

# Blue Ridge Parkway

National Park Service  
U.S. Department of the Interior

Blue Ridge Parkway  
North Carolina, Virginia



**Blue Ridge Parkway  
Proposed Right-of-Way (ROW) Permit  
for  
Dominion T2 Natural Gas Pipeline Crossing  
Buncombe County, North Carolina  
  
Draft Environmental Assessment (EA)  
January 2022**

## *Executive Summary*

The applicant, Dominion Energy North Carolina, has constructed approximately 11 miles of 12-inch diameter steel natural gas pipeline beginning at Duke Energy's Asheville Energy Plant located in Arden, North Carolina, ending near the intersection of US Highway 23 and NC Highway 112 in Enka Village, North Carolina. Based on the alignment, the applicant has submitted an application for a right-of-way (ROW) permit for construction, operation, and maintenance of the last unconstructed segment of pipeline that would cross entirely beneath the Blue Ridge Parkway (Parkway), a unit of the National Park System. This crossing would be the last of seven horizontal directional drills (HDDs) for the project including three crossings of the French Broad River and one crossing of Interstate 26.

The segment is part of a new natural gas pipeline that would enable DENC to derate (reduce pressure) on an aging segment of its existing pipeline network so that it can be repurposed from transmission service to lower pressure distribution service and would increase the reliability of natural gas service to DENC's area customer base. The older segment of pipeline to be derated is currently located within the shoulder of heavily-trafficked, geologically/topographically challenged and otherwise developed portions of the North Carolina Department of Transportation (NCDOT) ROW adjacent to Brevard Road.

To the extent practicable, the new pipeline was routed through areas that are less proximate to concentrated development. The pipeline was constructed within a new 50-foot-wide ROW. Additional temporary workspace (TWS), typically 25 feet wide, was required adjacent to above-ground portions of the ROW. A majority of the new pipe was installed by conventional trench excavation and buried with a minimum depth of four feet of cover. The pipe was installed beneath the French Broad River and numerous other waterbodies by HDD. Temporary impacts to other aquatic resources along the route have been similarly avoided or otherwise minimized.

During internal scoping and applicant research, there were five alternatives for the proposed project, including a "No Action" alternative and four crossings of the Parkway discussed; four alternatives were considered but dismissed after internal scoping and these are described in Section 4.2. The No Action alternative was determined to be not practical, because it could result in a loss of natural gas service to existing customers, which would impact the adjacent community. One of the crossing alternatives would not be allowed within a NCDOT Interstate ROW by NCDOT. due to public safety concerns. Two of the crossing alternatives created more potential impacts to the Parkway than the proposed action. Based on the analysis documented in this Environmental Assessment (EA), the preferred alternative for the proposed pipeline includes the National Park Service (NPS) issuing a ROW permit for construction, operation, and maintenance of approximately 760 feet of the new pipeline to be installed beneath NPS property by HDD with entry and exit points on private lands adjacent to the NPS property.

The remaining HDD crossing of NPS land would be conducted perpendicular to the Parkway, adjacent to an existing 143-foot-wide Duke Energy Electric transmission line cleared ROW that

crosses NPS land. For the purpose of this document, Parkway refers to the motor road, Mountains to Sea Trail, and the associated land owned by NPS in the vicinity of the proposed pipeline ROW. The pipe would be located no less than 50 feet below the ground surface of the Parkway property, and at the location of the Parkway motor road surface itself, the pipe would be located approximately 115 feet below the surface. The HDD entry and exit points would be located more than 800 feet from the Parkway travel lane and 380 feet from the NPS property boundary, and no additional appurtenances or facilities are proposed for construction on NPS property. No grading, land clearing, tree removal or other land disturbances within the proposed ROW on the Parkway property are proposed.

Equipment access to private property on the north side of the Parkway would be provided by an existing deeded private access road that passes beneath the French Broad River Bridge on NPS property. The access road at this location is situated in high ground and is well-maintained. The road is used regularly by the deed reserved owners of the private property for access to their property, and by Duke Energy for maintenance activities associated with the portion of their utility ROW north of the Parkway adjacent to the proposed Dominion ROW.

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Project Blue Ridge Parkway HDD Crossing Asheville, North Carolina S&ME Project No. 7435-18-003

### **Acronyms**

CEQ – Council on Environmental Quality

DENC – Dominion Energy North Carolina

DOT- Department of Transportation

EA – Environmental Assessment

EPA – Environmental Protection Agency

FEMA – Federal Emergency Management Agency

FONSI – Finding of No Significant Impact

HDD – Horizontal Directional Drill

IPaC – Information, Planning, and Conservation Decision Support System

NCDEACS - Department of Environmental Assistance and Customer Service

NCDEMLR - Department of Energy, Mineral, and Land Resources

NCDENR - North Carolina Department of Environment and Natural Resources NCDEQ – North Carolina Department of Environmental Quality

NCDOT – North Carolina Department of Transportation

NCDNCR – North Carolina Department of Natural and Cultural Resources

NCNHP - North Carolina Natural Heritage Program

NCWRC - NC Water Resources Commission

NEPA – National Environmental Policy Act

NHPA – National Historic Preservation Act

NPS – National Park Service

NRCS – Natural Resources Conservation Service

NRHP – National Register of Historic Places

Parkway – Blue Ridge Parkway, including road, trail and NPS property

PHMSA - Pipeline and Hazardous Materials Safety Administration

ROW – Right of Way  
SHPO – State Historic Preservation Office  
SI - Secretary of the Interior  
USACE – US Army Corps of Engineers  
USFWS – U.S. Fish and Wildlife Service  
T&E – Threatened and Endangered

## ***1.0 Purpose of and Need for Action***

Dominion Energy North Carolina has recently constructed approximately 11 miles of 12-inch diameter steel natural gas pipeline. The new pipeline begins at Duke Energy's Asheville Energy Plant located in Arden, North Carolina and ends near the intersection of US Highway 23 and NC Highway 112 in Enka Village, North Carolina. The last remaining unconstructed element of the pipeline would cross beneath the Blue Ridge Parkway via horizontal directional drill (HDD).

The new natural gas pipeline has two primary purposes, to enable DENC to derate (reduce pressure) an aging segment of its existing pipeline network such that it can be repurposed from transmission service to lower pressure distribution service, and to increase the reliability of natural gas service to DENC's area customer base. The older segment of pipeline to be derated is currently located within the shoulder of heavily-trafficked, geologically/topographically challenged and otherwise developed portions of the North Carolina Department of Transportation (NCDOT) right-of-way (ROW) adjacent to Brevard Road.

To the extent practicable, the new pipeline has been routed through areas that are less proximate to concentrated development. The new pipeline is located within a new 50-foot-wide ROW. Additional temporary workspace (TWS), typically 25 feet wide, was required adjacent to above-ground portions of the ROW. A majority of the new pipe was installed by conventional trench excavation and buried with a minimum depth of four feet of cover. The pipe was installed beneath the French Broad River and numerous other waterbodies by HDD. Temporary impacts to other aquatic resources along the route have been similarly avoided or otherwise minimized.

The proposed NPS action that is the subject of this Environmental Assessment (EA) is the potential issuance of a ROW permit for construction, operation, and maintenance of the HDD pipeline at Parkway Milepost 393.3. The project area for this Environmental Assessment (EA) has been defined broadly to include not just the underground Parkway crossing itself, but also potential impacts related to the entry and exit boreholes for the drilling (located on private land), as well as potential impacts from the workspace needed to complete the drilling and install the pipeline (also located on private land). The private, deed reserved access road across NPS property is also within the project area. For viewsheds and visitor use and experience, the project area has been further expanded to encompass visual and noise impacts associated with the project. For the purpose of this EA, Parkway refers to the road, Mountains to Sea Trail, and the associated land owned by the National Park Service (NPS) in the vicinity of the proposed pipeline ROW.

## ***2.0 Purpose and Significance of the Blue Ridge Parkway***

The legislated purpose of the Parkway, under the Act of June 30, 1936, is to link Shenandoah National Park in Virginia and Great Smoky Mountains National Park in North Carolina and Tennessee by way of a recreation-oriented motor road intended for public use and enjoyment. The Parkway extends 469 miles through the Blue Ridge, Black, Great Craggy, Great Balsam,

and Plot Balsam Mountains. The Parkway is known for spectacular mountains and valley vistas, quiet pastoral scenes, sparkling waterfalls, colorful flowers and foliage displays, and interpretation of mountain history and culture. The Parkway's location was selected to provide the best in a variety of scenic, historic, and natural features that evoke the regional image of the central and southern Appalachian Mountains. Designed for driving, the Parkway provides visitors with quiet, leisure travel, free from commercial traffic and the congestion of high-speed highways. As its All-American Road status in North Carolina and Virginia State Scenic Byway status indicate, it is one of the most diverse and high-quality recreational driving experiences in the world. To maximize scenic views and give visitors the impression that they are in a park with boundaries to the horizon, the Parkway was located in mountainous terrain that roads would normally have avoided.

The Blue Ridge Parkway purposes, described in the NPS's Final General Management Plan/Environmental Impact Statement for the Parkway (2013), are to "connect national parks by way of a 'national rural parkway'—a destination and recreational road that passes through a variety of scenic ridge, mountainside, and pastoral farm landscapes"; "conserve the scenery and preserve the natural and cultural resources of the parkway's designed and natural areas"; "provide for public enjoyment and understanding of the natural resources and cultural heritage of the central and southern Appalachian Mountains"; and "provide opportunities for high-quality scenic and recreational experiences along the parkway and in the corridor through which it passes."

## **2.1 Blue Ridge Parkway - Authority to issue ROW permits**

The Blue Ridge Parkway has park-specific legislative authority to issue ROWs. According to the United States Code (USC) (1994 Edition, Title 16 – Conservation), in the administration of the Parkway, the Secretary of the Interior may issue revocable licenses or permits for ROW over, across, and upon parkway lands, or for the use of parkway lands by the owners or lessees of adjacent lands, for such purposes and under such nondiscriminatory terms, regulations, and conditions as the Secretary of the Interior may determine to be not inconsistent with the use of such lands for parkway purposes (16 U.S.C Section 460a-3).

## **2.2 Scoping History**

The Council on Environmental Quality (CEQ 2020) implementing regulations for the National Environmental Policy Act (NEPA) and the NPS NEPA guidelines contained in Director's Order # 12: Conservation Planning, Environmental Impact Analysis and Decision-Making Handbook (NPS, 2015) require scoping. Scoping is an early and open process completed by the NPS to:

- Determine important issues,
- Eliminate issues that are not important or relevant,
- Identify relationships to other planning efforts or documents,

- Define a time schedule of document preparation and decision-making, and
- Define purpose and need, agency objectives and constraints, and the range of alternatives.

On February 28, 2018, a scoping meeting between applicant DENC, S&ME, NC Department of Environmental Quality (NCDEQ), Department of Environmental Assistance and Customer Service (NCDEACS) Department of Energy, Mineral, and Land Resources (NCDEMLR), NC Water Resources Commission (NC WRC), U.S. Army Corps of Engineers (USACE), Buncombe County Planning, NC Parks and Recreation, US Fish and Wildlife Service (USFWS), and NPS Parkway representatives was held to introduce the proposed natural gas pipeline and its intended purpose.

Applicant DENC and their consultant S&ME provided background information on the original and current pipeline route and the purpose and need for the pipeline, which included reasons for the new pipeline alignment and subsequent derating of the existing line. S&ME explained that a 300-foot (ft) corridor along the proposed pipeline was being surveyed for environmental purposes (e.g., jurisdictional waters, threatened and endangered (T&E) species, cultural resources) and that most stream and wetland impacts would be temporary, as there would be no permanent fill placement and such areas would be restored following construction. The various agencies provided initial comments regarding the pipeline; the NPS addressed proposed impacts to approximately 760 feet of NPS ROW that would be crossed.

NPS indicated that using HDD methods to cross the Parkway would be preferred, because no surface disturbance to NPS land would be necessary. It was discussed that a guidance wire (similar to a traffic counter wire) would be temporarily laid on the surface to ensure an accurate drill path. Minor hand trimming of heavy underbrush may be required to accommodate the guidance wire alignment but no clearing is anticipated. NPS also indicated that providing detailed information regarding the HDD alignment, maintenance access, and addressing any potential visual issues (including visibility from nearby Parkway overlooks) would reduce concerns for the Parkway during the permitting and approval process. In addition, NPS indicated that the Mountains to Sea Trail is located within the NPS/Parkway crossing location, and potential impacts to this feature would need to be addressed.

Following the scoping meeting, applicant DENC and S&ME completed environmental, geotechnical, and cultural resources studies within the pipeline corridor, including the segment within NPS land. Subsequent to completion of the studies, the NPS determined that a CE would not be appropriate for the project, because the HDD would be installed within land not previously disturbed (i.e., at the depths proposed for the HDD). Therefore, the appropriate NEPA pathway is an EA. This EA includes analysis of potential resource impacts required under NEPA, NHPA and other environmental statutes, as well as supplemental information to support the project. Agency scoping letters are attached in Appendix B.

A copy of the EA will be made available to the public at the NPS Planning, Environment, and Public Comment (PEPC) website and at Parkway headquarters.

An EA analyzes the alternatives for the proposed action and their impacts on the environment. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the 2020 Council on Environmental Quality implementing regulations for NEPA (40 CFR 1508.9), and the NPS's Director's Order-12 (Conservation Planning, Environmental Impact Analysis, and Decision-making) and associated NPS NEPA Handbook, 2015.

### ***3.0 Issues and Impacts***

Impact topics were developed utilizing guidance set forth in the NPS NEPA Handbook (2015). Potential issues associated with this project were also identified by NPS staff and input from other state and federal agencies. The topics are resources of concern that could be beneficially or adversely affected by the actions proposed under each alternative. The impact topics were selected to guide the evaluation of alternatives associated with the proposed project. The impact topics listed below were identified based on the following: issues raised during scoping; federal laws, regulations, and executive orders; NPS Management Policies 2006; and NPS knowledge of resources.

Based on review of routes in the project area, potential impact topics have been evaluated and are classified as either "Remaining Impact Topics Addressed with Detailed Analysis" within this document, or "Impact Topics Previously Addressed or Dismissed from Detailed Analysis". In the sections below (Sections 3.1 and 3.2), there is a brief discussion of each impact topic and justification of each topic's placement in one of the two categories for the purpose of this EA. When evaluating the justification for each topic's categorization, the following were taken into consideration:

- No land disturbance would occur on Parkway property
- Activities taking place adjacent to Parkway property would include: (1) equipment mobilization, (2) HDD (including access), and (3) ongoing ROW maintenance
- No vehicles and equipment would be used in streams and wetlands
- Modified, lower profile, pipeline markers would be located on Blue Ridge Parkway ROW for line of sight to satisfy DOT 192.707 requirements. Pedestrian access would be required twice per year for non-invasive leak surveys and quarterly at road crossings.



### **3.1.0 Remaining Impact Topics Addressed with Detailed Analysis**

#### **3.1.1 Visual Resources – Viewshed**

Of the visual resources in the study area that could be affected by the proposed actions, viewshed was selected for further analysis (See Section 5.2). This impact topic was selected for further analysis because of potential impacts associated with the visibility of the proposed drill rig and construction equipment that would be present during HDD activities from key vistas and overlooks along the Parkway, as well as the Mountains to Sea Trail.

#### **3.1.2 Socioeconomic Environment – Noise**

The Noise Control Act of 1972 (42 U.S.C. 4901) found “that inadequately controlled noise presents a growing danger to the health and welfare of the Nation’s population, particularly in urban areas; that the major sources of noise include transportation vehicles and equipment, machinery, appliances, and other products in commerce; and that, while primary responsibility for control of noise rests with state and local governments, federal action is essential to deal with major noise sources in commerce control of which require national uniformity of treatment.” The Noise Control Act of 1972 was amended by the Quiet Communities Act of 1978 (42 U.S.C. 4913) to promote the development of effective state and local noise control programs, to provide funds for noise research, and to produce and disseminate educational materials to the public on the harmful effects of noise and ways to effectively control it. In addition, NPS DO #47 “Soundscape Preservation and Noise Management” requires an analysis of impacts from noise in the affected area.

The project proposes to HDD approximately 760 linear feet of 12-inch diameter steel piping underneath NPS property. The pipe would be located no less than 50 feet below the ground surface of the Parkway property, and at the location of the parkway itself, the pipe would be located approximately 115 feet below the surface. The HDD entry and exit points would be located outside of the Parkway property boundaries, and no additional appurtenances or facilities are proposed for construction on the Parkway property. No grading, land clearing, tree removal or other land disturbances within the proposed ROW on the Parkway property are proposed. This impact topic was selected for further analysis because of potential noise impacts to the Parkway associated with the drilling activity that would occur for approximately six to eight weeks. Current plans include drilling twelve-hours per day, six to seven days a week. Although unlikely, in the event that 24-hour drilling is warranted, a 24-hour/seven days a week schedule has also been considered for noise impacts. Section 5.3 addresses the methodology and findings of the noise assessment.

### **3.2 Impact Topics Previously Addressed or Dismissed from Further Analysis**

This section addresses impact topics that were previously addressed or were not evaluated in more detail. Impact topics were dismissed from further evaluation either because the resource

does not occur in the area or because implementing the alternatives would have no effect or a small or imperceptible effect on the resource or value.

### **3.2.1 Natural Resources**

**A. *Vegetation*** - Proposed HDD plans do not require grading or earth-moving activities on Parkway property. The pipe would be located no less than 50 feet below the ground surface of the Parkway property, and at the location of the road within the Parkway, the pipe would be located approximately 115 feet below the surface. No Parkway vegetation would be cleared or disturbed for the project; therefore, this impact topic was dismissed from further analysis.

**B. *Topography*** - Proposed HDD plans do not require grading or earth-moving activities on Parkway property. The pipe would be located no less than 50 feet below the ground surface of the Parkway property, and at the location of the road within the Parkway, the pipe would be located approximately 115 feet below the surface. The HDD entry and exit points would be located outside of the Parkway property boundaries, and no additional appurtenances or facilities are proposed for construction on the Parkway property. No grading, land clearing, tree removal or other land disturbances within the proposed ROW on the Parkway property are proposed, and therefore this impact topic was dismissed from further analysis.

**C. *Geology / Soils*** - Proposed HDD plans do not require grading or earth-moving activities on Parkway property. No grading, land clearing, tree removal or other land disturbances within the proposed ROW on the Parkway property are proposed. A geotechnical evaluation has been performed to investigate soils for the HDD and based on the findings there are not anticipated impacts given the soil and geology within the Parkway (Appendix F).

**D. *Jurisdictional Streams and Wetlands*** - Proposed HDD plans associated with work proposed within Parkway property do not impact streams and/or wetlands. Fieldwork for the project area was conducted on July 14, 2018. A Natural and Cultural Resources Report dated September 10, 2018, was completed for the footprint of the proposed 50-foot-wide ROW that would cross the Parkway and adjacent NPS land approximately 1,200 feet east of the bridge over the French Broad River, and the portion of an existing access road that crosses NPS property below the bridge (Appendix C). A stream and wetland delineation was completed as a part of this work; one jurisdictional stream is present within the proposed ROW and is located on the north side of the Parkway, approximately 160 feet north of the edge of pavement. The HDD alignment would be approximately 57 feet below the stream bed and in competent rock which is conducive for HDD success while minimizing the potential of an inadvertent return. No wetlands were observed within the assessment area. Because DENC does not propose to conduct any clearing or land-disturbing activities within the proposed ROW, jurisdictional surface waters should not be affected by the project. A North Carolina Department of Environmental Quality (NCDEQ) Stream Classification Form prepared for the stream located on Parkway property is included in the Natural and Cultural Resources Report (Appendix C; Data Sheet S54). This impact topic was dismissed from further analysis because no discharges to wetlands or streams,

proposed fill activities, or vegetation disturbance are associated with the proposed project. There are no jurisdictional streams or wetlands to be impacted within the project area. Therefore, water quality was not retained for further analysis.

**E. *Prime and Unique Farmland*** - Prime or unique farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. The HDD entrance/exit points are located outside of the Parkway within soils classified as farmland of local importance and farmland of statewide importance. The proposed temporary entry workspace consists of a generally rectangular-shaped area measuring approximately 0.59 acres and is partially within an existing, previously cleared and graded Duke Energy ROW with overhead powerlines. The proposed exit workspace is an irregularly shaped area measuring approximately 0.89 acres and is partially within an existing, previously cleared and graded Duke Energy ROW with overhead powerlines. The entry and exit workspaces would require additional clearing and grading prior to construction.

Although the location of the proposed HDD occupies soils classified as farmland of local and statewide importance as defined in the Farmland Protection Policy Act, 7 CFR Part 658, this land is not located within NPS property, and the impacts to the soil would be temporary and discrete; therefore, the topic of prime and unique farmland was dismissed as an impact topic in this document.

**F. *Air Quality*** – Because no construction is proposed within the NPS property, and the entrance/exit points of the HDD are located more than 800 feet from the Parkway and 380 feet from NPS property ROW, no local air quality impacts by dust generated from construction activities and emissions from construction equipment and vehicles are anticipated. The proposed action and alternatives would not affect the attainment status of the airshed that encompasses the Parkway and would not affect the airshed designation. This impact topic was therefore dismissed from further analysis.

**G. *Water Resources*** – Residents and businesses within or adjacent to the study area rely primarily on water from municipal water services. Potable and non-potable water supplies are not present within the vicinity of the proposed Parkway crossing, and impacts to streams, wetlands, or other non-potable water sources are not proposed. The water to be utilized for the drilling and testing of the HDD under the Parkway would be drawn from the French Broad River adjacent to existing and ongoing construction for a bridge across the river. Returns from the drilling and testing would be filtered through a filter structure approved by NCDEQ. These filter structures have been successfully utilized at other bore locations on the project. Because potable and non-potable water would not be impacted by this project, this impact topic was dismissed from further analysis.

**H. *Terrestrial and Aquatic Wildlife*** - Fieldwork for the project area was conducted on July 14, 2018. A Natural and Cultural Resources Report was completed for the footprint of the

proposed 50-foot-wide ROW that would cross the Parkway and adjacent NPS land (Appendix C). Habitat types are identified in this report. This impact topic was dismissed from further analysis because no discharges due to proposed grading or fill activities, vegetation removal, or habitat disturbance are associated with the proposed project. Therefore, this impact topic was dismissed from further analysis.

***I. Threatened and Endangered (T&E) Species*** - The Endangered Species Act of 1973 requires examination of impacts to all federally listed threatened, endangered, and candidate species. Section 7 of the Endangered Species Act requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. In addition, NPS Management Policies 2006 and Director's Order #77 Natural Resources Management Guidelines require the NPS to examine the impacts to federal candidate species, as well as state listed threatened, endangered, candidate, rare, declining, and sensitive species.

The USFWS list of protected species for Buncombe County was identified using the Information, Planning, and Consultation (IPaC) tool and a search of the North Carolina Natural Heritage Program (NCNHP) database (i.e., the Natural Heritage Data Explorer NHDE) to identify element occurrences of federally-protected species listed as potentially occurring near the proposed ROW. Additionally, S&ME personnel conducted pedestrian field reviews of the proposed ROW to locate potential habitat or the presence of protected terrestrial species that were identified through the records review. Fieldwork for the project area was conducted on July 14, 2018, and the findings are discussed in the Natural and Cultural Resources Report (Appendix C). NPS staff reviewed the species list and Natural and Cultural Resources Report.

Neither Parkway records nor field surveys identified any individual species and/or habitat for any of the known special status species with the potential to occur within the vicinity of the project area. The USFWS was notified of the proposed project via S&ME's letter report in an email dated July 7, 2020 (Appendix C). In consultation with the USFWS under Section 7 it was determined that the proposed action "may affect, but is not likely to adversely affect" Northern long-eared bat (see recommendation below), Virginia spiraea, Appalachian elktoe (subject to commitments outlined below), and Gray bat. In addition, the USFWS concurred with the "no effect" determination for all other federally listed species known to occur in Buncombe County. Therefore, special status species were not retained for detailed analysis.

The USFWS provided comments (Appendix B), which included encouraging seasonal tree clearing to avoid impacts to the northern long-eared bat and developing a monitoring/contingency plan for HDD crossings of the French Broad River to avoid potential effects on the Appalachian elktoe (Appendix C). Specific findings and resulting commitments are described below:

Northern long-eared bat – Construction of the new 50-foot wide and temporary work space for the project will require the removal of about 42-acres of forest. Forest clearing will result in the removal/loss of potential suitable summer roosting habitat for northern long-eared bat. However, the final 4(d) rule (effective as of February 16, 2016), exempts incidental take of northern long-eared bat associated with activities that occur greater than 0.25 miles from a known hibernation site, and greater than 150 feet from a known, occupied maternity roost during the pup season (June 1 – July 31). Based on the information provided, the project (which may or may not require tree clearing) would occur at a location where any incidental take that may result from associated activities is exempt under the 4(d) rule. Although not required, the USFWS encourages avoiding any associated tree clearing activities during the maternity roosting season from April 15 – October 15; and especially during the period of June 1 – July 31 when pups are typically non-volant.

Appalachian elktoe – Appalachian elktoe occurs in the French Broad River and has been recently found in close proximity to the project corridor. Construction of the proposed pipeline will require three crossings of the French Broad River. To avoid impacts to the French Broad River, DENC is proposing to install the new gas pipeline under the river bed using HDD. The USFWS “may affect, not likely to adversely affect” determination for Appalachian elktoe is based on the proposed use of HDD at all French Broad River crossing locations. USFWS commended DENC for using HDD for these and other stream crossing locations. However, USFWS recommended the following additional measures be implemented into the project plans to ensure that impacts to the French Broad River and Appalachian elktoe are completely avoided:

1. Develop a monitoring plan to be used during the HDD installation. An observer(s) should be stationed on the river to follow the drill as it bores under the river bed to watch for evidence of potential frac-out (e.g., bubbles, slurry discharge). If evidence of frac-out is observed, operations should cease until further investigation demonstrates or measures are taken to ensure a frac-out will be avoided.
2. Establish a contingency plan to be executed should a frac-out or slurry discharge to the river occurs during HDD installation. The plan should contain steps to be taken if a frac-out occurs to minimize any adverse effects to aquatic resources.
3. If a frac-out occurs, this office should be contacted immediately to assess the potential impacts to Appalachian elktoe.
4. Ensure that construction of drilling pits are located so that sediment or accidental slurry spills will not reach surface waters. Adequate sediment and erosion control measures should be installed and maintained until drilling pits are closed out and stabilized.
5. Develop a monitoring plan that includes periodic inspections of stream crossing locations to assess for destabilization of stream banks. The work sites should be

monitored at least every 3 months during the first 24 months and annually thereafter. Moreover, USFWS recommended the development of a riparian monitoring and maintenance program that would outline procedures for the prompt stabilization of streambanks near the utility crossing (should any streambank erosion or destabilization occur) throughout the life of this project.

With the implementation of these additional measures, USFWS believes the potential effects to Appalachian elktoe from project activities will be minimized to a discountable level and USFWS concurs with the “may affect, not likely to adversely affect” determination for this species.

In addition to the above recommendations and commitments, the USFWS also outlined the general project recommendations regarding project siting, plantings, and seed mixes (Appendix B).

All of DENC’s construction to date, and future construction, would be consistent with those USFWS comments. Otherwise, the USFWS determined that the pipeline project may affect, but is not likely to adversely affect gray bat due to proposed tree-clearing restrictions and made a determination of “no effect” on all other federally-listed species known to occur in Buncombe County. Based on the USFWS coordination findings, the requirements under section 7 of the Act are fulfilled. Therefore, this impact topic was dismissed from further analysis. The NPS confirmed that the USFWS documentation was acceptable in an email dated February 22, 2021, and that no further consultation regarding T&E species would be necessary.

**J. Floodplains** - The proposed action does not involve development in the floodplain or modifications that could adversely affect the natural resources and functions of floodplains or increase flood risks. The proposed crossing of the Parkway would not impact areas designated as “floodplain” by the Federal Emergency Management Agency (FEMA), as shown on FEMA map number 3700963500J effective date January 6, 2010; therefore, this topic was dismissed from further analysis.

**K. Migratory Birds** - The Migratory Bird Treaty Act, as amended (16 U.S.C. 703) and Executive Order (E.O. 13186, January 2001) directs each Federal agency taking actions having or likely to have a negative impact on migratory bird populations to work with the USFWS to develop an agreement to conserve those birds. No grading, land clearing, tree removal or other land disturbances within the proposed ROW on the Parkway property are proposed. Clearing and grading near the entry and exit points, located off Parkway property, is expected to be minimal and partially in areas that have already been previously disturbed. This impact topic was dismissed from further analysis because no impacts to neotropical/migratory bird species would be expected from this project.

### **3.2.2 Cultural Resources**

**A. Historic, Archaeological, and Ethnographic Resources** - In 1990, the Blue Ridge Parkway was determined to be eligible for inclusion in the National Register of Historic Places

(NRHP) under Criterion A for its contributions to industry and transportation and Criterion C for its architecture; the NRHP-eligible status was reconfirmed in 2008. In 1995, a National Historic Landmark Theme Study was completed by the NPS for landscape that dated from 1917 to 1941. The Blue Ridge Parkway is currently in the process of completing a draft National Historic Landmark nomination.

In order to evaluate the HDD project, archeological survey fieldwork for the project area was conducted on July 14, 2018. An archeological survey report was completed for the footprint of the proposed 50-foot- wide ROW that would cross the Parkway and adjacent NPS land. Archeological investigations of the portion of the project corridor located on NPS property included an intensive archeological survey using both pedestrian survey and shovel testing techniques. Pedestrian survey was used to search for the presence of quarries, cemeteries, chimneys, earthworks and other above-ground features, as well as artifacts lying on the ground surface. The shovel test survey was conducted to search for sub-surface artifacts and/or features that are not visible on the ground surface. Since there are no previously recorded archaeological sites within the portion of the proposed ROW or access road located on NPS property, the focus of the study was the identification of previously unrecorded sites. No new archaeological sites or artifacts, however, were identified during this survey.

The NPS Southeast Archeological Center accepted the findings of S&ME's archeological survey report in a letter dated October 18, 2018 (Appendix B). The North Carolina Department of Natural and Cultural Resources (NCDNCR) State Historic Preservation Office (SHPO) accepted S&ME's archeological survey report, and on July 23, 2020 concurred that no further archaeological investigation was needed for this undertaking based on the proposed alignments (Appendix II). As part of the Government-to-Government relationship between the NPS and Native American tribes, S&ME's archeological survey report was sent to the consulting tribes that claim this area as part of their ancestral lands. The report was shared with the Catawba Indian Nation, the Cherokee Nation, the Eastern Band of Cherokee Indians, the United Keetoowah Band of Cherokee Indians, the Absentee Shawnee Tribe of Oklahoma, the Eastern Shawnee Tribe, and the Shawnee Tribe on November 17, 2021 for their review and comment. The Catawba Indian Nation and the Eastern Shawnee Tribe both concurred with the finding of No Adverse Effect after their reviews of the archeological survey report. The Cherokee Nation responded with clarifying questions, which were answered to their satisfaction. They then concurred with the finding of No Adverse Effect. NPS had received no responses from additional tribes.

This impact topic was dismissed from further analysis because no impacts to historic, archaeological, and ethnographic resources would be expected from this project. In the unlikely event that items of cultural significance are discovered during the course of the project, project activities would be halted and the appropriate consulting parties would be contacted.

**B. *Museum Collections*** - Museum collections (i.e., prehistoric and historic objects, artifacts, works of art, archival material, and natural history specimens) would be unaffected by the

implementation of the project. The park's museum collections would continue to be acquired, accessioned/cataloged, preserved, protected, and made available for access and use according to NPS standards and guidelines. Therefore, museum collections were dismissed as an impact topic.

### **3.2.3 Visitor Use and Experience**

The following visitor uses and experiences in the study area were excluded from further analysis in the EA.

**A. *Visitation Patterns*** - For the purpose of this EA, visitation patterns are defined as general classes of activities (i.e., hiking, driving the motor road, etc.). This topic was dismissed from further analysis because there are no anticipated impacts to the number and type of visitors using the Parkway motor road and trail systems.

**B. *Visitor Experience and Activities*** – Approximately 200 feet of the Mountains to Sea Trail is located within the existing electric transmission line ROW that crosses the Parkway adjacent to the proposed HDD location. However, because no impacts to vegetation or topography are proposed and no grading, fill, or other construction would be performed within the NPS property, no impacts to the Mountains to Sea Trail are expected. Potential visual impacts to the scenic aspects of the trail are addressed under the Viewshed Analysis (Section 3.1.1 and 5.2.2). There are no anticipated closures to the trail resulting from the proposed action. This topic was dismissed from further analysis because the visitor experience and activities using the Parkway motor road and trail systems should not change as a result of the proposed activities.

### **3.2.4 Socioeconomic Environment**

The following is a description of socioeconomic environment topics that are excluded from further discussion in the EA.

**A. *Population and Economy*** – The purpose of the proposed action is to allow a natural gas pipeline to address service reliability and in response to existing and predicted demands and is not a driver of growth. The proposed action is not anticipated to increase or decrease population or impact the economy. Therefore, this topic was dismissed from further analysis.

**B. *Housing*** – The purpose of the proposed action is to allow a natural gas pipeline to address service reliability in response to existing and predicted demands, so the proposed action is not anticipated to increase or decrease the need for housing or result in changes to housing. Therefore, this topic was dismissed from further analysis.

**C. *Community Services and Infrastructure*** - Currently, there are no community services provided within the Parkway pipeline corridor. Infrastructure already in place (i.e., road, road shoulders, signs, etc.) would not be impacted by the proposed action. Therefore, this topic was dismissed from further analysis.



**D. Land Use** - Current land use within the Parkway pipeline corridor is scenic and recreational with federal lands being maintained as forestlands and ROW. The Blue Ridge Parkway General Management Plan/Environmental Impact Statement (GMP/EIS 2012) zoned the corridor, which is part of Segment 6, as “historic parkway” and “scenic character”. This topic was dismissed from further analysis because there are no anticipated impacts to land use in the vicinity of the proposed action.

**E. Socioeconomic Conditions** - Possible impacts from new natural gas pipelines include impacts to property or home values on adjacent lands when associated with land clearing and ROW acquisition. This topic was dismissed from further analysis because no homes are located within the vicinity of the Parkway and HDD, and there would be no impacts to property within NPS land. Therefore, the proposed project would not impact socioeconomic conditions in the vicinity of the project.

**F. Environmental Justice** - Presidential Executive Order 12898, “General Actions to Address Environmental Justice in Minority Populations and Low-income Populations”, requires all Federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. There are no minority or low-income populations located adjacent to the proposed ROW or within the broader action area, so the proposed action would not have disproportionate health or environmental effects on minorities or low-income populations or communities. Therefore, this topic was dismissed from further analysis.

**G. Hazardous Materials** - There would be no hazardous waste used for or generated from the proposed activity. The HDD would be continually monitored, and the contractor is aware that they must follow Dominion Energy’s Inadvertent Releases (IR) Contingency Plan if there is a drilling fluid surface release at any point along the HDD alignment. DENC also has a monitoring and response program that would be implemented during operation of the pipeline. Therefore, this topic was dismissed from further analysis.

**H. Health and Human Safety** - Applicant DENC would conduct the proposed activities in accordance with their established monitoring and response program that would be implemented during operation of the pipeline. Because the HDD entrance and exit points are located outside of NPS property, no related safety measures within the Parkway are necessary. Therefore, this topic was dismissed from further analysis.

### **3.2.5 Greenhouse Gases and Climate Change**

The proposed action, issuance of a ROW for construction, operation, and maintenance of the project pipeline, is proposed in response to existing energy demands on the current energy system for existing development. The proposed action is not anticipated to create additional growth or development which in turn might increase greenhouse gas emissions which contribute to climate change. Construction equipment utilized for the project would meet current air quality

and emission standards. Temporary, de minimis impacts may be associated with equipment emissions during installation of the pipeline, however these are not anticipated to be significant or have a long-term effect on the environment. For these reasons, this impact topic was dismissed from further analysis.

### **3.2.6 Energy Resources**

The NPS's Guiding Principles of Sustainable Design (1993) provide a basis for achieving sustainability in facility planning, design and park operations, emphasizing the importance of biodiversity, and encourages responsible decisions. The project as proposed does not include development of new park facilities or alteration to park operations; therefore, this topic was dismissed from further analysis.

### **3.2.7 Park Operations**

The project as proposed would not affect park operations. Work installing, operating, and maintaining the HDD would take place off Parkway property and the project would not be accessed by the Parkway motor road. Equipment access for operations and maintenance of the ROW would be provided by an existing deed reserved private access road that passes beneath the French Broad River Bridge on NPS property. The access road at this location is situated in high ground and is well-maintained. The road is used regularly by deed reserved owners of the private property adjoining the Parkway for access, and by Duke Energy for maintenance activities associated with the portion of their utility ROW north of the Parkway. No additional NPS staffing requirements are anticipated during construction, operation, or maintenance of the ROW. For these reasons, this topic was dismissed from further analysis.

## **4.0 Alternatives**

### **4.1 Alternatives Considered**

#### **A. Alternative A – No Action**

The “No Action” alternative would result in no new impacts to NPS resources. Under the no action alternative, NPS would not issue a ROW permit for the HDD through Parkway property. The “No-Action” alternative could impact applicant DENC's ability to provide natural gas service to existing customers, which would impact the adjacent community. Because the pipeline origin and terminus points are located north and south of the Parkway, respectively, the contiguous length of the Parkway prohibits routing the pipeline in a manner that would avoid such a crossing entirely. No Action alternative has been dismissed.

#### **B. Alternative B – HDD of a New 12-inch Diameter Gas Line Underneath the Blue Ridge Parkway (Proposed Action)**

Under Alternative B, the NPS would issue a ROW permit for construction, operations, and maintenance of the DENC T-072 project to cross NPS lands.

Approximately 760 feet of the new 12-inch diameter steel natural gas pipeline (a portion of the larger 11.5-mile DENC project) would be installed beneath the NPS Parkway property by HDD perpendicular to the Parkway and adjacent to an existing 143-foot-wide cleared Duke Energy Electric transmission line ROW. The project includes up to three attempts to complete the HDD in the ROW. The pipe would be located no less than 50 feet below the ground surface of the Parkway property, and at the location of the road itself, the pipe would be located approximately 115 feet below the surface. The HDD entry and exit points would be located more than 800 feet from the Parkway travel lane and 380 feet from the NPS property boundary. No additional appurtenances or facilities are proposed for construction on the Parkway property. No grading, land clearing, tree removal or other land disturbances within the proposed ROW on the Parkway property are proposed. Modified, lower profile, pipeline markers would be located on Blue Ridge Parkway ROW for line of sight to satisfy DOT 192.707 requirements. Pedestrian access would be required twice per year for non-invasive leak surveys and quarterly at road crossings.

Equipment access to private property on the north side of the Parkway would be provided by an existing deed reserved private access road that passes beneath the French Broad River Bridge on NPS property. The access road at this location is situated in high ground and is well-maintained. The road is used regularly by deed reserved owners of the private property adjoining the Parkway for access, and by Duke Energy for maintenance activities associated with the portion of their utility ROW north of the Parkway.

The water to be utilized for the drilling and testing of the HDD under the Parkway would be drawn from the French Broad River adjacent to existing and ongoing construction for a bridge across the river, not on NPS property. Returns from the drilling and testing would be filtered through a filter structure approved by NCDEQ. These filter structures have been successfully utilized at other bore locations on the project.

Based upon NEPA and NHPA analysis of potential resource impacts and effects, the proposed action is not anticipated to have significant impacts to Blue Ridge Parkway resources.

#### **4.2 Alternatives Considered but Eliminated from Detailed Study**

Alternative C – Construction of a New 12-inch Diameter Gas Line Through the Blue Ridge Parkway via Trenching

The alternative to acquire an NPS ROW to HDD underneath the Parkway (the preferred alternative) would be conventional trench construction. This would involve excavation of a trench for installation of the new pipe. This alternative would require land clearing and grading within the proposed ROW, along with acquisition of additional temporary workspace to accommodate heavy construction equipment, temporary closure of the Parkway and potential impacts to on-site jurisdictional areas and natural resources. This alternative would result in

significant land disturbance and potential impacts to natural/historic resources located on the Parkway property. Therefore, this alternative, while significantly more cost-effective than the current proposal, was dismissed from further consideration.

#### **Alternative D – Construction of a New 12-inch Diameter Gas Line Along Interstate 26**

During initial planning of the pipeline, DENC proposed to construct the pipeline on the east side of Interstate 26, approximately 1.3 miles east of the proposed HDD crossing. However, the NCDOT would not allow the pipeline to be located within the highway ROW due to public safety concerns. Therefore, this alternative location was dismissed from further consideration.

#### **Alternative E - Replace Existing Pipeline with Proposed Line, in the Same General Location**

The alternative to replace the existing pipeline along Brevard Road has multiple concerns including geological and topographic impediments, the French Broad River to the east and Parkway infrastructure and rock high walls to the west, as well as a significant wetland crossing. This alternative did not offer environmental advantages. Additionally, safety concerns with traffic control on a heavily travelled road, flood plain issues, multiple property owners, conservancies, and other construction challenges make this alternative infeasible.

### ***5.0 Affected Environment and Environmental Consequences***

#### **5.1 Introduction and Methodology**

In accordance with Council on Environmental Quality regulations finalized in 2020 (40 CFR 1508.1), effects include:

- (a) Direct effects, which are caused by the action and occur at the same time and place.
- (b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Further clarified in paragraph g:

- (g) Effects or impacts means changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the

proposed action or alternatives, including those effects that occur at the same time and place as the proposed action or alternatives and may include effects that are later in time or farther removed in distance from the proposed action or alternatives.

(1) Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic (such as the effects on employment), social, or health effects. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

(2) A “but for” causal relationship is insufficient to make an agency responsible for a particular effect under NEPA. Effects should generally not be considered if they are remote in time, geographically remote, or the product of a lengthy causal chain. Effects do not include those effects that the agency has no ability to prevent due to its limited statutory authority or would occur regardless of the proposed action.

(3) An agency’s analysis of effects shall be consistent with this paragraph (g). Cumulative impact, defined in 40 CFR 1508.7 (1978), is repealed

## **5.2 Visual Resources – Viewshed**

The visual character of the Parkway in the proposed ROW is forested with a cleared utility corridor and towers currently visible directly adjacent to the proposed ROW. The project area is in what is referred to as the Asheville corridor, an urban area where there are periodic views of development. Ongoing projects within Buncombe and Henderson Counties and NCDOT State Transportation Improvement Program (STIP) within one mile of the project site include: the NCDOT Replacement of Parkway Bridge over I-26 (Milepost 391.8); private development of Pratt & Whitney manufacturing facility, including bridge construction adjacent to the Parkway near NC 191 (Brevard Road), and widening of I-26 from NC 280 (Exit 40) to I-40 at Asheville, with additional lanes currently under construction. Broadband installation is also proposed along the corridor, with planning and environmental study underway. In addition, widening of NC 191 (Brevard Road) from NC 146 to north of Blue Ridge Parkway, is proposed but this project remains unfunded and no timeline or schedule has been established.

Several ongoing projects within Buncombe and Henderson Counties and NCDOT State Transportation Improvement Program (STIP) within one mile of the project site contribute to the urbanization of the landscape. These include: the NCDOT Replacement of Parkway Bridge over I-26 (Milepost 391.8) and widening of I-26 from NC 280 (Exit 40) to I-40 at Asheville; private development of Pratt & Whitney manufacturing facility, including bridge construction adjacent to the Parkway near NC 191 (Brevard Road); and a proposed interchange connecting I-26 to NC 191 (Brevard Road) adjacent to the Parkway on-ramp. . These projects are not impacted by, and do not impact, the proposed action.

### **5.2.1 Effects on Viewshed of Alternative A – No Action**

Under this alternative, NPS not issuing a ROW permit, there would be no changes in the viewshed.

### **5.2.2 Effects on Viewshed of Alternative B – HDD Under Parkway**

In order to determine potential effects of the HDD and associated equipment on the Parkway viewshed, the height of the HDD operations relative to the tree-canopy height and density at the HDD entry and exit locations was evaluated, along with the topography between the HDD locations and the Parkway. A viewshed analysis for the HDD drill pad location on the north and the exit location on the south side of the Parkway, evaluating the travel lanes and the adjacent Mountains-to-Sea Trail (the Trail) was conducted by S&ME. The visual impact analysis had a goal of identifying potential effects to the viewshed of each of the resources.

To achieve this goal, S&ME visited the Parkway HDD crossing and photographed the proposed HDD entry and exit locations from this vantage point (to the northwest and southeast, respectively); S&ME also took photos from the Trail that could also potentially be visually impacted. The HDD entrance point is located 825 feet from the Parkway travel lanes and 930 feet from the Trail. A utility tower is located approximately 200 feet south of the proposed HDD entry point and is visible from the Parkway and Trail. The lowest crossbar of the tower that is visible from the Parkway is approximately 30 feet high. A crossbar that is 20 feet high is visible from the Trail. The tower base below these crossbars cannot be seen due to tree cover. The line of sight from the Parkway is 52 feet above ground surface (AGS) at the HDD entry point (30-foot-high crossbar plus 22 feet difference in ground surface elevation between the tower and the HDD entry point). The line of sight from the Trail is 42 feet above ground surface (20-foot-high crossbar plus 22 feet difference in ground surface elevation). The HDD rig and associated equipment do not exceed 30 feet in height; therefore, neither would be visible from the Parkway or the Trail. To further support this conclusion, it is noteworthy that the observations documented herein were taken along the cleared Duke Energy transmission line ROW. The HDD location would be offset from this cleared ROW, and DENC has committed to leaving a 30-foot tree buffer between their HDD location and the Parkway. These trees would further block visibility from the Parkway toward the HDD operations. Also, the photographs were taken during a leaf-off season. The anticipated HDD work is planned during the leaf-on season, further reducing the potential for visual impacts.

The HDD exit point is located over 800 feet southeast of the Trail; the exit point is approximately 30 feet higher than the Parkway and 22 feet higher than the Trail. At the exit point, equipment would be restricted to standard truck heights (less than eight feet high). Due to the difference in elevation and the existing vegetation, no equipment would be visible from the Parkway or the Trail at the exit point.

S&ME also visited the French Broad Overlook to evaluate the potential viewshed impact from this overlook. The previously mentioned utility tower could be seen from the French Broad

Overlook, however, only the upper-most portion of the tower was visible. Based on the discussion presented in the previous paragraph, and because the HDD rig and equipment are less than 30 feet high, the HDD operations would not be visible from the overlook. An attempt to view the HDD exit point from the Overlook was also made, but as shown in Appendix D, Figure 2, Photograph 5, only trees are visible from the Overlook, and the HDD exit point is not visible behind the trees.

As one additional component of the viewshed analysis, S&ME drove the Parkway one mile in each direction from the proposed HDD crossing point, looking for areas where the tower discussed above or the HDD exit point are visible. Within this corridor, the tower near the HDD entry point was barely visible from the parkway at only one location approximately 1.2 miles to the south, but only the top of the tower could be seen. The viewshed analysis demonstrated that the Duke Energy transmission line ROW provides the location with the clearest view toward the HDD entry and exit locations. As explained above, the HDD operations are not expected to impact the Parkway viewshed.

In summary, according to the viewshed analysis, the proposed action of NPS issuing a ROW permit would not result in impacts to the viewshed. Photographic documentation and a figure depicting the results of the viewshed analysis are attached (Appendix D).

### **5.3 Soundscapes**

The project area is in what is referred to as the Asheville corridor, an urban area where development is adjacent to and nearby the Parkway. This is one of the busiest stretches of the Parkway given the proximity to and connection with Asheville and Buncombe County, North Carolina and use of the Parkway in this section as part of the local transportation network because of those connections. Sounds related to urbanization, including traffic noise, can be heard periodically while travelling through this corridor.

Several ongoing projects within Buncombe and Henderson Counties and NCDOT State Transportation Improvement Program (STIP) within one mile of the project site contribute to the urbanization of the landscape. These include: the NCDOT Replacement of Parkway Bridge over I-26 (Milepost 391.8) and widening of I-26 from NC 280 (Exit 40) to I-40 at Asheville; private development of Pratt & Whitney manufacturing facility, including bridge construction adjacent to the Parkway near NC 191 (Brevard Road); and a proposed interchange connecting I-26 to NC 191 (Brevard Road) adjacent to the Parkway on-ramp. . These projects are not impacted by, and do not impact, the proposed action.

#### **5.3.1 Effects on Soundscapes of Alternative A – No Action**

Under this alternative, NPS not issuing a ROW permit, there would be no impacts to the Parkway soundscape. The soundscape existing conditions, including other project work, would not change.

### **5.3.2 Effects on Noise of Alternative B – HDD Under Parkway**

In order to determine potential effects of the HDD and associated equipment on noise levels at the Parkway, S&ME performed an environmental noise assessment at two active drill sites in close proximity to the Parkway HDD entry point location (i.e., the French Broad River (FBR) HDD and the Hominy Creek HDD sites). The active FBR HDD site lies approximately 825 feet to the northwest of the proposed Parkway HDD location.

The noise assessment included the following tasks:

1. An estimation of the sound level contribution from the drilling entry/exit locations to the nearest existing Noise Sensitive Areas (NSAs) in the vicinity of the HDD construction activities. Noise measurements were collected by a qualified technician at operating DENC HDD rig locations in the vicinity of the proposed Parkway HDD. Measurements were collected using a TSI SoundPro DL with Octave Band Analyzer (1/1 Octave) Type II sound level meter. Broadband sound pressure measurements were collected using the A-weighted scale in the slow response mode. Sound levels were also recorded in each octave band frequency (31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16,000 Hz.)
2. Using the data collected under Item 1, S&ME assessed the far-field community sound levels anticipated at the identified NSAs for HDD construction activities.
3. Equipment sound power levels were based on data of similar capacity/type equipment to those proposed for use by DENC.

Department of Energy regulation 18 CFR § 157.206 sets the maximum A-weighted Nighttime Sound Level (Ln) at 55 dBA for HDD activities. No applicable local or state environmental sound regulations or ordinances were identified.

A copy of the complete Report of Limited Environmental Noise Assessment dated March 12, 2021 is included in Appendix E. In summary, sound level measurements were recorded at 100-foot intervals from both the front (drill direction) and rear (exhaust end) of the current FBR and Hominy Creek drill sites. The sound level measurements are considered a representative surrogate for the expected sound levels at the Parkway NSA.

From the proposed Parkway drill entry point to the Parkway NSA (the travel lanes) is approximately 825 feet and the entry point is approximately 930 feet from the Trail. The NSAs for the purpose of this assessment are the actual Parkway travel lanes and the Trail where the drill is expected to cross beneath. The Trail is an additional 75 feet further to the east of the Parkway edge of the travel lanes (and thus, 75 feet farther from the drill entry point.) The proposed HDD exit point is approximately 800 feet east of the Trail and 875 feet from the edge of the Parkway travel lanes (i.e., approximately 1,700 feet from the Parkway HDD entry point).



At a maximum of 550 feet from the front of the drill rig and 800 feet beyond the exhaust (rear end of the rig) the sound level measurements were observed consistently below 55 dB(A). These measurements were collected in the far field with limited interference due to topography, terrain conditions, vegetation, ground cover, density and height of foliage. They are believed to represent worst case conditions under which the drill rig would be operating at the Parkway drill site. Even under these worst-case conditions, noise impacts are not anticipated at the Parkway. To further support this conclusion, it is worthwhile to note that the proposed HDD entry location sits in a depression, and there is a hill between the entry location and the Parkway. As mentioned in Section 5.2.2, the HDD location would be offset from the cleared Duke ROW, and DENC has committed to leaving a 30-foot tree buffer between their HDD location and the Parkway. These trees and the previously mentioned hill would further buffer noise and increase noise dampening between the Parkway and the HDD operations.

In summary, the noise levels dropped to below background levels 550 feet from the front of the drill rig and 800 feet behind the rig. The front of the rig should generally be facing the Parkway during drilling. The findings demonstrate the drilling operation at the Parkway crossing site would occur at sufficient distance from both the Blue Ridge Parkway travel lanes and Mountains to Sea Trail to prevent potential adverse noise impacts. Furthermore, the HDD entry point is located in a topographic depression and would be separated from the Parkway by a tree buffer. No other noise sensitive receptors were identified within the proximity of the proposed drilling location. The NPS proposed action of issuing a ROW permit would not affect ongoing or proposed projects in or near the Asheville corridor of the Parkway and would not be impacted by those projects.

## ***6.0 Consultation and Coordination***

As part of this planning process, NPS, as well as S&ME on behalf of applicant DENC have undertaken consultation and coordination to ensure that all applicable federal policies and regulations are addressed. This coordination included consultation and involvement with other regulatory agencies with jurisdiction and other stakeholders. Scoping history is discussed in Section 2.3 above and letters and agency responses are referenced where applicable in project analysis and included in their entirety for review (Appendix B).

The NPS has completed the Tribal Consultation process. Formal consultation letters and a copy of the archeological survey report were sent to the seven federally recognized tribes that previously indicated this project area is within their tribal homelands. The Catawba Indian Nation, the Cherokee Nation, and the Eastern Shawnee Tribe each sent letters concurring with the finding of No Adverse Effect. No other comments or questions were received during the 30-day tribal consultation period.

## ***7.0 List of Preparers***

This document was prepared with input and analysis from NPS staff, DENC, and S&ME.

## **S&ME, Inc.**

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## **8.0      *Compliance with Federal and State Regulations***

Three overarching environmental protection laws and policies guide the NPS in conducting NEPA analysis, these include:

- NEPA and its implementing regulations, as Amended
- National Parks Omnibus Management Act of 1998 (NPOMA)
- NPS Organic Act of 1996

Other applicable NPS guiding laws, regulations, and policies include:

- Redwood National Park Act of 1978, As Amended
- National Park Service Management Policies 2006
- Blue Ridge Parkway Authority to Issue ROW permits (16 U.S.C Section 160a-3)

The NPS is also required to comply with the following laws, executive orders, regulations, and policies in developing this EA

- National Historic Preservation Act of 1966, As Amended
- Federal Noxious Weed Act, 1975
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
- Director's Order 28, Cultural Resource Management
- Clean Water Act
- Endangered Species Act
- Clean Air Act
- Archeological Resources Protection Act
- Native American Graves Protection and Repatriation Act
- Marine Mammal Protection Act
- NC Sediment and Erosion Control Act, 1973
- Secretarial Order 3399, Department-Wide Approach to the Climate Crisis and Restoring Transparency and Integrity to the Decision-Making Process

## ***9.0 Citations***

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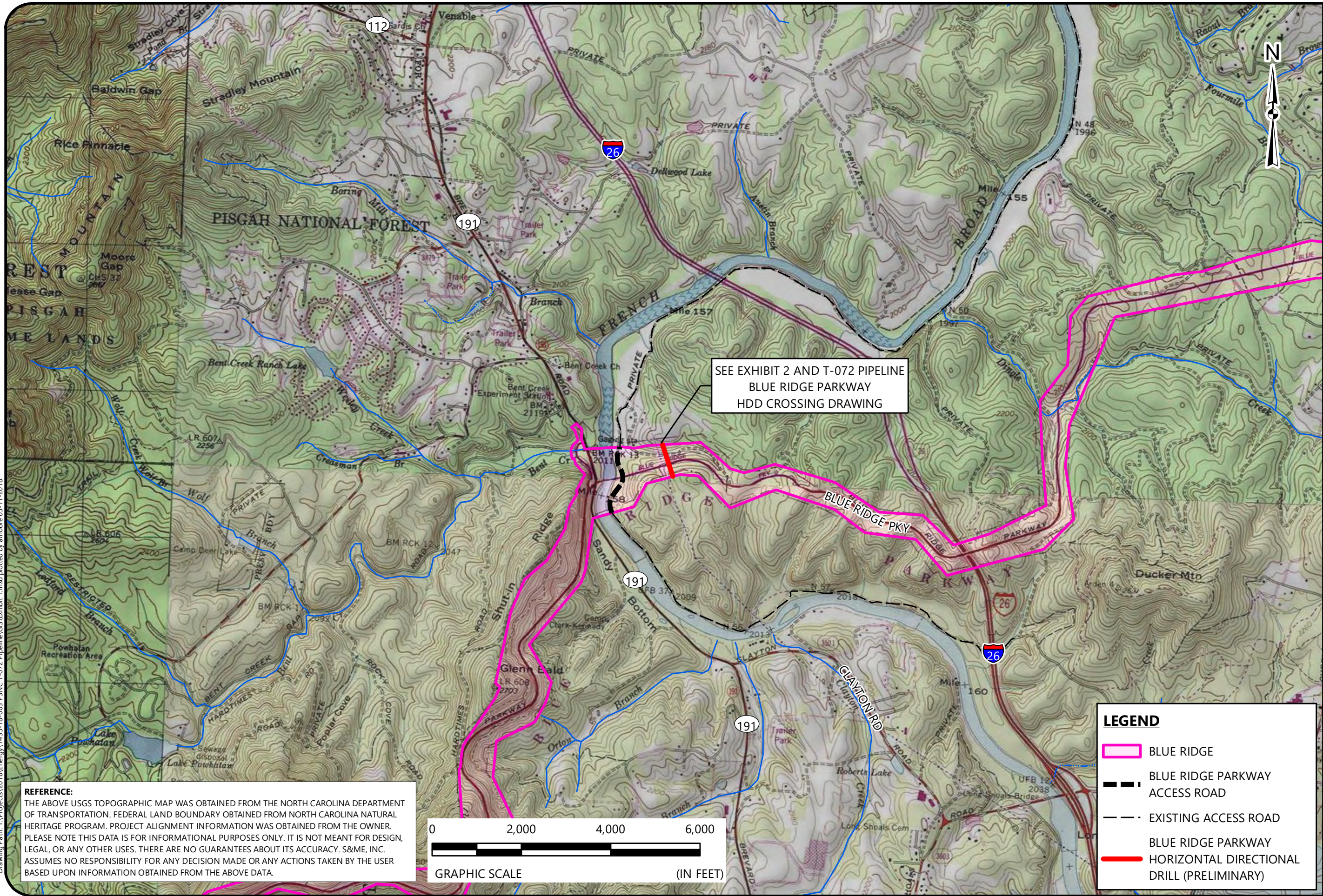
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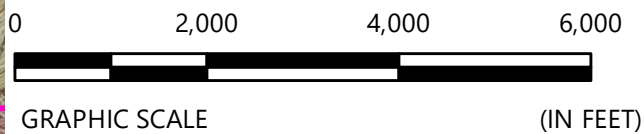
## **Appendix A - Figures**



Drawing Path: T:\Projects\2018\Energy\7435-18-003 PSNC T-072 Pipeline\GIS\Exhibit 1.mxd plotted by amcree 05-11-2018



**REFERENCE:**  
THE ABOVE USGS TOPOGRAPHIC MAP WAS OBTAINED FROM THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION. FEDERAL LAND BOUNDARY OBTAINED FROM NORTH CAROLINA NATURAL HERITAGE PROGRAM. PROJECT ALIGNMENT INFORMATION WAS OBTAINED FROM THE OWNER. PLEASE NOTE THIS DATA IS FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT MEANT FOR DESIGN, LEGAL, OR ANY OTHER USES. THERE ARE NO GUARANTEES ABOUT ITS ACCURACY. S&ME, INC. ASSUMES NO RESPONSIBILITY FOR ANY DECISION MADE OR ANY ACTIONS TAKEN BY THE USER BASED UPON INFORMATION OBTAINED FROM THE ABOVE DATA.



**LEGEND**

- BLUE RIDGE
- BLUE RIDGE PARKWAY ACCESS ROAD
- EXISTING ACCESS ROAD
- BLUE RIDGE PARKWAY
- HORIZONTAL DIRECTIONAL DRILL (PRELIMINARY)

SITE VICINITY & USGS TOPOGRAPHIC MAP EXHIBIT

DENC ENERGY  
T-072 PIPELINE BLUE RIDGE PARKWAY HDD CROSSING  
BUNCOMBE COUNTY, NORTH CAROLINA

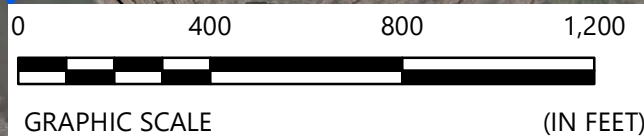
SCALE:  
1" = 2,000'  
DATE:  
5-11-18  
PROJECT NUMBER:  
7435-18-003  
FIGURE NO.



Drawing Path: T:\Projects\2018\Energy\7435-18-003 PS\NC T-072 Pipeline\GIS\Exhibit 2.mxd plotted by Jlawler 06-11-2018

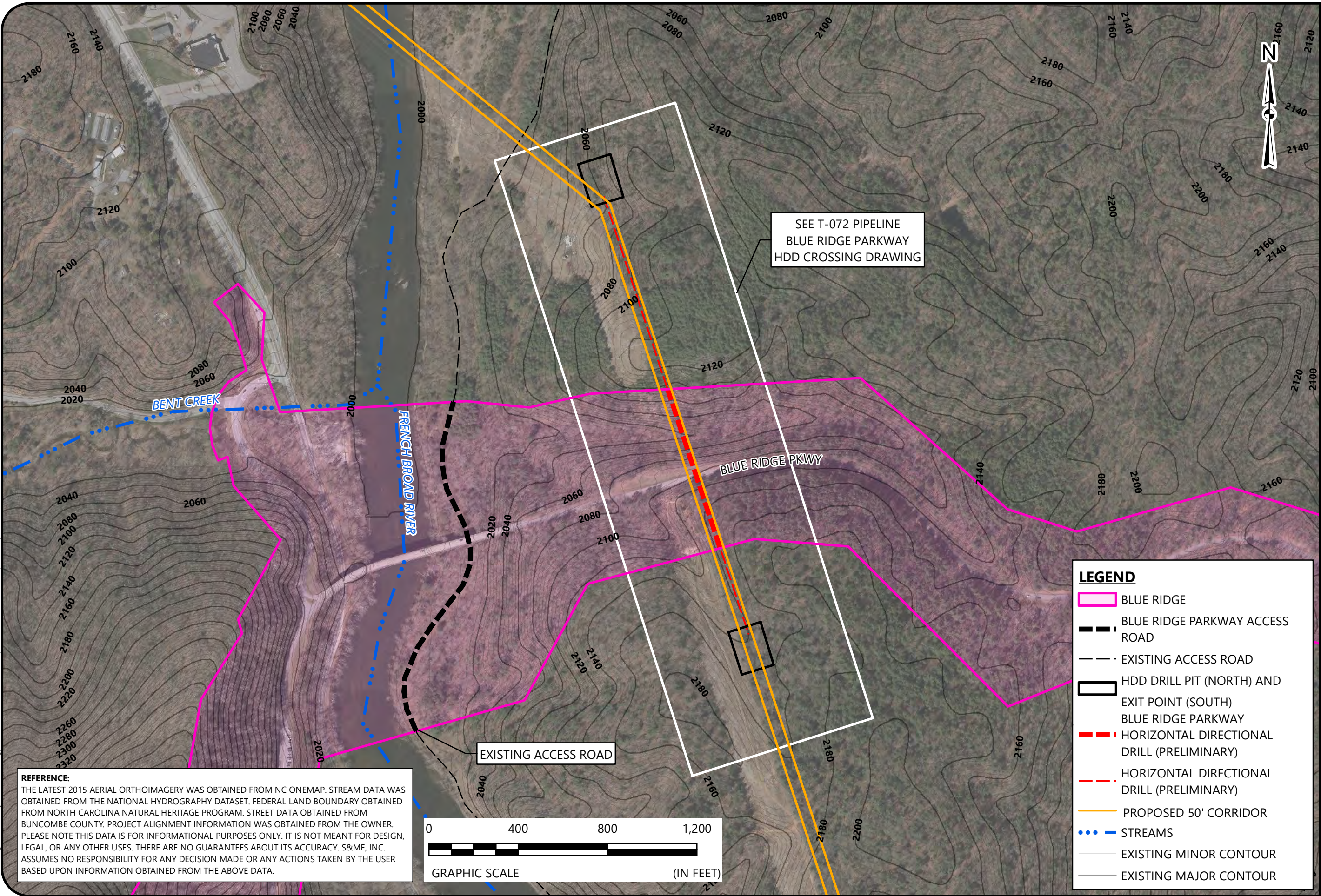
**REFERENCE:**

THE LATEST 2015 AERIAL ORTHOIMAGERY WAS OBTAINED FROM NC ONEMAP. STREAM DATA WAS OBTAINED FROM THE NATIONAL HYDROGRAPHY DATASET. FEDERAL LAND BOUNDARY OBTAINED FROM NORTH CAROLINA NATURAL HERITAGE PROGRAM. STREET DATA OBTAINED FROM BUNCOMBE COUNTY. PROJECT ALIGNMENT INFORMATION WAS OBTAINED FROM THE OWNER. PLEASE NOTE THIS DATA IS FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT MEANT FOR DESIGN, LEGAL, OR ANY OTHER USES. THERE ARE NO GUARANTEES ABOUT ITS ACCURACY. S&ME, INC. ASSUMES NO RESPONSIBILITY FOR ANY DECISION MADE OR ANY ACTIONS TAKEN BY THE USER BASED UPON INFORMATION OBTAINED FROM THE ABOVE DATA.



**LEGEND**

- BLUE RIDGE
- BLUE RIDGE PARKWAY ACCESS ROAD
- EXISTING ACCESS ROAD
- HDD DRILL PIT (NORTH) AND EXIT POINT (SOUTH) BLUE RIDGE PARKWAY
- HORIZONTAL DIRECTIONAL DRILL (PRELIMINARY)
- HORIZONTAL DIRECTIONAL DRILL (PRELIMINARY)
- PROPOSED 50' CORRIDOR
- STREAMS
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR



**2015 AERIAL ORTHOIMAGERY EXHIBIT**

DENC ENERGY  
T-072 PIPELINE BLUE RIDGE PARKWAY HDD CROSSING  
BUNCOMBE COUNTY, NORTH CAROLINA

SCALE:  
1" = 400'

DATE:  
6-11-18

PROJECT NUMBER:  
7435-18-003

FIGURE NO.

**2**

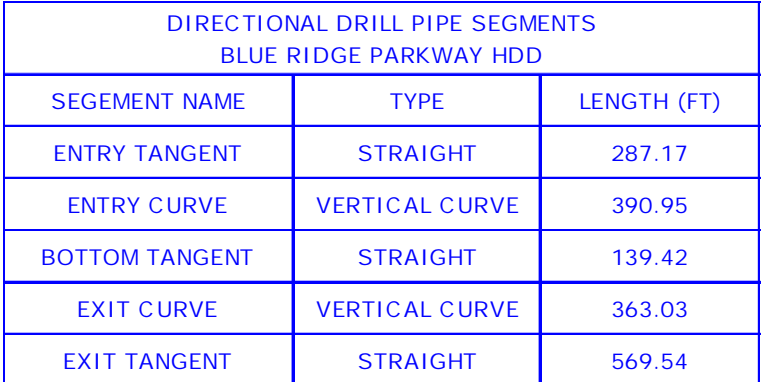




DIRECTIONAL DRILL DATA BLUE RIDGE PARKWAY HDD		
DESCRIPTION	* STATION (FT)	ELEVATION (FT)
ENTRY @ 14°	0+00.00	2092.00
PVC1 (14.00° @ 1,600 FT R.)	2+78.64	2022.53
PVT1	6+65.72	1975.00
PVC2 (13.00° @ 1,600 FT R.)	8+05.13	1975.00
PVT2	11+65.05	2016.01
EXIT @ 13°	17+20.00	2144.13
HORIZONTAL DISTANCE = 1,720.00 FT		
DIRECTIONAL DRILL PIPE LENGTH = 1,750.11 FT		

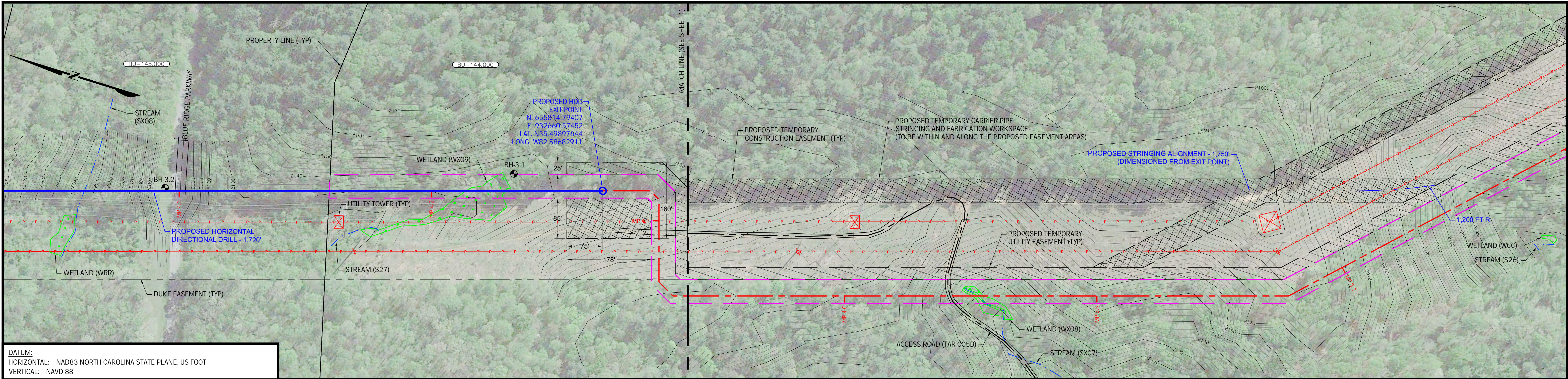
\* TOLERANCE SHALL BE MAINTAINED UNLESS OTHERWISE APPROVED BY THE COMPANY.

NOT FOR DISSEMINATION



127 West Chatham Street  
Cary, NC 27511  
Telephone (801) 307-0217



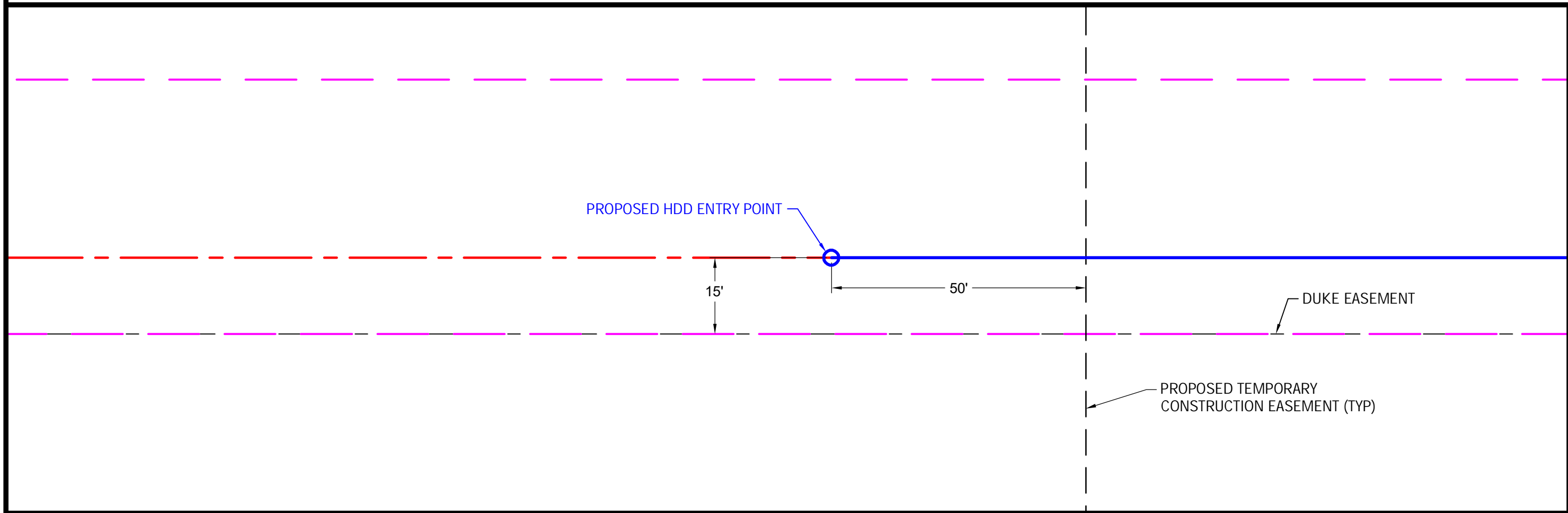


DATUM:  
HORIZONTAL: NAD83 NORTH CAROLINA STATE PLANE, US FOOT  
VERTICAL: NAVD 88



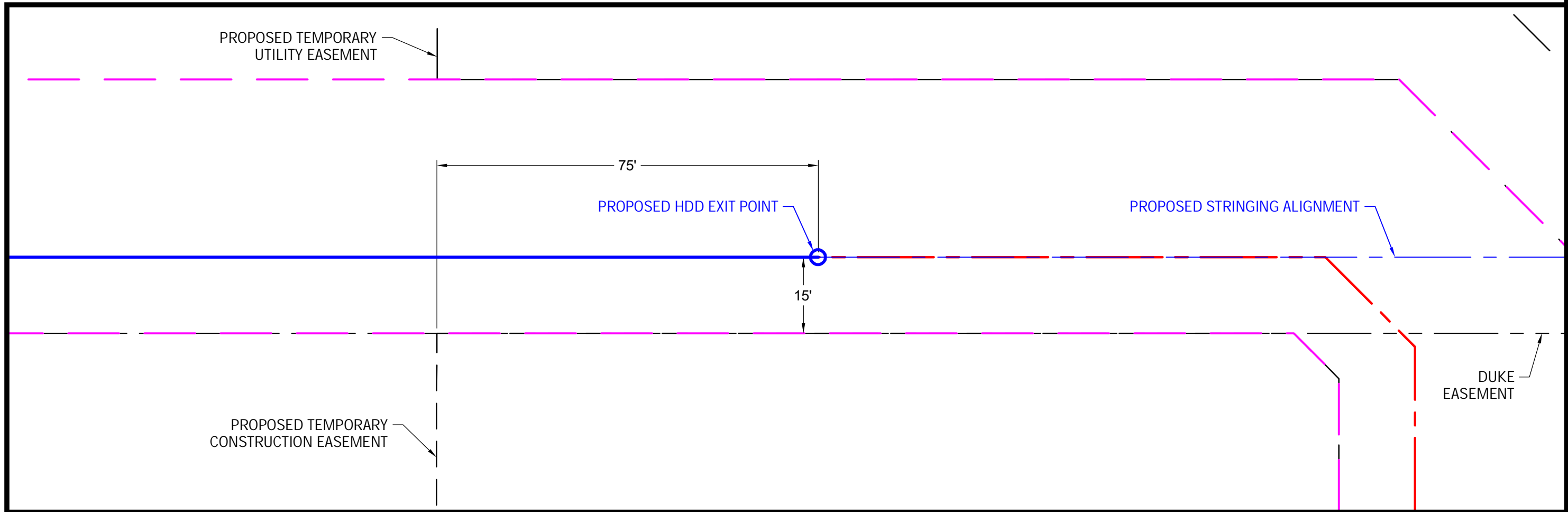
PLAN

SCALE IN FEET



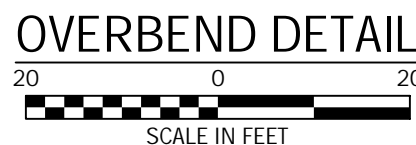
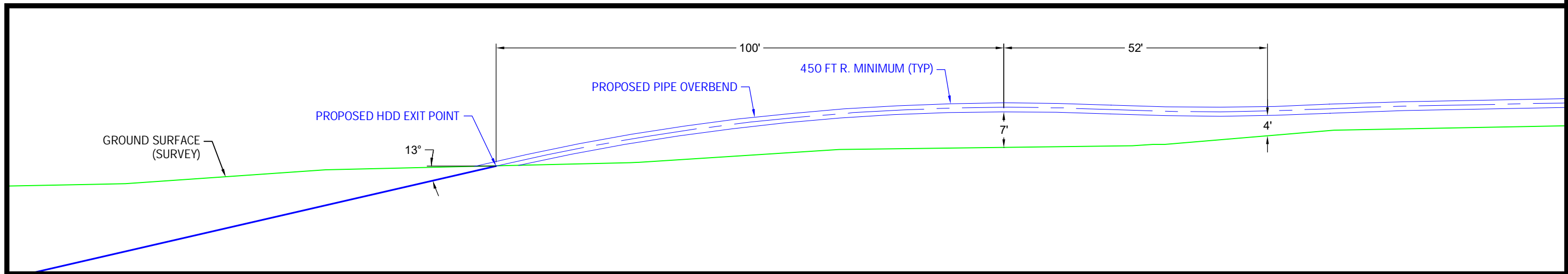
ENTRY DETAIL

SCALE IN FEET



EXIT DETAIL

SCALE IN FEET



OVERBEND DETAIL

SCALE IN FEET

NOTES:

- CONTRACTOR SHALL ADHERE TO THE SPECIFICATIONS AND REQUIREMENTS PER DOMINION ENERGY NORTH CAROLINA GAS SPECIFICATIONS, CONTRACT DOCUMENTS AND SPECIAL PERMIT CONDITIONS, EXCEPT AS NOTED ON THIS DRAWING.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND PROTECT ANY FOREIGN UTILITY THAT MAY BE AFFECTED BY THE HDD OPERATIONS.
- ALL EQUIPMENT MUST ACCESS THE SITE ALONG THE CONSTRUCTION RIGHT-OF-WAY OR FROM APPROVED ACCESS ROADS.
- BASE FILE, GROUND SURFACE AND SURVEY DATA PROVIDED BY DOMINION ENERGY NORTH CAROLINA GAS, AERIAL IMAGE TAKEN FROM GOOGLE EARTH PRO © 2021, LICENSED TO GEOENGINEERS, INC., IMAGE DATED 04/26/19.

LEGEND

- BORING LOCATION
- PROPOSED CENTERLINE
- PROPOSED UTILITY EASEMENT
- OVERHEAD POWER LINE
- POWER POLE
- MAJOR CONTOUR - 10' INTERVAL
- MINOR CONTOUR - 2' INTERVAL

NOT FOR CONSTRUCTION  
FOR DISCUSSION ONLY

REFERENCES		REVISIONS							
DRAWING NUMBER	REFERENCE DRAWING TITLE	NO.	DESCRIPTION	BY	DATE	CHK'D	DATE	APP'D	DATE
T-072_Workspace	WORKSPACE	0	ISSUED FOR CONSTRUCTION	BTL	12/04/20	TJP	12/04/20	TNH	12/04/20
T-072_Property	PROPERTY	1A	NOT FOR CONSTRUCTION - FOR DISCUSSION ONLY						
T-072_Land	TOPO SURVEY								
T-072_Easements	EASEMENTS								
T-072_Environmental	ENVIRONMENTAL								
T-072_Access_Road	ACCESS ROAD								
T-072_Centerline	PROPOSED CENTERLINE								

TJP	Design
11/22/19	Date
BTL	Drawn
11/22/19	Date

**GeoEngineers** **USA**

127 West Chatham Street  
Cary, NC 27511  
Telephone (801) 307-0217

DOMINION ENERGY NORTH CAROLINA GAS T-072 PROJECT BLUE RIDGE PARKWAY HDD HDD DESIGN STRINGING WORKSPACE / DETAILS BUNCOMBE COUNTY, NORTH CAROLINA		Project No. 22982-016-00
		Drawing No. 290667-33-003B
		Sheet 2 of 2



## **Appendix B - Scoping Letters**



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Asheville Field Office  
160 Zillicoa Street Suite #B  
Asheville, North Carolina 28801



July 17, 2020

Ms. Suzanne Knudsen  
Mr. Joey Lawler  
S&ME, Inc.  
9751 Southern Pine Boulevard  
Charlotte, North Carolina 28273

Dear Ms. Knudsen and Mr. Lawler:

Subject: Federally Listed Species Assessment, Dominion Energy North Carolina T-072 Natural Gas Pipeline Replacement Project, Buncombe County, North Carolina

On July 7, 2020, we received a letter (via e-mail) from you requesting our review and comments on the subject project. Included with your letter was a copy of the Protected Species Assessment for the project. We originally met with you, representatives from Dominion Energy North Carolina (DENC), and the US Army Corps of Engineers on February 28, 2018 to discuss the project and potential alignment of the replacement pipeline. We have reviewed the information you presented and are providing the following comments in accordance with the provisions of the National Environmental Policy Act (42 U.S.C. §4321 et seq.) (NEPA); the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e), and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act).

According to the information that you presented, DENC is proposing to replace an existing natural gas pipeline with a new 11.5-mile segment of 12-inch diameter steel natural gas pipeline. The pipeline is proposed to begin at Duke Energy's Asheville Energy Plant located in Arden, North Carolina, and end near the intersection of US Highway 23 and NC Highway 112 in Enka Village, North Carolina. Based on the proposed alignment, the pipeline will cross beneath the French Broad River at three locations. Two crossings of Interstate 26 are also proposed, along with a crossing of the Blue Ridge Parkway (BRPW) and Mountains to Sea Trail. Horizontal directional drilling (HDD) will be used at these crossings to avoid impacts. The proposed natural gas transmission line will result in thirty stream crossings and fourteen wetland crossings. Construction of the pipeline will result in temporary impacts during trench excavation, and maintenance of some portions of the corridor will result in permanent conversion of forested wetlands. The pipeline will be located within a new 50-foot wide permanent easement, with additional required temporary workspace. Phase 1 of the project, which will entail installation of approximately 0.8 mile of the new pipe, roughly from Sand Hill Road to a point north of Country

Meadows Drive on the east side of Hominy Creek, is scheduled to commence in November 2020. The remainder of the project (Phase 2) is scheduled to commence in March 2021.

**Federally Listed Species.** As indicated in your Protected Species Assessment included with your letter, the proposed project corridor contains potential suitable habitat for northern long-eared bat (*Myotis septentrionalis*) and Virginia spiraea (*Spiraea virginiana*), both of which are currently federally listed as a threatened species; as well as Appalachian elktoe (*Alasmidonta raveneliana*) and gray bat (*Myotis grisescens*) which are both currently federally listed as endangered species. You have made a “may affect, not likely to adversely affect” determination for each of these species and provided justification for your determination. We have reviewed the information you presented regarding the above listed species and their habitats within the project site. Our assessment for these species per section 7 of the Act are as follows:

Northern long-eared bat – Construction of the new 50-foot wide permanent easement and temporary work space for the project will require the removal of about 42-acres of forest. Forest clearing will result in the removal/loss of potential suitable summer roosting habitat for northern long-eared bat. However, the final 4(d) rule (effective as of February 16, 2016), exempts incidental take of northern long-eared bat associated with activities that occur greater than 0.25 miles from a known hibernation site, and greater than 150 feet from a known, occupied maternity roost during the pup season (June 1 – July 31). Based on the information provided, the project (which may or may not require tree clearing) would occur at a location where any incidental take that may result from associated activities is exempt under the 4(d) rule. **Although not required, we encourage you to avoid any associated tree clearing activities during the maternity roosting season from April 15 – October 15; and especially during the period of June 1 – July 31 when pups are typically non-volant.**

Virginia spiraea – Though Virginia spiraea once occurred throughout the area, the population that once occurred along Hominy Creek is believed to be extirpated. Currently, the species is known to occur in only a few areas in Buncombe County. No populations of Virginia spiraea are known to occur within the project corridor. S&ME personnel conducted surveys for this species at stream crossing locations and in areas of suitable habitat. According to the Protected Species Assessment, pockets of habitat occur in the project area however no individuals of Virginia spiraea were observed. For this reason, you have made a “may affect, not likely to adversely affect” determination for this species and we concur with your determination.

Appalachian elktoe – Appalachian elktoe occurs in the French Broad River and has been recently found in close proximity to the project corridor. Construction of the proposed pipeline will require three crossings of the French Broad River. To avoid impacts to the French Broad River, DENC is proposing to install the new gas pipeline under the river bed using HDD. Your “may affect, not likely to adversely affect” determination for Appalachian elktoe is based on the proposed use of HDD at all French Broad River crossing locations. We commend DENC for using HDD for these and other stream crossing locations. However, we recommend the following additional measures be implemented into the project plans to ensure that impacts to the French Broad River and Appalachian elktoe are completely avoided:

1. Develop a monitoring plan to be used during the HDD installation. An observer(s) should be stationed on the river to follow the drill as it bores under the river bed to watch

for evidence of potential frac-out (e.g., bubbles, slurry discharge). If evidence of frac-out is observed, operations should cease until further investigation demonstrates or measures are taken to ensure a frac-out will be avoided.

2. Establish a contingency plan to be executed should a frac-out or slurry discharge to the river occurs during HDD installation. The plan should contain steps to be taken if a frac-out occurs to minimize any adverse effects to aquatic resources.
3. If a frac-out occurs, this office should be contacted immediately to assess the potential impacts to Appalachian elktoe.
4. Ensure that construction of drilling pits are located so that sediment or accidental slurry spills will not reach surface waters. Adequate sediment and erosion control measures should be installed and maintained until drilling pits are closed out and stabilized.
5. Develop a monitoring plan that includes periodic inspections of stream crossing locations to assess for destabilization of stream banks. The work sites should be monitored at least every 3 months during the first 24 months and annually thereafter. Moreover, we recommend the development of a riparian monitoring and maintenance program that would outline procedures for the prompt stabilization of streambanks near the utility crossing (should any streambank erosion or destabilization occur) throughout the life of this project.

With the implementation of these additional measures, we believe the potential effects to Appalachian elktoe from project activities will be minimized to a discountable level and we can concur with your “may affect, not likely to adversely affect” determination for this species.

Gray bat – As mentioned in the Protected Species Assessment, a segment of the project will be constructed within ½-mile of a known gray bat colony. Because the project will require some forest clearing for the new easement, the project could result in the removal of a minor amount of potential foraging habitat. However, 1) no suitable roosting habitat was observed within the proposed easement; 2) a majority of the pipe will be installed in areas that are already cleared of woody vegetation; and, 3) efforts will be made to schedule a majority of the clearing outside of April 15 - October 15, during the period when the bats are expected to be more active. For these reasons, we concur with your “may affect, not likely to adversely affect” determination for gray bat.

Additionally, you have made a “no effect” determination for all other federally listed species known to occur in Buncombe County. We concur. For this reason, and given the conclusions in the preceding species determinations/assessments, we believe the requirements under section 7 of the Act are fulfilled. However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed or critical habitat is determined that may be affected by the identified action.

**Wetland/Stream Protection and Erosion Control** - We strongly recommend that stringent measures to control erosion be implemented prior to any ground disturbance and these measures should be maintained throughout project construction. Excavated material should not be stockpiled in an area or manner that would allow the material to erode into surface waters.

Grading and backfilling should be minimized, and existing native vegetation should be retained (if possible) to maintain riparian cover for fish and wildlife. Disturbed areas should be revegetated with native grass and tree species as soon as the project is completed. Ground disturbance should be limited to what will be stabilized quickly, preferably by the end of the workday. **Natural fiber matting (coir) should be used for erosion control as synthetic netting can trap animals and persist in the environment beyond its intended purpose.** Fertilizers and pesticides should not be used near streams.

**Project Recommendations** - We are concerned about the introduction and spread of invasive exotic species in association with the proposed project. Without active management, including the revegetation of disturbed areas with native species, project corridors will likely be sources of (and corridors for) the movement of invasive exotic plant species. Exotic species are a major contributor to species depletion and extinction, second only to habitat loss. Exotics are a factor contributing to the endangered or threatened status of more than 40 percent of the animals and plants on the *Federal List of Endangered and Threatened Wildlife and Plants*.<sup>1</sup> It is estimated that at least 4,000 exotic plant species and 2,300 exotic animal species are now established in the United States, costing more than \$130 billion a year to control.<sup>2</sup> Additionally, the U.S. Government has many programs and laws in place to combat invasive species (see [www.invasivespecies.gov](http://www.invasivespecies.gov)). Specifically, Section 2(a)(3) of Executive Order 13112 - Invasive Species (February 3, 1999) directs federal agencies to “not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.” Despite their short-term erosion-control benefits, many exotic species used in soil stabilization seed mixes are persistent once they are established, thereby preventing the reestablishment of native vegetation. Many of these exotic plants<sup>3</sup> are also aggressive invaders of nearby natural areas, where they are capable of displacing already-established native species. Therefore, we strongly recommend that only species native to the natural communities within the project area be used in association with all aspects of this project.

We also recommend that seeds for native plants that are beneficial to pollinators be included in the erosion control seed mixes. Pollinators, such as most bees, some birds and bats, or other insects, including moths and butterflies, play a crucial role in the reproduction of flowering plants and in the production of most fruits and vegetables. Over 75 percent of flowering plants and about 75 percent of crops are pollinated by these pollinators. A recent study of the status of pollinators in North America by the National Academy of Sciences found that populations of honey bees (which are not native to North America) and many wild pollinators are declining. Declines in wild pollinators are a result of loss, degradation, and fragmentation of habitat and disease; while declines in honey bees has also been linked to disease. Because loss of habitat and diminished native food sources have decreased the populations and diversity of pollinators throughout the country, we recommend that development projects be sited in areas that are

---

<sup>1</sup>D.S. Wilcove, D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. *BioScience* 48:607-615.

<sup>2</sup>D. Pimentel, L. Lach, R. Zuniga, and D. Morrison. 2000. Environmental and economic costs of nonindigenous species in the United States. *BioScience* 50:53-65.

<sup>3</sup>Lists of invasive exotic plants can be found at <http://www.tneppc.org/> and <http://www.invasive.org/eastern/srs/> (exotic wildlife links)

previously disturbed (fallow fields, closed industrial sites, etc.) or sites that do not impact mature forests, streams, or wetlands. To offset the overall impacts of development and/or to increase the habitat and species diversity within the project area, we further recommend the following measures be implemented into project design:

1. Throughout the site, sow native seed mixes with plant species that are beneficial to pollinators. Taller-growing pollinator plant species should be planted around the periphery of the site and anywhere on the site where mowing can be restricted during the summer months. Taller plants, not mowed during the summer, would provide benefits to pollinators, habitat to ground-nesting/feeding birds, and cover for small mammals. Low-growing/groundcover native species should be planted in areas that need to be maintained. This would provide benefits to pollinators while also minimizing the amount of maintenance, such as mowing and herbicide treatment. Using a seed mix that includes milkweed species (milkweed is an important host plant for monarch butterflies) is especially beneficial. The following Web site provides a comprehensive list of native plant species that benefit pollinators:

[http://www.xerces.org/wp-content/uploads/2014/09/MidAtlanticPlantList\\_web.pdf](http://www.xerces.org/wp-content/uploads/2014/09/MidAtlanticPlantList_web.pdf)

Additional information regarding plant species, seed mixes, and pollinator habitat requirements can be provided upon request. **Attachment 1** and **Attachment 2** of this letter include a sample upland and riparian mix that can be used in conjunction with a fast growing erosion control seed mix for overall soil stability and pollinator benefits. We also offer our assistance with developing seed mixes that can be used in conjunction with fast growing erosion control seed mix for overall soil stability and pollinator benefits.

2. Implement an easement mowing and maintenance program that restricts mowing during the summer months. Mowing at the site should be restricted to the smallest area possible to manage the edges of the easement for early successional habitat. We recommend that DENC evaluate its maintenance plan to target ecological/habitat benefits to other wildlife species, especially pollinators and birds that require early successional habitats. One of the best ways to accomplish this objective is to use Integrated Vegetation Management (IVM) practice using low-volume herbicide applications when planning management activities. Pollinator nest sites in ROWs managed with IVM practices have been found to contain about 30% more pollinator nesting sites and species richness than traditionally mowed maintenance areas. Aside from removing problem vegetation, the primary focus should be placed on establishing compact flowering shrubs and managing for native grasses and wildflowers. The overall objective is to reach a sustainable level of grasses, forbs, and flowering shrubs (wherever feasible) throughout the project area.

3. Provide nesting sites for pollinator species. Different pollinators have different needs for nesting sites. Therefore, we recommend managing the pipeline easements in a manner that creates or maintains a diverse array of habitats to accommodate varied pollinators, from hummingbirds to butterflies to bees. Hummingbirds typically nest in

trees or shrubs while many butterflies lay eggs on specific host plants. Most bees nest in the ground and in wood or dry plant stems. For additional information and actions that can be taken to benefit pollinators please visit the following Web site:

<http://www.fws.gov/pollinators/pollinatorpages/yourhelp.html>.

We appreciate the opportunity to provide these comments. If we can be of assistance or if you have any questions, please contact Mr. Bryan Tompkins of our staff at 828/258-3939, Ext. 42240. In any future correspondence concerning this project, please reference our Log Number 4-2-20-383.



### Attachment 1 – Sample Upland Meadow Seed Mix for NC Piedmont

This is an example upland pollinator seed mix that is suitable for the project site. This list is not an all-inclusive list nor does a pollinator planting project need to include all of these species. I can help to customize a seed mix for the project area which could decrease costs if requested.

- 20% Indiangrass, NC Ecotype (Sorghastrum nutans, NC Ecotype)
- 18% Beaked Panicgrass, SC Ecotype (Panicum anceps, SC Ecotype)
- 14% Little Bluestem, Piedmont NC Ecotype (Schizachyrium scoparium, Piedmont NC Ecotype)
- 10% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype)
- 6% Purpletop, Southeastern VA Ecotype (Tridens flavus, Southeastern VA Ecotype)
- 3% Bigtop Lovegrass, VA Ecotype (Eragrostis hirsuta, VA Ecotype)
- 3% Blackeyed Susan, Coastal Plain NC Ecotype (Rudbeckia hirta, Coastal Plain NC Ecotype)
- 2.5% Sensitive Pea, NC Ecotype (Chamaecrista nictitans, NC Ecotype)
- 2% Lanceleaf Coreopsis, Coastal Plain NC Ecotype (Coreopsis lanceolata, Coastal Plain NC Ecotype)
- 2% Spiked Wild Indigo, NC Ecotype (Baptisia albescens, NC Ecotype)
- 2% Winter Bentgrass, NC Ecotype (Agrostis hyemalis, NC Ecotype)
- 2% Slender Bushclover, VA Ecotype (Lespedeza virginica, VA Ecotype)
- 2% Scaly Blazing Star, VA Ecotype (Liatris squarrosa, VA Ecotype)
- 2% Appalachian Beardtongue, SC Ecotype (Penstemon laevigatus, SC Ecotype)
- 2% Wild Quinine, NC Ecotype (Parthenium integrifolium, NC Ecotype)
- 2% Slender Indiangrass, NC Ecotype (Sorghastrum elliottii, NC Ecotype)
- 1% Grassleaf Blazing Star, NC Ecotype (Liatris graminifolia (L. pilosa), NC Ecotype)
- 1% Mistflower, VA Ecotype (Eupatorium coelestinum (Conoclinium c.), VA Ecotype)
- 1% Splitbeard Bluestem, VA Ecotype (Andropogon ternarius, VA Ecotype)
- 1% Spotted Beebalm, Coastal Plain SC Ecotype (Monarda punctata, Coastal Plain SC Ecotype)
- 1% Orange Coneflower, Northern VA Ecotype (Rudbeckia fulgida var. fulgida, Northern VA Ecotype)
- 0.5% Late Purple Aster, NC Ecotype (Aster patens, NC Ecotype)
- 0.5% Wild Indigo, Coastal Plain SC Ecotype (Baptisia tinctoria, Coastal Plain SC Ecotype)
- 0.5% Anise Goldenrod, GA Ecotype (Solidago odora, GA Ecotype)
- 0.5% Gray Goldenrod, VA Ecotype (Solidago nemoralis, VA Ecotype)
- 0.5% Swamp (Narrowleaf) Sunflower, Coastal Plain NC Ecotype (Helianthus angustifolius, Coastal Plain NC Ecotype)

Total: 100%

**Attachment 2 – Sample Riparian Area Seed Mix**

• <i>Agrostis perennans</i>	Autumn bentgrass	11%
• <i>Andropogon gerardii</i>	Big Bluestem	7%
• <i>Elymus canadensis</i>	Canada wild rye	2%
• <i>Elymus virginicus</i>	Virginia wild rye	15%
• <i>Juncus effusus</i>	Soft Rush	4%
• <i>Panicum virgatum</i>	Switchgrass	11%
• <i>Schizachyrium scoparium</i>	Little Bluestem	5%
• <i>Sorghastrum nutans</i>	Indiangrass	6%
• <i>Tridens flavus</i>	Purple top	1%
• <i>Tripsacum dactyloides</i>	Eastern Gamagrass	6%
• <i>Achillea millefolium</i>	Common yarrow	3%
• <i>Asclepias tuberosa</i>	Butterfly weed	1%
• <i>Bidens aristosa</i>	Bidens	3%
• <i>Chamaecrista fasciculata</i>	Partridge pea	2%
• <i>Coreopsis lanceolata</i>	Lanceleaf Coreopsis	7%
• <i>Echinacea purpurea</i>	Cone flower	1%
• <i>Gaillardia pulchella</i>	Indian blanket	2%
• <i>Helianthus angustifolius</i>	Swamp sunflower	1%
• <i>Helianthus maximiliani</i>	Maximilian's sunflower	1%
• <i>Monarda punctata</i>	Spotted beebalm	1%
• <i>Rudbeckia hirta</i>	Blackeyed Susan	7%
• <i>Senna hebecarpa</i>	Wild senna	1%
• <i>Symphotrichum pilosum</i>	Heather aster	1%
• <i>Verbena hastata</i>	Blue vervain	1%

Total 100%



## ⊠ North Carolina Wildlife Resources Commission ⊠

---

Gordon Myers, Executive Director

August 3, 2020

Ms. Amanda Fuemmeler  
U.S. Army Corps of Engineers, Regulatory Branch  
151 Patton Avenue, Room 208  
Asheville, North Carolina 28801-5006

SUBJECT: DENC T-072 Replacement Project  
UTs to French Broad River, Hominy Creek, Clayton Creek, Boring Branch, Pond  
Branch & Wetlands, Buncombe County

Dear Ms. Fuemmeler:

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) reviewed an application for impacts associated with the Duke Energy North Carolina (DENC) T-072 Replacement Project, which include 1,312 ft of temporary impact and 43 ft of permanent impact to numerous named and unnamed tributaries (UTs) to the French Broad River including Hominy Creek, Clayton Creek, Boring Branch, and Pond Branch and tributaries to these streams, as well as 0.38 acre of temporary and 0.09 acre of permanent wetland impact in Buncombe County. Our comments on this application are offered for your consideration under provisions of the Clean Water Act of 1977 (33 U.S.C. 466 et. seq.) and Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

Wild trout would not be impacted by project activities, and a trout moratorium is not needed. However, the French Broad River supports a number of rare and listed species in the vicinity of the project crossings, including Appalachian Elktoe (*Alasmidonta raveneliana*, US and NC Endangered), Creeper (*Strophitus undulatus*, NC Threatened), Eastern Hellbender (*Cryptobranchus alleganiensis*, US Federal Species of Concern, NC Special Concern), and Blotched Chub (*Erimystax insignis*, NC Significantly Rare). Effective erosion and sediment control on the project are essential to minimize impacts to these species.

DENC intends to construct 11.5 miles of new gas pipeline within a new permanent 50-ft wide easement, with an additional 25-ft wide temporary workspace. The line would cross the French Broad River three times and Hominy Creek three times via horizontal directional drilling (HDD). Fifteen other stream crossings and numerous wetland crossings would be done via trench cut.

Wetlands will be crossed with timber mats where extensive rutting or soil disturbance is anticipated, and grubbing will be limited in wetlands. In riparian areas, grubbing will be limited to trench line

and travel lanes. Where practicable, wetland topsoil will be set aside during trenching for replacement afterwards and the wetland and 10-ft buffer outside of the wetland replanted with a native wetland seed mix. The streams will be trenched in the dry, with flows pumped around the work areas. Surficial stream substrate will be stockpiled and replaced in the stream bed. Banks will be restored to pre-construction contours, and coir matting and native riparian seed mix applied to a 50-ft wide riparian area.

We appreciate the applicant's coordination with NCWRC to avoid important wetland areas along the French Broad River as well as to perform surveys for bald eagles.

We offer the following recommendations to minimize impacts to terrestrial and aquatic wildlife:

1. Avoid equipment maintenance in the immediate vicinity of streams, make stream crossings as narrow as possible, minimize stream bank disturbance, avoid spraying of herbicides, and cut woody vegetation so that stumps can resprout.
2. Sediment and erosion controls measures should be installed prior to any land clearing or construction. These measures should be routinely inspected and properly maintained. Excessive silt and sediment loads can have numerous detrimental effects on aquatic resources including destruction of spawning habitat, suffocation of eggs, and clogging of gills of aquatic species.
3. Matting used for stabilization should be free of nylon or plastic mesh, as this mesh netting frequently entangles wildlife and is slow to degrade resulting in a hazard that may last for years.
4. The HDD crossings of the French Broad River and Hominy Creek involve a risk of frac-out. We request that the applicant develop a frac-out contingency and containment plan.
5. Any right-of-way vegetation maintenance work should generally be avoided between April 1 and October 1 to minimize impacts to ground nesting birds.
6. Where feasible, work within the existing easement to minimize impacts to terrestrial wildlife habitat. Avoid the removal of large trees at the edges of easement corridors. Use woody debris and logs from any corridor clearing to establish brush piles and downed logs adjacent to the cleared right-of-way to improve habitat for wildlife.
7. Re-seed all upland disturbed areas with seed mixtures that are beneficial to wildlife; avoid fescue based mixtures because fescue is invasive and provides little benefit to wildlife. Native mixes of grasses and herbaceous plants that emphasize pollinator species are recommended. Allowing the corridor area to re-vegetate into a brush/scrub habitat would maximize benefits to wildlife. For areas adjacent to residential areas, a native shrub/grass option may be beneficial.

Thank you for the opportunity to review and comment on this project. Please contact me at (828) 400-4223 if you have any questions.

Sincerely,



Andrea Leslie

Mountain Region Coordinator, Habitat Conservation Program

Ec: Bryan Tompkins, US Fish and Wildlife Service  
Andrew Moore, NC Division of Water Resources  
Joey Lawler, S&ME



# United States Department of the Interior

## NATIONAL PARK SERVICE

### SOUTHEAST ARCHEOLOGICAL CENTER

2035 E. Paul Dirac Drive  
Johnson Building, Suite 120  
Tallahassee, Florida 32310

IN REPLY REFER TO:

1.A.2

BLRI-2018-03  
SEAC-03006

October 18, 2018

Kimberly Nagle  
S&ME, Inc.  
134 Suber Road  
Columbia, South Carolina 29210

Dear Ms. Nagle:

Thank you for your report, "Phase I Archaeological Survey T-072 Pipeline Project – NPS Property Buncombe County, North Carolina," which I received on September 24, 2018 in partial fulfillment of ARPA Permit BLRI 2018-03 (accession number SEAC-03006). I appreciate the opportunity to review the results of your investigations. The park's Cultural Resource Manager, John McDade, also has reviewed the report and indicated that the park is satisfied with it. The report is accepted as part of the terms of ARPA permit BLRI 2018-03 (accession number SEAC-03006).

Please be aware that acceptance of your report is based on S&ME's compliance with the terms of the ARPA permit you were issued, and thus represents only one part of the compliance process. Acceptance of your report in partial fulfillment of the ARPA permit will not complete the compliance process.

SEAC and the Blue Ridge Parkway should each receive one unbound and two bound copies of the final report on archival paper (Special Permit Condition 10), as well as electronic copies of the reports. Although no artifacts were recovered, all other materials, including project documents, and GPS/GIS data, are due within 30 days of the submission of the final report. If you have not already done so, please contact SEAC GIS Coordinator Jill Halchin ([jill\\_halchin@nps.gov](mailto:jill_halchin@nps.gov) or 850-580-8249) about providing spatial data.

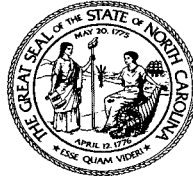
Please feel free to contact me if you have questions.

Sincerely,

David W. Morgan, Ph.D.  
Director and Regional Archeologist

cc: Superintendent J.D. Lee, BLRI  
John McDade, BLRI





**North Carolina Department of Natural and Cultural Resources  
State Historic Preservation Office**

Ramona M. Bartos, Administrator

Governor Roy Cooper  
Secretary Susi H. Hamilton

Office of Archives and History  
Deputy Secretary Kevin Cherry

July 23, 2020

Kimberly Nagle  
S&ME, Inc.  
134 Suber Road  
Columbia, SC 29210

[knagle@smeinc.com](mailto:knagle@smeinc.com)

Subject: T-072 Pipeline Project, from Arden to Enka Village, Asheville, Buncombe County, ER 18-0276

Dear Ms. Nagle,

Thank you for your June 16, 2020, letter transmitting the final report for the above-referenced undertaking. We have reviewed the report and offer the following comments.

No new archaeological resources were identified within the project area as it is currently proposed. We have accepted the submitted document as the final compliance report and concur that no further archaeological investigation is needed for this undertaking based on the proposed alignments.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comments, please contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or [environmental.review@ncdcr.gov](mailto:environmental.review@ncdcr.gov). In all future communication concerning this project, please cite the above-referenced tracking number.

Sincerely,

A handwritten signature in blue ink that reads "Renee Gledhill-Earley".

 Ramona Bartos, Deputy  
State Historic Preservation Officer





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Office of the Chief

**Chuck Hoskin Jr.**  
*Principal Chief*

**Bryan Warner**  
*Deputy Principal Chief*

September 18, 2020

Amanda Fuemmeler  
United States Army Corps of Engineers  
Asheville Regulatory Field Office  
151 Patton Avenue, Room 208  
Asheville, NC 28801-5006

Re: SAW-2020-01170, Dominion Energy North Carolina T-072 Replacement Project

Ms. Amanda Fuemmeler:

The Cherokee Nation (Nation) is in receipt of your correspondence about and related report for **SAW-2020-01170**, and appreciates the opportunity to provide comment upon this project. Please allow this letter to serve as the Nation's interest in acting as a consulting party to this proposed project.

The Nation maintains databases and records of cultural, historic, and pre-historic resources in this area. Our Historic Preservation Office reviewed this project, cross referenced the project's legal description against our information, and found no instances where this project intersects or adjoins such resources. Thus, the Nation does not foresee this project imparting impacts to Cherokee cultural resources at this time.

However, the Nation requests that the United States Army Corps of Engineers (USACE) halt all project activities immediately and re-contact our Offices for further consultation if items of cultural significance are discovered during the course of this project.

Additionally, the Nation requests that USACE conduct appropriate inquiries with other pertinent Tribal and Historic Preservation Offices regarding historic and prehistoric resources not included in the Nation's databases or records.

If you require additional information or have any questions, please contact me at your convenience. Thank you for your time and attention to this matter.

Wado,

Elizabeth Toombs, Tribal Historic Preservation Officer  
Cherokee Nation Tribal Historic Preservation Office  
[elizabeth-toombs@cherokee.org](mailto:elizabeth-toombs@cherokee.org)  
918.453.5389

## **Appendix C - Natural and Cultural Resources Report**





Natural and Cultural Resources  
Report  
Proposed PSNC T072 Natural Gas  
Pipeline Easement  
Blue Ridge Parkway - Asheville, NC  
S&ME Project No. 7435-18-003

**PREPARED FOR:**  
**PSNC Energy**  
**800 Gaston Road**  
**Gastonia, NC 28056**

**PREPARED BY:**  
**S&ME, Inc.**  
**9751 Southern Pine Boulevard**  
**Charlotte, NC 28273**



September 10, 2018

National Park Service  
Blue Ridge Parkway  
Road 199 Hemphill Knob  
Asheville NC 28803

Attention: Mr. David Anderson  
Resident Landscape Architect/GIS & GPS Coordinator  
[j\\_david\\_anderson@nps.gov](mailto:j_david_anderson@nps.gov)

**Reference: Natural and Cultural Resources Report**  
Proposed PSNC T-072 Natural Gas Pipeline Easement  
Blue Ridge Parkway  
Asheville, North Carolina  
S&ME Project No. 7435-18-003

Dear Mr. Anderson:

On behalf of our client, PSNC Energy (PSNC), S&ME, Inc. (S&ME) is pleased to provide the U.S. National Park Service with this report detailing findings of the natural and cultural resources assessments performed by in connection with the proposed natural gas transmission pipeline easement that will cross the Blue Ridge Parkway in Arden, Buncombe County, NC. The project area within which the assessments were performed consists of the footprint of the proposed 50-foot wide easement that will cross the BRP and adjacent NPS land approximately 1,200 feet east of the bridge over the French Broad River, and the portion of an existing access road that crosses NPS property below the bridge.

Thank you for your continued assistance with the proposed project. If you have questions or require additional information, please do not hesitate to contact Joey Lawler at 704.604.6474.

Sincerely,

**S&ME, Inc.**

Joey Lawler, PWS  
Natural Resources Project Manager

Kimberly Nagle, MS, RPA  
Senior Archaeologist/Project Manager

Senior Review by Jason Reeves, PE

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**Figure 1: Site Vicinity and USGS Topographic Map Exhibit**

**Figure 2: 2015 Aerial Orthoimagery Exhibit**

## **Appendices**

**Appendix I – HDD Profile Drawing (TRC Drawing No. 290667-33-003)**

**Appendix II – Resumes of Personnel Contributing to This Report**

**Appendix III – NCDEQ Stream Classification Form**

**Appendix IV - Site Photographs**

**Appendix V - Cultural Resources Exhibits**

## 1.0 Project Description

PSNC is proposing to install and operate of an underground natural gas transmission pipeline that will traverse across the Blue Ridge Parkway (BRPW) and adjacent National Park Service (NPS) property in Asheville, Buncombe County, NC (35.501232°N, -82.587782°) approximately 125 feet east of the Blue Ridge Parkway Bridge over the French Broad River. The purpose of the proposed project is to replace a segment of pipeline that is currently located next to a heavily-trafficked roadway, and to provide increased reliability and capacity to PSNC's service area.

The new pipeline will be located within a proposed 50-foot wide easement that crosses the NPS property in a perpendicular manner, and is adjacent to an existing Duke Energy transmission line easement. The location of the proposed easement, along with an existing access road that PSNC plans to use for access, is depicted on a USGS Topographic Map Exhibit (**Figure 1**) and a 2015 Aerial Photograph (**Figure 2**).

The pipeline will consist of 12-inch diameter steel piping, approximately 825 linear feet of which will be installed beneath NPS property no less than 30 feet below the ground surface. The length of pipe beneath the NPS property will be installed by horizontal directional drilling (HDD) with entry and exit points located outside of the NPS property boundaries. A profile drawing of the proposed HDD is included in **Appendix I**. No additional appurtenances or facilities are proposed for construction on the NPS property, and the easement should not be visible from the parkway. No grading, land clearing, tree removal or other land disturbances within the proposed easement on the NPS property are anticipated.

Equipment access to private property on the north side of the NPS will be provided by an existing private access road that passes beneath the French Broad River Bridge, and is generally not visible from the Parkway. The access road at this location is located in high ground and is well-maintained. The road is used regularly by owners of the private property adjoining the parkway for access, and Duke Energy uses the access road for maintenance activities associated with the portion of their utility easement north of the parkway. In the event that maintenance of the access road in this area is required, it should be limited to minor pruning of overhanging or encroaching branches, pothole repair or similar routine maintenance activities. Use of new or additional workspace outside the limits of the existing access road is not anticipated.

## 2.0 Assessment Methodology and Personnel Qualifications

### 2.1 Natural Resources Assessment

The natural resources assessment for the project area performed by S&ME consisted of a general assessment of the existing natural features present within and adjacent to the project area. Existing vegetative communities and suitability as potential habitat for protected species were documented.

S&ME also identified and delineated streams and wetlands within the project area. Wetlands were delineated in accordance with the guidelines provided in the 1987 US Army Corps of Engineers (USACE) Wetland Delineation Manual and the corresponding USACE Eastern Mountains and Piedmont Regional Supplement Guide. Accordingly, wetlands were evaluated based on three criteria: presence of hydric soils, wetland vegetation, and wetland hydrology. Streams were identified in accordance with USACE requirements and with the NC Department of Environmental Quality (NCDEQ) 2010 Intermittent and Perennial Stream Identification Guidelines. Relevant supporting information, including Geographic

Information Systems data, USGS Topographic Maps, Buncombe County Soil Survey, the U.S. Department of Agriculture publication Hydric Soils of the U.S., and representative aerial imagery, were also reviewed.

S&ME natural resources professionals demarcated wetland boundaries using a Global Positioning System (GPS) unit, and data required to complete the USACE Regional Data Forms was collected. Streams were identified as Relatively Permanent Waters (RPW), either seasonal (intermittent) or year-round (perennial) flow, or Traditionally Navigable Waters (TNW), and were similarly demarcated with a GPS unit.

## 2.2 Cultural Resources Assessment

Phase I archaeological investigations of the portion of the project corridor and access road located on NPS property included an intensive archaeological survey using both pedestrian survey and shovel testing techniques. Pedestrian survey was used to search for the presence of quarries, cemeteries, chimneys, earthworks and other above ground features, as well as artifacts lying on the ground surface. In addition to the pedestrian survey, shovel tests were placed at 20-meter (m) intervals along transects placed 20-m apart. In areas containing slope greater than 12 percent, shovel testing was replaced by pedestrian survey.

Shovel tests were at least 50 cm in diameter and excavated to at least 50 cm below surface (cmbs), except where subsurface conditions prevented it. Soil from the shovel tests was screened through 0.25-inch wire mesh. Had artifacts been found, additional shovel tests would be excavated at 10-m intervals to delineate site boundaries. The midpoint between the last positive shovel test and the first of the two negative tests would constitute a site boundary. Each shovel test location on NPS property was recorded with a GPS unit with sub-meter accuracy.

As there are no previously recorded archaeological sites within the portion of the proposed easement or access road located on NPS property, the focus of the study was the identification of previously unrecorded sites. However, because no new archaeological sites or artifacts were identified, a description of methods relating to the delineation of such sites, artifact recovery, reporting and curation is not necessary.

Primary S&ME personnel that performed the assessments were:

Investigator:	Joey Lawler, PWS
Education:	BS Biology, 1994
Experience:	Wetland Scientist, SEGI, Inc. 1995-2001; Natural Resources Project Manager, S&ME, 2001-2018
Project Role:	Jurisdictional delineation, natural community assessment, protected species assessment
Investigator:	Kimberly Nagle, MS, RPA
Education:	MS Archaeological Resource Management, 2002
Experience:	RPA since 2010; Cultural Resources Project Manager, S&ME, 2008-2018
Project Role:	Principal Investigator for cultural resource investigations

Additional S&ME personnel who contributed to the assessment through performance of fieldwork or data collection/documentation were Marshall Bagley, Ashley Bentz, Paul Connell, Amy Moore and Ron Walker. Resumes detailing the qualifications of personnel who contributed are included in **Appendix II**.

## 3.0 Natural Resources

### 3.1 Soils

Based on review of the 2009 Buncombe County Soil Survey, soil types mapped within the proposed easement are limited to the following:

- Clifton sandy loam, 8 to 15 percent slopes
- Clifton sandy loam, 15 to 30 percent slopes
- Evard-Cowee complex, 30 to 50 percent slopes, moderately eroded
- Tate loam, 15 to 30 percent slopes

Soils within the portion of the proposed access road that crosses the NPS property are limited to:

- Iotla loam, 0 to 2 percent slopes, occasionally flooded
- Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded

PSNC does not propose to conduct land-disturbing activities within the proposed easement. The existing access road segment located on the NPS appears in good condition and improvements requiring grading or earth-moving operations should not be necessary. Therefore, soils within the NPS should not be affected by the project.

### 3.2 Jurisdictional Surface Waters

One jurisdictional stream is present within the proposed easement. The stream is located on the north side of the parkway, approximately 160 feet north of the edge of pavement. The stream is a first order unnamed tributary to the French Broad River (NCDEQ Index No. 6-(54.75), Class C), which is located approximately 1,200 feet east of the proposed easement. The stream is considered a relatively permanent water with perennial (year-round) flow. No wetlands or other surface waters were observed within the proposed easement footprint, nor within the segment of the existing access road that crosses the NPS property. Because PSNC does not propose to conduct any clearing or land-disturbing activities within the proposed easement, jurisdictional surface waters should not be affected by the project.

An NCDEQ Stream Classification Form prepared for the stream is included in **Appendix III**.

### 3.3 Natural Communities

#### 3.3.1 Northern Hardwood Forest

This community type is present in wooded portions of the proposed easement both north and south of the parkway. These areas consist of a generally closed canopy dominated by various hardwood species and white pine (*Pinus strobus*). Overstory species observed within these areas included white oak (*Quercus alba*), rock chestnut oak (*Q. prinus*), northern red oak (*Q. rubra*), shortleaf pine (*Pinus echinata*), American beech (*Fagus grandifolia*), red maple (*Acer rubrum*), sourwood (*Oxydendrum arboreum*) and black cherry (*Prunus serotina*). Understory species observed included multiflora rose (*Rosa multiflora*) and common persimmon (*Diospyros virginiana*). Herbaceous species observed included Christmas fern (*Polystichum acrostichoides*), little brown jug (*Hexastylis arifolia*), wild violet (*Viola* sp.), Indian cucumber (*Medeola virginiana*) and rattlesnake plantain (*Goodyera pubescens*). Vines observed included grape (*Vitis* sp.), and Oriental bittersweet (*Celastrus orbiculatus*).

### 3.3.2 *Rich Cove Forest*

This community type is present along the stream that flows through the northern portion of the proposed easement. This area is distinguished from the adjacent hardwood forest area by the dense herbaceous layer. Overstory species observed in this area included white oak, red maple, white ash (*Fraxinus Americana*), tulip tree (*Liriodendron tulipifera*) and mockernut hickory (*Carya tomentosa*). Understory species included mountain laurel (*Kalmia latifolia*), ironwood (*Carpinus caroliniana*), white pine, flowering dogwood (*Cornus florida*), American holly (*Ilex opaca*), spicebush (*Lindera benzoin*), Japanese silverbell (*Elaeagnus umbellata*) and Chinese privet (*Ligustrum sinense*). Herbaceous species included Japanese stilt grass (*Microstegium vimineum*), giant cane (*Arundinaria gigantea*), yellowroot (*Xanthorrhiza simplicissima*), cinnamon fern (*Osmundastrum cinnamomeum*), Christmas fern, lady fern (*Athyrium filix-femina*) and false Solomon's seal (*Maianthemum racemose*). Vines included poison ivy (*Toxicodendron radicans*), grape, Oriental bittersweet and hog peanut (*Amphicarpaea bracteata*).

### 3.3.3 *White Pine Forest*

A small portion of the easement near the northern boundary of the proposed easement, along with an area near the existing access road, is characterized by this community type. Overstory species observed in this area are dominated by white pine, but also included scattered hardwood species, including tulip tree and black cherry. Blackberry (*Rubus allegheniensis*), Russian olive (*Elaeagnus angustifolia*) and multiflora rose were observed among the understory. Otherwise, the understory and herbaceous layers were sparse.

### 3.3.4 *Roadside Areas*

Roadside areas consist of herbaceous species and are generally free of overstory vegetation. Species typical of this habitat type include goldenrod (*Solidago* spp.), white clover (*Trifolium repens*), little bluestem (*Schizachyrium scoparium*), orchard grass (*Dactylis glomerata*), ox-eye daisy (*Leucanthemum vulgare*), bulbous buttercup (*Ranunculus bulbosus*), vernal grass (*Anthoxanthum odoratum*), Allegheny blackberry, annual ragweed (*Ambrosia artemisiifolia*), wineberry (*R. phoenicolasius*), dandelion (*Taraxacum officinale*) and Queen Anne's lace (*Daucus carota*).

Photographs of typical conditions observed within the proposed easement are included in **Appendix IV**.

## 3.4 *Terrestrial and Aquatic Wildlife*

Based on the habitat present within the proposed easement, terrestrial mammalian wildlife that may utilize the area include the following: black bear, eastern chipmunk, eastern cottontail, gray squirrel, groundhog, Virginia opossum, white-footed mouse and whitetail deer. Common bird species include the American crow, American robin, blue jay, brown thrasher, Carolina chickadee, eastern meadowlark, killdeer, cardinal, red-tailed hawk, turkey vulture and wild turkey. Reptile and amphibian species include American toad, copperhead snake, eastern box turtle, eastern fence lizard, five-lined skink, marbled salamander, rat snake, spotted salamander, timber rattlesnake and wood frog.

Aquatic wildlife that may be present within the proposed easement, specifically the perennial stream, include a number of fish species including fantail darter, redline darter, sunfish and Tennessee shiner. Salamanders include Blue Ridge two-line salamander, northern dusky salamander and three-lined salamander. Benthic macroinvertebrates, including various caddisfly, mayfly and stonefly larvae, are also likely present within the stream.



Because PSNC does not propose to conduct any clearing or land-disturbing activities within the proposed easement, terrestrial and aquatic wildlife should not be affected by the project.

### 3.5 Federally Protected Species

S&ME reviewed the U.S. Fish and Wildlife Service (USFWS) list of protected species for Buncombe County, and conducted a search of the North Carolina Natural Heritage Program (NCNHP) database to identify element occurrences (EOs) of federally-protected species listed as potentially occurring near the proposed easement. Additionally, S&ME personnel conducted multiple pedestrian field reviews of the proposed easement site in conjunction with the delineation to locate potential habitat or the presence of protected terrestrial species that were identified through the records review. The assessment did not include sampling or a habitat assessment for aquatic or state-listed species.

The most recent NCNHP report (August 20, 2018) identified one record of bog turtle (*Glyptemys muhlenbergii*) that was identified within one mile of the proposed easement. The proposed easement does not contain habitat suitable for bog turtle. In addition, this species is classified as *threatened due to similarity of appearance*, and as such, is not biologically threatened or subject to Section 7 consultation.

Aside from the NPS property itself, the NCNHP report did not identify important natural communities, natural areas, conservation areas or federally-protected species documented within the proposed easement. The closest natural area (Sandy Bottom Preserve) is mapped on the west side of the French Broad River, approximately 2,000 feet southwest of the proposed easement.

The FWS list of federally-protected species listed for Buncombe County is provided in Table 1. Descriptions of the relevant species taken from FWS profiles are also listed below.

**Table 1. Federally Protected Species for Buncombe County**

Scientific Name	Common Name	Federal Status	Biological Determination
<i>Alasmidonta raveneliana</i>	Appalachian Elktoe	E	No Effect
<i>Bombus affinis</i>	Rusty Patch Bumblebee	E	No Effect
<i>Epioblasma florentina walkeri</i>	Tan Riffleshell	E	No Effect
<i>Erimonax monachus</i>	Sporfin Chub	T	No Effect
<i>Geum radiatum</i>	Spreading Avens	E	No Effect
<i>Glaucomys sabrinus coloratus</i>	Carolina Northern Flying Squirrel	E	No Effect
<i>Glyptemys muhlenbergii</i>	Bog Turtle	T (S/A)	No Effect
<i>Gymnoderma lineare</i>	Rock Gnome Lichen	E	No Effect
<i>Microhexura montivaga</i>	Spruce-fir Moss Spider	E	No Effect
<i>Myotis grisescens</i>	Gray Bat	E	No Effect
<i>Myotis septentrionalis</i>	Northern Long-eared Bat	T	No Effect
<i>Sagittaria fasciculata</i>	Bunched Arrowhead	E	No Effect
<i>Sarracenia rubra</i> spp. <i>jonesii</i>	Mountain Sweet Pitcher Plant	E	No Effect
<i>Solidago spithamea</i>	Blue Ridge Goldenrod	T	No Effect
<i>Spiraea virginiana</i>	Virginia Spiraea	T	No Effect

E = Endangered; T = Threatened; T(S/A) = Threatened due to Similarity of Appearance.

### 3.5.1 *Appalachian Elktoe*

Appalachian elktoe (*Alasmidonta raveneliana*) is a freshwater mussel. The Appalachian elktoe has a thin, kidney-shaped shell, extending to about 4 inches. Juveniles generally have a yellowish-brown periostracum (outer shell surface), while the periostracum of the adults is usually dark brown to greenish-black in color. Although rays are prominent on some shells, particularly in the posterior portion of the shell, many individuals have only obscure greenish rays. The shell nacre (inside shell surface) is shiny, often white to bluish-white, changing to a salmon, pinkish, or brownish color in the central and beak cavity portions of the shell; some specimens may be marked with irregular brownish blotches.

This species is probably quite sessile with only limited movement through the substrate. Passive downstream displacement may occur when mussels are dislodged from the substrate during floods. Major dispersal occurs while the larvae (glochidia) are encysted on their hosts.

This mussel has been found in gravelly substrate, often mixed with cobble and boulder, or in cracks in bedrock. Water depths typically have been shallow, and current velocities have varied from moderate to fast. They are reported from shallow, medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate to fast-flowing water. Most often in riffles, runs, and shallow flowing pools with stable, relatively silt-free, coarse sand and gravel substrate with cobble, boulders, and/or bedrock. Stability of substrate is critical.

Glochidia of freshwater mussels generally are parasitic on fish and display varying degrees of host specificity. No host is known for this species. No specific trophic studies have been conducted on this species. General literature claims that mussels are filter-feeders which remove phytoplankton from the water column. These assumptions appear to be based on casual observations of mussels in situ and a few examinations of rectal contents.

The proposed easement does not contain suitable habitat for this species. Accordingly, it is unlikely to be affected by the proposed project.

### 3.5.2 *Rusty Patched Bumblebee*

Historically, the rusty patched bumble bee was broadly distributed across the eastern United States. They once occupied grasslands and tallgrass prairies of the Upper Midwest and Northeast, but most grasslands and prairies have been lost, degraded, or fragmented by conversion to other uses. Bumble bees need areas that provide nectar and pollen from flowers, nesting sites (underground and abandoned rodent cavities or clumps of grasses), and overwintering sites for hibernating queens (undisturbed soil).

Rusty patched bumble bees live in colonies that include a single queen and female workers. The colony produces males and new queens in late summer. Queens are the largest bees in the colony, and workers are the smallest. All rusty patched bumble bees have entirely black heads, but only workers and males have a rusty reddish patch centrally located on the back.

This species is listed as a historic occurrence for Buncombe County, and may be an extant record.

### 3.5.3 *Tan Riffleshell*

Tan riffleshell is a medium-sized freshwater mussel with a dull brownish-green to yellowish-green shell with numerous, evenly-distributed faint green rays. Its reproductive cycle is similar to that of other mussels. Historically, its distribution was limited to the Cumberland and Tennessee River systems.

This species may even be the only remaining representative of the genus subspecies *E. florentina*, with the only known reproducing population found on a 1.2-mile reach of Indian Creek, a tributary to the Clinch River in southwest Virginia. Tan riffleshells inhabit sand and gravel river bottom and are usually found in shallow water at the source of a river, stream, creek, or where shallow water runs swiftly.

The proposed easement does not contain suitable habitat for tan riffleshell. Given its limited known distribution, and the fact that this species is listed as a historic/obscure record for Buncombe County, it is unlikely to be affected by the proposed project.

### 3.5.4 *Spotfin Chub*

Spotfin chub is a small, freshwater fish (chub or shiner) ranging from two to 3.5 inches in length. Spawning possibly begins in late May and extends into July or August. Nuptial adults have been taken from mid-May to mid-August, and spawning has been observed at temperatures of 78-80 F. Females probably produce several clutches of eggs in a single season. The fish mature in two years (some may spawn at one year), and live three years at most.

Adults and young eat mainly benthic immature aquatic insects, largely small chironomids and simuliids, plus some mayfly nymphs and caddisfly larvae. Habitat includes cool and warm, typically clear, large creeks or medium-sized rivers of moderate gradient, in upland and montane areas, generally in or near moderate and swift currents over gravel to bedrock, rarely over sand or silt. Eggs are laid in stone cracks, crevices, or in the narrow interface of two touching rocks. Jenkins and Burkhead reported breeding sites in moderate current of shallow portions of runs, in areas strewn with unsilted rubble and boulders.

The proposed easement does not contain suitable habitat for spotfin chub, and species is listed only as a historic record for Buncombe County. Accordingly, is not anticipated that this project will affect populations of this species.

### 3.5.5 *Spreading Avens*

Spreading avens is a perennial herb with stems that grow up to 20 inches tall from a large basal rosette of leaves. The stems are topped with showy, bright yellow flowers during most of the summer. There is no other *Geum* in the southeastern U.S. that remotely resembles this species. It is taxonomically closest to *G. peckii*, a species whose southernmost range is in the White Mountains of New Hampshire - about 900 km north of spreading aven's range.

This species inhabits exposed, high elevation areas in the southern Appalachians, primarily in the crevices of northwest-facing cliffs. It is also found at the bases of talus slopes, or, rarely, in openings in heath balds, only at elevations over 4,300 feet.

The proposed easement does not contain suitable habitat for the above species, and no individuals of this species were observed. Accordingly, is not anticipated that this project will affect populations of this species.

### 3.5.6 *Carolina Northern Flying Squirrel*

The northern flying squirrel can be distinguished from the southern flying squirrel by its larger size; the gray base of its ventral hairs as opposed to a white base in the southern species; the relatively longer upper tooth row; and the short, stout baculum (penis bone) of the males. This small squirrel is highly social, especially in winter, when nests may be shared. They apparently live in family groups of adults and juveniles. Summer home range was estimated at four-to-seven acres in North Carolina. The gestation period lasts 37-42 days, and one litter per year, in spring or summer, is produced. Young are weaned at about two months.

The squirrel inhabits cool, moist conifer and mixed forests with standing snags/hollow trees, but will also utilize deciduous and riparian woods. It occupies tree cavities, leaf nests, and underground burrows. Small outside twig nests are sometimes used for den sites.

The squirrel is nocturnal, and spends considerable time foraging on ground. Peak activity occurs from sunset to two hours after and one hour before sunrise. They are active throughout the year.

The proposed easement does not contain suitable habitat for the above species, and no individuals of this species were observed. Accordingly, it is not anticipated that this project will affect populations of this species.

### 3.5.7 *Bog Turtle*

Characteristics of this small turtle include a light brown to black carapace (may have yellowish or reddish areas on large scutes), strongly sculptured with growth lines, and an inconspicuous keel. The plastron is mainly dark brown to black, the head is brown, with a large yellow or orange (sometimes red) blotch above and behind the tympanum (blotch may be divided). The adult carapace length is usually three to 3.5 inches. The male vent is posterior to the rear edge of the carapace and the plastron is concave (flat in female). Bog turtle differs from the spotted turtle (a few of which lack yellow dots on the carapace) by having a large orange patch on each side of the head rather than many small yellow or orange spots on the head and neck; also, the bog turtle has prominent growth lines on the carapace (most, but not all, spotted turtles have a smooth carapace).

Bog turtles inhabit slow, shallow, muck-bottomed rivulets of sphagnum bogs, calcareous fens, marshy/sedge-tussock meadows, spring seeps, wet cow pastures, and shrub swamps; the habitat usually contains an abundance of sedges or mossy cover. The turtles depend on a mosaic of microhabitats for foraging, nesting, basking, hibernation, and shelter. Unfragmented riparian systems that are sufficiently dynamic to allow the natural creation of open habitat are needed to compensate for ecological succession. Beaver, deer, and cattle may be instrumental in maintaining the essential open-canopy wetlands. Bog turtles commonly bask on tussocks in the morning in spring and early summer. They burrow into soft substrate of waterways, crawl under sedge tussocks, or enter muskrat burrows during periods of inactivity in summer.

The proposed easement does not contain suitable habitat for this species, and no individuals of this species were observed. Further, species that are threatened due to similarity of appearance are not biologically threatened, and are not subject to Section 7 consultation. Accordingly, it is not anticipated that this project will affect populations of this species.

### 3.5.8 *Rock Gnome Lichen*

Rock gnome lichen is one of two lichens on the federal list of threatened and endangered species, and the only member of the genus *Gymnoderma* to live in North America. Rock gnome lichen occurs in dense colonies of narrow strap-like lobes that are about 0.04 inch across and generally one to two cm long. These lobes are blue gray on the terminal upper surface, and generally shiny white on the lower surface, grading to black near the base. The fruiting bodies are born on the tips of these lobes, are black, and have been found from July through September. The primary means of propagation appears to be asexual, with colonies spreading clonally.

This species occurs on shady or moss-covered rock. Further, it is "found in areas of high humidity, either on high-elevation cliffs, where it is frequently bathed in fog, or in deep river gorges at lower elevations. It is primarily limited to vertical rock faces, where seepage water from forest soils above flows at (and only at) very wet times, and large stream side boulders, where it receives a moderate amount of light but not high-intensity solar radiation. It is threatened by habitat change, especially due to loss of Fraser-fir forests and by heavy recreational use of its habitat.

The proposed easement does not contain suitable habitat for rock gnome lichen, and no individuals of this species were observed. Accordingly, it is not anticipated that this project will affect populations of this species.

### 3.5.9 *Spruce-fir Moss Spider*

The spruce-fir moss spider is one of the smallest members of the primitive suborder of spiders that are often popularly referred to as "tarantulas." Adults of this species measure only 0.10 to 0.15 inch. Coloration of the spruce-fir moss spider ranges from light brown to yellow-brown to a darker reddish brown, and there are no markings on its abdomen. The most reliable field identification characteristics for the spruce-fir moss spider are chelicerae that project forward well beyond the anterior edge of the carapace, a pair of very long posterior spinnerets, and the presence of a second pair of book lungs, which appear as light patches posterior to the genital furrow. The spruce-fir moss spider is known to occur only from red spruce forest communities of the highest elevations of the southern Appalachian Mountains. Typical habitat of this spider is found in damp, but well-drained, moss mats growing on rock outcrops and boulders in well shaded forests.

Based on the lack of suitable habitat within the proposed easement, it is not anticipated that this project will adversely affect populations of this species.

### 3.5.10 *Gray Bat*

Gray bat has unicolored dorsal fur (gray after the mid-summer molt, at other times sometimes chestnut brown or russet), paler below, with hairs darker basally; wing membrane (gray) connects to the foot at the ankle. There is a distinct sagittal crest on the skull. Gray bat is most likely to be confused with *M. lucifugus*, *M. sodalis*, *M. austroriparius*, and *M. septentrionalis*. It is distinguished from these by uniform-colored dorsal fur from base to tip (all others have contrasting shades, bi- or tri-colored dorsal fur) and by attachment of wing membrane at the ankle, not at base of toe.

Mating occurs in September-October. Adult females store sperm through the winter and become pregnant soon after emergence from hibernation. One young is born late in May or in early June (reported as mid-June for Oklahoma; flying as early as late June or early July). Larger colonies are more successful in raising young. Most young are able to fly in 20-35 days, depending on colony size.

Individual females typically do not produce young until their second year. Recorded maximum longevity approximately 14-17 years but may be longer. Maternity colonies include from a few hundred to many thousands of individuals.

The bats forage in loose groups, but become territorial when insect numbers decrease, and territories seem to be controlled by reproductively-active females.

Wintering caves often are hundreds of kilometers from summer range. Individuals regularly migrate 10-270 miles between summer maternity sites and winter hibernacula. In some areas, the same caves are used in winter and summer; in other areas (e.g., Missouri, Arkansas) many caves used in summer are vacant in winter. Most Florida breeders migrate north to hibernate in cooler caves of northern Alabama and central Tennessee; migration occurs mostly in September-October, some as late as November or December. Females depart wintering caves in late March and early April, males in late April and May. Evidence suggests that bats migrate in small flocks (Barbour and Davis 1969). Small caves may be used as rest stops. Gray bats show strong philopatry to both summering and wintering sites.

Roost sites are nearly exclusively restricted to caves throughout the year, though only a few percent of available caves are suitable. Winter roosts are in deep vertical caves with domed halls. Large summer colonies utilize caves that trap warm air and provide restricted rooms or domed ceilings; maternity caves often have a stream flowing through them and are separate from the caves used in summer by males.

In the summer, maternity colonies prefer caves that act as warm air traps or that provide restricted rooms or domed ceilings that are capable of trapping the combined body heat from thousands of clustered individuals. Undisturbed summer colonies may contain up to 250,000 bats, and average 10,000 to 25,000. Summer caves are nearly always located within 0.6 mile of a river or reservoir over which the bats forage.

Young often feed and take shelter in forest areas near the entrance to cave roosts. Foraging is generally parallel to streams, over the water at heights of 6 to 9 feet. The energy demands on adult females are tremendous during lactation, and individual females sometimes feed continuously for seven or more hours per night. They feed mostly upon flying insects, including mayflies and beetles.

Suitable habitat for grey bat was not observed within the proposed easement. Accordingly, the project should not affect this species.

### 3.5.11 *Northern Long-eared Bat*

The northern long-eared bat is a medium-sized bat about 3 to 3.7 inches in length but with a wingspan of 9 to 10 inches. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*, which are actually bats noted for their small ears (*Myotis* means mouse-eared). The species' range includes 37 states. White-nose syndrome, a fungal disease known to affect bats, is currently the predominant threat to this bat, especially throughout the Northeast where the species has declined by up to 99 percent from pre-white-nose syndrome levels at many hibernation sites. Although the disease has not yet spread throughout the northern long-eared bat's entire range (white-nose syndrome is currently found in at least 25 of 37 states where the northern long-eared bat occurs), it continues to spread. Experts expect that where it spreads, it will have the same impact as seen in the Northeast.

This bat generally is associated with old-growth forests composed of trees 100 years old or older. It relies on intact interior forest habitat, with low edge-to-interior ratios. Relevant late-successional forest features include a high percentage of old trees, uneven forest structure (resulting in multilayered vertical

structure), single and multiple tree-fall gaps, standing snags, and woody debris. These late successional forest characteristics may be favored for several reasons, including the large number of partially dead or decaying trees that the species uses for breeding, summer day roosting, and foraging. Small, highly fragmented, or young forests that provide limited areas of subcanopy foraging habitat may not be suitable. Young forests may also lack appropriate nursery sites. However, recent studies indicate that these bats can exploit relatively isolated and small forest fragments.

Foraging occurs within forests, along forest edges, over forest clearings, and occasionally over ponds. Eleven individuals (10 males, 1 female) tagged with chemical lights observed during the summer in Missouri, foraged almost exclusively among the trees of hillside and ridge forests, rather than utilizing floodplain and riparian forests; frequently foraging occurred within 1 to 3 m of the ground. Foraging bats doubled back frequently and only slowly moved out of the observation area. In Iowa, females were found primarily foraging in mature deciduous uplands with adjacent deep ravines and in a disturbed riparian area with an adjacent floodplain and agricultural lands.

Hibernation occurs primarily in caves, mines, and tunnels, typically those with large passages and entrances, relatively constant and cool temperatures, high humidity, and no air currents. Hibernators frequently roost in crevices, drill holes, and similar sites where they may be overlooked during surveys, but roosting in the open is not uncommon. A lack of suitable hibernacula may prevent occupancy of areas that otherwise have adequate habitat.

Most nursery colonies are in cavities or beneath loose bark in trees or snags in upland forests, with roost entrances generally below or within the tree canopy. Reproductive females use a wide range of tree species. Roosts of males and nonreproductive females include tree hollows as well as cooler locations, including caves and mines. In Arkansas, pine snags were important summer roosts for males.

Hibernation occurs from late summer/early fall to spring. In summer, an activity peak generally occurs one-two hours after sunset, with a secondary peak seven-eight hours after sunset. Nocturnal insects often exhibit a strong flight period among nocturnal insects beginning before sunset, peaking near midnight, and waning throughout the early morning hours, and a second but less intense flight period may occur before sunrise.

Although the proposed easement contains potentially-suitable roost trees for this species, the project will not involve tree clearing or land disturbance within the proposed easement. Accordingly, the project should not affect this species.

### 3.5.12 *Bunched Arrowhead*

Bunched arrowhead is an aquatic perennial herb with erect, emergent leaves. In May and June, one-to-several flowering stems appear bearing, white flowers arranged in whorls. Female flowers are on the lowest whorls, and males are on the upper ones. It is distinguished from the other similar species in the Southeast by a combination of flattened phyllodia, blades of emergent leaves relatively broad but at the same time female pedicels not recurved, the anther definitely longer than the filament, and the bracts strongly fused.

The plant is typically found in very gently sloping areas with some standing water refreshed by slow continuous seepage of cool, clear water. Appropriate habitat for this species is typically found in a narrow band at the bluff-floodplain ecotone. The seeps originate at the base of the bluffs and this species is generally found near, but not at, the origin of the seep (water flow at the seep origin is usually too swift or too heavy to allow for colonization). Appropriate habitats often continue along the edge of the bluff



downslope from the seep, but generally do not extend far into the floodplain proper because there the seepage tends to spread out and the water stagnates.

The proposed easement does not contain suitable habitat for the above species, and no individuals of this species were observed. Accordingly, it is not anticipated that this project will adversely affect populations of this species.

### 3.5.13 *Mountain Sweet Pitcher Plant*

Mountain sweet pitcher plant (*Sarracenia rubra* spp. *jonesii*) is a carnivorous perennial herb with tall, hollow pitcher-shaped leaves and red sweet-smelling flowers. The hollow leaves contain liquid and enzymes. When insects fall into the pitchers, they're digested and the nutrients are incorporated into the plant's tissues. The evolutionary role of carnivory in such plants is not fully understood, but some evidence indicates that absorption of minerals from insect prey may allow carnivorous species to compete in nutrient-poor habitats. The unusual red flowers (yellow in rare cases) appear from April to June, with fruits ripening in August. Flowering plants reach heights of 29 inches. Very little specific information is available on the biology of mountain sweet pitcher plant. Like other pitcher plants, it has rhizomes that are probably long-lived and capable of persisting and reproducing vegetatively for decades without producing seedlings.

Mountain sweet pitcher plants are found in mountain bogs from the upstate of South Carolina and southwestern North Carolina. The most serious threat to mountain sweet pitcher plant is the destruction or degradation of its small wetland habitat. Collecting from wild populations continues to be a problem for carnivorous plants, even though cultivated sources are available for almost all species.

The proposed easement does not contain mountain bogs, and no individuals of this species were observed. Based on our pedestrian field review, it is not anticipated that this project will affect populations of this species.

### 3.5.14 *Blue Ridge Goldenrod*

Blue Ridge goldenrod is a perennial herb with solitary or tufted, erect, unbranched stems, usually 4-12 inches tall. It is characterized by a flat- or round-topped terminal cluster of yellow flower heads, each containing 20-30 flowers, and blooms from July to September. It is one of only a few southern goldenrods with close affinities to plants now abundant in more northern areas. Populations are thought to be relict in nature, persisting on mountain-tops as the regional climate became warmer and drier.

This species inhabits rocky places such as outcrops, ledges, cliffs, and balds at elevations above 4,600 feet. Sites occupied by the species are generally exposed to full sun. Common associates include grasses and sedges, as well as other rare, high-elevation species such as Heller's blazing star (*Liatris helleri*), Roan Mountain bluet (*Houstonia montana*) and spreading avens. The proposed easement does not contain suitable habitat for this species, and it is not anticipated that this project will affect populations of this species.

### 3.5.15 *Virginia Spiraea*

Virginia spiraea is a shrub with upright, arching branches, usually 1-3 m tall. The leaves are acute at the apex and entire or sparingly toothed. It produces showy clusters of small white flowers. Stems are sparsely branched and are upright up to 1.2 m or arching with some stems touching the ground. The



leaves are alternate, simple, and have variable serration. The cream-colored flowers are in showy corymbs. The fruit is a follicle, and it flowers in June and July, and fruits in August and September.

This species is distinguished from most other *Spiraea* by its creamy white flowers in corymbs, and its leaves which have an acute apex (Weakley 2004). The exotic *Spiraea japonica*, which also occurs along streams, has pink flowers and leaves with long-acuminate tips (Patrick et al. 1995).

Virginia spiraea occurs along rocky bars at river edges. It grows between boulders and in fine alluvial sand and other alluvial deposits. Areas such as periodically flood-scoured banks of high-gradient mountain streams, meander scrolls, point bars, natural levees, and braided features of lower stream reaches, and occasionally near disturbed ROW provide habitat. The plants often found on geologically active areas with erosion, deposition, and slumping, along rivers with dynamic flooding regimes, sandbars, scoured river shore and flatrock habitat with crevices. These areas also are associated with cobbles, boulders, and massive rock outcrops with sandy or clay soils. The areas can be periodically xeric.

Although the stream contains pockets of potentially-suitable habitat for this species, no individuals of this species were observed, and this area will not be affected. As such, it is not anticipated that this project will adversely affect populations of this species.

### 3.6 Bald and Golden Eagle Protection Act

Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water for foraging. Large, dominant trees are utilized for nesting sites, typically within 1.0 mile of open water. Suitable habitat for bald eagle exists along the French Broad River, west of the proposed easement and proximate to the existing access road. Review of the August 20, 2018, NCNHP report indicates no known bald eagle or golden eagle occurrences have been documented within one mile of the proposed easement. Because the proposed project will not result in tree clearing or land disturbance within the NPS property, these species should not be affected by the proposed project.

### 3.7 Essential Fish Habitat

The National Marine Fisheries Service (NMFS) has identified no essential fish habitat in the project area.

## 4.0 Cultural Resources

A total of 21 shovel tests were excavated within the areas surveyed for the proposed pipeline corridor and access road on NPS property. One shovel test was placed within the proposed pipeline corridor (the remaining area associated with the pipeline corridor was steeply sloped and pedestrian surveyed or not surveyed due to slope over 20 percent), and 20 shovel tests were placed along the proposed access road. See **Appendix V** for exhibits illustrating shovel test placement, areas of shovel testing, pedestrian survey, and the areas where no survey was performed along the proposed pipeline corridor. Photographs of the project area and soil profiles are also included.

Vegetation in these areas is predominately wooded, with areas of secondary growth within the adjacent existing transmission line corridor (Exhibit V-2 and V-3). A typical shovel test within the proposed pipeline corridor consisted of 10+ cm of brown (10YR 4/3) mottled with strong brown (7.5YR 4/6) silty sand with numerous rock inclusions that made it impossible to fully excavate the shovel test (Figure V-4); this area looks to have been filled in at some point, perhaps during construction of the adjacent transmission line corridor. A typical soil profile along the proposed access road consisted of 45 cm of light brownish gray

(10YR 6/2) mottled with light yellowish brown (10YR 6/4) sand, terminating with 35+ cm (45–80+ cmbs) of brownish yellow (10YR 6/8) sand (Figure V-5).

As a result of the investigations, no archaeological sites were identified and no additional archaeological investigations are recommended for the currently proposed easement and access road on the NPS property.

## 5.0 Conclusions

Based on an assessment of the natural and cultural resources identified within the proposed easement and the nature of the proposed activity, the proposed project should have no effect on the resources identified in this report. The proposed project will not involve tree clearing, ground disturbance or otherwise result in changes to the existing nature and character of the BRPW or adjacent NPS property.

## 6.0 References

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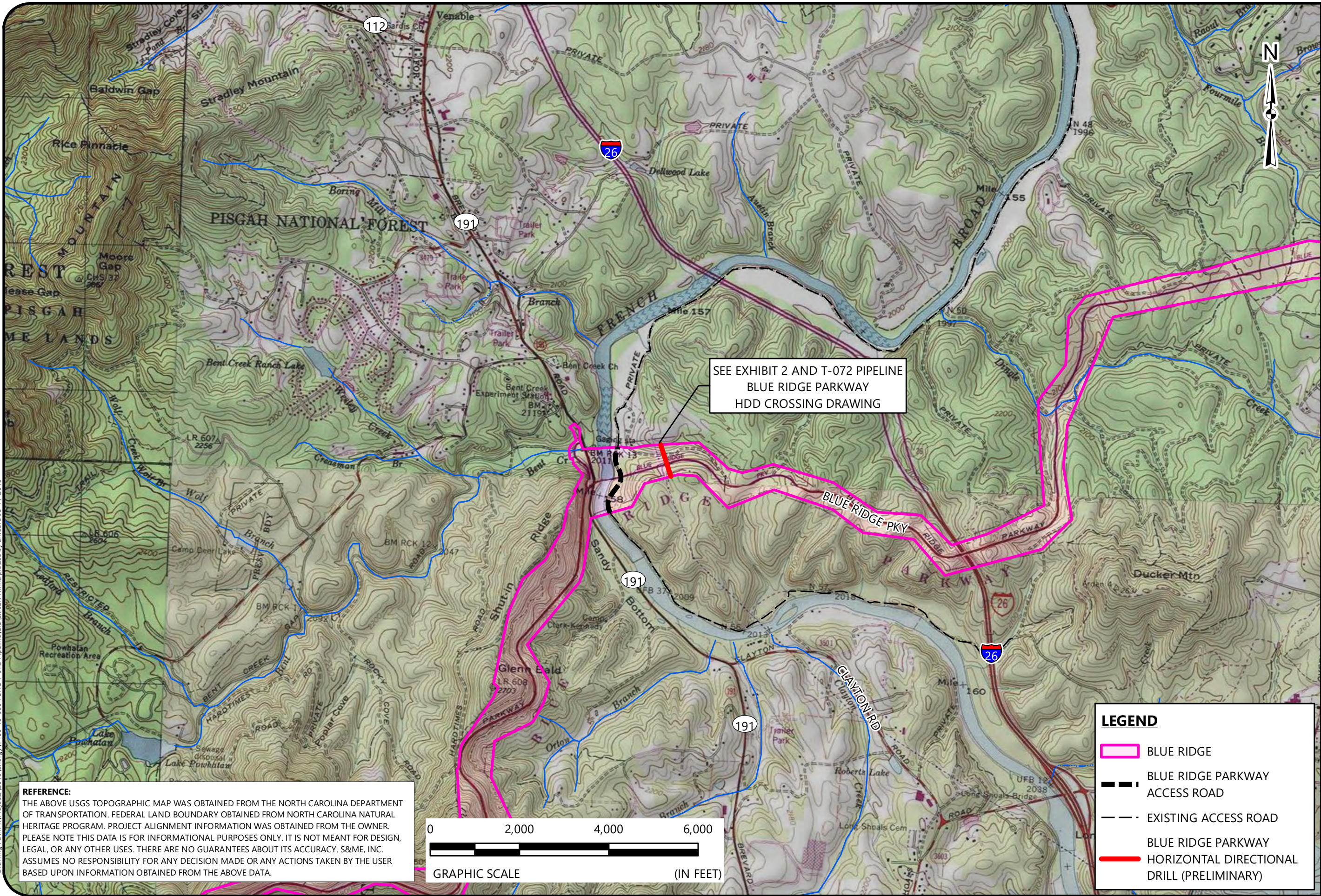
## Figures

## **Appendix I**

**HDD Profile Drawing (TRC Drawing No. 290667-33-003)**



Drawing Path: T:\Projects\2018\Energy\7435-18-003 PSNC T-072 Pipeline\GIS\Exhibit 1.mxd plotted by amcroe 05-11-2018



**REFERENCE:**  
THE ABOVE USGS TOPOGRAPHIC MAP WAS OBTAINED FROM THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION. FEDERAL LAND BOUNDARY OBTAINED FROM NORTH CAROLINA NATURAL HERITAGE PROGRAM. PROJECT ALIGNMENT INFORMATION WAS OBTAINED FROM THE OWNER. PLEASE NOTE THIS DATA IS FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT MEANT FOR DESIGN, LEGAL, OR ANY OTHER USES. THERE ARE NO GUARANTEES ABOUT ITS ACCURACY. S&ME, INC. ASSUMES NO RESPONSIBILITY FOR ANY DECISION MADE OR ANY ACTIONS TAKEN BY THE USER BASED UPON INFORMATION OBTAINED FROM THE ABOVE DATA.

**LEGEND**

BLUE RIDGE

BLUE RIDGE PARKWAY ACCESS ROAD

EXISTING ACCESS ROAD

BLUE RIDGE PARKWAY HORIZONTAL DIRECTIONAL DRILL (PRELIMINARY)

SITE VICINITY & USGS TOPOGRAPHIC MAP EXHIBIT

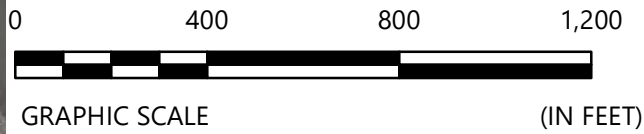
PSNC ENERGY  
T-072 PIPELINE BLUE RIDGE PARKWAY HDD CROSSING  
BUNCOMBE COUNTY, NORTH CAROLINA

SCALE:  
1" = 2,000'  
DATE:  
5-11-18  
PROJECT NUMBER:  
7435-18-003  
FIGURE NO.



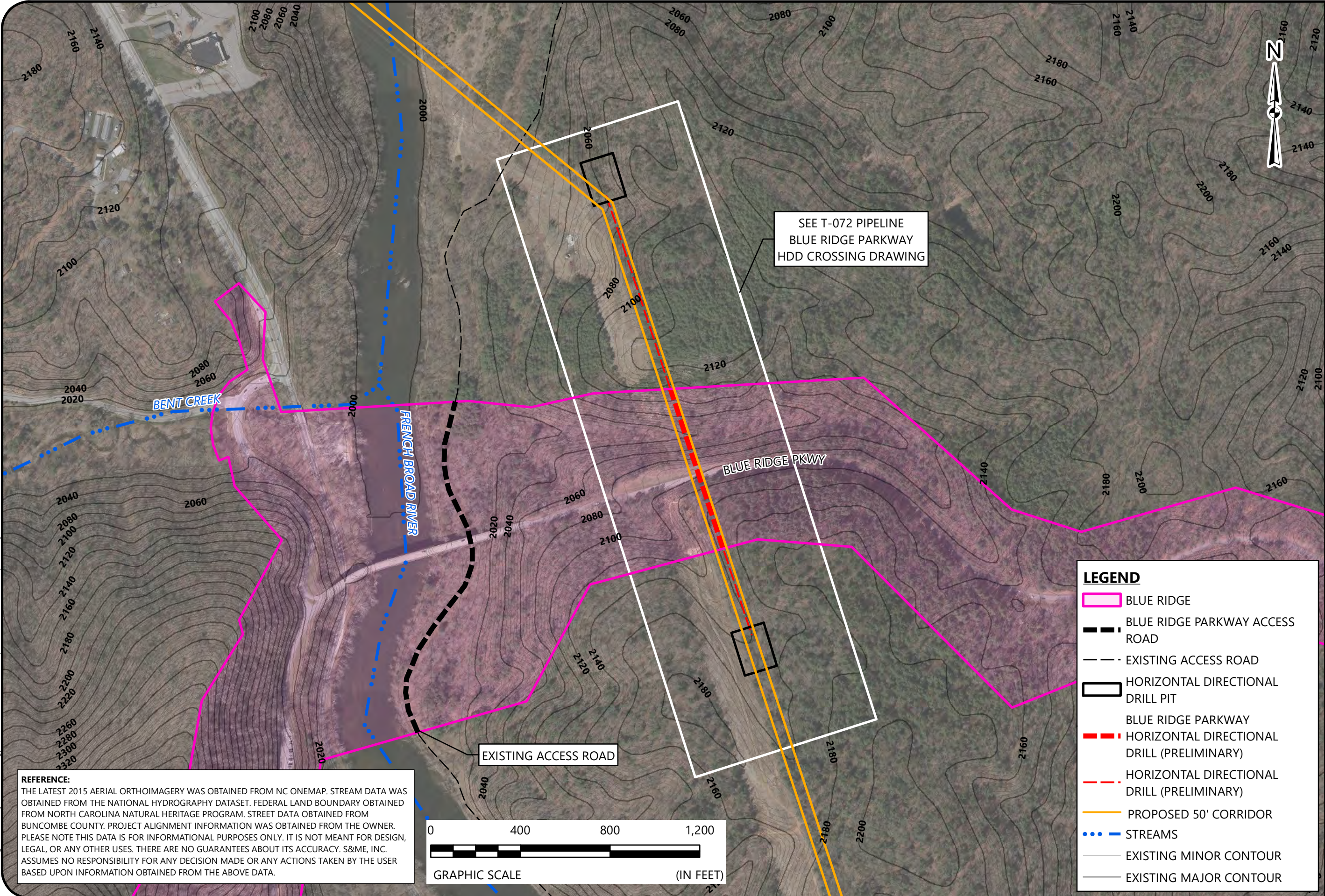
Drawing Path: T:\Projects\2018\Energy\7435-18-003 PSNC T-072 Pipeline\GIS\Exhibit 2.mxd plotted by Jlawler 06-11-2018

**REFERENCE:**  
THE LATEST 2015 AERIAL ORTHOIMAGERY WAS OBTAINED FROM NC ONEMAP. STREAM DATA WAS OBTAINED FROM THE NATIONAL HYDROGRAPHY DATASET. FEDERAL LAND BOUNDARY OBTAINED FROM NORTH CAROLINA NATURAL HERITAGE PROGRAM. STREET DATA OBTAINED FROM BUNCOMBE COUNTY. PROJECT ALIGNMENT INFORMATION WAS OBTAINED FROM THE OWNER. PLEASE NOTE THIS DATA IS FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT MEANT FOR DESIGN, LEGAL, OR ANY OTHER USES. THERE ARE NO GUARANTEES ABOUT ITS ACCURACY. S&ME, INC. ASSUMES NO RESPONSIBILITY FOR ANY DECISION MADE OR ANY ACTIONS TAKEN BY THE USER BASED UPON INFORMATION OBTAINED FROM THE ABOVE DATA.



**LEGEND**

- BLUE RIDGE
- BLUE RIDGE PARKWAY ACCESS ROAD
- EXISTING ACCESS ROAD
- HORIZONTAL DIRECTIONAL DRILL PIT
- BLUE RIDGE PARKWAY
- HORIZONTAL DIRECTIONAL DRILL (PRELIMINARY)
- HORIZONTAL DIRECTIONAL DRILL (PRELIMINARY)
- PROPOSED 50' CORRIDOR
- STREAMS
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR



2015 AERIAL ORTHOIMAGERY EXHIBIT

PSNC ENERGY  
T-072 PIPELINE BLUE RIDGE PARKWAY HDD CROSSING  
BUNCOMBE COUNTY, NORTH CAROLINA

SCALE:  
1" = 400'

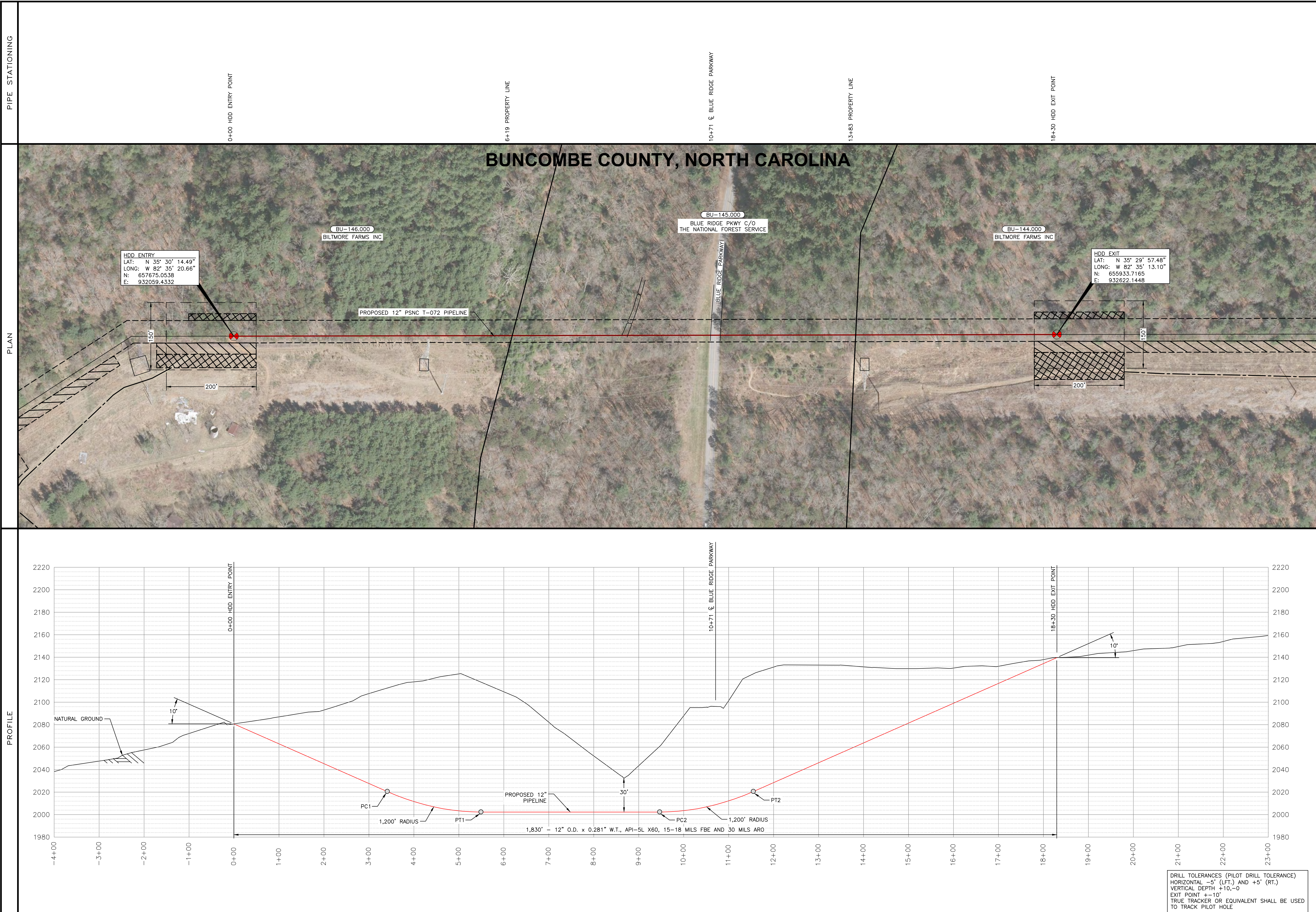
DATE:  
6-11-18

PROJECT NUMBER:  
7435-18-003

FIGURE NO.



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**LEGEND:**

HDD ENTRY / EXIT POINTS

GEOTECH BORE HOLE LOCATIONS

**GENERAL NOTES:**

- IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE NECESSARY ARRANGEMENTS IF TRAFFIC CONTROL PLANS AND/OR RAILROAD REPRESENTATION ARE REQUIRED.
- CONTRACTOR TO LOCATE, MARK AND POTHOLE FOREIGN LINES PRIOR TO EXCAVATION (AND MONITOR DURING DRILLING).
- CONTRACTOR TO MAT OVER ANY FOREIGN PIPELINES CROSSED WITH DRILLING EQUIPMENT.
- LOCATIONS OF EXISTING FACILITIES SHOWN ARE APPROXIMATE. CONTRACTOR TO LOCATE AND/OR CONFIRM THE LOCATIONS AND DEPTH OF ALL UTILITIES, PIPELINES OR OTHER OBSTACLES PRIOR TO EXCAVATION.
- CONTRACTOR TO SUPPORT EXISTING UTILITIES, PIPELINES AND/OR OTHER FEATURES.
- CONTRACTOR TO GRADE EXCAVATION AREA AND RESTORE TO ORIGINAL CONDITIONS.
- CONTRACTOR TO CONTACT STATE ONE CALL SYSTEM AT LEAST 72 HOURS PRIOR TO DRILLING.

**PHOTOGRAPHY:**

NC ONEMAP 2015 - 6" RESOLUTION

**PROJECTION SYSTEM:**

NAD83 STATE PLANE, NORTH CAROLINA (U.S. SURVEY FEET)

**INSTALLATION NOTES:**

- ACCESS: ALL EQUIPMENT MUST ACCESS THE SITE ALONG THE CONSTRUCTION RIGHT-OF-WAY FROM PUBLIC OR APPROVED PRIVATE ROADS.
- WORK SPACE: WORK SPACE LIMITS ARE DEPICTED. CLEARING WILL BE RESTRICTED TO THE WORK SPACES INDICATED AT THE ENTRY AND EXIT POINTS AND PULLBACK MAKE-UP AREA ALONG THE RIGHT-OF-WAY. CLEARING BETWEEN THE ENTRY AND EXIT POINTS IS LIMITED TO THE MINIMUM AMOUNT NECESSARY TO STRING LOCATION WIRES AND INSTALL PUMPS AND PIPING TO OBTAIN WATER (WHERE APPROVED).
- WATER SOURCE: DRILL WATER AND PRE-INSTALLATION HYDRO-STATIC TEST WATER SHALL BE OBTAINED FROM AN APPROVED SOURCE.
- HYDROSTATIC TEST: ABOVE GROUND PRE-INSTALLATION HYDROSTATIC TEST SHALL BE CONDUCTED IN ACCORDANCE WITH PERMIT REQUIREMENTS. THE CONTRACTOR SHALL DISCHARGE HYDROSTATIC TEST WATER IN ACCORDANCE WITH PROJECT PERMITS.
- SPILL-PREVENTION: ALL PUMPS SHALL BE SET IN SECONDARY CONTAINMENT AND IN ACCORDANCE WITH THE SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN (SPCC). EQUIPMENT AND PUMPS OPERATING WITHIN 100 FEET OF ANY WATER BODY OR WETLAND SHALL BE OPERATED AND REFUELED IN ACCORDANCE WITH THE SPCC PLAN. EQUIPMENT REFUELING AND STORAGE OF HAZARDOUS MATERIALS, FUELS, ETC. SHALL BE CONDUCTED AT LEAST 100 FEET FROM WATER BODIES AND WETLAND. EACH CONSTRUCTION CREW SHALL HAVE ON HAND SUFFICIENT TOOLS AND MATERIALS TO STOP LEAKS AND SUPPLIES OF ABSORBENT AND BARRIER MATERIALS TO ALLOW RAPID CONTAINMENT AND RECOVERY OF SPILLED MATERIALS.
- EROSION AND SEDIMENT CONTROL: CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES IN ACCORDANCE WITH CONTRACT DOCUMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL STRUCTURES AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
- TOPSOIL SHALL BE STRIPPED AS REQUIRED BY PROJECT DOCUMENTS.
- INSTALLATION: THE PIPE SECTION FOR THE DRILLED CROSSING SHALL BE MADE UP WITHIN THE RIGHT-OF-WAY AT THE DRILL EXIT POINT AS SHOWN, AND THE DRILL RIG SHALL PULL THE PIPE STRING INTO THE BORE HOLE FROM THE ENTRY POINT. CONTRACTOR SHALL ASSESS THE NEED FOR AND SUPPLY APPROPRIATE BALLAST DURING PULLBACK.
- MUD DISPOSAL: CONTRACTOR SHALL DISPOSE OF EXCESS DRILLING MUD AS DIRECTED BY THE COMPANY REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS. UNDER NO CIRCUMSTANCES SHALL DRILLING FLUID BE DISPOSED OF IN WATER BODIES OR WETLANDS. ANY DRILLING MUD WHICH INADVERTENTLY EXISTS AT POINTS OTHER THAN THE ENTRY AND EXIT POINTS SHALL BE CONTAINED AND COLLECTED TO THE EXTENT PRACTICAL AND DISPOSED OF AS DIRECTED BY THE COMPANY REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS.
- CLEANUP/STABILIZATION/RESTORATION: ALL DISTURBED AREAS SHALL BE RETURNED TO THE ORIGINAL CONTOURS. DISTURBED AREAS SHALL BE SEED AS SPECIFIED IN PROJECT DOCUMENTS.

**ISSUED FOR REVIEW**  
08/09/2018

**TRC**  
Results you can rely on

**T-072**  
**BLUE RIDGE PARKWAY**  
**HDD CROSSING**

SCALE:	PROJ. NO:	DRAWING NO:	REV.
1" = 100'		290667-33-003	B

August 09, 2018 - 2:06pm



## **Appendix II**

### **Resumes of Personnel Contributing to This Report**



#### PROJECT ROLE

- Lead Biologist
- Wetland & Stream Delineation, Qualitative Assessment & Permitting
- Wetland Mitigation Design
- Arborist
- Protected Species Survey(s)

#### LOCATION

Tri-Cities, TN

#### EDUCATION

- BS, Liberal Arts, Zoology University of Florida, 1996
- Former US Navy Diver

#### YEARS OF EXPERIENCE

Joined S&ME in 2007 with 10 years of experience

#### CERTIFICATIONS

- Society of Wetland Scientists – (PWS) Professional Wetland Scientist #2394
- TDEC Certified Qualified Hydrologic Professional QHP #1174-TN18

## Marshall C. Bagley, PWS

### Senior Biologist

Mr. Bagley is a Senior Project Manager, Professional Wetland Scientist (PWS), Biologist, and an S&ME Lead Delineator in S&ME's Tri-Cities office. He is a member of the S&ME Natural Resource Technical Leadership Committee. He is experienced in the following: project management, wetland & stream and protected species survey, water quality pathogen & macro-invertebrate assessments, botanical ID and mapping, permitting, regulatory coordination, mitigation monitoring, and erosion/sediment control inspection.

### Key Projects and Assignments

#### 26 & 48-mile Linear Pipeline NR - Project

##### Transylvania County, North Carolina

2015 & 2016 Performed wetland delineations, stream surveys, protected species assessments including bat habitat assessments, bat portal emergence study, led protected species survey and Section 7 USFWS consultation on the 26-mile portion of pipeline system in western North Carolina.

#### 47-mile Linear Project

##### Jefferson County, Ohio

2013 Coordinated contractors and assisted in mist net bat surveys, bat habitat assessment, species survey, wetland & stream delineations, wetland and stream quality assessments, and macroinvertebrate sampling upper tier HHEI streams for new pipeline system in eastern Ohio.

#### 43-mile Linear Project

##### Washington, Pennsylvania & Marshall County, West Virginia

Performed wetland delineations, stream surveys, assisted with mist net bat surveys, on new 43-mile pipeline system from NE WV. through SE PA.

#### TDOT State Route 27 Natural Resource Evaluation

##### Roane County, Tennessee

Lead biologist for protected species evaluation and natural resource evaluation along 1.4 mile corridor of State Route 61 in Roane County, Tenn. Performed environmental survey for the presence of protected species and potential habitat, wet weather conveyances, streams and wetlands. Completed TDOT "Form N" Habitat Assessment.

#### TDOT Knob Creek Road Bat Habitat Assessment

##### Washington County, Tennessee

Lead biologist for threatened and endangered bat habitat and natural resource evaluation along 1.4 mile corridor of Knob Creek Road in Washington County, Tennessee. Performed survey for the presence of protected species and potential habitat, streams and wetlands.



### **Middlebrook Knoxville Acoustic Bat Study**

#### **Knoxville, Tennessee**

May 2016 – Developed the acoustic survey plan and conducted acoustic bat survey on 14 acre potential Indiana and northern long-eared bat habitat / tree clearing for a new hospital off Middlebrook Pike in Knox County. The monitoring was performed using Anabat™ SD-2, and calls were filtered using BCID™. The survey was done in compliance with 2016 Summer Survey Guidance and coordination with U.S. Fish and Wildlife (Cookeville).

### **Acoustic Bat Study**

#### **Mt. Juliet, Tennessee (2016)**

Conducted acoustic survey on 130 acre property in Mt. Juliet 118 acres of which were forested. The monitoring was performed using the Anabat™ SD-2, and filtered using BCID™. The survey was done in compliance with U.S. Fish and Wildlife guidance for acoustic monitoring.

### **Florida Power and Light Panther and Protected Species Survey**

#### **Collier County, Florida**

Lead biologist for protected species evaluation and natural resource evaluation along Collier County 3 mile corridor of a proposed power transmission line installation. Species of concern were Florida panther, red-cockaded woodpecker, Big Cypress fox squirrel, and Florida black bear.

### **Sneedville Sewer Rehab/Clinch River Natural Resource Study**

#### **Sneedville, Tennessee**

Developed experiment design to trace plume of waste water discharge into the Clinch River to extrapolate sewer treatment release affect and link findings with mussel survey activities on this River containing the greatest range of biodiversity in the United States. USFWS drove the project in coordination of grant and matching federal funds required to rehab an existing underperforming sewer treatment facility. Experiment involved permitting for dye injection, wide range of water sampling requirements and mussel survey oversight.

### **Virginia Creeper Trail NEPA**

#### **Pennington Gap, Virginia**

Performed wetland assessments, stream surveys, species survey, assisted in permitting, and assisted with bat consulting on proposed recreational (ATV) trail starting and returning to Pennington Gap for inclusion into NEPA EIS (by others).

### **Verizon Site(s) NEPA**

#### **Tennessee and South Carolina**

Submitted per NEPA to agencies for natural resource consults for tow tower project sites and assembled the NEPA document / report for these two Verizon sites under S&ME master services agreement.



#### PROJECT ROLE

Staff Scientist

#### LOCATION

Raleigh, North Carolina

#### EDUCATION

- Bachelor of Science in Environmental Studies, Elon University, 2009
- Master of Natural Resources, North Carolina State University, 2013

#### YEARS WITH COMPANY

Joined S&ME in 2014 with 3 years of experience

#### CERTIFICATIONS

- Professional Wetland Scientist
- North Carolina Wetland Assessment Method (NCWAM)
- North Carolina Surface Water Identification Training and Certification
- North Carolina Stream Assessment Method (NCSAM)
- Certified Stormwater BMP Inspection and Maintenance Professional

## Ashley Bentz, PWS

### Staff Scientist

Ms. Bentz is a Staff Scientist in the Raleigh office's Natural Resources Department with over six years of experience. The majority of Ms. Bentz's experience entails wetland and stream determinations and delineations, utilizing U.S. Army Corps of Engineer (USACE) methodology and N.C. Division of Water Resources (NCDWR) methodologies; 401/404 permitting and Riparian Buffer Rule application, utilizing USACE, NCDWR, and local municipality methodologies; protected species, habitat, and biological assessments; stream and wetland restoration; and the inspection of Stormwater BMPs in accordance with local municipal guidelines.

### Key Projects and Assignments

#### T-030 Pipeline Phases I and II

Wake and Franklin Counties, NC | 2017-Current

Conducted wetland and waters of the U.S. delineation of Phase II and field verifying delineation of Phase I. In process of obtaining regulatory confirmation for riparian buffers and from the USACE. Will obtain a USACE 404 Nationwide Permit.

#### T-01 Pipeline Replacement Project Phase II

Polk to Cleveland County, NC | 2016-2017

Natural Resource Specialist for natural resource assessments associated with a 45+ mile natural gas pipeline. Performed wetlands and stream assessments and protected species assessments. Obtained agency verification from local, state, and federal agencies. Aided in the preparation of 401/404 permit.

#### Wake County Public School System

Multiple Sites in Wake County, NC | 2014-Current

Natural Resource Specialist for various existing and proposed school site development projects for the Wake County Public School System. Performed stream and wetland assessments, riparian buffer evaluations, and other natural resource assessments. Obtained regulatory verification from local, state, and federal agencies. Prepared and secured 401/404 permits from NCDWR and USACE where applicable.

#### NEPA Assessments – Verizon Wireless

Multiple Sites in North Carolina | 2015- Current

In North Carolina, Natural Resources Specialist for National Environmental Policy Act (NEPA) reviews of wireless communication projects. Assessments include wetland and stream determinations and delineations, protected species assessments including coordination with the US Fish and Wildlife Service (USFWS) relative to protected bat habitat mitigation, wildlife and wilderness area evaluations, floodplain, and zoning analysis, along with coordination of archaeological and architectural studies and Native American tribal consultation.



#### **CERTIFICATIONS, CONT.**

- NCDOT Level I Erosion and Sediment Control / Stormwater Installer, Certification Number: 3016
- NCDOT Level II Erosion and Sediment Control / Stormwater Site Manager, Certification Number: 7621
- Certified Erosion Prevention and Sediment Control Inspector (CEPSCI) # 10803

#### **PROFESSIONAL MEMBERSHIPS**

- North Carolina Association of Environmental Professionals
- Carolina Wetlands Association
- Society of Wetland Scientists

#### **High Shoals Solar Farm**

##### **High Shoals, NC | 2018**

Conducted wetland and waters of the U.S. delineation and obtained regulatory verification from USACE and NCDWR. Completed protected species assessment with limited site reconnaissance and received USFWS confirmation of findings.

#### **Doggett Associates Properties**

##### **Garner, NC | 2018**

Conducted wetland and waters of the U.S. delineation and riparian buffer evaluation. Obtained regulatory verification from USACE and NCDWR. Completed protected species assessment with limited site reconnaissance and received USFWS confirmation of findings. Initiated NC SHPO consultation for cultural resources and obtained NC SHPO concurrence.

#### **Burlington Calamar Senior Living Facility**

##### **Burlington, NC | 2017-2018**

Conducted wetland and stream delineation, riparian buffer evaluation, obtained regulatory verification from local, state, and federal agencies. Prepared and secured 401/404 permits from NCDWR and USACE.

#### **NEPA Assessments – Pine Gate Solar**

##### **Multiple Sites in North Carolina | 2017- 2018**

Completed NEPA documentation reporting for several proposed solar farm sites throughout North Carolina. Compiled existing reports, consulted available environmental resource datasets, and generated scoping letters to the USDA and relevant Native American tribes. Finalized multiple formal Environmental Assessment (EA) reports for submittal to the U.S. Department of Agriculture.

#### **Sanford Housing Authority – NEPA Assessments**

##### **Multiple Sites in North Carolina | 2018**

Completed NEPA documentation in support of the Sanford Housing Authority in their Categorical Exclusion (CE) submittal to the U.S. Department of Housing and Urban Development (HUD). Compiled existing reports, consulted available environmental resource datasets, and generated scoping letters to the SHPO.

#### **Burlington Alamance Site #3**

##### **Burlington, NC | 2017-2018**

Conducted wetland and waters of the U.S. delineation and riparian buffer evaluation. Obtained regulatory verification from USACE and NCDWR. Completed desktop protected species and cultural resources assessment with limited site reconnaissance.



#### ROLE

Project Manager

#### LOCATION

Charlotte, NC

#### EDUCATION

- B.S., Biology, East Carolina University, 1994

#### YEARS OF EXPERIENCE

Joined S&ME in 2001 with 6 years of experience

#### REGISTRATIONS

- Professional Wetland Scientist (#1647)
- South Carolina Erosion Prevention and Sediment Control Inspector (#1603)
- Rosgen Level I: Applied Fluvial Geomorphology, 2003
- Rosgen Level II: River Morphology and Applications, 2004
- Rosgen Level III: River Assessment and Monitoring, 2006
- NCDWQ Macroenthos Monitoring Protocols, 2004

## Joseph Lawler, Jr., PWS

### Project Scientist

Mr. Lawler is a Project Scientist in the Natural Resources Department with nearly 20 years' experience conducting jurisdictional delineation and providing environmental permitting services. Mr. Lawler's expertise includes environmental management of linear corridor and utility projects, wetland determinations and delineations utilizing U.S. Army Corps of Engineer (USACE) methodology, Section 404 permit acquisition, Section 401 Water Quality Certification (WQC) acquisition, stream assessments utilizing USACE and N.C. Division of Water Resources (NCDWR) methodologies, coastal wetland delineation, stream geomorphological assessment and monitoring in accordance with Rosgen methodology, National Environmental Policy Act (NEPA) compliance, protected species assessment, macroenthos monitoring in accordance with NCDWR and U.S. Environmental Protection Agency (EPA) protocols, assessment of sediment and erosion control measures and Phase I Environmental Site Assessments.

### Key Projects and Assignments

#### **Piedmont Natural Gas – Natural Resources Permitting, Erosion & Sedimentation Control Permitting**

**Approximately 70 Locations, North and South Carolina | 2006 - present**

In roles as a Project Manager or Project Scientist, Mr. Lawler provided services related to environmental permitting on a wide array of Piedmont Natural Gas pipeline projects. These projects range in size from 1 mile to 80 miles in length and included both roadside and cross-country pipeline sections. Tasks he has performed or directed include jurisdictional delineation, trout buffer variance acquisition, Phase I environmental site assessments, protected species assessment, agency coordination and Section 404/401/10 permit authorization.

#### **PSNC Energy – Natural Resources/Environmental Permitting, Erosion & Sedimentation Control Permitting**

**Approximately 40 Locations, North and South Carolina | 2010 - present**

In roles principally as a Project Scientist, Mr. Lawler provided services related to environmental permitting on numerous PSNC natural gas pipeline projects throughout the state. These projects range in size from less than 1 mile to over 40 miles in length and included both roadside and cross-country pipeline sections. Tasks he has performed or directed include jurisdictional delineation, trout buffer variance acquisition, agency coordination and Section 404/401/10 permit authorization.

#### **South Carolina Electric & Gas – Natural Resources/Environmental Permitting**

**Multiple South Carolina Locations | 2014 - present**

As a Project Scientist, Mr. Lawler provided services related to environmental permitting on several SCE&G natural gas pipeline projects in South Carolina, and included both roadside and cross-country pipeline sections. Tasks he has



#### PROFESSIONAL MEMBERSHIPS

- Society of Wetland Scientists (SWS)

performed or directed include jurisdictional delineation, coastal zone consistency permitting, protected species review, agency coordination and Section 404/401 permit authorization.

#### **26-Mile Gas Pipeline Replacement Project**

**North Carolina | 2015-present**

Environmental coordinator for replacement of a 20-inch natural gas pipeline in the mountain and upper Piedmont region of North Carolina. Responsibilities include jurisdictional delineation, trout buffer variance acquisition, and agency coordination and Section 404/401 permit authorization.

#### **47-Mile Gas Pipeline Replacement Project**

**North Carolina | 2016-present**

Environmental coordinator for construction of a new 24-inch diameter natural gas pipeline in the Piedmont region of North Carolina. Responsibilities include jurisdictional delineation, protected species assessment, agency coordination and Section 404/401 permit authorization.

#### **Statewide Natural Gas Pipeline Right-of-Way Reclamation and Integrity Projects**

**North Carolina | 2012-present**

Project Manager and environmental coordinator for a series of right-of-way reclamation projects totaling over 300 miles. Responsibilities include jurisdictional delineation, riparian buffer authorization, agency coordination and Section 404/401 permit authorization for multiple maintenance/integrity projects.

#### **120-Mile Natural Gas Pipeline Project**

**Eastern North Carolina | 2010-2013**

Project Manager and Single Point of Contact for this project. Responsibilities include jurisdictional delineation, protected species assessment and Section 404/401 Individual Permit authorization for this project.

#### **38-Mile Natural Gas Pipeline Project**

**Central and Eastern North Carolina | 2010-present**

Project Manager for this project. Responsibilities included jurisdictional delineation, protected species assessment and Section 404/401 Nationwide Permit authorization for this project.

#### **39-Mile Natural Gas Pipeline Project**

**Western South Carolina | 2009-2010**

Project Manager for this project. Responsibilities included jurisdictional delineation, protected species assessment and Section 404/401 Nationwide Permit authorization for this project.

#### **Continuing Education**

- NC Wetland Assessment Methodology (NC WAM) Refresher Course, NCAEP
- NC Stream Assessment Methodology (NC SAM) course, 2016, NCAEP
- Advanced Problems in Hydric Soils, 2014, North Carolina State University
- Basic Processes in Hydric Soils, 2014, North Carolina State University





#### PROFESSIONAL MEMBERSHIPS

- Society of Wetland Scientists (SWS)

- NC WAM Assessment Methodology course, 2012 NCDEQ
- FERC Environmental Review and Compliance for Natural Gas Facilities Workshop, 2010, FERC, Austin Texas
- Wetland Delineation: The Atlantic and Gulf Coastal Plain Supplement, 2009, North Carolina State University
- Certified Erosion Prevention and Sediment Control Inspector Program, 2006-2011, Clemson University
- Charlotte-Mecklenburg Soil and Sedimentation Control Training Seminar, 2008, Charlotte, North Carolina
- USACE/DWQ Joint Workshop for Consultants, 2007, Raleigh, North Carolina
- ACEC/NC - PENC Environmental Conference, 2007
- River Assessment and Monitoring, 2006, Wildland Hydrology
- Stream Restoration Monitoring Analysis, 2005, North Carolina Stream Restoration Institute (NCSRI)
- Society of Wetland Scientists 26th Annual Meeting, 2005, SWS
- Aquatic Insect Collection Protocols for Stream Restoration Projects, 2004, NCDWQ
- Southeastern Regional Conference on Stream Restoration, 2004, NCSRI
- Express Review Program Training, 2004, NCDWQ
- River Morphology and Applications, 2004, Wildland Hydrology
- Applied Fluvial Geomorphology, 2003, Wildland Hydrology
- Carolinas Wetlands & Surface Water Regulation, 2003, CLE International
- Stream and Surface Water Identification, 2003, North Carolina State University
- SEPA Workshop, 2002, ACEC
- Restoration in the Coastal Plain: Stream and Wetland Processes, 2002, NCSRI
- Stream Identification Course, 2001, North Carolina State University
- Environmental Site Assessments for Commercial Real Estate, 2001, ASTM
- Stream Restoration and Design Principles, 2001, NCSRI
- Stream Classification & Assessment, 2001, NCSRI
- Wetland Identification and Delineation, 1997, North Carolina State University





#### PROJECT ROLE

Crew Chief

#### LOCATION

Columbia, South Carolina

#### EDUCATION

- B.A., Anthropology, Appalachian State University, Boone, North Carolina, 2015
- B.S., History, Appalachian State University, Boone, North Carolina, 2015

#### YEARS OF EXPERIENCE

Joined S&ME in 2018 with 3 years of professional

## Paul Connell

### Crew Chief

Mr. Connell has three years of experience in archaeological fieldwork. Most of his archaeological work has been in the Southeastern United States. He has also worked in Midwestern and Mid-Atlantic States. He has worked on various types of projects such as Department of Transportation, pipelines, military base, historic sites, prehistoric sites and Army Corp land. He has experience with prehistoric and historic artifact identification, deep testing excavation, soil stratigraphy and cleaning and processing artifacts for curation.

### Key Projects and Assignments

#### *Pipeline Projects*

##### **T-072 Pipeline**

**Buncombe County, NC | June 2018**

Conducted Phase I cultural resource survey for proposed pipeline route.

##### **Riverport Pipeline**

**Jasper County, SC | December 2017**

Served as an archaeological field technician. Conducted Phase I cultural resource survey for proposed pipeline route.

##### **Lawyers Road Pipeline**

**Union County, NC | November 2017**

Served as an archaeological field technician. Conducted Phase I cultural resource survey for proposed pipeline route.

##### **Nexus Pipeline Project**

*\*TRC Environmental Corporation*

**Multiple Counties, OH | May 2015-October 2017**

Served as an archaeological field technician. Conducted Phase I cultural resource survey for proposed pipeline, reroutes, access road and additional work areas. Conducted Phase II data evaluations on historic and prehistoric sites.

##### **Line 3 Replacement Project**

*\*Merjent, Inc.*

**Aitkin, Itasca, and Saint Louis Counties, MN | August 2017-September 2017**

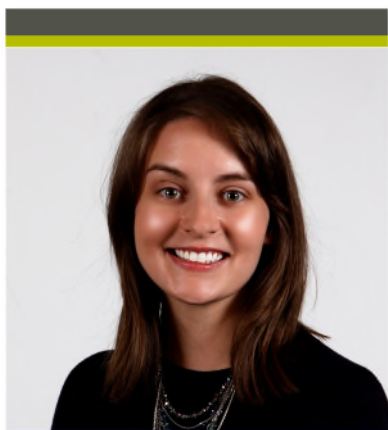
Served as an archaeological field technician. Conducted Phase I cultural resource survey for proposed pipeline route.

#### *D.O.T/Highway Projects*

##### **Highway 107 Expansion**

*\*TRC Environmental Corporation*

*\*Experience with previous employer.*



#### PROJECT ROLE

Associate Project Manager

#### LOCATION

Charlotte, NC

#### EDUCATION

- BS, Environmental Science, 2014, Queens University of Charlotte

#### YEARS OF EXPERIENCE

Joined S&ME in 2015

## Amy Moore

### Associate Project Manager

Ms. Moore is an Associate Project Manager for S&ME's Charlotte location. She is involved primarily in geographic information systems (GIS) mapping, data management, permitting, and natural resources services for natural gas pipelines. Her expertise includes geographic information systems (GIS) mapping, erosion and sediment control (E&SC) permitting, environmental science, and threatened & endangered species.

### Key Projects and Assignments

#### **PSNC Energy – NPDES Inspections**

**Iredell County, North Carolina | 2017-present**

As a Staff Professional and Associate Project Manager, Ms. Moore performs North Carolina National Pollutant Discharge Elimination System (NPDES) inspections on the T-18B natural gas pipeline in Iredell County. These inspections monitor and report about discharge of water and sediment related to pipeline construction.

#### **South Carolina Electric & Gas – Storm Water Pollution Prevention Plan (SWPPP) Design and Permitting, Floodplain Encroachments, and Natural Resources Permitting**

**Multiple Locations, South Carolina | 2015-present**

As an Associate Project Manager, Ms. Moore designs SWPPPs including mapping, determination of erosion control measures, report writing, and receipt of regulatory agency approval. These projects range in size from 1 mile to 10 miles in length and include both roadside and cross-country pipeline sections.

#### **PSNC Energy – Erosion & Sediment Design and Permitting, Floodplain Encroachments, and Natural Resources Permitting**

**Multiple Locations, North Carolina | 2014-present**

As an Associate Project Manager, Ms. Moore designs E&SC plans including GIS mapping, determination of erosion control measures, report writing, and receipt of regulatory agency approval. These projects range in size from 1 mile to 15 miles in length and included both roadside and cross-country pipeline sections.

#### **Piedmont Natural Gas Company, Inc. – Erosion & Sediment Design and Permitting, NCDOT Encroachments, CDOT Encroachments, Floodplain Encroachments, and Natural Resources Permitting**

**Multiple Locations, North Carolina | 2014-present**

As an Associate Project Manager, Ms. Moore manages various permits and encroachments for roadside and cross-country natural gas pipelines and is the primary contact for regulatory agency approval. These projects range in size from 1 mile to 10 miles in length and included both roadside and cross-country pipeline sections.



### **Town of Indian Trail – Stormwater Mapping**

**Union County, North Carolina | 2015**

As a Staff Professional, Ms. Moore performed field work mapping close stormwater systems, open-channel culvert mapping and inspections, SCM mapping and observations and assisted with GIS data management and mapping for the Town of Indian Trail, North Carolina's stormwater systems.

### **PSNC Energy Spencer Mountain Natural Gas Pipeline – Natural Resources**

**Gaston County, North Carolina | 2015**

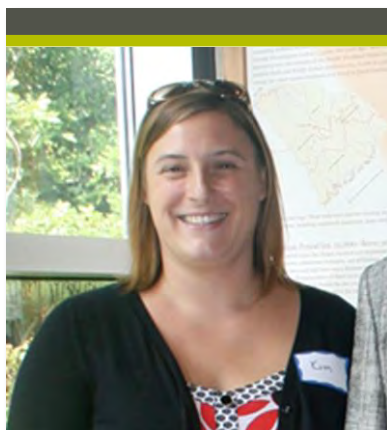
As a Staff Professional, Ms. Moore was a field expert on the *Helianthus schweinitzii* (Schweinitz's sunflower). She was responsible for identifying whether *H. schweinitzii* would be affected by natural gas pipeline construction during a site visit.

### **Piedmont Natural Gas Company, Inc. Lines 294/295**

**Near Hickory, North Carolina | 2014-2015**

As a Staff Professional, Ms. Moore was responsible for natural resources wetland and stream delineation efforts in support of a reclamation project. She provided oversight on a crew of up to nine laborers in order to transplant threatened *Hexastylis naniflora* (dwarf-flowered heartleaf) plants so they would not be impacted by natural gas operations. Plants were identified by S&ME personnel and flagged before being transplanted outside of the construction easement.

#4335-14-194



#### PROJECT ROLE

Project Manager / Principal Investigator

#### LOCATION

Columbia, South Carolina

#### EDUCATION

- M.S., Archaeological Resource Management, Ball State University, Muncie, Indiana, 2002
- B.A., Anthropology, California State University, Sacramento, 1997

#### YEARS OF EXPERIENCE

Joined S&ME in 2008 with 10 years professional experience

#### PROFESSIONAL MEMBERSHIPS

- Register of Professional Archaeologists – 2010
- Society for American Archaeology
- Southeastern Archaeological Conference

#### CONTINUING EDUCATION

- Section 106 Essentials
- Advanced Section 106
- FERC Environmental Review for Natural Gas Seminar

## Kimberly Nagle

### Project Manager/Principal Investigator

Ms. Nagle has over 17 years of experience and is responsible for managing all aspects of the cultural resources department in Columbia, including financial and personnel management, marketing, preparing Memorandums of Agreement and data recovery plans, overseeing all aspects of field investigation and laboratory analysis, and ensuring that researching and reporting is to S&ME standards and is accomplished in a timely fashion. She has led numerous archaeological investigations serving a number of industrial, commercial, and residential developers, public utilities, and a variety of local, state, and federal agencies. She has managed projects on a variety of scales ranging from small single-property reconnaissance studies to multi-state pipeline corridors and large hydroelectric relicensing surveys. Ms. Nagle specializes in prehistoric archaeology, cultural resource management, GIS, and artifact curation, and possesses a variety of analytical skills including lithic and ceramic analysis, and human osteology.

### Key Projects and Assignments

#### FERC

##### **Parr Hydroelectric Project (FERC Project No. 1894)**

**Fairfield & Newberry Counties, SC | August 2013-August 2014**

Project Manager and Principal Investigator for the Parr Hydroelectric Project. Conducted Phase I cultural resource survey for the SCE&G relicensing of the Parr Hydroelectric Project; the project area included 70 separate areas (3,375 acres) along the Broad River and Monticello Reservoir.

##### **Tygart Hydroelectric Project (FERC Project No. 12613)**

**Taylor County, WV | September 2011-April 2013**

Project Manager for the Tygart Hydroelectric Project. Oversaw Phase I cultural resource survey for Tygart, LLC's relicensing of the Tygart Hydroelectric Project; project area included the hydroelectric facility and a proposed transmission line corridor along the Kanawha River near Grafton.

##### **London/Marmet and Winfield Hydroelectric Projects (FERC Project Nos. 1175 and 1290)**

**Kanawha & Putnam Counties, WV | November 2009-February 2010**

Field Director and project archaeologist for the London/Marmet and Winfield Hydroelectric Projects. Conducted Phase I cultural resource survey for Appalachian Power Company's relicensing of the London/Marmet and Winfield Hydroelectric Projects; project area included three hydroelectric facilities along the Kanawha River near Charleston, WV.

##### **Tree House Site (38LX531) (FERC Project No. 516)**

**Lexington County, SC | February 2008-August 2010**

Served as field director and project archaeologist, laboratory supervisor and primary analyst for over 30,000 artifacts associated with archaeological data



recovery excavations at site 38LX531, a deeply stratified Paleoindian through Mississippian site located on the Saluda River. The work was conducted on behalf of SCE&G, for their relicensing of the Saluda Hydroelectric Project.

### **PIPELINE**

#### **T-018B Pipeline Replacement Project**

**Iredell County, NC | March 2018-ongoing**

Principal Investigator for the T-018B Pipeline replacement project. Conducted Phase I archaeological investigations along 2.5 miles of pipeline corridor. This was done in support of obtaining a USACE permit.

#### **Riverport Pipeline**

**Jasper County, SC | November 2017-ongoing**

Principal Investigator for the Riverport Pipeline project. Conducted Phase I archaeological investigations along 10.3 miles of pipeline corridor and access roads. This was done in support of obtaining a USACE permit.

#### **Line 208 Relocation Project**

**Chowan and Gates Counties, NC | December 2017-February 2018**

Principal Investigator for the Line 208 Pipeline project. Conducted Phase I archaeological investigations at three bridge locations where HDD would be used to relocate the pipeline allowing for the bridges to be replaced. This was done in support of obtaining a USACE permit.

#### **Lawyers Road Pipeline Project**

**Union County, NC | December 2017-ongoing**

Principal Investigator for the Lawyers Road Pipeline project. Conducted Phase I archaeological investigations along 6.7 miles of pipeline corridor. This was done in support of obtaining a USACE permit.

#### **Clemmons Line 328 Upgrade Project**

**Davie County, NC | March 2017-August 2017**

Principal Investigator for the Clemmons Pipeline project. Conducted Phase I archaeological investigations along 10.5 miles of pipeline corridor. This was done in support of obtaining a USACE permit.

#### **Line 30 Pipeline Project**

**Wake County, NC | March 2017-June 2017**

Principal Investigator for the Line 30 Pipeline project. Conducted Phase I archaeological investigations along 12.4 miles of pipeline corridor. This was done in support of obtaining a USACE permit.

#### **Line 36 Pipeline Replacement Project**

**Harnett and Sampson Counties, NC | December 2016-January 2017**

Principal Investigator for the Line 36 Pipeline replacement project. Conducted Phase I archaeological investigations along 14.25 miles of pipeline corridor. This was done in support of obtaining a USACE permit.



### **Line T-001, Phase II Pipeline Replacement Project**

**Cleveland, Polk, and Rutherford Counties, NC | June 2016-December 2016**

Principal Investigator for Phase II of the T-01 Pipeline replacement project. Conducted Phase I archaeological investigations along 57 miles of pipeline, as well as reroutes and access roads. This was done in support of obtaining a USACE permit.

### **Dremak Well Connect**

**Wheeling, Ohio County, West Virginia | November 2016**

Principal Investigator for the Dremak Well Connect Project. Conducted archaeological and architectural surveys along 1.66 miles of pipeline and access roads. This was done in support of obtaining a USACE permit.

### **Richtex System Improvement – Wetland C**

**Richland County, South Carolina | October 2016**

Principal Investigator for the archaeological survey of the area surrounding Wetland C along the Richtex System Improvement project. Previously recorded, NRHP eligible archaeological site 38RD283 is located directly adjacent to Wetland C and the USACE requested an archaeological survey of the area surrounding the wetland be conducted to verify the site will not be impacted by the project.

### ***DOT***

### **Archaeological and Historic Resources Survey, Poplar Creek**

**Buchanan County, Virginia | August 2016**

Field Director conducting archaeological and architectural survey along US Route 121 where improvements to the roadway are proposed. The project was completed for 3B Consulting Services, LLC under contract to Virginia DOT.

### **Historic Architectural Analysis of the Improvements to NC 73**

**Lincoln and Mecklenburg Counties, NC | August 2016**

Field assistant in gathering data and taking pictures of the 80 structures to be recorded along NC 73. The project was completed for North Carolina DOT in anticipation of roadway improvements to NC 73 from NC 16 Business to Northcross Avenue.

### **OTHER – Traditional CR projects**

#### ***PHASE I/II***

### **Peony Solar Farm**

**Orangeburg County, SC | October 2017-ongoing**

Principal Investigator for cultural resource investigations for an approximately 320 acre solar farm; eight archaeological sites and the Tivoli Plantation property were identified. Four of the archaeological sites were recommended for Phase II testing and additional consultation is necessary for the Tivoli Plantation property. This project was completed in anticipation of receiving federal funding.





### **CSX Railroad Extension Addendum**

**Clarendon County, SC | July 2017-August 2017**

Principal Investigator for cultural resource investigations for approximately seven miles of reroutes associated with the proposed railroad extension. A total of six archaeological sites, two isolated finds, and one historic structure was recorded during the survey. This project was completed in anticipation of USACE permitting.

(#4261-17-107)

### **Charlie's Place**

**Horry County, SC | June 2017-January 2018**

Principal Investigator for a cultural resource survey at Charlie's Place and the Fitzgerald Motel, a 1930s through 1970s supper club and jazz club in Myrtle Beach. This project was completed for the City of Myrtle Beach, who is seeking Community Block Development Grant funding from the US Department of Housing and Urban Development.

### **Scottsmoor to Edgewater 115kV Transmission Line Corridor**

**Voulsia County, FL | June 2017-December 2017**

Principal Investigator for a Phase I survey along approximately five miles of transmission line corridor. This project was completed in anticipation of USACE permitting.

### **Riverchase Collection and Recycling Center Project**

**Lexington County, SC | June 2017**

Principal Investigator for a Phase I survey for a proposed recycling center. This project was completed in anticipation of USACE permitting.

### **Black River Airport Industrial Park**

**Sumter County, SC | March 2017**

Principal Investigator for a Phase I survey of approximately 86 acres of the 208 acre industrial park property. Three archaeological sites and four historic resources were identified, none of the resources were eligible for the National Register.

### **Lake Rabon Trails**

**Laurens County, SC | October 2016-November 2016**

Principal Investigator for a cultural resource survey for a park expansion project in Laurens County, South Carolina. This project was completed in anticipation of USACE permitting.

### **Carolinas I-95 Super Park**

**Dillon County, SC | September 2016-November 2016**

Principal Investigator for a Phase I survey of approximately 621 acres for the Carolinas I-95 Super Park in Dillon County, South Carolina. A total of four archaeological sites were re-located, seven archaeological sites and four isolated finds were recorded, and two NRHP eligible historic structures were assessed during the survey. This project was completed in anticipation of USACE permitting.



### **Phase II Testing at sites 38KE1135 and 38KE1164**

**Kershaw County, SC | September 2016-October 2016**

Principal Investigator for Phase II archaeological testing at sites 38KE1135 and 38KE1164. Site 38KE1135 was identified in 2011 during the CRIS for the Conder Mega Site and site 38KE1164 was identified in 2014 during the Phase I investigations for the Conder Mega Site. Site 38KE1135 was recommended not eligible for the National Register as a result of the Phase II testing, while site 38KE1164 was recommended eligible. Avoidance of site 38KE1164 was recommended; if avoidance is not possible a data recovery of the site would be necessary. This project was completed to obtain USACE permitting.

### **Phase II Testing at site 38NE1032/1035**

**Newberry County, SC | June 2016**

Principal Investigator for Phase II archaeological testing at site 38NE1032/1035. The site was recorded in 2013 as an Early through Late Archaic short term occupation area; because of the intact Early Archaic deposits the site was recommended for additional testing to determine the NRHP eligibility of the site. The Phase II was completed in 2016 and identified additional artifacts and one feature in intact deposits. The site was recommended eligible for the National Register and avoidance of the site was suggested. This project was completed to obtain USACE permitting.

### **CSX Railroad Extension**

**Clarendon County, SC | February 2016-July 2016**

Principal Investigator for cultural resource investigations for an approximately 11-mile railroad extension in Clarendon County, South Carolina. A total of five archaeological sites, two isolated finds, six historic structures, and two cemeteries were recorded during the survey. Additional work was recommended for one archaeological site and two historic structures. This project was completed in anticipation of USACE permitting.

### **SC Highway 34 Mega Site**

**Fairfield County, SC | February 2016-March 2016**

Principal Investigator for cultural resource investigations of approximately 1,976 acres for the SC Highway 34 Mega Site in Fairfield County, South Carolina. This project was completed for the state site certification program and in anticipation of USACE permitting.

### **Brunswick Riverwalk Park**

**Brunswick County, NC | January 2016-February 2016**

Principal Investigator for archaeological investigations of approximately two acres for the Brunswick Riverwalk Park expansion. This is the reported location of the Buchoi Plantation and investigations were necessary to determine if the park expansion would impact subsurface features associated with the eighteenth century plantation. This project was completed to fulfill Condition 13 of the Coastal Area Management Act permit.



### **Recent Technical Reports**

- 2018 – Kimberly Nagle and Heather Carpini. *Phase I Archaeological Survey, T-018B Pipeline Replacement Project, Iredell County, North Carolina*. Report prepared for PSNC Energy – A SCANA Company, Cayce, South Carolina. Report prepared by S&ME, Inc., Columbia.
- 2018 – Kimberly Nagle and Heather Carpini. *Cultural Resource Survey, Riverport Pipeline, Jasper County, South Carolina*. Report prepared for SCANA, Cayce, South Carolina. Report prepared by S&ME, Inc. Columbia.
- 2017 – Kimberly Nagle and Heather Carpini. *Phase I Archaeological Survey, Line 208 Relocations for Three Bridge Replacements, Chowan and Gates Counties, North Carolina*. Report prepared for Piedmont Natural Gas, Charlotte North Carolina. Report prepared by S&ME, Inc. Columbia.
- 2017 – Kimberly Nagle and Heather Carpini. *Phase I Archaeological Survey, Lawyers Road Pipeline Project, Union County, North Carolina*. Report prepared for Piedmont Natural Gas, Charlotte North Carolina. Report prepared by S&ME, Inc. Columbia.
- 2017 – Kimberly Nagle and Heather Carpini. *Phase I Archaeological Survey, Clemmons Line 328 Upgrade Project, Davie County, North Carolina*. Report prepared for Piedmont Natural Gas, Charlotte North Carolina. Report prepared by S&ME, Inc. Columbia.
- 2017 – Kimberly Nagle and Heather Carpini. *Phase I Archaeological Survey, Line 30 Pipeline Project, Wake County, North Carolina*. Report prepared for PSNC Energy – A SCANA Company, Cayce, South Carolina. Report prepared by S&ME, Inc. Columbia.
- 2017 – Kimberly Nagle and Heather Carpini. *Phase I Archaeological Survey, Line T-001 Pipeline Replacement Project, Cleveland, Polk, and Rutherford Counties, North Carolina*. Report prepared for PSNC Energy – A SCANA Company, Cayce, South Carolina. Report prepared by S&ME, Inc. Columbia.
- 2017 – Kimberly Nagle and Heather Carpini. *Addendum to the Phase I Cultural Resource Survey, CSX Railroad Extension, Clarendon County, South Carolina*. Report prepared for Alliance Consulting Engineers, Inc., by S&ME, Inc., Columbia, SC.
- 2017 – Kimberly Nagle, Joseph DeAngelis, and Heather Carpini. *Cultural Resource Survey, Charlie's Place, Horry County, South Carolina*. Report prepared for The City of Myrtle Beach, by S&ME, Inc., Columbia, SC.
- 2017 – Kimberly Nagle, Joseph DeAngelis, and Heather Carpini. *Phase I Cultural Resources Survey, Riverchase Collection and Recycling Center, Lexington County, South Carolina*. Report prepared for Alliance Consulting Engineers, Inc., by S&ME, Inc., Columbia, SC.
- 2017 – Kimberly Nagle and Joseph DeAngelis. *Phase I Cultural Resources Survey, Black River Airport Industrial Park, Sumter County, South Carolina*. Report prepared for Alliance Consulting Engineers, Inc., by S&ME, Inc., Columbia, SC.
- 2017 – Kimberly Nagle and Heather Carpini. *Phase I Archaeological Survey, Line 36 Pipeline Replacement Project, Harnett and Sampson Counties, North*



Carolina. Report prepared for Magnolia River of NC, PLLC, by S&ME, Inc., Columbia, SC.

- 2016 – Kimberly Nagle and Heather Carpini. *Phase I Archaeological Survey, Line T-01, Phase II Pipeline Replacement Project, Cleveland, Polk, and Rutherford Counties, North Carolina*. Report prepared for PSNC Energy – A SCANA Company, by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Heather Carpini. *Historic Architecture Survey, Dremak Well Connect, Wheeling, Ohio County, West Virginia*. Report prepared for Appalachia Midstream Services, LLC, by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Frank Carvino. *Phase I Archaeological Survey, Dremak Well Connect, Wheeling, Ohio County, West Virginia*. Report prepared for Appalachia Midstream Services, LLC, by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Heather Carpini. *Archaeological Survey – Wetland C, Richtex System Improvement, Richland County, South Carolina*. Report prepared for SCE&G – A SCANA Company, by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle, Joseph DeAngelis, and Heather Carpini. *Archaeological Investigation of the Proposed Legacy Park East Development, Rock Hill, York County, South Carolina*. Report prepared for Scannell Properties, by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle, Joseph DeAngelis, and Heather Carpini. *Archaeological and Historic Resource Survey, Haier America Company Expansion Project, Camden, Kershaw County, South Carolina*. Report prepared for Kershaw County Economic Development, by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Heather Carpini. *Cultural Resource Survey, Lake Rabon Trails Phase III, Laurens County, South Carolina*. Report prepared for Laurens County Water and Sewer Commission, by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Heather Carpini. *Phase I Cultural Resource Survey, Carolinas I-95 Super Park, Dillon County, South Carolina*. Report prepared for Alliance Consulting Engineers, Inc., by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Heather Carpini. *Phase II Testing at Sites 38KE1135 and 38KE1164, Central SC MegaSite, Kershaw County, South Carolina*. Report prepared for Kershaw County Economic Development, by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Heather Carpini. *Phase II Testing at Site 38NE1032/1035, I-26 MegaSite, Newberry County, South Carolina*. Report prepared for Alliance Consulting Engineers, Inc., by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Heather Carpini. *Phase I Cultural Resource Survey, CSX Railroad Extension, Clarendon County, South Carolina*. Report prepared for Alliance Consulting Engineers, Inc., by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle and Heather Carpini. *Cultural Resources Identification Survey of Approximately 1,976 Acres at the SC Highway 34 Mega Site, Fairfield County, South Carolina*. Report prepared for Alliance Consulting Engineers, Inc., by S&ME, Inc., Columbia, SC.
- 2016 – Kimberly Nagle, Joseph DeAngelis, and Heather Carpini. *Archaeological Investigation of the Proposed Brunswick Riverwalk Park, Belville, Brunswick County, North Carolina*. Report prepared for the Town of Belville, by S&ME, Inc., Columbia, SC.



#### **Jackson County, NC | October 2017**

Served as an archaeological field technician. Conducted Phase I cultural resource survey along existing highway. Excavated three prehistoric and documented one above ground historic resource. Conducted deep soil profile with soil probe.

#### **Maryland Highway 219 Expansion**

\*TRC Environmental Corporation

#### **Garrett County, MD | August-November 2015**

Served as an archaeological field technician. Conducted Phase I cultural resource survey for the proposed highway expansion area. Excavated historic sites and documented historic structures.

#### **Cellular Tower Projects**

##### **Mountain View**

##### **Spartanburg County, SC | 2018**

Crew Chief for a survey of a proposed cell tower for Verizon Wireless (4226-18-0001B Phase 003). Conducted Phase I cultural resource survey and photo documented the project area.

##### **Allen 49**

##### **Randolph County, NC | 2018**

Crew Chief for a survey of a proposed cell tower for Verizon Wireless (4335-18-001B Phase 05). Conducted Phase I cultural resource survey and photo documented the project area.

##### **Fred Dobbins**

##### **Anderson County, SC | 2018**

Crew Chief for a survey of a proposed cell tower for Verizon Wireless (4226-18-001B Phase 06). Conducted Phase I cultural resource survey and photo documented the project area. Excavated and documented a historic site with an above ground feature.

##### **Wilson Tower**

##### **Wilson County, NC | 2018**

Crew Chief for a survey of a proposed cell tower for Verizon Wireless (4335-18-001 B Phase 12). Conducted a Section 106 only survey by photo documenting the project area and any significant cultural resources within a 0.5 radius of the project area.

##### **Conley HS 1**

##### **Pitt County, NC | 2018**

Crew Chief for a survey of a proposed antenna for Verizon Wireless (4335-18-001 B Phase 15). Conducted a Section 106 only survey by photo documenting the project area and any significant cultural resources within a 0.5 radius of the project area.

*\*Experience with previous employer.*



### ***Other Archaeological Projects***

#### **U.S. Highway 176 Phase I Survey**

**Calhoun County, SC | February 2018**

Served as an archaeological field technician. Conducted Phase I cultural resource survey for project area.

#### **Peony Solar Farm**

**Orangeburg County, SC | November 2017**

Served as an archaeological field technician. Conducted Phase I cultural resource survey in proposed project area. Excavated four prehistoric sites and one historic site.

#### **Kerr Lake Survey**

*\*TRC Environmental Corporation*

**Multiple counties in NC and VA | February 2017-May 2017**

Served as an archaeological field technician. Conducted Phase I cultural resource survey for proposed timber harvest by the Army Corp of Engineers. Documented and excavated both historic and prehistoric sites. Assisted in documenting and photographing historic structures and foundations.

#### **Cainhoy Plantation Survey**

*\*Brockington and Associates*

**Berkeley County, SC | May 2016-November 2016**

Served as an archaeological field technician. Conducted Phase I cultural resource survey for residential/commercial development. Documented and excavated both historic and prehistoric sites. Conducted Phase II archaeological excavations on one historic and four prehistoric sites.

#### **Seabee Loran**

*\*TRC Environmental Corporation*

**New Hanover County, NC | February 2016**

Served as an archaeological field technician. Conducted Phase II stripping of a prehistoric site. Excavated, documented and photographed a shell midden and associated archaeological features.

#### **Fort Bragg Cultural Resource Survey**

*\*TRC Environmental Corporation*

**Cumberland County, NC | October 2015-January 2016**

Served as an archaeological field technician. Conducted Phase I cultural resource survey on the Fort Bragg military base. Excavated and documented historic and prehistoric sites.

### ***Reconnaissance and Site Recertification Projects***

#### **U.S Highway 176 Mega site addition**

**Calhoun County, SC | 2018**

Served as crew chief for a Cultural Resources Identification (CRIS) of approximately 23 acres for a proposed industrial/commercial project for Alliance Consulting Engineers, Inc.

*\*Experience with previous employer.*





#### PROJECT ROLE

Project Scientist

#### LOCATION

Greenville, SC

#### EDUCATION

- BS, Sacred Music, 1991, Tennessee Temple University

#### YEARS OF EXPERIENCE

Joined S&ME in 2004 with 22 years of experience

#### REGISTRATIONS

- Grade A Biological Waste Water Operator License, SC

## Ronald H. Walker

### Project Scientist / Project Manager

#### Key Projects and Assignments

##### Landfill Expansion

Pickens County, South Carolina | 2016

Project Manager: Project included jurisdictional waters delineation and protected species evaluation on a 400 acre site. CWA 404/401 Individual Permitting for construction within jurisdictional waters.

##### Nuclear Station Permitting

Oconee County, South Carolina | 2016

Project Manager: Project included jurisdictional waters delineation and protected species evaluation associated with a new access road. CWA 404/401 Nationwide Permitting for construction within jurisdictional waters.

##### Steam Station Permitting

Anderson County, South Carolina | 2015

Project Scientist: Project included jurisdictional waters delineation and protected species evaluation on a 600 acre site. CWA 404/401 Nationwide Permitting for construction within jurisdictional waters.

##### Wastewater Diffuser Permitting

Cherokee County, South Carolina | 2015

Project Manager: Project included jurisdictional waters delineation and protected species evaluation for ongoing repairs associated with a facilities wastewater discharge diffusers within a Traditional Navigable Water. CWA 404/401 Individual Permitting for construction within navigable jurisdictional waters.

##### Industrial Development Project

Spartanburg County, South Carolina | 2015

Project Scientist: Project included jurisdictional waters delineation and protected species evaluation on a 405 acre site. CWA 404/401 Nationwide Permitting for construction within jurisdictional waters.

##### Gas Pipeline Project Right of Way Reclamation

Greenville, South Carolina | 2014

Project Scientist: Project included jurisdictional waters delineation along a 12 mile natural gas pipeline. Including CWA 404/401 permitting for tree removal within jurisdictional waters.

##### S164 (Batesville Road) Realignment & Improvements

Greenville, South Carolina | 2014

Project Scientist: Jurisdictional Determination for road widening project. Preparation and submittal of Jurisdictional Determination Request to Army Corps of Engineers.

*\*Experience with previous employer.*



### **Motlow Creek Bridge Relocation**

**Campobello, South Carolina | 2014**

Project Scientist: Project included jurisdictional waters delineation, preparation and submittal of Jurisdictional Determination Request to Army Corps of Engineers.

### **Mitigation Bank Development**

**Anderson County, South Carolina | 2012 - 2014**

Project Scientist: Project included jurisdictional waters delineation and protected species evaluation on a 2,000 acre site. The site waters were also extensively evaluated for restoration potential. Preparation of the Banking Prospectus and the Banking Instrument. Project is ongoing.

### **Distribution Center Development**

**Cobb County, Georgia | 2014**

Project Manager: Project included jurisdictional waters delineation and protected species evaluation on a 60 acre site. CWA 404/401 Nationwide Permitting for construction within jurisdictional waters.

### **Natural Resources Performed for Mitigation Bank Development**

**Star, South Carolina | 2011**

Project Scientist: Project included jurisdictional waters delineation and protected species evaluation on a 2,000 acre site. The site waters were also extensively evaluated for restoration potential. Preparation of the Banking Prospectus and the Banking Instrument.

### **CXS Rail Bridge Replacement - CWA 404/401 and SC Navigable Waters Permitting Services**

**Union Counties, South Carolina | 2009**

Jurisdictional Determination and Clean Water Act, Sections 404/401 permitting for the replacement of a rail bridge over a SC Navigable Water. Specific Role; Project Manager, field assessment and permitting.

### **Residential Development Project**

**Hamilton County, Tennessee | 2007**

Project Manager for natural resource evaluation for a 1500 acre residential development in Hamilton County Tennessee. Twenty wetlands were delineated and numerous streams were evaluated.

(#1464-07-046)

### **Water and Wastewater Authority Project**

**Tennessee**

Project Manager for local Water and Wastewater Authority permitted impacts associated with the replacement of a sewer line along a three-mile corridor. Impacts included crossing two perennial streams and 0.968 acre of impacts to 8 delineated wetlands along the corridor. The proposed mitigation plan included restoration and monitoring for a two year period.

(#1436-05-186)

*\*Experience with previous employer.*



### **Natural Resources Performed for Residential Development**

#### **Tennessee**

Project Manager for natural resource evaluations for two large residential developments in middle Tennessee (937 acres) and eastern Tennessee (578 acres). Used GPS to log and evaluate the jurisdictional waters on the properties. (#1437-06-647 and #1464-05-018B)

### **Residential and Industrial Development Projects**

#### **Tennessee**

Project Manager responsible for successfully permitted minor impacts to wetlands associated with local residential and industrial developments. (#1436-05-194, #1436-05-951, #1464-06-032 and #1464-06-035)

### **Stream Restoration Project**

#### **Tennessee**

Project Manager for stream restoration. Project included an assessment of the impacts to the stream, and writing a Corrective Action Plan for the removal of sediments in a 600 foot length of stream. (#1464-05-034)

### **Shopping Complex**

Project Manager responsible for performing mitigation monitoring associated with a wetland and stream mitigation area for a local shopping complex. Wrote and implemented five year monitoring plan. (#1436-05-178)

### **Commercial Development**

Staff Professional responsible for performing a stream relocation involving 344 feet of channel impacts and 0.26 acres of wetland impacts for a commercial development. Project involved wetland delineation, stream assessment, permitting, and mitigation plans. Mitigation included both onsite creation of wetlands and offsite purchasing of wetland credits (#1436-05-052).

### **Apartment Complex (2003)**

Project Manager responsible performing wetlands delineation for a new apartment complex. Project included wetland delineation, report writing, and verification coordination with the Army Corps of Engineers and the State regulatory authority.

### **Lake Front Housing Development Project (2001 – 2002)**

Project Manager responsible for performing wetland delineation, permitting and mitigation services for a new lake front housing development. Responsibilities included project management, wetland delineation, report writing, and verification coordination. Completed negotiations with the Army Corps of Engineers, and the State regulatory authority for the ARAP Permit for the removal

*\*Experience with previous employer.*



of 0.20 acre of wetland and the creation of 0.30 acres of wetland adjacent to the one removed and the creation of a 0.99 acre wetland off site.

### **New Housing Development Project (2002)**

Project Manager responsible for performing wetlands delineation and permitting for a new housing development. Responsibilities included project management, wetland delineation, report writing, and verification coordination with the State regulatory authority.

### **Development of 18-acre Site (2000)**

Project Manager for wetland delineation on an 18-acre track of property. Responsibilities included project management, wetland delineation, report writing, and verification coordination with the Army Corps of Engineers and the State regulatory authority.

### **Dry Cleaners Project Chattanooga, Tennessee**

Field Manager for environmental services and assistant project management for large dry cleaners project in Chattanooga, Tennessee. Responsibilities included contract management, development of site assessment and corrective action plans for solvents (DNAPLs) released from dry cleaner and petroleum hydrocarbons from a gasoline station, remediation system procurement, construction, and operation and maintenance; pilot testing, reporting, soil sampling, groundwater sampling, air monitoring and waste disposal oversight during construction of downtown office. Work was performed on expedited schedule to meet construction schedule.

(#1434-02-025, #1434-02-025A)

### **Environmental Services for Development Project Chickamauga, Georgia**

Field Manager at UST remediation site in Chickamauga, Georgia. Project involved underground storage tanks and environmental services. Responsibilities included UST removal oversight at three sites, project and contract management, development of site assessment and corrective action plans, remediation system procurement, free product recovery, construction, and operation and maintenance; POTW permit application and compliance sampling, and UST trust fund reimbursement management.

(#1436-04-260)

### **Dry Cleaners Site**

Field Manager responsible for overseeing environmental services on dry cleaners remediation site. Responsibilities included contract management, development of site assessment and corrective action plans for solvents (DNAPLs) released from dry cleaner and petroleum hydrocarbons from a gasoline station, remediation system procurement, construction, operation and maintenance, reporting, soil sampling, groundwater sampling using passive diffusion bags, air monitoring and waste management.

*\*Experience with previous employer.*





(#1434-02-024A)

### **Continuing Education**

- Annual 8 Hour Refresher Courses, S&ME, Inc.
- Design Principles for Stream Restoration Workshop, Auburn University, May 2005
- 38 Hour Army Corps of Engineers Wetland Delineation & Management Training Program, Richard Chinn Environmental Training, Inc., 1999
- 8 Hour Confined Spaced Trained, Apollo Safety Training, 1995
- 40 Hour Hazardous Waste Operations Training, Apollo Safety Training, 1995

*\*Experience with previous employer.*

**Appendix III**  
**NCDEQ Stream Classification Form**

**NC Division of Water Quality –Methodology for Identification of Intermittent and  
Perennial Streams and Their Origins v. 4.11**

**NC DWQ Stream Identification Form Version 4.11**

<b>Date:</b> 7.14.2018	<b>Project/Site:</b> T-072	<b>Latitude:</b> 35.501776°
<b>Evaluator:</b> Joey Lawler, PWS	<b>County:</b> Buncombe	<b>Longitude:</b> -82.587990°
<b>Total Points:</b> <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i>	<b>Stream Determination (circle one)</b> <b>Perennial</b>	<b>Other</b> <i>e.g. Quad Name:</i> Asheville, NC

A. Geomorphology (Subtotal = <u>14.5</u> )	Absent	Weak	Moderate	Strong
1 <sup>a</sup> Continuity of channel bed and bank	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input checked="" type="radio"/>
2. Sinuosity of channel along thalweg	0 <input type="radio"/>	1 <input type="radio"/>	2 <input checked="" type="radio"/>	3 <input type="radio"/>
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	0 <input type="radio"/>	1 <input type="radio"/>	2 <input checked="" type="radio"/>	3 <input type="radio"/>
4. Particle size of stream substrate	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input checked="" type="radio"/>
5. Active/relict floodplain	0 <input type="radio"/>	1 <input checked="" type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
6. Depositional bars or benches	0 <input type="radio"/>	1 <input checked="" type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
7. Recent alluvial deposits	0 <input checked="" type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
8. Headcuts	0 <input checked="" type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
9. Grade control	0 <input type="radio"/>	0.5 <input type="radio"/>	1 <input checked="" type="radio"/>	1.5 <input type="radio"/>
10. Natural valley	0 <input type="radio"/>	0.5 <input type="radio"/>	1 <input type="radio"/>	1.5 <input checked="" type="radio"/>
11. Second or greater order channel	No = 0 <input checked="" type="radio"/>		Yes = 3 <input type="radio"/>	


<sup>a</sup> artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>8.5</u> )	Absent	Weak	Moderate	Strong
12. Presence of Baseflow	0 <input type="radio"/>	1 <input type="radio"/>	2 <input checked="" type="radio"/>	3 <input type="radio"/>
13. Iron oxidizing bacteria	0 <input type="radio"/>	1 <input checked="" type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
14. Leaf litter	1.5 <input type="radio"/>	1 <input checked="" type="radio"/>	0.5 <input type="radio"/>	0 <input type="radio"/>
15. Sediment on plants or debris	0 <input type="radio"/>	0.5 <input checked="" type="radio"/>	1 <input type="radio"/>	1.5 <input type="radio"/>
16. Organic debris lines or piles	0 <input type="radio"/>	0.5 <input type="radio"/>	1 <input checked="" type="radio"/>	1.5 <input type="radio"/>
17. Soil-based evidence of high water table?	No = 0 <input type="radio"/>		Yes = 3 <input checked="" type="radio"/>	

C. Biology (Subtotal = <u>10</u> )	Absent	Weak	Moderate	Strong
18. Fibrous roots in streambed	3 <input checked="" type="radio"/>	2 <input type="radio"/>	1 <input type="radio"/>	0 <input type="radio"/>
19. Rooted upland plants in streambed	3 <input checked="" type="radio"/>	2 <input type="radio"/>	1 <input type="radio"/>	0 <input type="radio"/>
20. Macroinvertebrates (note diversity and abundance)	0 <input type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input checked="" type="radio"/>
21. Aquatic Mollusks	0 <input checked="" type="radio"/>	1 <input type="radio"/>	2 <input type="radio"/>	3 <input type="radio"/>
22. Fish	0 <input checked="" type="radio"/>	0.5 <input type="radio"/>	1 <input type="radio"/>	1.5 <input type="radio"/>
23. Crayfish	0 <input type="radio"/>	0.5 <input checked="" type="radio"/>	1 <input type="radio"/>	1.5 <input type="radio"/>
24. Amphibians	0 <input type="radio"/>	0.5 <input checked="" type="radio"/>	1 <input type="radio"/>	1.5 <input type="radio"/>
25. Algae	0 <input checked="" type="radio"/>	0.5 <input type="radio"/>	1 <input type="radio"/>	1.5 <input type="radio"/>
26. Wetland plants in streambed	<input checked="" type="radio"/> FACW = 0.75 <input type="radio"/> OBL = 1.5 <input type="radio"/> Other = 0 <input type="radio"/>			

\*perennial streams may also be identified using other methods. See p. 35 of manual.

**Notes:** Located north of Blue Ridge Parkway on NPS Property

Sketch:	
---------	--

## **Appendix IV**

### **Site Photographs**





View of forested portion of easement facing north from BRPW.



View of stream located on north side of BRPW.

Project No.: 7435-18-003

Taken by: S&ME

Date: 08.27.2018



**Natural & Cultural Resources Report**  
**Proposed PSNC T072 Natural Gas**  
**Pipeline Easement**  
**Blue Ridge Parkway – Asheville, NC**

**SITE**  
**PHOTOGRAPHS**  
 Photo Page1





Forested portion of proposed easement dominated by white pine.



View of marker denoting boundary of NPS property.

Project No.: 7435-18-003

Taken by: S&ME

Date: 08.27.2018



**Natural & Cultural Resources Report**  
**Proposed PSNC T072 Natural Gas**  
**Pipeline Easement**  
**Blue Ridge Parkway – Asheville, NC**

**SITE**  
**PHOTOGRAPHS**  
 Photo Page1





View of existing access road facing north.



View of existing access road facing south.

Project No.: 7435-18-003

Taken by: S&ME

Date: 08.27.2018



**Natural & Cultural Resources Report**  
**Proposed PSNC T072 Natural Gas**  
**Pipeline Easement**  
**Blue Ridge Parkway – Asheville, NC**

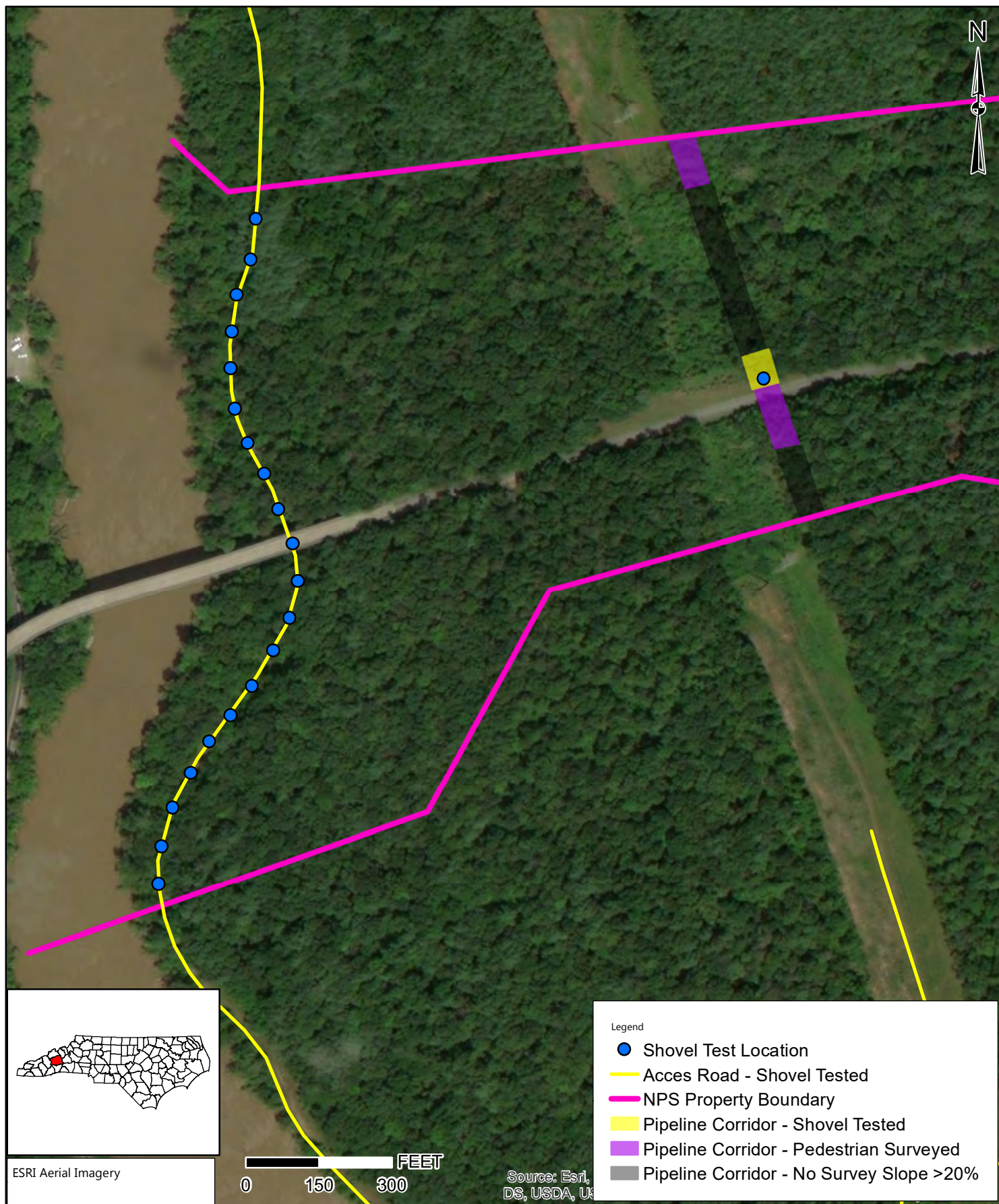
**SITE**  
**PHOTOGRAPHS**  
 Photo Page1



**Appendix V**  
**Cultural Resources Exhibits**



Drawing Path: T:\Projects\2018\Energy\7435\Charlotte\7435-18-003 Line T-072\GIS\EA for Joey\Exhibit V-1.mxd plotted by KNagle 08-23-2018



	SCALE: 1:3,185	<b>Aerial Map</b> T-072 Pipeline Corridor - Field Methods and Shovel Test Placement on NPS Property Buncombe County, North Carolina	FIGURE NO. <b>V-1</b>
	PROJECT NO: 7435-18-003		
	DRAWN BY: KJN		
	DATE: 8/23/2018		





**Exhibit V-2. Wooded areas within NPS property, facing east.**



**Exhibit V-3. Secondary growth and wooded areas in utility corridor on NPS property, Blue Ridge Parkway, facing south.**





**Exhibit V-4. Shovel test profile within the proposed pipeline corridor on NPS property.**



**Exhibit V-5. Shovel test profile within the proposed access road on NPS property.**

## **Appendix D - Viewshed Analysis**



**REFERENCE:** GIS BASE LAYERS WERE OBTAINED FROM ARCGIS ONLINE THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Service Layer Credits: © 2021 Microsoft Corporation © 2021 Maxar © CNES (2021) Distribution Airbus DS © 2021 TomTom  
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Drawing Path: R:\GISRA\Knoxville North\GIS PROJECTS\2018 Projects\7435-18-003\_T072\FIG1\_VIEWSHED\_LOCATION\_MAP.mxd plotted by Srowe 03-30-2021



- - - HDD
- PROPOSED 50' CORRIDOR



## VIEWSHED PHOTOGRAPH LOCATION MAP

ENVIRONMENTAL ASSESSMENT - BLUE RIDGE PARKWAY  
ASHEVILLE, BUNCOMBE COUNTY, NORTH CAROLINA

SCALE:  
1" = 800'  
DATE:  
3-30-21  
PROJECT NUMBER  
7435-18-003

FIGURE NO.  
  
**1**



## Figure 2 – Viewshed Study Photographs Environmental Assessment – Blue Ridge Parkway

Asheville, Buncombe County, North Carolina

S&ME Project No. 7435-18-003

Page 1



			Date: 2/27/2021
			Photographer: K. Nagle
1	Location / Orientation	Standing on the BRP, facing northwest towards the proposed HDD entry point.	
	Remarks	HDD equipment will be located right of the tower, behind tree cover, and therefore, will not be visible.	

			Date: 3/3/2021
			Photographer: T. Perez
2	Location / Orientation	Standing on the Mountains-to-Sea Trail, facing northwest towards the proposed HDD entry point.	
	Remarks	HDD equipment will be located right of the tower, behind tree cover, and therefore, will not be visible.	


**Figure 2 – Viewshed Study Photographs**  
**Environmental Assessment – Blue Ridge Parkway**

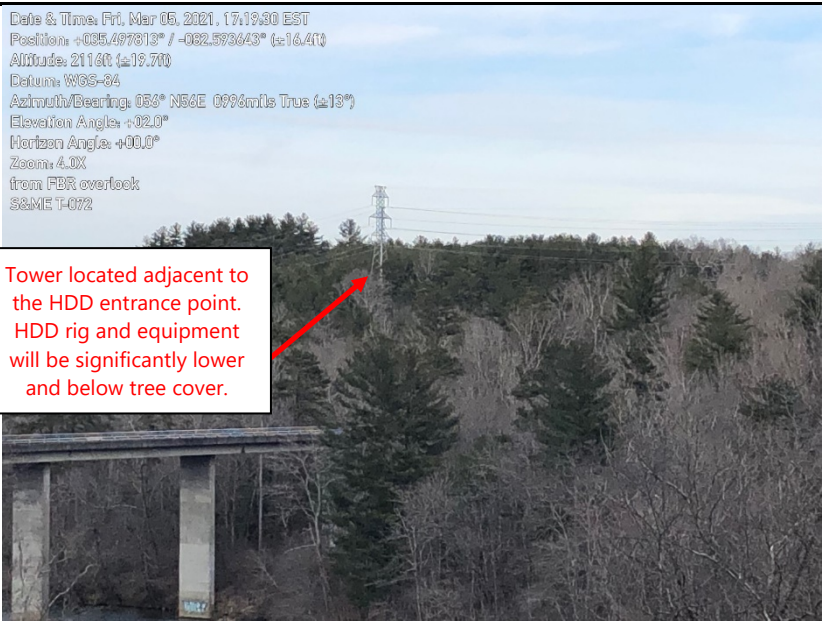
Asheville, Buncombe County, North Carolina

S&ME Project No. 7435-18-003

Page 2



		Date: 2/27/2021
		Photographer: K. Nagle
3	Location / Orientation	Standing on the BRP, facing southeast towards the proposed HDD exit point.
	Remarks	HDD equipment will be located left of the tower, behind vegetation, and therefore, will not be visible.

<p>Date &amp; Time: Fri, Mar 05, 2021, 17:19:30 EST  Position: +035.497613° / -082.573643° (±16.41)  Altitude: 2114ft (±19.7ft)  Datum: WGS-84  Azimuth/Bearing: 056° N56E 099±mils True (±13°)  Elevation Angle: +02.0°  Horizon Angle: +00.0°  Zoom: 4.0X  from FBR overlook  S&amp;ME T-072</p> 		Date: 3/3/2021
		Photographer: T. Perez
4	Location / Orientation	Standing at the French Broad Overlook on the BRP, facing northeast towards the proposed HDD entry point.
	Remarks	HDD equipment will be located behind and below the tower, behind tree cover, and therefore, will not be visible.



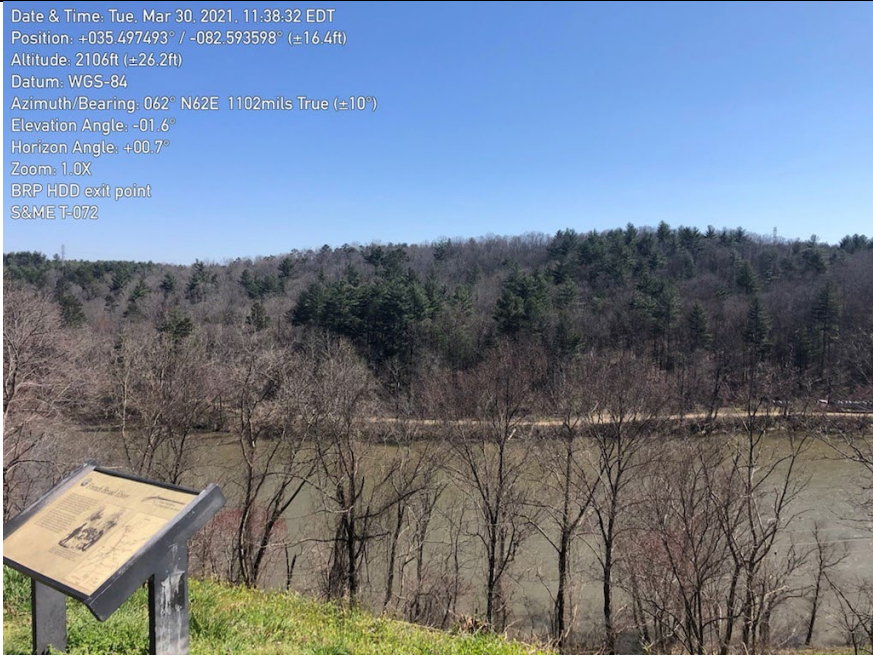
**Figure 2 – Viewshed Study Photographs**  
**Environmental Assessment – Blue Ridge Parkway**

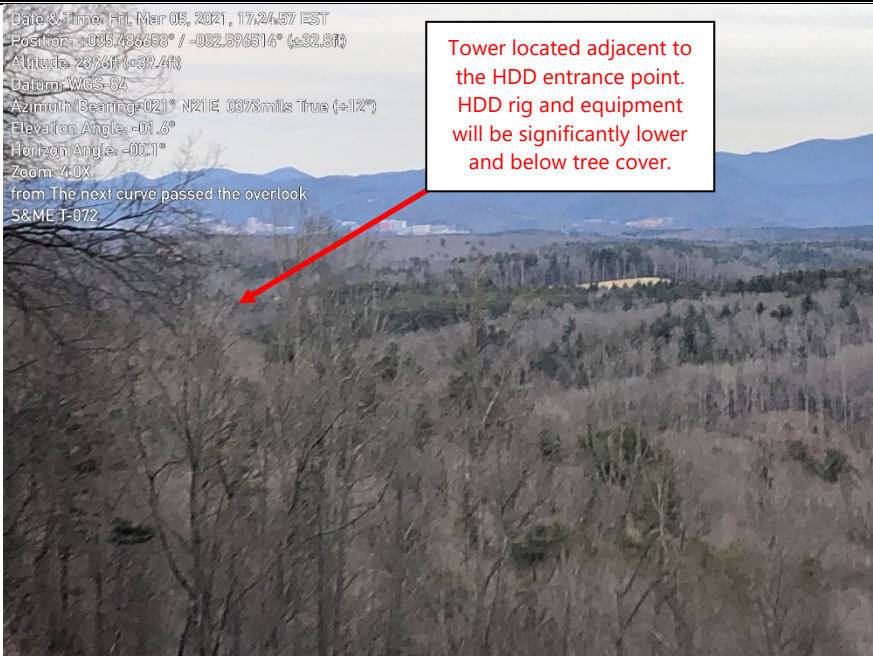
Asheville, Buncombe County, North Carolina

S&ME Project No. 7435-18-003

Page 3

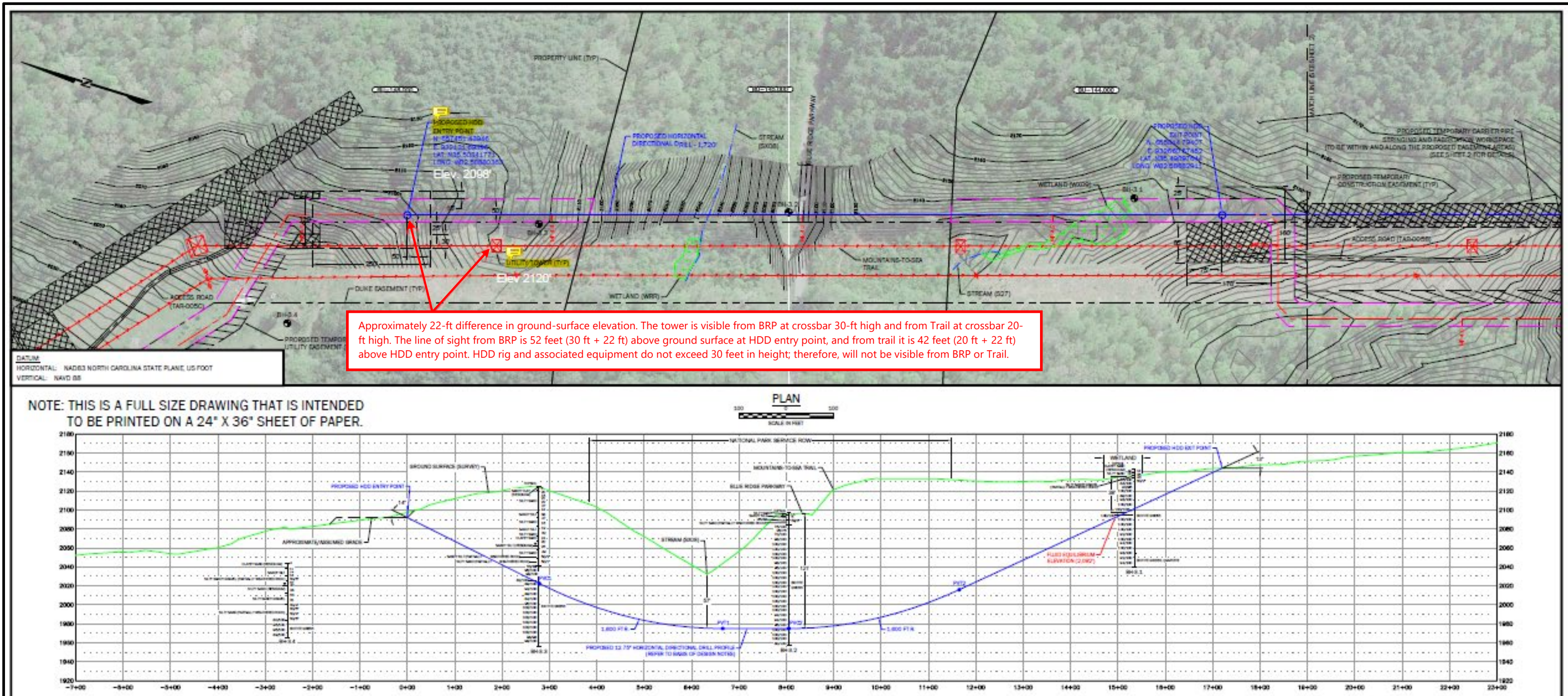


<p>Date &amp; Time: Tue, Mar 30, 2021, 11:38:32 EDT  Position: +035.497493° / -082.593598° (±16.4ft)  Altitude: 2106ft (±26.2ft)  Datum: WGS-84  Azimuth/Bearing: 062° N62E 1102mils True (±10°)  Elevation Angle: -01.6°  Horizon Angle: +00.7°  Zoom: 1.0X  BRP HDD exit point  S&amp;ME T-072</p> 		Date: 3/30/2021
		Photographer: T. Perez
5	Location / Orientation	Standing on the BRP, facing east towards the proposed HDD exit point.
	Remarks	Only trees can be seen from the overlook, and the HDD exit will not be visible.

<p>Date &amp; Time: Fri, Mar 05, 2021, 17:24:57 EST  Position: +035.786668° / -082.596614° (±32.9ft)  Altitude: 2394ft (±39.4ft)  Datum: WGS-84  Azimuth/Bearing: 021° N21E 0878mils True (±12°)  Elevation Angle: -01.8°  Horizon Angle: -00.1°  Zoom: 1.0X  from The next curve passed the overlook  S&amp;ME T-072</p>  <p>Tower located adjacent to the HDD entrance point. HDD rig and equipment will be significantly lower and below tree cover.</p>		Date: 3/3/2021
		Photographer: T. Perez
6	Location / Orientation	Standing on the BRP, facing northeast towards the proposed HDD entry point.
	Remarks	The tower cannot be seen from the next-closest overlook; therefore, the HDD entry will not be visible.



Asheville, Buncombe County, North Carolina  
S&ME Project No. 7435-18-003  
Page 5

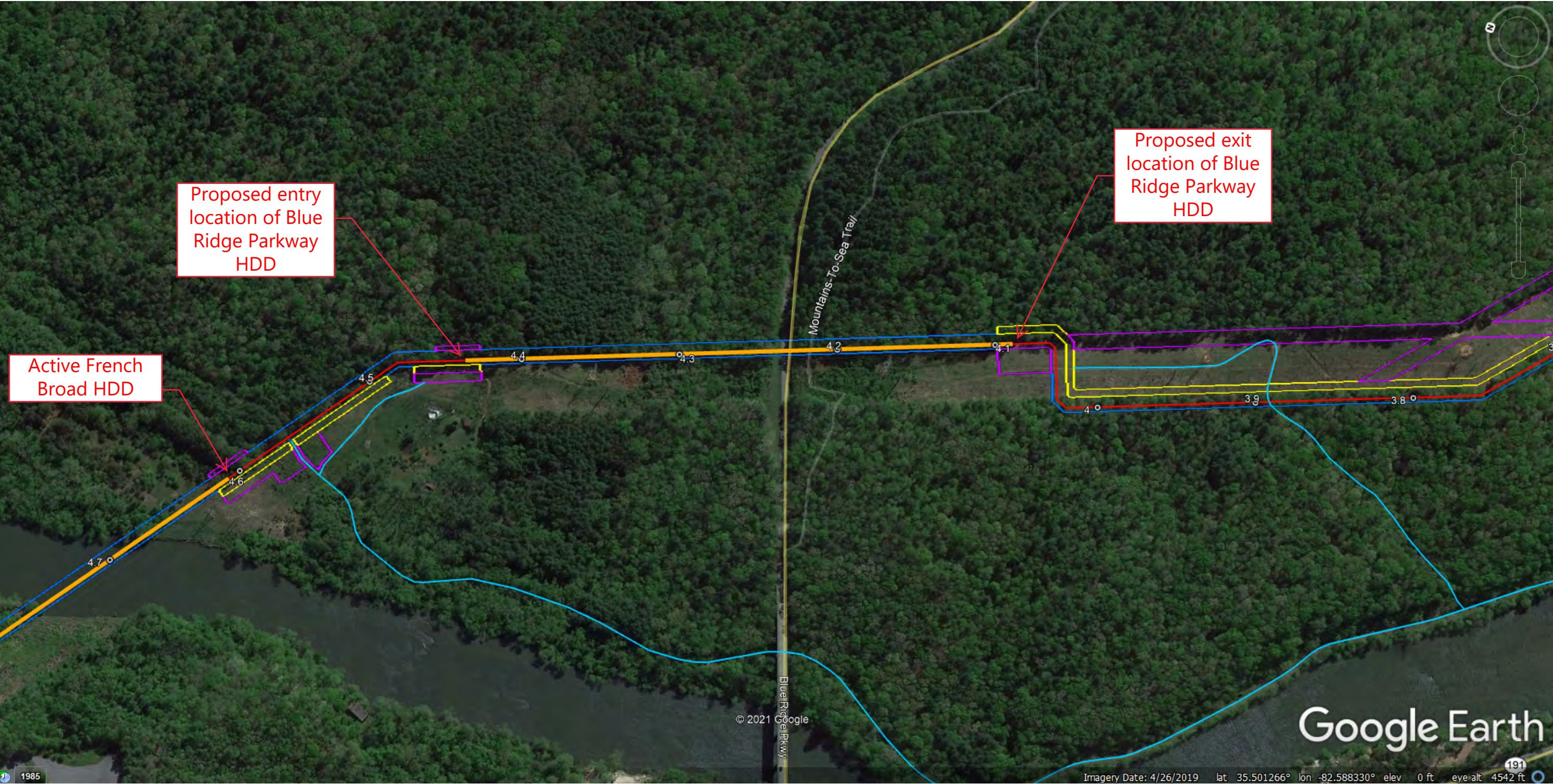




**Appendix E - Report of Limited Environmental  
Noise Assessment Dated March 12, 2021**



**Figure 1 – Noise Study**  
**Environmental Assessment – Blue Ridge Parkway**  
Asheville, Buncombe County, North Carolina  
S&ME Project No. 4341-20-029







Report of Limited Environmental  
Noise Assessment  
Buncombe County, North Carolina  
S&ME Project No. 7435-18-003

PREPARED FOR:

**Dominion Energy**  
**800 Gaston Road**  
**Gastonia, North Carolina 28056**

PREPARED BY:

**S&ME, Inc.**  
**3201 Spring Forest Road**  
**Raleigh, NC 27616**

**March 12, 2021**



March 12, 2021

Dominion Energy  
800 Gaston Road  
Gastonia, North Carolina 28056

Attention: Mr. Mike Lewis

Reference: **Report of Limited Environmental Noise Assessment**  
**Dominion Energy – T072 Project**  
Buncombe County, North Carolina  
S&ME Project No. 7345-18-003

Dear Mr. Lewis:

Please find enclosed the report of our limited environmental noise assessment conducted on March 10, 2021 at the French Broad horizontal directional drill (HDD) location in Buncombe County, North Carolina. The limited assessment included sampling for noise to assist in evaluating potential environmental impacts associated with the proposed HDD under the Blue Ridge Parkway.

S&ME, Inc. appreciates this opportunity to provide Dominion Energy with our industrial hygiene services and we look forward to our continued association. Please contact either of us if you have any questions concerning this report.

Sincerely,

**S&ME, Inc.**

A handwritten signature in black ink, appearing to read 'Chris B. Murray'.

Christopher B. Murray, CIH, CSP  
Principal Industrial Hygienist

A handwritten signature in black ink, appearing to read 'Kenneth R. Warren'.

Kenneth R. Warren, CIH  
Vice President/ Principal Industrial Hygienist





# Table of Contents

**Executive Summary .....1**

**1.0 Introduction .....2**

**2.0 Methods .....3**

    2.1 Noise Sampling.....3

**3.0 Results .....4**

    3.1 Noise Sampling .....4

**4.0 Conclusions .....7**

**5.0 Recommendations.....7**

## Appendices

- Appendix I – DRAFT HDD Design Plan and Profile
- Appendix II – Hominy Creek Drill Site Noise Measurements
- Appendix III – Photo Log



## Executive Summary

The Dominion Energy North Carolina (DENC) T-072 project entails the construction of approximately 11.5 miles of 12-inch diameter steel natural gas pipeline. The new pipeline will begin at Duke Energy's Asheville Energy Plant located in Arden, North Carolina and will end near the intersection of US Highway 23 and NC Highway 112 in Enka Village, North Carolina. Based on the proposed alignment, the pipeline will cross beneath the Blue Ridge Parkway (BRP), one of 11 proposed horizontal directional drill (HDD) locations including three crossings of the French Broad River (FBR) and one crossing of Interstate I-26.

This report presents the results of a limited environmental noise assessment for the proposed HDD locations for the Blue Ridge Parkway/Mountains to Sea Trail location (Project).

The purpose of this study was to provide an environmental noise assessment at the French Broad HDD location (N35.50575712, W82.59117796) which is an active drill site, to estimate potential noise impacts to the Blue Ridge Parkway/Mountains to Sea Trail which lies approximately 825 feet to the northwest of the proposed BRP HDD location (N35.50341771, W82.58880363).

The limited assessment included the following tasks:

1. Estimate the sound level contribution levels from the drilling entry/exit locations to the nearest existing Noise Sensitive Areas (NSAs) in the vicinity of the HDD construction activities. Noise measurements were collected by a qualified technician at two operating DENC HDD rig locations near Enka, North Carolina site (comparable sites) and applied to the proposed HDD site. Measurements were collected using a TSI SoundPro DL with Octave Band Analyzer (1/1 Octave) Type II sound level meter. Broadband sound pressure measurements were collected using the A-weighted scale in the slow response mode. Sound levels were also recorded in each octave band frequency (31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16,000 Hz.)
2. Using the data collected under Item 1, S&ME assessed the far-field<sup>1</sup> community sound levels anticipated at the identified NSA (Blue Ridge Parkway and Mountain to Sea Trail) for HDD construction activities.
3. If warranted, identify noise mitigation measures that could be implemented to comply with the project environmental sound level criterion.
4. Equipment sound power levels will be based on data of similar capacity/type equipment to those proposed for use by DENC.

Department of Energy regulation 18 CFR § 157.206, sets the maximum A-weighted Nighttime Sound Level (Ln) at 55 dB(A) for HDD activities. No applicable local or state environmental sound regulations or ordinances have been identified that would be applicable at the site.

---

<sup>1</sup> The far field of a source begins where the near field ends and extends to infinity. Note that the transition from near to far field is gradual in the transition region. In the far field, the direct field radiated by most machinery sources will decay at the rate of roughly 6 dB each time the distance from the source is doubled. For line sources such as traffic noise, the decay rate varies between 3 and 4 dB.



The sound level measurements from the French Broad river site are recorded in Table 1.0 and 2.0 below and indicate the approximate measurement at 100 foot intervals from both the front (drill direction) and rear (exhaust end) of the current (FBR) drill site. Measurements from the front (drill direction) were collected until reaching the French Broad River (350 feet away). A subsequent measurement on the opposite side of the French Broad River was also collected approximately 550 feet away from the drill operation. An additional set of measurements was collected from the Hominy Creek (HC) HDD for comparison. Those results are located in Appendix II. The results of those measurements were similar to the FBR results presented in the tables below. Noise levels from the front of the HC drill rig dropped below 55 dB(A) at 500 feet and at 300 feet from the reclaimer (or rear) of the drill rig during daytime operations.

Measurements from the exhaust end of the FBR drill rig were collected until an equivalent distance from the proposed entry site to the BRP NSA (approximately 900 feet away). The sound level measurements are considered a representative surrogate for the expected sound levels at the BRP NSA.

From the proposed BRP drill entry point to the BRP NSA is approximately 825 feet. The NSAs for the purpose of this assessment is the actual parkway road and the Mountains to Sea Trail (MTS) where the drill is expected to cross beneath. The MTS is additional 75 feet further to the east. The proposed HDD exit point is 800 feet east of the MTS (i.e. approximately 1,700 feet from the BRP HDD entry point).

At 550 feet from the front of the drill rig and 800 feet beyond the exhaust the sound level measurements were observed consistently below 55 dB(A). These measurements were collected in the far field with limited interference due to topography, terrain conditions, vegetation, ground cover, density, and height of foliage. They are believed to represent worst case conditions under which the drill rig will be operating at the BRP drill site.

Based on the results of the monitoring, the following conclusion is provided:

- The limited assessment indicates that the drilling operation at the BRP site will occur at sufficient distance from both the Blue Ridge Parkway and Mountain to Sea Trail to prevent potential adverse noise impacts. No other noise sensitive receptors were identified within the proximity of the current or proposed drilling locations.

This summary provides an overview only and should not in any way be considered a substitute for the thorough review of the detailed sections of this report.

## **1.0 Introduction**

S&ME, Inc. (S&ME) conducted a limited environmental noise assessment for the proposed horizontal directional drill (HDD) locations for the Blue Ridge Parkway/Mountains to Sea Trail location on March 10, 2021 in Buncombe County, North Carolina. The assessment was performed to support the Environmental Assessment currently being prepared by S&ME for the proposed Blue Ridge Parkway HDD crossing. The assessment was performed by Tom Gardner and Chris Murray, both of S&ME on March 10, 2021.





The Dominion Energy North Carolina (DENC) T-072 project entails the construction of approximately 11.5 miles of 12-inch diameter steel natural gas pipeline. The new pipeline will begin at Duke Energy's Asheville Energy Plant located in Arden, North Carolina and will end near the intersection of US Highway 23 and NC Highway 112 in Enka Village, North Carolina. Based on the proposed alignment, the pipeline will cross beneath the Blue Ridge Parkway (BRP), one of 11 proposed HDDs including three crossings of the French Broad River (FBR) and one crossing of Interstate I-26. The drilling operation is scheduled to run on 12-hour shifts until completed. There is a possibility that 24-hour shifts may be implemented and therefore noise from light plant contributions have also been considered.

The purpose of this study was to provide an environmental noise assessment at the French Broad HDD location (N35.50575712, W82.59117796) which is an active drill site, to ascertain potential noise impacts to the Blue Ridge Parkway/Mountains to Sea Trail which lies approximately 825 feet to the northwest of the proposal Blue Ridge HDD location (N35.50341771, W82.58880363).

This assessment was not intended to address all areas, operations, or possible hazardous exposures at the drill site, but only those operations and exposures specifically discussed in this report.

S&ME performed the services in accordance with generally accepted practices of reputable environmental consultants undertaking similar studies at the same time and in the same geographical area. S&ME has endeavored to meet this standard of care. No other warranty, expressed or implied, is intended or made with respect to this report or S&ME's services. Users of this report should consider the scope and limitations related to these services when developing opinions as to risks associated with the site.

This report is provided for the sole use of DENC. Use of this report by any other parties will be at such party's sole risk, and S&ME disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions only during the time of the sampling period and of the specific areas referenced. This service was performed in general accordance the terms and conditions described in the Master Service Contract for Professional Services between Dominion Energy Services, Inc., and S&ME, Inc. (MSC DE 1901) dated January 24, 2019.

## **2.0 Methods**

### **2.1 Noise Sampling**

Measurements were collected using a TSI SoundPro DL with Octave Band Analyzer (1/1 Octave) Type II sound level meter. Broadband sound pressure measurements were collected using the A-weighted scale in the slow response mode. Sound levels were also recorded in each octave band frequency (31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16,000 Hz.)

The instrument was positioned to approximate the hearing zone in the area measured. Readings were integrated over a period of time, which varied depending upon the variability of the noise source. The integration was continued until the average noise level stabilized, showing little or no fluctuation.



The sound level meter was acoustically calibrated before use and the calibration was verified after use.

A draft diagram of HDD Design Plan and Profile on which this assessment was based is included Appendix I. Photographs of each drill site evaluated – French Broad and Hominy Creek are included in Appendix III.

An additional set of measurements was collected from the Hominy Creek (HC) HDD for comparison. Those results are located in Appendix II.

## 3.0 Results

### 3.1 Noise Sampling

The following denotes the typical equipment at the HDD entry side and most of the listed equipment are considered noise sources associated with the HDD operations:

- Drilling rig and engine-driven hydraulic power unit (i.e., most significant noise source);
- Engine-driven mud pump(s) and engine-driven generator set(s);
- Mud mixing/cleaning equipment and associated fluid systems shale shakers;
- Frac tanks (i.e., water & drilling mud storage);

Engine driven lights for nighttime operation were present at the site during the assessment but were not in use. According to the operator, no nighttime work is anticipated so the lights will not be used. Based on review of a cut sheet for Generac MLT6SK Mobile Light Towers, the measured sound level for the lights in operation is 68 dB(A) measured at a distance of 23 feet. The addition of the added noise resulting from the use of the lights to the total sound level produced by the site is minimal and will not impact the report findings.

Sound level measurements collected in the area around the drill rig entry location ranged from upper 80s dB(A) to low 90s dB(A) during the day shift only. The drill rig shut down for the day around 5 p.m. the day of this limited assessment following the completion of the pilot hole, so no measurements were collected after 5 p.m.

The sound level measurements are recorded in the table below and indicate the approximate measurement at 100 foot intervals from and rear of the existing drill site until the reaching the location of the proposed HDD drill entry site for the BRP (approximately 900 feet away). Measurements were also recorded from the front of the FBR rig to a point across the river approximately 500 feet away.

From the proposed BRP drill entry point to the BRP Noise Sensitive Area (NSA) is approximately 825 feet. The Mountains to Sea Trail (MTS) is an additional 75 feet further to the east. The proposed HDD exit point is 800 feet east of the MTS (i.e. approximately 1,700 feet from the BRP HDD entry point).

At 800 feet and beyond the sound level measurements were observed to be consistently below 55 dB(A). These measurements were collected with limited interference due to topography, terrains conditions, vegetation, ground cover, density, and height of foliage. These are believed to represent worst case conditions under which the drill rig will be operating at the BRP drill site.



The proposed BRP drill entry location will be sited in a slight depression adjacent to an existing Duke Energy transmission line easement. A surface elevation increase of approximately 22 feet exists between the proposed drill entry site and the crest of the transmission line easement. Additionally, the proposed drill entry location will be separated from the BRP by a 30-foot tree buffer.

Tables 4-1 and 4-2 provide a summary of the sound level measurements collected at the surrogate FBR and HDD site.

**Table 3-1 Sound Level Measurements (Exhaust End of Drill Rig)**

Area Description	SLM Reading (Broadband)	Octave Band Frequencies (decibels – dB)									
		31.5	63	125	250	500	1K	2K	4K	8K	16K
Drill Rig Exhaust (facing BRP)	89.5	48.8	64.6	74.1	77.2	83.3	84.6	82.9	78.7	68.8	53.6
+100 feet SE of Rig toward BRP	72.6	44.4	57.8	64.3	63.6	65.5	68.7	63.8	58.7	46.7	35.3
+200 feet SE of Rig toward BRP	67.5	39.2	52.2	54.9	56.1	63.2	60.4	60.2	54.7	41.2	35.3
+300 feet SE of Rig toward BRP	61.4	36.2	47.3	48.2	45.6	53.3	59.6	56.5	46.4	35.3	35.3
+400 feet SE of Rig toward BRP	62.4	33.2	43.4	47.5	45.8	52.2	60.2	55.6	42.6	35.3	35.3
+500 feet SE of Rig toward BRP	59.9	31.1	43.4	44.9	45.4	49.8	55.4	50.6	39.1	35.3	35.3
+600 feet SE of Rig toward BRP	57.8	33.4	42.1	42.3	49.8	48.7	51.1	50.1	38.4	35.3	35.3
+700 feet SE of Rig toward BRP	60.5	31.6	42.8	43.7	44.6	53.7	59.2	56.4	40.2	35.3	35.3
+800 feet SE of Rig toward BRP	53.8	26.9	33.7	34.9	37.6	49.5	51.2	44.2	32.3	35.3	35.3





+ 900 feet At Proposed BRP HDD Entry Point	51.5	22.3	33.8	35.4	36.1	44.9	45.9	39.6	32.3	35.3	35.3
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SLM – Sound Level Meter BRP – Blue Ridge Parkway SE – Southeast Data collected on March 10, 2021 by Thomas Gardner of S&ME, Inc.

**Table 3-2 Sound Level Measurements (From Front of Drill Rig)**

Area Description	SLM Reading (Broadband)	Octave Band Frequencies (decibels – dB)									
		31.5	63	125	250	500	1K	2K	4K	8K	16K
Drill Direction (facing FBR)	89.5	48.8	64.6	74.1	77.2	83.3	84.6	82.9	78.7	68.8	53.6
+100 feet W of Rig toward FBR	80.2	43.8	61.7	67.2	65.5	73.8	72.3	72.7	71.4	64.5	49.7
+200 feet W of Rig toward FBR	70.1	35.4	57.1	62.1	60.4	59.3	64.3	64.6	61.6	50.1	35.3
+300 feet W of Rig toward FBR	64.8	31.7	53.3	58.1	55.8	53.2	59.9	58.4	51.6	40.2	35.3
+350 feet W of Rig bank of FBR	59.0	32.2	47.1	52.2	49.8	49.5	53.7	49.8	41.1	35.3	35.3
+550 feet W of Rig across FBR	53.1	42.1	47.7	47	45.8	50.6	53.9	48.5	43.2	35.3	35.3

SLM – Sound Level Meter FBR – French Broad River W – West Data collected on March 10, 2021 by Thomas Gardner of S&ME, Inc.

An additional set of measurements was collected from the Hominy Creek (HC) HDD for comparison. The results of those measurements were similar to the FBR results presented above. Noise levels from the front of the HC drill rig dropped below 55 dB(A) at 500 feet and at 300 feet from the reclaimer (or rear) of the drill rig during daytime operations. These measurements were also impacted by nearby traffic which would overestimate the noise levels emitted by the drilling operation at this location.



## 4.0 Conclusions

The limited assessment results indicate that the drilling operation at the BRP site will occur at sufficient distance from both the BRP and MTS to prevent potential adverse noise impacts. No other noise sensitive receptors were identified within the proximity of the current or proposal drilling locations.

Note, however, that this assessment did not address all areas and/or all potential operations at the drill site due to certain limitations which have been identified in the report. The data collected is expected to be representative of the noise levels anticipated during similar drilling operations operated under the same conditions as those monitored and in similar locations.

## 5.0 Recommendations

The following recommendations are based upon conditions and operations observed at the time of this limited assessment. Changes in operations, production levels, material use, procedures and other factors can cause exposures to vary and may alter these recommendations.

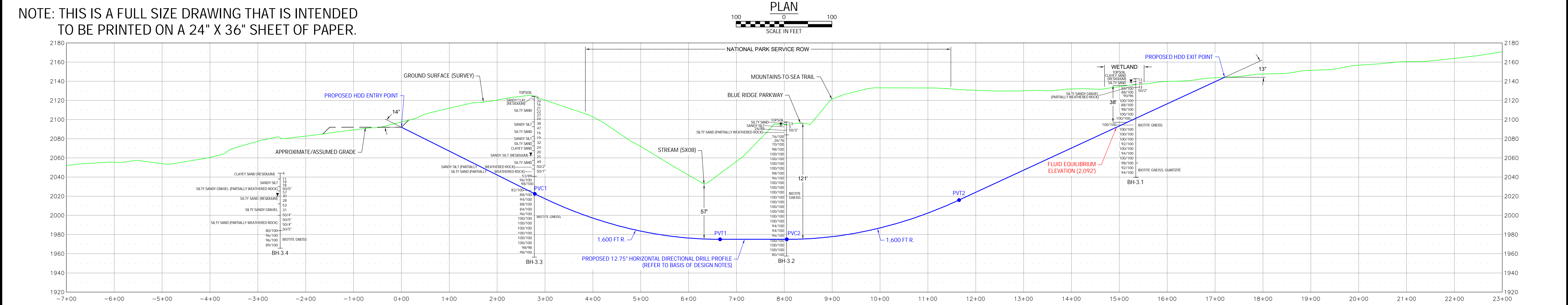
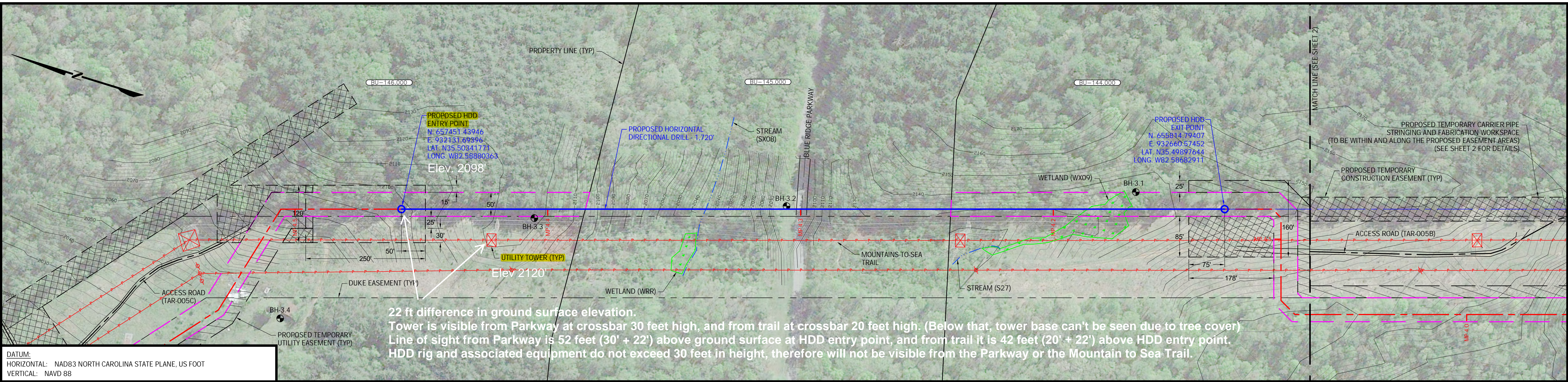
Based on the conditions observed and the exposure parameters evaluated at the time of this assessment, *no recommendations were determined to be necessary to address noise levels associated with the proposed HDD beneath the BRP.*

## **Appendices**



## **Appendix I – DRAFT HDD Design Plan and Profile**





DIRECTIONAL DRILL DATA BLUE RIDGE PARKWAY HDD		
DESCRIPTION	* STATION (FT)	ELEVATION (FT)
ENTRY @ 14°	0+00.00	2092.00
PVC1 (14.00° @ 1,600 FT. R.)	2+78.64	2022.53
PVT1	6+65.72	1975.00
PVC2 (13.00° @ 1,600 FT. R.)	8+05.13	1975.00
PVT2	11+65.05	2016.01
EXIT @ 13°	17+20.00	2144.13
HORIZONTAL DISTANCE = 1,720.00 FT		
DIRECTIONAL DRILL PIPE LENGTH = 1,750.11 FT		

\* PROFILE STATIONING IS BASED ON AN ARBITRARY ENTRY POINT WHERE 0+00 = 235+38 CENTERLINE STATIONING.

BASIS OF DESIGN:

- CARRIER PIPE WILL CONSIST OF 12.75" O.D. X 0.281" W.T., API-5L X-60 PIPE WITH 12-24 MILS OF FUSION BONDED EPOXY (FBE) AND 40-125 MILS OF POWERCRETE® DD TOPCOAT.
- THE MAXIMUM ALLOWABLE OPERATING PRESSURE (MAOP) = 960 PSI.
- THE ASSUMED OPERATING TEMPERATURE = 58° FAHRENHEIT.

PILOT HOLE TOLERANCES	
ITEM	* TOLERANCE
ENTRY ANGLE	INCREASE ANGLE UP TO 1° (STEEPER), BUT NO DECREASE IN ANGLE ALLOWED.
ENTRY LOCATION	AS PER COORDINATES PROVIDED BY COMPANY WITH NO CHANGES WITHOUT COMPANY APPROVAL.
EXIT ANGLE	INCREASE ANGLE UP TO 1° (STEEPER) OR DECREASE UP TO 2° (FLATTER).
EXIT LOCATION	UP TO 20 FEET BEYOND OR 10 FEET SHORT OF THE EXIT STAKE. BETWEEN 5 FEET LEFT AND 5 FEET RIGHT OF CENTERLINE.
DEPTH	UP TO 2 FEET ABOVE THE DESIGN DRILL PROFILE ALLOWED. UP TO 10 FEET BELOW THE DESIGN DRILL PROFILE ALLOWED.
ALIGNMENT	UP TO 5 FEET LEFT OR RIGHT OF THE HDD ALIGNMENT WILL BE ALLOWED.
MINIMUM ALLOWABLE 3-JOINT RADIUS	1.025 FEET

\* TOLERANCE SHALL BE MAINTAINED UNLESS OTHERWISE APPROVED BY THE COMPANY.

LEGEND

TYPE OF SOIL | SPT (N)

WATER LEVEL TAKEN AFTER 24 HOURS

ROD/REC | TYPE OF ROCK

BORING LOCATION

PROPOSED CENTERLINE

PROPOSED UTILITY EASEMENT

OVERHEAD POWER LINE

POWER POLE

MAJOR CONTOUR - 10' INTERVAL

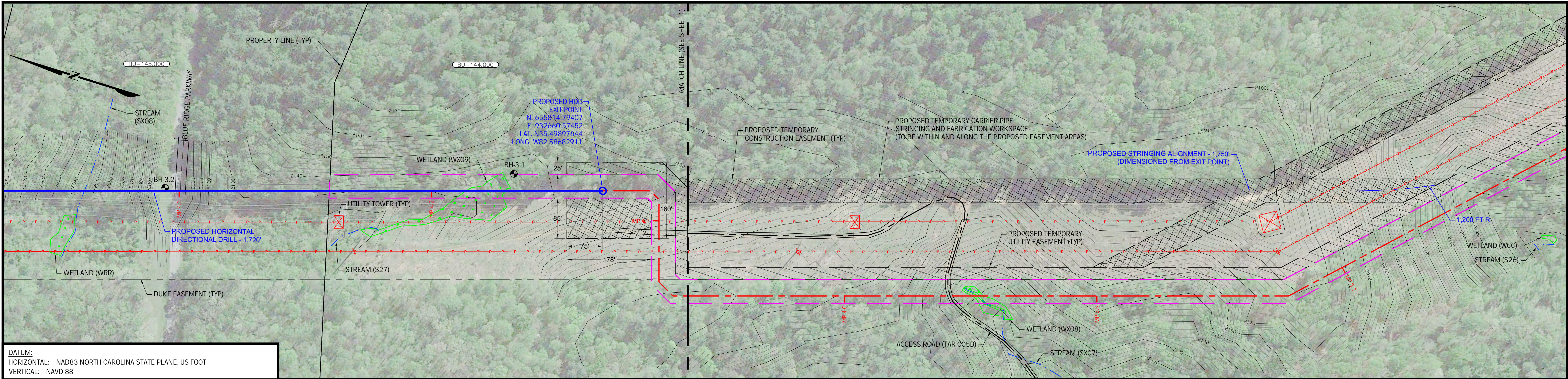
MINOR CONTOUR - 2' INTERVAL

DIRECTIONAL DRILL PIPE SEGMENTS BLUE RIDGE PARKWAY HDD		
SEGEMENT NAME	TYPE	LENGTH (FT)
ENTRY TANGENT	STRAIGHT	287.17
ENTRY CURVE	VERTICAL CURVE	390.95
BOTTOM TANGENT	STRAIGHT	139.42
EXIT CURVE	VERTICAL CURVE	363.03
EXIT TANGENT	STRAIGHT	569.54

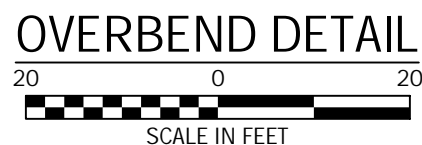
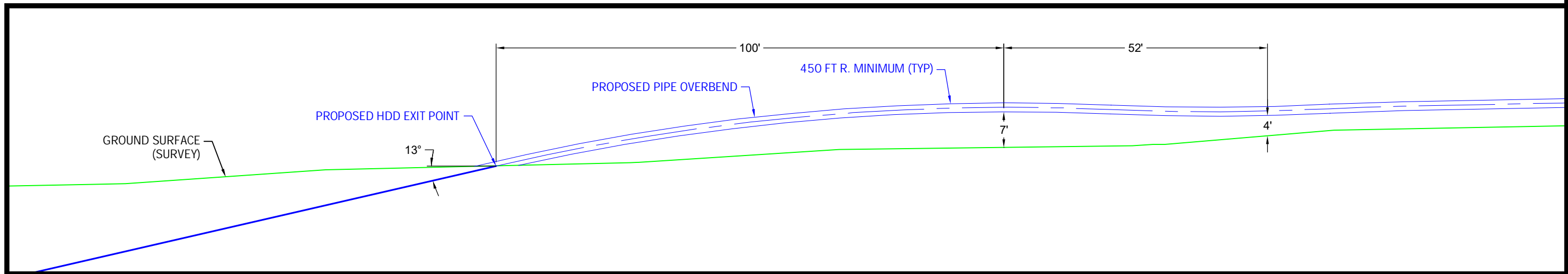
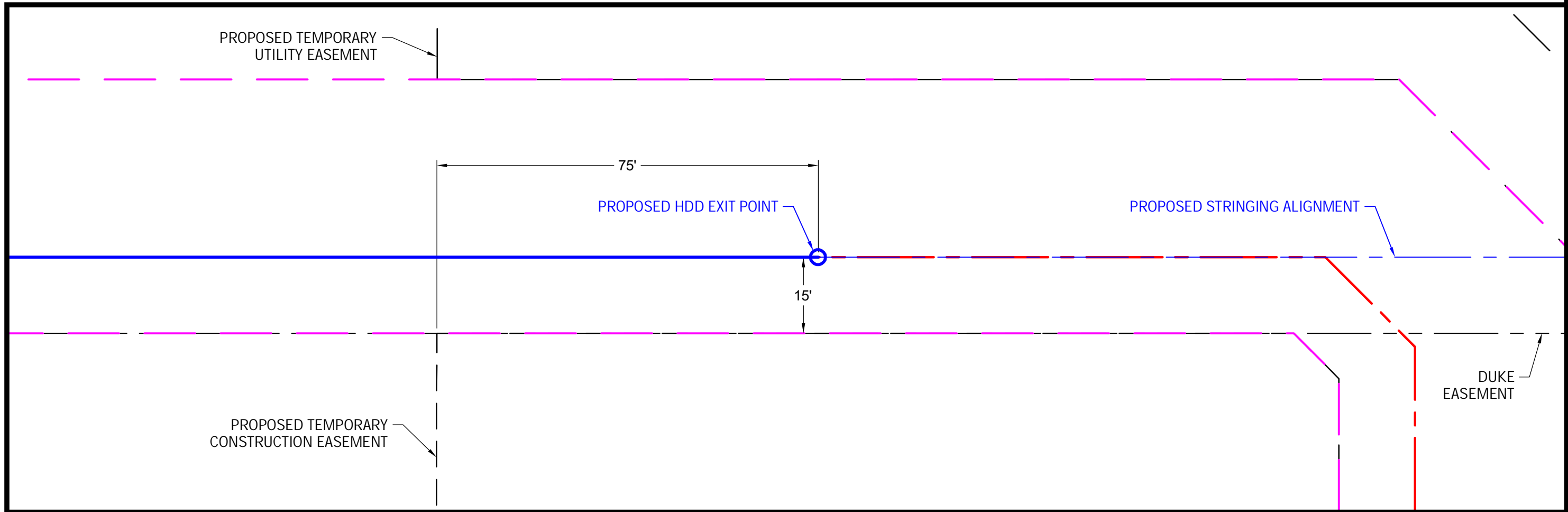
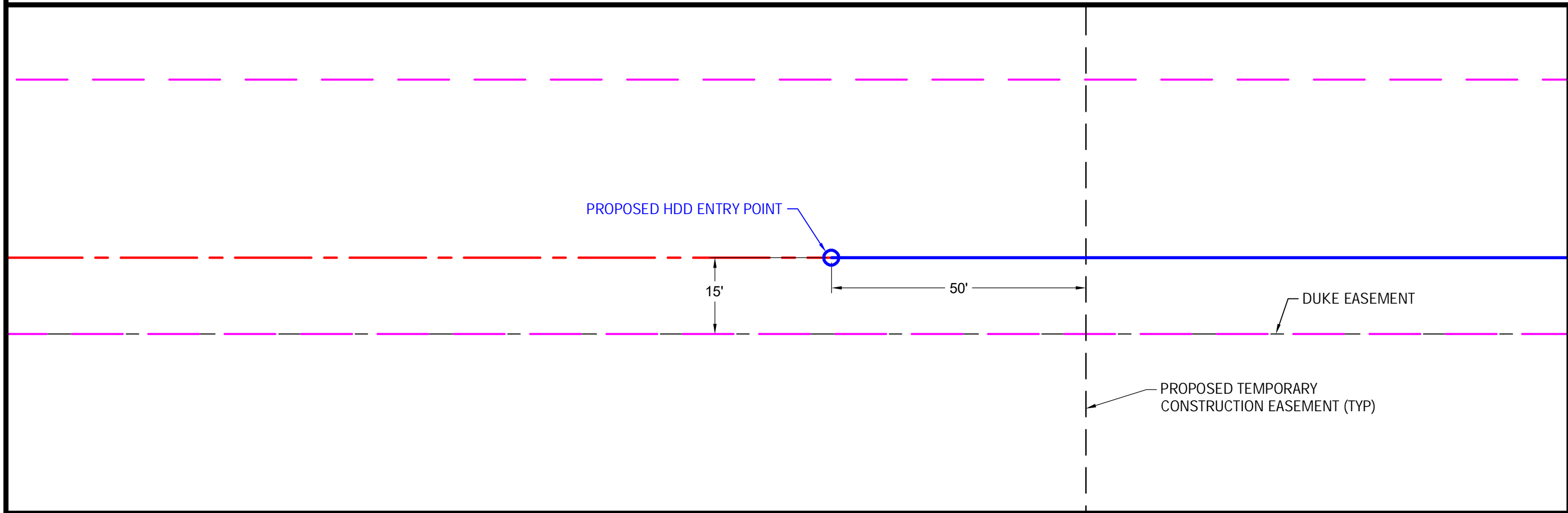
NOTES

- CONTRACTOR SHALL ADHERE TO THE SPECIFICATIONS AND REQUIREMENTS PER DOMINION ENERGY NORTH CAROLINA GAS SPECIFICATIONS, CONTRACT DOCUMENTS, HDD INADVERTENT RETURN AND CONTINGENCY PLAN, AND SPECIAL PERMIT CONDITIONS, EXCEPT AS NOTED ON THIS DRAWING.
- CONTRACTOR IS RESPONSIBLE FOR CALLING NORTH CAROLINA STATE ONE CALL AND LOCATING ALL UNDERGROUND UTILITIES PRIOR TO BEGINNING CONSTRUCTION. IF ANY UTILITY IS LOCATED WITHIN 15 FEET OF THE DESIGNED HDD PROFILE AND ALIGNMENT, CONTRACTOR SHALL OBTAIN APPROVAL FROM DOMINION ENERGY NORTH CAROLINA GAS PRIOR TO INITIATING HDD OPERATIONS.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND PROTECT ANY FOREIGN UTILITY THAT MAY BE AFFECTED BY THE HDD OPERATIONS.
- THE HDD PILOT HOLE SHALL BE DRILLED FROM ENTRY TO EXIT, AS INDICATED ON THE DRAWING. THE USE OF DUAL HDD RIGS DURING CONSTRUCTION MAY BE AT THE DISCRETION OF THE HDD CONTRACTOR, TO BE APPROVED BY DOMINION ENERGY NORTH CAROLINA GAS.
- ALL EQUIPMENT MUST ACCESS THE SITE ALONG THE CONSTRUCTION RIGHT-OF-WAY OR FROM APPROVED ACCESS ROADS.
- DURING REAMING OPERATIONS, THE HDD CONTRACTOR MAY ELECT TO REAM THE HOLE TO A FINAL HOLE DIAMETER ROUGHLY 2 TIMES LARGER THAN THE CARRIER PIPE. THE HDD CONTRACTOR SHALL NOTIFY DOMINION ENERGY NORTH CAROLINA GAS AND DOMINION ENERGY NORTH CAROLINA GAS' ENGINEER IF CONTRACTOR PROPOSES TO REAM THE HOLE TO BE GREATER THAN THE OUTSIDE DIAMETER OF THE CARRIER PIPE PLUS 12 INCHES.
- WORKSPACE: MAXIMUM WORKSPACE LIMITS ARE DEPICTED. RESTRICT CLEARING TO THE WORKSPACE INDICATED AT THE ENTRY AND EXIT POINTS AND PRODUCT PIPE STRINGING AND FABRICATION AREA ALONG THE CONSTRUCTION RIGHT-OF-WAY. CLEARING BETWEEN THE ENTRY AND EXIT POINTS REQUIRES PRIOR APPROVAL FROM THE ENVIRONMENTAL INSPECTOR AND IS LIMITED TO THE AMOUNT NECESSARY TO STRING SURVEY WIRES AND INSTALL PUMPS AND PIPING TO OBTAIN WATER (WHERE APPROVED).
- HYDROSTATIC TEST: PRE-INSTALLATION AND POST-INSTALLATION HYDROSTATIC TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH THE HYDROSTATIC TEST PLAN. TEST WATER SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH PERMIT REQUIREMENTS. THE TEST WATER SHALL BE DISCHARGED IN AN UPLAND AREA INTO AN EROSION CONTROL STRUCTURE OF STRAW BALES AND/OR SILT FENCES, GEOTEXTILE FILTER BAG, OR COLLECTED IN A TRUCK AND HAULED TO AN APPROVED DISPOSAL SITE.
- UPON INSTALLATION OF THE HDD, A CALIPER TOOL SURVEY SHALL BE PERFORMED AND APPROVED BY DOMINION ENERGY NORTH CAROLINA GAS BEFORE THE CONTRACTOR'S DRILLING EQUIPMENT CAN BE DEMOBILIZED FROM THE SITE.
- SPILL PREVENTION: REFUELING OF ALL EQUIPMENT SHALL BE COMPLETED IN ACCORDANCE WITH THE SPPC PLAN.
- EROSION AND SEDIMENT CONTROL: CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES IN ACCORDANCE WITH CONTRACT DOCUMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL STRUCTURES AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
- INSTALLATION: THE PIPE SECTION FOR THE DRILLED CROSSING SHALL BE MADE UP WITHIN THE APPROVED CONSTRUCTION RIGHT-OF-WAY AT THE DRILL EXIT POINT AS SHOWN. AFTER THE PILOT HOLE IS COMPLETE, CONTRACTOR'S ACTUAL DRILL PROFILE SHALL BE SUBMITTED TO DOMINION ENERGY NORTH CAROLINA GAS FOR APPROVAL. CONTRACTOR SHALL ASSESS THE NEED FOR AND SUPPLY APPROPRIATE BALLAST DURING PULLBACK.
- DRILLING FLUID DISPOSAL: CONTRACTOR SHALL DISPOSE OF EXCESS DRILLING FLUID AS DIRECTED BY DOMINION ENERGY NORTH CAROLINA GAS IN ACCORDANCE WITH PERMIT CONDITIONS. UNDER NO CIRCUMSTANCES SHALL DRILLING FLUID BE DISPOSED OF IN WATER BODIES OR WETLANDS. ANY DRILLING FLUID WHICH INADVERTENTLY SURFACES AT POINTS OTHER THAN THE ENTRY OR EXIT POINTS SHALL BE CONTAINED AND COLLECTED TO THE EXTENT PRACTICAL AND DISPOSED OF AS DIRECTED BY DOMINION ENERGY NORTH CAROLINA GAS IN ACCORDANCE WITH PERMIT CONDITIONS.
- CLEANUP/STABILIZATION/RESTORATION: ALL DISTURBED AREAS SHALL BE RETURNED TO THE ORIGINAL CONTOURS. DISTURBED AREAS SHALL BE SEEDED AS SPECIFIED IN THE CLEAN-UP AND RESTORATION REQUIREMENTS. IF THE TERRAIN ALLOWS AND ACCESS IS PERMITTED, CONTRACTOR SHALL UTILIZE LOW GROUND PRESSURE EQUIPMENT OR OTHER EQUIPMENT APPROVED BY OWNER, TO FACILITATE CONTAINMENT AND CLEAN-UP OF ANY INADVERTENT RETURNS THAT OCCUR DURING THE HDD INSTALLATION PROCESS.
- GEOTECHNICAL DATA: BOREHOLES ARE OFFSET FROM THE PIPELINE CENTERLINE AS SHOWN ON THE PLAN VIEW. THE GEOTECHNICAL INFORMATION PROVIDED ON THIS DRAWING IS A GENERAL SUMMARY AND WAS PROVIDED BY G&M, INC. REFER TO THE APPLICABLE GEOTECHNICAL REPORT IN THE CONTRACT DOCUMENTS FOR MORE DETAILED INFORMATION.
- AERIAL IMAGE TAKEN FROM GOOGLE EARTH PRO © 2021, LICENSED TO GEOENGINEERS, INC., IMAGE DATED 04/26/19.
- BASE FILE, GROUND SURFACE AND SURVEY DATA PROVIDED BY DOMINION ENERGY NORTH CAROLINA GAS.





DATUM:  
HORIZONTAL: NAD83 NORTH CAROLINA STATE PLANE, US FOOT  
VERTICAL: NAVD 88



- NOTES:
- CONTRACTOR SHALL ADHERE TO THE SPECIFICATIONS AND REQUIREMENTS PER DOMINION ENERGY NORTH CAROLINA GAS SPECIFICATIONS, CONTRACT DOCUMENTS AND SPECIAL PERMIT CONDITIONS, EXCEPT AS NOTED ON THIS DRAWING.
  - IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND PROTECT ANY FOREIGN UTILITY THAT MAY BE AFFECTED BY THE HDD OPERATIONS.
  - ALL EQUIPMENT MUST ACCESS THE SITE ALONG THE CONSTRUCTION RIGHT-OF-WAY OR FROM APPROVED ACCESS ROADS.
  - BASE FILE, GROUND SURFACE AND SURVEY DATA PROVIDED BY DOMINION ENERGY NORTH CAROLINA GAS, AERIAL IMAGE TAKEN FROM GOOGLE EARTH PRO © 2021, LICENSED TO GEOENGINEERS, INC., IMAGE DATED 04/26/19.

LEGEND	
	BORING LOCATION
	PROPOSED CENTERLINE
	PROPOSED UTILITY EASEMENT
	OVERHEAD POWER LINE
	POWER POLE
	MAJOR CONTOUR - 10' INTERVAL
	MINOR CONTOUR - 2' INTERVAL

NOT FOR CONSTRUCTION  
FOR DISCUSSION ONLY

REFERENCES		REVISIONS							
DRAWING NUMBER	REFERENCE DRAWING TITLE	NO.	DESCRIPTION	BY	DATE	CHK'D	DATE	APP'D	DATE
T-072_Workspace	WORKSPACE	0	ISSUED FOR CONSTRUCTION	BTL	12/04/20	TJP	12/04/20	TNH	12/04/20
T-072_Property	PROPERTY	1A	NOT FOR CONSTRUCTION - FOR DISCUSSION ONLY						
T-072_Land	TOPO SURVEY								
T-072_Easements	EASEMENTS								
T-072_Environmental	ENVIRONMENTAL								
T-072_Access_Road	ACCESS ROAD								
T-072_Centerline	PROPOSED CENTERLINE								

TJP	Design
11/22/19	Date
BTL	Drawn
11/22/19	Date

**GeoEngineers**

127 West Chatham Street  
Cary, NC 27511  
Telephone (801) 307-0217

DOMINION ENERGY NORTH CAROLINA GAS  
T-072 PROJECT  
BLUE RIDGE PARKWAY HDD  
HDD DESIGN STRINGING WORKSPACE / DETAILS  
BUNCOMBE COUNTY, NORTH CAROLINA

Project No.	22982-016-00
Drawing No.	290667-33-003B
Sheet	2 of 2



## **Appendix II – Hominy Creek Drill Site Noise Measurements**

## Hominy Creek Sound Level Measurements (From Front of Drill Rig)

Area Description	SLM Reading (Broadband)	Octave Band Frequencies (decibels – dB)									
		31.5	63	125	250	500	1K	2K	4K	8K	16K
Drill Rig Exhaust	97.1	40.2	54.5	70.2	86.7	89.3	91.7	90.1	83.8	75.3	59.9
+100 feet W of Rig	66.2	29.5	44.5	51.6	57.1	56.5	63.2	62.7	52.4	35.4	35.3
+200 feet W of Rig	62.5	28.9	40.2	48.5	56.4	51.6	58.3	58.1	49.6	35.3	35.3
+300 feet W of Rig	57.2	28.3	37.1	42.8	43.4	51.4	53.9	52.3	41.4	35.3	35.3
+400 feet W of Rig (Top of Berm)	56.8	27.8	38.1	41.2	42.4	48.3	50.9	51.9	38.6	35.3	35.3
+500 feet W of Rig (Top of Berm)	54.7	26.6	34.8	41.1	42.0	47.7	50.4	48.6	35.3	35.3	35.3
+500 feet W of Rig (Bottom of Berm)	52.8	29.1	34.9	39.4	39.1	44.5	48.8	47.3	35.3	35.3	35.3

W – West

Data collected on March 10, 2021 by Thomas Gardner of S&ME, Inc.

## Hominy Creek Sound Level Measurements (From Rear of Drill Rig)

Area Description	SLM Reading (Broadband)	Octave Band Frequencies (decibels – dB)									
		31.5	63	125	250	500	1K	2K	4K	8K	16K
Reclaimer Exhaust	83.5	58.9	56.3	62.1	71.9	77.1	78.7	76.4	71.6	63.6	50.0
+100 feet E of Reclaimer	71.2	50.8	54.9	60.5	52.8	62.1	66.2	64.1	58.8	45.3	35.3
+200 feet E of Reclaimer	58.6	45.6	48.0	52.5	46.2	50.5	54.1	52.6	51.2	35.3	35.3
+300 feet E of Reclaimer	52.7	43.9	44.7	42.4	41.5	44.4	49.4	47.2	34.2	35.3	35.3

E – East


Data collected on March 10, 2021 by Thomas Gardner of S&ME, Inc.




## **Appendix III – Photo Log**

**Limited Noise Assessment**  
**Dominion Energy T-072 Project**  
 Enka, North Carolina  
 S&ME Project No. 7345-18-003



1			Date: 3/11/2021
	Location / Orientation	Hominy Creek HDD Site	Photographer: Tom Perez
	Remarks	Facing East	

Approx. BRP HDD  
Entry Site

2			Date: 3/11/2021
	Location / Orientation	French Broad HDD Site	Photographer: Tom Perez
	Remarks	Facing South – Towards BRP	

## **Appendix F - Geotechnical Data Report**





Geotechnical Data Report  
Dominion Energy Line T-072  
Pipeline Replacement Project  
Blue Ridge Parkway HDD Crossing  
Asheville, North Carolina  
S&ME Project No. 7435-18-003

PREPARED FOR:

**Dominion Energy North Carolina**  
**220 Operation Way, MC C202**  
**Cayce, South Carolina 29033-3701**

PREPARED BY:

**S&ME, Inc.**  
**8646 W. Market Street, Suite 105**  
**Greensboro, North Carolina 27409**

**January 21, 2020**



January 21, 2020

Dominion Energy North Carolina  
220 Operation Way, MC C202  
Cayce, South Carolina 29033-3701

Attention: Mr. Craig Bodie, P.E.

Reference: **Geotechnical Data Report**  
**Dominion Energy T-072 Pipeline Replacement Project**  
**Blue Ridge Parkway HDD Crossing**  
Buncombe County, North Carolina  
S&ME Project No. 7435-18-003  
NC PE Firm License No. F-0176

Dear Mr. Bodie:

S&ME, Inc. (S&ME) is pleased to submit this Geotechnical Data Report for the above-referenced project in Asheville, North Carolina. Our services were performed in accordance with Proposal No. 74-180039A Revision 1 dated December 2, 2019. The purpose of this geotechnical study was to explore and characterize the general subsurface conditions at the planned Blue Ridge Parkway crossing location for use in the planning, design, and construction of the project.

S&ME appreciates the opportunity to assist you during this phase of the project. If you have questions concerning this report, please contact us.

Sincerely,

**S&ME, Inc.**

A handwritten signature in black ink that reads "Dillon Nance".

Matt Moler, P.E.  
Principal Engineer  
[mmoler@smeinc.com](mailto:mmoler@smeinc.com)

Dillon Nance, P.G.  
Project Geologist  
[dnance@smeinc.com](mailto:dnance@smeinc.com)

MM/DN/wj



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    4.1 Site Observations .....3

    4.2 Field Testing .....3

    4.3 Laboratory Testing .....4

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6.0 Qualifications .....5

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- HDD Natural Geologic Hazards, Table A-1
- Site Vicinity Plan, Figure 1
- Boring Location Plan, Figure 2
- Generalized Subsurface Profile, Figure 3
- Legend to Soil Classification and Symbols
- Boring Logs
- Summary of Laboratory Test Data, Table A-2
- Laboratory Test Results
- Rock Core Photographs





## 1.0 Project Information

Project information has been obtained from the following:

- Weekly T-072 project conference calls including our Joey Lawler and Dominion Energy personnel.
- Review of the T-072 Pipeline Blue Ridge Parkway HDD Crossing prepared by TRC (Drawing No. 290667-33-003, dated September 10, 2019) which included four revised boring locations, provided by Mr. Travis Harris with TRC via email on November 5, 2019.
- A meeting with Mike Lewis with Dominion Energy (previously PSNC Energy) and Matt McCurdy with S&ME on March 27, 2018.
- Site visit of the planned Blue Ridge Parkway pipeline alignment and originally requested boring locations on March 30, 2018 with Mr. Heath Brown with Dominion and Mr. McCurdy.
- A Google Earth KMZ file showing the proposed pipeline alignment and alternate routes.
- Information detailing the depth and location of 11 HDD locations along the project alignment (list from Mr. Chamlee provided on May 17, 2019).
- A site visit by Mr. Jason Jansante, P.E. with S&ME on May 30, 2019.
- On-going engineering and environmental/natural resource services performed by S&ME on behalf of the project.
- A coordination call between Dominion Energy and S&ME personnel on November 5, 2019.
- A telephone discussion between Tim Pierce with GeoEngineers and Matt Moler on November 19, 2019 to discuss the Blue Ridge Parkway crossing. Based on this conversation, S&ME understands GeoEngineers will prepare the formation pressure calculations for the planned HDD.
- An e-mail from Tim Pierce to Matt Moler on November 25, 2019 requesting deeper boring depths for the Blue Ridge Parkway crossing than originally anticipated.

The overall project includes the installation of approximately 11 miles of 12-inch diameter steel natural gas pipeline within a new cross-country easement. The pipeline will begin near the Duke Energy Asheville Plant in Arden, North Carolina and end near the intersection of Smokey Park Highway and Sand Hill Road in Candler, North Carolina. The majority of the proposed easement will cross through open field and wooded areas; however, several section of the pipeline will parallel existing powerline right-of-way (ROW). However, the pipeline will cross multiple roads (notably Interstate 26, Long Shoals Road, the Blue Ridge Parkway, Brevard Road, and Sardis Road), the French Broad River, Hominy Creek, additional streams, floodplains, and wetlands. We understand the new pipeline will involve eleven HDD crossings.

S&ME was requested to perform borings at each of the proposed HDD locations and prepare Geotechnical Data Reports. This report provides information for the Blue Ridge Parkway HDD Crossing (Figure 1 in the Appendix). Information for the other HDD locations will be provided in separate reports.

## 2.0 Purpose and Scope

The purpose of this geotechnical study was to explore the subsurface conditions at the Blue Ridge Parkway HDD crossing location to aid in the planning, design, and construction of the HDD installation. S&ME completed the following scope of geotechnical services for this project:



- Coordinated with Dominion, National Park Service, and Duke Energy personnel regarding site access and traffic control services.
- Visited the site to observe site surface conditions and mark test locations.
- Contacted North Carolina 811 to have them mark the locations of existing underground utilities in the proposed exploration areas.
- Mobilized a drill rig mounted on an ATV carrier and crew to the site.
- Drilled test borings at the crossing location.
- Performed groundwater level measurements within the boreholes.
- Obtained the approximate ground surface elevations at the boreholes by interpolating from provided topographic information.
- Abandoned the boreholes by tremie grouting with a cement-bentonite grout mixture.
- Performed laboratory testing.
- Prepared this Geotechnical Data Report.

### 3.0 Area Geology

The Geologic Map of North Carolina (1985) indicates the site is in the Blue Ridge Physiographic Province. The bedrock in this region is a complex crystalline formation that has been faulted and contorted by past tectonic movements. The rock has weathered to residual soils which form the mantle for hillsides and hilltops. The typical residual soil profile in areas not disturbed by erosion or the activities of man consists of clayey silts and silty sands. Soils typically become less clayey and more sandy with depth. There may be colluvial (old land-slide) material on slopes.

The boundary between soil and rock is not sharply defined. This transitional zone termed "partially weathered rock" is normally found overlying the parent bedrock. Partially weathered rock is defined for engineering purposes as residual material that can be penetrated by the drilling rig augers and has standard penetration test blow counts in excess of 50 blows for six inches or less of sampler penetration. Weathering is facilitated by fractures, joints and by the presence of less resistant rock types. Consequently, the profile of the partially weathered rock and hard rock is quite irregular and erratic, even over short horizontal distances. Also, it is not unusual to find lenses and boulders of hard rock and zones of partially weathered rock within the soil mantle, well above the general bedrock level.

Rivers, streams, and creeks all develop flood plains, which are low-lying, flat landforms adjacent to the river. The flood plain is covered in alluvial soils, which are deposited by the river during a flood. Alluvial soils tend to be poorly consolidated, well sorted, at or near moisture saturation, and are highly compressible due to their high water content. Fine-grained alluvial soils also frequently have a high organic content. These conditions would be expected in proximity to current or past drainage features.

The Geologic Map of North Carolina indicates the site is underlain by Biotite Gneiss and Schist. This rock is described as inequigranular and locally abundant with potassic feldspar and garnet. The rock is interlayered and gradational with calc-silicate rock, sillimanite-mica schist, mica schist, and amphibolite. The rock also contains small masses of granitic rock and quartzite at deeper depths.

## 4.0 Exploration Procedures

### 4.1 Site Observations

The HDD alignment is located approximately 0.3 miles east of the intersection of Brevard Road and the Blue Ridge Parkway on the eastern side of the French Broad River along an existing power line easement. The entry location is on the south side of the Blue Ridge Parkway. The bore will extend beneath the Blue Ridge Parkway and will exit on the north side of the roadway. Pictures of the surficial conditions are provided below.



BH-3.2 Looking West Along Blue Ridge Parkway



BH-3.3 Looking North along the HDD bore alignment

### 4.2 Field Testing

Four test borings (labeled BH-3.1 through BH-3.2, BH-3.3, and BH-3.4) were drilled to depths of approximately 78.3 to 168 feet below the existing ground surface between December 11 and December 19, 2019. The borings were advanced at the approximate locations shown on the Boring Location Plan (Figure 2 in the Appendix). Boring locations were identified using GPS equipment.

A Diedrich D-50 drill rig mounted on a track carrier was used to advance the borings with hollow stem auger drilling techniques. Standard Penetration Test (SPT) split-spoon sampling was performed at designated intervals in the test borings in general accordance with ASTM D1586 to provide an index for estimating soil strength and relative density or consistency. The drill rig was equipped with a hydraulic automatic hammer for Standard Penetration Tests. In conjunction with the SPT testing, samples were obtained for soil classification purposes. Representative portions of each soil sample were placed in glass jars and taken to our laboratory. Rock materials were cored with NQ coring equipment, and rock samples were placed in cardboard core boxes.

Groundwater level measurements were performed in the borings after termination of drilling. Temporary PVC standpipes were installed in each borehole to prevent collapse and allow stabilized water level measurements. The borings were abandoned by tremie-grouting from the bottom up with a cement-bentonite mixture, using the PVC pipe as tremie tubes. The final 5 feet of the boreholes were backfilled with soil cuttings.





### 4.3 Laboratory Testing

A geotechnical professional visually examined each sample to estimate the distribution of grain sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams, and apparent geological origin after the samples were received in our laboratory. The results of the classifications, designated in general accordance with the Unified Soil Classification System (USCS) and ASTM D2488, as well as the field test results, are presented on the attached Boring Logs. Similar soils and rock were grouped into strata on the Boring Logs. The strata contact lines represent approximate boundaries between the soil and rock types; the actual transition between the soil and rock types in the field may be gradual in both the horizontal and vertical directions. Ground surface elevations at the boring locations were interpolated from provided topographic information and should be considered approximate.

Laboratory classification tests were also performed on select soil and rock samples to confirm visual soil and rock classifications and estimate the engineering properties of the soils and rock tested. Laboratory testing included:

**Moisture Content:** The moisture content is the ratio, expressed as a percentage, of the weight of water in a given mass of soil to the weight of the solid particles. This test was conducted in general accordance with ASTM D2216.

**Grain Size Test:** A grain size test was performed to determine the particle size and distribution of a sample. To perform the test, the sample was dried, weighed, and washed over a No. 200 mesh sieve. The dried sample was then passed through a standard set of nested sieves to determine the grain size distribution of the soil particles coarser than the No. 200 sieve. This test was conducted in general accordance with the Sieve Analysis portion of ASTM D422.

**Atterberg Limits Test:** Atterberg Limits testing determines the plasticity characteristics of soil. The Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). These tests were conducted in general accordance with ASTM D4318.

**Rock Unconfined Compressive Test:** Unconfined compressive strength tests were performed on rock core samples in general accordance with ASTM D7012 Method C. A Deluxe Hardness Pick Set and Mineral Identification Kit manufactured by Mineralab, LLC were also used to estimate the Moh's Hardness Number of the rock core samples.

Results of the laboratory testing, as well as a Summary of Laboratory Test Data table, are included in the Appendix.

## 5.0 HDD Subsurface Conditions

Subsurface conditions along the planned HDD crossing were characterized based on subsurface conditions encountered in the borings and geologic setting. Based on our experience with the area geology, Table A-1 in the Appendix summarizes our comments relative to HDD natural geologic hazards associated with the subject site. Subsurface conditions are summarized on the Boring Logs and Generalized Subsurface Profile (Figure 3) in the



Appendix. Conditions will likely vary between the borings due to widely spaced data and should be considered approximate.

## **6.0 Qualifications**

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of the engineering profession at the time this report was prepared. No other warranty, express or implied, is made.

The nature and extent of variations between borings may not become evident until construction. If variations appear evident, then it will be necessary to reevaluate the applicability of the information obtained with this exploration and laboratory testing program. Environmental services were beyond the scope of this report.

## **Appendices**



**Table A-1 – HDD Natural Geologic Hazards**

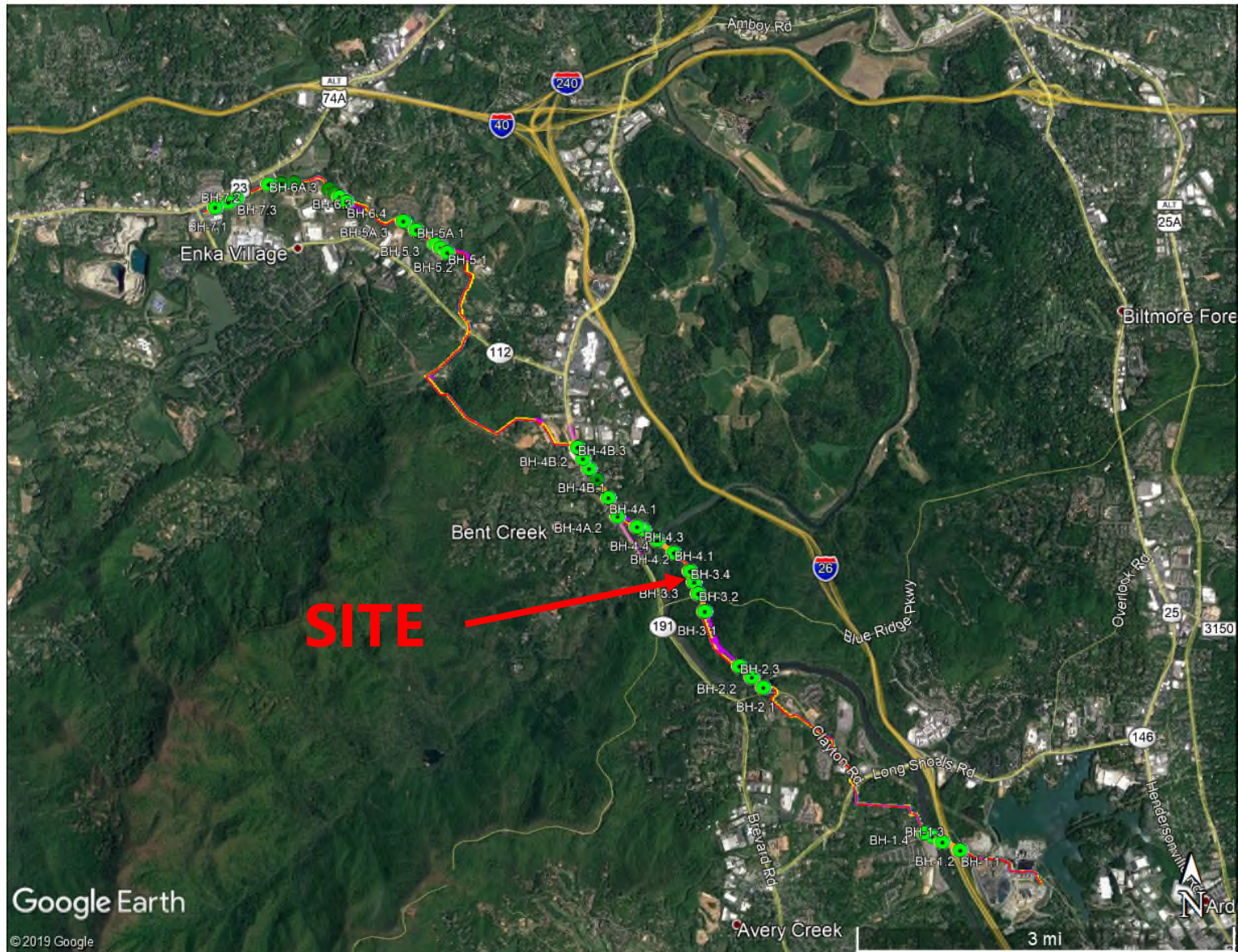
SOIL CONDITIONS AND HDD DIFFICULTY				POTENTIAL SITE SOIL CONDITIONS AND HDD DIFFICULTY <sup>3</sup>		
Soil Condition	Generally Suitable <sup>4</sup>	Difficulties May Occur	Substantial Problems	Consistent with Geology	Encountered by Borings	Comments
Soft to very soft clays, silts, and organic deposits <sup>1</sup>		<b>X</b>		<b>Yes</b>	<b>Yes</b>	Encountered in BH-3.4.
Medium to Very stiff Clays and Silts <sup>1</sup>	<b>X</b>			Yes	Yes	Encountered in the borings.
Hard Clays and highly weathered shales <sup>1</sup>	<b>X</b>			Yes	No	Not encountered by the borings to the depths explored.
Very loose to loose sands above and below the water table (not more than 30% gravel by weight) <sup>1,2</sup>		<b>X</b>		<b>Yes</b>	<b>Yes</b>	Encountered in the borings.
Medium to dense sands above or below the water table (not more than 30% gravel by weight) <sup>1,2</sup>	<b>X</b>			Yes	Yes	Encountered in the borings.
Very loose to dense gravelly sand, (30% to 50% gravel by weight) <sup>1,2</sup>		<b>X</b>		<b>Yes</b>	<b>Yes</b>	Encountered in boring BH-3.1 and BH-3.4.
Very loose to dense gravelly sand (50% to 85% gravel by weight) <sup>1,2</sup>			<b>X</b>	<b>Yes</b>	<b>Yes</b>	Encountered in boring BH-3.4.
Very loose to very dense gravel <sup>1,2</sup>			<b>X</b>	<b>Yes</b>	<b>Yes</b>	Encountered in boring BH-3.4.
Soils with significant cobbles, boulders, and obstructions <sup>1</sup>			<b>X</b>	No	No	Not consistent with geology and not encountered in the borings.
Weathered rocks, marls, chalks, and firmly cemented sands <sup>1</sup>	<b>X</b>			Yes	Yes	Encountered in all borings.
Slightly weathered to un-weathered rocks <sup>1</sup>		<b>X</b>		<b>Yes</b>	<b>Yes</b>	Encountered in all borings. Very hard quartzite rock layer with a high compressive strength encountered in BH-3.1 at a depth of 90.3 ft to 94.5 ft.
Material with sufficient potential swell upon exposure to water to reduce borehole diameter		<b>X</b>		No	No	Not consistent with geology and not encountered in the borings.
Karst geology or preferential seepage paths potentially resulting in loss of drilling fluid circulation			<b>X</b>	No	No	Not consistent with geology and not encountered in the borings.
Artesian groundwater conditions		<b>X</b>		No	No	Not consistent with geology and not encountered in the borings.
Rock Fill or fill containing rock			<b>X</b>	N/A	No	Not encountered by the borings to the depths explored.
General HDD Issues (Historically derived)				T-072 Blue Ridge Parkway HDD Crossing – Asheville, NC		

<sup>1</sup> Adapted from ASTM F1962, Table 1-“Soil Conditions and Suitability of Horizontal Directional Drilling”. Soil Conditions with a Superscript of <sup>1</sup> are directly from this reference.

<sup>2</sup> The inside diameter of Split Spoon Samplers (ASTM D1586) is 1-3/8 inches. Gravel larger than 1-3/8 inches in diameter cannot be recovered from split spoon samplers used for this exploration which may result in the percent gravel and maximum gravel size being underestimated.

<sup>3</sup> “Potential Site Soil Conditions and HDD Difficulty” is a professional opinion based on experience with the site geology; subsurface conditions encountered by borings performed for this exploration; and subsurface soil conditions known to be difficult for HDD.

<sup>4</sup> “Generally Suitable” presumes a knowledgeable, experienced contractor and personnel using appropriate equipment.



REFERENCE:  
Google Earth



## SITE VICINITY PLAN

Dominion Energy Line T-072 Project – Blue Ridge Parkway Crossing  
Asheville, North Carolina

SCALE:  
AS SHOWN

DATE:  
JAN. 2020

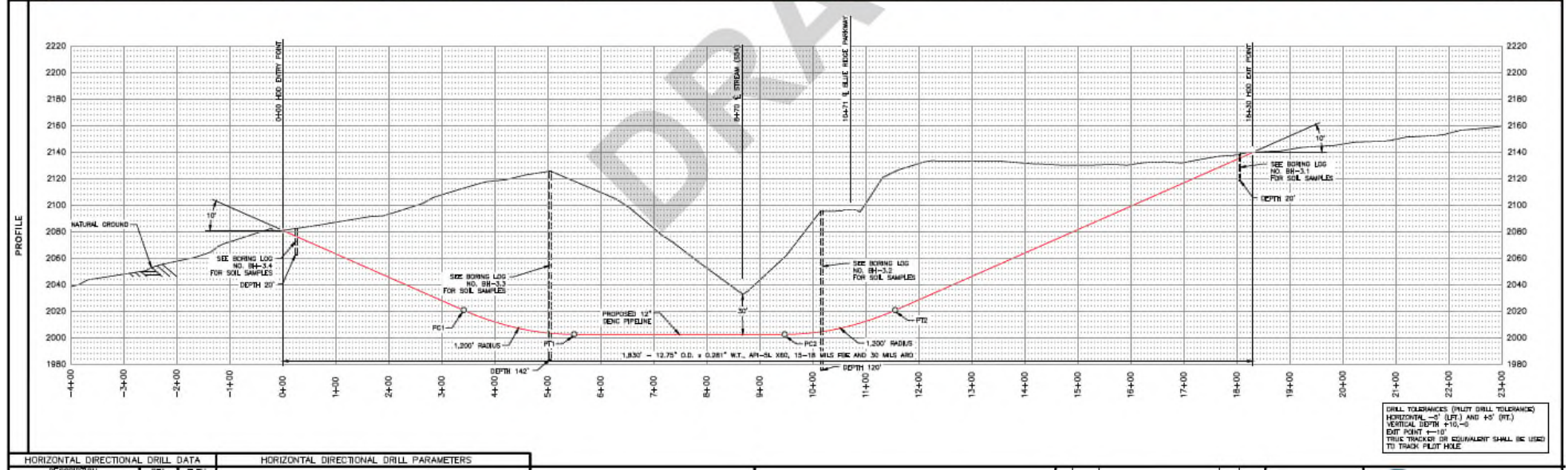
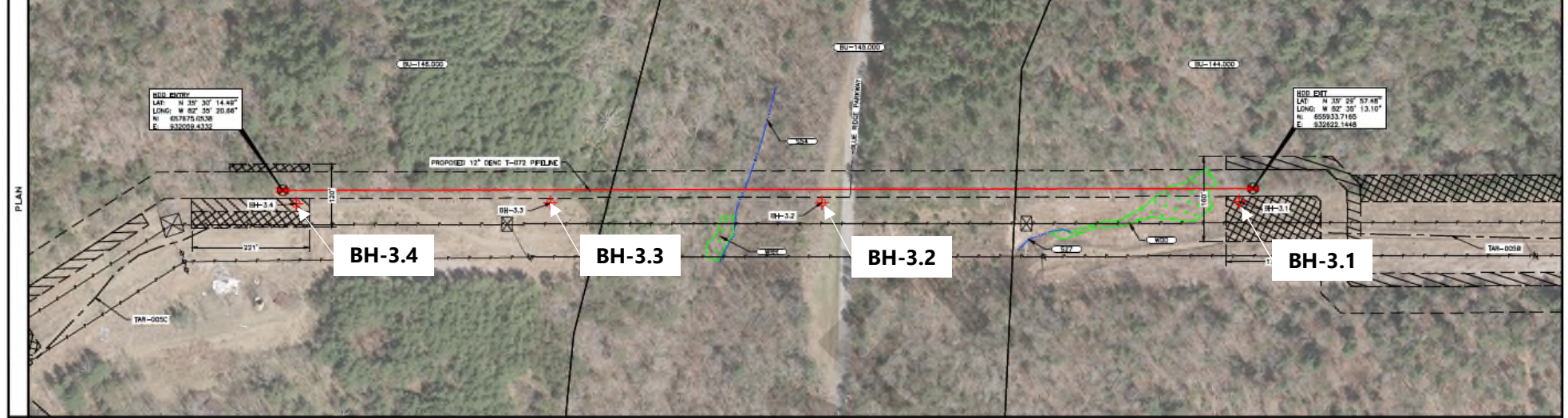
PROJECT NUMBER  
7435-18-003

FIGURE NO.

1



# BUNCOMBE COUNTY, NORTH CAROLINA



**REFERENCE:**  
 Dominion Energy Line T-072 Blue Ridge Parkway HDD Crossing Drawing 290667-33-003 Rev. C Excerpt Dated March 3, 2018.

	<h2 style="text-align: center;">BORING LOCATION PLAN</h2> <p style="text-align: center;">Dominion Energy Line T-072 Project – Blue Ridge Parkway Crossing Asheville, North Carolina</p>	SCALE: AS SHOWN	FIGURE NO.  <b>2</b>
		DATE: JAN. 2020	
		PROJECT NUMBER 7435-18-003	



**BH-3.4**

N

4  
11  
19  
18  
50/5"  
57  
40  
28  
53  
31  
50/4"  
50/5"  
50/4"  
50/5"

REC 100%, RQD 80%  
REC 100%, RQD 96%  
REC 100%, RQD 96%  
REC 100%, RQD 89%

AR @ 59.8'  
BT @ 78.3'

**BH-3.3**

N

6  
20  
16  
21  
22  
27  
44  
38  
47  
16  
19  
32  
24  
20  
25  
49  
50/2"  
50/1"

REC 89%, RQD 53%  
REC 100%, RQD 96%  
REC 100%, RQD 98%  
REC 100%, RQD 82%  
REC 100%, RQD 88%  
REC 100%, RQD 94%  
REC 100%, RQD 88%  
REC 100%, RQD 84%  
REC 100%, RQD 96%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 98%, RQD 98%  
REC 100%, RQD 98%

AR @ 83.5'  
BT @ 168'

**BH-3.2**

N

13  
5  
50/3"

REC 88%, RQD 26%  
REC 100%, RQD 76%  
REC 76%, RQD 26%  
REC 100%, RQD 70%  
REC 100%, RQD 98%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 98%  
REC 100%, RQD 98%  
REC 100%, RQD 100%  
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REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%

AR @ 8.5'  
BT @ 140'

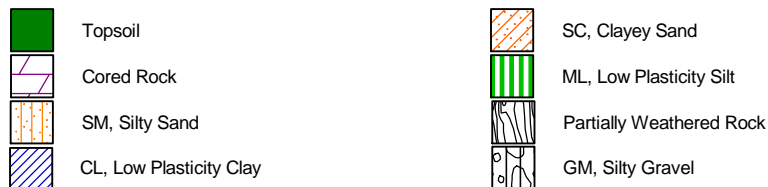
**BH-3.5**



N

13  
38  
43  
50/2"

REC 100%, RQD 55%  
REC 100%, RQD 88%  
REC 96%, RQD 90%  
REC 100%, RQD 100%  
REC 100%, RQD 88%  
REC 100%, RQD 98%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 100%  
REC 100%, RQD 92%  
REC 100%, RQD 100%  
REC 100%, RQD 94%  
REC 100%, RQD 100%  
REC 100%, RQD 98%  
REC 100%, RQD 92%  
REC 100%, RQD 94%

AR @ 9'  
BT @ 103'



BT @ 103' - Boring Terminated      AR @ 9' - Auger Refusal  
 - Groundwater after 24 Hours  
 - Approximate Depth/Elevation of HDD Borepath  
REC 100%, RQD 100% - REC = Rock Core Recovery, RQD = Rock Quality Designation

N = Standard Penetration Test resistance value (blows per foot). The depicted stratigraphy is shown for illustrative purposes only. The actual subsurface conditions will vary between boring locations. Elevations are approximate.

JOB NO: 7435-18-003

DATE: 1/8/20



Diagram: Generalized Subsurface Profile

Project: T-072 Pipeline - Blue Ridge Parkway Crossing

Location: Asheville, North Carolina

Figure No.  
3

# LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

## SOIL TYPES

(Shown in Graphic Log)



Fill



Alluvium



Asphalt



Concrete



Topsoil



Gravel



Sand



Silt



Clay



Organic



Silty Sand



Clayey Sand



Sandy Silt



Clayey Silt



Sandy Clay



Silty Clay



Partially Weathered Rock



Cored Rock

## WATER LEVELS

(Shown in Water Level Column)



= Water Level at TOB



= Water Level After 24 Hours or at EOD



= Loss of Drilling Water

HC = Hole Cave

## CONSISTENCY OF COHESIVE SOILS

### CONSISTENCY

Very Soft  
Soft  
Firm  
Stiff  
Very Stiff  
Hard  
Very Hard

### STD. PENETRATION RESISTANCE BLOWS/FOOT

0 to 2  
3 to 4  
5 to 8  
9 to 15  
16 to 30  
31 to 50  
Over 50

## RELATIVE DENSITY OF COHESIONLESS SOILS

### RELATIVE DENSITY

Very Loose  
Loose  
Medium Dense  
Dense  
Very Dense

### STD. PENETRATION RESISTANCE BLOWS/FOOT

0 to 4  
5 to 10  
11 to 30  
31 to 50  
Over 50

## SAMPLER TYPES

(Shown in Samples Column)



Split Spoon



Rock Core



No Recovery

## CONSTITUENT MODIFIERS

Trace: <5%  
Few: 5 to <15%  
Little: 15 to <30%  
Some: 30 to <50%  
Mostly: 50 to 100%

## TERMS

**Standard Penetration Resistance** - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

**REC** - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

**RQD** - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

**TOB** Termination of Boring

**EOD** End of the the Day of Boring



PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003				BORING LOG BH-3.1					
DATE DRILLED: 12/19/19		ELEVATION: 2138.0 ft		NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.					
DRILL RIG: D-50		BORING DEPTH: 103.0 ft							
DRILLER: B. Blizzard		WATER LEVEL: 2.8 ft @ 24 hrs							
HAMMER TYPE: 140-lb Autohammer		LOGGED BY: P. Gunnell							
SAMPLING METHOD: Split Spoon									
DRILLING METHOD: 3¼" H.S.A., NQ Core									
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN # 2nd 6in / REC 3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS 10 20 30 60 80	N VALUE
		TOPSOIL 2 inches	▼		SS-1	⬆	4 6 7		13
5		RESIDUUM: CLAYEY SAND (SC) medium dense, brown orange, with gravel, fine, moist		2133.0	SS-2	⬆	12 14 21		35
		SILTY SAND (SM) dense, brown tan gray, with gravel, fine to medium, moist			SS-3	⬆	3 18 25		43
10		PARTIALLY WEATHERED ROCK: SILTY SANDY GRAVEL (GM) very dense, brown tan, with rock fragments, fine to coarse, moist		2128.0	SS-4	50/2"			50/2"
15		BIOTITE GNEISS - black gray white, soft to hard, continuous, fair rock quality, severe to very slight weathering, Moh's Hardness of 1 to 7		2123.0	RC 2		100% 88%		
20		BIOTITE GNEISS - black gray white, moderately soft to hard, continuous, good rock quality, slight to fresh weathering, Moh's Hardness of 6 to 8		2118.0	RC-3		96% 90%		
25		BIOTITE GNEISS - black gray white, moderately soft to hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2113.0	RC-4		100% 100%		
30		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2108.0	RC-5		100% 88%		
35		BIOTITE GNEISS - black gray white, very hard, continuous, good rock quality, fresh weathering, Moh's Hardness of 7 to 8		2103.0	RC-6		100% 98%		
40		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2098.0	RC-7		100% 100%		
45		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2093.0	RC-8		100% 100%		

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- WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.





PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003				BORING LOG BH-3.1										
DATE DRILLED: 12/19/19			ELEVATION: 2138.0 ft			NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.								
DRILL RIG: D-50			BORING DEPTH: 103.0 ft											
DRILLER: B. Blizzard			WATER LEVEL: 2.8 ft @ 24 hrs											
HAMMER TYPE: 140-lb Autohammer			LOGGED BY: P. Gunnell											
SAMPLING METHOD: Split Spoon														
DRILLING METHOD: 3¼" H.S.A., NQ Core														
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS				N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	10	20	30	6080	
55		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8 (continued)		2083.0	RC-9		100%	100%						
60		BIOTITE GNEISS - black gray white green, moderately soft to very hard, continuous, excellent rock quality, slight to fresh weathering, Moh's Hardness of 6 to 8		2078.0	RC-10		100%	100%						
65		BIOTITE GNEISS - black gray white green, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 6 to 8		2073.0	RC-11		100%	100%						
70		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, very slight to fresh weathering, Moh's Hardness of 7 to 8		2068.0	RC-12		100%	100%						
75		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2063.0	RC-13		100%	92%						
80		BIOTITE GNEISS - black gray white, hard to very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2058.0	RC-14		100%	100%						
85		BIOTITE GNEISS - black gray white, hard to very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2053.0	RC-15		100%	94%						
90		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2048.0	RC-16		100%	100%						
95		BIOTITE GNEISS, QUARTZITE - black gray white, hard to very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8, Quartzite: 89.9 ft to 93 ft		2043.0	RC-17		100%	98%						
		BIOTITE GNEISS, QUARTZITE - black gray white, hard to very hard, continuous, excellent rock quality, slight to fresh weathering, Moh's Hardness of 7 to 8, Quartzite: 93 ft to 94.5 ft			RC-18		100%	92%						

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3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.




PROJECT: **T-072 Pipeline - Blue Ridge Parkway Crossing**  
**Asheville, North Carolina**  
**S&ME Project No. 7435-18-003**

**BORING LOG**                      **BH-3.1**

NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.

DATE DRILLED: <b>12/19/19</b>	ELEVATION: <b>2138.0 ft</b>
DRILL RIG: <b>D-50</b>	BORING DEPTH: <b>103.0 ft</b>
DRILLER: <b>B. Blizzard</b>	WATER LEVEL: <b>2.8 ft @ 24 hrs</b>
HAMMER TYPE: <b>140-lb Autohammer</b>	LOGGED BY: <b>P. Gunnell</b>
SAMPLING METHOD: <b>Split Spoon</b>	

DRILLING METHOD: 3¼" H.S.A., NQ Core

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft)  / REMARKS					N VALUE	
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	10	20	30	60	80		
		<div><b>BIOTITE GNEISS</b> - black gray white green, very hard, continuous, excellent rock quality, very slight to fresh weathering, Moh's Hardness of 7 to 8 <i>(continued)</i></div> <div>Auger refusal at 9 ft Boring terminated at 103 ft</div>			RC-19	<div><div></div></div>		100%	94%							

**NOTES:**

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3. **STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.**
4. **WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.**



PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003					BORING LOG BH-3.2											
DATE DRILLED: 12/16/19			ELEVATION: 2096.0 ft			NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.										
DRILL RIG: D-50			BORING DEPTH: 140.0 ft													
DRILLER: B. Blizzard			WATER LEVEL: 4.5 ft @ 24 hrs													
HAMMER TYPE: 140-lb Autohammer			LOGGED BY: P. Gunnell													
SAMPLING METHOD: Split Spoon																
DRILLING METHOD: 3¼" H.S.A., NQ Core																
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS				N VALUE		
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD		10	20	30	6080		
		TOPSOIL 3 inches			SS-1	▲	6	7	6							13
5		SILTY SAND (SM) medium dense, brown tan, with isolated gravel, fine to coarse, moist		2091.0	SS-2	▲	1	2	3							5
		SANDY SILT (ML) firm, brown orange, trace organics, fine to medium, wet			SS-3	▲	31	50/3"								50/3"
10		PARTIALLY WEATHERED ROCK: SILTY SAND (SM) very dense, tan brown, trace mica, fine to coarse, dry		2086.0	RC-1			88%	26%							
15		BIOTITE GNEISS - black gray white, soft to hard, fairly continuous, poor rock quality, very severe to moderate weathering, Moh's Hardness of 1 to 6		2081.0	RC-2			100%	76%							
20		BIOTITE GNEISS - black gray white, soft to hard, continuous, good rock quality, very severe to very slight weathering, Moh's Hardness of 1 to 6		2076.0	RC-3			76%	26%							
25		BIOTITE GNEISS - black gray white, soft to hard, fairly continuous, poor rock quality, very severe to very slight weathering, Moh's Hardness of 1 to 6		2071.0	RC-4			100%	70%							
30		BIOTITE GNEISS - black gray white, soft to very hard, continuous, fair rock quality, moderate to very slight weathering, Moh's Hardness of 4 to 7		2066.0	RC-5			100%	98%							
35		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, very slight to fresh weathering, Moh's Hardness of 4 to 8		2061.0	RC-6			100%	100%							
40		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 4 to 8		2056.0	RC-7			100%	100%							
45		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 4 to 8		2051.0	RC-8			100%	100%							

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4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.






PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003				BORING LOG BH-3.2								
DATE DRILLED: 12/16/19		ELEVATION: 2096.0 ft		NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.								
DRILL RIG: D-50		BORING DEPTH: 140.0 ft										
DRILLER: B. Blizzard		WATER LEVEL: 4.5 ft @ 24 hrs										
HAMMER TYPE: 140-lb Autohammer		LOGGED BY: P. Gunnell										
SAMPLING METHOD: Split Spoon												
DRILLING METHOD: 3¼" H.S.A., NQ Core												
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #    2nd 6in / REC    3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS  10    20    30    6080				N VALUE
		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 4 to 8			RC-9		100%100%					
55		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 4 to 8 (continued)		2041.0	RC-10		100%98%					
60		BIOTITE GNEISS - black gray white, moderately soft to very hard, continuous, excellent rock quality, slight to fresh weathering, Moh's Hardness of 7 to 8		2036.0	RC-11		100%96%					
65		BIOTITE GNEISS - black gray white, moderately hard to very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2031.0	RC-12		100%100%					
70		BIOTITE GNEISS - black gray white, moderately hard to very hard, continuous, excellent rock quality, slight to fresh weathering, Moh's Hardness of 7 to 8		2026.0	RC-13		100%100%					
75		BIOTITE GNEISS - black gray white, moderately soft to very hard, continuous, excellent rock quality, slight to fresh weathering, Moh's Hardness of 7 to 8		2021.0	RC-14		100%100%					
80		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2016.0	RC-15		100%100%					
85		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2011.0	RC-16		100%100%					
90		BIOTITE GNEISS - black gray white, hard to very hard, continuous, excellent rock quality, very slight to fresh weathering, Moh's Hardness of 7 to 8		2006.0	RC-17		100%100%					
95		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		2001.0	RC-18		100%100%					

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4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.















PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003				BORING LOG BH-3.2										
DATE DRILLED: 12/16/19		ELEVATION: 2096.0 ft		NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.										
DRILL RIG: D-50		BORING DEPTH: 140.0 ft												
DRILLER: B. Blizzard		WATER LEVEL: 4.5 ft @ 24 hrs												
HAMMER TYPE: 140-lb Autohammer		LOGGED BY: P. Gunnell												
SAMPLING METHOD: Split Spoon														
DRILLING METHOD: 3¼" H.S.A., NQ Core														
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS				N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	10	20	30	6080	
105		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8 (continued)		1991.0	RC-19		100%	100%						
		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8			RC-20		100%	100%						
110		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, slight to fresh weathering, Moh's Hardness of 7 to 8		1986.0	RC-21		100%	94%						
115		BIOTITE GNEISS - black gray white, soft to very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		1981.0	RC-22		100%	94%						
120		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		1976.0	RC-23		100%	96%						
125		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		1971.0	RC-24		100%	100%						
130		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		1966.0	RC-25		100%	100%						
135		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 7 to 8		1961.0	RC-26		100%	100%						
140		BIOTITE GNEISS - black gray white, very hard, continuous, good rock quality, fresh weathering, Moh's Hardness of 7 to 8  Auger refusal at 8.5 ft Boring terminated at 140 ft		1956.0	RC-27		100%	80%						

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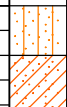


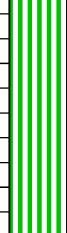
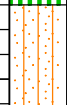



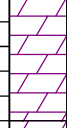

PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003				BORING LOG BH-3.3										
DATE DRILLED: 12/11/19		ELEVATION: 2127.0 ft		NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.										
DRILL RIG: D-50		BORING DEPTH: 168.0 ft												
DRILLER: B. Blizzard		WATER LEVEL: 64.3 ft @ 24 hrs												
HAMMER TYPE: 140-lb Autohammer		LOGGED BY: P. Gunnell												
SAMPLING METHOD: Split Spoon														
DRILLING METHOD: 3¼" H.S.A., NQ Core														
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS				N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	10	20	30	6080	
		<b>TOPSOIL</b> 3 inches			SS-1	⚡	1	2	4					6
5		<b>RESIDUUM: SANDY CLAY (CL)</b> firm, orange tan, with mica, fine to medium, moist		2122.0	SS-2	⚡	7	8	12					20
		<b>SILTY SAND (SM)</b> medium dense, orange tan brown, with mica, with manganese, fine to medium, dry		2117.0	SS-3	⚡	8	8	8					16
10		<b>SILTY SAND (SM)</b> medium dense, tan orange, with isolated gravel, fine to coarse, dry			SS-4	⚡	4	9	12					21
		<b>SILTY SAND (SM)</b> medium dense, tan orange, with isolated gravel, fine to coarse, dry		2112.0	SS-5	⚡	9	12	10					22
15		<b>SILTY SAND (SM)</b> medium dense, orange tan, trace mica, fine, dry			SS-6	⚡	11	12	15					27
20		<b>SILTY SAND (SM)</b> medium dense, brown tan, with mica, fine, dry		2107.0	SS-7	⚡	11	18	26					44
25		<b>SILTY SAND (SM)</b> medium dense to dense, tan orange brown, trace mica, fine, dry		2102.0	SS-8	⚡	10	13	25					38
30		<b>SANDY SILT (ML)</b> hard, brown orange, with mica, fine, dry		2097.0	SS-9	⚡	12	22	25					47
35		<b>SILTY SAND (SM)</b> dense, tan orange, trace mica, fine, dry		2092.0	SS-10	⚡	5	7	9					16
40		<b>SILTY SAND (SM)</b> medium dense, orange tan, with mica, fine, dry		2087.0	SS-11	⚡	4	6	13					19
45		<b>SANDY SILT (ML)</b> very stiff, orange red black, with mica, with manganese, fine, dry		2082.0	SS-12	⚡	11	14	18					32

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PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003				BORING LOG BH-3.3					
DATE DRILLED: 12/11/19		ELEVATION: 2127.0 ft		NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.					
DRILL RIG: D-50		BORING DEPTH: 168.0 ft							
DRILLER: B. Blizzard		WATER LEVEL: 64.3 ft @ 24 hrs							
HAMMER TYPE: 140-lb Autohammer		LOGGED BY: P. Gunnell							
SAMPLING METHOD: Split Spoon									
DRILLING METHOD: 3¼" H.S.A., NQ Core									
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
							1st 6in / RUN # 2nd 6in / REC 3rd 6in / RQD	10 20 30 6080	
55		<b>SILTY SAND (SM)</b> dense, tan orange white, trace mica, fine to medium, moist (continued)		2072.0	SS-13	Δ	6 10 14		24
60		<b>CLAYEY SAND (SC)</b> medium dense, orange tan, fine to coarse, moist		2067.0	SS-14	Δ	7 8 12		20
65		<b>RESIDUUM: SANDY SILT (ML)</b> very stiff, orange tan, fine, moist		2062.0	SS-15	Δ	6 11 14		25
70		<b>SILTY SAND (SM)</b> dense, orange tan white, fine to coarse, moist		2057.0	SS-16	Δ	11 14 35		49
75		<b>PARTIALLY WEATHERED ROCK: SANDY SILT (ML)</b> very hard, orange tan, fine, moist		2052.0	SS-17	Δ	27 50/2"		50/2"
80		<b>PARTIALLY WEATHERED ROCK: SILTY SAND (SM)</b> very dense, orange tan, fine to coarse, moist, with abundant mica		2047.0	SS-18	Δ	48 50/1"		50/1"
85		<b>BIOTITE GNEISS</b> - black gray white, soft to hard, fairly continuous, fair rock quality, severe to fresh weathering, Moh's Hardness of 1 to 8		2042.0	RC-1		89% 53%		
90		<b>BIOTITE GNEISS</b> - black gray white, hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8		2037.0	RC 2		100% 96%		
95		<b>BIOTITE GNEISS</b> - black gray white, soft to very hard, continuous, excellent rock quality, very severe to fresh weathering, Moh's Hardness of 1 to 8		2032.0	RC-3		100% 98%		

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PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003				BORING LOG BH-3.3										
DATE DRILLED: 12/11/19		ELEVATION: 2127.0 ft		NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.										
DRILL RIG: D-50		BORING DEPTH: 168.0 ft												
DRILLER: B. Blizzard		WATER LEVEL: 64.3 ft @ 24 hrs												
HAMMER TYPE: 140-lb Autohammer		LOGGED BY: P. Gunnell												
SAMPLING METHOD: Split Spoon														
DRILLING METHOD: 3¼" H.S.A., NQ Core														
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS				N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	10	20	30	6080	
105		BIOTITE GNEISS - black gray white, very hard, fairly continuous, good rock quality, fresh weathering, Moh's Hardness of 5 to 8 (continued)		2022.0	RC-4		100%	82%						
		BIOTITE GNEISS - black gray white, very hard, continuous, good rock quality, fresh weathering, Moh's Hardness of 5 to 8			RC-5		100%	88%						
110		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8		2017.0	RC-6		100%	94%						
115		BIOTITE GNEISS - black gray white, very hard, continuous, good rock quality, fresh weathering, Moh's Hardness of 5 to 8		2012.0	RC-7		100%	88%						
120		BIOTITE GNEISS - black gray white, very hard, continuous, good rock quality, fresh weathering, Moh's Hardness of 5 to 8		2007.0	RC-8		100%	84%						
125		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8		2002.0	RC-9		100%	96%						
130		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8		1997.0	RC-10		100%	100%						
135		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8		1992.0	RC-11		100%	100%						
140		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8		1987.0	RC-12		100%	100%						
145		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8		1982.0	RC-13		100%	100%						

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PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003				BORING LOG BH-3.3										
DATE DRILLED: 12/11/19			ELEVATION: 2127.0 ft					NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.						
DRILL RIG: D-50			BORING DEPTH: 168.0 ft											
DRILLER: B. Blizzard			WATER LEVEL: 64.3 ft @ 24 hrs											
HAMMER TYPE: 140-lb Autohammer			LOGGED BY: P. Gunnell											
SAMPLING METHOD: Split Spoon														
DRILLING METHOD: 3¼" H.S.A., NQ Core														
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS				N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD					
155		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8 (continued)		1972.0	RC-14		100%	100%						
		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8			RC-15		100%	100%						
160		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8, lost circulation briefly		1967.0	RC-16		98%	98%						
165		BIOTITE GNEISS - black gray white, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 5 to 8		1962.0	RC-17		100%	98%						
		Auger refusal at 83.5 ft Boring terminated at 168 ft												

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PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003					BORING LOG BH-3.4						
DATE DRILLED: 12/18/19			ELEVATION: 2083.0 ft			NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.					
DRILL RIG: D-50			BORING DEPTH: 78.3 ft								
DRILLER: J. Marlowe			WATER LEVEL: 30.4 ft @ 24 hrs								
HAMMER TYPE: 140-lb Autohammer			LOGGED BY: D. Nance								
SAMPLING METHOD: Split Spoon											
DRILLING METHOD: 3¼" H.S.A., NQ Core											
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	10 20 30 6080	
5		<b>RESIDUUM: CLAYEY SAND (SC)</b> soft to stiff, red brown, trace mica, with gravel, fine, moist		2078.0	SS-1	⚡	2	1	3		4
					SS-2	⚡	4	5	6		11
					SS-3	⚡	5	9	10		19
10		<b>FINE SANDY SILT (ML)</b> very stiff, red brown, trace mica, fine, moist		2073.0	SS-4	⚡	5	8	10		18
15		<b>PARTIALLY WEATHERED ROCK: SILTY SANDY GRAVEL (GM)</b> brown tan, with rock fragments, fine to coarse		2068.0	SS-5	⚡	21	50/5"			50/5"
20		<b>RESIDUUM: SILTY SAND (SM)</b> medium dense to very dense, gray brown tan, with rock fragments, fine to coarse, moist to wet		2063.0	SS-6	⚡	35	32	25		57
25				2058.0	SS-7	⚡	21	20	20		40
30			▼ 2053.0		SS-8	⚡	17	13	15		28
35		<b>SILTY SANDY GRAVEL (GM)</b> dense to very dense, gray brown tan, with rock fragments, fine to coarse, moist to wet		2048.0	SS-9	⚡	14	20	33		53
40				2043.0	SS-10	⚡	6	11	20		31
45		<b>PARTIALLY WEATHERED ROCK: SILTY SAND (SM)</b> gray brown, some rock fragments, fine to coarse		2038.0	SS-11	⚡	49	50/4"			50/4"
					SS-12	⚡	50/5"				50/5"

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PROJECT: T-072 Pipeline - Blue Ridge Parkway Crossing Asheville, North Carolina S&ME Project No. 7435-18-003					BORING LOG BH-3.4										
DATE DRILLED: 12/18/19			ELEVATION: 2083.0 ft			NOTES: Borehole backfilled by tremie grouting to within 5 ft of the surface. Soil cuttings backfilled to ground surface.									
DRILL RIG: D-50			BORING DEPTH: 78.3 ft												
DRILLER: J. Marlowe			WATER LEVEL: 30.4 ft @ 24 hrs												
HAMMER TYPE: 140-lb Autohammer			LOGGED BY: D. Nance												
SAMPLING METHOD: Split Spoon															
DRILLING METHOD: 3¼" H.S.A., NQ Core															
DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA			STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS				N VALUE	
							1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	10	20	30	60/80		
55		PARTIALLY WEATHERED ROCK: SILTY SAND (SM) gray brown, some rock fragments, fine to coarse (continued)		2028.0	SS-13	⚡	33	45	50/4"					50/4"	
60				2023.0	SS-14	⚡	50/5"							50/5"	
65		BIOTITE GNEISS - white black gray, soft to very hard, continuous, good rock quality, severe to fresh weathering, Moh's Hardness of 1 to 7		2018.0	RC-1			100%	80%						
70		BIOTITE GNEISS - white black gray, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 6 to 7		2013.0	RC-2			100%	96%						
75		BIOTITE GNEISS - white black gray, very hard, continuous, excellent rock quality, fresh weathering, Moh's Hardness of 6 to 7		2008.0	RC-3			100%	96%						
		BIOTITE GNEISS - white black gray, very hard, continuous, good rock quality, fresh weathering, Moh's Hardness of 6 to 7			RC-4			100%	89%						
		Auger refusal at 59.8 ft Boring terminated at 78.3 ft													

**NOTES:**

- THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.
- BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.
- STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
- WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

Page 2 of 2





**Table A-2 – Summary of Laboratory Test Data**

Sample Location			Sample Type	USCS Classification Soil Type	Atterberg Limits			Natural Moisture Content %	Diameter (millimeters)				% Silt and Clay	% Sand			% Gravel	Rock Core Compressive Strength (psi)
Boring	Sample	Depth (ft)			LL	PL	PI		D <sub>100</sub>	D <sub>60</sub>	D <sub>30</sub>	D <sub>10</sub>		Fine	Medium	Coarse		
BH-3.1	1	1-2.5	SS	SC	--	--	--	36.5	20	0.42	0.16	--	19	41	15	9	17	--
	2	3.5-5	SS	GC	--	--	--	8.2	40	13	0.25	--	12	27	8	4	49	--
	3	6-7.5	SS	SM	--	--	--	8.5	20	0.42	0.16	--	19	44	19	9	9	--
	RC-1	10.4-10.9	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6,162
	RC-2	12.0-12.7	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5,075
	RC-3	30-30.5	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,984
	RC-4	93.8-94.5	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	29,521
BH-3.2	RC-1	91.2-91.7	SS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8,880
	RC-2	92.7-93.2	SS	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7,318
	RC-3	110.4-111.1	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9,711
	RC-4	135.2-135.9	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	7,156
BH-3.3	RC-1	120.4-120.9	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4,354
	RC-2	122.5-123	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,611
	RC-3	110-110.9	RC	---	--	--	--	--	--	--	--	--	--	--	--	--	--	3,381
	RC-4	134-134.7	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4,224
BH-3.4	2	3.5-5	SS	SC	--	--	--	19	20	0.35	--	--	38	26	10	5	21	--
	4	8.5-10	SS	ML	40	26	14	18.1	--	--	--	--	--	--	--	--	--	--
	5	13.5-15	SS	GM	--	--	--	6.5	40	16	2.4	0.18	7	10	12	9	63	--
	6	18.5-20	SS	SM	--	--	--	6.9	25	4.9	0.39	--	13	18	15	13	41	--
	9	33.5-35	SS	GM	--	--	--	11.5	40	17	0.55	--	11	17	11	6	56	--
	RC-1	63.9-64.8	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3,312
	RC-2	74.8-75.5	RC	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12,685



**Geotechnical Data Report**  
**T-072 Pipeline Replacement Project**  
Buncombe County, North Carolina  
S&ME Project No. 7435-18-003



**Legend**

LL – Liquid Limit	SS- Split Spoon Soil Sample
PL – Plastic Limit	RC – Rock Core Sample
PI – Plasticity Index	NP – Non-Plastic

\* - Fines visually/ manually classified

**Notes**<sup>1</sup> - USCS classification determined by visual-manual identification

# LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216



AASHTO T 265



S&amp;ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #:	7435-18-003	Report Date:	1-8-20
Project Name:	T-072 Pipeline	Test Date(s):	1-3-20
Client Name:			
Client Address:			
Sample by:		Sample Date(s):	12-18-19
Sampling Method:	NA	Drill Rig :	NA

**Method: A (1%)****B (0.1%)**

Balance ID. 5544

Calibration Date: 2-10-19

Oven ID. 5470

Calibration Date: 2-12-19

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt. + Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
BH-3.1	1	1.0'-2.5'	3	121.74	400.66	326.05	74.61	36.5%	
BH-3.1	2	3.5'-5.0'	1	119.53	386.49	366.23	20.26	8.2%	
BH-3.1	3	6.0'-7.5'	12	264.34	489.61	472.03	17.58	8.5%	
BH-3.4	4	8.5'-10.0'	27	121.70	341.86	308.05	33.81	18.1%	
BH-3.4	5	13.5'-15.0'	2-1	130.99	475.28	454.25	21.03	6.5%	
BH-3.4	6	18.5'-20.0'	19	121.51	401.63	383.52	18.11	6.9%	

Notes / Deviations / References Delete one of the references under Procedure.

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Jimmy Thomasson

Technician Name

Signature

NICET 119392

Certification Type / No.

Date

Matt Moler, PE

Technical Responsibility

Signature

Group Leader

Position

Date

## LABORATORY DETERMINATION OF WATER CONTENT



ASTM D 2216



AASHTO T 265



S&ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #: 7435-18-003

Report Date: 1/17/20

Project Name: T-072 Pipeline Blue Ridge Parkway HDD Crossing

Test Date(s): 1/14/20

Client Name:

Client Address:

Sample by: D. Nance

Sample Date(s): 12/19/19

Sampling Method:	NA
------------------	----

Drill Rig :	NA
-------------	----

**Method:**      **A (1%)**      ☐



**B (0.1%)** ☒



Balance ID.	5544
-------------	------

5544	Calibration Date:	2-10-19
------	-------------------	---------

Oven ID. 5470

Calibration Date: 2-12-19

[illegible]

Notes / Deviations / References	Delete one of the references under Procedure.
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Jimmy Thomasson

Technician Name

Matt Moler, PE

### Technical Responsibility

NICET 119392

*Certification Type / No.*

## Project Manager

### Position

Date \_\_\_\_\_

Date \_\_\_\_\_



# SIEVE ANALYSIS OF SOIL

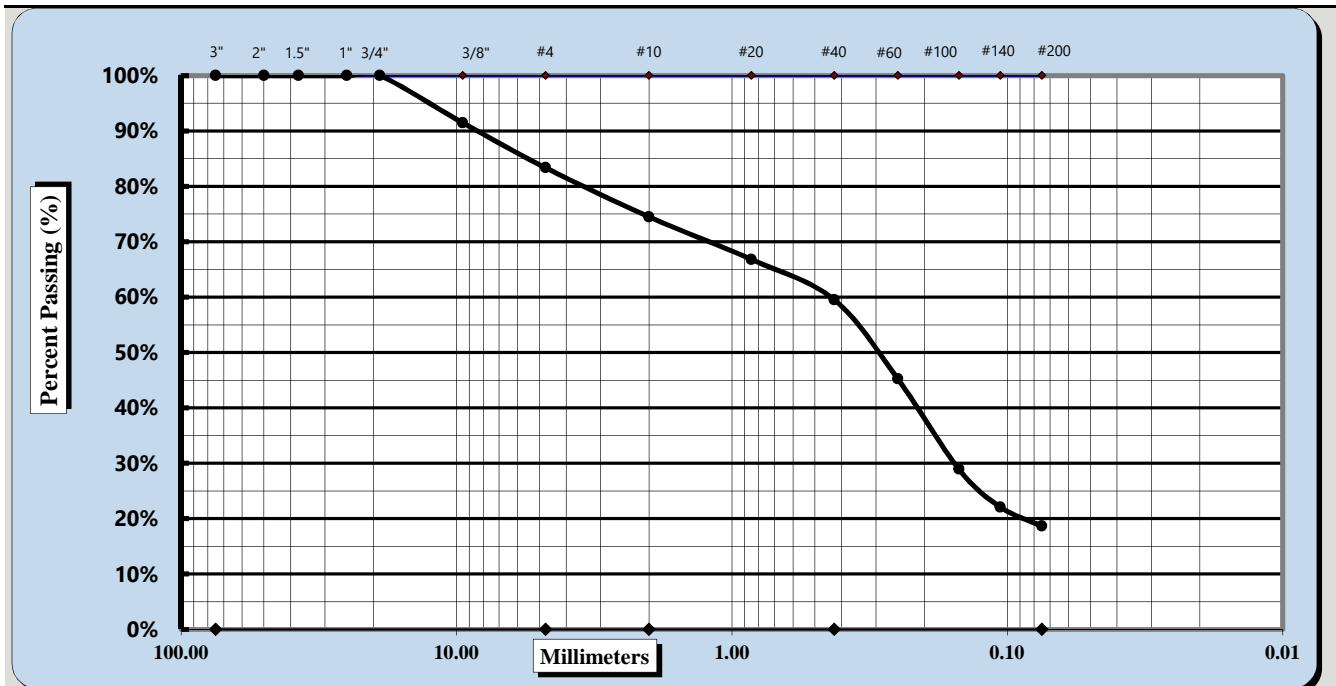


Single sieve set

ASTM D6913

S&ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #:	7435-18-003	Record Date:	1/8/2020
Project Name:	T-072 Pipeline	Lab Report #:	
Client Name:		Date Received:	12/30/2019
Received By:	J. Thomasson	Sampled by:	
Location:	BH-3.1	Date Sampled:	12/18/2019
Log/Sample Id.	1	Type:	Jar
		Elev/Depth:	1.0'-2.5'
Sample Description:	Brown Orange Clayey SAND w/gravel		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Method:	A	Procedure for obtaining Specimen:	Moist	Dispersion Process:	ultrasonic apparatus
Maximum Particle Size	3/4"	Coarse Sand	9%	Fine Sand	41%
Gravel	17%	Medium Sand	15%	Silt & Clay	19%
Liquid Limit		Plastic Limit		Plastic Index	
Maximum Dry Density		Bulk Gravity (C127)		% Absorption	
Optimum Moisture		Natural Moisture		CBR	

Notes / Deviations / References:

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Matt Moler, PE  
Technical Responsibility

Signature

Project Manager  
Position

Date

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# SIEVE ANALYSIS OF SOIL

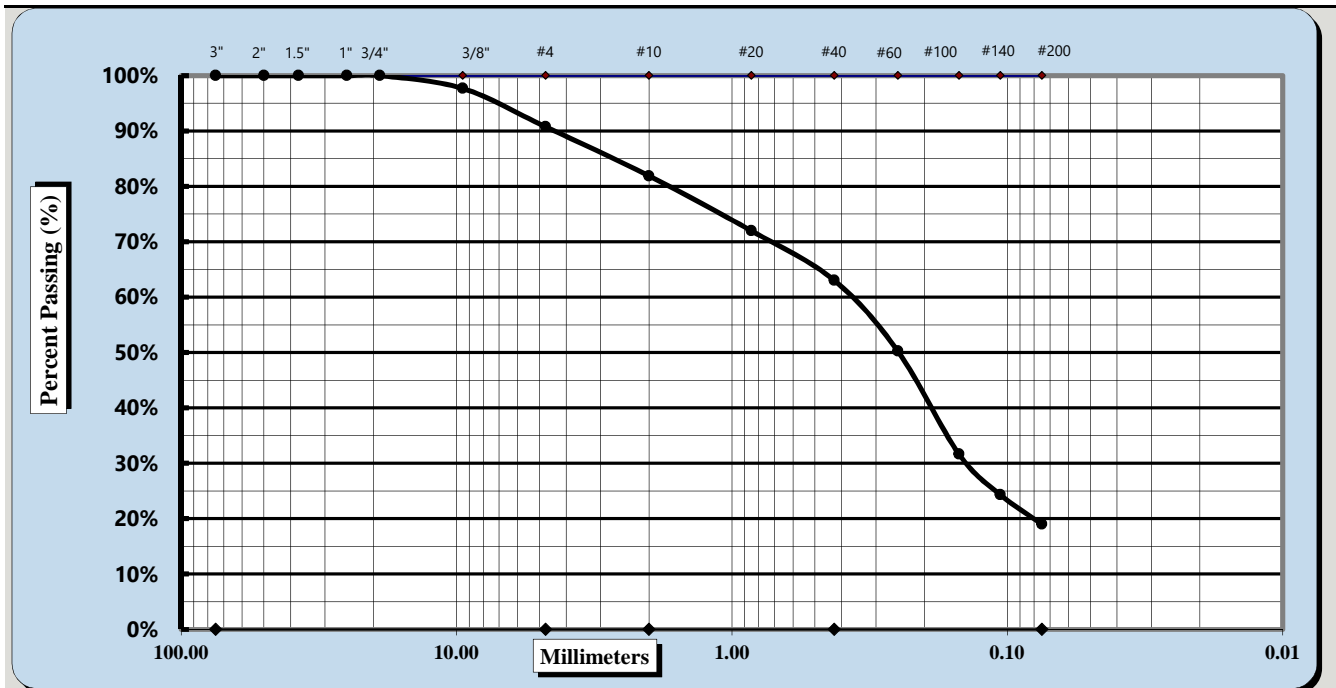


Single sieve set

ASTM D6913

S&ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #:	7435-18-003	Record Date:	1/8/2020
Project Name:	T-072 Pipeline	Lab Report #:	
Client Name:		Date Received:	12/30/2019
Received By:	J. Thomasson	Sampled by:	
Location:	BH-3.1	Date Sampled:	12/18/2019
Log/Sample Id.	3	Type:	Jar
		Elev/Depth:	6.0'-7.5'
Sample Description:	Brown Tan Silty SAND w/ gravel		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Method:	A	Procedure for obtaining Specimen:	Moist	Dispersion Process:	ultrasonic apparatus
Maximum Particle Size	3/4"	Coarse Sand	9%	Fine Sand	44%
Gravel	9%	Medium Sand	19%	Silt & Clay	19%
Liquid Limit		Plastic Limit		Plastic Index	
Maximum Dry Density		Bulk Gravity (C127)		% Absorption	
Optimum Moisture		Natural Moisture		CBR	

Notes / Deviations / References:

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Matt Moler, PE

Technical Responsibility

Signature

Project Manager

Position

Date

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# LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX



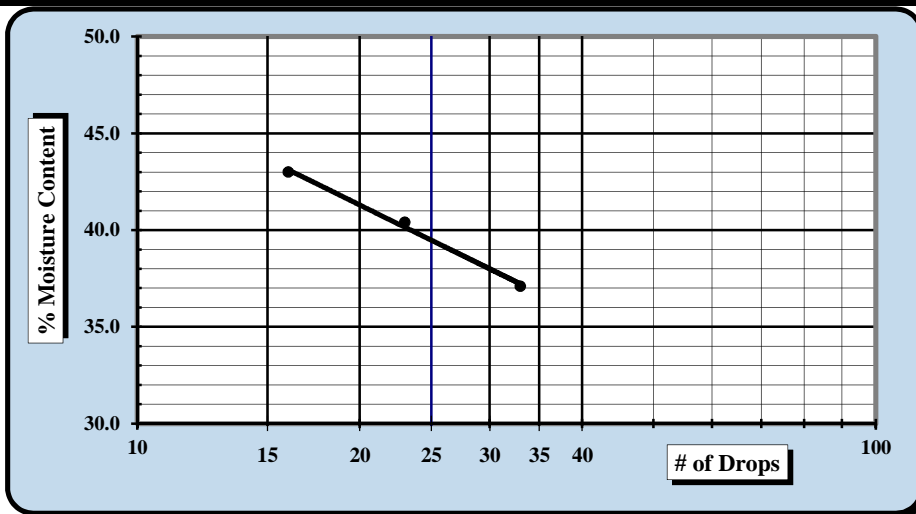
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #:	7435-18-003	Report Date:	1-8-20
Project Name:	T-072 Pipeline	Test Date(s)	1-6-20
Client Name:			
Client Address:			
Boring #:	BH-3.4	Sample #:	4
Location:	NA	Sample Date:	12-18-19
	Offset: NA	Elevation:	8.5'-10.0'

Sample Description: Red Brown Sandy SILT					
Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	5544	2/10/2019	Grooving tool	5918	4/18/2019
LL Apparatus	5917	4/18/2019	Grooving tool		
Oven	5470	2/12/2019	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
Tare #:		5	3	23				112	116	
A	Tare Weight	15.78	14.01	14.13				11.39	11.41	
B	Wet Soil Weight + A	23.25	23.74	23.34				17.75	17.49	
C	Dry Soil Weight + A	21.23	20.94	20.57				16.43	16.23	
D	Water Weight (B-C)	2.02	2.80	2.77				1.32	1.26	
E	Dry Soil Weight (C-A)	5.45	6.93	6.44				5.04	4.82	
F	% Moisture (D/E)*100	37.1%	40.4%	43.0%				26.2%	26.1%	
N	# OF DROPS	33	23	16				Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average	#DIV/0!						26.2%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	<input type="checkbox"/>
Liquid Limit	40
Plastic Limit	26
Plastic Index	14
Group Symbol	ML

Multipoint Method ☐  
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☒ Air Dried ☐ Estimate the % Retained on the #40 Sieve: \_\_\_\_\_

Notes / Deviations / References: \_\_\_\_\_

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Jimmy Thomasson  
Technician Name

Date

Matt Moler, PE  
Technical Responsibility

Date

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# SIEVE ANALYSIS OF SOIL

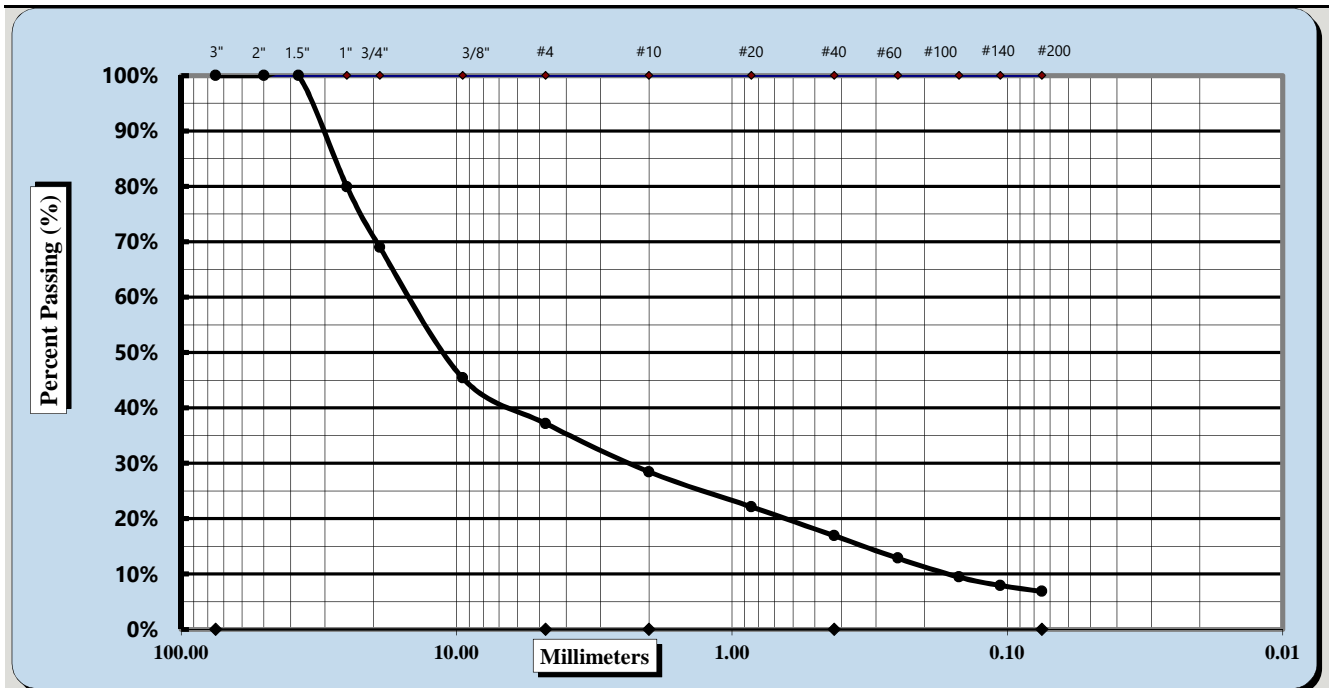


Single sieve set

ASTM D6913

S&ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #:	7435-18-003	Record Date:	1/8/2020
Project Name:	T-072 Pipeline	Lab Report #:	
Client Name:		Date Received:	12/30/2019
Received By:	J. Thomasson	Sampled by:	
Location:	BH-3.4	Date Sampled:	12/18/2019
Log/Sample Id.	5	Type:	Jar
		Elev/Depth:	13.5'-15.0'
Sample Description:	Brown Tan Silty Sandy GRAVEL		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Method:	A	Procedure for obtaining Specimen:	Moist	Dispersion Process:	ultrasonic apparatus
Maximum Particle Size	1.5"	Coarse Sand	9%	Fine Sand	10%
Gravel	63%	Medium Sand	12%	Silt & Clay	7%
Liquid Limit		Plastic Limit		Plastic Index	
Maximum Dry Density		Bulk Gravity (C127)		% Absorption	
Optimum Moisture		Natural Moisture		CBR	

Notes / Deviations / References:

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<u>Matt Moler, PE</u>	_____	<u>Project Manager</u>	_____
Technical Responsibility	Signature	Position	Date

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# SIEVE ANALYSIS OF SOIL

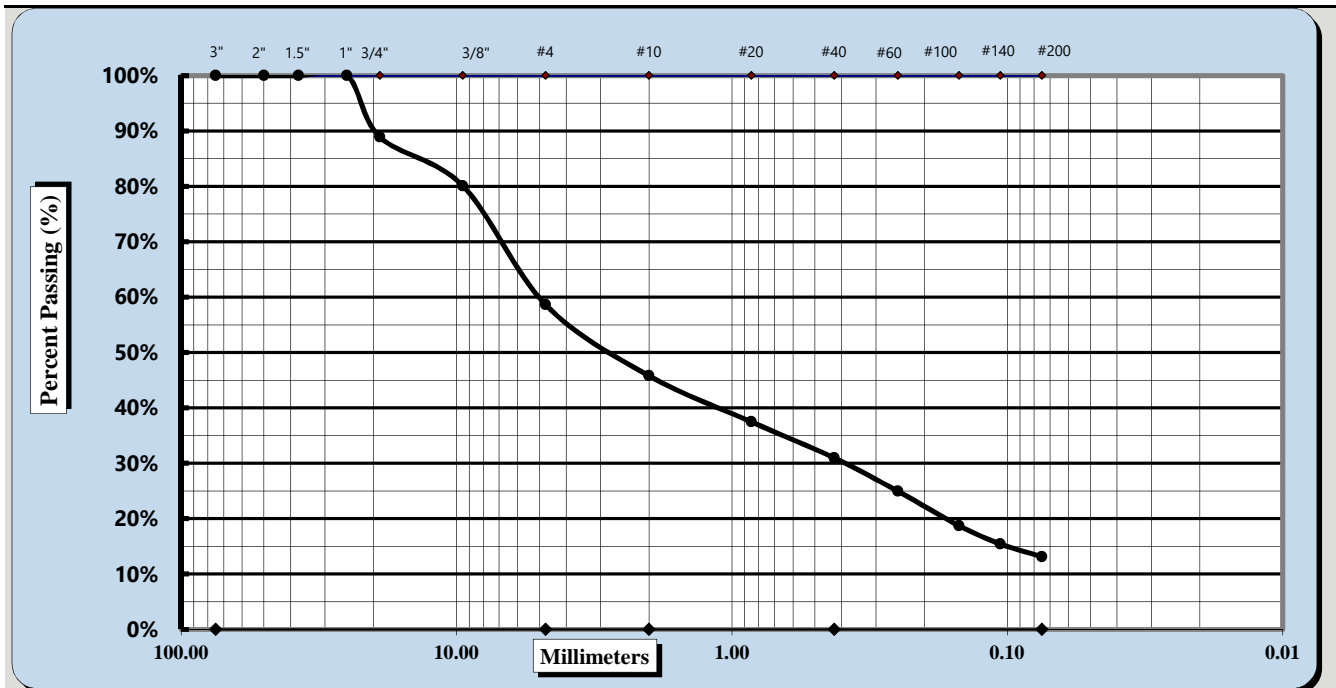


Single sieve set

ASTM D6913

S&ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #:	7435-18-003	Record Date:	1/8/2020
Project Name:	T-072 Pipeline	Lab Report #:	
Client Name:		Date Received:	12/30/2019
Received By:	J. Thomasson	Sampled by:	
Location:	BH-3.4	Date Sampled:	12/18/2019
Log/Sample Id.	6	Type:	Jar
		Elev/Depth:	18.5'-20.0'
Sample Description:	Gray Brown Tan Silty SAND		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Method:	A	Procedure for obtaining Specimen:	Moist	Dispersion Process:	ultrasonic apparatus
Maximum Particle Size	1.0"	Coarse Sand	13%	Fine Sand	18%
Gravel	41%	Medium Sand	15%	Silt & Clay	13%
Liquid Limit		Plastic Limit		Plastic Index	
Maximum Dry Density		Bulk Gravity (C127)		% Absorption	
Optimum Moisture		Natural Moisture		CBR	

Notes / Deviations / References:

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<u>Matt Moler, PE</u>	_____	<u>Project Manager</u>	_____
Technical Responsibility	Signature	Position	Date

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# SIEVE ANALYSIS OF SOIL

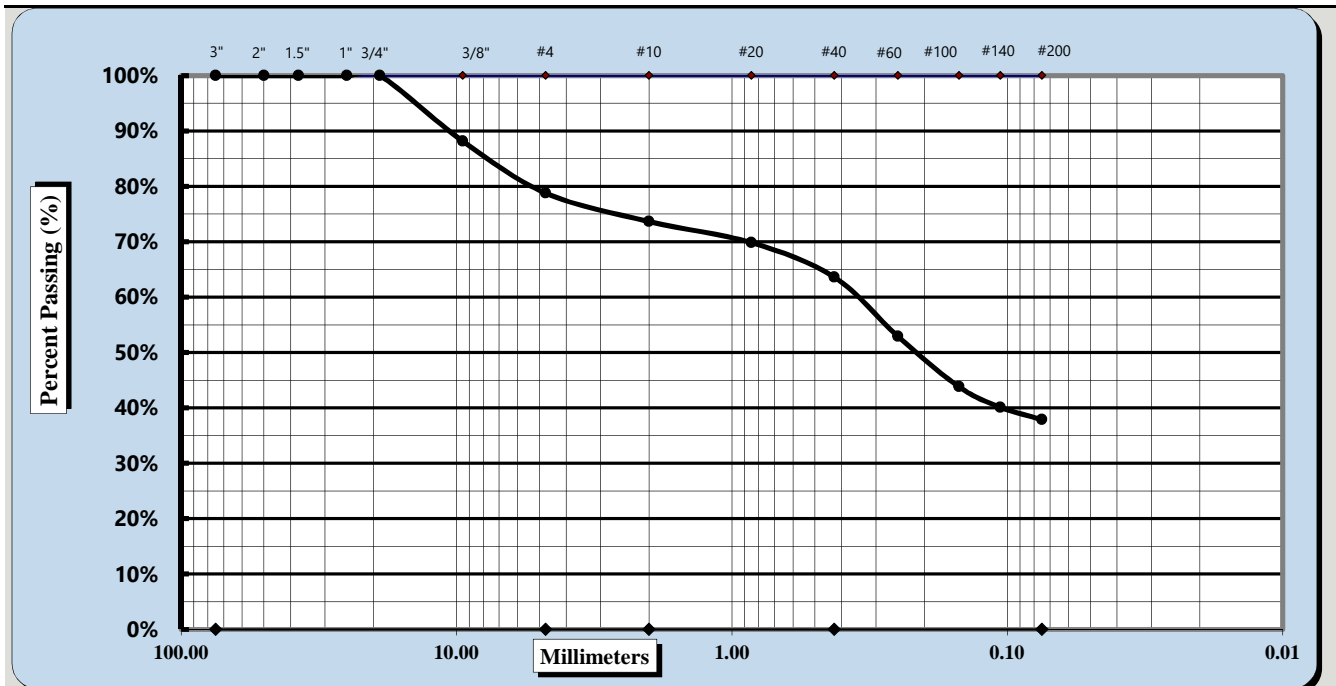


Single sieve set

ASTM D6913

S&ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #:	7435-18-003	Record Date:	1/17/2020
Project Name:	T-072 Pipeline Blue Ridge Parkway HDD Crossing	Lab Report #:	
Client Name:		Date Received:	1/13/2020
Received By:	J. Thomasson	Sampled by:	D. Nance
Location:	BH-3.4	Date Sampled:	12/19/2019
Log/Sample Id.	SS-2	Type:	Jar
		Elev/Depth:	3.5-5
Sample Description:	Red Brown Silty Clayey SAND w/ Gravel		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Method:	A	Procedure for obtaining Specimen:	Moist	Dispersion Process:	ultrasonic apparatus
Maximum Particle Size	3/4"	Coarse Sand	5%	Fine Sand	26%
Gravel	21%	Medium Sand	10%	Silt & Clay	38%
Liquid Limit		Plastic Limit		Plastic Index	
Maximum Dry Density		Bulk Gravity (C127)		% Absorption	
Optimum Moisture		Natural Moisture		CBR	

Notes / Deviations / References:

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Matt Moler, PE  
Technical Responsibility

Signature

Project Manager  
Position

Date

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# SIEVE ANALYSIS OF SOIL

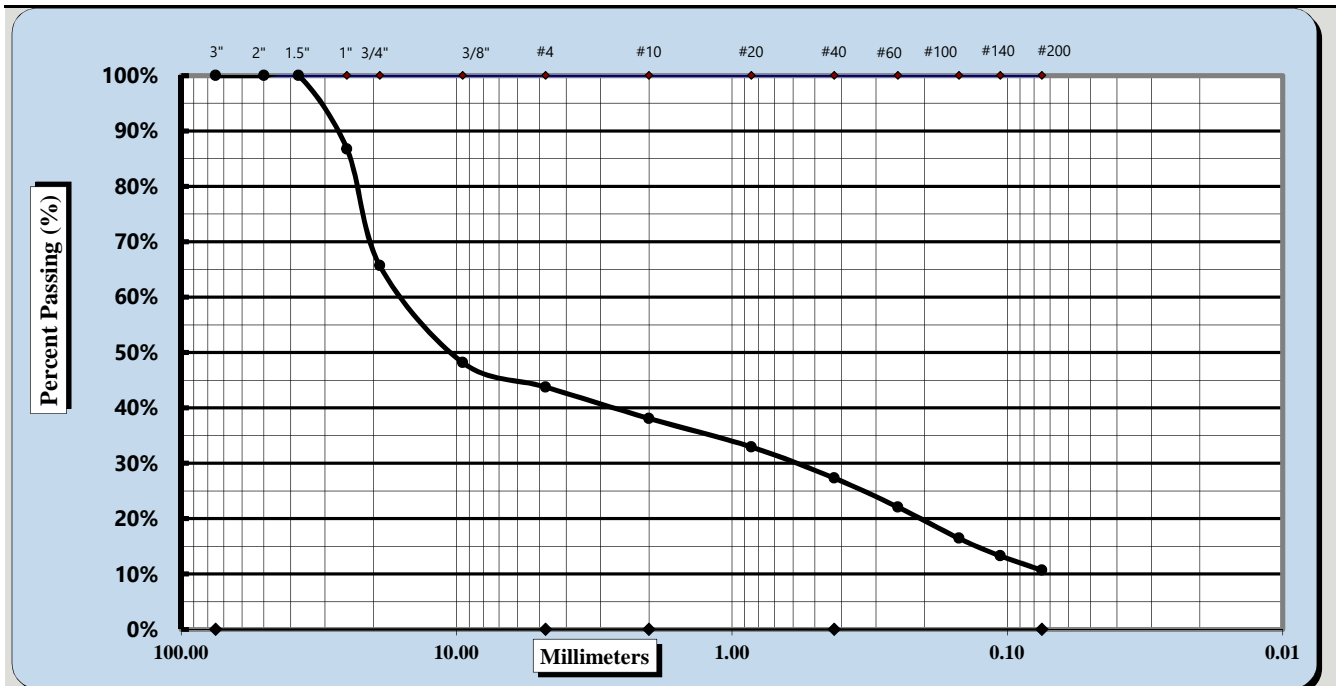


Single sieve set

ASTM D6913

S&ME, Inc. Greensboro: 8646 West Market Street, Suite 105, Greensboro, NC 27409

Project #:	7435-18-003	Record Date:	1/17/2020
Project Name:	T-072 Pipeline Blue Ridge Parkway HDD Crossing	Lab Report #:	
Client Name:		Date Received:	1/13/2020
Received By:	J. Thomasson	Sampled by:	D. Nance
Location:	BH-3.4	Date Sampled:	12/19/2019
Log/Sample Id.	SS-9	Type:	Jar
		Elev/Depth:	33.5'-35.0'
Sample Description:	Gray Brown Tan Silty Sandy Gravel		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Method:	A	Procedure for obtaining Specimen:	Moist	Dispersion Process:	ultrasonic apparatus
Maximum Particle Size	1.5"	Coarse Sand	6%	Fine Sand	17%
Gravel	56%	Medium Sand	11%	Silt & Clay	11%
Liquid Limit		Plastic Limit		Plastic Index	
Maximum Dry Density		Bulk Gravity (C127)		% Absorption	
Optimum Moisture		Natural Moisture		CBR	

Notes / Deviations / References:

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---

Matt Moler, PE

Technical Responsibility

Signature

Project Manager

Position

Date

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# Unconfined Compression

(ASTM D7012 Method C)



S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	7435-18-003	Report Date:	1/18/2020
Project Name:	T-072 Pipeline	Test Date(s)	1/16 - 1/18/2020
Client Name:	Dominion Energy		
Client Address:			

Dimensional Data					
Boring No.	BH3.1	BH3.1			
Sample Date	12/19/2019	12/19/2019			
Sample Id	RC-3	RC-4			
Depth (ft)	30.0-30.5	93.8-94.5			
Average Height (in.)	4.21	4.28			
Average Diameter (in.)	1.98	1.97			
Area (in <sup>2</sup> )	3.08	3.05			
Length to Diameter Ratio	2.13	2.17			
Mass (g)	593.8	568.6			
Unit Weight (pcf)	174.5	165.9			
Moisture Data					
Moisture (%)	0.2	0.1			
Compression Data					
Load (lbs)	12,270	90,040			
Comp. Strength (psi)	3,984	29,521			
Time	Minutes				
	Seconds	96	396		
Load Rate (psi/sec)	42	75			
Remarks: Unconfined Compressive Strength of Rock Specimen Before/After					
					

References / Comments / Deviations:

ASTM D4543: Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances.

ASTM D2216: Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

Mal Krajan  
Technical Responsibility

  
Signature

Laboratory Manager  
Position

1/18/2020  
Date

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# Unconfined Compression

(ASTM D7012 Method C)



S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	7435-18-003	Report Date:	1/9/2020
Project Name:	T-072 Pipeline	Test Date(s)	1/6 - 1/9/2020
Client Name:	Dominion Energy		
Client Address:			

Dimensional Data					
Boring No.	BH3.1	BH3.1			
Sample Date	12/19/2019	12/19/2019			
Sample Id	RC-1	RC-2			
Depth (ft)	10.4-10.9	12.0-12.7			
Average Height (in.)	4.09	4.15			
Average Diameter (in.)	1.98	1.98			
Area (in <sup>2</sup> )	3.08	3.08			
Length to Diameter Ratio	2.07	2.10			
Mass (g)	537.5	577.3			
Unit Weight (pcf)	162.5	172.1			
Moisture Data					
Moisture (%)	0.3	0.1			
Compression Data					
Load (lbs)	18,980	15,630			
Comp. Strength (psi)	6,162	5,075			
Time	Minutes				
	Seconds	126	101		
Load Rate (psi/sec)	49	50			
Remarks: Unconfined Compressive Strength of Rock Specimen Before/After					
					

References / Comments / Deviations:

ASTM D4543: Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances.

ASTM D2216: Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

**Mal Krajan**  
Technical Responsibility

  
Signature

**Laboratory Manager**  
Position

**1/9/2020**  
Date

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# Unconfined Compression

(ASTM D7012 Method C)



S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	7435-18-003	Report Date:	1/18/2020
Project Name:	T-072 Pipeline	Test Date(s)	1/16 - 1/18/2020
Client Name:	Dominion Energy		
Client Address:			

Dimensional Data					
Boring No.	BH3.2	BH3.2			
Sample Date	12/19/2019	12/19/2019			
Sample Id	RC-3	RC-4			
Depth (ft)	110.4-111.1	135.2-135.9			
Average Height (in.)	4.27	4.24			
Average Diameter (in.)	1.98	1.98			
Area (in <sup>2</sup> )	3.08	3.08			
Length to Diameter Ratio	2.16	2.14			
Mass (g)	582.6	584.6			
Unit Weight (pcf)	168.8	170.5			
Moisture Data					
Moisture (%)	0.1	0.1			
Compression Data					
Load (lbs)	29,910	22,040			
Comp. Strength (psi)	9,711	7,156			
Time	Minutes				
	Seconds	201	158		
Load Rate (psi/sec)	48	45			
Remarks: Unconfined Compressive Strength of Rock Specimen Before/After					
					

References / Comments / Deviations:

ASTM D4543: Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances.

ASTM D2216: Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

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# Unconfined Compression

(ASTM D7012 Method C)



S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	7435-18-003	Report Date:	1/9/2020
Project Name:	T-072 Pipeline	Test Date(s)	1/6 - 1/9/2020
Client Name:	Dominion Energy		
Client Address:			

Dimensional Data					
Boring No.	BH3.2	BH3.2			
Sample Date	12/19/2019	12/19/2019			
Sample Id	RC-1	RC-2			
Depth (ft)	91.2-91.7	92.7-93.2			
Average Height (in.)	4.08	4.35			
Average Diameter (in.)	1.98	1.98			
Area (in <sup>2</sup> )	3.08	3.08			
Length to Diameter Ratio	2.06	2.20			
Mass (g)	573.3	610.5			
Unit Weight (pcf)	173.8	173.6			
Moisture Data					
Moisture (%)	0.1	0.1			
Compression Data					
Load (lbs)	27,350	22,540			
Comp. Strength (psi)	8,880	7,318			
Time	Minutes				
	Seconds	195	148		
Load Rate (psi/sec)	46	49			
Remarks: Unconfined Compressive Strength of Rock Specimen Before/After					
					

References / Comments / Deviations:

ASTM D4543: Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances.

ASTM D2216: Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

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**1/9/2020**  
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# Unconfined Compression

(ASTM D7012 Method C)



S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	7435-18-003	Report Date:	1/18/2020
Project Name:	T-072 Pipeline	Test Date(s)	1/16 - 1/18/2020
Client Name:	Dominion Energy		
Client Address:			

Dimensional Data					
Boring No.	BH3.3	BH3.3			
Sample Date	12/19/2019	12/19/2019			
Sample Id	RC-3	RC-4			
Depth (ft)	110.0-110.9	134.0-134.7			
Average Height (in.)	4.27	4.27			
Average Diameter (in.)	1.98	1.98			
Area (in <sup>2</sup> )	3.08	3.08			
Length to Diameter Ratio	2.16	2.16			
Mass (g)	600.7	605.7			
Unit Weight (pcf)	174.0	175.5			
Moisture Data					
Moisture (%)	0.2	0.1			
Compression Data					
Load (lbs)	11,800	13,010			
Comp. Strength (psi)	3,831	4,224			
Time	Minutes				
	Seconds	79	96		
Load Rate (psi/sec)	48	44			
Remarks: Unconfined Compressive Strength of Rock Specimen Before/After					
					

References / Comments / Deviations:

ASTM D4543: Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances.

ASTM D2216: Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

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# Unconfined Compression

(ASTM D7012 Method C)



S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	7435-18-003	Report Date:	1/9/2020
Project Name:	T-072 Pipeline	Test Date(s)	1/6 - 1/9/2020
Client Name:	Dominion Energy		
Client Address:			

Dimensional Data					
Boring No.	BH3.3	BH3.3			
Sample Date	12/19/2019	12/19/2019			
Sample Id	RC-1	RC-2			
Depth (ft)	120.4-120.9	122.5-123.0			
Average Height (in.)	4.10	4.23			
Average Diameter (in.)	1.99	1.99			
Area (in <sup>2</sup> )	3.11	3.11			
Length to Diameter Ratio	2.06	2.13			
Mass (g)	573.4	573.0			
Unit Weight (pcf)	171.3	165.9			
Moisture Data					
Moisture (%)	0.1	0.1			
Compression Data					
Load (lbs)	13,540	11,230			
Comp. Strength (psi)	4,354	3,611			
Time	Minutes				
	Seconds	89	75		
Load Rate (psi/sec)	49	48			
Remarks: Unconfined Compressive Strength of Rock Specimen Before/After					
					

References / Comments / Deviations:

ASTM D4543: Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances.

ASTM D2216: Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

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Laboratory Manager  
Position

1/9/2020  
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# Unconfined Compression

(ASTM D7012 Method C)



S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	7435-18-003	Report Date:	1/18/2020
Project Name:	T-072 Pipeline	Test Date(s)	1/16 - 1/18/2020
Client Name:	Dominion Energy		
Client Address:			

Dimensional Data					
Boring No.	BH3.4	BH3.4			
Sample Date	12/19/2019	12/19/2019			
Sample Id	RC-1	RC-2			
Depth (ft)	63.9-64.8	74.8-75.5			
Average Height (in.)	4.21	4.29			
Average Diameter (in.)	1.98	1.99			
Area (in <sup>2</sup> )	3.08	3.11			
Length to Diameter Ratio	2.13	2.16			
Mass (g)	596.7	594.9			
Unit Weight (pcf)	175.3	169.9			
Moisture Data					
Moisture (%)	0.2	0.1			
Compression Data					
Load (lbs)	10,200	39,450			
Comp. Strength (psi)	3,312	12,685			
Time	Minutes				
	Seconds	69	231		
Load Rate (psi/sec)	48	55			
Remarks: Unconfined Compressive Strength of Rock Specimen Before/After					
					

References / Comments / Deviations:

ASTM D4543: Practices for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerances.

ASTM D2216: Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

Mal Krajan  
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Signature

Laboratory Manager  
Position

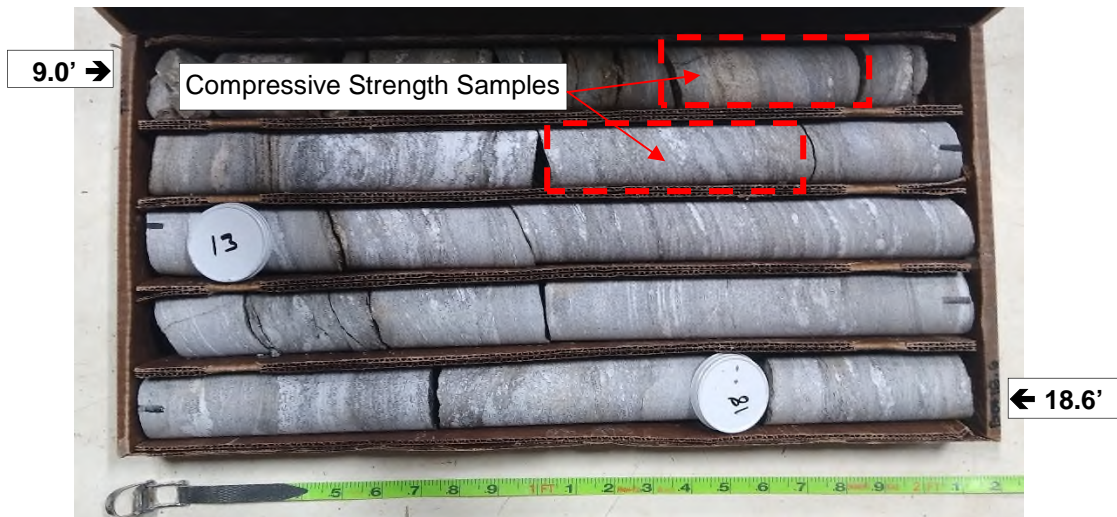
1/18/2020  
Date

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### Rock Core Photo Log

Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 18.6 feet	Total Run: 9.6 feet



Box 1 of 10  
 Top of Box @ 9.0 Feet; Bottom of Box @ 18.6 Feet

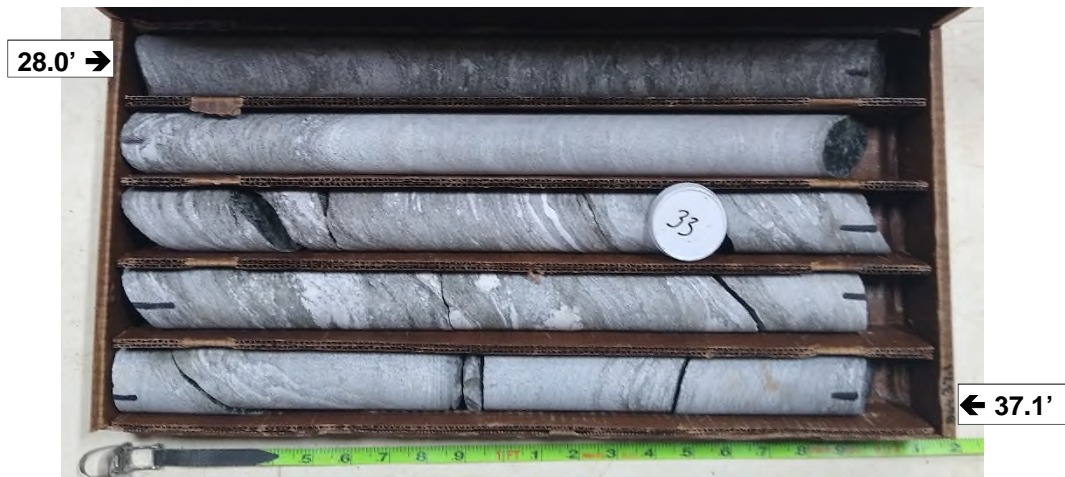
Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 28.0 feet	Total Run: 9.4 feet



Box 2 of 10  
 Top of Box @ 18.6 Feet; Bottom of Box @ 28.0 Feet

### Rock Core Photo Log

Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 37.1 feet	Total Run: 9.1 feet



Box 3 of 10  
 Top of Box @ 28.0 Feet; Bottom of Box @ 37.1 Feet

Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 46.9 feet	Total Run: 9.8 feet



Box 4 of 10  
 Top of Box @ 37.1 Feet; Bottom of Box @ 46.9 Feet



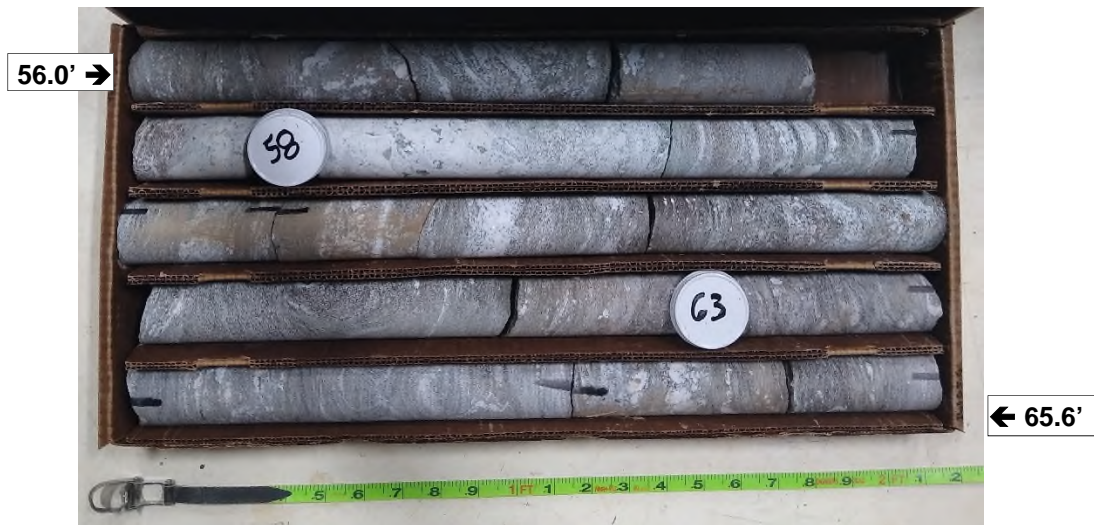
### Rock Core Photo Log

Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 56.0 feet	Total Run: 9.1 feet



Box 5 of 10  
 Top of Box @ 46.9 Feet; Bottom of Box @ 56.0 Feet

Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 65.6 feet	Total Run: 9.6 feet



Box 6 of 10  
 Top of Box @ 56.0 Feet; Bottom of Box @ 65.6 Feet



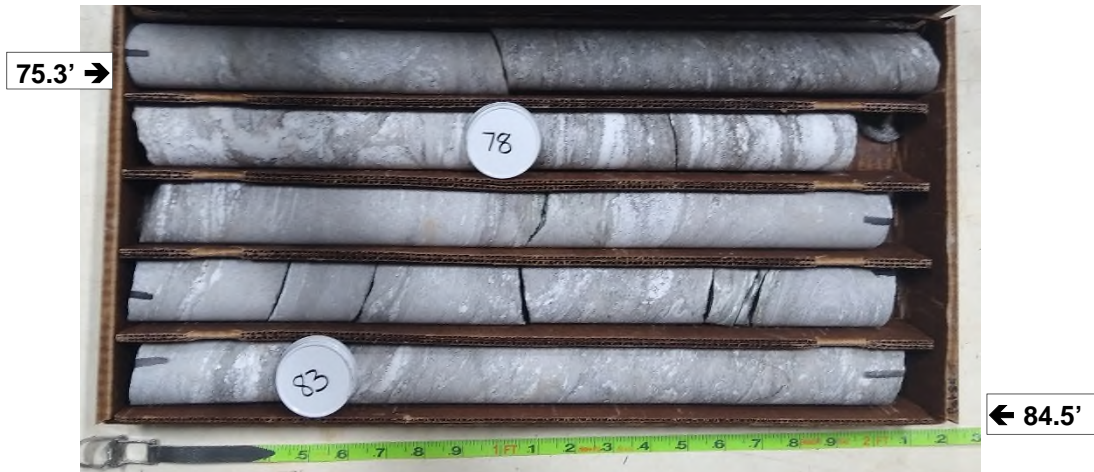
### Rock Core Photo Log

Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 75.3 feet	Total Run: 9.7 feet



Box 7 of 10  
 Top of Box @ 65.6 Feet; Bottom of Box @ 75.3 Feet

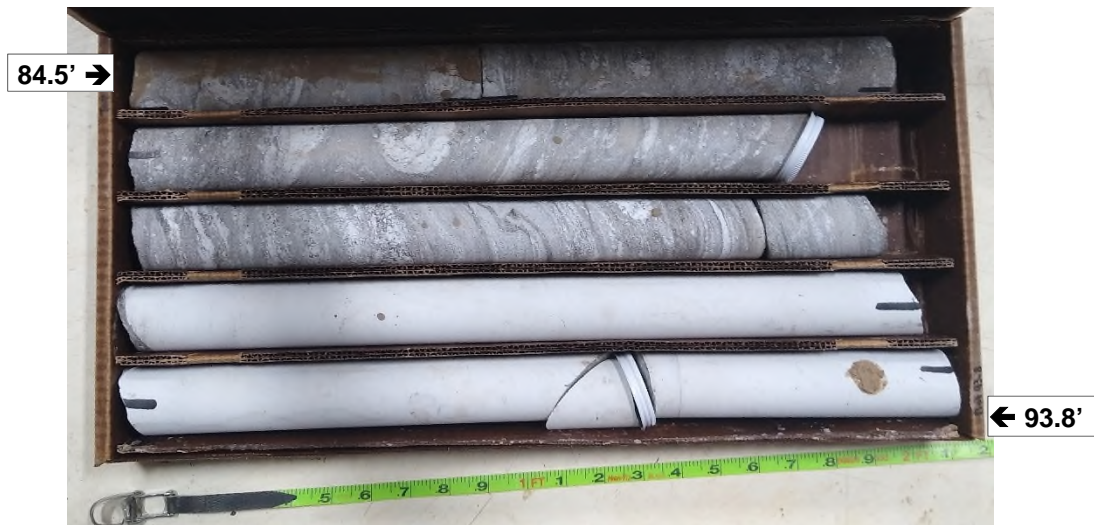
Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 84.5 feet	Total Run: 9.2 feet



Box 8 of 10  
 Top of Box @ 75.3 Feet; Bottom of Box @ 84.5 Feet

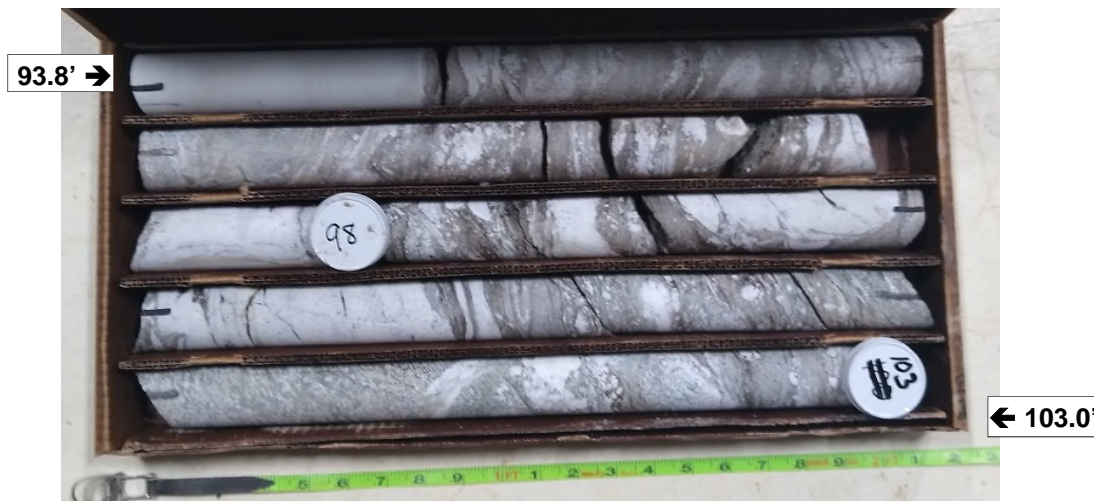
### Rock Core Photo Log

Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 93.8 feet	Total Run: 9.3 feet



Box 9 of 10  
 Top of Box @ 84.5 Feet; Bottom of Box @ 93.8 Feet

Boring No.: BH-3.1	Date: 12/19/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 103.0 feet	Total Run: 9.3 feet



Box 10 of 10  
 Top of Box @ 93.8 Feet; Bottom of Box @ 103.0 Feet



### Rock Core Photo Log

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 103.0 feet	Total Run: 9.1 feet



Box 1 of 14  
 Top of Box @ 8.5 Feet; Bottom of Box @ 17.6 Feet

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 28.5 feet	Total Run: 10.9 feet

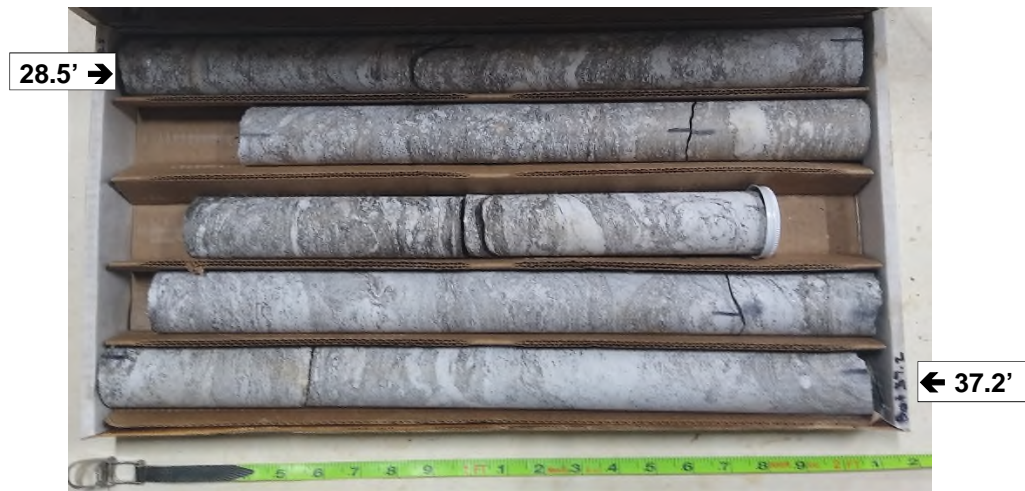


Box 2 of 14  
 Top of Box @ 17.6 Feet; Bottom of Box @ 28.5 Feet



### Rock Core Photo Log

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 37.2 feet	Total Run: 8.7 feet



Box 3 of 14  
 Top of Box @ 28.5 Feet; Bottom of Box @ 37.2 Feet

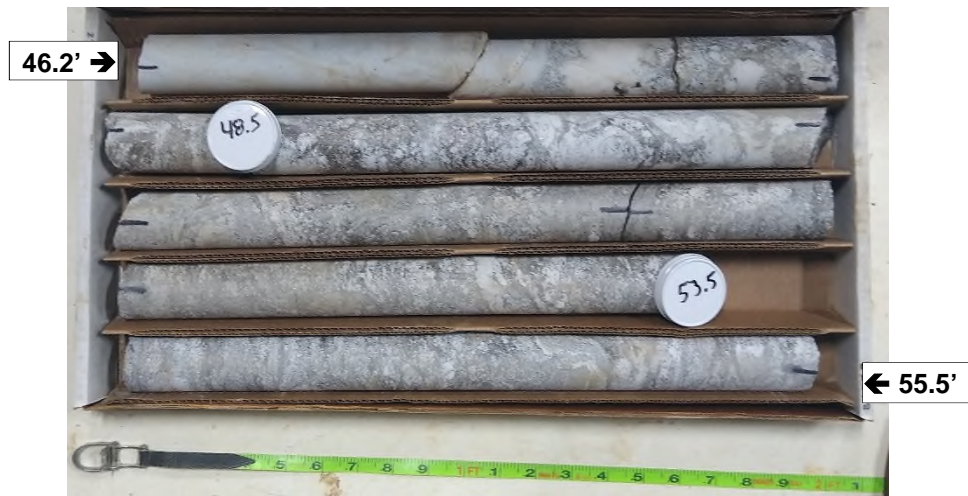
Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 46.2 feet	Total Run: 9.0 feet



Box 4 of 14  
 Top of Box @ 37.2 Feet; Bottom of Box @ 46.2 Feet

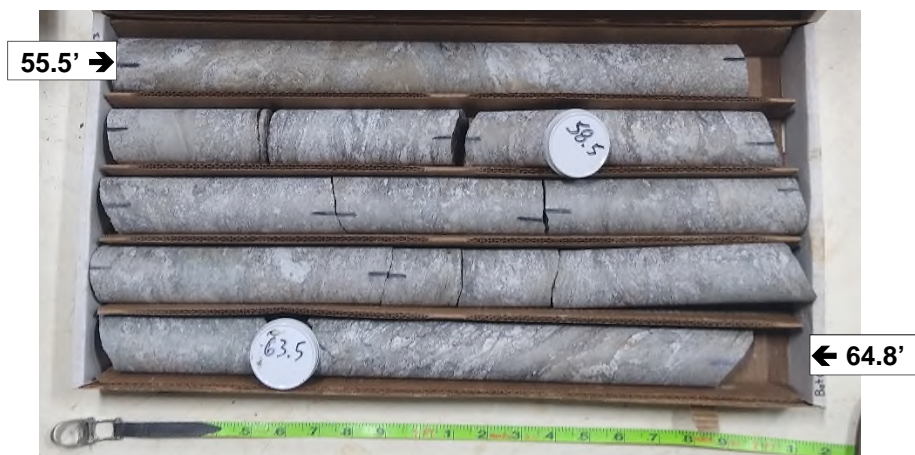
### Rock Core Photo Log

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 55.5 feet	Total Run: 9.3 feet



Box 5 of 14  
 Top of Box @ 46.2 Feet; Bottom of Box @ 55.5 Feet

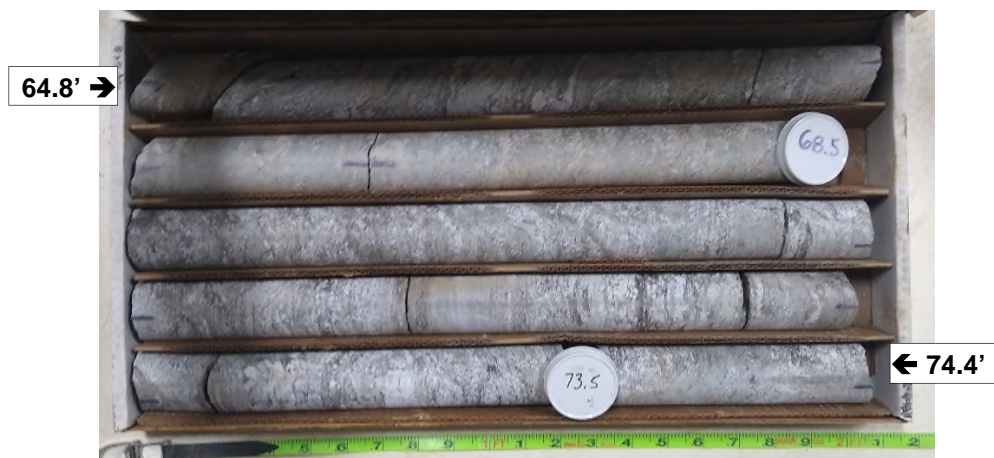
Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 64.8 feet	Total Run: 9.3 feet



Box 6 of 14  
 Top of Box @ 55.3 Feet; Bottom of Box @ 64.8 Feet

## Rock Core Photo Log

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 74.4 feet	Total Run: 9.6 feet



Box 7 of 14  
 Top of Box @ 64.8 Feet; Bottom of Box @ 74.4 Feet

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 83.5 feet	Total Run: 9.1 feet

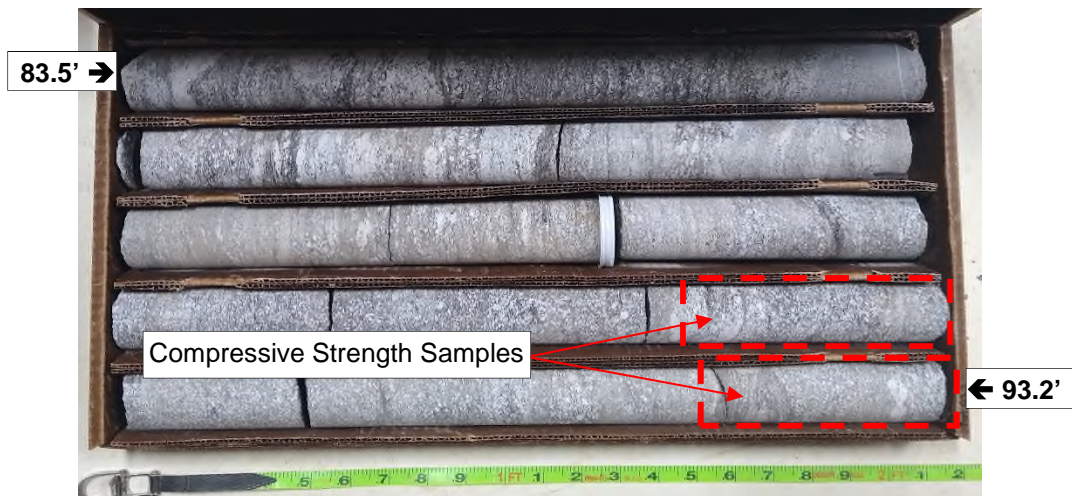


Box 8 of 14  
 Top of Box @ 74.4 Feet; Bottom of Box @ 83.5 Feet



## Rock Core Photo Log

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 93.2 feet	Total Run: 9.7 feet



Box 9 of 14  
 Top of Box @ 83.5 Feet; Bottom of Box @ 93.2 Feet

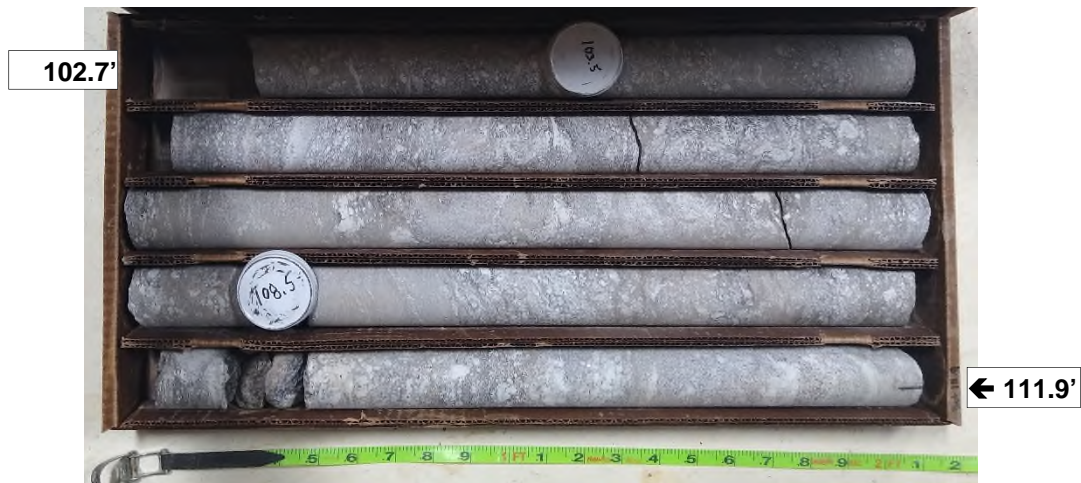
Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 102.7 feet	Total Run: 9.5 feet



Box 10 of 14  
 Top of Box @ 93.2 Feet; Bottom of Box @ 102.7 Feet

### Rock Core Photo Log

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 111.9 feet	Total Run: 9.2 feet



Box 11 of 14  
 Top of Box @ 102.7 Feet; Bottom of Box @ 111.9 Feet

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 121.0 feet	Total Run: 9.1 feet



Box 12 of 14  
 Top of Box @ 111.9 Feet; Bottom of Box @ 121.0 Feet



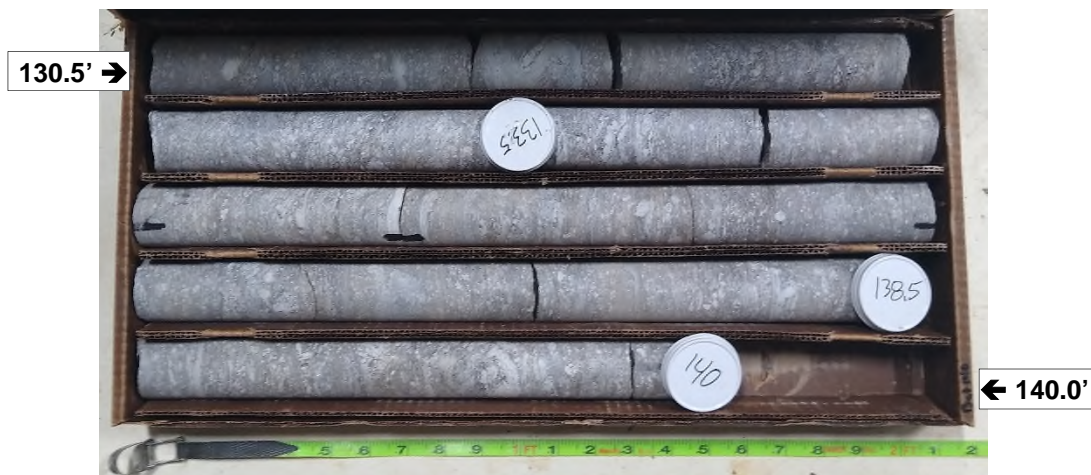
## Rock Core Photo Log

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 130.5 feet	Total Run: 9.5 feet



Box 13 of 14  
 Top of Box @ 121.0 Feet; Bottom of Box @ 130.5 Feet

Boring No.: BH-3.2	Date: 12/16/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 140.0 feet	Total Run: 9.5 feet

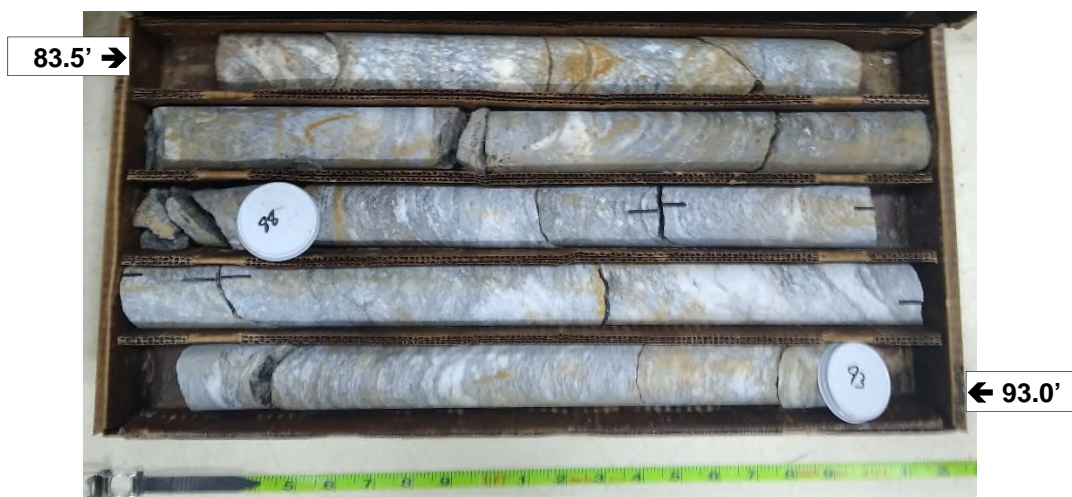


Box 14 of 14  
 Top of Box @ 130.5 Feet; Bottom of Box @ 140.0 Feet



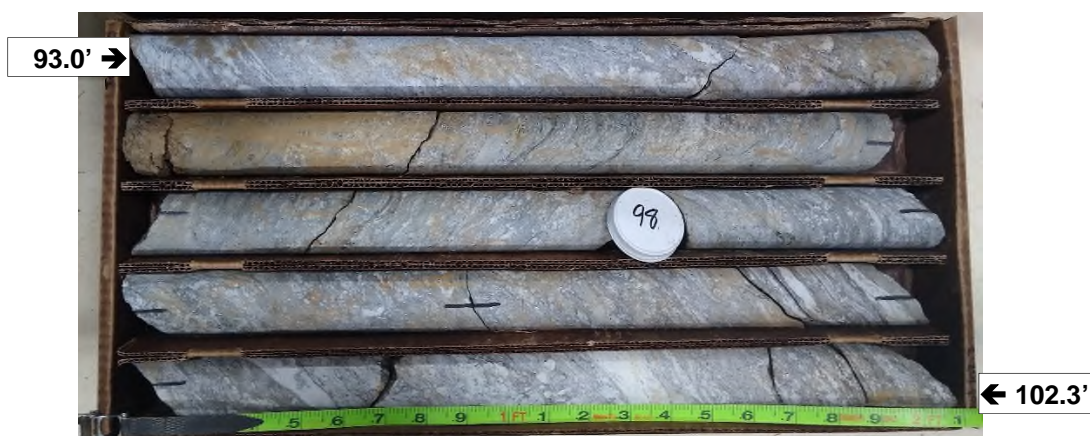
### Rock Core Photo Log

Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 93.0 feet	Total Run: 9.5 feet



Box 1 of 10  
 Top of Box @ 83.5 Feet; Bottom of Box @ 93.0 Feet

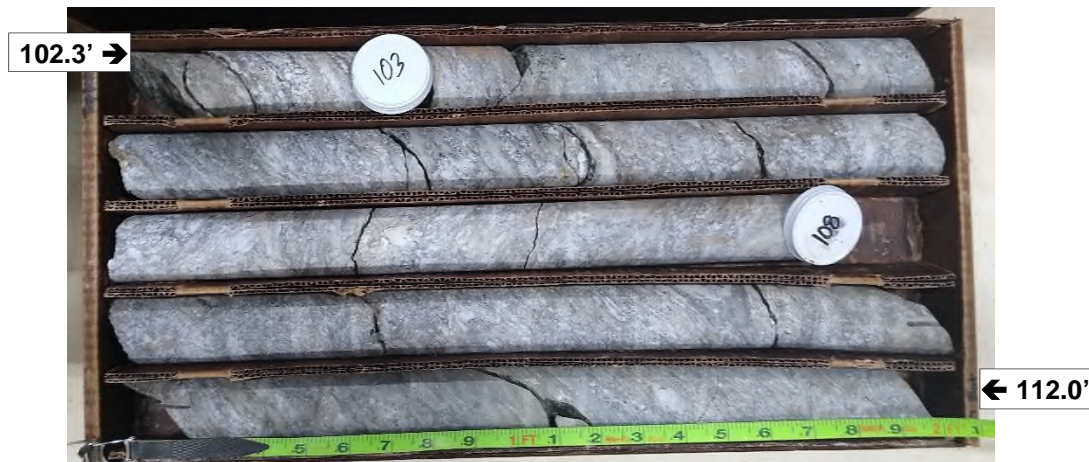
Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 102.3 feet	Total Run: 9.3 feet



Box 2 of 10  
 Top of Box @ 93.0 Feet; Bottom of Box @ 102.3 Feet

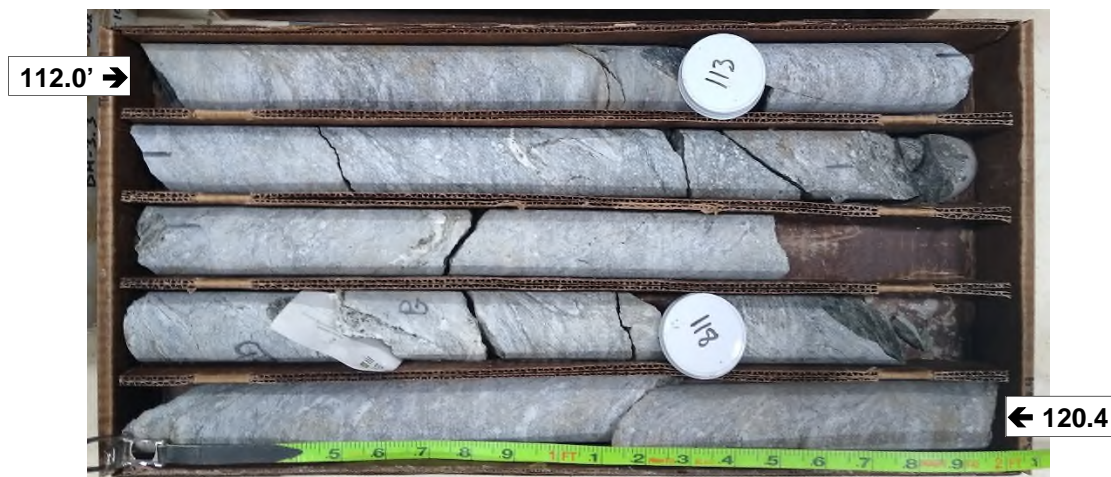
### Rock Core Photo Log

Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 112.0 feet	Total Run: 9.7 feet



Box 3 of 10  
 Top of Box @ 102.3 Feet; Bottom of Box @ 112.0 Feet

Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 120.4 feet	Total Run: 8.4 feet

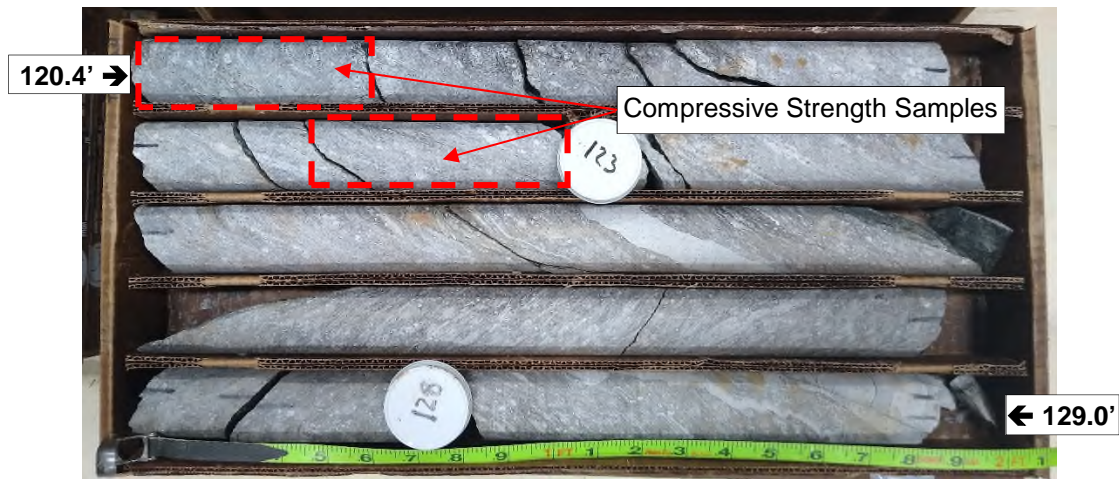


Box 4 of 10  
 Top of Box @ 112.0 Feet; Bottom of Box @ 120.4 Feet



### Rock Core Photo Log

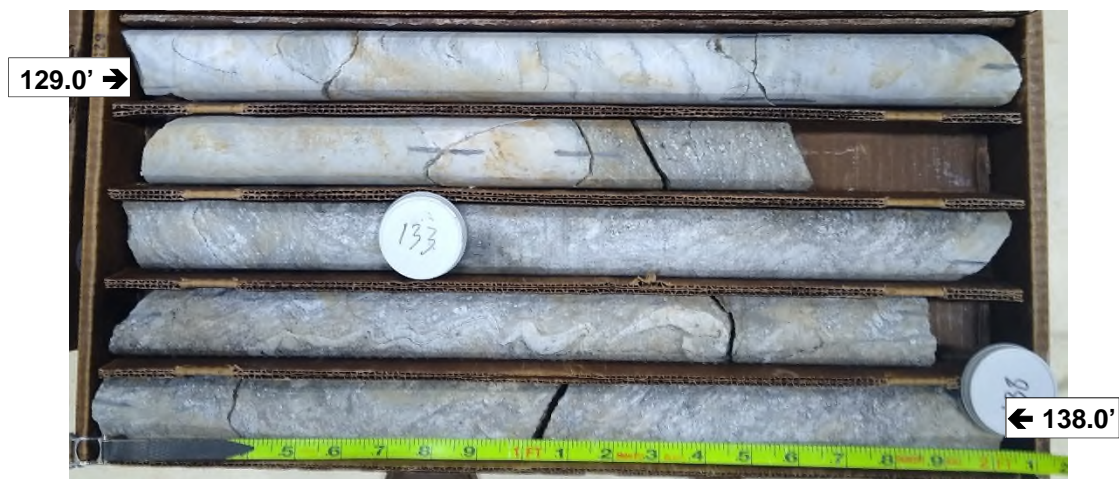
Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 129.0 feet	Total Run: 8.5 feet



Box 5 of 10

Top of Box @ 120.5 Feet; Bottom of Box @ 129.0 Feet

Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 138.0 feet	Total Run: 9.0 feet



Box 6 of 10

Top of Box @ 129.0 Feet; Bottom of Box @ 138.0 Feet



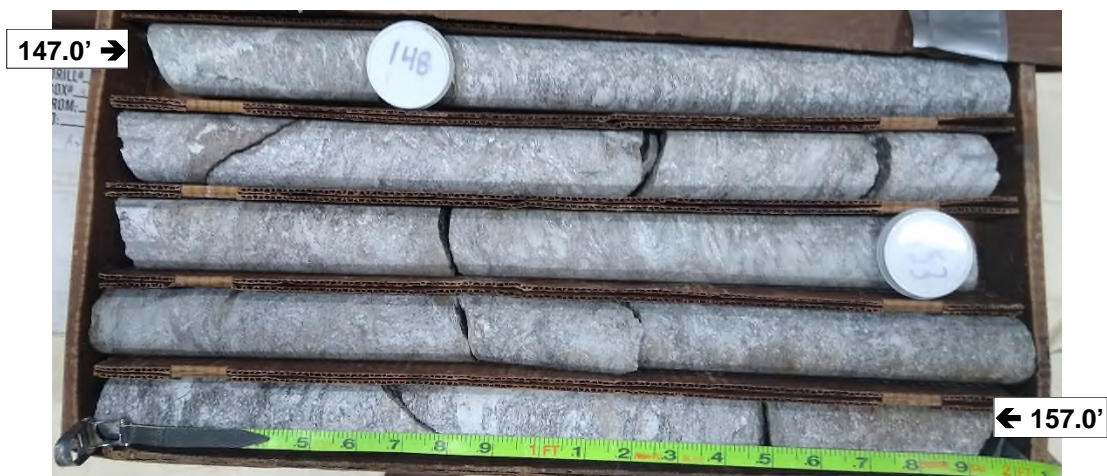
### Rock Core Photo Log

Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 147.0 feet	Total Run: 9.0 feet



Box 7 of 10  
 Top of Box @ 138.0 Feet; Bottom of Box @ 147.0 Feet

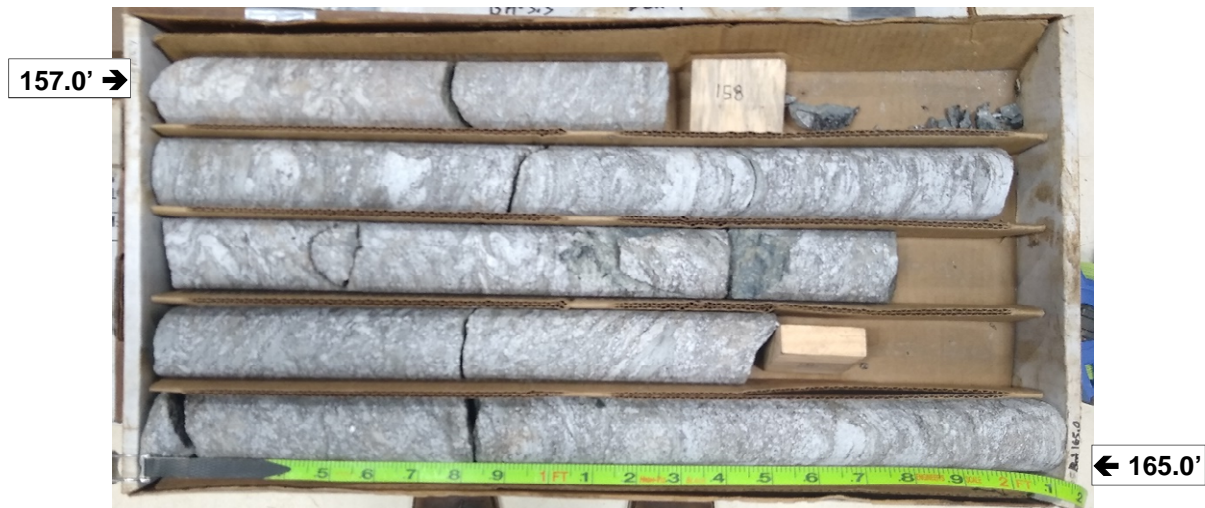
Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 157.0 feet	Total Run: 10.0 feet



Box 8 of 10  
 Top of Box @ 147.0 Feet; Bottom of Box @ 157.0 Feet

### Rock Core Photo Log

Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 165.0 feet	Total Run: 8.0 feet



Box 9 of 10  
 Top of Box @ 157.0 Feet; Bottom of Box @ 165.0 Feet

Boring No.: BH-3.3	Date: 12/11/2019	Driller: B. Blizzard	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 168.0 feet	Total Run: 3.0 feet



Box 10 of 10  
 Top of Box @ 165.0 Feet; Bottom of Box @ 168.0 Feet



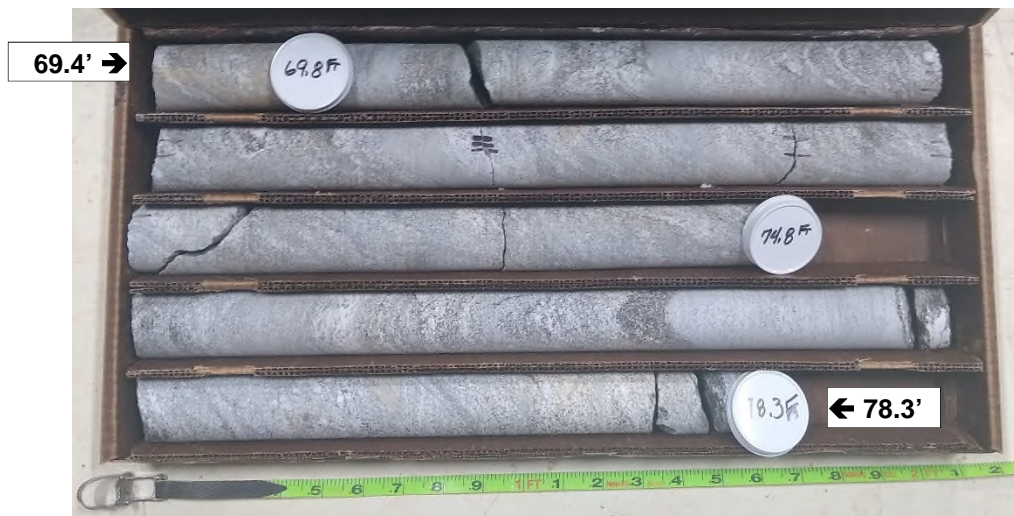
### Rock Core Photo Log

Boring No.: BH-3.4	Date: 12/18/2019	Driller: J. Marlowe	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 69.4 feet	Total Run: 9.6 feet



Box 1 of 2  
 Top of Box @ 59.8 Feet; Bottom of Box @ 69.4 Feet

Boring No.: BH-3.4	Date: 12/18/2019	Driller: J. Marlowe	Geologist: P. Gunnell
Equipment: D-50	Core Size: NQ	Total Depth: 78.3 feet	Total Run: 8.9 feet



Box 2 of 2  
 Top of Box @ 69.4 Feet; Bottom of Box @ 78.3 Feet