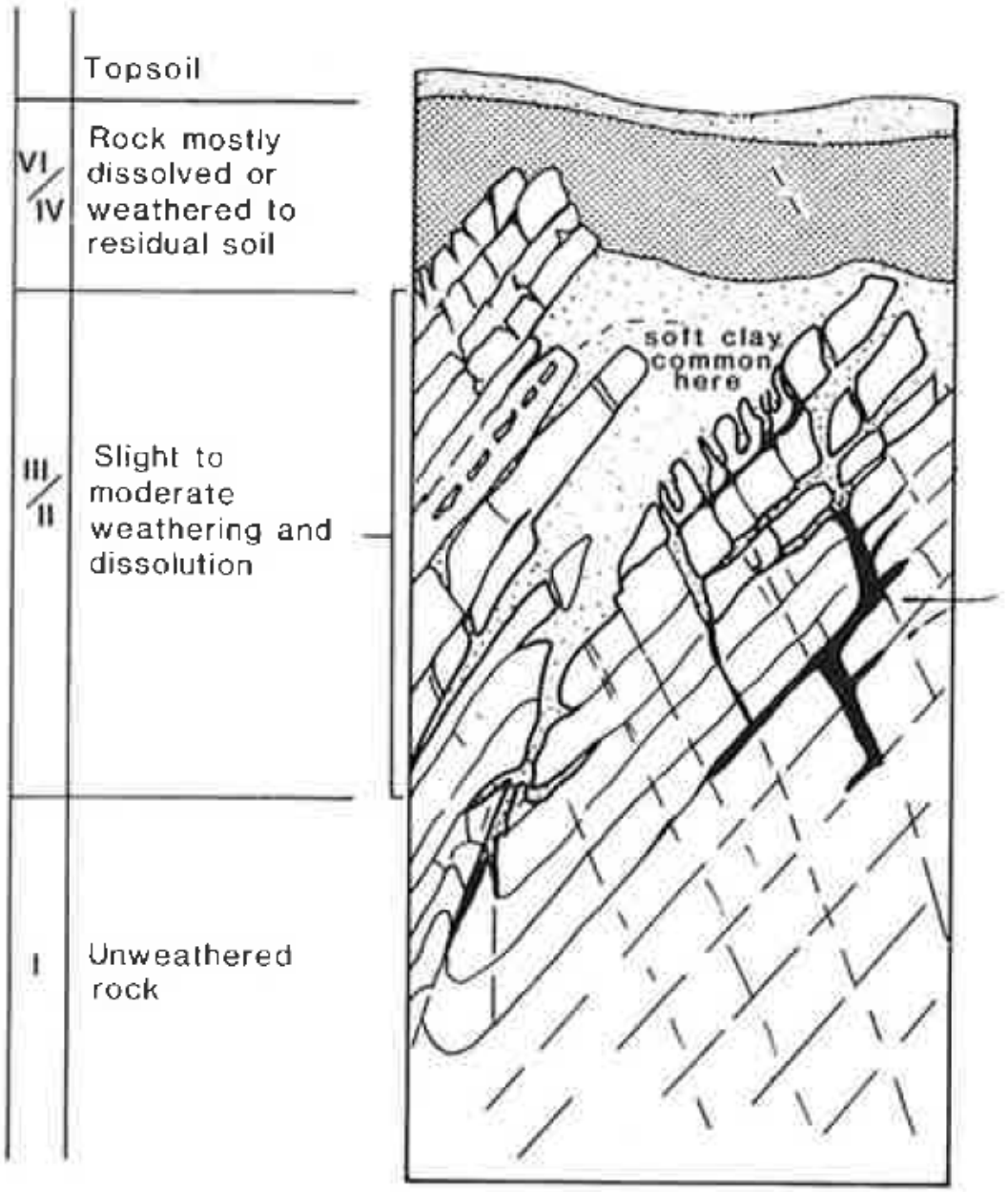
Bourbié, Thierry, Olivie Coussy, and Bernie Zinszner, 1987. Acoustics of Porous Media, Gulf Publishing Company, 334 pp.

7.0 FIGURES

Idealized cross-section of differential weathering



Draper Aden Associates
Engineering • Surveying • Environmental Services
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291
Richmond, VA
Charlottesville, VA
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FIGURE
1

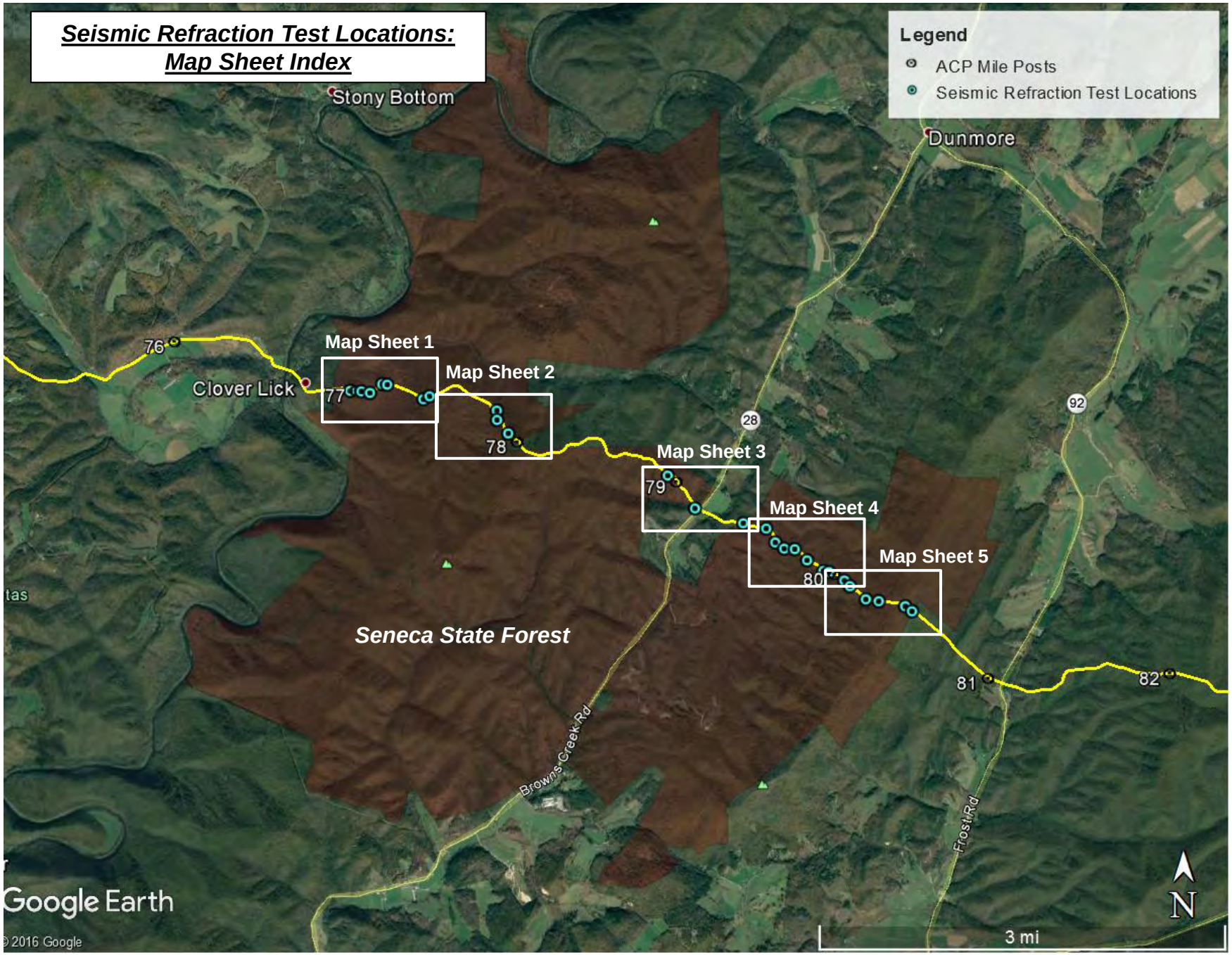

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FIGURE
2

Seismic Refraction Line Locations
Map Sheet 1

Test Pits:

SSF-P003-161108
SSF-P004-161108
SSF-P005-161108
SSF-P007-161108
SSF-P008-161108
SSF-P012-161107
SSF-P013-161107

SSF-P003-161108
SSF-P004-161108
SSF-P005-161108
SSF-P007-161108
SSF-P008-161108
SSF-P012-161107
SSF-P013-161107

77
77.1
77.2
77.3
77.4

Elevation Color Scale (feet)
2770
2730
2690
2650
2610
2570
2530
2490
2450

N

Scale: 1 in = 1000 ft
0 50 100 150 200

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FIGURE
3

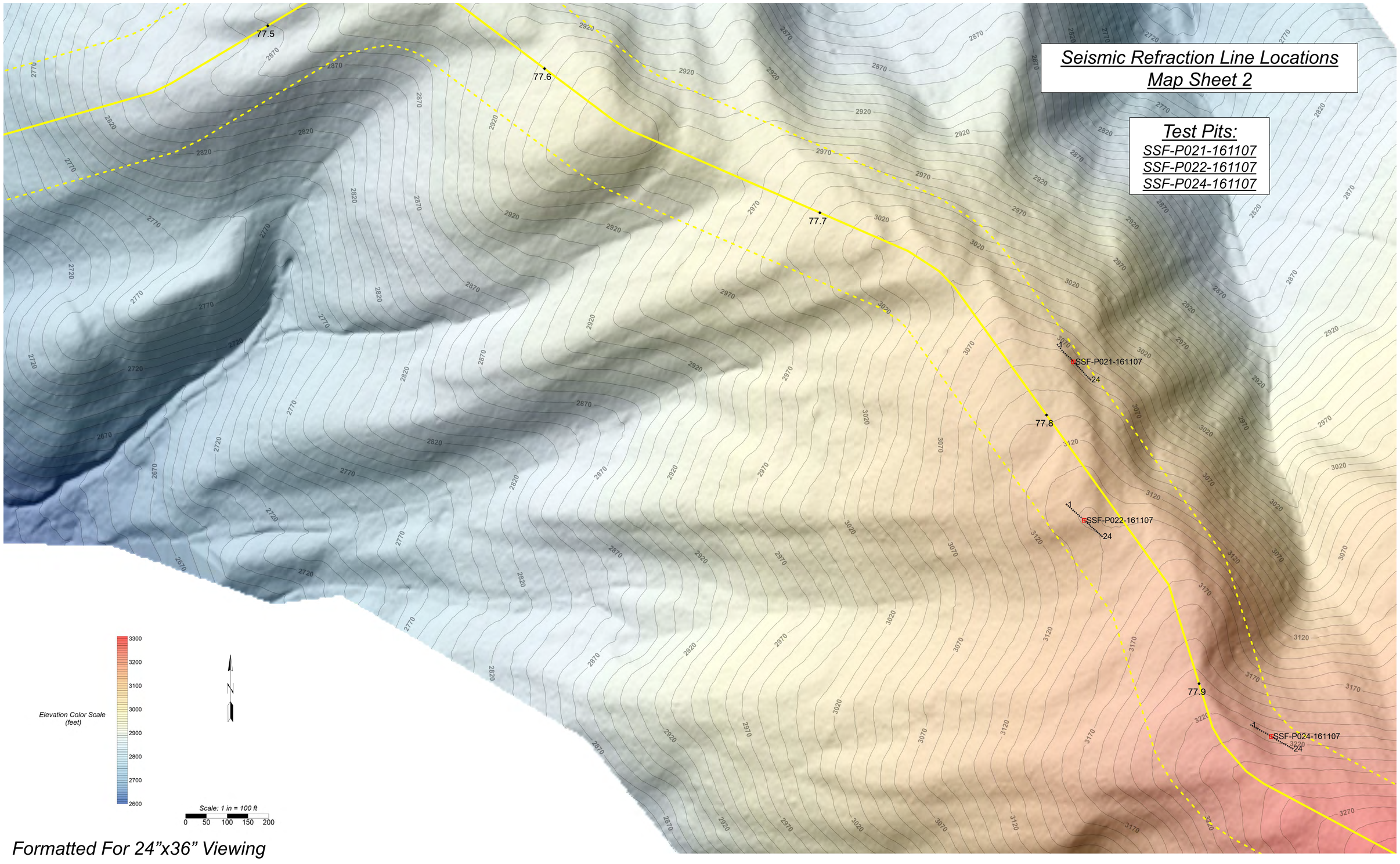

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FIGURE
4

Seismic Refraction Line Locations
Map Sheet 3

Test Pits:
SSF-P046-161108
SSF-P051-161108
SSF-P052-161110

24
SSF-P046-161108
1
79
79.1
24
SSF-P051-161108
1
79.2
79.3
79.4
24
SSF-P052-161110
1

Elevation Color Scale (feet)
2800
2750
2700
2650
2600
2550

N

Scale: 1 in = 100 ft
0 50 100 150 200

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FIGURE
5

Seismic Refraction Line Locations
Map Sheet 4

Test Pits:

SSF-055-161110
SSF-P057-161110
SSF-P058-161110
SSF-P059A-161108
SSF-P061-161108
SSF-P063-161108
SSF-P064-161108
SSF-P066A-161108

SSF-P055-161110
SSF-P057-161110
SSF-P058-161110
SSF-P059A-161108
SSF-P061-161108
SSF-P063-161108
SSF-P064-161108
SSF-P066A-161108
79.6
79.7
79.8
79.9
80

Elevation Color Scale (feet)
3220
3170
3120
3070
3020
2970
2920
2870
2820
2770
2720
2670

Scale: 1 in = 100 ft
0 50 100 150 200

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FIGURE
6

Seismic Refraction Line Locations
Map Sheet 5

Test Pits:

SSF-P066A-161108
SSF-P066-161108
SSF-P069-161110
SSF-P070-161110
SSF-P073-161110
SSF-P074-161110

Scale: 1 in = 100 ft
0 50 100 150 200

Elevation Color Scale (feet)
3600
3500
3400
3300
3200
3100
3000

N

80
80.1
80.2
80.3
80.4
SSF-P066A-161108
SSF-P066-161108
SSF-P069-161110
SSF-P070-161110
SSF-P073-161110
SSF-P074-161110
1
24

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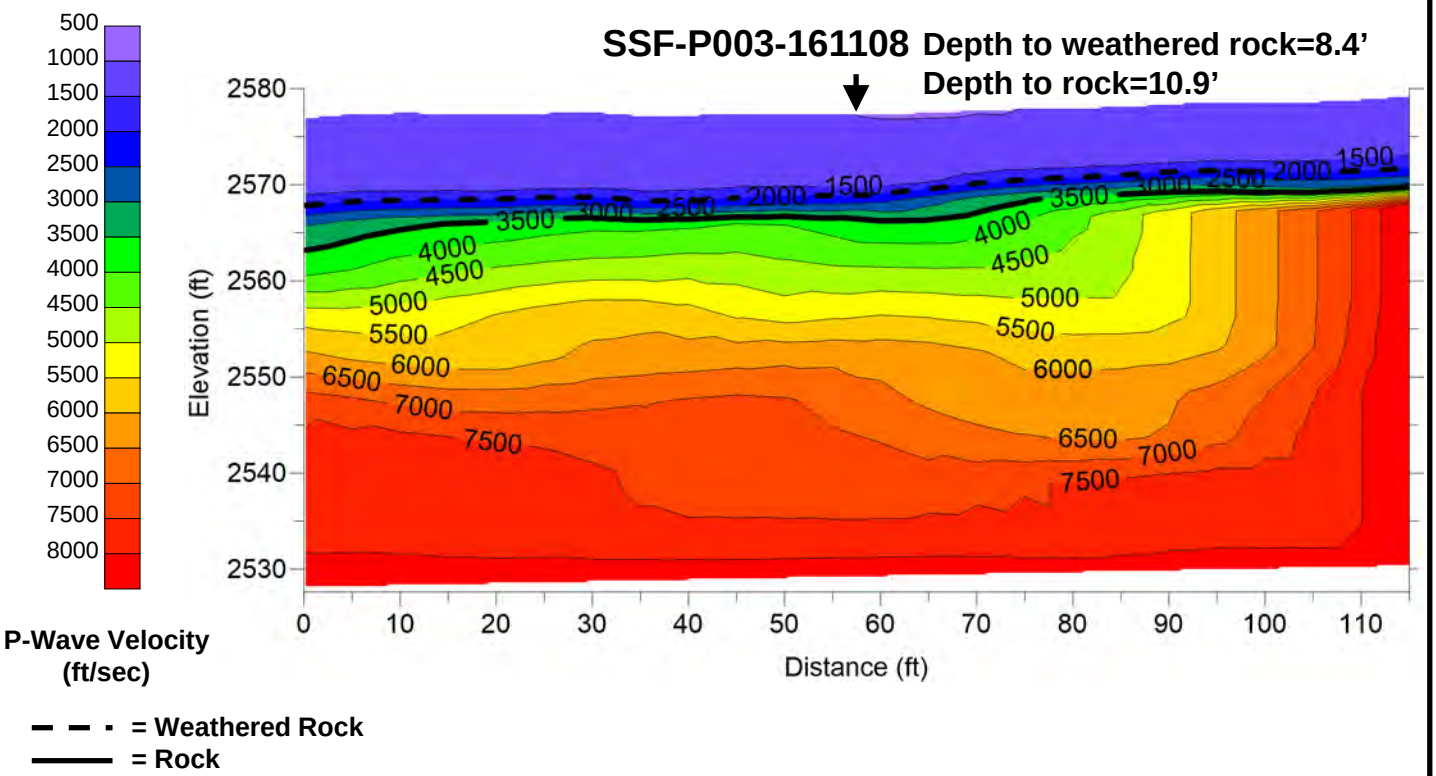
FIGURE
7

Seismic refraction model results for SSF-P003-161108 and SSF-P004-161108



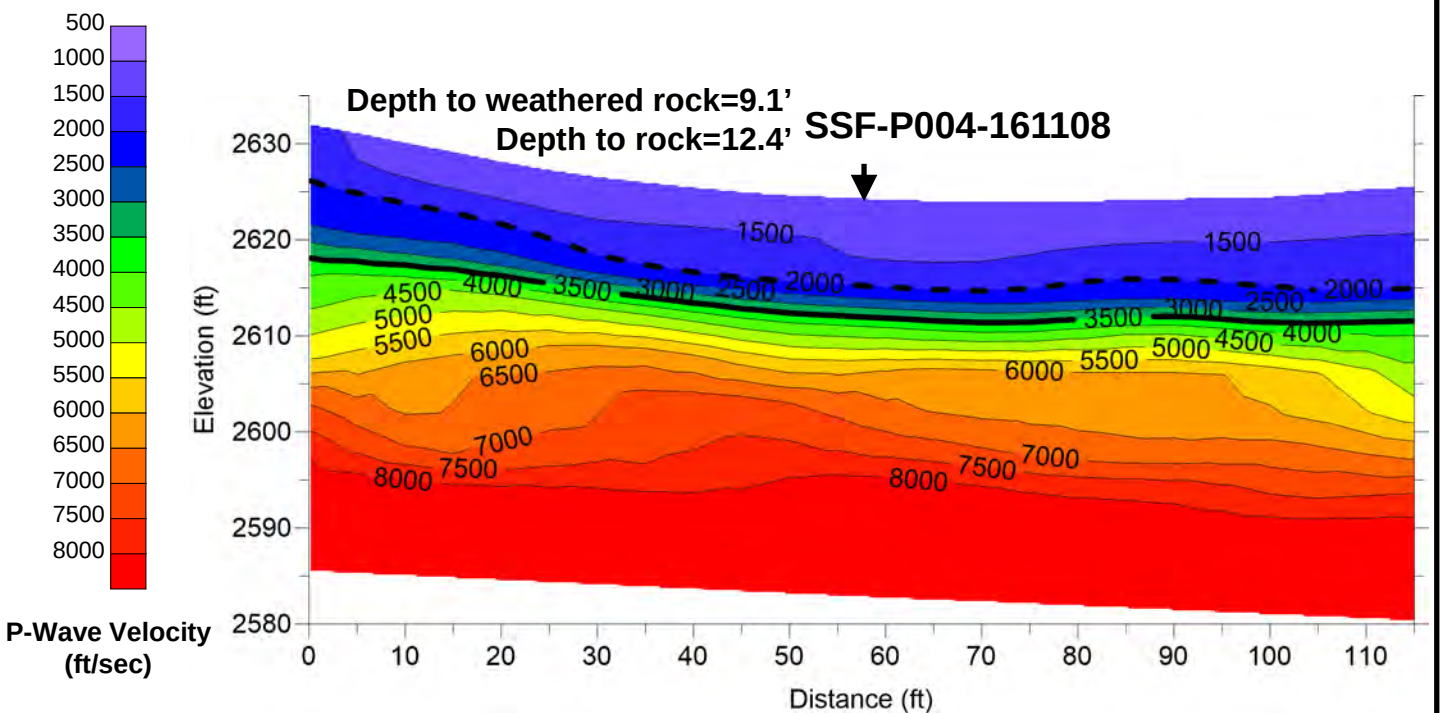


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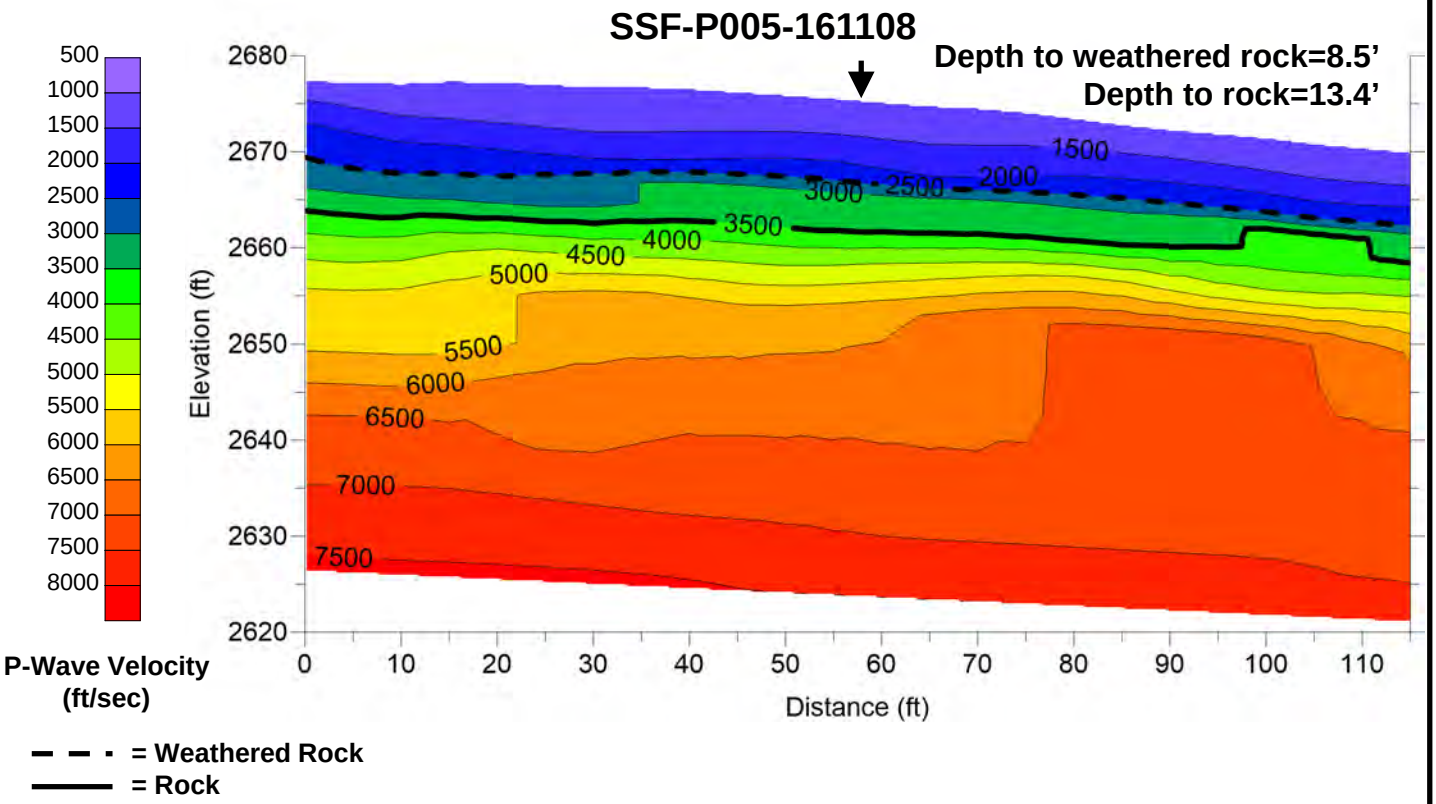
FIGURE
8

Seismic refraction model results for SSF-P005-161108 and SSF-P007-161108



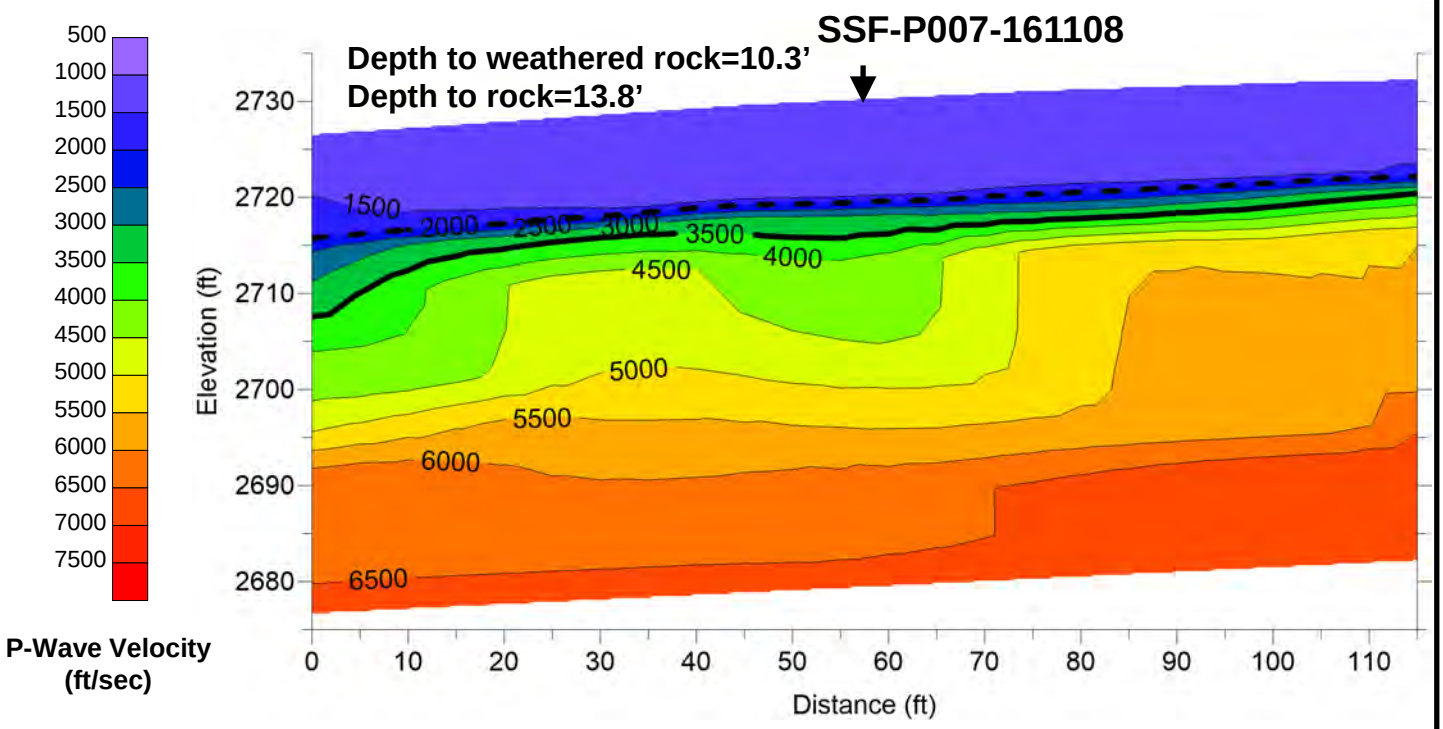


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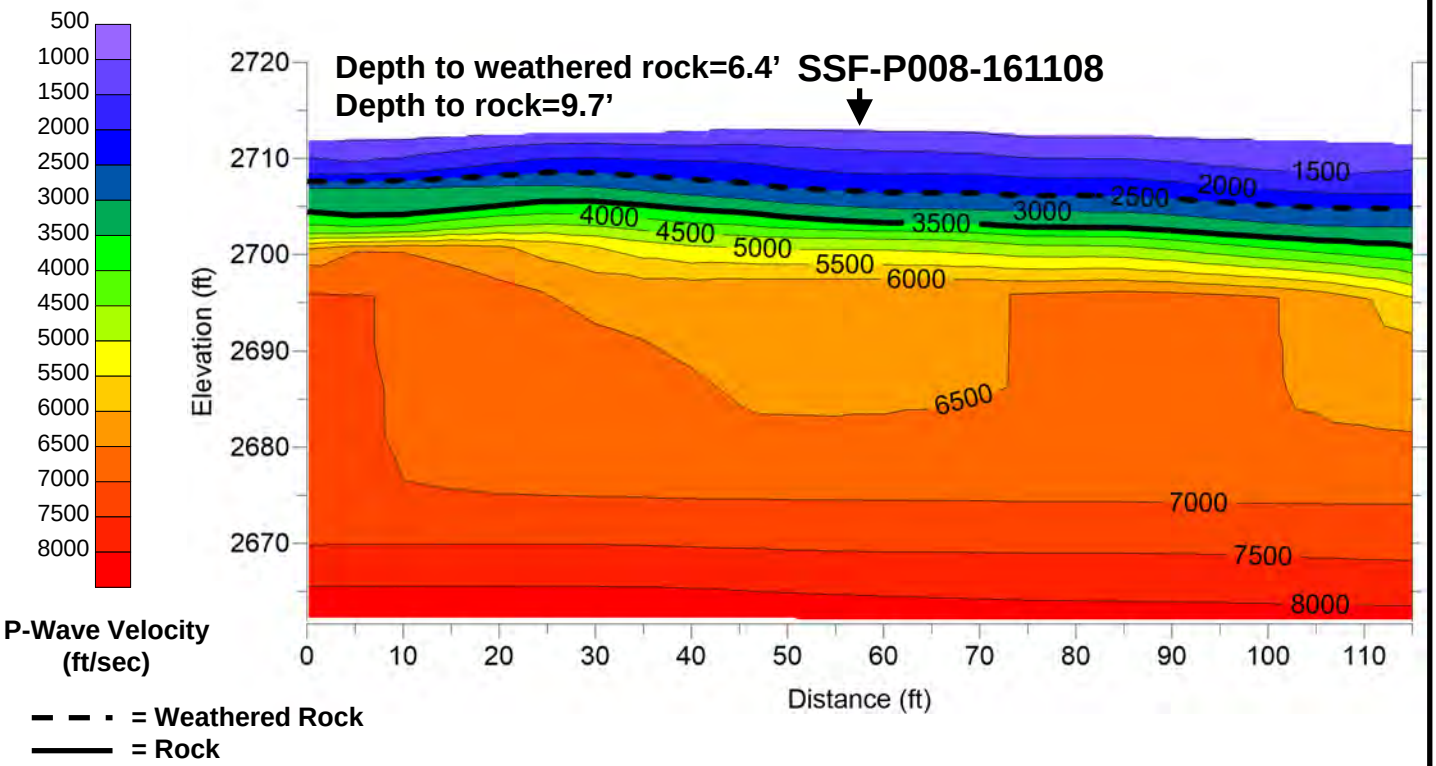
FIGURE
9

Seismic refraction model results for SSF-P008-161108 and SSF-P012-161107



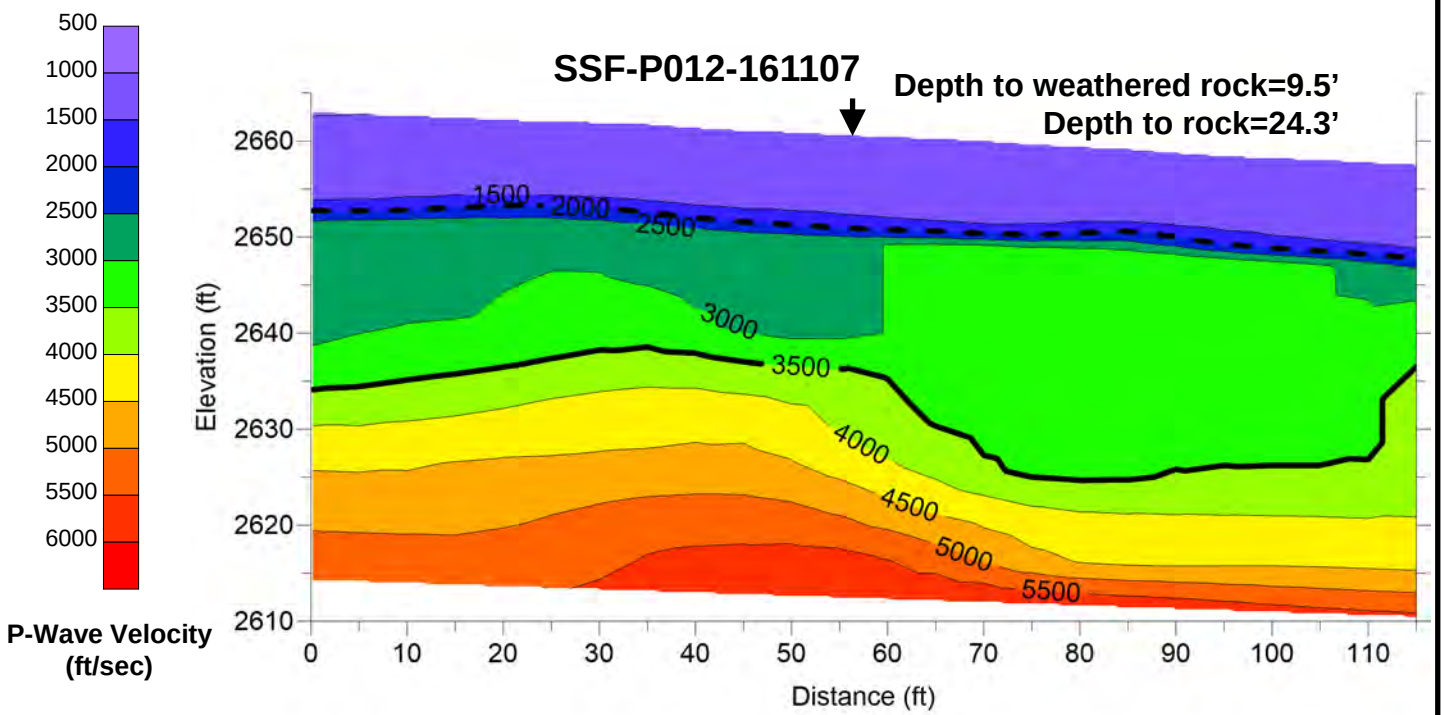


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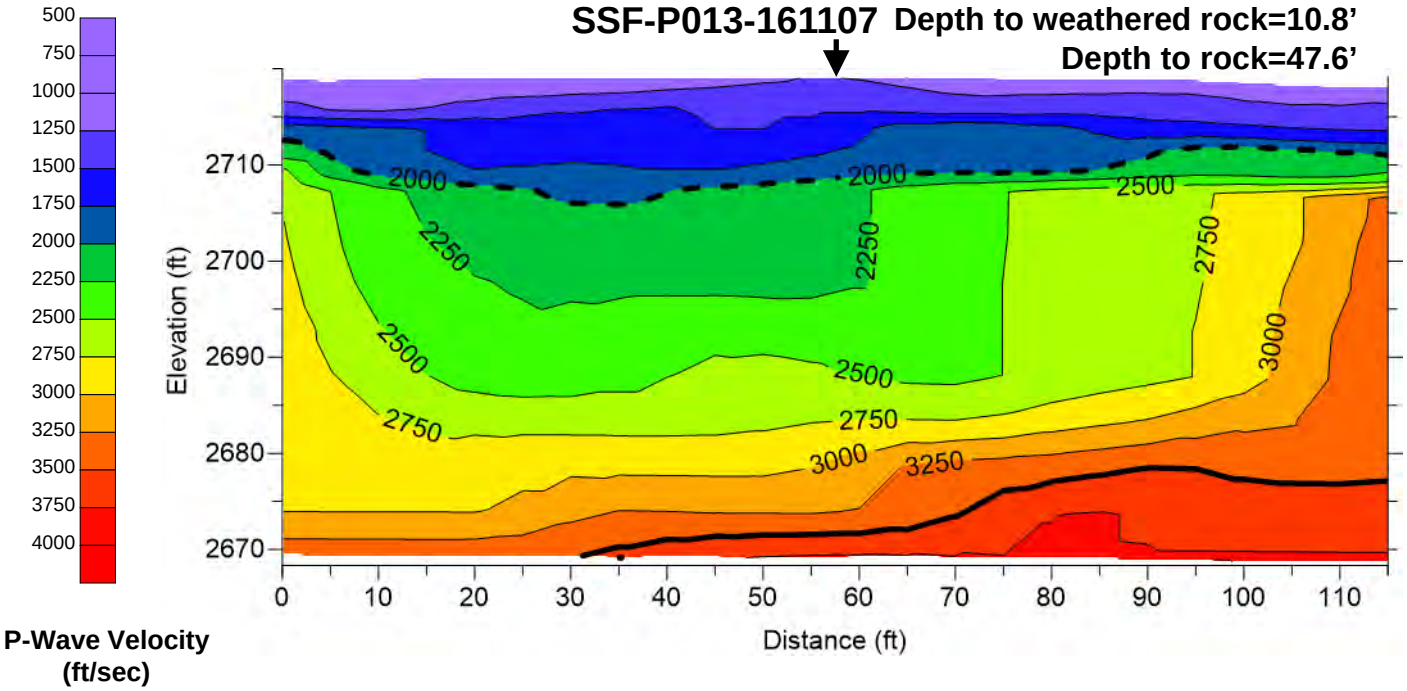
FIGURE
10

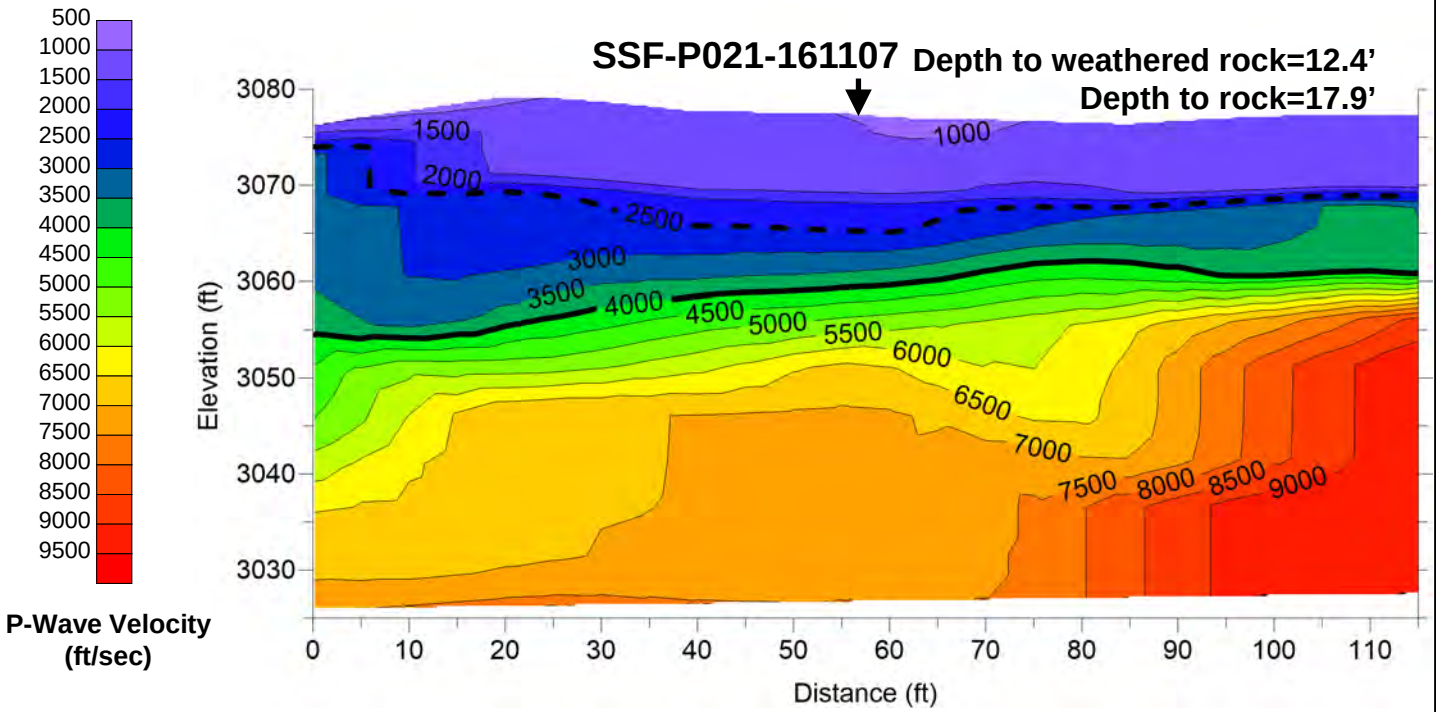
Seismic refraction model results for SSF-P013-161107 and SSF-P021-161107



P-Wave Velocity (ft/sec)

– – · = Weathered Rock

——— = Rock



P-Wave Velocity (ft/sec)

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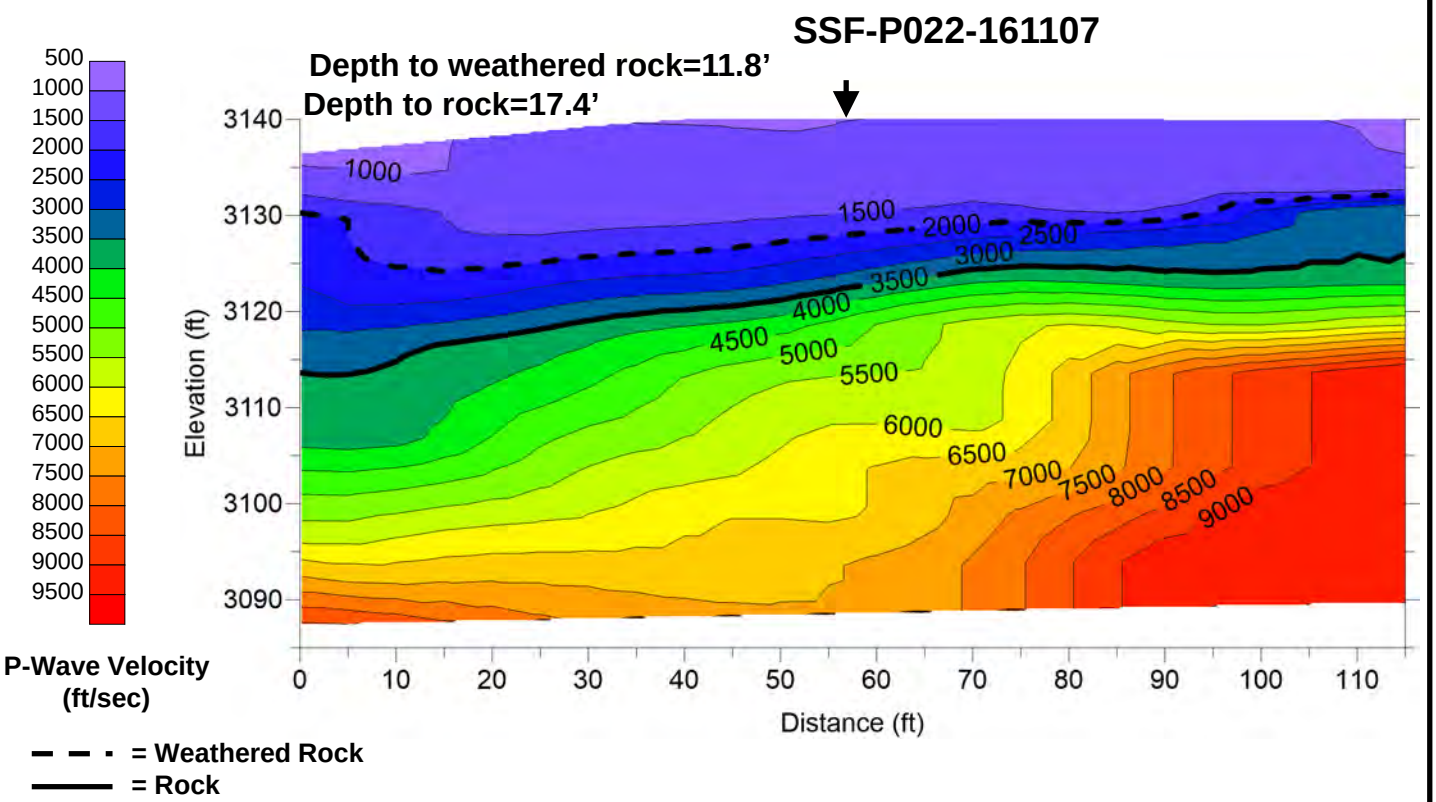
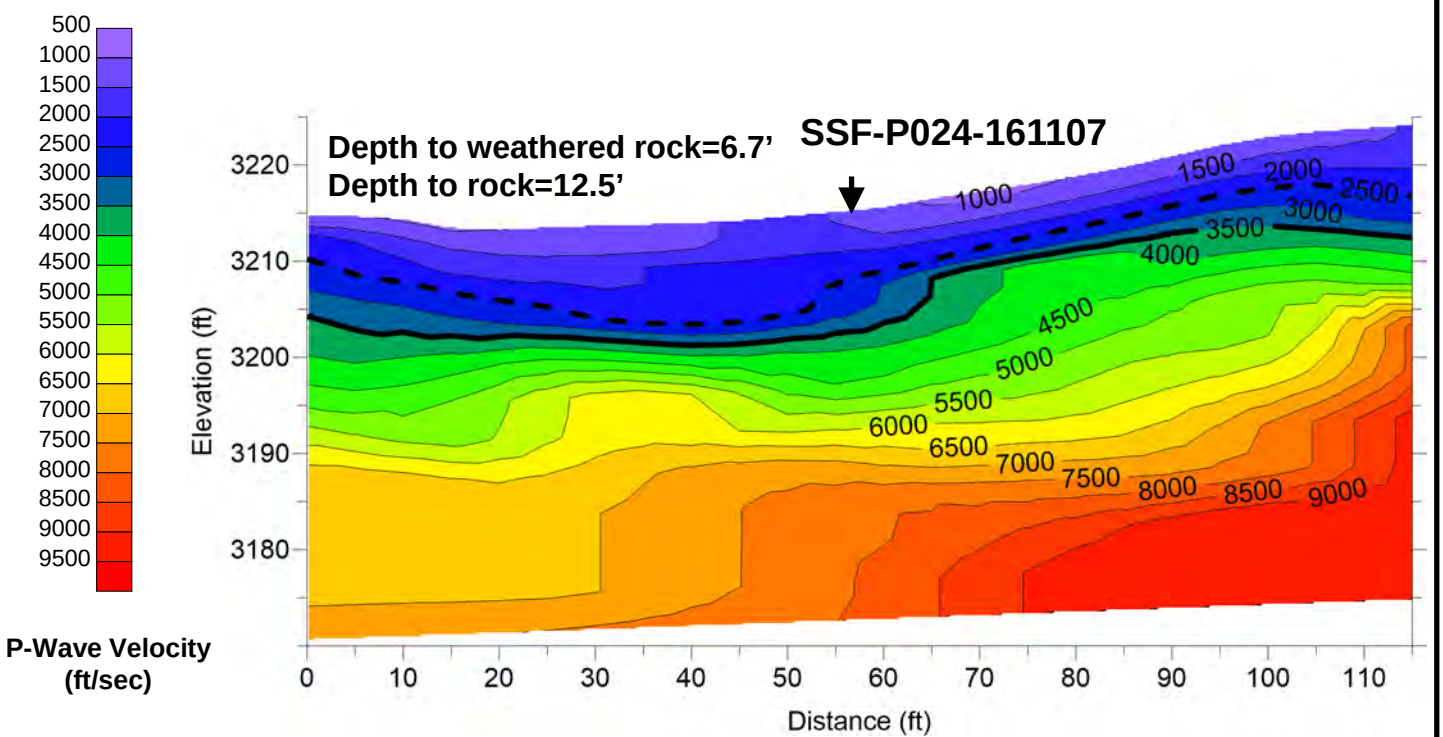
FIGURE 11

Seismic refraction model results for SSF-P022-161107 and SSF-P024-161107





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Engineering • Surveying • Environmental Services
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291
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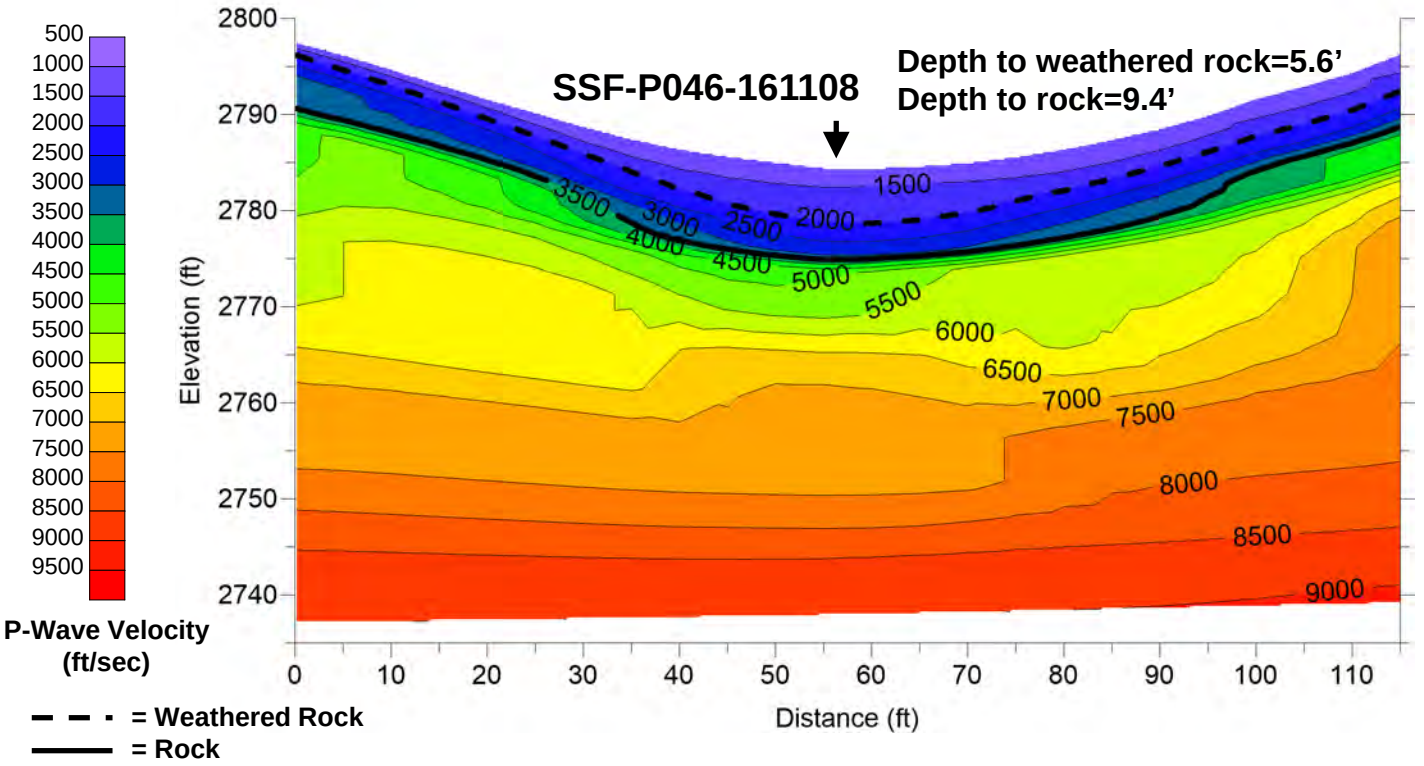
FIGURE
12

Seismic refraction model results for SSF-P046-161108 and SSF-P051-161108



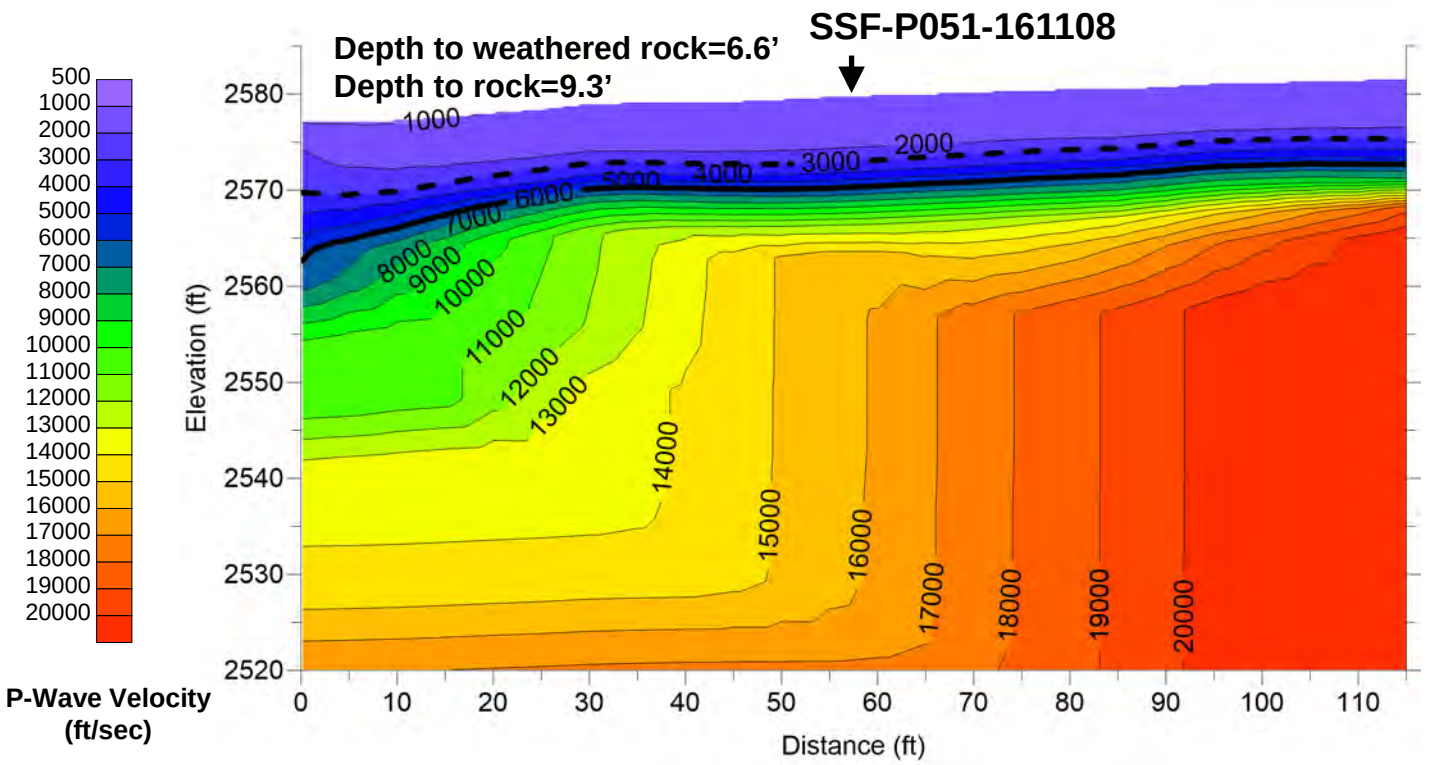


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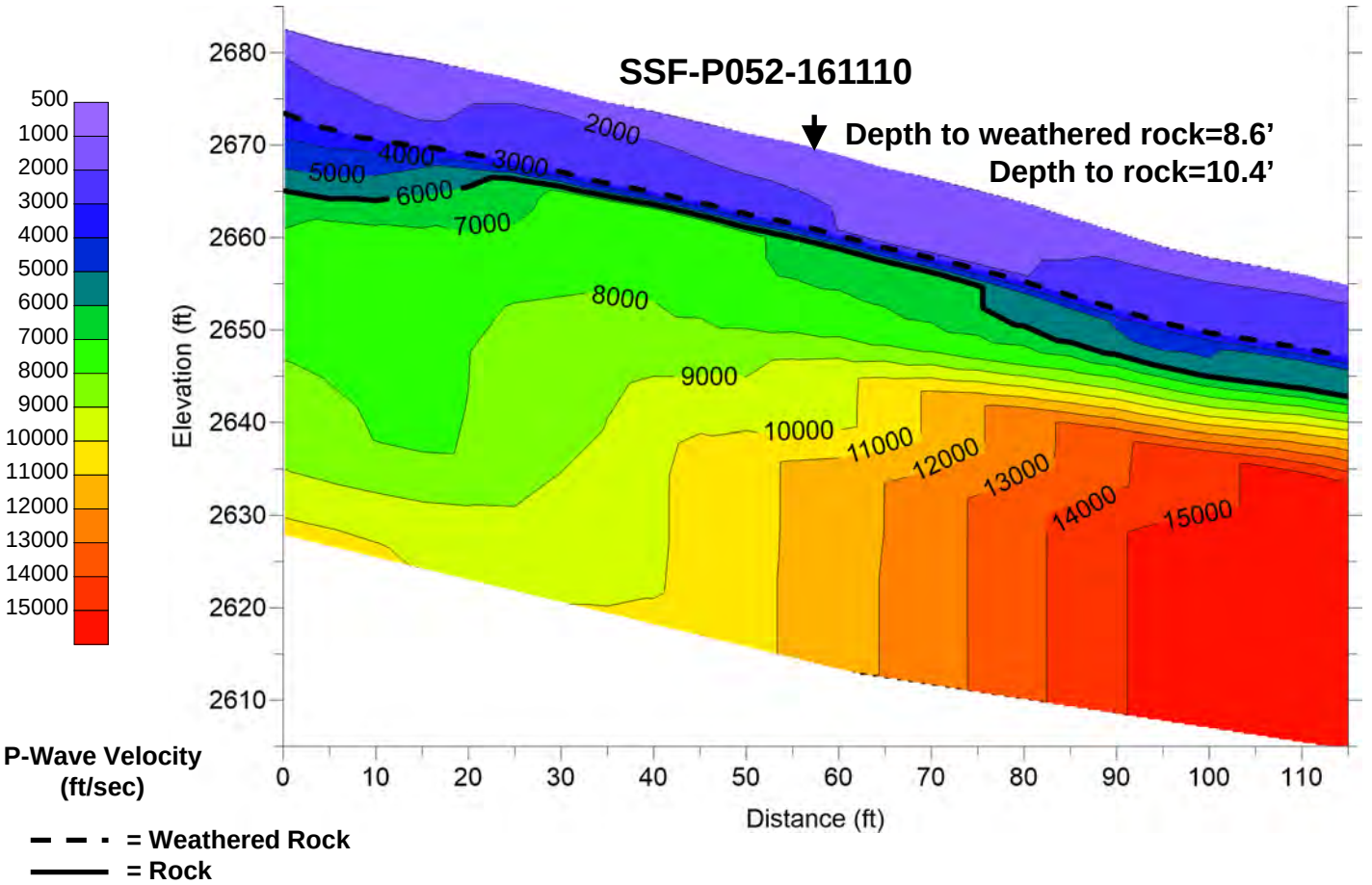
FIGURE
13

Seismic refraction model results for SSF-P052-161110 and SSF-P055-161110



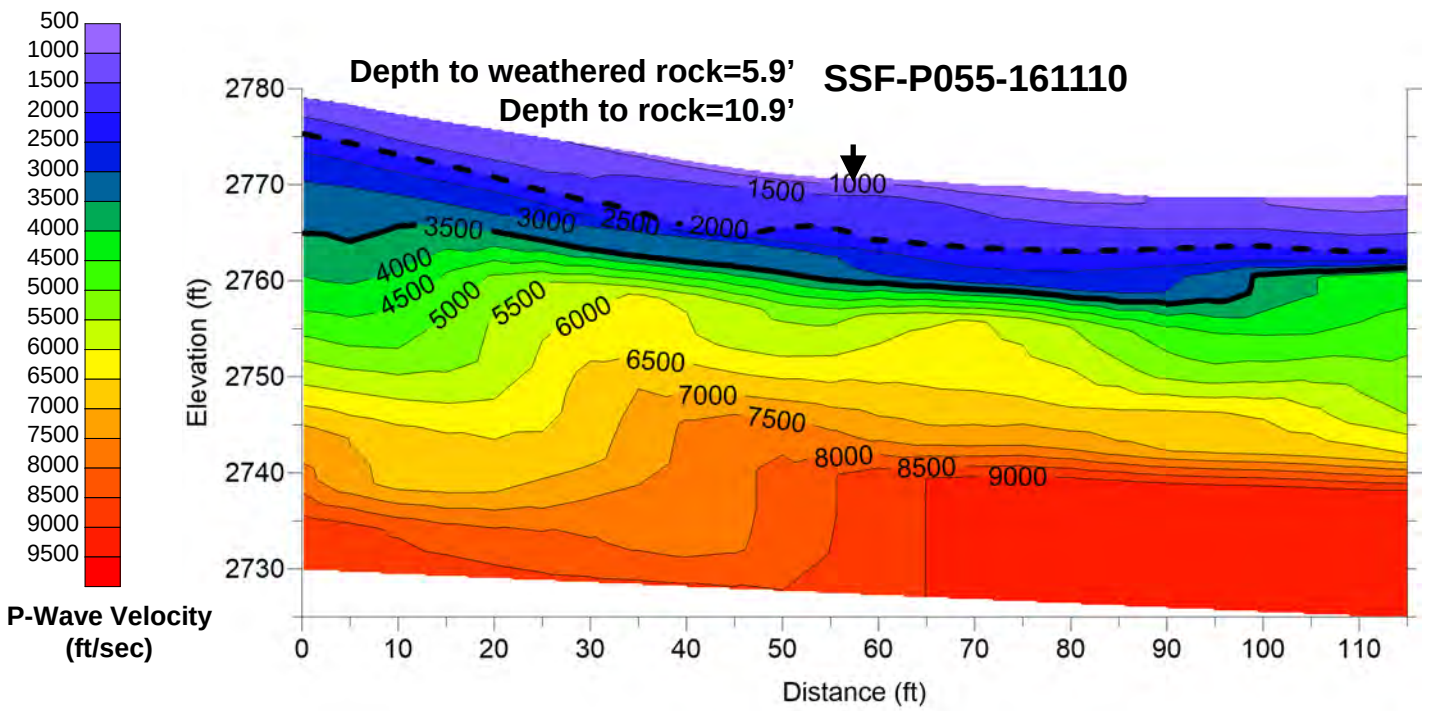


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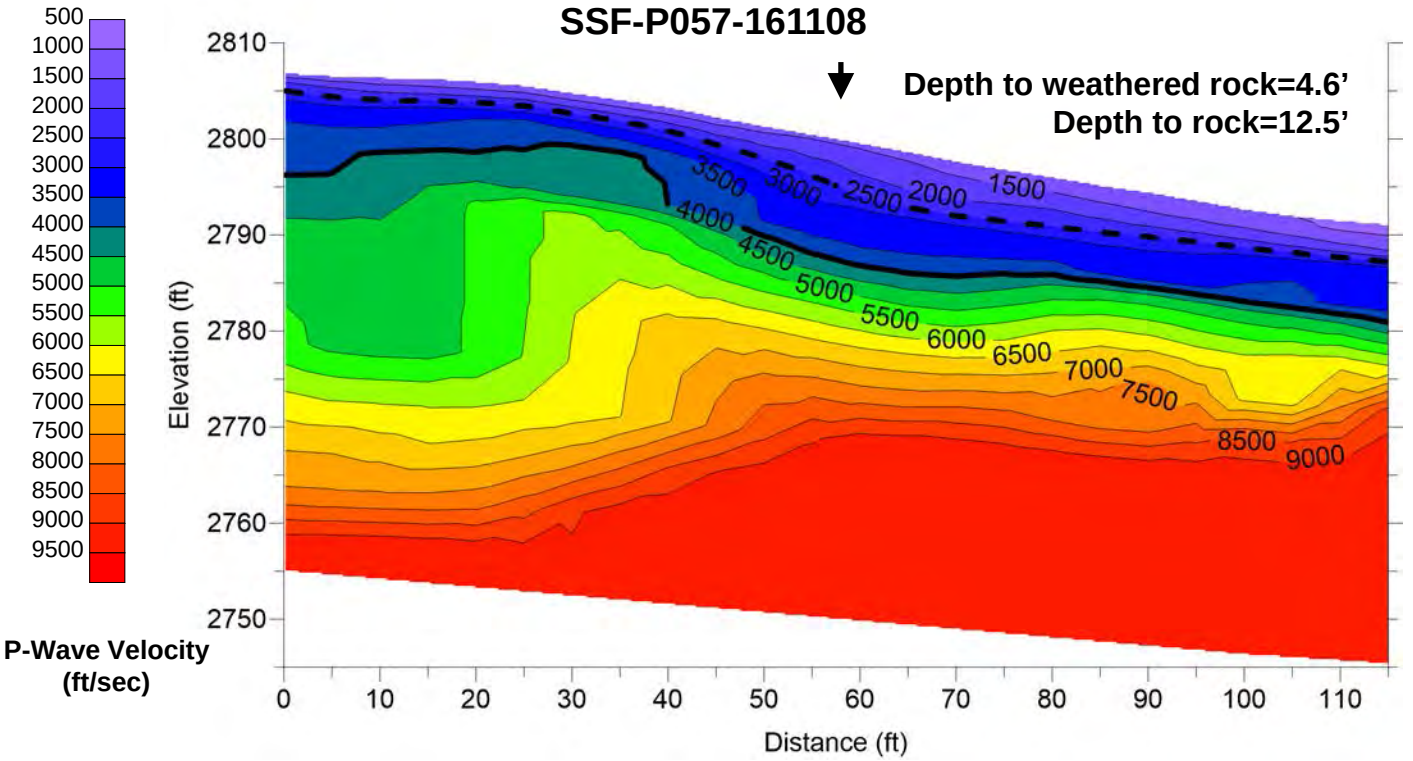
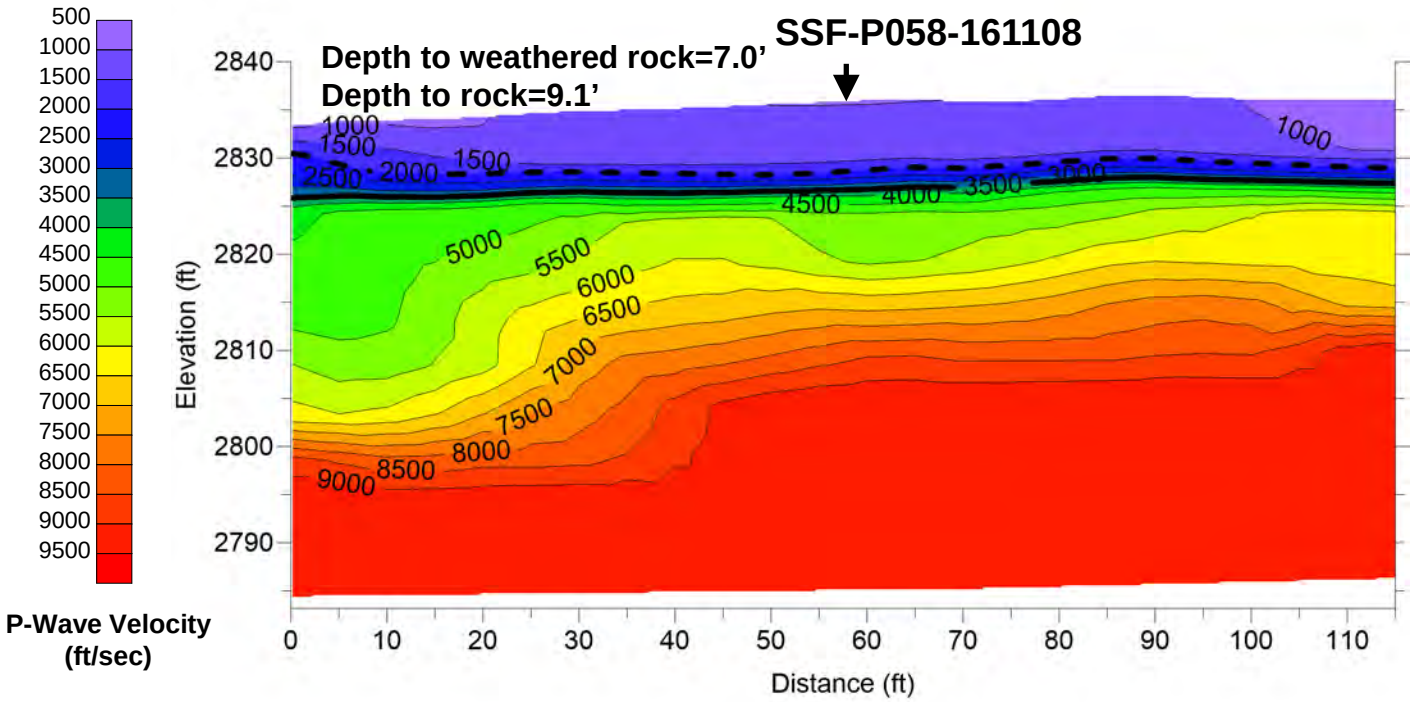
FIGURE
14

Seismic refraction model results for SSF-P057-161108 and SSF-P058-161108





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Engineering • Surveying • Environmental Services
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Blacksburg, VA 24060
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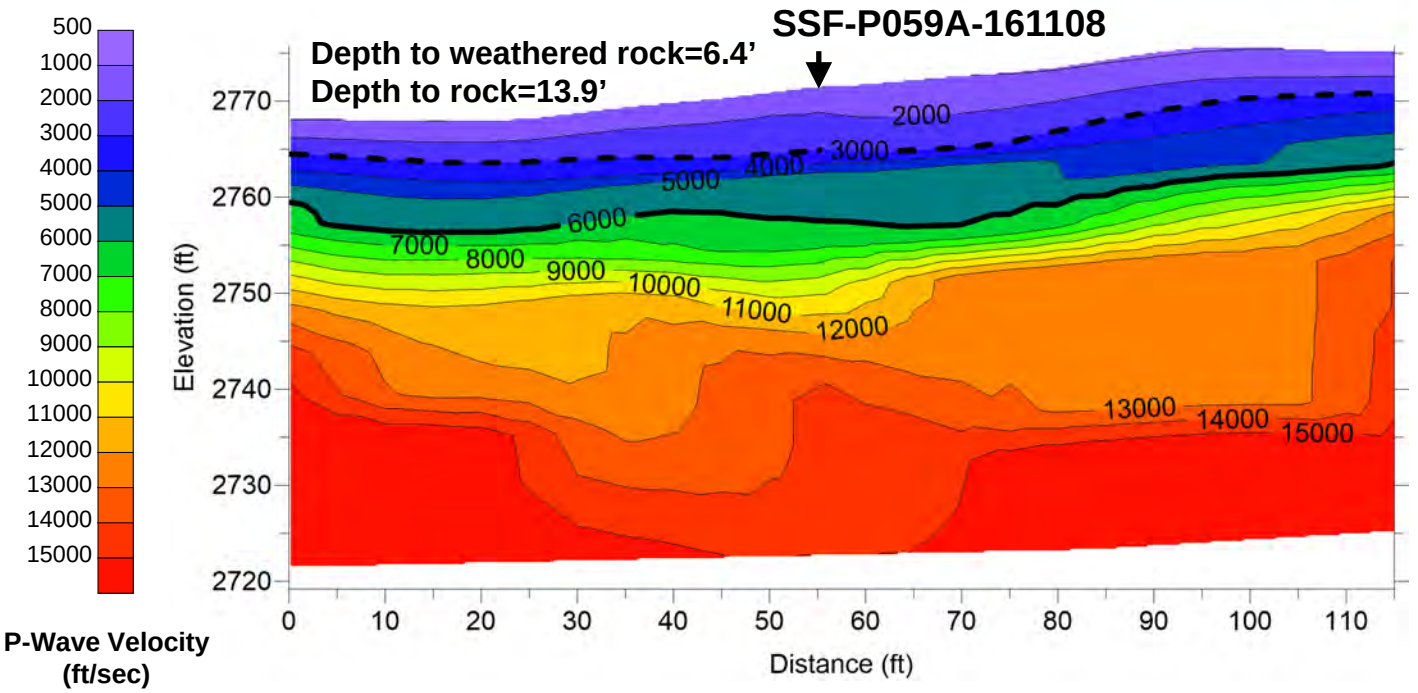
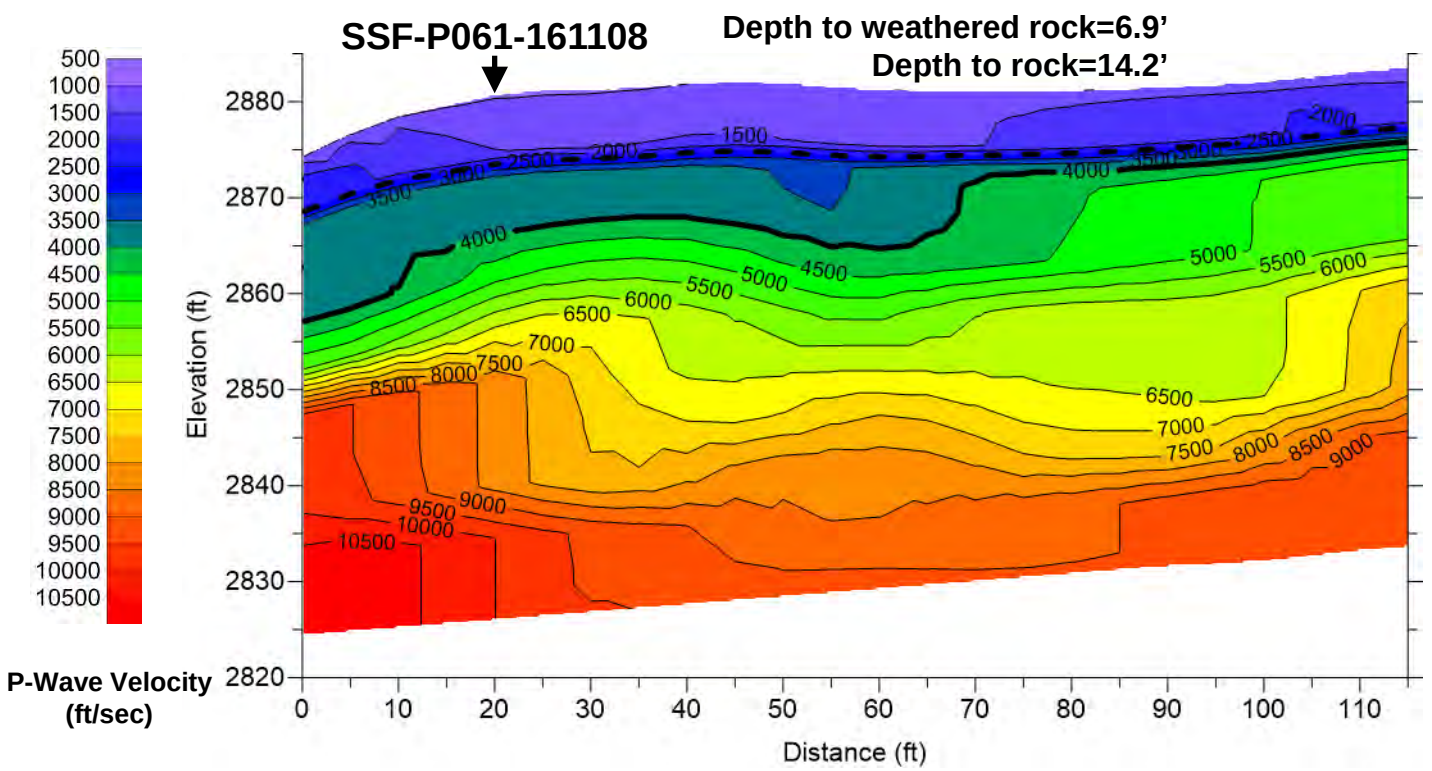
FIGURE
15

Seismic refraction model results for SSF-P059A-161108 and SSF-P061-161108



= Weathered Rock

= Rock



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Engineering • Surveying • Environmental Services
2206 South Main Street
Blacksburg, VA 24060
540-552-0444 Fax: 540-552-0291
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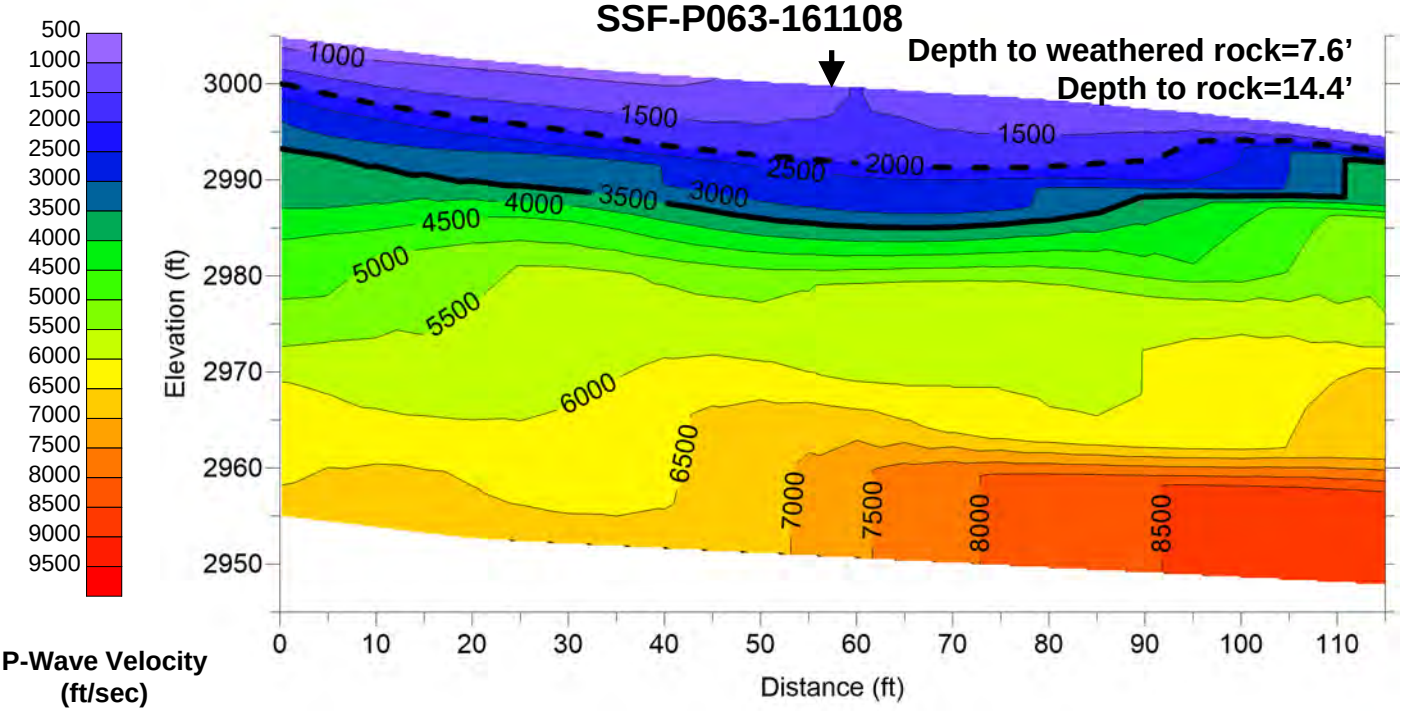
FIGURE
16

Seismic refraction model results for SSF-P063-161108 and SSF-P064-161108

SSF-P063-161108

Depth to weathered rock=7.6'
Depth to rock=14.4'

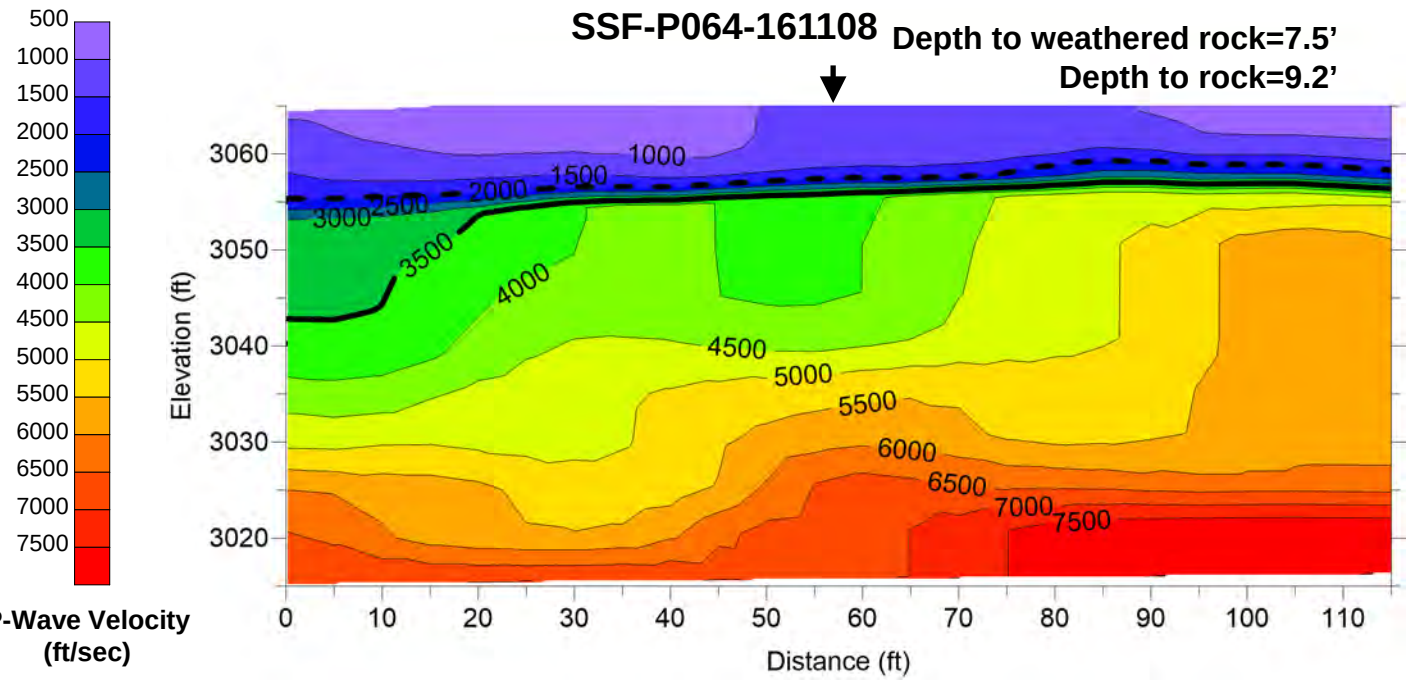


P-Wave Velocity (ft/sec)

- - - = Weathered Rock
——— = Rock

SSF-P064-161108

Depth to weathered rock=7.5'
Depth to rock=9.2'



P-Wave Velocity (ft/sec)

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2206 South Main Street
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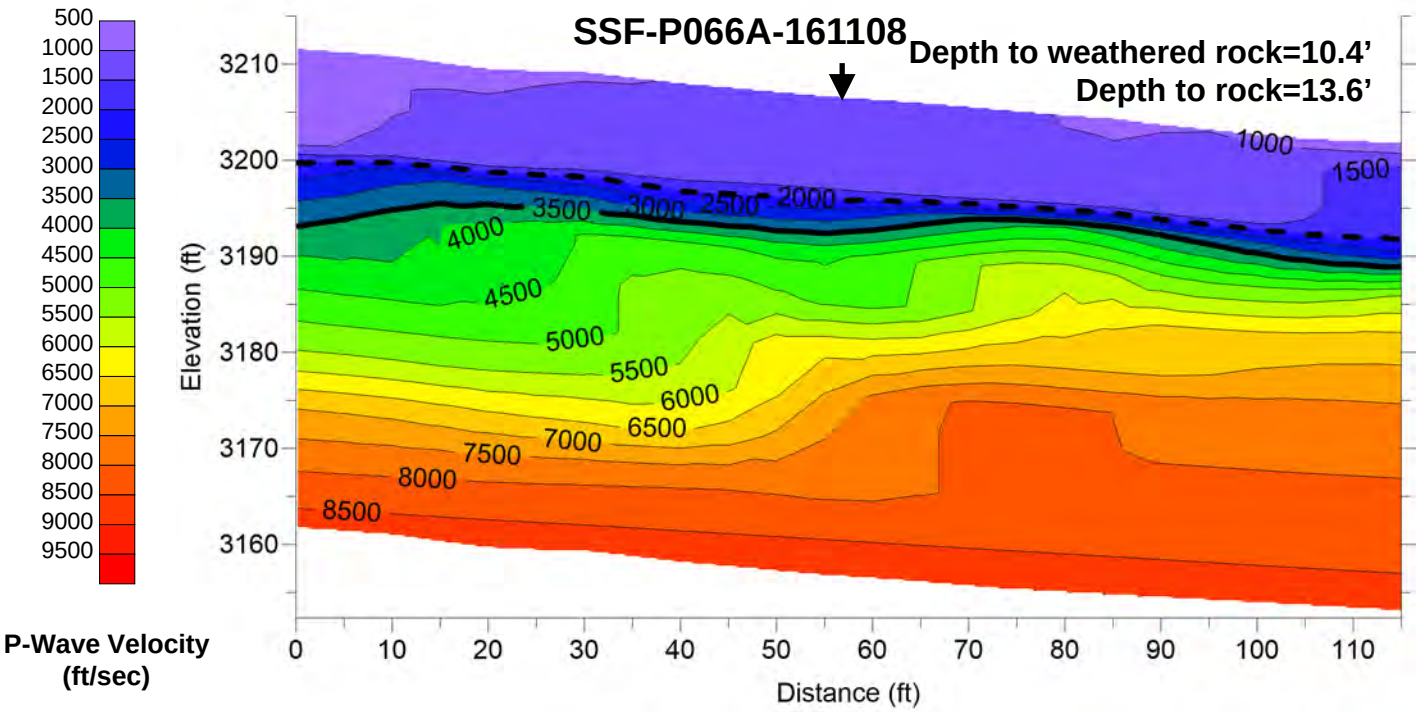
FIGURE
17

Seismic refraction model results for SSF-P066A-161108 and SSF-P066-161108



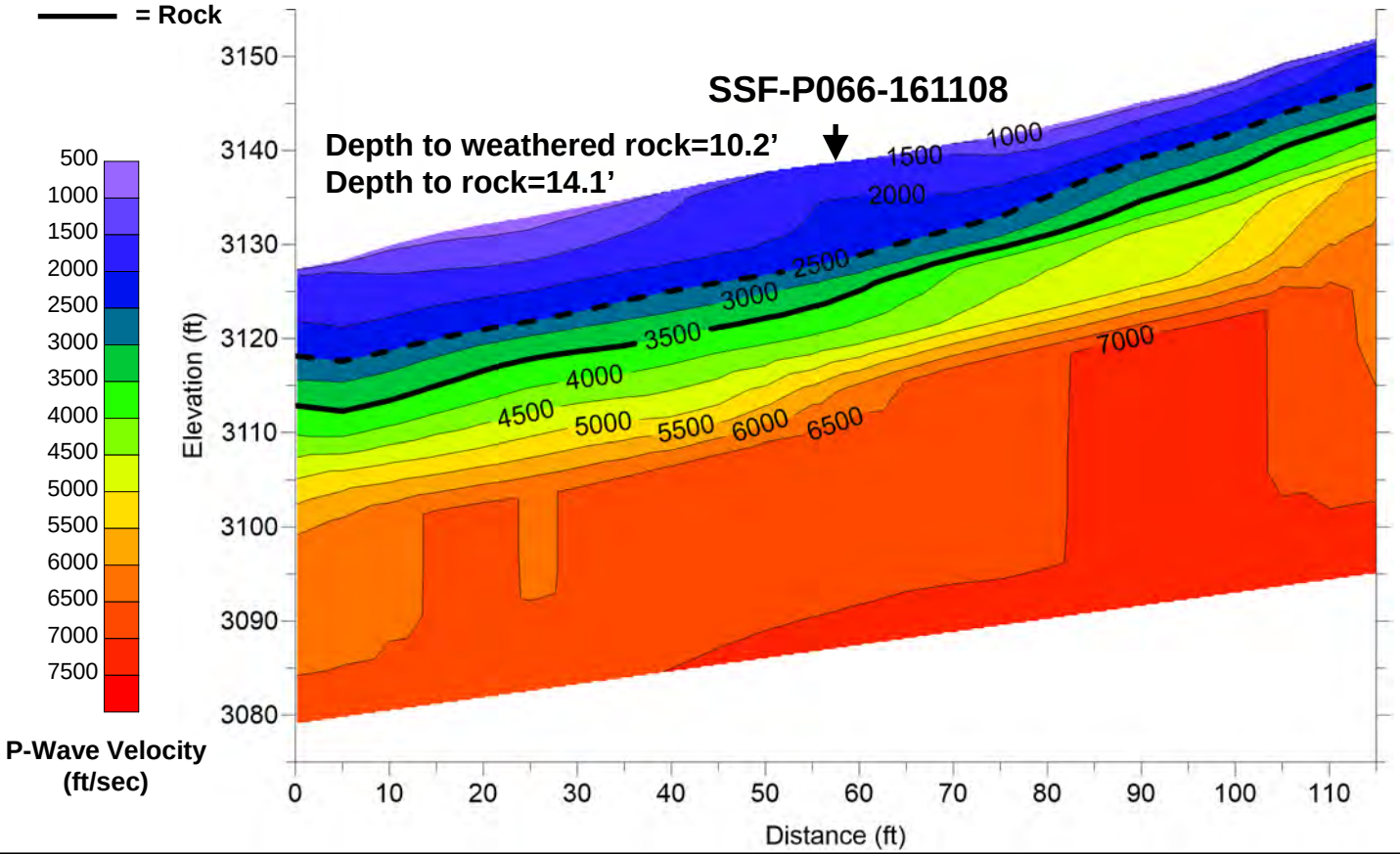


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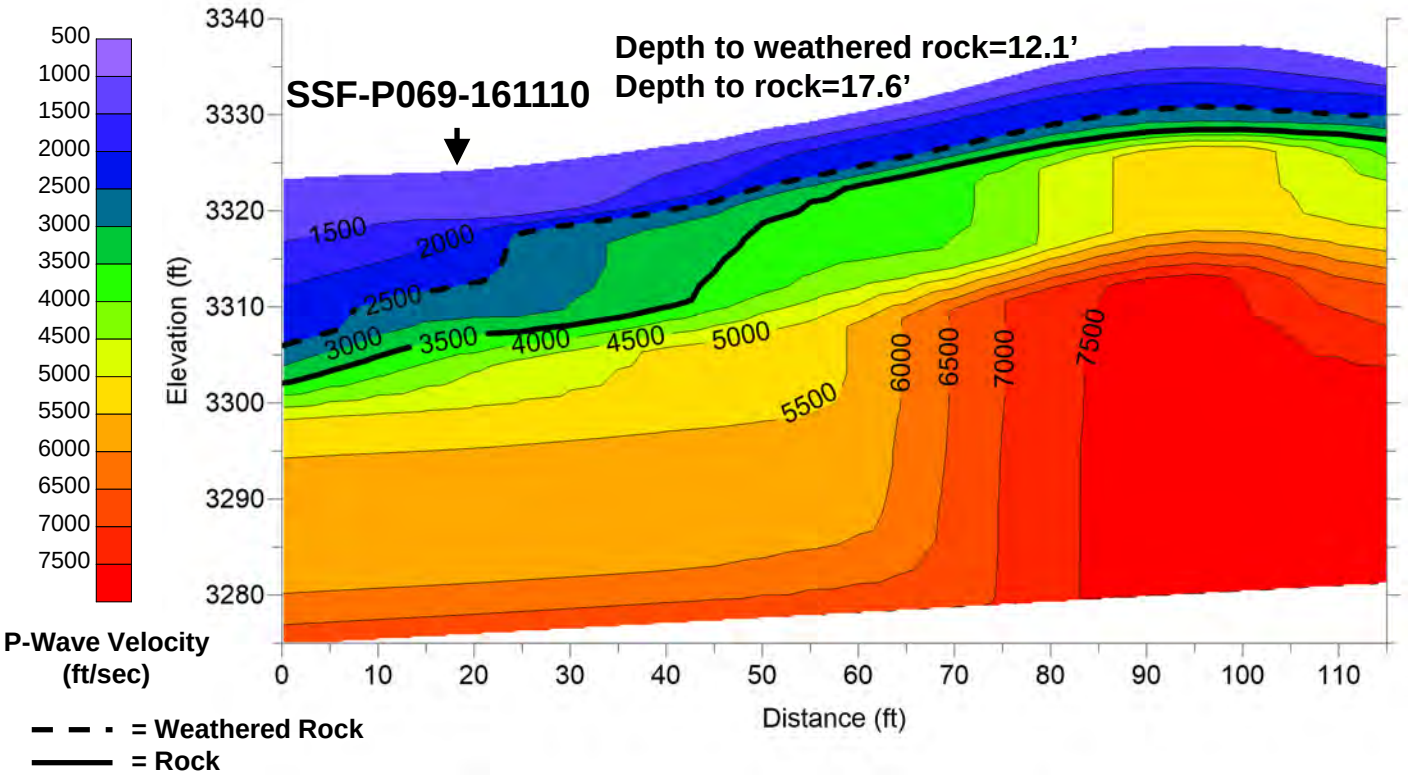
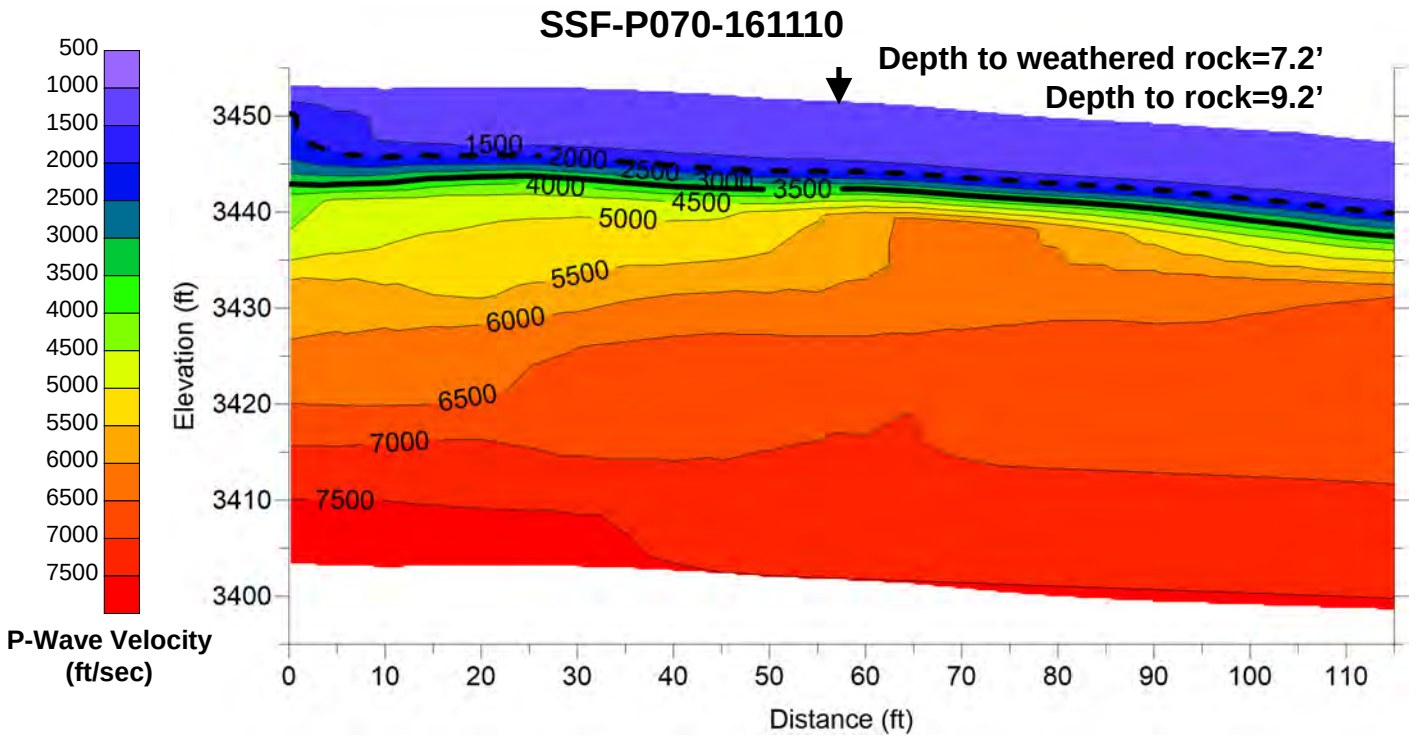
FIGURE
18

Seismic refraction model results for SSF-P069-161110 and SSF-P070-161110





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Engineering • Surveying • Environmental Services
2206 South Main Street
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540-552-0444 Fax: 540-552-0291
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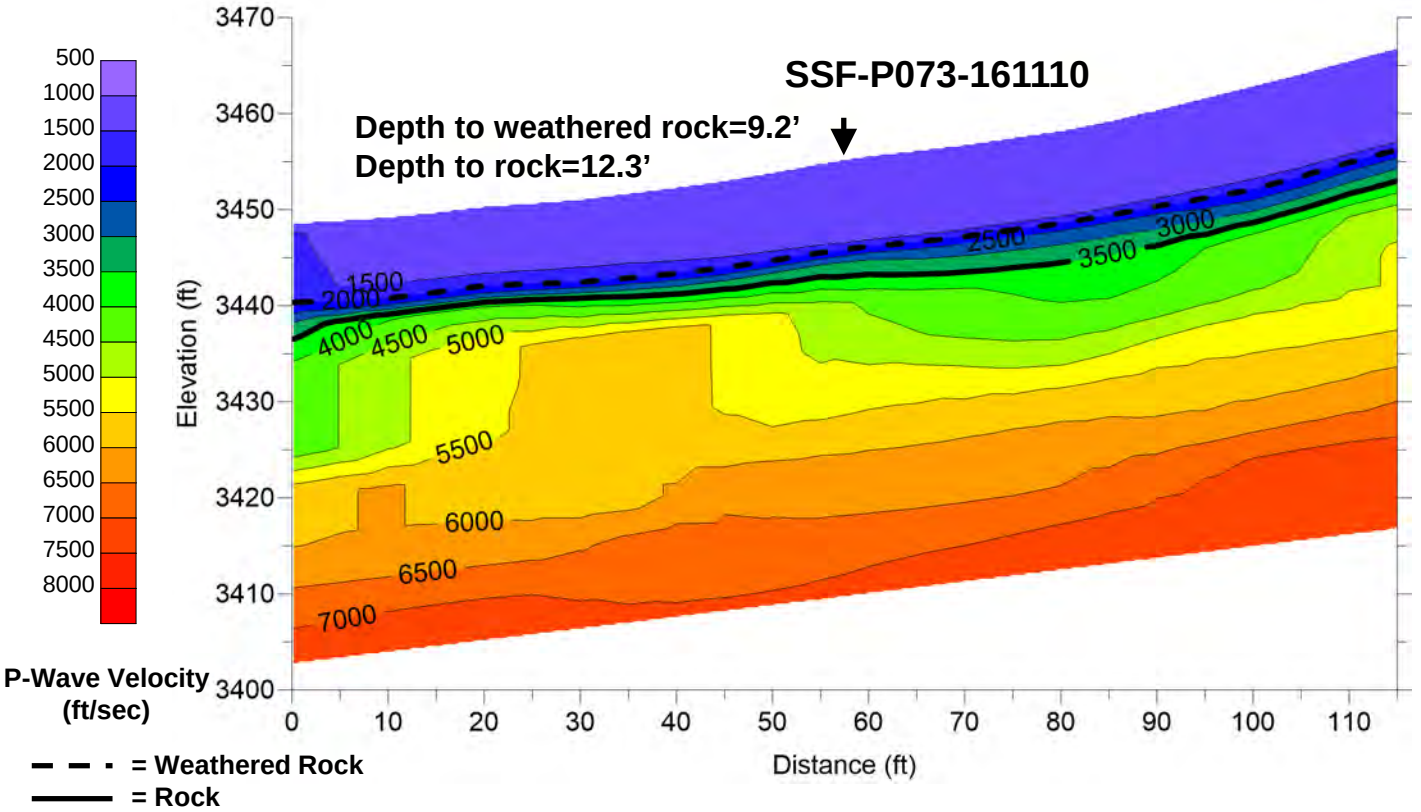
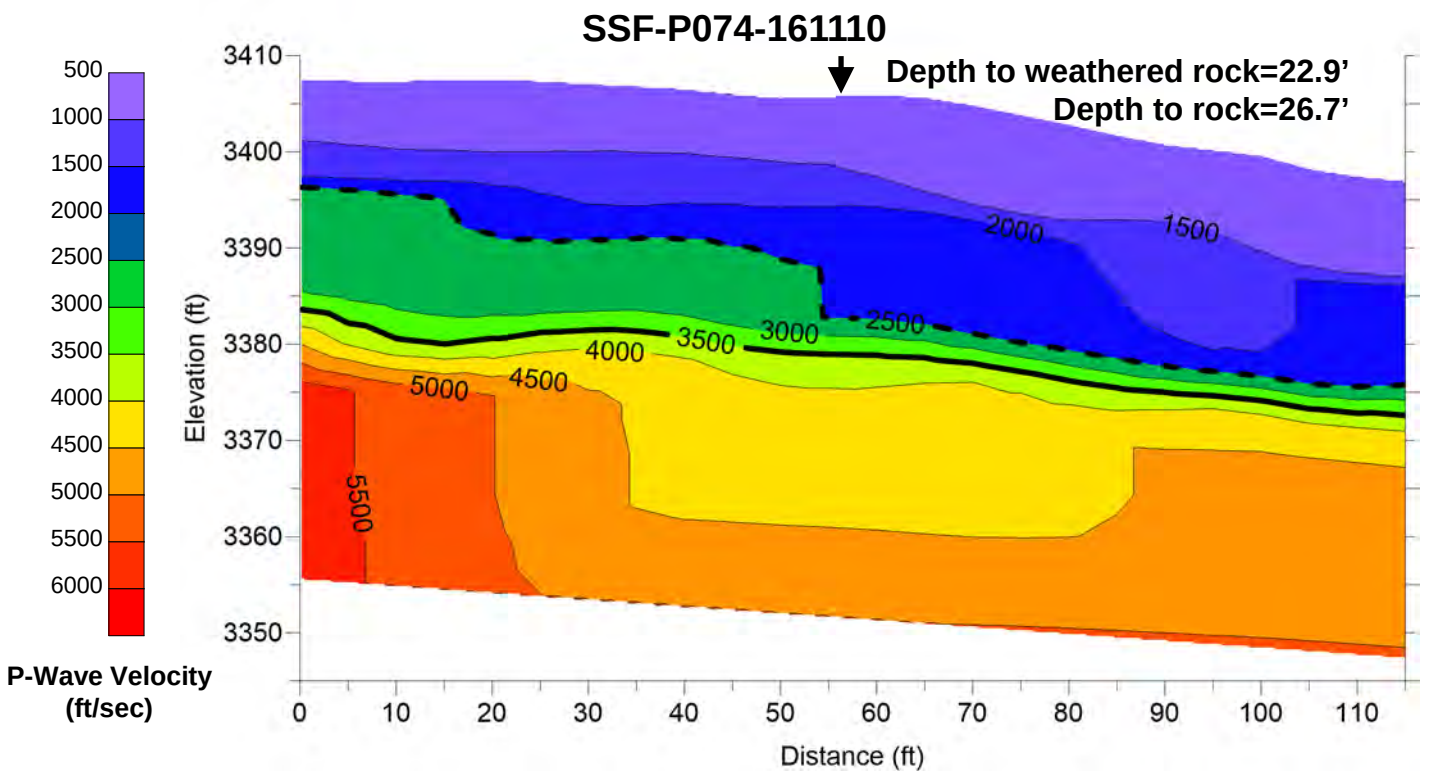
FIGURE
19

Seismic refraction model results for SSF-P073-161110 and SSF-P074-161110





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Engineering • Surveying • Environmental Services
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Blacksburg, VA 24060
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FIGURE
20

West Virginia Division of Natural Resources

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

April 12, 2017

BY EMAIL

Cliff Brown & Rich Bailey
West Virginia Division of Natural Resources
PO Box 67
Elkins, WV 26241

Re: Dominion Transmission, Inc., Atlantic Coast Pipeline
West Virginia Rookeries

Dear Mr. Brown and Mr. Bailey,

Pedestrian surveys were conducted on February, 7, 8, and 9, 2017 along the Project area in West Virginia, Virginia, and North Carolina to investigate bird activity at rookeries identified either during prior aerial survey, or from available databases. These pedestrian surveys were completed to evaluate the overall site conditions of the rookeries. In West Virginia, one rookery was identified as overlapping with construction workspace. This rookery (ROOK-01) buffer overlaps with construction workspace in Lewis County, West Virginia. Attached is a memo containing proposed conservation measures for ROOK-01 and a figure displaying rookery location and time of year restriction buffers. This information was included in the Migratory Bird Plan filed with FERC on January 27, 2017.

Project and Company Background

Atlantic is a company formed by four major U.S. energy companies – Dominion Resources, Inc., Duke Energy Corporation, Piedmont Natural Gas Co., Inc., and Southern Gas Company. Atlantic will own and operate the proposed ACP, an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. The ACP will deliver up to 1.5 billion cubic feet per day (bcf/d) of natural gas to be used to generate electricity, heat homes, and run local businesses. The underground pipeline project will facilitate cleaner air, increase reliability and security of natural gas supplies, and provide a significant economic boost in Virginia and North Carolina.

Atlantic has contracted with DTI, a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic. The ACP will be regulated by the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act. The ACP is subject to review by FERC under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act, as well as other environmental and natural resource laws.

Atlantic requests your concurrence on the proposed conservation measures for rookeries in West Virginia. Please contact Mr. Richard B. Gangle at (804) 273-2814 or

Richard.B.Gangle@dom.com, if there are questions regarding this information. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc: Liz Stout, U.S Fish and Wildlife Service West Virginia Ecological Field Office

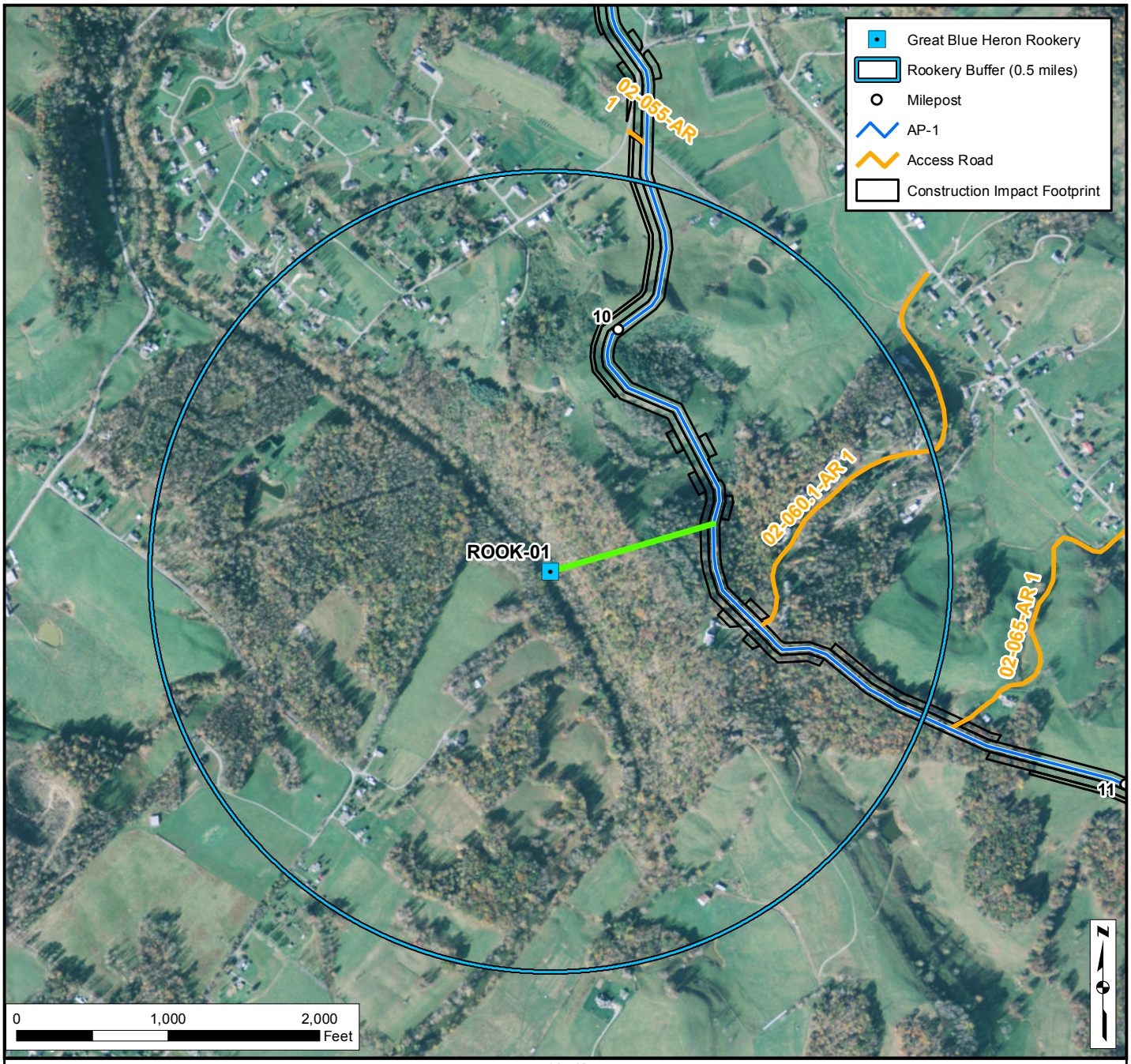
Attachments:

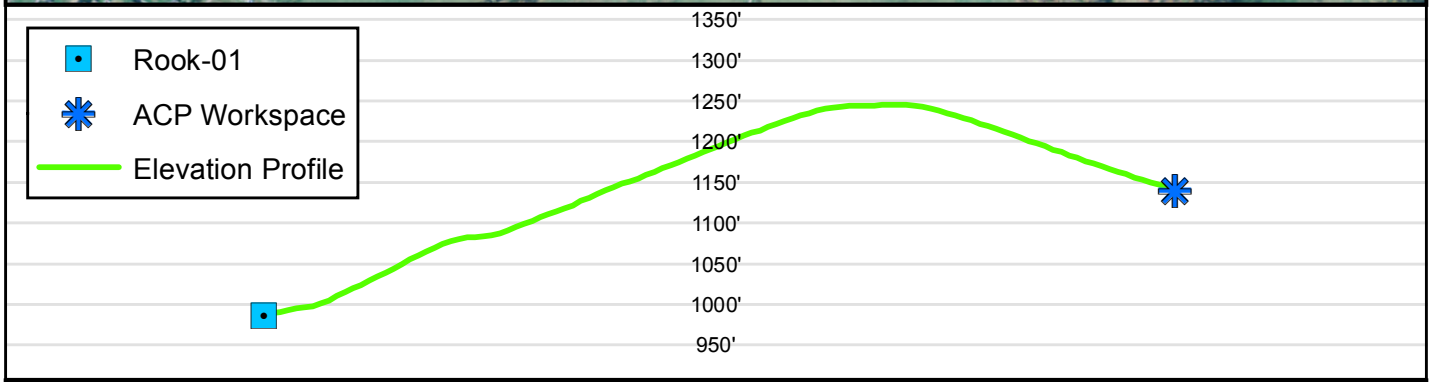
ACP West Virginia Rookery Review Memo

Colonial Wading Bird Rookeries
Atlantic Coast Pipeline Project, West Virginia

Rookery ID	County, State	Project Segment, near MP	Survey Notes [a]	Proposed Conservation Measures
ROOK-01	Lewis County, WV	AP-1, 10.3	Approximately 20 nests observed, but not active at time of visit [may have been too early for bird activity; rookery was actively used by great blue herons when surveyed by air on March 3, 2016]. Rookery overhangs West Fork River. Updated location point collected.	The rookery is on the other side of an approximately 100 foot tall, heavily vegetated ridge. The rookery is about 0.2 mile from the workspace, so noise may travel to the rookery, however, there are other human related noises including roads and houses surrounding the rookery. Construction activities are not likely visible from the rookery. Atlantic and DTI will minimize the number of personnel and vehicle traffic within the buffer to that required to construct this portion of the pipeline safely and as quickly as possible within the recommended buffer. Once construction is complete, vehicle travel will be restricted in the buffer during the recommended no activity window (no activity from Apr. 1 through Aug. 15, when rookery is actively used); signs will be placed on the right-of-way to indicate that vehicles cannot use the right-of-way as a travel corridor if the rookery is actively being used.

[a] ERM biologists conducted pedestrian surveys on February 7, 8, and 9, 2017 at rookeries along the project in West Virginia, Virginia, and North Carolina to investigate bird activity at rookeries identified either during aerial survey or from available databases, to evaluate the overall site conditions at the rookery.





Atlantic Coast Pipeline

Dominion

Atlantic Coast Pipeline Project

Rookery Rook-01 Profile

Lewis County, West Virginia

ERM

FILE: M:\Clients\D-F\DOM\SRPP_ArcGIS\2017\03\22_Rookery_Profile_ACP_Rook01_Profile.mxd, REVISED: 04/10/2017, SCALE: 1:12,000 DRAWN BY: GIS

Virginia Agencies

Virginia Department of Environmental Quality

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

April 13, 2017

BY E-FILE

Ms. Julia Wellman
Virginia Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street
Richmond, VA 23219

Re: Dominion Transmission, Inc., Atlantic Coast Pipeline
Virginia Coastal Zone Management Program
Federal Consistency Certification - Information Response

Dear Ms. Wellman:

Thank you again for meeting with Atlantic Coast Pipeline (Atlantic) last week on Wednesday, April 5, 2017 to discuss Atlantic's proposed pipeline crossings of the Quaker and Cohoon Swamps located in Suffolk County, Virginia which require Federal Consistency Certification. As discussed during our meeting, attached please find a memo from Environmental Resource Management (ERM), our environmental consultant for this project that contains the results of a hydraulic watershed flow analysis for the drainage basins associated with both of these wetland complexes. The results of these analyses indicate the predicted depth and flow of water across the construction right-of-way area in the vicinity of the drainage channels. ERM used local LiDAR data, GIS technologies, USGS digital elevation models and various other hydraulic models to predict the peak water depth and flow within these wetlands during a 1-year and a 2-year storm event to determine flow conditions if these events were to occur during construction.

As stated during our meeting and reiterated here, Atlantic will time the crossing of these tributaries such that the work would be carried out during low flow conditions, as feasible. Should weather forecasts indicate that heavy rainfall is predicted, the trenching would not occur until the threat of rain has passed. Atlantic expects that the crossing of each of these would not take more than 3 to 5 days to install from trench excavation through backfilling, at which time restoration would begin immediately.

Atlantic also agrees to improve sediment control measures in these areas to account for the concentrated flows during heavy rain events that occur within these wetland tributaries by using a combination of silt fence and turbidity barriers along the edges of the right-of-way commensurate with micro-site conditions. The erosion and sediment control plans will include the details of such commitments and the attached memo describes the potential flows that could occur during the storm events describe above.

Dominion appreciates the coordination to date and looks forward to continuing to work with you on this project. Please contact Richard Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding this submittal.

Please direct written responses to:

Richard Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Randy Owen, VMRC
Larry Gavan, VDEQ

Memorandum

Refer to File: Document3

Date: April 13, 2017

To: Spencer Trichell, Dominion

From: Steve Holden, ERM

Cc: Robert Hare, Dominion

Subject: **RE: Construction within Select Forest Wetlands in Virginia**

1. BACKGROUND

Atlantic Coast Pipeline (Atlantic) is proposing to install a 20-inch-diameter natural gas pipeline lateral across three forested wetlands located within the coastal plain of Suffolk County, Virginia. The wetland crossings include Quaker Swamp, an un-named tributary to Quaker Swamp, and Cohoon Creek; all three of these locations can be described as bottomland hardwood forested wetlands (see Attachment 1). These wetlands are periodically inundated, and have little or no discernable flow through them under normal conditions. Atlantic has determined that the use of an open-cut crossing method is most appropriate for these situations in order to expedite the crossings and minimize impacts to the floodplain ecosystems.

Open-cut pipeline crossings of low wetland and floodplain systems where high water tables, fine, silty soils, and/or areas of standing water are encountered have the potential, without control or containment, to introduce sediment into the wetland system and to move sediment-laden water off right-of-way. Environmental Resources Management (ERM) understands that the Virginia Department of Environmental Quality (DEQ) and Virginia Marine Resources Commission (VMRC) have expressed concerns over Atlantic's ability to manage open trench construction through these floodplains and prevent the movement of sediment downgradient of the pipeline crossings. Specific agency concerns included:

i. control of unconsolidated trench spoil and preventing movement off right-of-way;

ii. control of turbidity and preventing downstream movement off right-of-way;

iii. functionality of both floating turbidity curtains and staked belted silt retention fence (BSRF) to control solids movement;

iv. potential for BSRF and turbidity curtains to continue containing trench spoil and turbidity off right-of-way during storm events; and

v. Duration of trenching, laying, backfilling in each wetland.

ERM has conducted Wetland and Waterbody field surveys of all wetlands and waterbodies being crossed by the project, including the pipeline crossing locations of Cohoon Creek and the waterbody draining into Quaker Swamp and have attached to this memo the figures showing the

channel cross-sections at the milepost (MP) locations for each wetland (see Attachment 2) and the field data sheets for each of these locations (see Attachment 3). The crossings are briefly described as follow:

a. Quaker Swamp – the crossing of Quaker Swamp at MP 49.5 is a hardwood floodplain comprised of swamp chestnut oak, red maple, and American Holly as the dominant tree species. A profile of the crossing shows a low, flat bottom approximately 180 feet across. The water table was observed to range from 15 inches below ground level to areas of standing water depending on microtopography.

b. Un-named Tributary to Quaker Swamp – this crossing of the Quaker Swamp at the point where an un-named waterbody and small wetland arm comes in at MP 50.2 is similar to the Quaker Swamp crossing noted above. Dominant overstory species include red maple, sweet gum American Holly, American Hornbeam, and bald cypress with a water table ranging from 16 inches below grade to standing water in some sections. The width of the inundation zone is approximately 170 feet in diagonal cross-section at the crossing milepost.

c. Cohoon Creek – the Cohoon Creek crossing involves the forested floodplain at MP 56.1, and includes a bottomland inundation zone of approximately 145 feet in width with a small streambed through it. Overstory tree species include bald cypress, swamp tupelo, sweet gum, and red maple. The water table was observed to occur at the ground surface, with areas of standing water.

2. MODELED HYDROLOGY

ERM has conducted watershed flow analyses at the three wetland crossing locations for two storm events, the 24-hour 1-year storm and the 24-hour 2-year storm, that may reasonably affect the water depth and flow velocity during construction. The water depths and the flow velocities at peak flow conditions were estimated using the anticipated peak flow rate for each storm event and the channel topography at each crossing location. These discussions are presented below.

Peak Flows

The peak flows were estimated using the Soil Conservation Service (SCS) graphical peak discharge method described in the U.S. Department of Agriculture Technical Release 55 (TR-55). The calculations were performed using the Watershed Modeling System (WMS 10.1) software[1]. Watershed characteristics were derived from the following data sources.

- The watershed topography was derived using Digital Elevation Model (DEM) data at 10-foot contour resolution publically available from the U.S. Geological Survey (USGS) National Elevation Dataset (NED).

[1] http://www.aquaveo.com/software/wms-watershed-modeling-system-introduction

- The land cover characteristics were derived from the National Land Cover Database 2011 publically available from the USGS Land Cover Institute. The Curve Numbers (CN)[2] were assigned using TR-55 Tables 2-2a-c.
- The Time of Concentration (Tc) was developed using the Watershed Lag method, described in the U.S. Department of Agriculture National Engineering Handbook, Part 630 Hydrology, Chapter 15.
- The precipitation depths were determined using NOAA's National Weather Service Precipitation Frequency Data Server.

The drainage areas that contribute stormwater runoff to each crossing locations are shown in Figures 1a, 1b, and 1c. Since the Unnamed Tributary to Quaker Swamp ultimately drains to Quaker Swamp, the drainage area contributing to the crossing at MP 49.5 (Quaker Swamp) includes the drainage area contributing to the crossing at MP 50.2 (Unnamed Tributary to Quaker Swamp).

The drainage area characteristics and corresponding peaks flows for the 24-hour 1-year storm are listed in Table 1-a and those for the 24-hour 2-year storm are listed in Table 1-b.

Table 1-a: Drainage Area Characteristics and Peak Flows for the 24-hour 1-year Storm

	Crossing Location		
Drainage Area Characteristics	**MP 49.5: Quaker Swamp**	**MP 50.2: UNT to Quaker Swamp**	**MP 56.1: Cohoon Creek**
Tc[3], hours	3.19	8.55	11.56
Drainage Area, acres	5,297	4,894	10,173
Precipitation Depth, in	3.0	3.0	3.0
CN	68	67	73
Peak Flow, cfs	651	276	658

CN= Curve Number; Tc= Time of concentration; cfs= cubic feet per second.

Table 1-b: Drainage Area Characteristics and Peak Flows for the 24-hour 2-year Storm

	Crossing Location		
Drainage Area Characteristics	**MP 49.5: Quaker Swamp**	**MP 50.2: UNT to Quaker Swamp**	**MP 56.1: Cohoon Creek**
Tc, hours	3.19	8.55	11.56
Drainage Area, acres	5,297	4,894	10,173
Precipitation Depth, in	3.7	3.7	3.7
CN	68	67	73
Peak Flow, cfs	1,141	471	1,033

[2] CN is based on soils, plant cover, and amount of impervious areas, interception, and surface storage. High CN values cause most of the rainfall to appear as runoff while lower values correspond to an increased ability of the soil to retain rainfall, and will produce much less runoff.

[3] Time of concentration is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed.

CN= Curve Number; Tc= Time of concentration; cfs= cubic feet per second.

Water Depths and Flow Velocities

The water depths and the flow velocities were estimated using the peak flow calculations (summarized in Section 3.1) and topographies of the channel cross-sections. The channel characteristics were derived from the following data sources.

- The topographies of the channel cross-sections were derived with ArcGIS from the Virginia LiDAR Dataset, project USGS Eleven County Virginia LiDAR - ARRA LiDAR, 2011, publically available from the Virginia Geographic Information Network (VGIN). The channel cross-sections are shown in Figures 2a, 2b, and 2c.
- Based on wetland and waterbody surveys (See Attachment 1), the water depth at each crossing location is considered to be negligible prior to each storm event.
- The channel slopes were derived from the publically available USGS National Hydrography Date Set and WMS.
- The Manning's "n", or the roughness factor of the channel, was chosen to be n=0.05 using hydrology of nearby streams (Flood Insurance Study, City of Suffolk, Virginia, Independent City, FEMA, 2015).

The cross-sectional areas of the channels were computed using Manning's equation for flow through rectangular channel as described by Equation 1.

Equation 1:

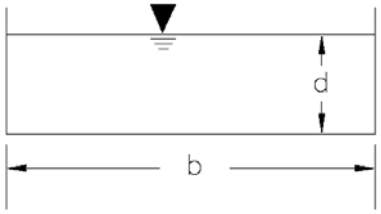
$$Q = Av$$

$$v = (1.486/n)R_h^{2/3}S^{1/2}$$

$$R_h = A/W_p$$

where,

Q: peak flow
A: cross-sectional area
v: velocity
n: Manning's "n" (roughness factor)
R_h: hydraulic radius
S: channel slope
W_p: wetted perimeter



b: channel width
d: channel depth

The calculations of water depths and flow velocities for the 24-hour 1-year storm are summarized in Table 2-a and those for the 24-hour 2-year storm are summarized in Table 2-b.

Table 2-a: Water Depth and Flow Velocity Calculations for the 24-hour 1-year Storm

Crossing Location	24-hr 1-yr Runoff Q, cfs	Approx. Q, cfs	d, ft	A, sf	W_p, ft	n	S, ft/ft	b, ft	R_h, ft	v, ft/s
MP 49.5: Quaker Swamp	651	652	**2.80**	504	185.60	0.05	0.0005	180	2.72	**1.29**
MP 50.2: UNT to Quaker Swamp	276	279	**1.33**	226	172.66	0.05	0.0012	170	1.31	**1.23**
MP 56.1: Cohoon Creek	658	660	**1.55**	225	148.10	0.05	0.0056	145	1.52	**2.94**

Table 2-b: Water Depth and Flow Velocity Calculations for the 24-hour 2-year Storm

Crossing Location	24-hr 2-yr Runoff Q, cfs	Approx. Q, cfs	d, ft	A, sf	W_p, ft	n	S, ft/ft	b, ft	R_h, ft	v, ft/s
MP 49.5: Quaker Swamp	1,141	1,143	**3.94**	709	187.88	0.05	0.0005	180	3.77	**1.61**
MP 50.2: UNT to Quaker Swamp	471	472	**1.83**	311	173.66	0.05	0.0012	170	1.79	**1.52**
MP 56.1: Cohoon Creek	1,033	1,039	**2.04**	296	149.08	0.05	0.0056	145	1.98	**3.51**

Conclusions

The stormwater runoff peak flows resulting from the 24-hour 1-year storm and the 24-hour 2-year storm are reasonably expected to impact construction by raising water depths and developing water flows through wetland channels crossed by pipeline construction at MP 49.5: Quaker Swamp, MP 50.2: UNT to Quaker Swamp, and MP 56.1: Cohoon Creek.

The water depths and flow velocities that are estimated to occur at peak flow conditions are summarized in Table 3.

Table 3: Estimated Water Depth and Flow Velocities at Peak Flow Conditions

	24-hour 1-year Storm		**24-hour 2-year Storm**	
Crossing Location	**Water Depth, ft**	**Flow Velocity, ft/s**	**Water Depth, ft**	**Flow Velocity, ft/s**
MP 49.5: Quaker Swamp	2.80	1.29	3.94	1.61
MP 50.2: UNT to Quaker Swamp	1.33	1.23	1.83	1.52
MP 56.1: Cohoon Creek	1.55	2.94	2.04	3.51

The 24-hour 1-year storm is estimated to raise the water depths approximately to 1-3 feet above ground surface and develop water velocities 1-3 feet/second at the evaluated crossing locations. The 24-hour 2-year storm is estimated to raise the waters depths approximately 2-4 feet above ground surface and develop water velocity 1.5-3.5 feet/second at the evaluated crossing locations.

3. CONSTRUCTION METHODS AND CONTROL MEASURES

ERM understands that Atlantic is proposing to construct during low flow times of the year and when weather forecasts do not predict storm events. Based on the field surveys conducted by ERM during January 2016, the water levels within these wetland areas during the low rainfall periods of the year are expected to be low, less than a few inches above ground surface level in inundated areas. However, should a 1-year or 2-year storm event occur during construction, ERM's analysis shows that water depths could rise between 1 and 4 feet in portions of the wetland crossing areas. Based on manufacturer's specifications and ERM's pipeline construction experience throughout the United States and along the east coast, the installation and proper maintenance of silt fence should be adequate to contain sediment within the construction workspace when constructing where the depth of water is less than 2 feet.

Construction and maintenance specifications outlined in the Virginia Erosion and Sediment Control Handbook, STD & SPEC 3.05 (Silt Fence) and 3.27 (Turbidity Curtain) must be adhered to if congruent with the manufacturer's recommended installation and use. In the event of conflicting specifications, the manufacturer's recommendations on proper installation and use of a product must be followed. ERM understands that the primary silt fence product planned for use on the Atlantic Coast Pipeline is a patented BSRF product. In wetlands and waterbodies, the Priority 1 (green band) BSRF will be used, which is a heavy-duty silt fence material constructed with a 36-inch, non-woven, spun-bond fabric with an internal scrim incorporated into the fabric for additional strength and durability. The system utilizes wood stakes spaced at 4-feet intervals and a specific method of attachment. The system is functionally equivalent to wire back and metal steel post silt fence and is designed for the protection of high priority areas, including wetlands and waterbodies. Proper installation and daily inspection and maintenance of the BSRF in accordance with installation locations depicted in the site-specific construction alignment sheets prior to and during trenching operations, stockpiling of saturated trench material, lowering-in or floating the pipeline into the trench, and during backfilling of the trench should adequately contain trench spoils and turbidity within the confines of the construction right-of-way.

Based on ERM's hydrologic flow analysis described in section 2 above, water depth during the peak water flow period for the 1-year storm event could possibly exceed 2.8 feet at the Quaker Swamp crossing location, with a corresponding peak flow velocity of only 1.29 feet per second. In the unlikely occurrence of an unexpected 2-year storm event, the deepest water would again occur at the Quaker Swamp crossing location with a potential peak depth of 3.9 feet, and a corresponding peak flow velocity of 1.6 feet per second. In these and other areas where the depth of inundated water exceeds 2 feet at initial BSRF installation or if, during construction, water levels are expected to rise above a 2-foot depth because of an unpredicted storm event, Type 2

turbidity curtains should be installed behind and in addition to the BSRF, if the BRSF was previously installed to contain sediment within the construction workspace. Peak flow velocities of 1.6 feet per second or less are not expected to affect the ability of the turbidity curtain to function as designed.

If sections of these wetlands contain waters deeper than 2 feet at initial installation, turbidity curtains would be deployed in place of, or in addition to, silt fence. In selecting and installing turbidity curtains, Atlantic should adhere to the construction and maintenance specifications outlined in the VESCH Std. & Spec. 3.27 (Turbidity Curtain). The type of curtain should be selected based on the anticipated flow conditions. The ends of the curtain should extend to the edge of the inundated areas containing, or expected to contain water depths greater than two feet to allow sediments to resettle in areas with limited flow. BSRF may be required at the ends of the curtains to direct suspended sediment into shallower, low-flow areas.

Throughout the construction process, Atlantic should also follow the Federal Energy Regulatory Commission (FERC) Wetland and Waterbody Construction and Mitigation Procedures to avoid or minimize impacts on water quality. Environmental Inspectors should perform daily inspections of all temporary erosion and sediment control measures in accordance with Atlantic's approved stormwater pollution prevention plan, FERC requirements, and associated regulations, where applicable.

Prepared by:

_____

Steve Holden, CPSS, CPESC
ERM

ATTACHMENT 1

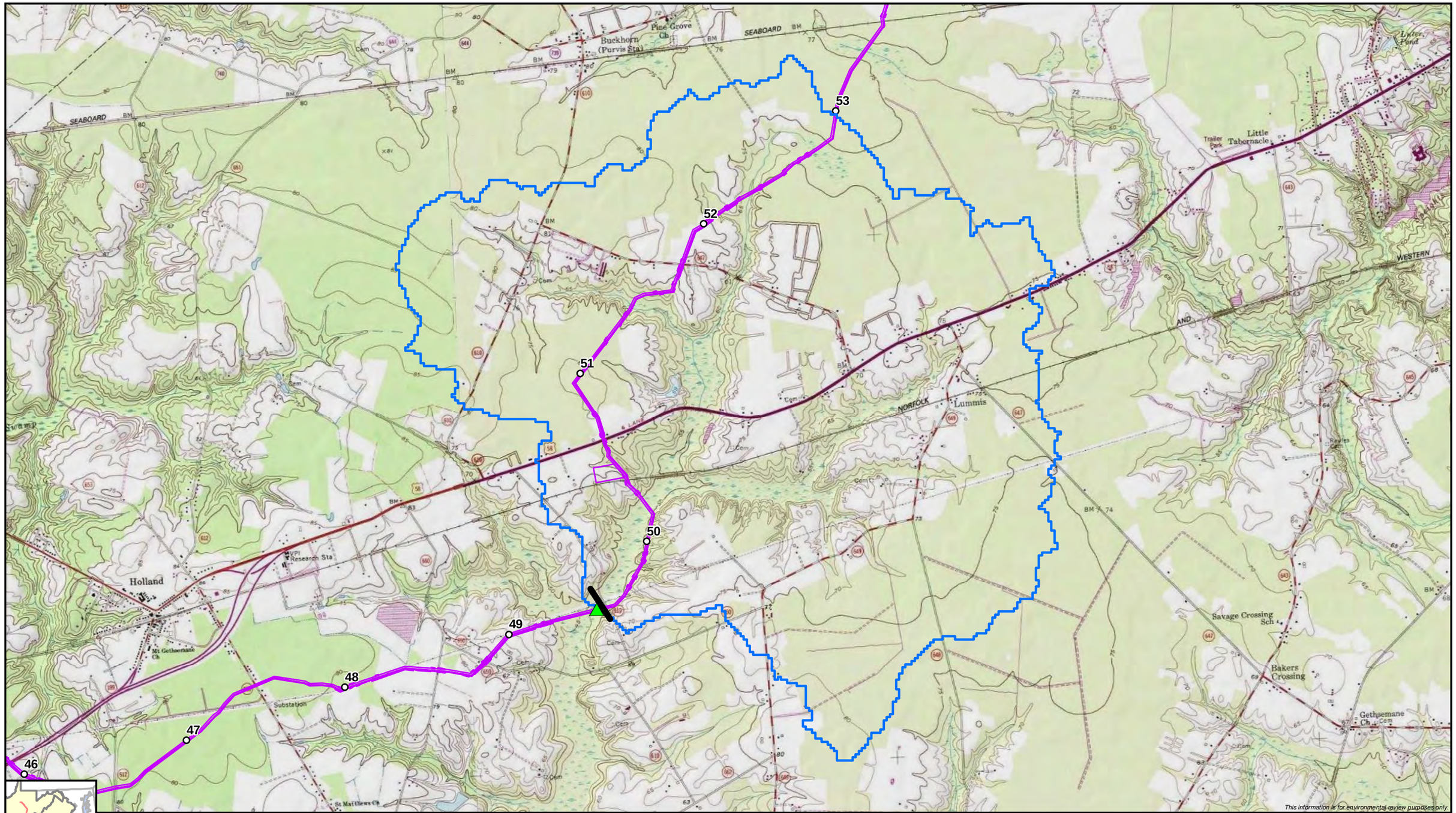


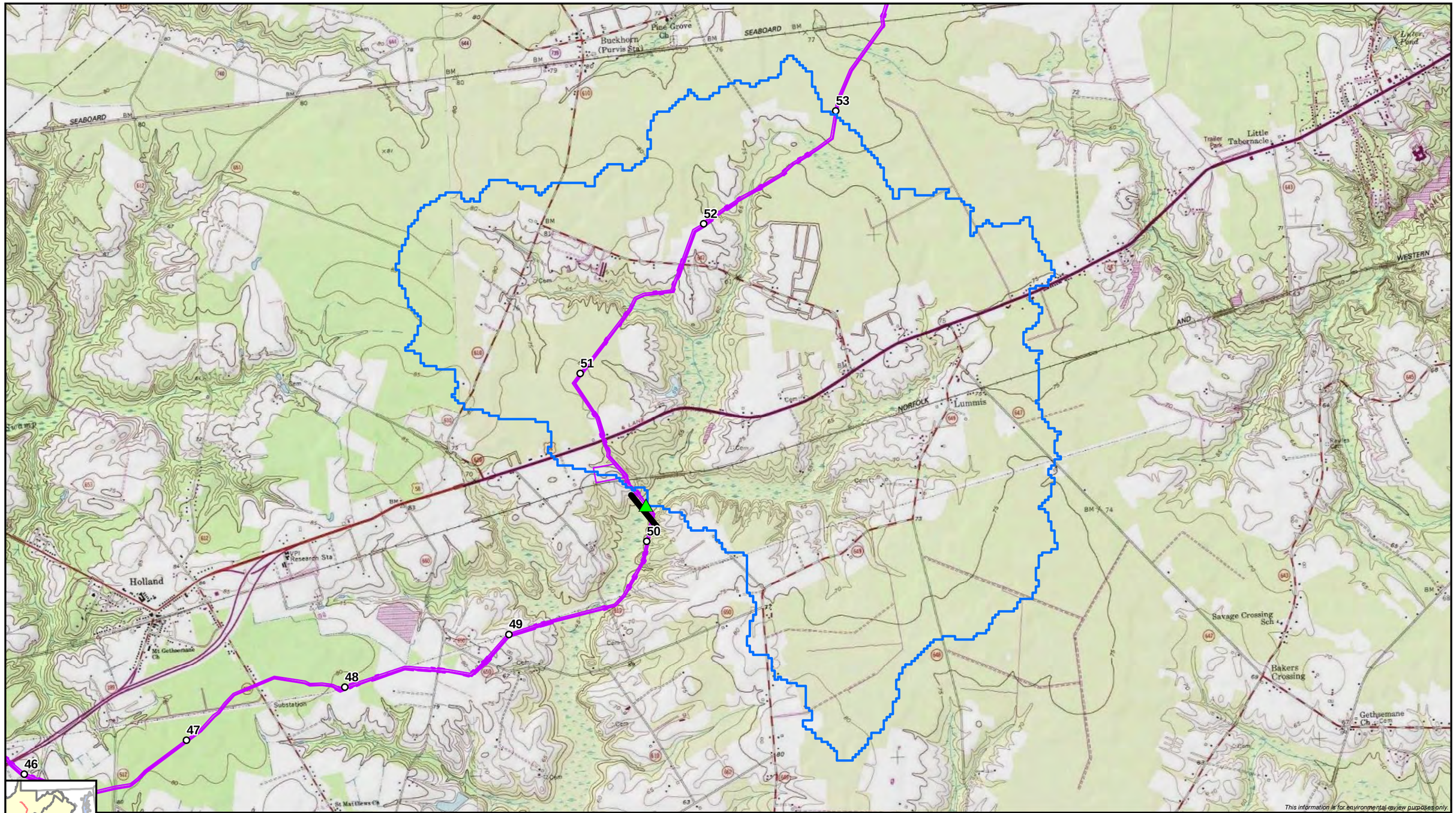
Figure 1-a MP 49.5: Quaker Swamp

Atlantic Coast Pipeline

ERM

M:\Clients\D-F\DOM\SRPP_ArcGIS\2017\04\11_Wetland_Crossings_Wetland_Crossings.mxd, **REVISED:** 4/11/2017

DRAWN BY: TG



0 0.25 0.5
Miles

1:31,680 | 1 inch = 0.5 miles

- Drainage Area
- Channel Cross-Section
- Point of Analysis (POA)
- Milepost
- Workspace

Atlantic Coast Pipeline

Figure 1-b MP 50.2: Unnamed Tributary (UNT) to Quaker Swamp

ERM

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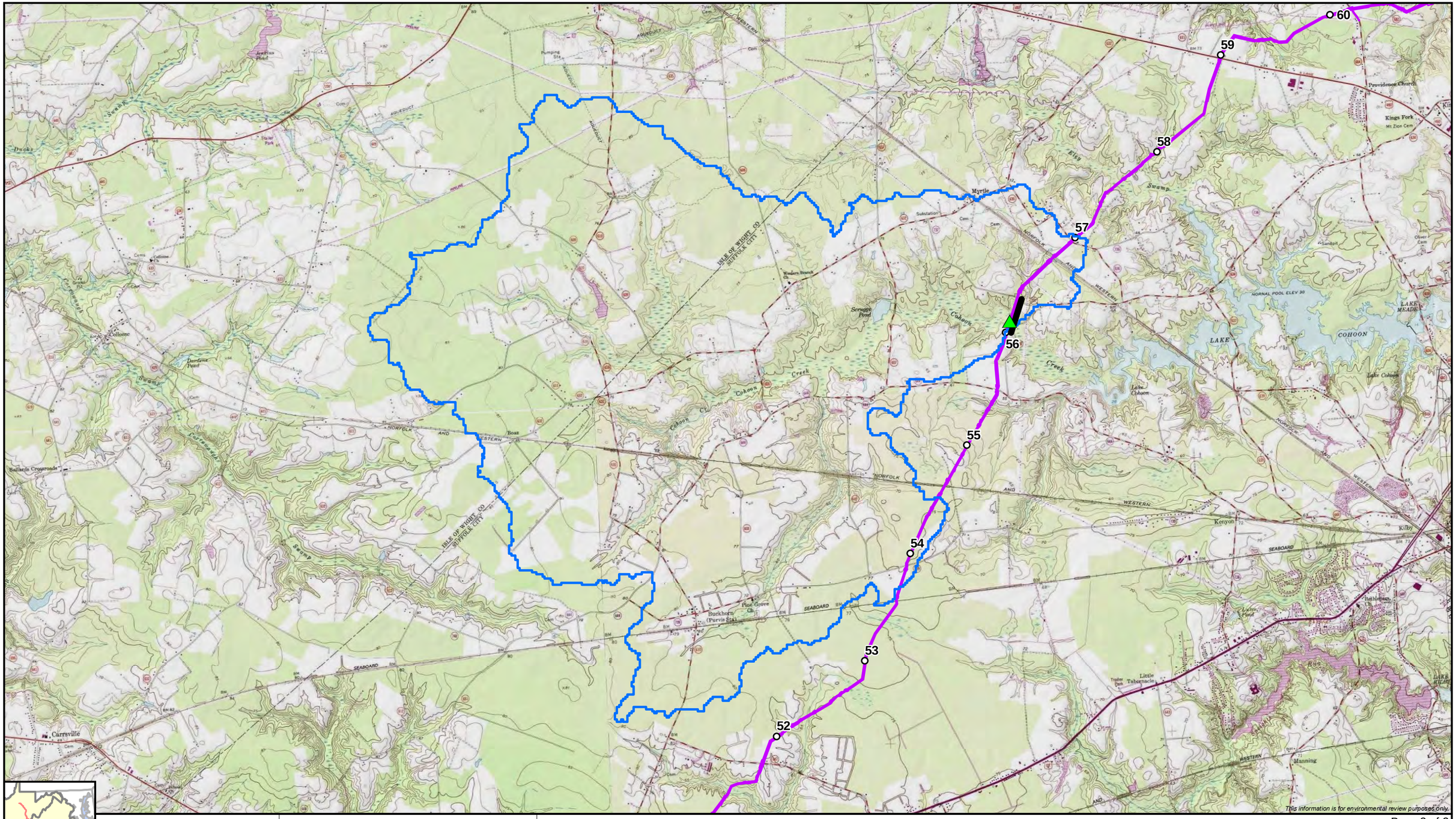
DRAWN BY: TG



0 0.35 0.7
Miles

1:47,520 | 1 inch = 0.75 miles

- Drainage Area
- Channel Cross-Section
- Point of Analysis (POA)
- Milepost
- Workspace

Atlantic Coast Pipeline SM

This information is for environmental review purposes only.

Figure 1-c MP 56.1: Cohoon Creek

ERM

M:\Clients\D-F\DOM\SRPP_ArcGIS\2017\04\11_Wetland_Crossings_Wetland_Crossings.mxd, **REVISED:** 4/11/2017

DRAWN BY: TG

ATTACHMENT 2

Figure 2-a
MP: 49.5 Quaker Swamp

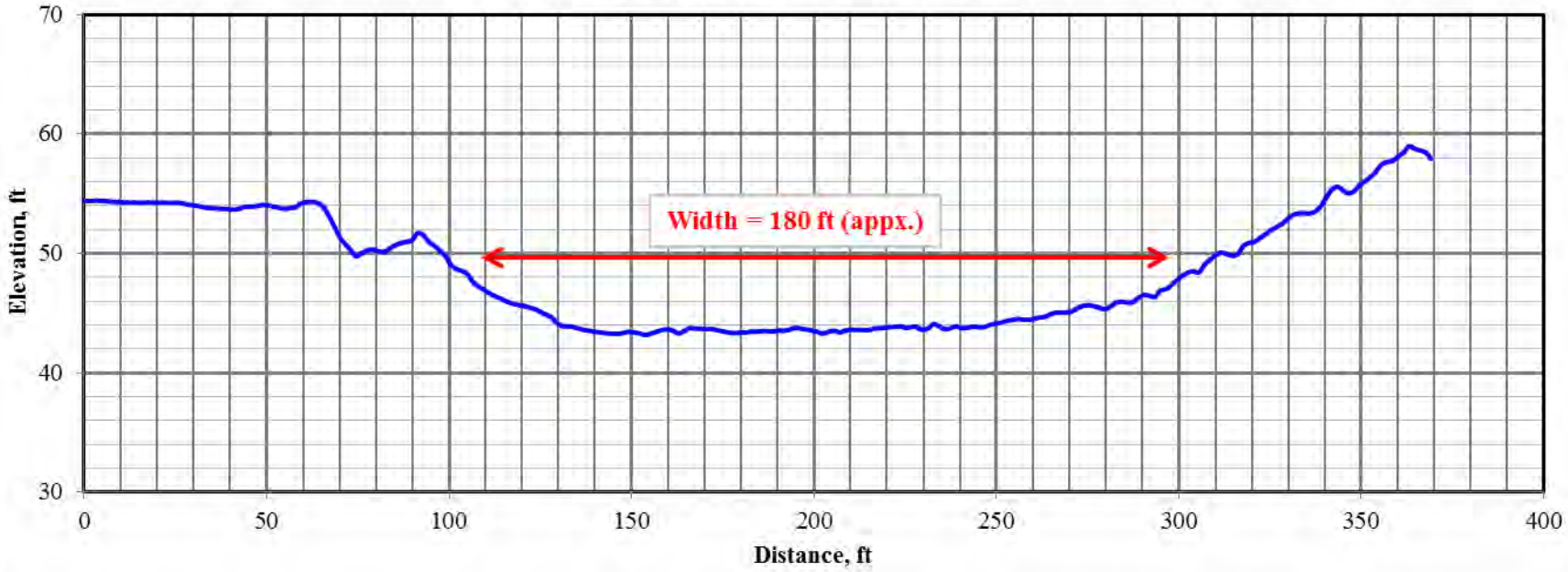


Figure 2-b
MP 50.2: UNT to Quaker Swamp

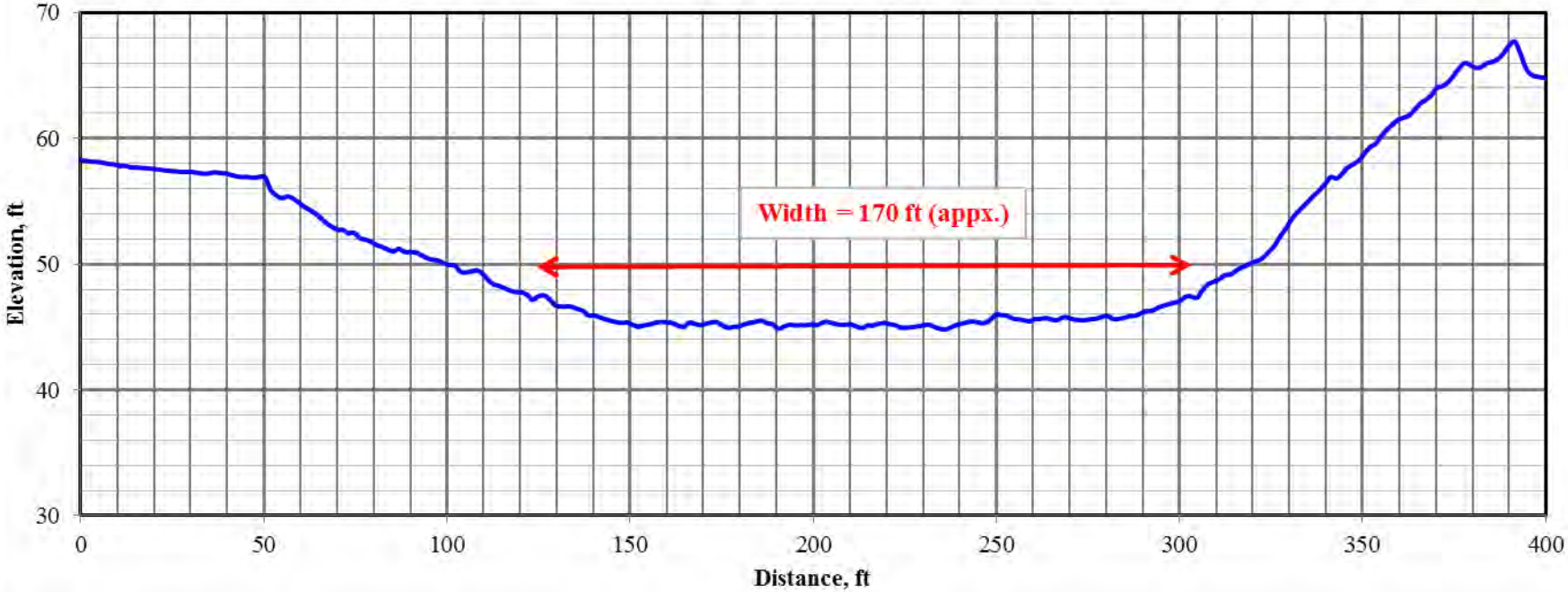
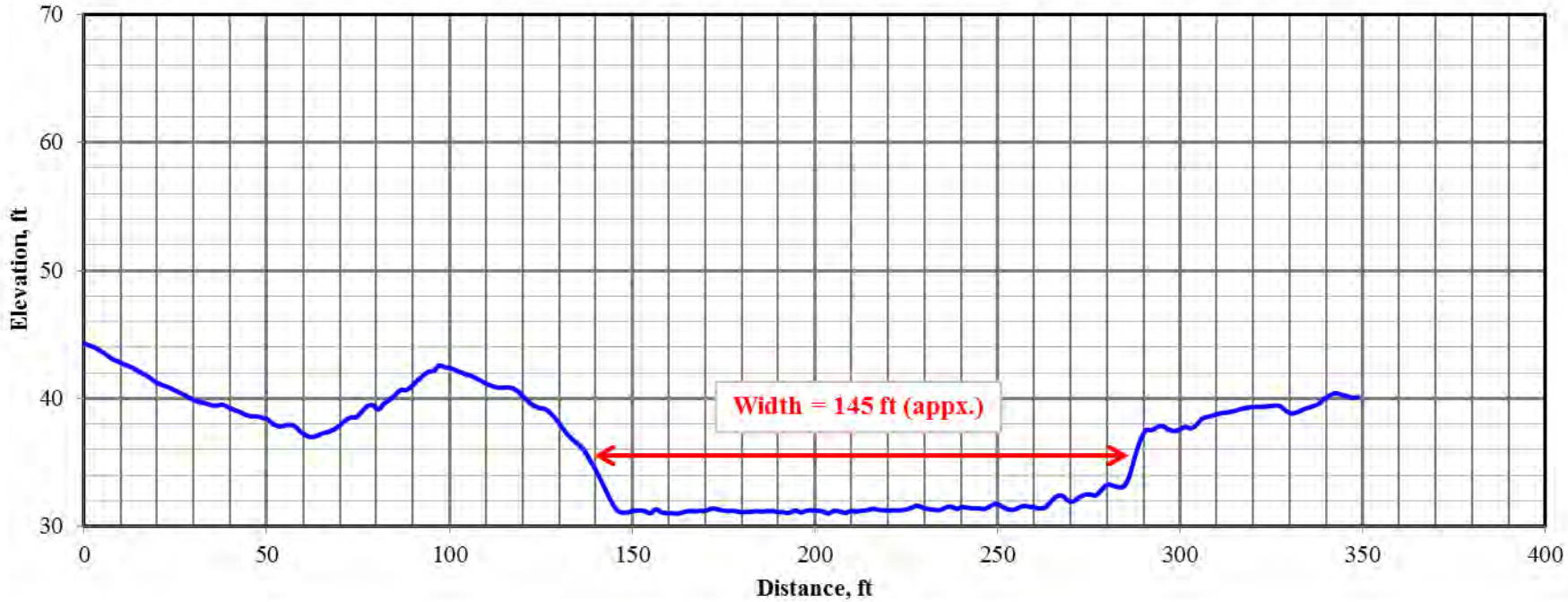


Figure 2-c
MP 56.1: Cohoon Creek



ATTACHMENT 3

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: ACP City/County: Suffolk Sampling Date: 1/13/16

Applicant/Owner: Dominion State: VA Sampling Point: WSUO 025f.W

Investigator(s): L. Roper, S. Josefa Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Drainage Local relief (concave, convex, none): None Slope (%): N/A

Subregion (LRR or MLRA): LRRT Lat: 36.608843 Long: -76.732158 Datum: WGS84

Soil Map Unit Name: Levy silty clay loam NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland?	Yes X No ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____		

Remarks:

NCWAM: Bottomland Hardwood Forest

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- X Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15) (LRR U)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres along Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ____ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): N/A
Water Table Present?	Yes X	No ____	Depth (inches): 1
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 1

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Portions of wetland are inundated

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WSU025F_W

Tree Stratum (Plot size: 30X30Ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus michauxii	10	Y	FACW
2. Acer rubrum	25	Y	FAC
3. Ilex opaca	10	Y	FAC
4.			
5.			
6.			
7.			
8.			
	45 = Total Cover		
50% of total cover: 22.5	20% of total cover: 9		
Sapling/Shrub Stratum (Plot size: 30X 30Ft)			
1. Ilex opaca	10	Y	FAC
2. Acer rubrum	20	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 6		
Herb Stratum (Plot size: 30X30ft)			
1. Arundinaria gigantea	20	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		
Woody Vine Stratum (Plot size: 30X30ft)			
1. Smilax rotundifolia	15	Y	FAC
2.			
3.			
4.			
5.			
	15 = Total Cover		
50% of total cover: 7.5	20% of total cover: 3		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (If observed, list morphological adaptations below).

ws40025f_w

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/1	100					LFS	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

could not auger below 15 inches, water table.

Wetland data point wsuo025f_w facing southwest.

Wetland data point wsuo025f_w facing southeast.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: ACP City/County: Suffolk Sampling Date: 01/13/16

Applicant/Owner: DOMINION State: VA Sampling Point: WSNO25-U

Investigator(s): L. Roper, S. Iocefa Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): none Slope (%) N/A

Subregion (LRR or MLRA): LRRT Lat: 36.68850 Long: -76.73226 Datum: WGS84

Soil Map Unit Name: Levy silty clay loam NWI classification: UPLAND

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	Is the Sampled Area within a Wetland? Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): N/A

Water Table Present? Yes _____ No X Depth (inches): >20

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): >20

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WSU025_u

Tree Stratum (Plot size: 30X30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liriodendron tulipifera	15	Y	FAC
2. Quercus rubra	5	N	FACU
3. Acer rubrum	20	Y	FAC
4. Ilex opaca	10	Y	FAC
5.			
6.			
7.			
8.			
	50	= Total Cover	
50% of total cover: 25	20% of total cover: 10		
Sapling/Shrub Stratum (Plot size: 30X30ft)			
1. Ilex opaca	5	Y	FAC
2. Acer rubrum	5	Y	FAC
3. Liriodendron tulipifera	5	Y	FAC
4.			
5.			
6.			
7.			
8.			
	15	= Total Cover	
50% of total cover: 7.5	20% of total cover: 3		
Herb Stratum (Plot size: 30X30ft)			
1. Ligustrum sinense	10	Y	FAC
2. Arundinaria gigantea	10	Y	FACW
3. Chasmanthium latifolium	10	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	= Total Cover	
50% of total cover: 15	20% of total cover: 6		
Woody Vine Stratum (Plot size: 30X30ft)			
1. Smilax rotundifolia	15	Y	FAC
2. Vitis rotundifolia	5	Y	FAC
3.			
4.			
5.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 11 (A)

Total Number of Dominant Species Across All Strata: 11 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

WS4025_U

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10	10YR 3/2	100					FS	>30% uncoated sand grains
10-20	10YR 5/6	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

Upland data point wsuo025_u facing northwest.

Upland data point wsuo025_u facing northeast.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: ACP City/County: Suffolk Sampling Date: 11/2/16

Applicant/Owner: Dominion State: VA Sampling Point: WSW04Bf-W

Investigator(s): ESI- Benton, Roper Section, Township, Range: none

Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR T U Lat: 36.679319 Long: -76.73602 Datum: WGS84

Soil Map Unit Name: Nansemond loamy fine sand NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks:

NCWAM: Riverine Swamp Forest

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ✓ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): NA
Water Table Present?	Yes ✓	No ____	Depth (inches): 16
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 8

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

portions of wetland inundated

Buttressed Trees

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WSUD048f_W

Tree Stratum (Plot size: 30ft x 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ilex opaca	5	N	FAC
2. Carpinus caroliniana	10	N	FAC
3. Acer rubrum	15	Y	FAC
4. Liquidambar styraciflua	15	Y	FAC
5. Taxodium distichum	10	N	OBL
6.			
7.			
8.			
	55 = Total Cover		
50% of total cover: 27.5	20% of total cover: 11		
Sapling/Shrub Stratum (Plot size: 30ft x 30ft)			
1. Quercus michauxii	5	N	FACW
2. Carpinus caroliniana	10	Y	FAC
3. Acer rubrum	5	N	FAC
4. Liquidambar styraciflua	5	N	FAC
5. Ligustrum sinense	10	Y	FAC
6.			
7.			
8.			
	35 = Total Cover		
50% of total cover: 17.5	20% of total cover: 7		
Herb Stratum (Plot size: 30ft x 30ft)			
1. Osmundastrum cinnamomeum	20	Y	FACW
2. Woodwardia areolata	10	N	OBL
3. Arundinaria gigantea	15	Y	FACW
4. Saururus cernuus	15	Y	OBL
5. Fraxinus pennsylvanica	10	N	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70 = Total Cover		
50% of total cover: 35	20% of total cover: 14		
Woody Vine Stratum (Plot size: 30ft x 30ft)			
1. Smilax rotundifolia	10	Y	FAC
2.			
3.			
4.			
5.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WSUD48Eus

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/3	100					L	
6-14	2.5Y 4/2	85	5YR 3/4	10	C	M	L	
			5YR 3/4	5	C	PL		
14-20	2.5Y 4/1	90	5YR 3/4	10	C	M	L	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Wetland data point wsuo048f_w facing north.

Wetland data point wsuo048f_w facing south.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: ACP City/County: Suffolk Sampling Date: 11/2/16

Applicant/Owner: Dominion State: VA Sampling Point: wsud48c-w

Investigator(s): ESI- Benton, Roper Section, Township, Range: none

Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR T Lat: 36.67895 Long: -76.74141 Datum: WGS84

Soil Map Unit Name: Rains fine sandy loam NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:
powerline easement

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): 1"	
Water Table Present?	Yes ✓	No ____	Depth (inches): surface	
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): surface	**Wetland Hydrology Present?** Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WSWD48e.w

Tree Stratum (Plot size: 30ft x 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. none			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0 = Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size: 30ft x 30ft)			
1. none			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0 = Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 30ft x 30ft)			
1. Saccharum giganteum	5	N	FACW
2. Fraxinus pennsylvanica	10	N	FACW
3. Rubus argutus	10	N	FAC
4. Woodwardia areolata	20	Y	OBL
5. Persicaria sagittata	50	Y	OBL
6. Arundinaria gigantea	20	Y	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	115 = Total Cover		

50% of total cover: 57.5 20% of total cover: 23

Woody Vine Stratum (Plot size: 30ft x 30ft)			
1. none			
2.			
3.			
4.			
5.			
	0 = Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WSUD48e-W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 2/1	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ✓ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Wetland data point wsuo048e_w facing north.

Wetland data point wsuo048e_w facing south.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: ALP City/County: Suffolk Sampling Date: 11/2/16

Applicant/Owner: Dominion State: VA Sampling Point: WSW078-U

Investigator(s): ESI- Benton, Roper Section, Township, Range: none

Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): concave Slope (%): 3-7

Subregion (LRR or MLRA): LRR T U Lat: 36.67930 Long: -76.73592 Datum: WGS84

Soil Map Unit Name: Nansemond loamy fine sand NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) **(LRR U)**
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): NA
Water Table Present?	Yes ____	No ✓	Depth (inches): >20
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 18

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WSub048-a

Tree Stratum (Plot size: 30ft x 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liriodendron tulipifera	10	Y	FACU
2. Acer rubrum	5	N	FAC
3. Carpinus caroliniana	10	Y	FAC
4. Quercus michauxii	5	N	FACW
5. Ilex opaca	10	Y	FAC
6. Pinus taeda	5	N	FAC
7.			
8.			
	45 = Total Cover		
50% of total cover: 22.5	20% of total cover: 9		
Sapling/Shrub Stratum (Plot size: 30ft x 30ft)			
1. Carpinus caroliniana	10	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		
Herb Stratum (Plot size: 30ft x 30ft)			
1. Arundinaria gigantea	25	Y	FACW
2. Ligustrum sinense	10	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	35 = Total Cover		
50% of total cover: 17.5	20% of total cover: 7		
Woody Vine Stratum (Plot size: 30ft x 30ft)			
1. Smilax rotundifolia	10	Y	FAC
2. Vitis rotundifolia	10	Y	FAC
3.			
4.			
5.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WSLD048-ea

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/4	100					L	
4-16	2.5Y 5/6	70	10YR 5/8	30	C	M	L	
16-20	2.5Y 4/3	90	7.5YR 5/8	10	C	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Upland data point wsuo048_u facing north.

Upland data point wsuo048_u facing south.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: ACP City/County: Suffolk Sampling Date: 1/5/16

Applicant/Owner: Dominion State: VA Sampling Point: wsup032fw

Investigator(s): ESI - M. Smith, N. Murphrey Section, Township, Range: NA

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR or MLRA): LRR T Lat: 36.7578 Long: 76.6878 Datum: WGS84

Soil Map Unit Name: Kenansville loamy sand, 0-4% slopes NWI classification: PFO6f

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

NCWAM: Riverine Swamp Forest

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [x] Surface Water (A1)
- [x] High Water Table (A2)
- [x] Saturation (A3)
- [x] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [x] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] Marl Deposits (B15) **(LRR U)**
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [x] Drainage Patterns (B10)
- [x] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [x] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [x] FAC-Neutral Test (D5)
- [ ] Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes ✓ No ____ Depth (inches): 5

Water Table Present? Yes ✓ No ____ Depth (inches): surface

Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): surface

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: wsup052f.w

Tree Stratum (Plot size: 30ft x 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Taxodium distichum	10	N	OBL
2. Nyssa biflora	40	Y	OBL
3. Liquidambar styraciflua	30	Y	FAC
4. Acer rubrum	20	Y	FAC
5.			
6.			
7.			
8.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		

Sapling/Shrub Stratum (Plot size: 30ft x 30ft)			
1. Clethra alnifolia	5	Y	FACW
2. Ilex opaca	5	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		
50% of total cover: 5	20% of total cover: 2		

Herb Stratum (Plot size: 30ft x 30ft)			
1. Boehmeria cylindrica	5	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Woody Vine Stratum (Plot size: 30ft x 30ft)			
1. Gelsemium sempervirens	5	Y	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☒ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WSUP032f_WS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10YR 2/2	100					organic	fibrous organic
5-20	10YR 3/1	100					loam	mucky

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☑ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

Wetland data point wsup032f_w facing north.

Wetland data point wsup032f_w facing northwest.

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: ACP City/County: Suffolk Sampling Date: 1/5/16

Applicant/Owner: Dominion State: VA Sampling Point: WSUP032_U

Investigator(s): ESI - M.Smith, N.Murphy Section, Township, Range: NA

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR or MLRA): LRR T Lat: 36.7577 Long: -76.6879 Datum: WGS84

Soil Map Unit Name: Kenansville loamy sand, 0-4% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): NA
Water Table Present?	Yes _____	No ✓	Depth (inches): >20
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): >20

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: wsup032-u

Tree Stratum (Plot size: 30ft x 30ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fagus grandifolia	20	N	FACU
2. Liquidambar styraciflua	35	Y	FAC
3. Ilex opaca	25	Y	FAC
4. Prunus serotina	25	Y	FACU
5.			
6.			
7.			
8.			
	105 = Total Cover		
50% of total cover: 52.5	20% of total cover: 21		

Sapling/Shrub Stratum (Plot size: 30ft x 30ft)			
1. Ilex opaca	15	Y	FAC
2. Fagus grandifolia	5	N	FACU
3. Carya cordiformis	20	Y	FAC
4.			
5.			
6.			
7.			
8.			
	40 = Total Cover		
50% of total cover: 20	20% of total cover: 8		

Herb Stratum (Plot size: 30ft x 30ft)			
1. Euonymus americanus	15	Y	FAC
2. Allium canadense	5	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Woody Vine Stratum (Plot size: 30ft x 30ft)			
1. Lonicera japonica	50	Y	FACU
2. Smilax rotundifolia	20	Y	FAC
3. Vitis rotundifolia	10	N	FAC
4.			
5.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover: 16		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☒ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: wsup132_u

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10YR 3/3	100					loam	
4-20	10YR 6/6	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Upland data point wsup032_u facing northwest.

Upland data point wsup032_u facing southeast.

Virginia Department of Game and Inland Fisheries

From: Sara Throndson [mailto:Sara.Throndson@erm.com]
Sent: Tuesday, April 04, 2017 5:13 PM
To: Ewing, Amy (DGIF)
Cc: Richard B Gangle (Services - 6); Robert M Bisha (Services - 6); Tracy Brunner; Spencer Trichell (spencer.trichell@dom.com); Pat Robblee; Steve Holden
Subject: ACP - Request for review of water sources

Amy,

On behalf of the Atlantic Coast Pipeline Project please find the attached letter requesting the Virginia Field Office's review and comment regarding species concerns for two potential water sources for use by the Project.

Atlantic looks forward to continued coordination with you on this project. Please contact Mr. Richard Gangle at (804) 273-2814 or richard.b.gangle@dom.com, or Ms. Sara Throndson at (612) 347-7113 or sara.throndson@erm.com if there are questions.

Thank you, Sara

Sara Throndson
Senior Scientist
ERM
1000 IDS Center, 80 S. 8th Street I Minneapolis I MN I 55402
Office 612-347-7113 I Cell 612-716-7812
sara.throndson@erm.com I www.erm.com

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

April 12, 2017

BY EMAIL

Amy Ewing
VA Department of Game and Inland Fisheries
7870 Villa Park Dr., Suite 400
PO Box 90778
Henrico, VA 23228

Re: Dominion Transmission, Inc., Atlantic Coast Pipeline
Virginia Rookeries

Dear Ms. Ewing,

Pedestrian surveys were conducted on February, 7, 8, and 9, 2017 along the Project area in West Virginia, Virginia, and North Carolina to investigate bird activity at rookeries identified either during prior aerial survey, or from available databases. These pedestrian surveys were completed to evaluate the overall site conditions of the rookeries. In Virginia, the buffers of four rookeries were identified as overlapping with construction workspace. Attached is a memo containing proposed conservation measures for the four rookeries of concern, and figures displaying rookery locations and time of year restriction buffers. This information was included in the Migratory Bird Plan filed with FERC on January 27, 2017.

Project and Company Background

Atlantic is a company formed by four major U.S. energy companies – Dominion Resources, Inc., Duke Energy Corporation, Piedmont Natural Gas Co., Inc., and Southern Gas Company. Atlantic will own and operate the proposed ACP, an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. The ACP will deliver up to 1.5 billion cubic feet per day (bcf/d) of natural gas to be used to generate electricity, heat homes, and run local businesses. The underground pipeline project will facilitate cleaner air, increase reliability and security of natural gas supplies, and provide a significant economic boost in Virginia and North Carolina.

Atlantic has contracted with DTI, a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic. The ACP will be regulated by the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act. The ACP is subject to review by FERC under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act, as well as other environmental and natural resource laws.

Atlantic requests your concurrence on the proposed conservation measures for rookeries in Virginia. Please contact Mr. Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, if there are questions regarding this information. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc: Sumalee Hoskin, U.S. Fish and Wildlife Service Virginia Field Office
Sarah Nystrom, U.S. Fish and Wildlife Service Virginia Field Office

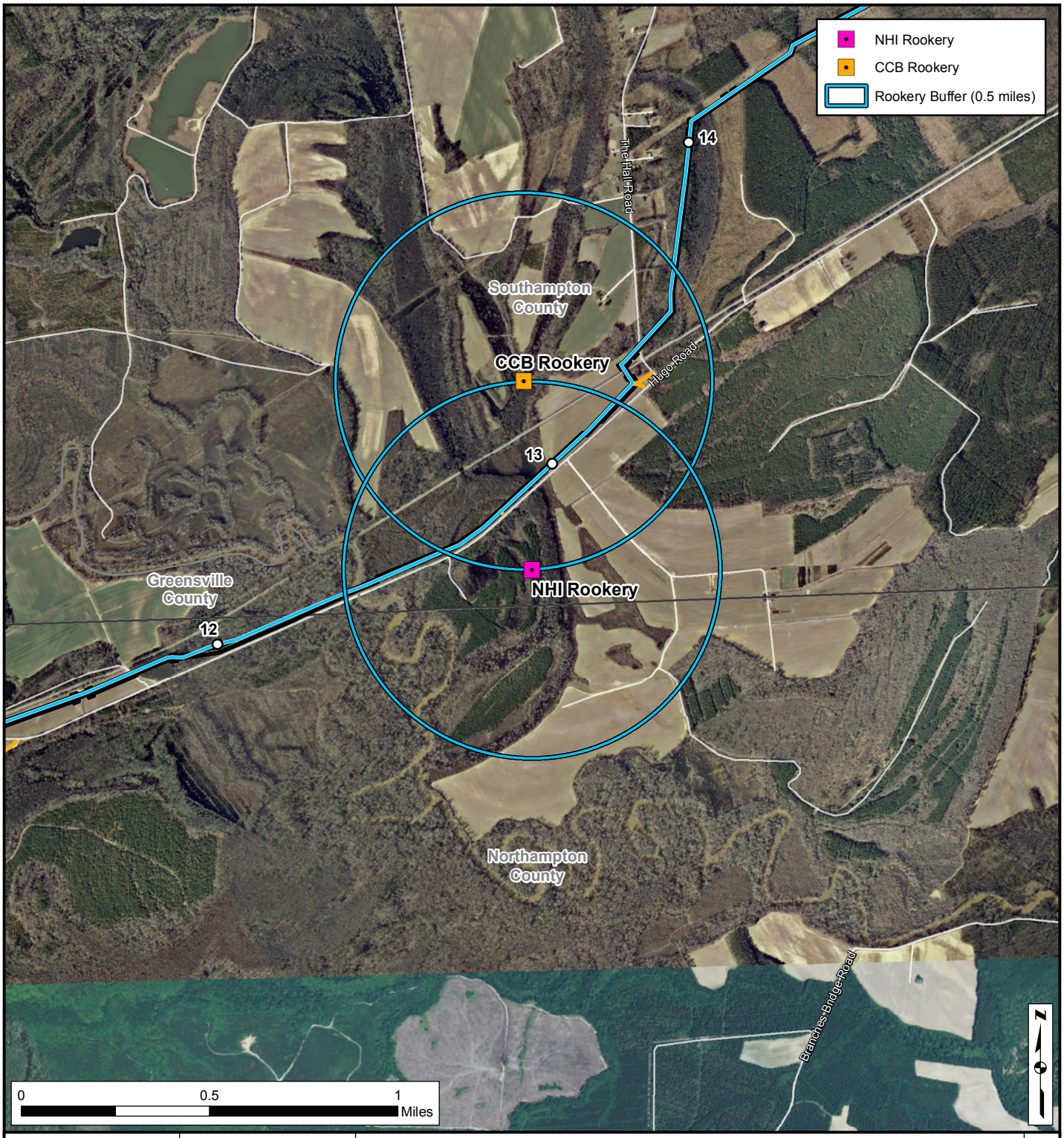
Attachments:
ACP Virginia Rookery Review Memo

Colonial Wading Bird Rookeries
Atlantic Coast Pipeline Project, Virginia

Rookery ID	County, State	Project Segment, near MP	Survey Notes [a]	Proposed Conservation Measures
ROOK-ACT-02	City of Suffolk, VA	AP-3, 64.6	Several nests and whitewash observed, but not active at time of visit. Updated location point collected.	Portion of HDD workspace and access road on east side of Nansemond River falls within recommended buffer. Due to distance of rookery to workspace edge (0.45 mile), request relief from extent of time of year restriction. Drilling is necessary to avoid impacts on other biological resources potentially found in the Nansemond River, and plans are in place to shift the HDD exit point outside of the buffer.

[a] ERM biologists conducted pedestrian surveys on February 7, 8, and 9, 2017 at rookeries along the project in West Virginia, Virginia, and North Carolina to investigate bird activity at rookeries identified either during aerial survey or from available databases, to evaluate the overall site conditions at the rookery.

Proposed Measures in Migratory Bird Plan, For agency concurrence			
Rookery ID	**County, State**	**Project Segment, near MP**	**Site Description**
NHI Rookery	Southampton County, VA	AP-3, 12.8	Public road is between right-of-way and rookery (0.15 mile from rookery), within 0.5 mile restriction area. Surrounding vegetation is a managed, planted area. Due to other human activities between right-of-way and rookery, no restrictions on activities are recommended. The rookery was not identified as active during 2016 surveys, therefore, may no longer be actively used.
CCB Rookery	Southampton County, VA	AP-3, 13.1	Railroad is between right-of-way and rookery (0.11 mile from rookery), within 0.5 mile restriction area. Due to other human activities between right-of-way and rookery, no restrictions on activities are recommended. The rookery was not identified as active during 2016 surveys, therefore, may no longer be actively used.
CCB Rookery	Southampton County, VA	AP-3, 38.5	The rookery is located between the HDD entry and exit points. The nearest project HDD workspace is 0.15 mile from the rookery location. Rookery was not identified as active during 2016 surveys, may no longer be active. Recommend no restrictions due to lack of activity in 2016 surveys.



Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Rookeries	0.5 mile	VA: Apr. 1 - Aug. 15	
Non-raptor migratory birds	Vegetation clearing	VA: Mar. 15 - Aug. 30	

Atlantic Coast Pipeline

Dominion

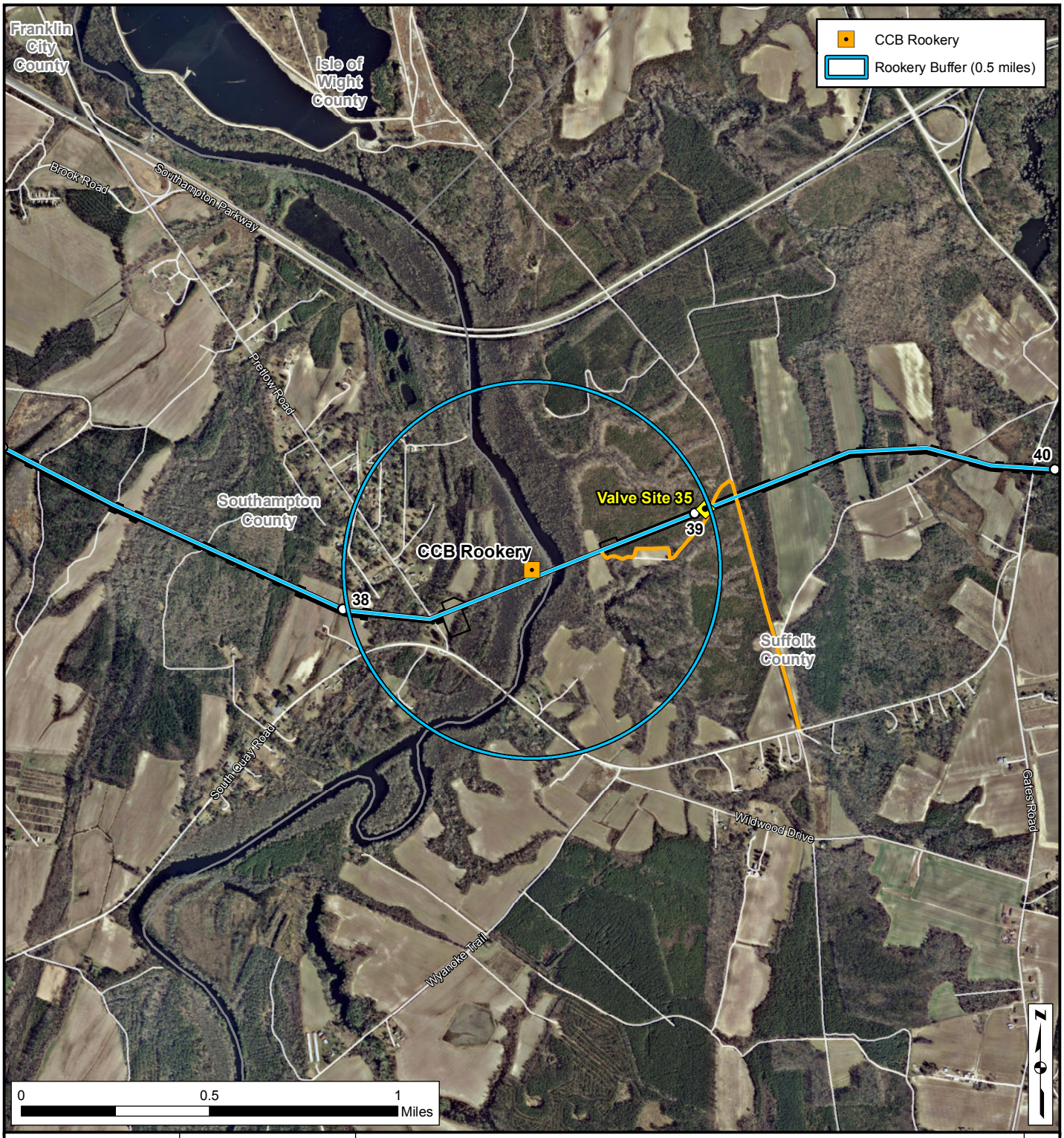
Milepost
AP-3
Access Road
Construction Impact Footprint

Atlantic Coast Pipeline Project
Known Migratory Bird Nesting Sites
Southampton County, Virginia

ERM

FILE: M:\Clients\D-F\DOM\SRPP_ArcGIS\2016\07\22_MBTA_Report_DRS_ACP_Known_Bird_Nests.mxd, REVISED: 04/10/2017, SCALE: 1:24,000 DRAWN BY: GIS

**** Times are approximate, and dependent on actual bird activity at nest or rookery.***



Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Rookeries	0.5 mile	VA: Apr. 1 - Aug. 15	
Non-raptor migratory birds	Vegetation clearing	VA: Mar. 15 - Aug. 30	

Atlantic Coast Pipeline

Dominion

Milepost
AP-3
Valve Site
Access Road
Construction Impact Footprint

Atlantic Coast Pipeline Project

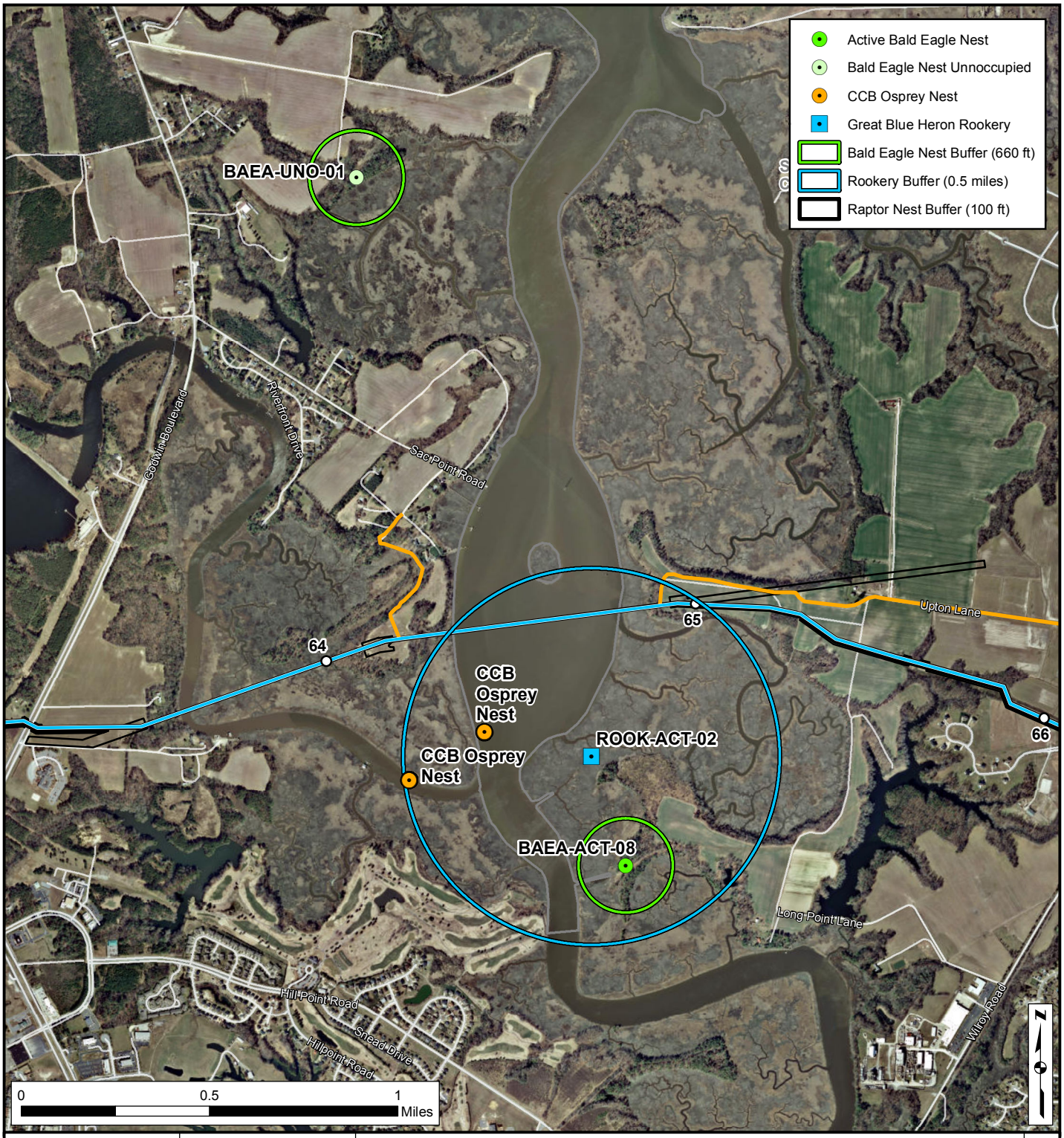
Known Migratory Bird Nesting Sites

Southampton County, Virginia

ERM

FILE: M:\Clients\D-F\DOM\SRPP_ArcGIS\2016\07\22_MBTA_Report_DRS_ACP_Known_Bird_Nests.mxd, REVISED: 04/10/2017, SCALE: 1:24,000 DRAWN BY: GIS

**** Times are approximate, and dependent on actual bird activity at nest or rookery.***



Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Bald Eagle Nests	660 feet	Nov. 15 - July 15	
Rookeries	0.5 mile	VA: Apr. 1 - Aug. 15	
Non-eagle raptor nests	100 feet	Species Dependent; can start as early as January and go through August	
Non-raptor migratory birds	Vegetation clearing	VA: Mar. 15 - Aug. 30	

Atlantic Coast Pipeline

Dominion

- Milepost
- AP-3
- Access Road
- Construction Impact Footprint

Atlantic Coast Pipeline Project

Known Migratory Bird Nesting Sites

City of Suffolk, Virginia

ERM

FILE: M:\Clients\D-F\DOM\SRPP_ArcGIS\2016\07\22_MBTA_Report_DRS_ACP_Known_Bird_Nests.mxd, REVISED: 04/10/2017, SCALE: 1:24,000 DRAWN BY: GIS

**** Times are approximate, and dependent on actual bird activity at nest or rookery.***

From: Ewing, Amy (DGIF) [mailto:Amy.Ewing@dgif.virginia.gov]
Sent: Tuesday, April 18, 2017 11:00 AM
To: Sara Throndson
Cc: Fernald, Ray (DGIF); richard.b.gangle@dom.com; Bugas, Paul (DGIF)
Subject: ESSLog#34825_ACPWaterSources_DGIF_AME20170418

Sara,
We received a request to review and provide comments on two water sources (Bath County Reservoir and Augusta Quarry) proposed for use by Atlantic during construction of the pipeline. We do not currently document any listed or WAP-tiered species from the project areas. However, there are wild and/or stockable trout resources associated with tributaries of the impoundments proposed for use. Assuming the water will be taken from the impoundment and not the live streams associated with them, we do not anticipate water withdrawals from these sources to result in adverse impacts upon trout.

To ensure protection of resident aquatic species from impingement and entrainment associated with the intakes, we recommend that the intakes be fitted with 1mm mesh screens and that the intake velocities not exceed 0.25 fps. In addition, to ensure continued access to necessary instream habitats, we recommend that the intake not withdraw more than 10% instantaneous flow (inflow into the impoundment).

Thank you,
Amy

Amy M. Ewing

Environmental Services Biologist/FWIS Program Manager
Chair, Team WILD (Work, Innovate, Lead and Develop)
VA Department of Game and Inland Fisheries
7870 Villa Park Dr., Suite 400, PO Box 90778, Henrico, VA 23228
804-367-2211 ☯ *www.dgif.virginia.gov*

"That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics" **Aldo Leopold, 1948**

Virginia Department of Historic Resources

COMMONWEALTH of VIRGINIA

Molly Joseph Ward
Secretary of Natural Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
www.dhr.virginia.gov

March 22, 2017

Mr. Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Re: *Phase I Historic Architectural Survey of the Atlantic Coast Pipeline Project, Virginia Addendum 2*
DHR File No. 2014-0710

Dear Mr. Gangle:

We have received for review the addendum report referenced above dated October 2016 prepared by Dovetail Cultural Resource Group. Dominion submitted this report in mid-October 2016; however, the accompanying architectural survey forms did not accompany the survey report at that time. DHR was unable to complete review of the report until the architectural survey forms were supplied, which occurred in February 2017. Between the time Dovetail wrote the draft report and the time Dominion submitted the survey forms to DHR, the pipeline route underwent some revision resulting in changes to the project's Area of Potential Effects (APE). As a consequence, the consultant had to conduct additional field work to document architectural properties which had not been previously recorded because they were outside the original APE. This situation appears to involve 10 properties, as DHR has their necessary survey forms, but the draft report makes no mention of them. These 10 properties are: 007-5596, 045-5076, 062-5180, 091-5098, 133-0209, 133-5192, 133-5559, 133-5560, 133-5563, and 133-5566. In all of these cases the surveyor recommendation was that the property was not eligible for listing in the National Register of Historic Places (NRHP). The DHR concurs with these recommendations; however, the report will need to be updated in order to address these resources and the consultant's NRHP recommendations. Also, in addition to 045-5076 not initially being included in the APE, the local jurisdiction where the farm is located, Highland County, appears to have been originally excluded from the corridor. Therefore, the updated report will now need to acknowledge Highland County being within the project corridor.

With respect to Dovetail's NRHP eligibility recommendations for those properties within the original APE and, therefore, included in the October 2016 draft report, DHR concurs with the following:

- Folly Farm (007-0015) remains listed in the NRHP
- Col. Joseph W. Harper House (026-0007) remains eligible for listing in the NRHP.
- Red Apple Orchards (062-5121) and House, 203 Upton Lane (133-0025) are both potentially eligible for the NRHP under Criterion C

We also agree that the following properties are ***not eligible*** for listing in the NRHP:

Western Region Office
962 Kime Lane
Salem, VA 24153
Tel: (540) 387-5443
Fax: (540) 387-5446

Northern Region Office
5357 Main Street
PO Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Eastern Region Office
2801 Kensington Avenue
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

007-5147
007-5586
007-5588 through 007-5595 (inclusive)
007-5597
012-5136
014-5072
014-5073
024-5109
040-5068 through 040-5071 (inclusive)
067-0186
067-5050
067-5051
073-5092
087-5615 through 087-5617 (inclusive)
087-5619
131-0542
131-5842 through 131-5865 (inclusive)
133-0233
133-5547 through 133-5558 (inclusive)
133-5561
133-5562
133-5564
133-5565
133-5567

During the field work a number of properties were inaccessible to the surveyor and "Indeterminate" was registered in the NRHP recommendation column of the report table for these properties. These properties are 007-5587, 012-5191, 014-5074, 026-5222, 087-5618, and 133-0105. It is acceptable at this stage to have "Indeterminate" as a placeholder; however, eventually a formal recommendation on eligibility will have to be made, or Dominion may treat these properties as NRHP eligible for the purposes of advancing the Section 106 process.

In the course of our review we noticed discrepancies between some of the construction dates on the survey forms and the construction dates given for the same properties listed in the tables included in the report. These discrepancies are as follows:

- 087-5615: The V-CRIS form has 1940 while the tables in the report have ca. 1960
- 131-5843: The V-CRIS form has 1950 while the tables in the report have 1947
- 133-5552: The V-CRIS form has ca. 1950 while the tables in the report have ca. 1960
- 133-5554: The V-CRIS form has no date while the tables in the report have ca. 1965

Because the report is presented as a draft and there is an immediate need to revise the document because of the reasons stated above, we only conducted a preliminary review of the text; however, our initial review uncovered editorial errors that the consultant will need to correct for the final document. For example, on page 47 the narrative states that Table 17 includes previously recorded architectural resources in the City of Suffolk, while Table 18 lists those properties newly recorded in the city. However, the title for Table 18 is for "Previously" surveyed architectural properties (see page 54). We suspect that there are other similar editorial errors which the consultant will need to address. For ease of use, DHR requests that the tables be organized numerically by DHR Inventory Number rather than by mile post as they are now.

We look forward to receiving the revised report. If you have any questions about these comments, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

c. Dovetail

Western Region Office
962 Kime Lane
Salem, VA 24153
Tel: (540) 387-5443
Fax: (540) 387-5446

Northern Region Office
5357 Main Street
PO Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Eastern Region Office
2801 Kensington Avenue
Richmond, VA 23221
Tel: (804) 367-2323
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COMMONWEALTH of VIRGINIA

Molly Joseph Ward
Secretary of Natural Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
www.dhr.virginia.gov

March 24, 2017

Mr. Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Re: *Phase I Historic Architectural Survey of the Atlantic Coast Pipeline Project, Virginia Addendum 3 Report* (October 2016)
DHR File No. 2014-0710

Dear Mr. Gangle:

The Department of Historic Resources (DHR) has received the report referenced above and accompanying architectural survey forms for our review and comment. Environmental Resources Management (ERM) prepared the subject addendum document to address segments of the Atlantic Coast Pipeline project where reroutes of the earlier corridor significantly affected the definition of the Area of Potential Effects (APE) resulting in the need for additional architectural survey and/or revisiting previously recorded properties.

The current addendum survey report documents a total of 73 architectural properties. ERM recommends that 63 are not eligible for listing in the National Register of Historic Places (NRHP), 10 resources are NRHP-eligible, and one (1) is already listed in the NRHP. The consultant further recommends that none of the historic properties included in the survey will be adversely affected by the construction of the Atlantic Coast Pipeline. Please accept the following as DHR's comments on the addendum report and NRHP eligibility conclusions proposed by the authors.

DHR acknowledges that the South Rockfish Valley Rural Historic District (**062-5119**) was listed in the NRHP in 2016 and remains eligible. Additionally, we concur with the consultant's findings that following architectural properties are eligible for listing in the NRHP: **007-0103** (Revercomb House), **007-5689** (Saltbox dwelling), **008-5053** (Craftsman Bungalow), **045-0120** (McDowell Battlefield), **062-5160** (Warminster Rural Historic District), **062-5180** (Chesapeake & Ohio Railroad), **091-5098** (Norfolk & Petersburg Railroad), and **133-5039** (Siege of Suffolk). ERM recommends that **007-0480** (John Montgomery House) is worthy of listing in the NRHP, however, both the addendum report and corresponding survey form state that the primary resource is no longer extant. Please verify if this is the case and, if so, what exactly is the consultant recommending as being eligible for listing in the NRHP? Also, ERM recommends that **045-0007** (Sidney Wade House) warrants inclusion in the NRHP. However, from the information contained in the survey form and the photographs of the dwelling it is clear that the house has undergone extensive

additions, some of them recently. We are unwilling at this time to agree with the recommendation that this property is NRHP-eligible. Please complete a Phase II (Intensive Level) survey form for 045-0007 and submitted it to DHR for our consideration.

With respect to the remaining architectural properties surveyed, we agree with the consultant that the following are *not eligible* for listing in the NRHP:

007-0445
007-0455
007-0457
007-5569
007-5681 through 007-5688 (inclusive)
007-5690 through 007-5699 (inclusive)
008-5053 through 008-5056 (inclusive)
008-5658 through 008-5063 (inclusive)
026-5226
045-0055
045-5013 through 045-5017 (inclusive)
045-5079 through 045-5084 (inclusive)
045-5086
062-5221
062-5222
133-0209
133-0215
133-5192
133-5444
133-5481
133-5558
133-5560
133-5563
133-5566
133-5571 through 133-5575 (inclusive)
133-5578

While reviewing the addendum report and architectural survey forms we noticed several discrepancies between the information for certain properties contained in each, particularly with respect to construction dates. DHR requests that the consultant reconcile the following inconsistencies and make the change in the appropriate document. When complete, DHR will require two copies of each replacement page for the addendum report and an electronic copy on CD of the revised document. Changes to the individual survey forms need to be made electronically in V-CRIS.

- **007-5690**: The date of construction in the report Table 2 is c.1960 while it is given as c.1985 on the V-CRIS form
- **008-5054**: The date of construction in the report Table 2 is c.1930-1950 while it is given as c.1940 on the V-CRIS form
- **008-5058**: The date of construction in the report Table 2 is c.1960-1970 while it is given as c.1965 on the V-CRIS form
- **008-5059**: The date of construction in the report Table 2 is c.1920-1930 while it is given as c.1925 on the V-CRIS form
- **008-5060**: The date of construction in the report Table 2 is c.1960-1970 while it is given as 1965 on the V-CRIS form
- **008-5062**: The date of construction in the report Table 2 is c.1960-1970 while it is given as c.1965 on the V-CRIS form
- **045-5082**: The date of construction in the report Table 2 is c.1950 while it is given as 2016 on the V-CRIS form
- **045-5084**: The date of construction in the report Table 2 is c.1965-1970 while it is given as c.1965 on the V-CRIS form
- **045-5086**: The date of construction in the report Table 2 is early 20th cent. while it is given as c.1910 on the V-CRIS form

- **062-5221**: The date of construction in the report Table 2 is c.1880-1910 while it is given as c.1900 on the V-CRIS form
- **062-5222**: The date of construction in the report Table 2 is c.1960-1970 while it is given as c.1965 on the V-CRIS form
- **133-0215**: The date of construction in the report Table 2 is c.1840 while it is given as c.1780 on the V-CRIS form
- **133-5444**: The date of construction in the report Table 2 is c.1930 while it is given as c.1920 on the V-CRIS form
- **133-5481**: In the report Table 2 this property is identified as a cemetery, which it is, with a date of 1867; however, the V-CRIS form identifies it as "House" with a construction date of 1920
- **133-5558**: The date of construction in the report Table 2 is c.1950 while it is given as 1945 on the V-CRIS form
- **133-5560**: The date of construction in the report Table 2 is c.1950-1960 while it is given as 1961 on the V-CRIS form
- **133-5563**: The date of construction in the report Table 2 is c.1960 while it is given as c.1950 on the V-CRIS form
- **133-5566**: The date of construction in the report Table 2 is c.1960 while it is given as 1947 on the V-CRIS form
- **133-5571**: The date of construction in the report Table 2 is c.1940-1950 while it is given as c.1945 on the V-CRIS form
- **133-5572**: The date of construction in the report Table 2 is c.1960-1970 while it is given as c.1965 on the V-CRIS form

The DHR will not comment on the project effect to historic properties until the remaining NRHP-eligibility issues are settled and the above discrepancies between information in the addendum report and those identified survey forms are corrected.

We look forward to receiving the revised report and documentation. If you have any questions about these comments, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

c. ERM

Western Region Office
962 Kime Lane
Salem, VA 24153
Tel: (540) 387-5443
Fax: (540) 387-5446

Northern Region Office
5357 Main Street
PO Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Eastern Region Office
2801 Kensington Avenue
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

COMMONWEALTH of VIRGINIA

Molly Joseph Ward
Secretary of Natural Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
www.dhr.virginia.gov

April 6, 2017

Mr. Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Re: *Phase I Historic Architectural Survey of the Atlantic Coast Pipeline Project, Virginia Addendum 4 Report* (January 2017)
DHR File No. 2014-0710

Dear Mr. Gangle:

The Department of Historic Resources (DHR) has received the report referenced above and accompanying architectural survey forms for our review and comment. Environmental Resources Management (ERM) prepared the subject addendum document to address those properties within the Virginia section of the proposed Atlantic Coast Pipeline where access was previously denied to the consultants, and for planned access roads and facilities which were not surveyed earlier.

The consultant identified 65 properties fifty years old or older within the pipeline corridor's Area of Potential Effects (APE). Of these, 51 are newly recorded properties associated with segments of the undertaking that had not been previously surveyed due to access restrictions or are associated with proposed access roads and project facilities. Additionally, the consultants resurveyed 14 previously documented properties within the project's APE. ERM recommends that 51 properties addressed in this report are not eligible for listing in the National Register of Historic Places (NRHP), 13 are potentially eligible for the NRHP, and one (1), the Sunray Agricultural Historic District (DHR ID #131-5325) is already listed in the NRHP under Criteria A and C.

The DHR concurs with ERM that the following properties are *not eligible* for listing in the NRHP: DHR ID #s **007-0467**, **007-5703 through 007-5727 (inclusive)**, **007-5729 through 007-5740 (inclusive)**, **008-5008**, **008-5064**, **008-5065**, **008-5067**, **014-5085**, **014-5086**, **026-5256**, **026-5257**, **045-5088**, **062-5223**, **087-5669**, **133-5580**, and **133-5581**.

The DHR concurs with ERM that the following properties are *potentially eligible* for listing in the NRHP: DHR ID #s **007-0447** (Criterion C), **007-0463** (Criterion C), **007-0476** (Criteria A and B), **007-0487** (Criterion C), **007-0863** (Criterion A, African-American history), **008-0011** (Criteria A and C), **008-0126** (Criterion C), **062-5160** (Criteria A and C), and **133-0101** (Criterion C).

The DHR also agrees that the Sunray Agricultural Historic District (DHR ID #**131-5325**) should remain ***listed*** in the NRHP for its significance in agriculture, community planning, ethnic heritage, and development (Criterion A); and its designed landscape (Criterion C). It should be noted, however, that Table 1, page 41, erroneously locates this resource in "Chesapeake County", as there is no such locale in Virginia. The Sunray Agricultural Historic District is in the City of Chesapeake. Please ensure that this is corrected in the revised report. Additionally, although mentioned in the report's introduction, and summary and recommendation sections, that one property is listed in the NRHP, it is not specified which one. Please include the property name in these sections in the revised report.

DHR does not concur with the potentially eligible recommendations for the following four (4) properties:

- **007-0490**: ERM recommends this Queen Anne cottage as eligible for listing in the NRHP under Criterion A as "a reminder of [Deerfield Village's] earlier twentieth-century development and history". However, the property is heavily altered by modifications to the porch, addition of a carport, replacement materials throughout, and additions to the rear. The consultant admits in the survey form and report that "the resource has lost considerable integrity of materials, design, and workmanship", and that the house has been moved "a short distance" so that it "no longer retains its original setting as part of the Augusta Wood Products employee housing." With all of these disadvantages, DHR believes that a better representative for the history of Deerfield is Hoy's Store and Post Office (007-0476).

- **007-5728**: This c.1900 I-House is recommended eligible under Criterion C for its architectural merit; however, DHR believes this is a ubiquitous house type and better examples exist elsewhere.

- **008-5066**: ERM recommends this c.1940 bungalow eligible for the NRHP under Criterion C; however, as with 007-5728 above, this architectural style is very common and Virginia has much better examples with higher degrees of historic integrity than 008-5066.

- **133-5443**: This c.1949 Cape Cod house is recommended by ERM as eligible under Criterion C. DHR believes, as with 007-5728 and 008-5066, this house is of an ordinary type, and the style is better represented in Virginia. This specific property also suffers from a number of changes that diminishes its historic integrity.

While reviewing the report and accompanying Virginia Cultural Resource Inventory System (VCRIS) forms, we noticed several inconsistencies that should be corrected. These are summarized below.

- 007-0490: The date of construction in Table 1 and in the report narrative is given as c.1915, but the VCRIS form lists it as c.1917.
- 007-5708: The date of construction in Table 1 and in the report narrative is given as c.1960-1970s, but the VCRIS form lists it as c.1965.
- 007-5722: This property is described in Table 1 and in the report narrative as a barn, but the VCRIS form has it as "House". The associated photographs show a barn.
- 007-5730: The date of construction in Table 1 and in the report narrative is given as c.1950s, but the VCRIS form lists it as 1956.
- 007-5734: The date of construction in Table 1 and in the report narrative is given as c.mid-20th century, but the VCRIS form lists it as c.1929.

- 007-5736: The date of construction in Table 1 and in the report narrative is given as c.1930-1940, but the VCRIS form lists it as c.1932.
- 007-5737: The date of construction in Table 1 and in the report narrative is given as c.1930, but the VCRIS form lists it as c.1932.
- 008-0011: The date of construction in Table 1 and in the report narrative is given as 1797, but the VCRIS form lists it as c.1798.
- 008-5065: This property is described in Table 1 and in the report narrative as a front-gabled barn with a c.1950 construction date, but the VCRIS form has it as "House" with a date of construction as c.2010.
- 087-5669: The date of construction in Table 1 and in the report narrative is given as c.1960-1990, but the VCRIS form lists it as c.1960.
- 133-0101: The date of construction in Table 1 and in the report narrative is given as 1865, but the VCRIS form lists it as c.1826. The house's appearance and description as being in the "Federal/Adamesque" style favors the earlier construction date.

Please revise the Addendum 4 architectural survey report to reflect the necessary changes discussed above, as well as to incorporate the other comments made by DHR regarding our NRHP eligibility recommendations. Two bound archival copies and one copy on CD of the revised final Addendum 4 report should then be provided to DHR for our records. The master list of historic properties should be updated to incorporate these recommendations. If you have any questions about these comments, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

c. ERM

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

April 26, 2017

Mr. Roger Kirchen, Director
Review and Compliance Division
Virginia Department of Historic Resources
2801 Kensington Ave.
Richmond, VA 23221

Subject: **Section 106 Review –Phase II Investigations, Sites 44AU0924 and 44BR0349**
Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
DHR File No. 2014-0710

Dear Mr. Kirchen:

Atlantic Coast Pipeline, LLC (Atlantic) is requesting review and comment on the enclosed Phase II Report on investigations conducted for the proposed Atlantic Coast Pipeline (ACP) in October 2016 and January 2017. The Federal Energy Regulatory Commission (FERC) is the lead Federal agency for this Project. Atlantic's consultant, ERM, conducted the survey and prepared the enclosed report pursuant to the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended.

Atlantic would appreciate your comments on the attached Phase II report, and we look forward to continuing to work with you on this Project. If you have any questions regarding the enclosed report, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle (Dominion)
Enclosure: **Phase II Investigations, Sites 44AU0924 and 44BR0349**

COMMONWEALTH of VIRGINIA

Molly Joseph Ward
Secretary of Natural Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
www.dhr.virginia.gov

April 28, 2016

Mr. Mike Madden, Forest Archaeologist
George Washington & Jefferson National Forests
5162 Valleypointe Parkway
Roanoke, VA 24019

Re: *Phase I Cultural Resources Investigation, Atlantic Coast Pipeline Project, George Washington National Forest, Augusta, Bath, and Highland Counties, Virginia* (rev. September 6, 2016)
DHR File No. 2014-0710

Dear Mr. Madden:

The Department of Historic Resources (DHR) has received the report referenced above prepared by GAI Consultants, Inc. (GAI). This study represents the archaeological survey of approximately 13.88 miles of 300' pipeline corridor and 4.41 miles of 50' access road right-of-way. It is our opinion that this report meets DHR's *Survey Guidelines* and other applicable standards. Our comments are provided as assistance to Atlantic Coast Pipeline, LLC, U.S. Forest Service, and the Federal Energy Regulatory Commission in meeting their collective responsibility under Section 106 of the National Historic Preservation Act.

This archaeological survey identified two (2) previously recorded, six (6) newly recorded sites, and six (6) isolated finds within the study area. Two (2) additional previously recorded sites within the survey area – **44AU0778** and **44AU0779** – were not re-identified and no further consideration of these resources is warranted. The isolated finds are, by definition, not eligible for listing in the Virginia Landmarks Register (VLR) or National Register of Historic Places (NRHP) and no further consideration of these resources is warranted. Of the eight (8) identified archaeological sites, GAI and the USFS recommend, and DHR concurs, that the following six (6) are *potentially eligible* for VLR/NRHP listing and warrant Phase II evaluation: **44AU0780**, **44AU0781**, **44AU0914**, **44AU0915**, **44AU0917**, and **44AU0918**. GAI and USFS recommend, and DHR concurs, that sites **44AU0916** and **44AU0924** are *not eligible* for VLR/NRHP listing.

Thank you for the opportunity to review this work. If you have any questions regarding these comments or our review of this project, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Director
Review and Compliance Division

Western Region Office
962 Kime Lane
Salem, VA 24153
Tel: (540) 387-5443
Fax: (540) 387-5446

Northern Region Office
5357 Main Street
PO Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Eastern Region Office
2801 Kensington Avenue
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

North Carolina Agencies

North Carolina State Historic Preservation Office

ATLANTIC COAST PIPELINE
PROJECT MEETING MINUTES

MEETING WITH (COMPANY/AGENCY):
NCSHPO

DATE:	LOCATION:
March 24, 2017	Raleigh, NC

ATTENDEES AND THEIR AFFILIATION:
Renee Gledhill-Earley - Environmental Review Coordinator, NCSHPO
Susan Meyers - NCSHPO
Molly Plautz – Dominion
Spencer Trichell – Dominion
Brad Knisley – Dominion
Bill Stanyard – ERM
Emily Laird - ERM

PREPARED BY:
Molly Plautz

MEETING MINUTES:

Archaeology

ERM provided an update on the status of Phase I surveys and Phase II investigations.

NCSHPO expressed a concern about Cemetery 31NS173 (Hunter Cemetery) and the proximity to the survey corridor mentioned in the concurrence letter dated March 20, 2017. ERM agreed to follow up with Susan Meyers on this cemetery.

ERM asked if, for sites that contain the same types of archaeological findings (mainly in Cumberland County), ACP could perform batch mitigation and data recovery on a few select sites. NCSHPO will entertain that possibility, but would need to review a proposal.

Architecture

ERM provided an update on the architectural findings and reports. The NCSHPO requested that for eligible properties listed under Criteria C, ACP re-evaluate and include an updated list of eligibility recommendations in a letter report. If recommended eligible on the merit of exterior architecture only, and the Project will not be close (e.g. no effect/no adverse effect), then ACP should not consider the property to be eligible. NCSHPO will provide an official letter indicating that Addendum 4 will not be reviewed until such time as the parameters discussed are addressed.

Microwave Towers

ERM provided an update on the plans for microwave towers (MTs). NCSHPO asked whether ACP is planning to increase the vertical real estate/value of the MTs by leasing to other parties. This will help NCSHPO with the decision-making process.

NCSHPO advised that ACP use the FCC guidelines for permitting of the towers (search radius, NCSHPO tower form, background studies, and field methods). ERM will prepare a report with all towers to be FERC permitted in one document which will include the archaeology and the architecture. For towers permitted through the FCC process, ERM will follow guidelines set forth by NPA, such as E106, TCNS, appropriate tower search etc.

Assessment of Effects Report

NCSHPO requested that ACP include assessment of effects on both archaeology and architecture in one report. The assessment should focus on what the setting currently looks like and how this setting will be changed. If there is no change, then there should be no adverse effect. For archaeology, NCSHPO indicated the Assessment of Effects document should also contain ACP data recovery research designs and site treatment plans.

Follow-up

1. Cemetery 31NS173 (Hunter Cemetery) concern about its proximity to the survey corridor. ERM sent follow-up information to Susan Meyers.
2. ERM provided an updated Addendum 4 report.
3. Follow up with Susan Meyers on batch mitigation for archeology.

cc: Project Files

Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060
dom.com

April 25, 2017

Renee Gledhill-Early
North Carolina Department of Natural Resources
State Historic Preservation Office
109 East Jones Street
Raleigh, NC 27601

Re: Updated NRHP findings: Atlantic Coast Pipeline, Multi County, ER 14-1475

Ms. Gledhill-Early:

Based on the meeting on March 24, 2017, and comments received on December 12, 2016, and February 6, 2017, as part of the consultation process for the Atlantic Coast Pipeline, Multi County, ER 14-1475, please find revised National Register of Historic Places (NRHP) assessments for historic resources CD1457 and CD1465. These revisions are based on our understanding from the SHPO that resources not be recommended eligible for the NRHP under Criterion C based on external conditions alone, and that the interior integrity of the resource needs to be documented if recommending a resource eligible under Criterion C. Furthermore, it is understood, based on this guidance, that in the absence of interior information, resources should not be recommended eligible for the NRHP under Criterion C alone.

Resource	Description	Report	Revised NRHP Assessment
CD1457	Ca. 1920 American Foursquare	*Phase I Historic Architecture Survey Addendum 2*, Voisin George et al. 2016	Ineligible
CD1465	Ca. 1846 I-house (Plantation Plain with Queen Anne updates)	*Phase I Historic Architecture Survey Addendum 3*, Tucker-Laird et al. 2016	Eligible: Criteria A & B

CD1457

Originally discussed in *Phase I Historic Architecture Survey of the Atlantic Coast Pipeline Project: North Carolina Addendum 2*, CD1457 was recommended by ERM as eligible for inclusion on the NRHP under Criterion C as a design that is unique to the area, and which has had few material changes. In a letter dated December 12, 2016, the North Carolina Department of Natural and Cultural Resources indicated that they did not agree that CD1457 is eligible for listing on the NRHP under Criterion C, because "[t]he description of the house noted that it has poor material integrity with the application of asbestos and composite siding, replacement windows and doors, and additions at the rear elevations." It was further stipulated that in addition to concerns about material integrity based on exterior observations, the resource's interior material integrity would need to be assessed to evaluate Criterion C eligibility. ERM was not

permitted access to the interior of CD1457, therefore, based on SHPO guidance, this resource is not recommended eligible for the NRHP under Criterion C. ERM's research failed to identify any significant events or personages associated with this resource, therefore ERM also recommends CD1457 not eligible for the NRHP under Criteria A and B. For these reasons, ERM now recommends CD1457 ineligible for inclusion on the NRHP.

CD1465

Originally discussed in *Phase I Historic Architecture Survey of the Atlantic Coast Pipeline Project: North Carolina Addendum 3,* CD1465 was recommended by ERM as eligible for inclusion on the NRHP under Criterion C as an outstanding example of antebellum architecture that has been updated to reflect the changing styles around the turn of the twentieth century and a rare surviving example of a Plantation Plain house. In a letter dated February 6, 2017, the North Carolina Department of Natural and Cultural Resources indicated that they did not agree that CD1465 is eligible for listing on the NRHP under Criterion C, because "minus more information on the interiors of the house, we are unable to concur that it is eligible under Criterion C." Based on the historic research carried out for this Project, the historic Jackson Plantation was significant in the local history of the area. The property was first acquired by early settlers in the Cape Fear region, and was a large and prosperous agricultural operation in the antebellum and postbellum periods. The Jacksons and the Yarboroughs who owned the property in the nineteenth and early twentieth centuries were high-profile members of the community. For these reasons, ERM recommended CD1465 as eligible for the NRHP under Criteria A and B. The North Carolina Department of Natural and Cultural Resources agreed with ERM that the Jackson Plantation (CD1465) is eligible for listing on the NRHP under Criteria A and B.

Atlantic would appreciate receipt of a letter acknowledging acceptance of the report by your office. If you have any questions regarding the enclosed documents, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle (Dominion)
Enclosure: Revised NC Historic Property Survey Summaries

North Carolina State Historic Preservation Office

Historic Property Survey Summary

County: **Cumberland**

SSN: **CD1457** Blockface#:

Quad: Autryville
PIN:
X: **Y:**

DOT Project #:
OSA#:

Update Mo: **08** Yr: **2016**

☐No Alt ☐Alt ☐Det ☐Rehab
☐**Removed** ☐Outbldg Loss
☐No Acc. ☐Not Fnd ☐FileMsg
☐Newly ID'd ☐ Needs Resch.

Property Name: **House**

Street or 911 Address: **3593 Stedman- Cedar Creek Road**

Location Description: **S side of SR 2023 0.2 mi E of John Hall Rd**

Town/vicinity: **Cedar Creek vicinity**

District: **None ()**

District Dates: NRdate: SLdate: DOEdate:

Local District:

☐ Recommended for SL ☐ StudyList SLDate: ☐ NR NRDate: NR # **None**
☐ DOE DOEDate:
DOE Type: Local Status: **None** Ownership: **Private**

Principal Resource Material Integrity: **Medium** Condition: **Good** Location Integrity: **Original**

Architectural Data: Date: **ca. 1920** Major Style Group: **Classical Revival**
Construction: **Light Frame**
Ext. Material: **Other - asbestos** Later Covering:
Height: **2 story** Roof: **Hip** Plan Core Form (Domestic): **N/A -Unspecified**
1st Design Source and attribution: **Not specified**

Major Theme **Architecture** 2nd Theme: **Agriculture**
Group Association: Religious Affiliation
Historic Function: **Domestic - single dwelling**

Written Summary

2-story wood frame, hipped roof with asphalt shingles. Main block siding is asbestos shingles. Paired 1/1 aluminum replacement windows with wood surrounds and decorative shutters. Boxed eaves, internal brick chimney, brick pier foundation, with brick infill. Wrap-around porch on N and W with hipped roof supported by squared columns and replacement wood floor. Ceiling appears original. Entry to N through original panel door. Entry to W through replacement door. SW addition enclosed with panel door. Addition wraps to S with hipped roof and has 3-paned window. Small shed addition on S elevation with 1/1 horizontal windows, and wood siding has panel entry door on W.

Outbuildings/Features

FeatureType	Material	CircaDate	Condition	Contrib
Carport	metal			
Prefabricated				
Barn 3	wood			
1.5-story wood-frame 3-bay front gable with standing seam metal roof. Center bay with vertical board, open central pass-through and hay loft. E bay mostly open with horizontal board, W bay enclosed with horisontal board. Rests on brick piers.				
Barn 1	wood			
one story front gable wood frame, covered in vertical board with shed additions to N and S. Standing seam metal roof, sliding door on N shed. Foundation unknown.				

Shed 2 wood

one story wood frame with horizontal board siding, standing seam metal roof, concreate foundation. Central opening to W covered with standing seam metal awning supported by brackets

Shed 1 wood

front gable, wood frame, compositional clapboard siding, asphalt roof, modern entry door

Barn 2 wood 1960

two-story front gable, 3-bay, with center bay enclosed with board and batten. W bay open and supported by poles; E bay open to N with board and batten. Standing seam metal roof. Concrete block foundation.

Actions

Year	Month	Surveyor	Action/Report
2016	08	Laura Voisin George	ERM, Atlantic Coast Pipeline Phase I Arch

North Carolina State Historic Preservation Office

Historic Property Survey Summary

County: **Cumberland**

SSN: **CD1465** Blockface#:

Quad: Cedar Creek
PIN:
X: **Y:**

DOT Project #:
OSA#:

Update Mo: Yr:
☐No Alt ☐Alt ☐Det ☐Rehab
☐**Removed** ☐Outbldg Loss
☐No Acc. ☐Not Fnd ☐FileMsg
☐Newly ID'd ☐Needs Resch.

Property Name: **Midway Farms**

Street or 911 Address: **3923 Yarborough Road**

Location Description: **The house is on Route 96, approximately 86 feet from the road**

Town/vicinity: **Hope Hills**

District: **None ()**

District Dates: NRdate: SLdate: DOEdate:

Local District:

☐ Recommended for SL ☐ StudyList SLDate: ☐ NR NRDate: NR # **None**
☐ DOE DOEDate:
DOE Type: Local Status: **None** Ownership: **Private**

Principal Resource Material Integrity: **High** Condition: **Good** Location Integrity: **Original**

Architectural Data: Date: **1846** Major Style Group: **Queen Anne**
Construction: **Timber Frame**
Ext. Material: **Weatherboard:Plain** Later Covering:
Height: **2 story** Roof: **Side Gable** Plan **Plantation** Core Form (Domestic): **I-House**
1st Design Source and attribution: **Not specified**

Major Theme **Architecture** 2nd Theme: **Social History**
Group Association: Religious Affiliation
Historic Function: **Domestic - single dwelling**

Written Summary

The area surrounding the property is predominately flat with areas of forest and fields. There is a flat grass yard, and directly to the north of the resource is a line of trees dividing the property from an agricultural field directly to its north. There are trees scattered throughout the property, including a cluster close to the dwelling and outbuildings. To the building's south and west are additional agricultural fields. Directly across the street to the east of CD1465 are other residences, which are surrounded by dense tree covering.

Currently known as Midway Farms, CD1465 has a long history in Cumberland County. Johnson (1978:42-43) provides a detailed history of Midway Farms, which is summarized here and supplemented with additional source material as noted. The farm was known historically as the Jackson Plantation and was first acquired by the Jackson family in 1798, when it was purchased by John Jackson. It was transferred to Jesse Jackson in 1804, but was foreclosed on in 1821. In 1823, Alfred and A. G. Jackson, sons of Jesse Jackson purchased the 907 acres located on both sides of Swans Creek (Cumberland County Register of Deeds 1823). A search of census records on Ancestry.com failed to turn up any record of A. G. Jackson in Cumberland County after 1830, and the property apparently passed to Alfred Jackson. One of the Jackson sons apparently constructed the house that still stands on the property about 1846, based on recollections of the Yarborough family, who purchased it in 1896 when it was reported to be 50 years old. It is not known if the house replaced an earlier one, incorporated portions of the original homestead, or was located on a new site, but the Jackson family cemetery nearby indicates that the Jackson family occupied the farm before the existing house was built.

Alfred Jackson appears in the 1850 census of Cumberland County, aged 47 years, living with his wife, Isabella, 50, his son John, 20, and five daughters. His real estate was valued at $5,000, and he owned 15 slaves. In 1860, his real estate was valued at only $4,000, but he also had $16,000 in personal estate,

including 20 slaves. The agricultural schedules for 1850 and 1860 census of Cumberland County are not available, but Alfred Jackson appears in the 1850 manufacturing census of the Western Division of Cumberland County as the owner of a gristmill and sawmill, with a total capital value of $1,200. In the 1860 manufacturing census, A. W. Jackson is recorded in the Eastern Division of the county as the owner of a turpentine distillery and shingle mill, although it is not clear if this is the same person (Ancestry.com 2016). In 1868, Alfred Jackson transferred the property to William McQueen, who resided in Robeson County. The land was sold at auction several times over the next 30 years before being purchased in 1896 by E. C. Blake, J. W. Edge, and F. C. Yarborough. At that time, the estate was referred to as the Jackson Plantation and contained 1,000 acres. The Nathan Williamson Mill was also located on the property. Edge was a native of Cumberland County. Frank Curtis Yarborough and his uncle, E. C. Blake had moved to Cumberland County from Montgomery County in 1891. Yarborough married Romelia Marsh that same year. By 1905, Yarborough had purchased the interest of the other two owners and was the sole owner of the Jackson Plantation and a portion of the 1,000 acre estate. According to Johnson, Frank Yarborough was a progressive and well-organized farmer, and the house was one of the first in the area to have electricity.

Frank Yarborough's son, Wilson, inherited the portion of Jackson Plantation containing the CD1465 after his father's death. In 1948, he sold the property, consisting of approximately 115 acres, to his niece, Dorothy Edge Devore and her husband, Charles A. Devore, for $100 and other good and valuable considerations. Portions of the property have been sold off since that time, and the current acreage is 67 acres. It has been known as Midway Farms under the Devores' ownership. Dorothy Edge Devore Bishop died in 2013 and willed the property to her son Jasper Gregory Devore. In 2014, he conveyed the 67 acres, excluding the primary residence, to Michael and Jillian Riddle, but reserving life estate in the property (Cumberland County Register of Deeds 2014; Cumberland County Tax Assessor 2016).

CD1465 is a two-story Plantation Plain I-house updated with Queen Anne detailing on the original block. It was constructed approximately 1846. There have been various additions to the house including a ca. 1900 one-story shed roof rear addition, ca. 1900 porch updates, a ca. 1940 one-and-a-half-story gable addition, a ca. 1960 one-story gable rear addition, which is attached to the first gable addition, and a ca. 1970s shed-roof addition added to the west elevation of the two gable additions and which extends beyond as a carport supported on two round metal pipes. The façade is dominated by an elaborate two-story porch that was either constructed or remodeled ca. 1900 with Queen Anne-influenced design elements. These changes were probably made around the time that Frank Curtis Yarborough acquired sole ownership of the property in 1905. The porch has plain wood balustrades and decorative jigsawn brackets on both stories. The first story of the porch has plain square wood posts, while the second story has panels with clapboard siding supporting the shed roof. The first story of the porch has a frieze consisting of gallery rails echoing the balustrade. The front-gable pediment above the second story of the porch was likely added at the time of the ca. 1900 porch updates, but was likely updated in the mid twentieth century with aluminum siding and a louvered gable vent. The main façade is five bays wide and faces east. The first story of the façade has a wood panel central door with sidelights and a transom with evenly spaced lights divided by muntins. There are two evenly spaced nine-over-six double-hung vinyl framed windows on each side of the central door. Although the windows on the house are not original, their dimensions appear to match the original openings. The second story copies the spacing of the first story. There is a central door, lacking the surround and transom of the main entrance. There are two six-over-six vinyl windows on each side of the door.

The house has a foundation of brick piers with brick infill. The foundation of the oldest shed-roofed addition on the original west elevation appears to match that of the original block, but the foundation of the later additions is obscured by shrubbery. The original I-house has two large exterior brick chimneys with corbelled details. They are flanked by symmetrically placed windows—two nine-over-six double-hung vinyl on the first floor and two six-over-six vinyl windows. The roof is composed of compositional asphalt and the walls are clad in clapboard. The oldest one-story shed-roof addition contains two squat six-over-six windows, which are paired on the south side. The north side of the house was not accessible. The rear gable additions displaying different roof heights are covered in compositional asphalt shingles. The more recent shed-roof addition has walls clad in aluminum siding and two pairs of six-over-six double-hung vinyl windows directly to the west of a secondary entrance. This side entrance has a small single-bay wide porch with two wood steps with wood hand rails on both side leading up to the wood porch deck, where square wood posts support a shed roof that is an extension of the roofline. The last portion of the roof over this

addition, and the westernmost portion of the house is a single-story carport supported by two cylindrical metal poles, covering a poured concrete parking pad.

Outbuildings/Features

FeatureType	Material	CircaDate	Condition	Contrib

Silo

To the west of the sheds are two silos of different sizes. These two structures are both cylindical with corrugated metal siding and conical metal roofs.

Shed Frame Fair

The northwesternmost outbuilding is a shed with a side-facing gable roof that is covered in brown asphalt shingles. The building is two bays wide and a single bay deep. The shed faces southeast and has two open bays. The shed is of wood-frame construction with corrugated metal siding. A cirular pole supports the roof at each corner and then again in the center of the open side. There are knee braces that start at the center height of each post to aid in the support of the roof. The shed is in fair conditin.

Shed Fair

The second shed to the northwest of the main house is a few feet south of the open shed. This structure is a single story, roughly five feet high with a front facing gable asphalt shingle roof. The shed has a continuous poured concrete foundation. The siding is wide horizontal clapboard siding. It is a single bay wide with a central door constructed of vertical boards. The building is in fair condition.

Shed

Further west and southwest of the previous shed is a larger shed. The shed stands approximately six feet high with a front-facing gable roof that is clad in asphalt shingles. The foundation is poured concrete and its walls are T1-11 siding. The entrance is centered on the northeast side.

Shed

To the southwest of CD1465 is a three-bay shed which is much larger than the previous two on the property. This shed has a front-facing gable roof with asphalt shingles. The shed is wood framed with two bays being open and the northern one enclosed with clapboard siding. There is a double door centered on the enclosed bay. The central bay has two swing gates that do not extend to the roof beam. The gates feature wood siding that is spaced with a few inches between each board, as well as X-brace boards behind them. The third bay only has corral fencing on the east elevation, and is entirely open on the southern elevation.

Actions

Year	Month	Surveyor	Action/Report
2017	02	Derrick, Mary Beth	ERM, ACP Phase I Architectural Survey

Dominion Resources Services, Inc.
5000 Dominion Boulevard.
Glen Allen, VA 23060

April 26, 2017

Renee Gledhill-Earley
State Historic Preservation Office
109 East Jones Street, Room 258
Raleigh, NC 27601

Subject: **Section 106 Review –Phase II Investigations Sites 31CD2020, 31CD2094, 31CD2100, 31CD2106, 31CD2107, 31CD2122, 31JT483, and 31JT484**
Atlantic Coast Pipeline, LLC, Atlantic Coast Pipeline Project
File No. Multi-County ER 14-1475

Dear Ms. Gledhill-Earley:

Atlantic Coast Pipeline, LLC (Atlantic) is requesting review and comment on the enclosed Phase II report on investigations conducted for the proposed Atlantic Coast Pipeline (ACP) from August 2016 through November 2016. The Federal Energy Regulatory Commission (FERC) is the lead Federal agency for this Project. Atlantic's consultant, ERM, conducted the survey and prepared the enclosed report pursuant to the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended.

Atlantic would appreciate your comments on the attached Phase II testing report, and we look forward to continuing to work with you on this Project. If you have any questions regarding the enclosed report, please contact Richard B. Gangle at (804) 273-2814 or Richard.B.Gangle@dom.com, or by letter at:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Respectfully submitted,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

cc: Richard Gangle (Dominion)
Enclosure: **Phase II Investigations Sites 31CD2020, 31CD2094, 31CD2100, 31CD2106, 31CD2107, 31CD2122, 31JT483, and 31JT484**

North Carolina Wildlife Resources Commission

Dominion Resources Services, Inc.
5000 Dominion Boulevard,
Glen Allen, VA 23060

April 12, 2017

BY EMAIL

Gabriela Garrison
NC Wildlife Resources Commission
Sandhills Depot, P.O. Box 149
Hoffman, NC 28347

Re: Dominion Transmission, Inc., Atlantic Coast Pipeline
North Carolina Rookeries

Dear Ms. Garrison,

Pedestrian surveys were conducted on February, 7, 8, and 9, 2017 along the Project area in West Virginia, Virginia, and North Carolina to investigate bird activity at rookeries identified either during prior aerial survey, or from available databases. These pedestrian surveys were completed to evaluate the overall site conditions of the rookeries. In North Carolina, the buffers of ten rookeries were identified as overlapping with construction workspace. Attached is a memo containing proposed conservation measures for the ten rookeries of concern, and figures displaying rookery locations and time of year restriction buffers. This information was included in the Migratory Bird Plan filed with FERC on January 27, 2017.

Project and Company Background

Atlantic is a company formed by four major U.S. energy companies – Dominion Resources, Inc., Duke Energy Corporation, Piedmont Natural Gas Co., Inc., and Southern Gas Company. Atlantic will own and operate the proposed ACP, an approximately 600-mile-long, interstate natural gas transmission pipeline system designed to meet growing energy needs in Virginia and North Carolina. The ACP will deliver up to 1.5 billion cubic feet per day (bcf/d) of natural gas to be used to generate electricity, heat homes, and run local businesses. The underground pipeline project will facilitate cleaner air, increase reliability and security of natural gas supplies, and provide a significant economic boost in Virginia and North Carolina.

Atlantic has contracted with DTI, a subsidiary of Dominion, to permit, build, and operate the ACP on behalf of Atlantic. The ACP will be regulated by the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act. The ACP is subject to review by FERC under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act, as well as other environmental and natural resource laws.

Atlantic requests your concurrence on the proposed conservation measures for rookeries in North Carolina. Please contact Mr. Richard B. Gangle at (804) 273-2814 or

Richard.B.Gangle@dom.com, if there are questions regarding this information. Please direct written responses to:

Richard B. Gangle
Dominion Resources Services, Inc.
5000 Dominion Boulevard
Glen Allen, Virginia 23060

Sincerely,

Robert M. Bisha
Technical Advisor, Atlantic Coast Pipeline

Cc: John Ellis, U.S Fish and Wildlife Service Raleigh Field Office

Attachments:

ACP North Carolina Rookery Review Memo

Colonial Wading Bird Rookeries
Atlantic Coast Pipeline Project, North Carolina

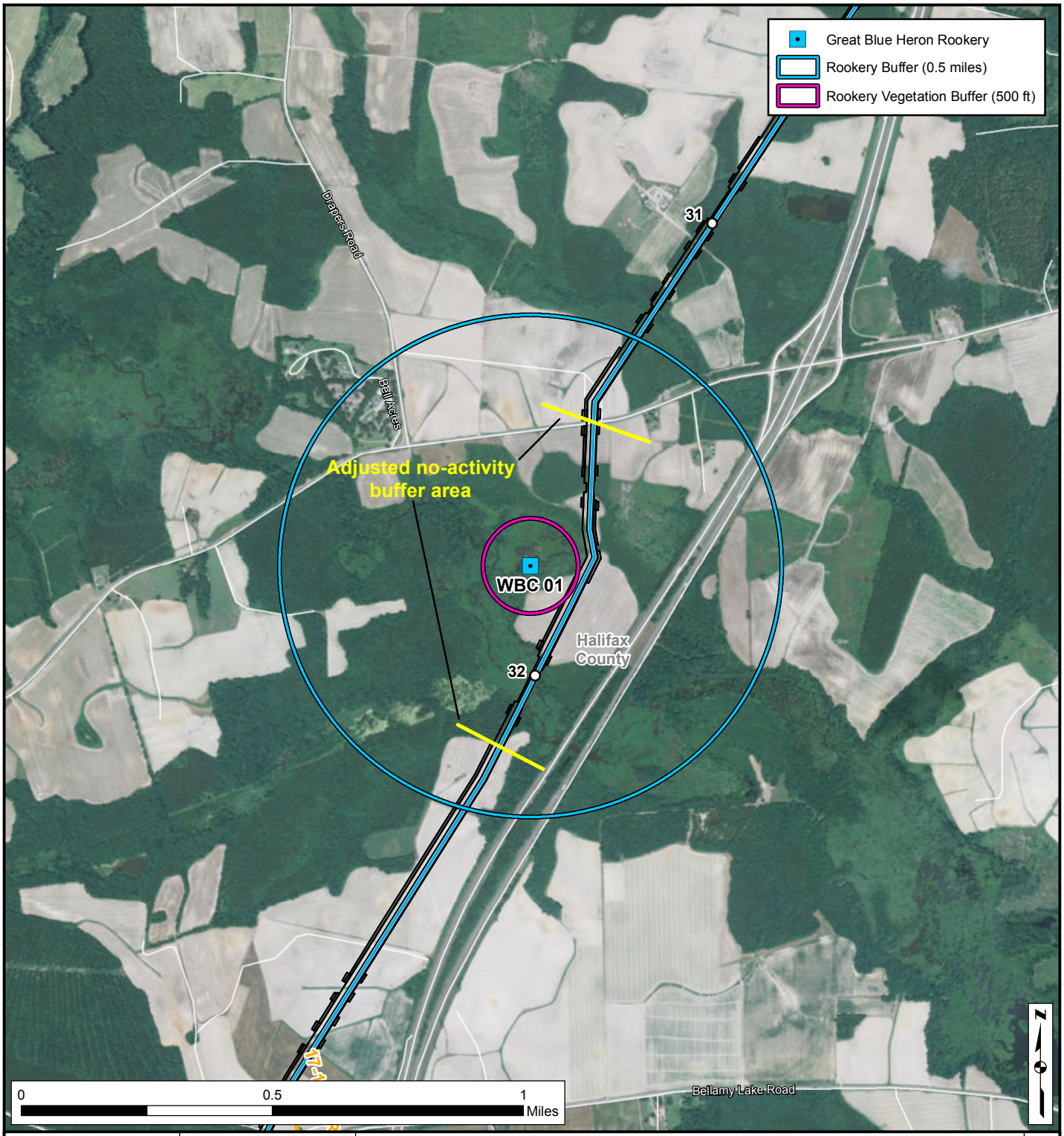
Rookery ID	County, State	Project Segment, near MP	Survey Notes [a]	Proposed Conservation Measures
WBC 01	Halifax County, NC	AP-2, 31.8	Rookery was not directly accessible; however, rookery was observed from I-95 in general location as originally indicated. Rookery was active at time of visit, Feb. 7, 2017, with multiple birds seen.	Vegetation clearing restriction area overlaps workspace; however it overlaps in an agricultural field. Workspace does not impact vegetation rookery is located in; reducing workspace footprint does not minimize vegetation clearing at rookery. Time of year restriction buffer would not be necessary north of highway 481 due to existing highway corridor, and recommend allowing construction activities in agricultural area at southern end of restriction buffer (north of project milepost 31.45 and south of project milepost 32.15 construction activities would be allowed). Due to the existing human infrastructure: highway 481 and Interstate 95, and agricultural activities adjacent to the rookery, it is expected that these birds may be accustomed to human disturbance. If possible, construction will begin within the buffer prior to birds returning to the rookery (assumed February); if the birds return while construction activities are occurring, they are not expected to be disturbed and activities will continue as planned. If construction activities do not begin prior to birds returning to the rookery, the time of year restriction (no activity from Feb. 15 through July 31, when rookery is actively used) will be adhered to between the highway and agricultural fields to the south (between project mileposts 31.45 and 32.15).

Rookery ID	County, State	Project Segment, near MP	Survey Notes [a]	Proposed Conservation Measures
WBC 02	Nash County, NC	AP-2, 48.0	Several nests observed, but not active at time of visit, Feb. 7, 2017. No birds were observed at the site. Crews spoke with landowner who indicated that the herons have had mixed success at the site and that one of the nest trees (a snag pine) had fallen down in the last two years. Updated location point collected.	Vegetation clearing restriction area does not overlap workspace; no change to workspace needed. Time of year restriction buffer would not be necessary south of Reges Store Road (project milepost 48.38), due to the traffic and housing developments in the area. If possible, construction will begin within the buffer prior to birds returning to the rookery (assumed February); if the birds return while construction activities are occurring, they are not expected to be disturbed and activities will continue as planned. If construction activities do not begin prior to birds returning to the rookery, the time of year restriction (no activity from Feb. 15 through July 31, when rookery is actively used) will be adhered to north of Reges Store to the northern boundary of the buffer near project milepost 47.5.
WBC 04	Nash County, NC	AP-2, 55.8	Single nest observed in open water; it was not active at time of survey, Feb. 7, 2017, but wading birds were heard in the area. Updated location point collected.	Vegetation clearing restriction area does not overlap workspace. Due to existing human disturbance and agricultural areas, time of year restrictions are not necessary between project mileposts 55.35 and 55.70. If possible, construction will begin within the buffer prior to birds returning to the rookery (assumed February); if the birds return while construction activities are occurring, they are not expected to be disturbed and activities will continue as planned. If construction activities do not begin prior to birds returning to the rookery, the time of year restriction (no activity from Feb. 15 through July 31, when rookery is actively used) will be adhered to between project mileposts 55.70 and 56.20.
WBC 05	Nash County, NC	AP-2, 62.6	No access, rookery not visible from public land or adjacent approved tracts.	Due to the distance of the rookery to the right-of-way (0.4 mile), thick vegetation between the rookery and right-of-way, and agricultural area in the workspace where the time of year restriction would apply, the time of year restriction is not proposed.

Rookery ID	County, State	Project Segment, near MP	Survey Notes [a]	Proposed Conservation Measures
WBC 09	Johnston County, NC	AP-2, 106.6	Several nests observed, bird activity was noted at time of survey, Feb. 7, 2017; only one great blue heron seen at rookery at time of survey. Nests were small, indicating could potentially be used by smaller herons such as night herons. Updated location point collected.	Workspace falls within 500-foot vegetation clearing restriction. Portion of vegetation clearing restriction area is in area previously cleared; therefore vegetation clearing restriction would not apply in this area. There would be impacts to a portion of the vegetation within 500 feet of the rookery. The current route avoids inundated wetlands to the east and west which would cause a constructability issue if the route were shifted outside of the buffer. In addition, if the route were shifted, there would be more impacts on wetland resources. If possible, construction will begin within the buffer prior to birds returning to the rookery (assumed February); if the birds return while construction activities are occurring, they are not expected to be disturbed and activities will continue as planned. If construction activities do not begin prior to birds returning to the rookery, the time of year restriction (no activity from Feb. 15 through July 31, when rookery is actively used) will be adhered to.
WBC 12	Cumberland County, NC	AP-2, 123.5	Rookery was active at time of visit, Feb. 7, 2017. Rookery is in swampy wetland habitat, which is impassable on foot or 4x4. Location did not require adjustment.	Vegetation clearing restriction area does not overlap workspace; no change to workspace needed. If possible, construction will begin within the buffer prior to birds returning to the rookery (assumed February); if the birds return while construction activities are occurring, they are not expected to be disturbed and activities will continue as planned. If construction activities do not begin prior to birds returning to the rookery, the time of year restriction (no activity from Feb. 15 through July 31, when rookery is actively used) will be adhered to.

[a] ERM biologists conducted pedestrian surveys on February 7, 8, and 9, 2017 at rookeries along the project in West Virginia, Virginia, and North Carolina to investigate bird activity at rookeries identified either during aerial survey or from available databases, to evaluate the overall site conditions at the rookery.

Proposed Measures in Migratory Bird Plan, For agency concurrence			
Rookery ID	**County, State**	**Project Segment, near MP**	**Site Description**
WBC 07	Wilson County, NC	AP-2, 70.5	Public road and houses are between right-of-way and rookery (0.17 and 0.12 mile, respectively), within 0.5 mile restriction area. Due to other human activities between right-of-way and rookery, no restrictions on activities are recommended.
WBC 08	Wilson County, NC	AP-2, 74.2	Edge of restriction buffer reaches project access road; road is an existing public road. No restrictions are recommended.
WBC 11	Sampson County, NC	AP-2, 117.2	Workspace falls at edge of 0.5 mile buffer; significant vegetation lies between workspace and rookery. Recommend no restrictions due to distance from rookery.
WBC 15	Cumberland County, NC	AP-2, 124.5	Interstate 95 is between right-of-way and rookery, within 0.5 mile restriction area. Due to other human activities between right-of-way and rookery, no restrictions on activities are recommended.



Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Rookeries	0.5 mile	NC: Feb. 15 - July 31	
Rookeries	500 feet	All year, no vegetation clearing	
Non-raptor migratory birds	Vegetation clearing	NC: Apr. 1 - Aug. 30	

Atlantic Coast Pipeline
Dominion

Milepost
AP-2
Access Road
Construction Impact Footprint

Atlantic Coast Pipeline Project
Known Migratory Bird Nesting Sites
Halifax County, North Carolina

ERM

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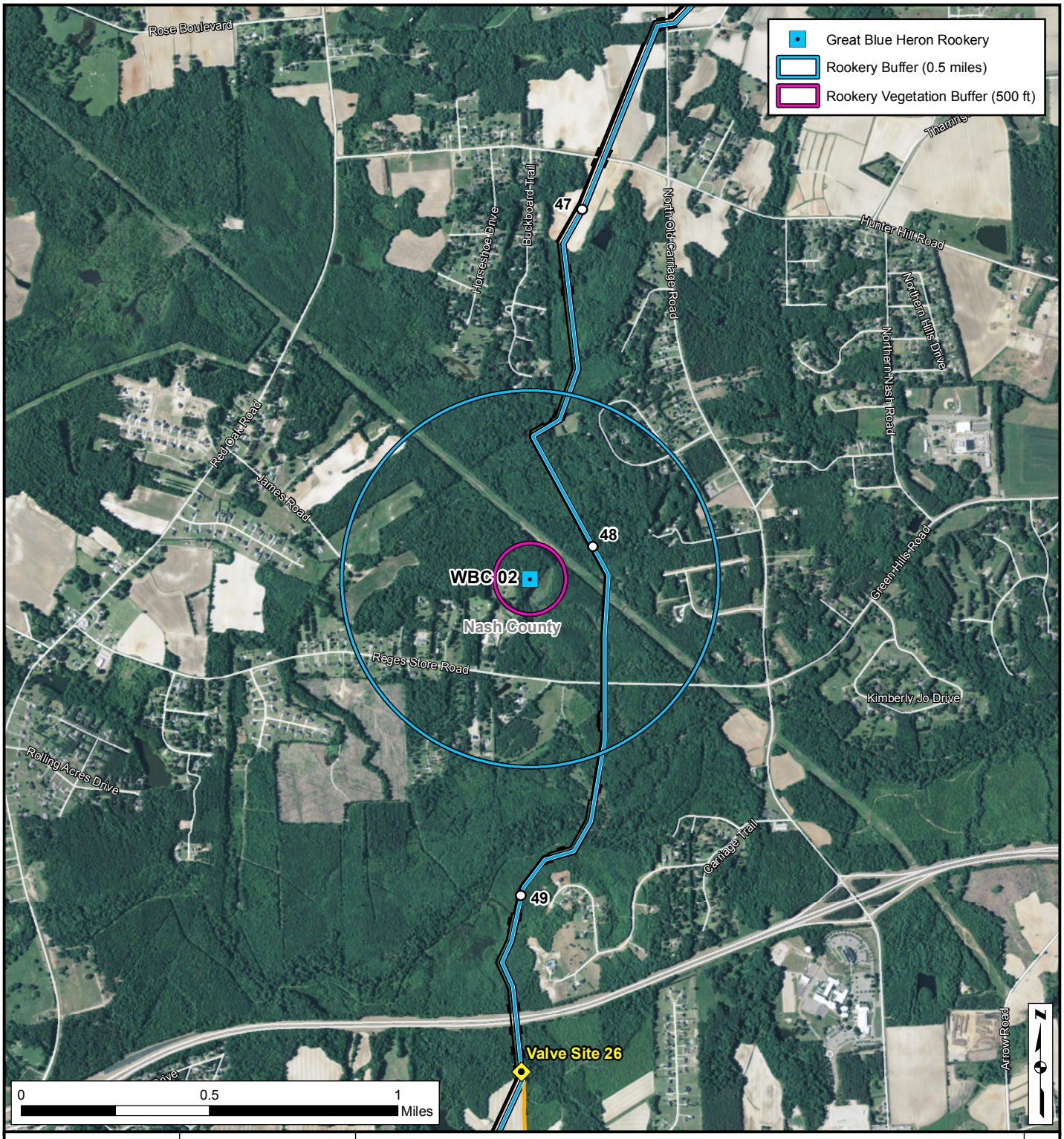
**** Times are approximate, and dependent on actual bird activity at nest or rookery.***



Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Rookeries	0.5 mile	NC: Feb. 15 - July 31	
Rookeries	500 feet	All year, no vegetation clearing	
Non-raptor migratory birds	Vegetation clearing	NC: Apr. 1 - Aug. 30	

Atlantic Coast Pipeline

Dominion

- Milepost
- AP-2
- Valve Site
- Access Road
- Construction Impact Footprint

Atlantic Coast Pipeline Project

Known Migratory Bird Nesting Sites

Nash County, North Carolina

ERM

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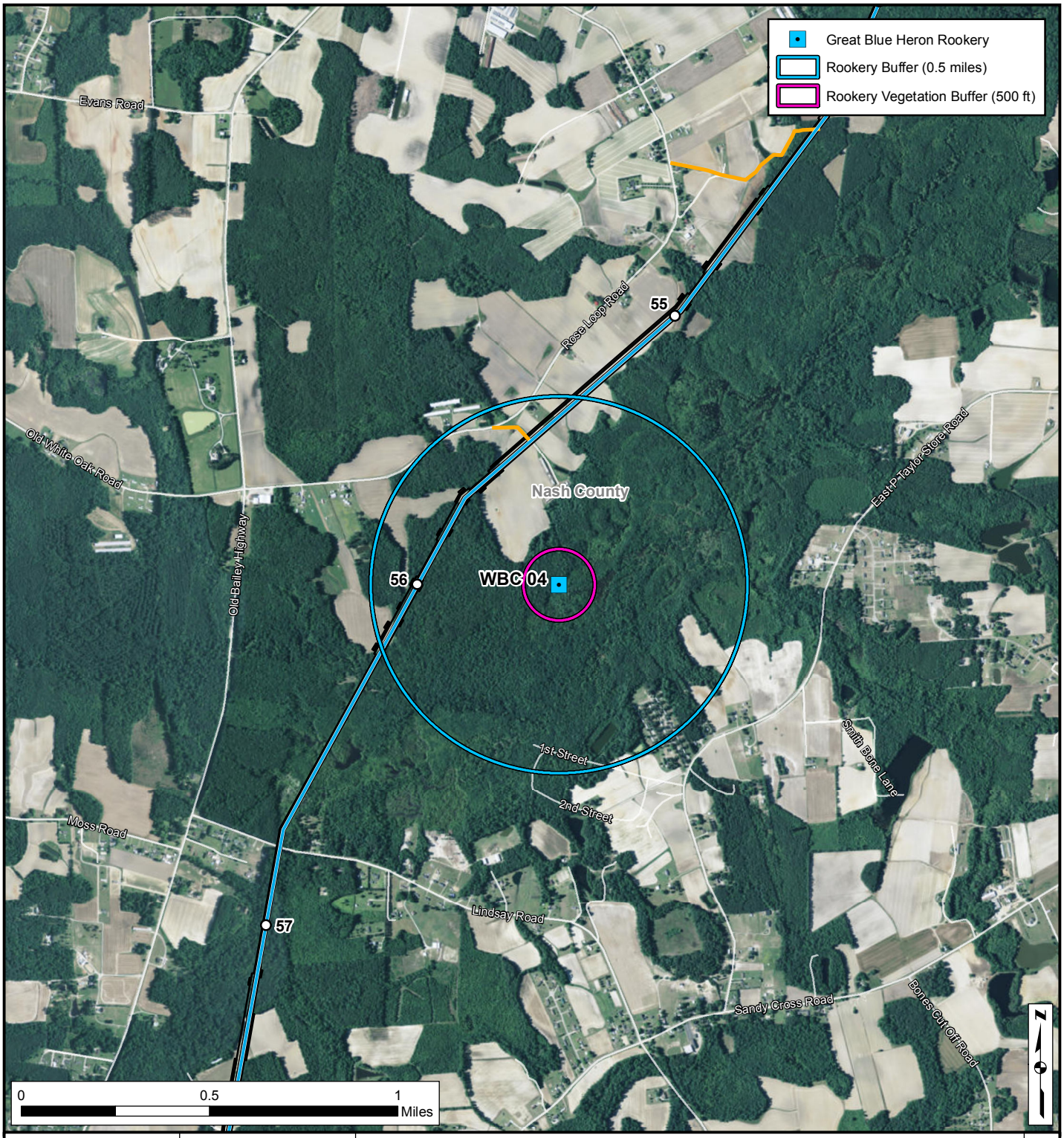

Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Rookeries	0.5 mile	NC: Feb. 15 - July 31	
Rookeries	500 feet	All year, no vegetation clearing	
Non-raptor migratory birds	Vegetation clearing	NC: Apr. 1 - Aug. 30	

Atlantic Coast Pipeline

Dominion

Milepost
AP-2
Access Road
Construction Impact Footprint

Atlantic Coast Pipeline Project
Known Migratory Bird Nesting Sites
Nash County, North Carolina

ERM

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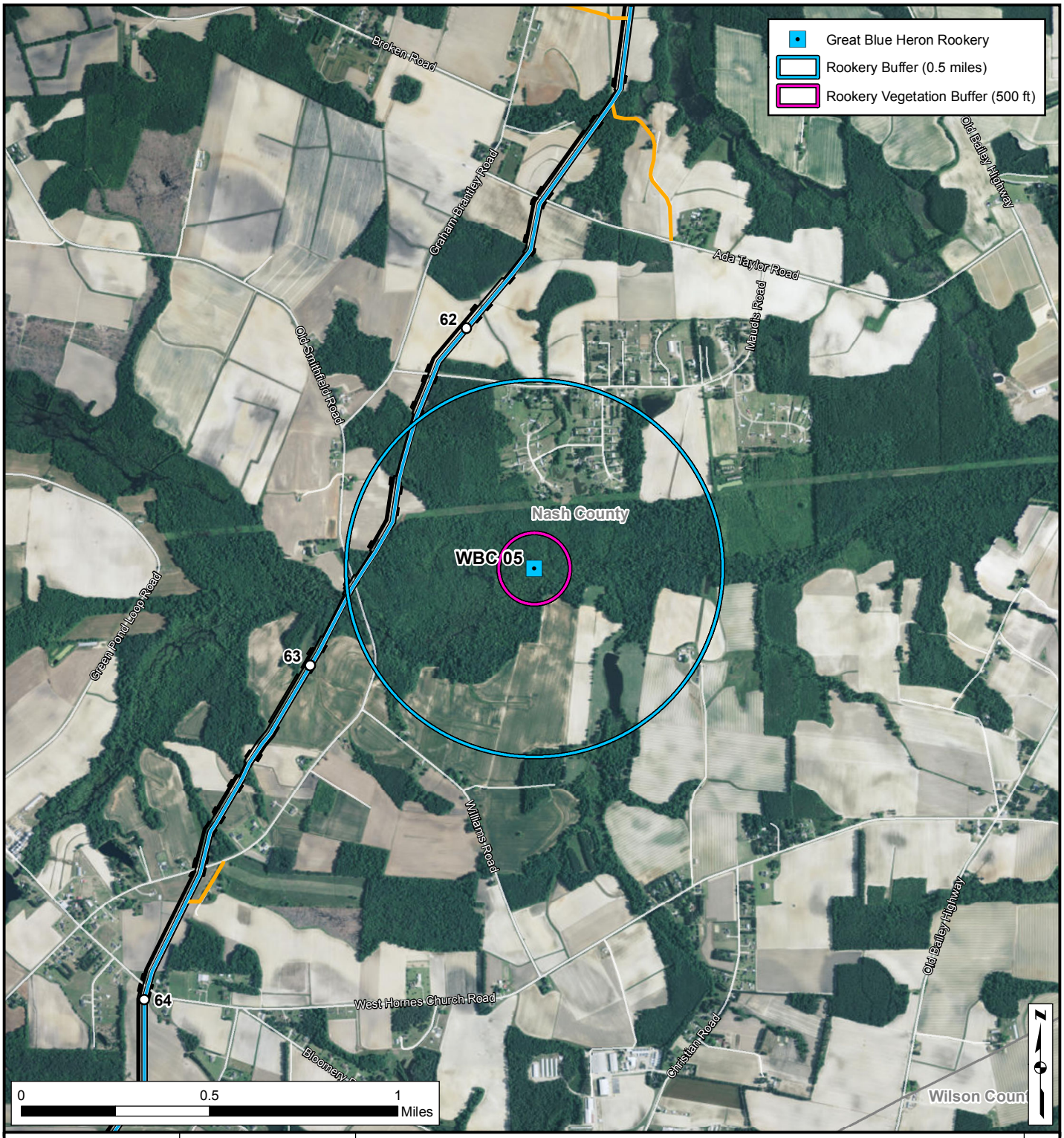

Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Rookeries	0.5 mile	NC: Feb. 15 - July 31	
Rookeries	500 feet	All year, no vegetation clearing	
Non-raptor migratory birds	Vegetation clearing	NC: Apr. 1 - Aug. 30	

Atlantic Coast Pipeline

Dominion

- Milepost
- AP-2
- Valve Site
- Access Road
- Construction Impact Footprint

Atlantic Coast Pipeline Project

Known Migratory Bird Nesting Sites

Nash County, North Carolina

ERM

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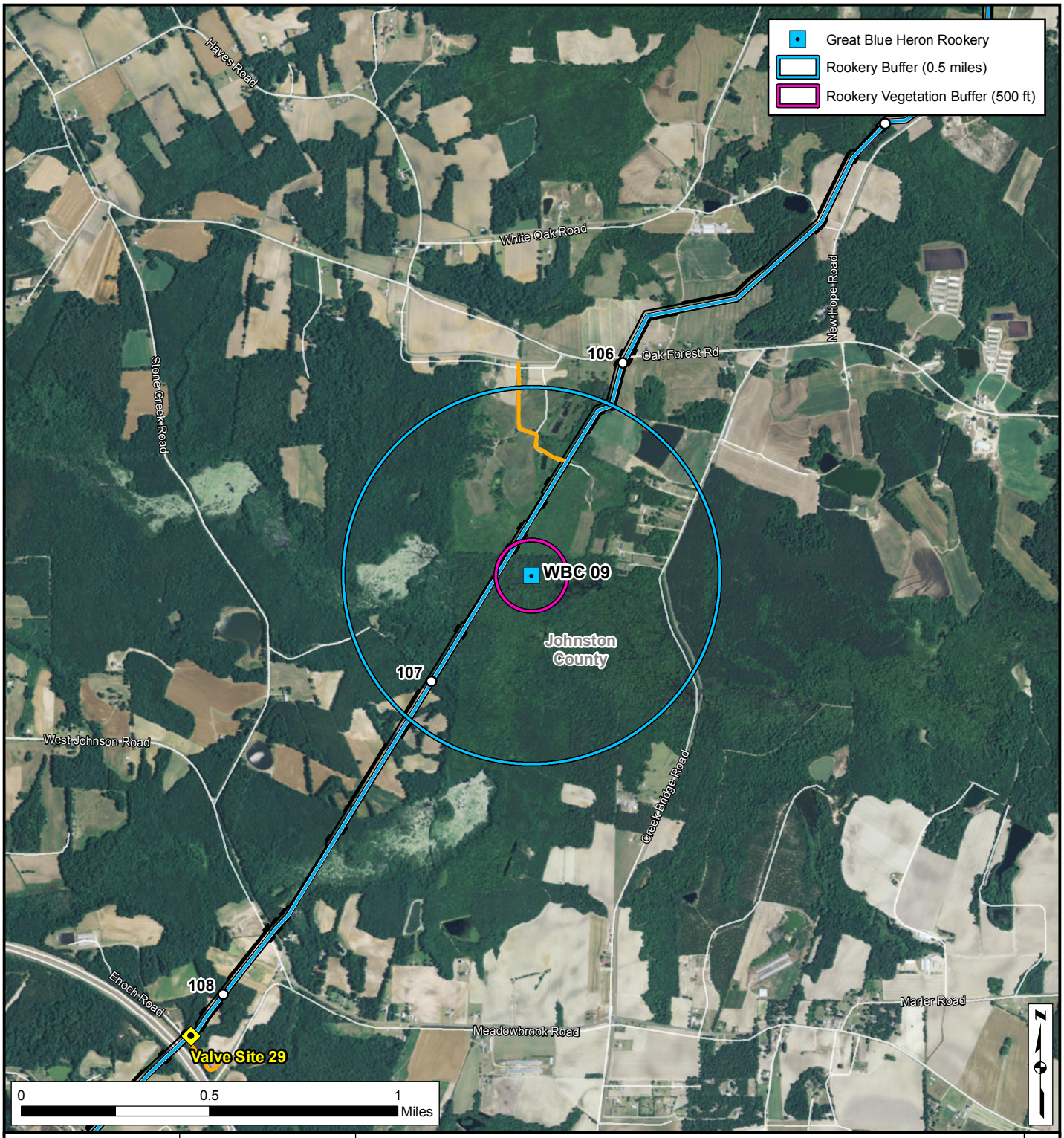

Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Rookeries	0.5 mile	NC: Feb. 15 - July 31	
Rookeries	500 feet	All year, no vegetation clearing	
Non-raptor migratory birds	Vegetation clearing	NC: Apr. 1 - Aug. 30	

Atlantic Coast Pipeline

Dominion

- Milepost
- AP-2
- Valve Site
- Access Road
- Construction Impact Footprint

Atlantic Coast Pipeline Project

Known Migratory Bird Nesting Sites

Johnston County, North Carolina

ERM

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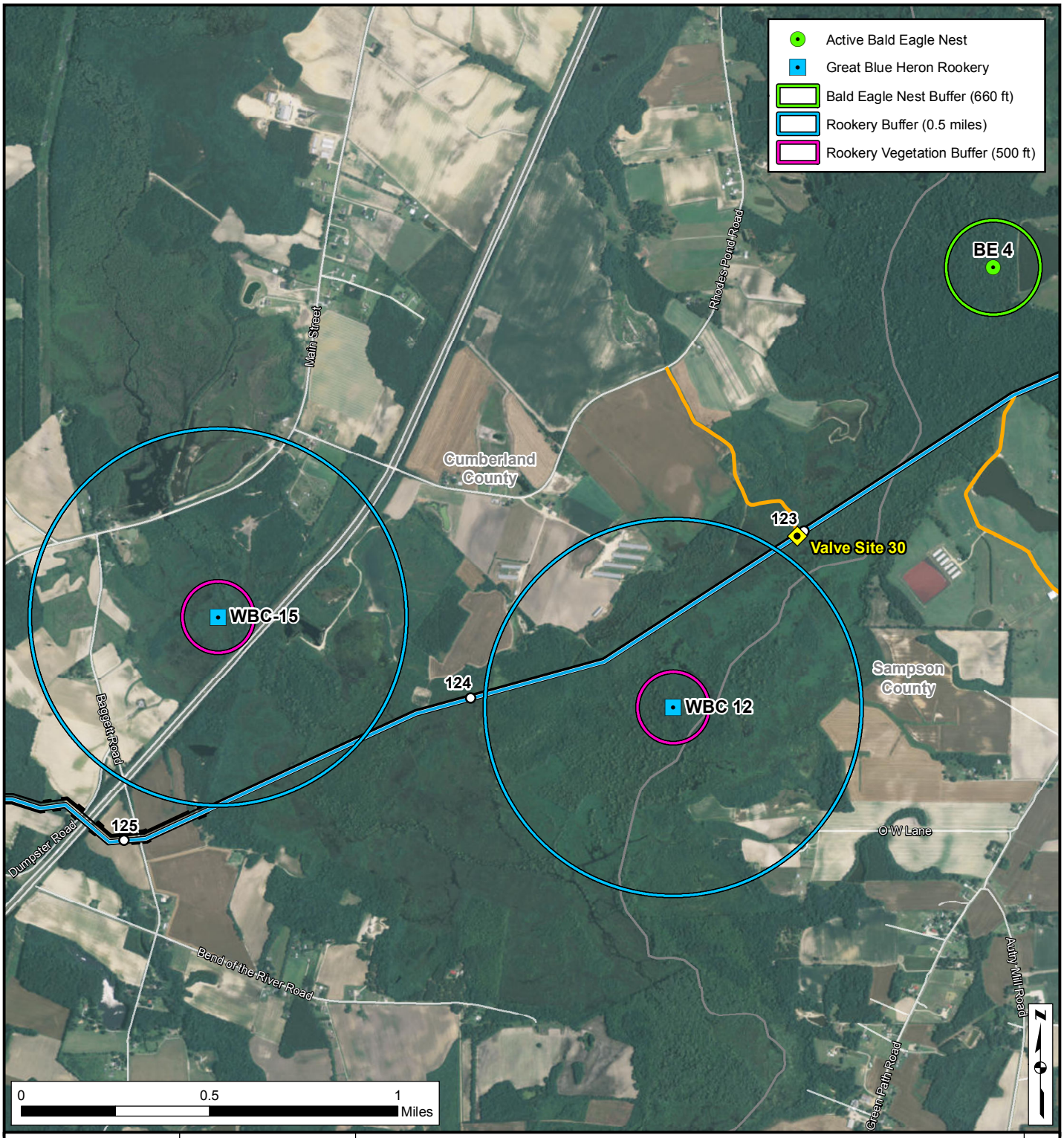

Bird Resource	Restriction Distance	Time of Year Restriction (no activity)*	
Bald Eagle Nests	660 feet	Nov. 15 - July 15	
Rookeries	0.5 mile	NC: Feb. 15 - July 31	
Rookeries	500 feet	All year, no vegetation clearing	
Non-raptor migratory birds	Vegetation clearing	NC: Apr. 1 - Aug. 30	

Atlantic Coast Pipeline

Dominion

- Milepost
- AP-2
- Valve Site
- Access Road
- Construction Impact Footprint

Atlantic Coast Pipeline Project

Known Migratory Bird Nesting Sites

Cumberland County, North Carolina

ERM

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**** Times are approximate, and dependent on actual bird activity at nest or rookery.***