U.S. Department of Agriculture
Rural Utilities Service

HOLLAND CLIFF – HEWITT ROAD
230 kV TRANSMISSION LINE PROJECT

ENVIRONMENTAL ASSESSMENT

Prepared by:

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for:

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MD

B&V Project 146026(G)
B&V File 32.0201

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Acronyms and Abbreviations

%	Percent
§	Section
AAC	All Aluminum Conductors
ACSR	Aluminum Conductor Steel Reinforced
APP	Avian Protection Plan
ARPA	Archeological Resources Protection Act of 1979
BER	Borrower's Environmental Report
BGEPA	Bald and Golden Eagle Protection Act
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
C	Celsius
CBCA	Chesapeake Bay Critical Area
CFR	Code of Federal Regulations
CMH	Calvert Memorial Hospital
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COMAR	Code of Maryland Regulations
CPCN	Certificate of Public Convenience and Necessity
CZMA	Coastal Zone Management Act of 1972, as amended
dBA	A-weighted Decibels
EA	Environmental Assessment
EMF	Electric and Magnetic Fields
EMS	Emergency Medical Service
ESA	Endangered Species Act of 1973, as amended
F	Fahrenheit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FR	Federal Register
FTB	Fluidized Thermal Backfill
GIS	Gas Insulated Substations
HDD	horizontal directional drill
Hz	Hertz
kcmil	Thousand Circular Mil
KDCA	Ronald Reagan Washington National Airport
kph	Kilometers Per Hour

kV	Kilovolt
kV/M	Kilovolts per Meter
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
MCM	Thousand Circular Mils
MD	Maryland
MDE	Maryland Department of Environment
MDNR	Maryland Department of Natural Resources
MG	Milligauss (one thousandth of a gauss)
mgd	Million Gallons Per Day
mph	Miles Per Hour
MSHA	Maryland State Highway Administration
MVA	Megavolt Amperes
MW	megawatt
MWH	megawatt-hour
NEPA	National Environmental Policy Act of 1969, as amended
NHPA	National Historic Preservation Act of 1966, as amended
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRC	Navy Recreation Center
NRCS	Natural Resources Conservation Service
OPGW	Optical Fiber Ground Wire
PEPCO	Potomac Electric Power Company
PM	Particulate Matter
PPRP	Power Plant Research Program
PSC	Public Service Commission
PSI	Pounds per square inch
PUC	Public Utilities Company
PVC	Polyvinyl Chloride
ROW	right-of-way, also rights-of-way
RUS	USDA, Rural Utilities Service
SHA	State Highway Administration
SMECO	Southern Maryland Electric Cooperative
SO_x	Sulfur Oxides
TDR	Transferable Development Rights
TL	Transmission Line

U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Survey
USGS	U.S. Geological Survey
VO_x	Volatile Organics
VOC	Volatile Organic Compounds

Executive Summary

Southern Maryland Electric Cooperative, Inc. ("SMECO" or "Cooperative") is proposing to construct (1) a new 230 kilovolt (kV) double circuit transmission line from SMECO's Holland Cliff switching station in northern Calvert County, Maryland to the SMECO Hewitt Road switching station in St. Mary's County, Maryland and (2) a new 230/69 kV switching station in southern Calvert County (the "Project"). This switching station would be connected to the new transmission line and located between the Holland Cliff and Hewitt Road switching stations near the existing SMECO Calvert Cliffs 69 kV transmission line tap, near the intersection of Pardoe Road and Maryland State Highway 2/4. The Project is proposed to meet the growth in electrical energy demands and improve system reliability within SMECO's service area. The Project is an expansion of SMECO's existing 230 kV system and would provide a 230 kV loop through SMECO's service area.

Because SMECO may apply for funding for the Project from the United States Department of Agriculture's Rural Utilities Service (RUS), the requirements of 7 Code of Federal Regulation (CFR) Part 1794 (Rule) may apply. The Rule contains the policies and procedures of RUS for implementing the requirements of the National Environmental Policy Act of 1969 (NEPA). SMECO's Project is considered a "proposal" under the Rule that is subject to the applicable requirements of the Rule.

Because the Project involves a 230 kV transmission line with a length of more than 25 miles (40.2 kilometers), it is subject to Section 1794.24 of the Rule, which addresses proposals normally requiring an environmental assessment (EA) with scoping. The procedures for scoping EAs are described in Sections 1794.50 through 1794.54 of the Rule. Section 1794.53 states that RUS shall require the applicant (borrower) to develop and submit an environmental report. This document is the borrower's environmental report (BER) and is intended to serve as RUS's EA for the Project.

The BER must address the need for the Project, the alternatives that were considered, Project engineering design features, the potential impacts of the Project on the existing environment, and the efforts made to inform the public of the Project.

The Project is needed to support the increasing system demand and ensure a reliable electric system for the Cooperative's customer-members. Because the demand for electricity is continually increasing on the SMECO system, there is a need to improve the transmission system to ensure continued reliability.

Southern Maryland is the fastest growing region in the state, the SMECO customer base has doubled since 1986, and the annual electricity demand has more than doubled from 331 MW in 1986 to 845 MW in 2006. Energy sales have also more than doubled, from 1,403,757 MWH in 1986 to 3,260,036 MWH in 2006. In January 2005, a two-mile 69 kV submarine cable in the lower Patuxent River near the Thomas Johnson Bridge failed. Restoring service to southern Calvert County required 69 kV transmission circuits from northern Calvert County to supply power over 21 miles (33.8 kilometers) on one of the coldest days of the year. SMECO's electrical system studies indicate that there will be insufficient capacity to restore service in this manner by 2015. The Project would provide the energy source required to eliminate this issue.

SMECO's electrical system studies also confirm that the existing SMECO 69 kV and 230 kV electric transmission infrastructure, including the 230/69 kV Holland Cliff switching station presently being constructed, is adequate to handle expected peak system loads in northern Calvert County under normal conditions until 2015. However, these same studies reveal that there are four potential transmission line outage contingency situations if the Project is not completed by the end of 2015. All four outage contingency concerns are eliminated when the Project infrastructure is operational.

Summary of Environmental Assessment

Overall, the project is anticipated to have minimal impacts on the environment, primarily because more than 90% of the project would be constructed on existing rights-of-way. However, no infrastructure project is without environmental impacts and those anticipated for this project are summarized here.

Air quality impacts result primarily from construction activities. During construction, atmospheric dust (particulate matter) would be generated from the mechanical disturbance of granular material that becomes exposed to the wind at the construction site. Construction activities, including material moving activities, site preparation, and vehicle traffic, all have the potential to generate fugitive dust. For this reason, fugitive dust control methods would be used to minimize the release of dust.

Air quality impacts would also result from the operation of construction equipment's internal combustion. Typically, the types of equipment used for construction projects will release NOx, sulfur oxides (SOx), Carbon Monoxide (CO), Carbon Dioxide (CO_2), particulate matter (PM) $_{10}$, $PM_{2.5}$ and other combustion products. However, these emissions are temporary and would cease upon the completion of the Project. Therefore, the air quality impacts associated with this Project are expected to be minimal and limited primarily to the immediate construction area.

Air quality impacts associated with the operation of the new line would be limited to right-of-way clearing activities, which require the use of gasoline-powered mowers, hand-held power tools, and the vehicles needed to transport them.

The effects of the Project on the physiography of the area would be minimal. More than 95% of the length of the Project would be on already disturbed right-of-way and, with the exception of switching station construction and the river crossing, structure placement would be the primary construction activity. The soils in the area are suitable for construction of this Project and the local topography would be left as is with the exception of grading for the new Sollers Wharf switching station. Soils excavated in the construction areas would be used in the same construction area to the extent that is possible to maintain construction integrity and without adversely affecting slopes and grading. The rest would be hauled off.

Potential impacts to rivers, streams, wetlands, and coastal areas, in the absence of mitigation measures, would include runoff of loosened soil into these water bodies. The resulting sedimentation could cause a shift in water quality and changes in aquatic species composition. To eliminate or at least mitigate potential impacts, erosion control using appropriate Best Management Practices would be employed and maintained to restrict soil movement into wetlands or streams.

Impacts to vegetation, fish and wildlife, and threatened and endangered species can be anticipated in the absence of proper construction mitigation measures. The primary effects on vegetation arise from construction access by construction equipment. These impacts are temporary since pre-construction conditions would be restored following construction to the extent possible. Best Management Practices that limit the extent of disturbance would be used to limit long-term damage to vegetation.

Fish and other aquatic wildlife may be adversely affected, in the absence of mitigative measures, by soil erosion if soil is disturbed near streams or wetlands. Resulting changes in water quality could diminish intolerant species populations and allow undesirable or invasive species to become established. Again, the use of Best Management Practices to prevent soil erosion and runoff to streams would be used to minimize impacts.

Finally, impacts to threatened and endangered species could result from habitat disturbance, construction noise and traffic, and soil disturbance. Therefore, mitigative construction activities would include the avoidance of irreversible impacts to suitable habitat in all locations where these species may be found.

Table ES-1 provides a summary of potential impacts and the mitigative measures to be employed to minimize them.

Table ES-1
Project Construction and Operations Mitigation Summary

Affected Environment	Construction Phase Mitigative Measures	Operations Phase Mitigative Measures
Air Quality	Mitigative measures would include dust control methods such as watering and limiting most soil disturbance on right-of–way to pole locations.	Specifications for maintenance of rights-of-way would be submitted to the Public Service Commission and Power Plant Research Program for their review.
Physiography	Soils excavated in construction areas would be used in the same construction area to the extent possible without adversely affecting slopes and grading. The rest would be hauled off.	Specifications for maintenance of rights-of-way would be submitted to the Public Service Commission and Power Plant Research Program for their review.
Water Bodies	New poles would be placed on high ground on either side of a ravine, away from stream or wetland areas when possible. Matting would be used to prevent damage to wetlands that need to be crossed to access right-of-way. Best Management Practices would be used to limit soil disturbances and areas of temporary impacts would be restored as required by the Maryland Department of the Environment.	Specifications for maintenance of rights-of-way would be submitted to the Public Service Commission and Power Plant Research Program for their review. These would include measures for erosion and sediment control whenever soil disturbance takes place.
Vegetation	Restoration from temporary impacts in the right-of-way would include restoration of contours to pre-construction conditions and maintenance of erosion control Best Management Practices until revegetation stabilizes the disturbed areas. Revegetation would be completed as required by the Maryland Department of the Environment.	Specifications for maintenance of rights-of-way would be submitted to the Public Service Commission and Power Plant Research Program for their review.
Fish and Wildlife	Pre-construction conditions would be restored to the extent possible after construction and appropriate native vegetation re-established to provide soil stabilization and to prevent wildlife habitat degradation. Crossing of the Patuxent River would be done using horizontal directional drilling under the river bottom. Other streams would be spanned.	No additional mitigative measures are anticipated during operation of the line.

Table ES-1 (Continued)
Project Construction and Operations Mitigation Summary

Affected Environment	Construction Phase Mitigative Measures	Operations Phase Mitigative Measures
Threatened and Endangered Species	Mitigation includes avoidance of irreversible impacts to suitable habitat and is intended to prevent loss of subject species. Removal of trees would be minimal along the route and minimized for the new substation to the number necessary for the substation site and grading requirements plus a buffer.	Specifications for maintenance of rights-of-way would be submitted to the Public Service Commission and Power Plant Research Program for their review. The right-of-way would be maintained to allow woody shrubs and small trees to grow along with dominant tall, native grasses and other forbs. A limited schedule would be used for applying herbicides and mowing on an as needed basis to accomplish the desired habitat, while allowing for adequate access. Grasses and other forbs would be maintained at a minimum height of 10 inches during the breeding season for forest interior dwelling birds.

1.0 Introduction

This document constitutes the BER that SMECO has developed to meet RUS's EA requirements. Its structure is intended to provide the reader with a logical progression through all of the issues that must be addressed for the Project. There are several specialized reports that appear in their entirety in the appendices and are summarized in the main body of the report. These specialized reports deal with the evaluation of alternatives to the Project, the macro-corridor study, cultural resources in the Project area, electric and magnetic fields, socioeconomics, and the proposed transmission line crossing of the Patuxent River.

Section 2.0 provides a Project overview that addresses the need for the Project and describes the design of the proposed facilities. Section 3.0 addresses the alternatives considered in lieu of the proposed Project and the reasons why they were rejected or deemed not preferable. Section 4.0 contains a description of the existing environment in the Project area and the effects that the Project may have to that environment. Section 5.0 provides a description of the efforts made by RUS and SMECO to inform the public and regulatory agencies about the Project. Section 6.0 contains a summary of filing requirements for this BER and for the application to the Public Service Commission of Maryland (PSC) for the required Certificate of Public Convenience and Necessity (CPCN). Section 7.0 contains a list of the resources that were used to support the development of this BER. A list of acronyms and abbreviations used in this BER is provided immediately after the table of contents.

Care was taken to address all of the topics that are required for consideration under the Part 1794 Rule. RUS Bulletins 1794A-601, *Guide for Preparing an Environmental Report for Electric Projects Requiring an Environmental Assessment* and 1794A-603, *Scoping Guide for RUS Funded Projects Requiring Environmental Assessments with Scoping and Environmental Impact Statements* were used to provide additional guidance in the development of this report.

2.0 Project Overview

SMECO is an unaffiliated electric transmission and distribution cooperative headquartered approximately 25 miles (40.2 kilometers) southeast of Washington D.C. in Hughesville, Maryland. SMECO presently serves more than 140,000 customer-members throughout Calvert, St. Mary's, Charles, and southern Prince George's counties in southern Maryland.

The Project is an expansion of SMECO's existing 230 kV system, and it provides for long-term growth and system reliability. The Project is needed to solve several short- and long-term concerns regarding the supply of normal electric loads and outage contingency loads. These issues affect SMECO's ability to continue to reliably serve its customer-members in the most efficient and cost-effective manners possible. The system demand and system reliability issues addressed by the Project are discussed further in the Project Need section of this document.

There are four generating plants located in SMECO's service area: Chalk Point Generating Station, Morgantown Generating Station, Calvert Cliffs Nuclear Power Plant, and the Panda-Brandywine Cogeneration Plant. Chalk Point (2,417 MW) and Morgantown (1,492 MW) are coal, oil, gas, and steam plants owned by Mirant. Calvert Cliffs Nuclear Power Plant (1,735 MW) is owned by Constellation Energy. A natural gas-fired combined cycle plant with a capacity of 230 MW, owned by Panda-Brandywine, is located in southern Prince George's County.

SMECO has 3,688 miles (5,935 kilometers) of overhead distribution lines, 5,815 miles (9,358 kilometers) of underground distribution lines, and 394 miles (634 kilometers) of transmission lines. SMECO's transmission system is primarily energized at 69 kV. Figure 2-1 illustrates SMECO's proposed 230 kV Holland Cliff to Hewitt Road transmission line Project.

SMECO has reviewed many options to address the need for additional capacity throughout its system and locally within Calvert County, as well as options to improve reliability in Calvert and St. Mary's counties. These alternatives are described in detail in Section 3.0, Project Alternatives.

A separate but related project involves the installation of 230 kV conductors on existing structures from Aquasco to Holland Cliff. This project was approved for construction by the PSC in 1976 through issuance of a CPCN. In 1986, SMECO completed the installation of single tubular steel poles with two sets of vertically configured circuit arms and installed 69 kV conductors on one set of circuit arms. This new line was energized at 69 kV and the installation of 230 kV conductors was postponed until demand growth in Calvert County warranted its installation.

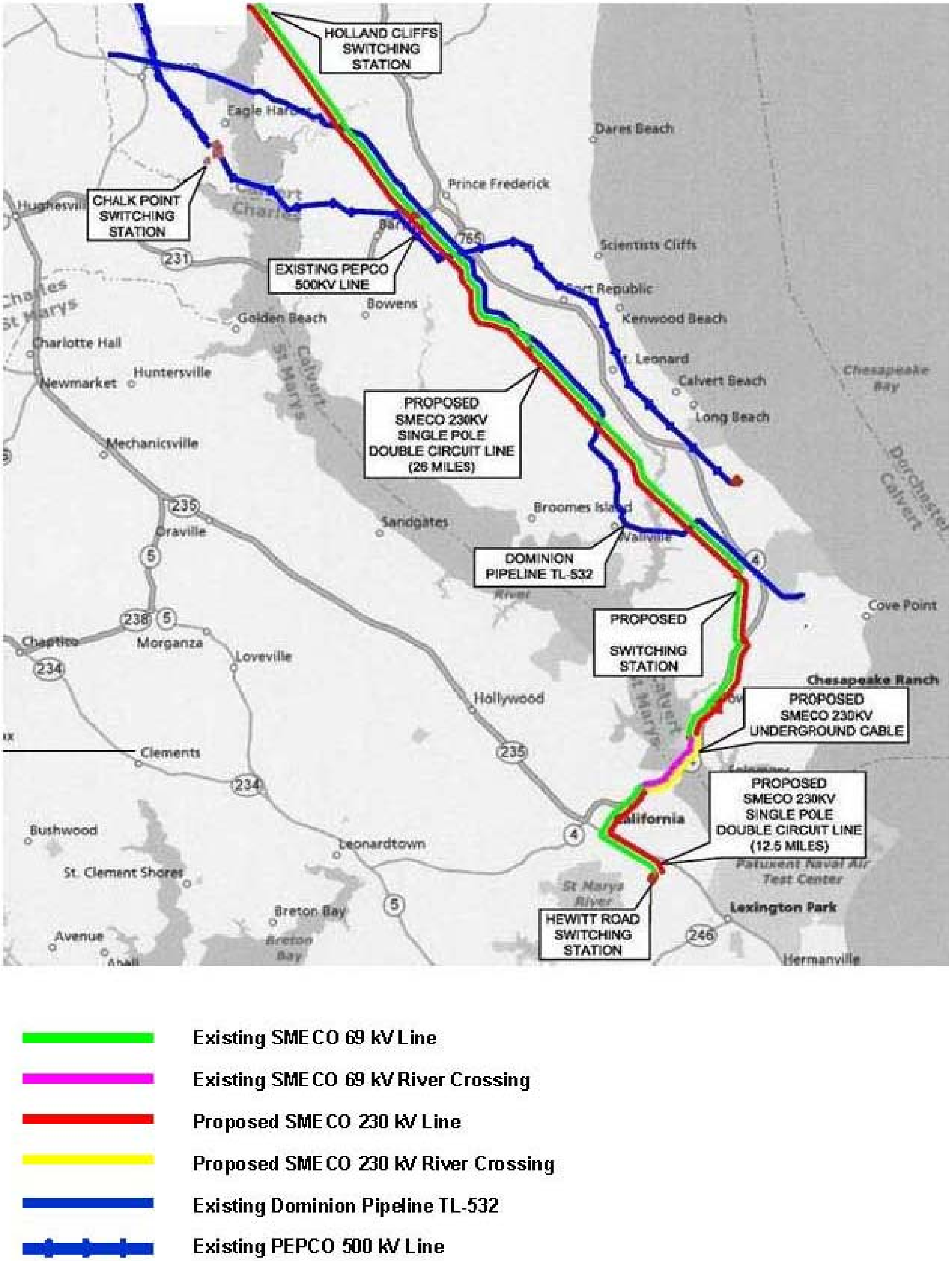


Figure 2-1
Holland Cliff to Hewitt Road 230 kV Transmission Line Project Map

That time has come and SMECO has commenced construction of the upgrade, which also includes a new switching station near Aquasco in southern Prince George's County and expansion of the existing Holland Cliff switching station (such upgrade, the "Aquasco/Holland Cliff Upgrade"). The Aquasco/Holland Cliff Upgrade must be operational by December 2009. SMECO did not seek funding from RUS for this Upgrade. On August 7, 2007, the PSC confirmed SMECO's right to undertake the Aquasco/Holland Cliff Upgrade under the CPCN issued in 1976 (Mailog #104940).

Although both the Aquasco/Holland Cliff Upgrade and the Project that is the subject of this BER are part of a 230 kV transmission system loop that is needed for future capacity and system reliability, they satisfy different needs. The Aquasco/Holland Cliff Upgrade must be completed by 2010 to support the system demand needs of northern Calvert County and to ensure reliable service to the SMECO service territory. The system demand and reliability issues that the Aquasco to Holland Cliff project specifically addresses include:

- **Northern Calvert Demand:** SMECO's existing 69 kV lines that distribute power to the northern Calvert County region are more than 18.5 miles (29.8 kilometers) long. Because of the limited transmission infrastructure in this region, the ever-increasing load of this area is becoming more susceptible to outage situations and voltage fluctuations. Existing system models project that there will be insufficient capacity to provide reliable service to this area after 2010.
- **Northern Calvert Reliability:** The upgrade of the Holland Cliff switching station to a 230/69 kV facility as part of the Aquasco/Holland Cliff Upgrade will provide the 69 kV source that SMECO requires to loop-feed the 69 kV system in northern Calvert County to improve system reliability. In addition, the Holland Cliff source will reduce the contingency on the long 69 kV line from Chalk Point, making SMECO's system in northern Calvert County less vulnerable to extended outages.
- **Chalk Point Firm Capacity**: SMECO has an existing delivery point from Potomac Electric Power Company (PEPCO) at Chalk Point; however, because of increasing demand, the connected load is expected to exceed PEPCO's firm capacity by 2012.

2.1 Project Need

The Project is needed to support the increasing system demand and ensure a reliable electric system for SMECO's customer-members. Because the demand for electricity is continually increasing on SMECO's system, there is a need to improve the transmission system to ensure continued reliability.

2.1.1 Meet System Demand

Southern Maryland is now the fastest growing region in the state. SMECO customer-members have more than doubled in Calvert County, from 13,785 in 1986 to 30,109 in 2006. With population growth comes additional community infrastructure, schools, and businesses to support the growth, resulting in an increase in electrical load. Energy demand has more than tripled from 61 MW in 1986 to 203 MW in 2006. Energy sales over the same period have almost tripled from 242,837 MWH in 1986 to 686,720 MWH in 2006.

In SMECO's entire service area, annual demand has more than doubled from 331 MW in 1986 to 845 MW in 2006. Energy sales have more than doubled, from 1,403,757 MWH in 1986 to 3,260,036 MWH in 2006.

Calvert County had only one reliable energy source or transmission line from Chalk Point serving customer demand until 1986 when the 69 kV line was rebuilt from SMECO's Chalk Point Substation to SMECO's Holland Cliff switching station. Not until 1993 was another energy source or transmission line installed into Calvert County. In 1993, SMECO installed a two-mile 69 kV submarine cable in the lower Patuxent River parallel to the Thomas Johnson Bridge near Solomons. This cable failed in January 2005. Restoring service to southern Calvert County required 69 kV transmission circuits from northern Calvert County to supply power over 21 miles on one of the coldest days of the year. SMECO's electrical system studies indicate that there will be insufficient capacity to restore service in this manner by 2015. The Project would provide the energy source required to eliminate this concern.

2.1.2 Ensure System Reliability

SMECO's electrical system studies confirm that the existing SMECO 69 kV and 230 kV electric transmission infrastructure, including the 230/69 kV Holland Cliff switching station presently being constructed, is adequate to handle expected peak system loads in northern Calvert County under normal conditions until 2015. However, these same studies reveal that there are four transmission line outage contingency situations that will be present if the Project is not completed by the end of 2015. All four outage contingency concerns are eliminated when the Project's infrastructure is operational. The four transmission line outage contingency scenarios include:

- **Loss of SMECO's 69 kV line #6786 between the Dukes Inn substation and the Mutual substation.** Under this scenario, all load south of Dukes Inn substation must be served via SMECO's 69 kV transmission line #6770 out of the Hewitt Road switching station. Part of the 69 kV transmission line #6770 circuit is composed of a submarine cable. This cable is rated for approximately 875 amps. The resultant contingency load is expected to be approximately 1,014 amps, which would cause an overload on the submarine cable. The Mutual substation load will have to be dumped to prevent the submarine cable from being overloaded if this contingency occurs during peak load conditions. This puts the center of Calvert County at risk of an extended outage that could last from 24 hours to five days, depending on the amount of damage that must be repaired or equipment that must be replaced.
- **Loss of the SMECO dual circuit 230 kV pole line #2350/#2355 between the Aquasco switching station and the Holland Cliff switching station.** Under this scenario, all load north of the Mutual substation in Calvert County will be served by the parallel combination of 69 kV transmission lines #6705 and #6706 and all load south of Mutual substation will be served through the 69 kV transmission submarine cable #6770 discussed in scenario #1 above. Both lines (#6770 and #6706) are at maximum emergency load capacity and line #6705 is loaded to 104% emergency load capacity. In this scenario the Dunkirk substation distribution feeders #21 and #22 will need to be dropped (i.e., all load north of Dunkirk substation) to prevent line #6705 from being overloaded. This puts the northern part of Calvert County at risk of an extended outage that could last from three to 10 days depending on the amount of damage that must be repaired or equipment that must be replaced.
- **Loss of SMECO 69 kV line #6770 between Hewitt Road switching station and Solomons substation.** Under this scenario, all load south of Prince Frederick substation is served by the parallel combination of 69 kV transmission lines #6705 and #6706. Line #6705 is loaded to maximum emergency load capacity and end of line voltage drop is at maximum allowable limits. SMECO's electrical system studies predict that this contingency cannot be supported beyond 2015. This puts the southern part of Calvert County at risk of daily brownout outages during peak load

conditions for a period of up to 5 days if the failure occurs on an overhead line section of line #6770 or up to 3 months if the failure occurs on the submarine cable section of line #6770.

- **Loss of the SMECO dual circuit 230 kV pole line #2320E/#2320W between the Ryceville switching station and the Hewitt Road switching station.** Under this scenario, all possible load is served via the 69 kV transmission lines #6740 and #6750 out of Hughesville substation and it is assumed that any load that could be shifted from Hughesville substation to other power supply points is appropriately transferred. The two 69 kV transmission lines #6703 and #6704 serving the Hughesville substation are at maximum emergency load capacity and all load south of Hollywood and Leonardtown substations will be dumped. End of line voltage drop is at maximum allowable limits. This contingency scenario already exists in 2008. This puts all of southern St. Mary's County, including the Patuxent River Naval Air Station, at risk of an extended outage that could last from 3 to 10 days depending on the amount of damage that must be repaired or equipment that must be replaced.

The combination of rapid growth in SMECO's service area and the reliability concerns that will only increase with growth makes the Project a technically sound and urgently needed solution.

2.2 Consequences if Project is Delayed or Not Approved

If the Project is delayed or not approved, SMECO's system will be unable to meet long-term demand and will be vulnerable to long-term outages because there is a lack of redundancy for the areas served in Calvert and St. Mary's counties. With the responsibility of SMECO to provide an emergency station service power source to the nuclear power plant in Calvert County and a reliable primary power source to the Naval Air Station in St. Mary's County, system reliability must be improved to enhance electrical system operational flexibility and reduce the potential for an extended outage contingency. The "no action" alternative would increase the potential for wide-area blackouts under contingency situations, violate good engineering principles for transmission planning, and indicate neglect of the responsibility by SMECO to provide adequate and reliable service to its customer-members.

The Project is the best solution to reduce the likelihood of extended outages on the transmission system in the area. The Holland Cliff to Hewitt Road 230 kV line would complete a 230 kV transmission system loop through St. Mary's and Calvert counties providing the additional capacity, operational flexibility, and high reliability required to greatly reduce the chances for extended outages on the area transmission system. Engineering design, material procurement, and switchyard property acquistion should be timed to support the required fall 2015 in-service date.

2.3 Project Location and Description

The proposed Holland Cliff to Hewitt Road 230 kV transmission line would start at SMECO's Holland Cliff switching station and end at the Hewitt Road switching station. The Project would comprise the following:

- Replacement of twenty miles (32.2 kilometers) of existing 69 kV transmission line with a new 230 kV single pole, double circuit transmission line from the Holland Cliff switching station to a new southern Calvert County switching station. The new 230 kV transmission line would be constructed in the existing 69 kV transmission line right-of-way and the new structures in this area would be designed for double circuit (230/69 kV) operation. The existing right-of-way would not have to be widened.
- A new 230/69 kV switching station (Sollers Wharf Road) located in southern Calvert County near the existing SMECO Calvert Cliffs 69 kV transmission line tap near the intersection of Pardoe Road and Maryland State Highway 2/4. The new 230/69 kV switching station fenced area will cover approximately four to six acres (1.6 to 2.4 hectares), though the parcel of land to be purchased would be much larger.
- A new 230 kV two-mile river crossing under the Patuxent River from Solomons to Town Creek.
- Eight miles (12.9 kilometers) of new 230 kV single pole, double circuit transmission line from the new Sollers Wharf switching station to the existing Hewitt Road switching station in Lexington Park in St. Mary's County. The new 230 kV transmission line would be constructed in an existing 69 kV transmission line right-of-way and the new structures in this area would be designed for double circuit (230/69 kV) operation. The existing 69 kV transmission line would be replaced and the existing right-of-way would not have to be widened.
- A new transmission line terminal position in the existing Hewitt Road switching station. The additions at the existing Hewitt Road switching station would be installed within the existing fenced area.

As illustrated in Figure 2.3-1, SMECO has an existing 230 kV transmission line that runs through St. Mary's County, from Ryceville (in Charles County) to the Hewitt Road switching station in Lexington Park. On completion of the Aquasco/Holland Cliff Upgrade described previously, SMECO would have a 230 kV transmission line that runs from the Aquasco switching station in Prince George's County to the Holland Cliff switching station in Calvert County (this portion of line is currently energized at 69 kV). These two 230 kV transmission lines are interconnected to each other by a 230 kV transmission line that runs from Morgantown through Chalk Point to the new Aquasco switching station. PEPCO owns and operates the 230 kV switching stations at Morgantown and Chalk Point as well as the 230 kV transmission lines that connect them and extend further north to Aquasco. The installation of the proposed Holland Cliff to Hewitt Road 230 kV transmission line as part of this Project would complete the 230 kV transmission loop. The Project is expected to take more than three years to construct with a proposed start of construction activities in 2012 resulting in a scheduled completion of construction in 2015.

2.4 Project Schedule

To ensure that the dual requirements of demand and reliability are satisfied by timely completion of the Project, SMECO has developed a construction schedule and has estimated construction costs. Details of each are provided here.

2.4.1 Project Schedule

Table 2.4-1 provides information on the schedule for conceptual and detailed design, as well as equipment procurement and construction for each segment of the Project. The segments are identified as follows:

- Holland Cliff switching station to Sollers Wharf switching station.
- Sollers Wharf switching station.
- Sollers Wharf switching station to Hewitt Road switching station.
- Patuxent River Crossing.
- Hewitt Road switching station.

Proposed in-service dates range from the end of 2013 for the Holland Cliff switching station to Sollers Wharf switching station portion of the line to late 2015 for the Sollers Wharf switching station to Hewitt Road switching station portion of the line. The Patuxent River Crossing construction would be completed in two separate steps, each taking place from November through March to avoid the busy season on the Naval Recreation Center property. Construction of the Patuxent River crossing would be completed in March 2015, while construction of the Sollers Wharf switching station to Hewitt Road switching station transmission line would be completed by November 2015.

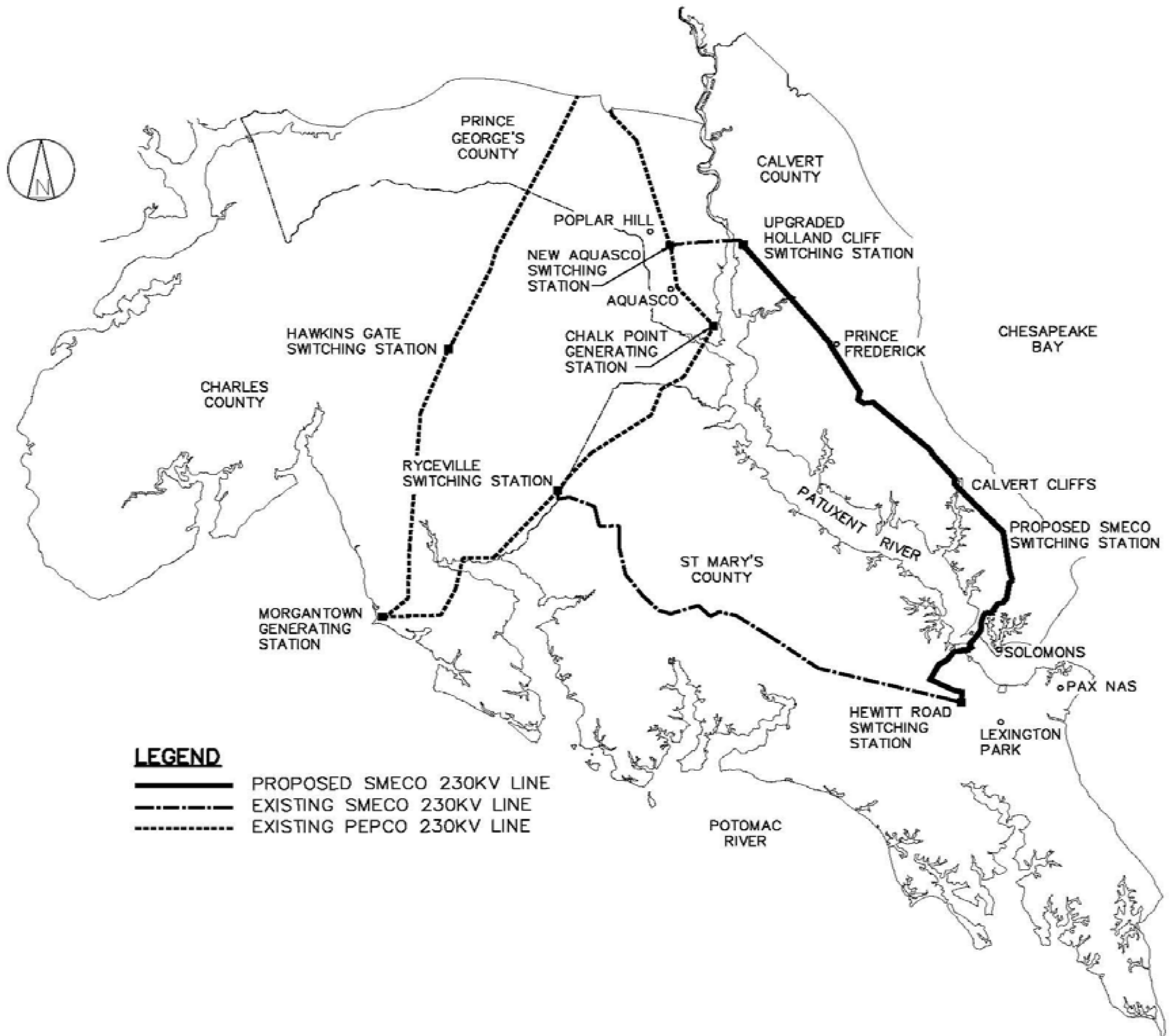
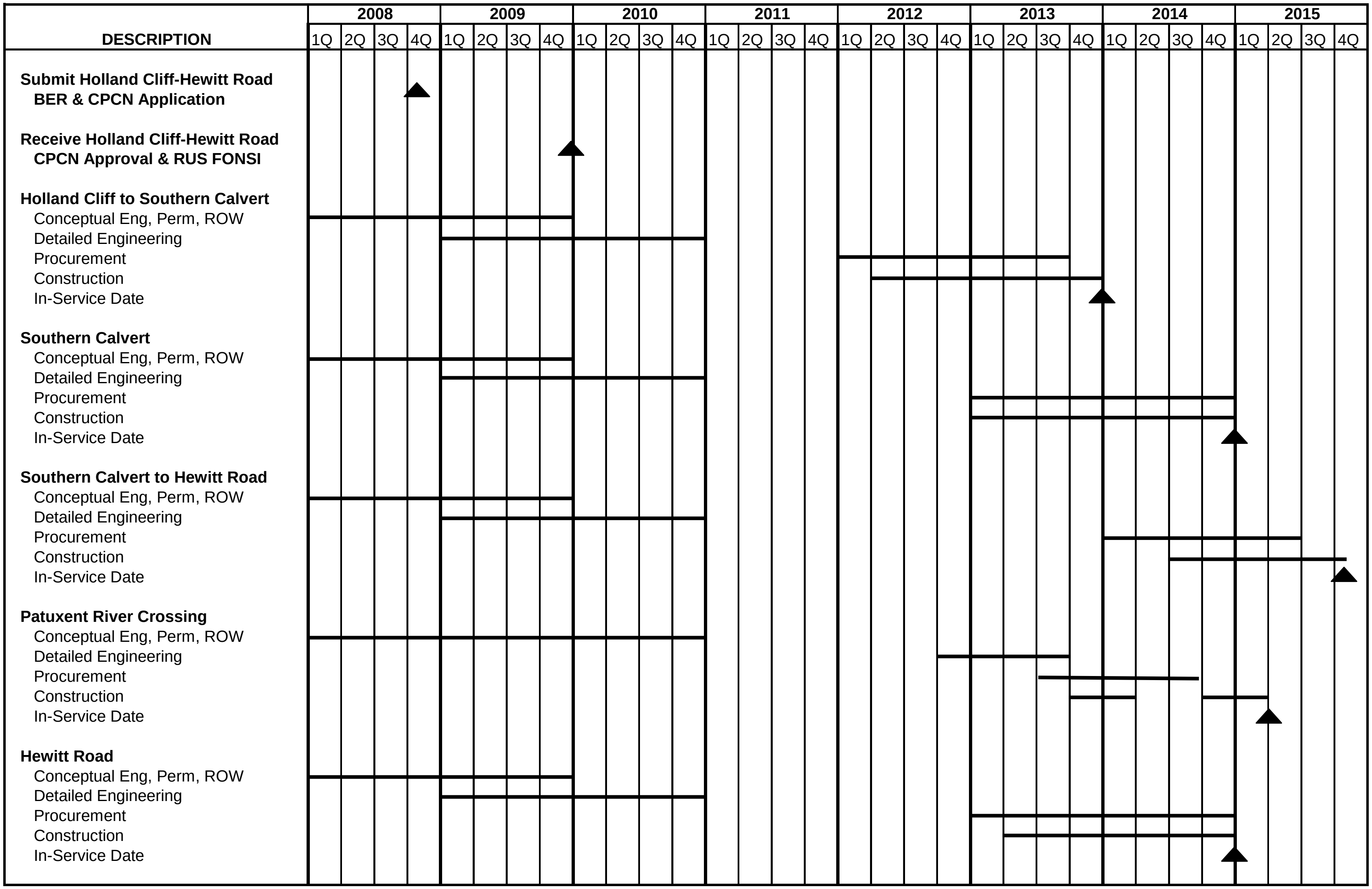


Figure 2.3-1
Existing and Proposed 230 kV Transmission Lines
Developing a 230 kV Transmission Loop

Table 2.4-1
Conceptual and Detailed Design Schedule



2.5 Right-of-Way Description

The existing 69 kV right-of-way proposed for use in installing the new 230 kV structures and transmission line varies in width from 75 to 150 feet (22.9 to 45.7 meters). Starting at Holland Cliff switching station, right-of-way widths are as follows:

- 100 feet (30.5 meters) from Holland Cliff for approximately 10 miles (16.1 kilometers) to two miles (3.2 kilometers) south of Prince Frederick.
- 150 feet (45.7 meters) feet for approximately one mile (1.6 kilometers).
- 100 feet (30.5 meters) for approximately 11 miles (17.2 kilometers) to the Calvert Cliffs tap.
- 150 feet (45.7 meters) for approximately five miles (8.0 kilometers) to the Naval Recreation Center near the Patuxent River.
- 75 feet (22.9 meters) (underground) for approximately one mile (1.6 kilometers) from the Patuxent River to the transition to overhead.
- 150 feet (45.7 meters) for approximately one mile to State Highway 235.
- 122 feet (37.2) for approximately one mile (1.6 kilometers).
- 150 feet (45.7 meters) for the last one-half mile (0.80 kilometers) into Hewitt Road switching station.

The total area associated with this existing right-of-way is 402.3 acres (162.8 hectares).

2.5.1 Property or Property Rights to Be Acquired

Because existing rights-of-way would be used for construction of nearly all of the new 230 kV transmission line, only small amounts of new property or property rights need to be acquired. The locations and amounts of new property or property rights needed are described here from north to south along the route.

PEPCO 500 kV Transmission Line Crossing

An existing 500 kV transmission line owned by PEPCO crosses the existing 69 kV line owned by SMECO in an area immediately south of Prince Frederick known as Prince Frederick Woods. Because the construction of the new 230 kV transmission line must cross the PEPCO line and right-of-way, SMECO would need rights to make this traverse. SMECO plans to acquire approximately five acres (2.0 hectares) of land from a private landowner in and adjacent to the PEPCO right-of-way to accomplish this.

Broomes Island Road Crossing

SMECO plans a minor relocation of its existing overhead transmission line where it crosses Broomes Island Road (State Highway 264) northwest of Saint Leonard. SMECO would need to obtain a new easement of 150 feet (45.7 meters) in width and approximately 1,600 feet (488 meters) in length to relocate the existing 69 kV overhead line and install the new 230 kV line.

Sollers Wharf Switching Station Site

The new Sollers Wharf switching station would be constructed in Calvert County and would be located near the SMECO right-of-way in the area just west of Lusby and Maryland Highway 2/4, near the intersection of Pardoe Road and Sollers Wharf Road. SMECO has entered into an agreement to purchase approximately 40 acres (16 hectares) of land from a private landowner to accommodate the switching station itself and provide a substantial buffer from existing development in the area. Only six to ten acres (2.4 to 4.0 hectares) would be developed for the switching station.

United States Naval Recreational Center

The new 230 kV transmission line may traverse the U. S. Naval Recreation Center near the southern tip of Calvert County. SMECO's existing 69 kV line already traverses this property. SMECO plans to install the new line underground through the Navy property from the point where the existing 69 kV transmission line transitions to underground and to the west of the existing 69 kV line. The construction site for the initiation of horizontal directional drilling associated with the Patuxent River crossing would also be on Navy property. More information on the river crossing can be found in Section 2.8 of this report and in Appendix F. No land purchase would be needed, but SMECO would seek a construction and operations easement of approximately 100 feet (30.48 meters) in width and 5,000 feet (1,524 meters) in length through the property.

Town Creek

Town Creek is on the south shore of the Patuxent River opposite the U. S. Naval Recreation Center and in St. Mary's County. SMECO would need to acquire approximately two acres (0.8 hectare) for the termination point of the horizontal directional drilling possibly within a few hundred feet of the river's shore. SMECO already owns a one-acre (0.4 hectare) parcel on North Patuxent Beach Road, but it is too far from the shoreline to accommodate the horizontal directional drill operation under the river. SMECO has made an offer to purchase a 0.6 acre (0.24 hectare) tract nearer the shoreline that would be used as a termination point. The purchase transaction is in condemnation proceedings.

SMECO would not need to acquire additional land for the riser structure (for the transition from underground to above ground construction) near State Highway 4, approximately one quarter of a mile farther south. The existing property would be sufficient. Installing underground cables through Town Creek would avoid Project visual impacts entirely.

For each of these locations, SMECO would begin the process of acquiring the land or the rights that it needs through contacts with landowners.

2.5.2 Location of Proposed Switching Station

As stated above, the proposed Sollers Wharf switching station would be sited in the Lusby area. SMECO has considered several sites for the station (refer to Table 2.5-1) and has rejected most of them for a variety of reasons. However, SMECO purchased 40 acres (16 hectares) in size (Property 2 in the table) near the intersection of Pardoe Road and Sollers Wharf Road. Most of the property would be used as a visual buffer because the fenced-in area (that is, the switching station site) would be approximately four to six acres (1.6 to 2.4 hectares) in size. Of the nearly 40 acres (16 hectares) on the property, approximately 32.6 acres (13.2 hectares) are wooded. Grading for the switching station, including the station pad, an access road, and a stormwater management facility, would cover about 6 acres (2.4 hectares), most of which is wooded; approximately 27 acres of wooded area within the larger property would remain after the switching station construction. The property, and by extension, the switching station site, is located outside of the 100-year floodplain and outside of the Chesapeake Bay Critical Area.

2.5.3 Access Roads for Construction and Maintenance

Because existing right-of-way would be used for more than 95% of the 230 kV line route, existing access roads for maintenance would also be used to the extent possible. However, wherever new access roads are needed, they would be constructed in a manner to minimize disturbance. In areas where the soils and topography allow, the existing right-of-way would serve as the access road. In areas where this is not possible, such as at creek crossings, crushed stone access roads 10 feet (3.05 meters) in width would be constructed. Best management practices for minimizing environmental impacts, such as the use of silt fences and stabilized construction entrances, would be implemented. If there is no option to traversing low-lying areas with construction vehicles, matting would be used to provide a load-bearing surface and to protect the underlying soil.

2.5.4 Construction Clearing Methods

For new right-of-way, trees within the right-of-way would be cleared and removed. This would be accomplished by staking and flagging construction limits, including right-of-way, access roads, and other work areas; marking utilities; installing erosion and sediment control measures; and conducting work zone clearing and pruning. Trees with trunks out of the right-of-way would be trimmed at the boundaries of the right-of-way. Tree removal would be with a combination of manual (chain saws) and mechanized (bulldozers and backhoes) techniques.

No right-of-way clearing in wetlands is anticipated, including at the Sollers Wharf switching station site. Along the line, poles would be placed in such a manner to span wetlands. If it becomes necessary to traverse wetlands for construction or vehicle passage, matting would be used and no vegetation would be removed unless absolutely necessary for the placement of structures or to prevent contact with the new conductors. Grass and other low growth plants would be left in place or restored to pre-construction conditions.

Sediment and erosion controls would be part of construction drawings and specifications and would be enforced on the construction contractors. Silt fences and super silt fences would be installed where needed to prevent soil runoff and silt settlement pits would be constructed where stormwater runoff can leave the right-of-way. Stabilized construction entrances would be installed and maintained at all points where the construction access roads intersect with paved roadways or parking areas, in order to prevent the deposition of materials onto these surfaces where they may runoff to wetlands and streams.

2.5.5 Right-of-Way Maintenance Methods

Because existing right-of-way would be used for more than 95% of the 230 kV transmission line route, right-of-way maintenance methods already in use by SMECO would be those used for maintenance of the new line. These include mowing, brush removal, and tree trimming at the edges of the right-of-way. In particular, trees that have grown into the right-of-way to the point that they reach the limit of line blowouts would be trimmed immediately after discovery.

Table 2.5-1
Southern Calvert Switching Station Sites

	Tax Map	Parcel	Acres/Hectares	Owner	Access	Zoning	APD	Topography	Structures	Location
Property 1	39	90	32/13	Harry Zinn	Pardoe Road	Farm and Forest District	Yes	Moderate	Several houses and structures near transmis-sion line	3.75 miles (6.0 kilometers) south of St. Leonard Tap
Summary: This property is unsuitable as there are multiple houses and structures near the transmission line and these would have to be purchased and removed.										
Property 2	39	82	40/16	John Crane, et. al.	Pardoe Road	Farm and Forest District	Yes	Moderate	None appear onsite	4 miles (6.4 kilometers) south of St. Leonard Tap
Summary: This property is suitable for a switching station. The adjoining parcel 10 would be somewhat affected by the construction.										
Property 3	39	109	22.6/9.1	Donald and Agnes Jefferson	Sollers Wharf Road	Rural Community District	No	Moderate	None appear onsite	4.7 miles (7.6 kilometers) south of St. Leonard Tap
Summary: This property is split by the transmission line and the larger area on the east side of the line (approx 7.6 acres) is not desirable for the proposed switching station due to the rolling terrain.										
Property 4	39	180	238/96.3	John Crane, Jr.	Maryland Highway 4	Rural Community District	Yes	Good	None appear onsite	4.9 miles (7.9 kilometers) south of St. Leonard Tap
Summary: This is a large property with approximately 4400 feet of frontage along the transmission line, including a major angle structure. A minor subdivision would be required to purchase a portion of this property. This was a desirable site until the Owner was contacted and informed SMECO that TDRs (Transferable Development Rights) had all ready been sold from this property, which would make it difficult to get the permits for station construction.										

Table 2.5-1 (Continued)
Southern Calvert Switching Station Sites

	Tax Map	Parcel	Acres/Hectares	Owner	Access	Zoning	APD	Topography	Structures	Location
Property 5	39	137	100/40.5	William Bedford Glascock II and Mary Elizabeth Trustees	Old Mill Road, MD Rte 4	Rural Community District	No	Moderate	None appear onsite	5.7 miles (9.2 kilometers) south of St. Leonard Tap
Summary: This is a large property with a large frontage along the transmission line, including a major angle structure. A minor subdivision would be required to purchase a portion of this property. This was a desirable site until it was learned that an access road would be required through Parcel 180. Therefore, this site was not pursued further for the same reasons identified for Property 4.										
Property 6	42	62	16.5/6.7	Brian and Helen Griffin	Old Mill Road, Donegal Drive	Rural Community District	No	Good	Barn	6.2 miles (10.0 kilometers) south of St. Leonard Tap
Summary: This property is of good size and would work well with the exception that it is approximately 600 feet west of the transmission line and additional property or easement would have to be procured for transmission access. Because of the need to acquire the additional transmission access, this property was not pursued further.										
Property 7	42	19, 206	203/82.2, 16.3/6.6	Board of Commis-sioners of Calvert County	Sweetwater Road, MD Rte 4	Rural Community District	No	Severe	Multiple Buildings and Structures	6.2 miles (10.0 kilometers) south of St. Leonard Tap
Summary: These parcels contain the Calvert County Landfill and its associated structures. This is not a desirable site to build a switching station because of the rolling terrain and design issues associated with construction on unknown fill material. This site contains approximately 4300 feet of frontage along the transmission line.										

Table 2.5-1 (Continued)
Southern Calvert Switching Station Sites

	Tax Map	Parcel	Acres/Hectares	Owner	Access	Zoning	APD	Topography	Structures	Location
Property 8	42	40	11.4/4.6	Kenneth Edwards and Terry Grover Bowen	MD Rte 4	Rural Community District	No	Severe	None	7.2 miles (11.6 miles) south of St. Leonard Tap
Summary: This parcel is too small and too steep for a switching station site. It does have approximately 650 feet of frontage along the transmission line.										
Property 9	42	90	45.7/18.5	Daniel and Michael Barrett	MD Rte 4	Rural Community District	No	Good/Moderate	None	7.4 miles (11.9 miles) south of St. Leonard Tap
Summary: This parcel is split by MD Highway 4 and has very little frontage on the transmission line. The portion of the parcel north of Rte 4 is approximately 25 acres. Because the transmission line taps would have to cross MD Highway 4, this property was not pursued further.										
Property 10	42	375, 376	48/19.4	Calvert Commis-sioners	MD Rte 4	Rural Community District	No	Good/Moderate	None	6 miles (9.7 kilometers) south of St. Leonard Tap
Summary: This is a previously subdivided parcel, which was purchased by the Calvert County Commissioners. Initial access is good from the extension of Cove Point Road, however the record plats show extensive floodplains and wetlands, which would have to be crossed to get to a site with suitable topography for a station. Another access road could be constructed off Maryland Route 4, and would entail greater permitting hurdles. This site is contiguous with the existing transmission line right of way, which entail the construction of a dual circuit transmission tap of approximately 1000 feet (305 meters). Due to the length of transmission line taps and mitigation of floodplain and wetlands associated with this property, the purchase of this property was not pursued further.										

2.6 Engineering and Construction Features

The new transmission line would be a combination of overhead and underground design. The crossing of the Patuxent River and a short segment through the community of Town Creek on the west side of the Patuxent River would be underground. The remainder of the line would be overhead.

2.6.1 Overhead Transmission Line

The overhead portion of the line would be constructed of self-supporting single pole, quad circuit, and tubular steel structures with steel arms. Figure 2.6-1 shows a typical tangent structure. However, there would also be dead-end and angle structures along the route, but they would be similar in appearance and height to the tangent structures. The new 230 kV circuits would be located near the top of the structure and the 69 kV circuits would be located at the bottom of the structure. At the top of the structure, a 7#9 alumoweld shield wire and an optical fiber ground wire (OPGW) would be installed on opposite sides of the structure.

Although the structures would be designed for two 230 kV circuits and two 69 kV circuits, only one 69 kV circuit would be installed initially. Both overhead 230 kV circuits would be installed from the Holland Cliff switching station to the Hewitt Road switching station.

The steel structures would average between 110 feet (33.5 meters) and 140 feet (42.7 meters) tall, with a maximum anticipated height of 160 feet (48.8 meters) at locations requiring additional clearance. Steel structures would be fabricated of weathering steel material of a dull rust brown color. Weathering steel was chosen over galvanized steel material based on comments from the public, which were obtained during public meetings. Galvanized steel has a dull silver appearance.

The 230 kV circuits would be in a vertical configuration because this requires the least width of right-of-way and offers good EMF characteristics. This configuration also facilitates maintenance activities because each phase conductor can be reached readily by climbing the pole or by the use of a bucket truck. Delta and horizontal configurations increase the width of right-of-way required. The 230 kV circuit arms would be approximately 10 and 12 feet (3.1 and 3.7 meters) long and they would be vertically spaced approximately 16 feet (4.9 meters) apart.

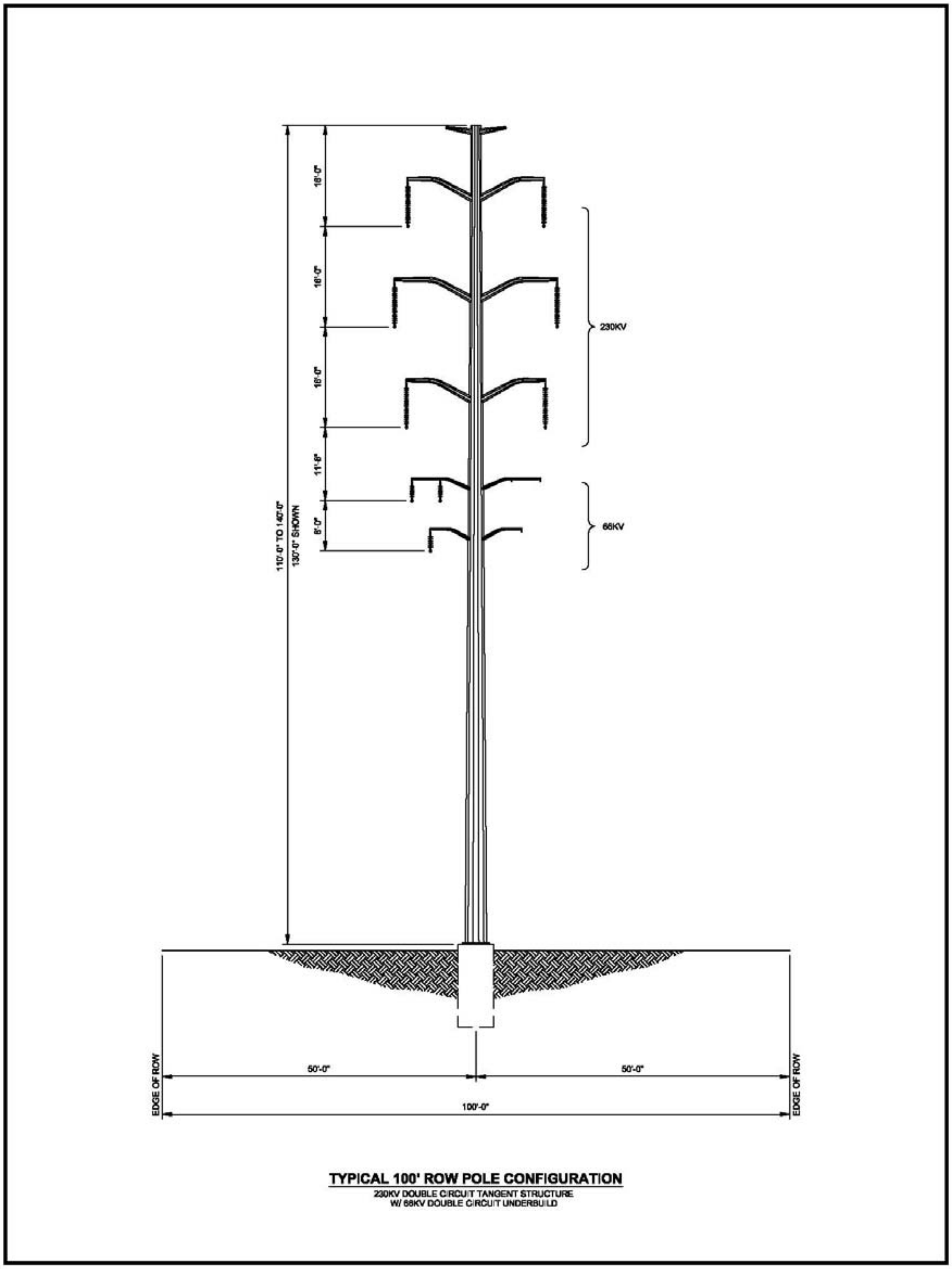


Figure 2.6-1
Typical Tangent Pole Configuration

The 69 kV circuits would be in a delta configuration. This configuration also provides good EMF characteristics. Because the phase spacing required for a 69 kV circuit is smaller than that required for a 230 kV circuit, the delta configuration for the 69 kV circuits does not affect the width of right-of-way required. The delta configuration also allows for a shorter pole height than a vertical configuration. While a horizontal configuration for the 69 kV circuit would allow the shortest pole height, this configuration would adversely affect maintenance activities on the 230 kV circuits. The boom from the bucket truck would need to reach over the 69 kV phase conductors. This would place maintenance personnel above energized circuits and require the boom to be in close proximity to the energized circuits, creating a possible electrical hazard for maintenance personnel. The 69 kV circuit could be de-energized during maintenance activities on the 230 kV circuit, but this approach would reduce the reliability of SMECO's 69 kV system and have the potential to adversely affect SMECO's customers.

At the top of the structure, shield wire and OPGW would be installed on two feet (0.6 meters) long davit arms. Both the shield wire and the OPGW provide protection for the phase conductors from lightning strikes. The OPGW contains optical fibers in its center and provides a communication path in addition to lightning strike protection. The optical fibers are used to provide a dedicated communication path for control and protection signals between the switching stations at the end of the transmission line and for transmission of system data to SMECO's operations center.

The phase conductors for both the 230 kV and 69 kV circuits would be 1590 kcmil all aluminum conductor (AAC), code name "Coreopsis". The normal current carrying capacity of this conductor is 1,305 amperes. It is also a stock item for SMECO and this would facilitate maintenance and repair of the circuits after storm events.

The phase conductors would be attached to the structure arms with polymer insulators. Polymer insulators were chosen over porcelain as they are lighter and easier to handle, and they resist vandalism (i.e., gunshots) better than porcelain.

All existing structures, which are primarily made of wood, would be removed. Because the new structures would be steel, the new structures would be stronger and allow longer spans. This would result in a significant reduction (by 30% to 40%) in the number of structures required from what is presently in place. The average span length would be approximately 750 to 800 feet (228.6 to 243.8 meters) resulting in approximately seven structures per mile. The new structures would be located to avoid driveways and minimize visual impacts to residents along the right-of-way, as much as is practical.

The new structures would be installed on concrete pier foundations approximately 20 to 40 feet (7.62 to 12.2 meters) deep. At each pole location, approximately two days would be required to drill the foundation hole and place the concrete. A large truck or track vehicle with a drill rig attached to it would be used to drill the foundation hole and normal concrete trucks would be used to place the concrete. After the concrete is placed, the spoils from the foundation hole would be spread around the foundation hole in an aesthetically pleasing manner and reseeded.

After the concrete has had time to harden (usually a minimum of one week), the pole can be erected and placed on the foundation. The pole sections and arms would be delivered to the foundation location on a semi trailer and unloaded using a crane. To the extent possible, the pole sections would be assembled on the ground, lifted on to the foundation, and bolted in place.

After the pole shaft has been constructed, the phase conductor and shield wire/OPGW arms would be lifted and bolted to the structure. The insulators would then be lifted and bolted onto the arms. The erection of each pole would take approximately one day and typical construction equipment is a crane and one or two bucket trucks to lift the construction workers.

For the most part, the existing wood poles for the existing 69 kV circuit are located in the center of the right-of-way and the new poles would also be located in the center of the right-of-way. For the 69 kV circuit, the existing 1590 kcmil "Coreopsis" conductor would be reused where practical. To facilitate reuse of the conductor, the line would be deenergized and the poles would be leaned to one side. Leaning the poles to one side facilitates the relocation of conductor from the center of the right-of-way so that the new poles can be installed. This method does not require that the existing conductor be taken off the existing structures. After the new poles are installed, the conductor would be transferred from the old poles to the new poles using bucket trucks and man lifts. This method is used because if the existing conductor is removed from the poles, it must be wound on reels for storage and special precautions must be taken so that it does not touch the ground or become damaged.

To install new conductor, a small pulling rope would be installed through the stringing blocks connected to the insulators. A pulling rope is used as it can be handled easily by construction personnel. The phase conductor weights approximately four tons per phase per mile. The phase conductor would then be connected to the pulling rope, pulled through the stringing blocks, and pulled to the right tension using a pulling winch. At each structure, construction personnel would then transfer the phase conductor from the stringing blocks and connect it to the arms with the permanent attachment hardware. A similar method would be used for the shield wire and OPGW. It is feasible to install a few miles of conductor in a single pulling operation.

The existing construction and maintenance roads and right-of-way would be used to access the pole locations.

2.6.2 Patuxent River and Town Creek Crossing

The Sollers Wharf to Hewitt Road portion of the Project would require crossing the Patuxent River north of the Thomas Johnson Memorial Bridge that carries Maryland Highway 4 and joins Calvert and St. Mary's Counties. The crossing is planned to be completed by horizontal directional drilling (HDD) a duct bank for underground transmission cables below the riverbed, and open trenching a duct bank from the HDD endpoints to the overhead riser poles.

HDD is a pipeline and conduit installation method that bores a path under the ground without disturbing the surface. The first stage of the HDD operation consists of directionally drilling a small diameter pilot hole along a predetermined path to the exit point. This process uses environmentally safe bentonite as a drilling fluid and lubricant. The second stage involves enlarging this pilot hole to a diameter sufficient to accommodate the polyvinyl chloride (PVC) pipes that make up the duct bank. The pipes are then pulled into the enlarged hole. Refer to Figure 2.6-2, Drawing DS-0013, for typical HDD details.

One end of the proposed HDD may be on the property of the Navy Recreation Center (NRC) on the east side of the Patuxent River. The other end of the proposed HDD would be on the west side of the river at Town Creek. After the HDD operation has been completed, all areas disturbed during construction would be graded and restored by seeding or paving to the condition prior to construction.

The open trench duct bank system would require nine 8-inch (20-millimeter) and two 2-inch (51-millimeter) schedule 40 PVC conduits. The conduit would be encased in 3,000 pounds per square inch (psi) thermal concrete for protection. Thermal concrete has specific characteristics that improve heat dispersal, increasing the capacity of the cables. The trench would be backfilled with native soils and the surface restored to match the existing conditions. The duct bank would be approximately 3.5 feet (1.1 meters) wide by 3.5 feet (1.1 meters) high, with a minimum of 36 inches (0.91 meter) of cover over the duct bank. Refer to Figure 2.6-3, Drawing SK DBK1-060208, for typical duct bank details.

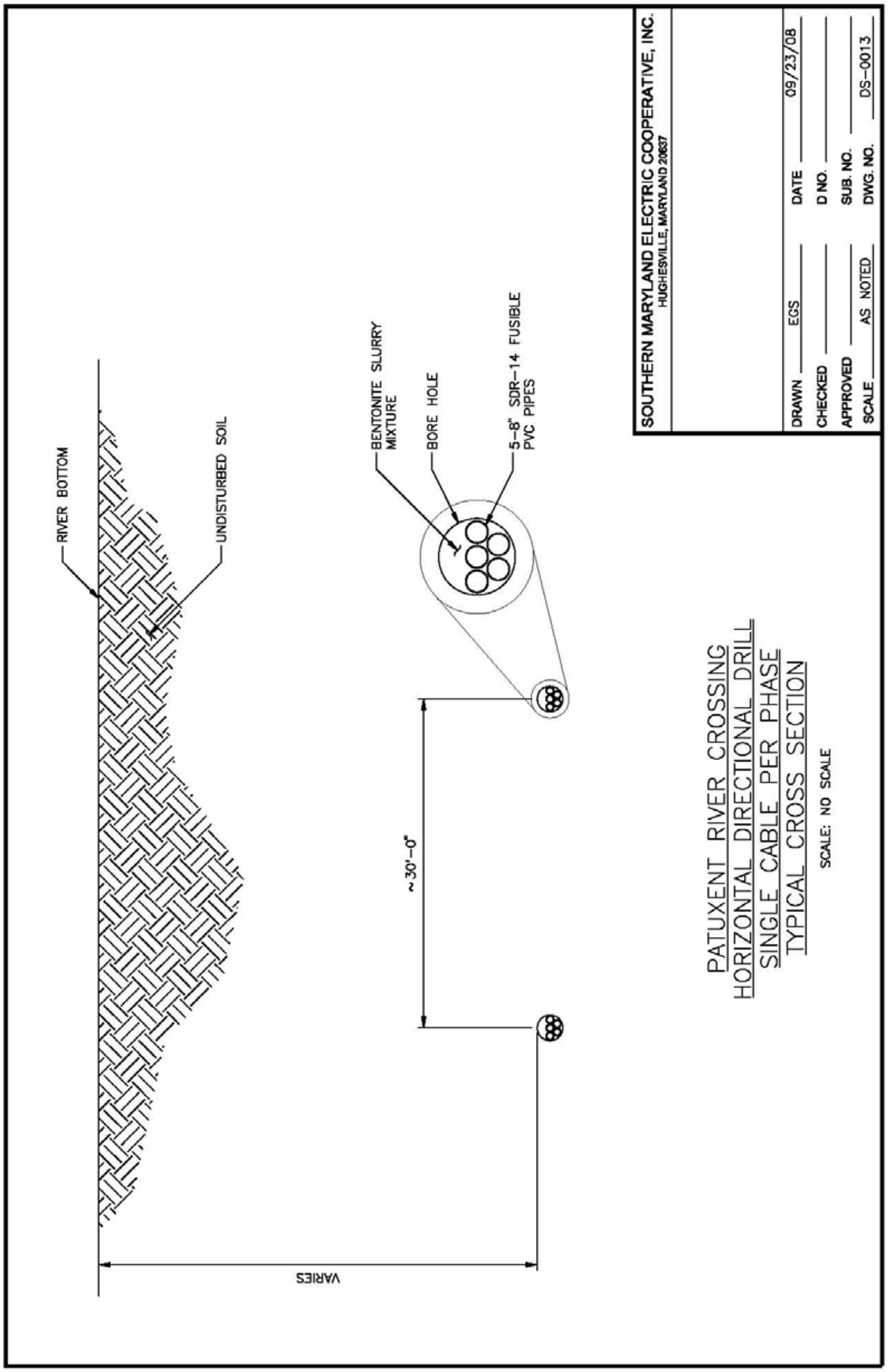
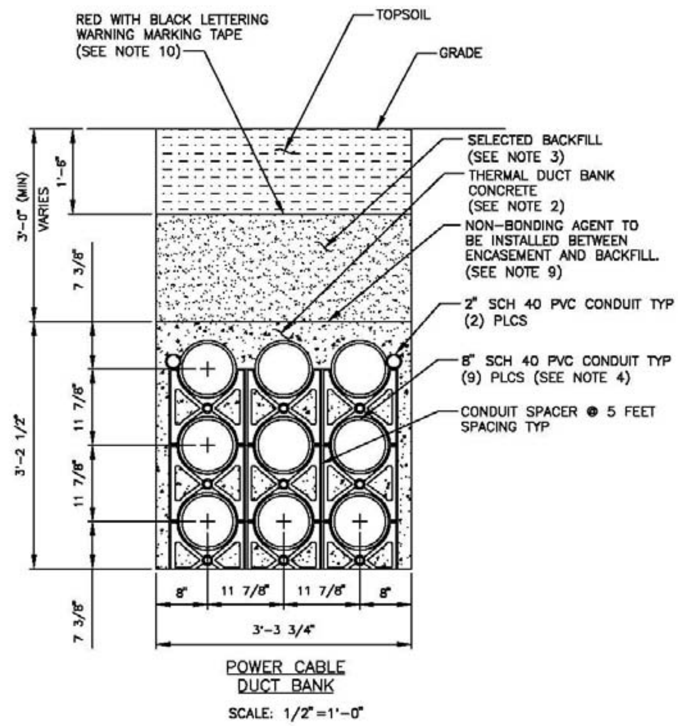


Figure 2.6-2
Typical Horizontal Directional Drill Details



NOTES:

1. ALL DUCTBANK DIMENSIONS ARE MINIMUMS.
2. THERMAL CONCRETE FOR DUCT BANK ENCASEMENT SHALL MEET PROJECT SPECIFICATIONS. MIX DESIGN SHALL BE TESTED AND APPROVED PRIOR TO INSTALLATION.
3. BACKFILL FOR DUCTBANK SHALL BE THERMALLY ACCEPTABLE. FLOWABLE THERMAL BACKFILL (FTB), SELECTED GRANULAR FILL, AND NATIVE SOIL ARE POSSIBLE BACKFILL MATERIALS. ALL BACKFILL MATERIALS SHALL BE APPROVED BEFORE INSTALLATION. ALL BACKFILL SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS.
4. CONDUIT SHALL BE RESTRAINED TO PREVENT FLOATING DURING ENCASEMENT. ONLY NON-METALLIC RESTRAINTS SHALL BE USED.
5. CONDUIT SPACERS SHALL BE ANCHORED BY MEANS OF REBAR STAKES OR ACCEPTABLE EQUAL.
6. ALL REINFORCING SHALL BE AT LEAST 2-INCHES FROM PVC CONDUITS, FITTINGS AND ANCHORS, AND SHALL HAVE 3-INCHES MINIMUM CONCRETE COVER.
7. WHEN DUCT BANK IS LOCATED WITHIN CITY STREETS PAVEMENT SHALL BE RESTORED TO CITY SPECIFICATIONS.
8. ALL CONDUIT SHALL BE SEALED AT THE END OF EACH WORKING DAY.
9. NON-BONDING AGENT TO BE INSTALLED BETWEEN ENCASEMENT CONCRETE AND FTB. NON-BONDING AGENT TO BE PLASTIC SHEETING OR ACCEPTABLE EQUAL. NON-BONDING AGENT IS NOT REQUIRED BETWEEN ENCASEMENT CONCRETE AND GRANULAR OR NATIVE BACKFILL.
10. CONTRACTOR TO INSTALL WARNING MARKING TAPE ABOVE THE DUCTBANK 12 TO 18 INCHES BELOW GRADE.
11. 3" EDGE TO EDGE SPACING SHALL BE MAINTAINED BETWEEN 8" CONDUITS AT ALL LOCATIONS.

BLACK & VEATCH

ENGINEER JRB	DRAWN TKH	NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
CHECKED JRB	DATE 06/02/2008								

SMECO, SOUTHERN MARYLAND 230kV RELIABILITY PROJECT	PROJECT 146026	DRAWING NUMBER	REV A
DOUBLE CIRCUIT DUCT BANK	CODE / AREA	SK-DBK1-060208	

Figure 2.6-3
Typical Double Circuit Duct Bank Details

The open trench duct bank route begins in the overhead line corridor. The new cable circuits would be installed by open trenching until they reach the HDD end point. The overall trenched duct bank would be approximately 5,350 feet (1,631 meters) in length. The HDD from Point Patience is a straight line across the Patuxent River, with an overall length of approximately 4,500 feet (1,372 meters).

On the Town Creek side of the river, the HDD would terminate on the south side of Patuxent Beach Road. SMECO has made an offer to purchase a 0.6 acre (0.24 hectare) tract nearer the shoreline that would be used as a termination point. The purchase transaction is in condemnation proceedings. The route would continue, as open-trenched duct bank, south along Patuxent Beach Road for approximately 1,450 feet (442 meters) to Maryland Highway 4 where the line would transition to overhead. Overhead lines cannot be used in this area due to right-of-way constraints and installing underground cables through Town Creek would avoid Project visual impacts in the area.

The concrete encased duct bank leading from the HDD end points to the riser poles would be constructed in stages so that one stage of duct bank construction is completed before the next stage is started. The staging of the construction is intended to keep the amount of open trench at any given time to a minimum and to maximize construction efficiencies.

The first step would be removal of the soil for the trench by an excavator. The soil would not immediately be removed from the work site but would be piled on the side of the trench. After this spoil has been put back in the trench following the installation of the duct bank, the remaining soil would be taken to an offsite disposal area.

Following the excavation, the conduit and reinforcement would be placed in the bottom of the trench. At the end of each day, the installed conduit would be encased in thermal concrete. This would require several concrete trucks to enter and exit the property during each pour.

After the concrete has been allowed to set up, 12 to 24 hours, the trench would be backfilled and compacted in 6-inch to 12-inch (152 to 305-millimeter) lifts (layers). In order to increase productivity, a backfill material called fluidized thermal backfill (FTB) may be used. FTB is a low strength "diggable" concrete mixture that is designed to set up quickly, provide the required thermal characteristics, and to be removable using hand tools in case of future construction in the area.

The top 12 to 18 inches (305 to 457 millimeters) of the trench would be restored to match the existing surface. This includes pavement and roadbed in roadways and sidewalks or topsoil outside of pavement.

Splicing vaults would be incorporated into the duct bank system. Splicing vaults are required because the size of the cable shipping reels limits the length of cable that can be installed as one continuous piece. The precast concrete splicing vaults would be installed to provide a clean, dry area for splicing the cable. The splicing vaults would have internal dimensions of approximately eight feet (2.4 meters) wide, 24 feet (7.6 meters) long, and eight feet (2.4 meters) deep, and would be provided in two or three pieces. Six splicing vaults would be installed on Navy property, and eight on North Patuxent Beach Road. Refer to Figure 2.6-4, Drawing DS-0010, for typical splicing vault details.

An excavator, e.g., track hoe, would remove the soil required to place the splicing vault. All spoils would be removed from the work site for proper disposal. The splicing vaults would be delivered to the excavation on flat bed trucks and would be lowered into the excavation using a large crane. The splicing vaults would be backfilled with a minimum of 18 inches (46 centimeters) of native soil cover over the top of the splicing vault.

Each splicing vault would have two manhole lids for access. Concrete pads would be poured around each manhole cover to provide an even and clean working area. The manhole cover and pad would be the only visible portion of the installation after completion. When complete, the manhole covers would be level with the grade, such that they would pose no obstruction.

Once the entire duct bank system connecting the overhead lines on both sides of the river is completed, the cable would be installed. The cable pulling activities would require the cable contractor to place trucks and pulling rigs or cable reel trailers at each splicing vault.

After the cables are installed in the duct bank system, they need to be spliced together in the splicing vaults. This splicing activity requires a splicing van to be parked directly over the splicing vaults and a few accessory vehicles parked near the splicing operations. Splicing operations would require three to five personnel for approximately 12 to 14 hours per day, for a period of two to three weeks for each splicing vault.

Where the underground transmission line meets the overhead transmission line, the cables would be routed up the cable riser structures within the transition station. Underground cable terminations would be connected to overhead transmission line conductors via conductor jumpers. Termination operations would require approximately four weeks for each circuit.

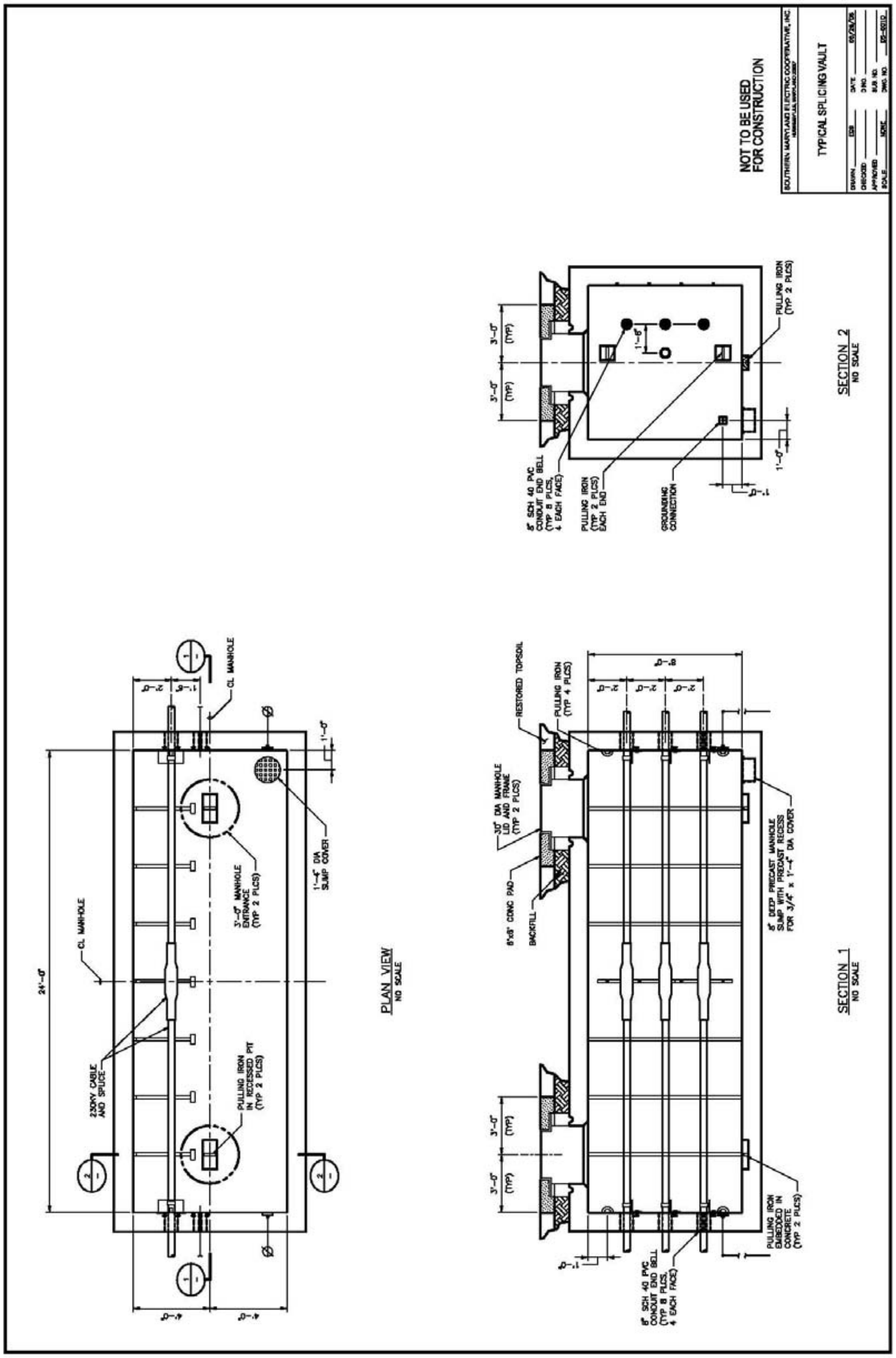


Figure 2.6-4
Typical Splicing Vault

2.6.3 Switching Stations

A new 230 kV/69 kV switching station facility currently named "Sollers Wharf switching station" would be constructed between SMECO's existing 69 kV Calvert Cliffs and Bertha substations. The preferred property for the switching station is located at the intersection of Sollers Wharf Road and Pardoe Road, just west of Maryland Highway 2/4 and near the Calvert Cliffs tap. The ultimate configuration of the switching station would be a six position 230 kV ring bus connected to a six position 69 kV ring bus through two 224 MVA, 230/69 kV transformers (refer to Figure 2.6-5, Drawing D3323-23-P0200). Initially three 230 kV transmission line positions and the transformers would be installed in the 230 kV portion of the switching station and two transmission lines and the transformers would be installed in the 69 kV switching station. Two of the 230 kV lines would connect to the existing Holland Cliff switching station and one 230 kV line would connect to the existing Hewitt Road switching station. A future line position is included for a future 230 kV circuit to Hewitt Road.

Where transformers are installed, oil containment systems that meet applicable industry standards and EPA requirements would be design and constructed. Control enclosures would be built to comply with the latest RUS seismic design regulations.

The existing 69 kV transmission line between Calvert Cliffs and Bertha substations would be cut and reterminated in the new 69 kV ring bus.

The switching station would be constructed as an open air insulated arrangement and enclosed with a high security chain link fence. The area within the fence and the perimeter outside of the fence would be covered with a uniform 4-inch (10 centimeters) thick layer washed #57 bluestone. The rock is required to provide an insulation barrier between the ground and personnel to reduce the electrical hazard caused during fault situations. The equipment within the switching station would be light grey in color as this is the industry standard color for switching station equipment.

The structures would be tubular steel type construction supported on drilled pier foundations, which would be approximately 10 to 25 feet (3.1 meters to 7.6 meters) deep. Structures and equipment would be installed using cranes and personnel lifts.

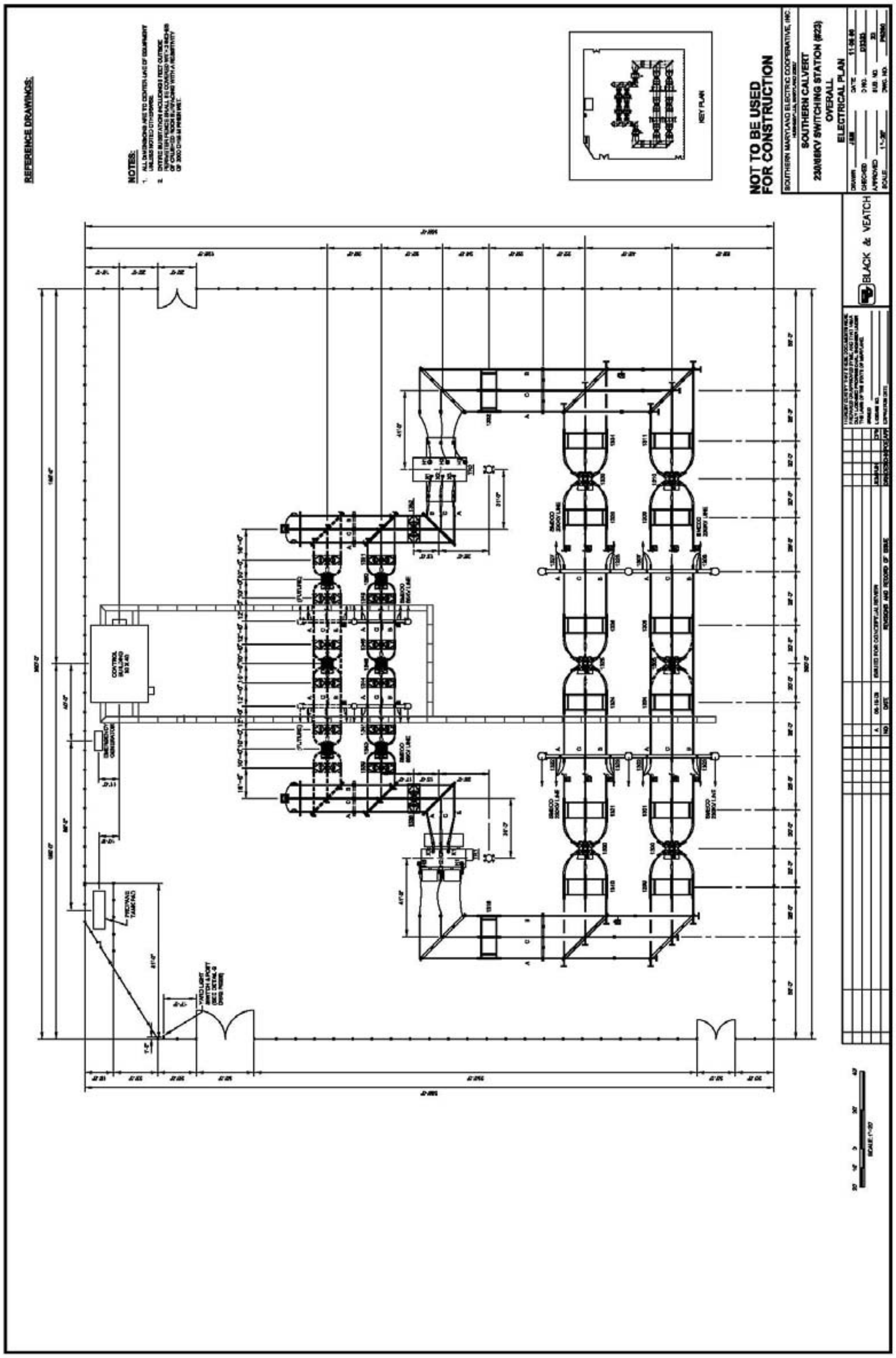


Figure 2.6-5
Sollers Wharf Switching Station

An undeveloped site would be used for the new switching station. The surface area for the site would need to be leveled to accommodate the switching station. It is expected that the site would be leveled by cutting the high spots to fill in the lower areas and/or importing dirt to fill low areas. To accommodate the new switching station, approximately 40 acres (16 hectares) would be purchased, of which six to ten acres (2.4 to 4.0 hectares) would be disturbed during construction and four to six acres (1.6 to 2.4 hectares) would be fenced to contain the station facilities. This work would be accomplished by using motor graders, front-end loaders, and trucks for hauling dirt. A new, permanent access road from a paved state or county road would be built to provide access to the site.

2.7 Naval Recreation Center Crossing

The existing 69 kV line crosses the United States Naval Recreation Center in Solomons and transitions to an underground line before crossing the Patuxent River. The new 230 kV line is proposed to cross this same property and both lines would share overhead structures. However, the 230 kV line would take a different underground course after the transition structure. SMECO has held several meetings with Navy personnel to discuss potential routes to the river crossing. Details of the plan for work on the Navy property can be found in Appendix G to this report.

2.8 Patuxent River Crossing

The existing 69 kV line crosses the Patuxent River from Calvert County to St. Mary's County at Solomons just north of the Thomas Johnson Bridge. The new 230 kV line crossing would be further north (upriver). Some details of the crossing are provided in Section 2.6.2 and more are provided in Appendices F and G to this report. Coordination with Navy personnel at their Recreation Center on the Calvert County side of the river would be essential in selecting the site for initiation of the horizontal directional drilling operations.

The river crossing construction would be accomplished in two seasons: November 2013 to March 2014 and November 2014 to March 2015. These months have been selected to minimize the impact of construction on activities at the Naval Recreation Center. During the first of the two seasons, the open trench duct bank system and the directional drilling under the river bottom would take place along with the pulling of pipe through the bore. The pipe would house the conductors. During the second season, the conductors would be pulled through the pipe and splices and terminations on both sides of the river would be completed.

2.9 Permits and Approvals Required

Table 2.9-1 preliminarily identifies applicable permits, approvals, and authorizations required for the Project. The table summarizes, for each applicable permit, the issuing agency, regulatory citation, required Project phase, and any pertinent comments regarding the permit or review process. As indicated above, the permits listed below are those currently identified for the construction and operation of the proposed transmission line. Construction permits are those permits that may be required, or may require modification, before a specific construction activity (site clearing, installation/erection of structures, etc.) commences. Operational permits are those permits needed prior to commencement of commercial operation, or shortly thereafter.

Table 2.9-1
Federal, State and Local Permits, Approvals, and Coordination Required

Permit/Approval/ Coordination	Regulatory Citation(s)	Responsible Agency(ies)	Potentially Required for:		Status (If Applicable)			Comments
			Construction	Operation	Application Contained Herein	Application to be Filed	Permit/Approval Obtained	
Federal								
Individual Permit or MDSPCG-3	Section 10 of the Rivers and Harbors Act of 1899, 33 United States Code (U.S.C.) 403	COE	☑			☑		Structures and/or work that may affect navigability of any navigable waters of the US. Structural alterations may include barge slip construction and the installation or modification to existing intake and outfall structures.
Individual Permit or MDSPCG-3	33 U.S.C. 1344	COE	☑			☑		Discharge of dredge or fill material into waters of the United States, including jurisdictional wetlands.
Spill Prevention, Control, and Countermeasure (SPCC) Plan	40 CFR 112	EPA		☑				Applicable to onsite oil storage tanks and equipment with combined capacity greater than 1,320 gallons (4,996 liters).
Notice of Proposed Construction or Alteration	14 CFR 77	FAA	☑			☑		Construction of an object, which has the potential to affect navigable airspace (height in excess of 200 feet (61 meters) or within 20,000 feet (6.1 kilometers) of an airport).
Coastal Zone Management Act (CZMA) Consistency Review	16 U.S.C. 1451 et. seq.	NOAA/ NCZMP/ MDE	☑			☑		Review to assure that the proposed activity is consistent with Coastal Zone Management Act goals and policies.

Table 2.9-1 (Continued)
Federal, State and Local Permits, Approvals, and Coordination Required

Permit/Approval/ Coordination	Regulatory Citation(s)	Responsible Agency(ies)	Potentially Required for: Construction	Operation	Status (If Applicable) Application Contained Herein	Application to be Filed	Permit/Approval Obtained	Comments
Endangered Species Act Consultation	16 USC 1531 et seq.	USFWS	☑					Consultation regarding the potential impacts to federally threatened and endangered species.
Endangered Species Act Consultation	16 USC 1531 et seq.	NOAA	☑					Consultation regarding the potential impacts to federally threatened and endangered marine species.
State								
Certificate of Public Convenience and Necessity	Annotated Code of MD 7- 207 and 7-208; and COMAR 20.79	PSC	☑				☑	Required for the construction of overhead transmission lines greater than 69 kV.
Cultural Resources Review and Consultation	National Historic Preservation Act (NHPA); 36 CFR 800	Maryland Historic Trust, State Historic Preservation Office	☑			☑		Identification, description, and evaluation of historic properties in the area of potential effect of the Project. Additional study to be done at the Naval Recreation Center.

Table 2.9-1 (Continued)
Federal, State and Local Permits, Approvals, and Coordination Required

Permit/Approval/ Coordination	Regulatory Citation(s)	Responsible Agency(ies)	Potentially Required for:		Status (If Applicable)			Comments
			Construction	Operation	Application Contained Herein	Application to be Filed	Permit/Approval Obtained	
401 Water Quality Certification	Federal Water Pollution Control Act, 33 USC 1251 et seq., and COMA 26.08.02	MDE	☑			☑		Required to assure federal action in compliance with state water quality standards
General National Pollutant Discharge Elimination System (NPDES) Permit for Stormwater associated with Construction Activity	COMAR 26.08.04	MDE	☑			☑		Discharge of stormwater during construction.
Maryland Tidal Wetlands License	COMAR 26.24	MDE	☑			☑		Required for construction work within Tidal Wetlands.
Maryland Non-Tidal Wetlands Permit	COMAR 26.23	MDE	☑			☑		Required for construction work within Non-Tidal Wetlands
Waterway and 100-year Floodplain Permits	COMAR 26.17.04	MDE	☑			☑		Any activity that changes the course, current, or cross-section of a non-tidal stream or body of water, including the 100-year floodplain.

Table 2.9-1 (Continued)
Federal, State and Local Permits, Approvals, and Coordination Required

Permit/Approval/ Coordination	Regulatory Citation(s)	Responsible Agency(ies)	Potentially Required for: Construction	Operation	Status (If Applicable) Application Contained Herein	Application to be Filed	Permit/Approval Obtained	Comments
Erosion and Sediment Control Plan /Stormwater Management Plan	COMAR 26.17.01, and COMAR 26.17.02	MDE	☑			☑		Land clearing, grading or other earth disturbances.
State Highway Administration (SHA) District Permit	COMAR 11.04.05	MSHA	☑			☑		Utility work within the State right-of-way.
Chesapeake Bay Critical Area (CBCA) Conformance	COMAR 27.02	CBCA Commission	☑			☑		Conducting regulated activities such as grading, or disturbance, within 1000 feet (305 meters) of tidal waters, tidal wetlands, or tributaries to tidal waters.
Air Quality General Permit to Construct	COMAR 26.11.02	MDE	☑			☑		Required for the installation of new equipment, including equipment such as small fuel burning equipment.
Local								
County Grading Permit	Calvert County Code, Ordinances and Resolutions Chapter 18, Building Code of Calvert County	Calvert County Department of Planning and Zoning	☑			☑		

Table 2.9-1 (Continued)
Federal, State and Local Permits, Approvals, and Coordination Required

Permit/Approval/ Coordination	Regulatory Citation(s)	Responsible Agency(ies)	Potentially Required for:		Status (If Applicable)			Comments
			Construction	Operation	Application Contained Herein	Application to be Filed	Permit/Approval Obtained	
Critical Area Permit	Calvert County Zoning Ordinance and Critical Area Program	Calvert County Department of Planning and Zoning	☑			☑		Required for activities within the Critical Area (land within 1,000 feet (305 meters) of the mean high water line of the Chesapeake Bay, Patuxent River, or their tributaries, or the landward boundary of tidal wetlands or heads of tide).
Building Permit	Calvert County Floodplain Management Ordinance	Calvert County Department of Planning and Zoning	☑			☑		Required for all development within a 100-year floodplain, including grading and excavation.
Grading Permit	Code of St. Mary's Maryland	St. Mary's County Department of Public Works and Transportation	☑			☑		Required when the anticipated earthwork activity resulting from site grading exceeds 1,000 cubic yards (765 cubic meters), and/or when stormwater management is proposed.
Building Permit for Construction within the Critical Area	Code of St. Mary's Maryland	St. Mary's County Department of Land Use and Growth Management	☑			☑		Construction of structures or other impervious surfaces within the Chesapeake Bay Critical Area.

Table 2.9-1 (Continued)
Federal, State and Local Permits, Approvals, and Coordination Required

Permit/Approval/ Coordination	Regulatory Citation(s)	Responsible Agency(ies)	Potentially Required for:		Status (If Applicable)			Comments
			Construction	Operation	Application Contained Herein	Application to be Filed	Permit/Approval Obtained	
Environmental Permit	Code of St. Mary's Maryland	St. Mary's County Department of Land Use and Growth Management	☑			☑		Land development and disturbance in the Critical Area. The Critical Area is defined as all land and water areas within 1,000 feet (305 meters) of the mean high tide line of the Chesapeake Bay and its tidal tributaries and all state or private tidal wetlands.
Utility Permit	Code of St. Mary's Maryland	St. Mary's County Department of Public Works and Transportation	☑			☑		Any utility installation or repair within a County right-of-way, digging, trenching, boring/crossing, tree removal, etc., requires a Utility Permit.

3.0 Project Alternatives

3.1 Alternative Facilities Design

As stated previously, the number of SMECO's customer-members has more than doubled in the past 20 years, and their corresponding energy use has also more than doubled over that same time period. The change is even more dramatic over the last 30 years, with energy usage increasing five-fold. In studying Project alternatives, SMECO reviewed a number of possible solutions to address the following issues:

- Growth of the Southern Maryland area and increased electrical demand.
- Construction of a reliable system that accounts for outage contingencies.

Initially, at least nine different alternatives, as described in the Alternatives Evaluation Study in Appendix A, were considered to address the potential overloads of key transmission facilities and to protect against single contingency outage scenarios that would expose sections of the SMECO service territory to extended outages. Each alternative evaluated was either eliminated or combined with another alternative for re-evaluation to address the demand and reliability issues stated above. The number of solutions involving new construction was reduced to six.

Types of evaluated alternatives include the no action alternative (Alternative 1), the installation of new generation (Alternative 2), upgrades to existing transmission facilities (Alternative 4), and construction of new transmission facilities (Alternatives 3, 5, 6, & 7). Other alternatives, including underground construction of transmission facilities, were considered but eliminated from further consideration (except for the Patuxent River 230 kV Underground River Crossing included in Alternative 7) due to excessive costs. The alternatives evaluated are described in more detail here.

3.1.1 Alternative 1: Make No Improvements to Transmission System

This alternative would make SMECO's system vulnerable to long-term outages, because there is a lack of redundancy for the areas served in Calvert County and St. Mary's County. Reliability needs to be improved to enhance electrical system operational flexibility and reduce the potential for an extended outage contingency on the local transmission system. The "no action" alternative would increase the potential for wide area blackouts under contingency situations. It would also violate good engineering principles for transmission planning, and neglect SMECO's responsibility to provide adequate and reliable electric service to its customer-members.

3.1.2 Alternative 2: Install New Generation

There are four-generation facilities located in SMECO's service area, and a fifth is proposed to be located in Charles County. None of these generation facilities is owned by SMECO. Building an additional plant in Calvert or St. Mary's County would be expensive and unnecessary. This alternative is considered excessive, and does not provide a solution for delivering power to the areas where it is most required, nor does it improve reliability for SMECO's customer-members.

3.1.3 Alternative 3: Interconnect with the Calvert Cliffs Nuclear Generation Facility 500 kV System

The nuclear plant has a 500 kV transmission system that is built for bulk power transmission and is not available for local service. An interconnection would require the development of major 500 kV electrical interconnection facilities and would not eliminate the need for a large portion of the proposed 230 kV facilities identified in the Project being proposed. In addition, if SMECO were to connect with BGE's transmission system, the interconnection would trigger federal regulations regarding wheeling power through SMECO's existing transmission system. This would require SMECO to make additional modifications to its transmission system as well as change how it operates the system. SMECO currently has no experience with 500 kV equipment or service, nor does it maintain 500 kV spare parts. From both engineering/construction and operations perspectives, this would be a costly solution with limited benefit.

3.1.4 Alternative 4: Upgrade the Calvert County 69 kV Transmission System Voltage to 138 kV

This alternative would consist of re-building approximately 60 miles (96.6 kilometers) of existing 69 kV transmission lines to 138 kV and the installation of 230/138 kV transformers at the Holland Cliff switching station. Although this option could provide a local reliable loop service, it would require rebuilding the affected transmission lines to support a higher voltage and changing all distribution substation transformers. Converting part of SMECO's system to 138 kV, a non-standard SMECO voltage, would also isolate Calvert County from the rest of SMECO's service area and would limit future capacity. SMECO would still need a second line to southern Calvert County because the existing transmission source from Hewitt Road can only be energized at 69 kV, which will not provide sufficient capacity in a contingency situation. In addition, long duration outages of the existing 69 kV transmission lines to facilitate the rebuilds would significantly reduce the reliability of the SMECO transmission system in Calvert County regardless of the load period. Finally, SMECO has no experience with 138 kV equipment or service, nor does it maintain 138 kV spare parts. From both engineering/construction and operations perspectives, this would be a costly solution with limited benefit.

3.1.5 Alternative 5: Ryceville/Morgantown to Hewitt Road 230 kV Line

This alternative would consist of the following sub-projects:

- Install a new 230 kV transmission line from either SMECO's Ryceville switching station (approximately 24 miles (38.6 kilometers)) or PEPCO's Morgantown switching station (approximately 36 miles (58.0 kilometers)).
- Modify either the Ryceville switching station or the Morgantown switching station to accommodate the new transmission line interconnect.
- Modify the Hewitt Road switching station to accommodate the new transmission line interconnect.
- Replace the existing 254 MVA transformers located in PEPCO's Chalk Point switching station with larger units to increase service capacity to SMECO's Chalk Point switching station.

A new line from Morgantown to Hewitt Road would need to cross the Wicomico River; otherwise, the line would go from Morgantown to the area near Ryceville and then south to Hewitt Road. This alternative would require new right-of-way to be acquired and cleared to accommodate the new transmission line. Optimally, the new transmission line would be located away from the right-of-way where the existing Ryceville – Hewitt Road 230 kV transmission line is located to prevent both lines from being affected by a single event. Similarly, it is not acceptable to tap the existing Ryceville – Hewitt Road 230 kV transmission line as this would also make the sources susceptible to a single failure event. This solution adds capacity and reliability for St. Mary's County and addresses the system demand issue in Calvert County. However, this alternative does not address the system reliability issues in either northern or southern Calvert County, thus leaving those areas susceptible to extended outages on the area transmission system under contingency situations.

3.1.6 Alternative 6: Chalk Point to Hughesville 230 kV Line

This alternative would consist of the following sub-projects:

- Install a new 230 kV transmission line from PEPCO's Chalk Point switching station to SMECO's Hughesville switching station (approximately 9 miles (14.5 kilometers)).
- Install a new 230 kV transmission line from the Hughesville switching station to the Hewitt Road switching station (approximately 32 miles (51.5 kilometers)).

- Expand the existing Hughesville switching station to install a new 230/69 kV interconnection.
- Modify the Chalk Point switching station to accommodate the new transmission line interconnect.
- Modify the Hewitt Road switching station to accommodate the new transmission line interconnect.
- Re-conductor approximately 6 miles (9.7 kilometers) of existing 69 kV transmission line #6705 and approximately 7 miles (11.3 kilometers) of existing 69 kV transmission line #6706.
- Install a new 69 kV transmission line from SMECO's Chalk Point switching station to southern Calvert County (approximately 20 miles (32.2 kilometers)).

To support this alternative, SMECO would need to acquire and clear approximately 61 miles (98.2 kilometers) of new right-of-way to accommodate the new transmission line construction. The addition of the 230 kV system improvements adds capacity and reliability for St. Mary's County but does not address the system demand or system reliability issues in Calvert County. The Calvert County system demand and reliability issues are addressed by the increase in capacity provided by reconductoring the 69 kV transmission lines (#6705 & #6706) and the addition of the new 69 kV transmission line to southern Calvert County. Re-conductoring these transmission lines would include installing new poles and replacing the existing conductor (556 MCM ACSR) with new conductor (1590 MCM AAC) or using the existing structures with a high temperature composite core conductor. Voltage degradation would require a regulating transformer or a shunt capacitor bank to support end-of-line voltage on the new 69 kV transmission line. This solution is very costly and provides limited future capacity and reliability benefit for Calvert County. The cost for this alternative is estimated to be $126,000,000.

3.1.7 Alternative 7: Holland Cliff to Hewitt Road 230 kV Line

This alternative was selected as the best alternative by SMECO, and comprises the Project proposed herein. It would consist of the following sub-projects:

- Install a new 230 kV transmission line from the Holland Cliff station to a new southern Calvert County switching station (approximately 20 miles (32 kilometers)).
- Install a new 230/69 kV switching station located in southern Calvert County.

- Install a new 230 kV underground transmission line circuit under the Patuxent River (approximately 2 miles (3.2 kilometers)).
- Install a new 230 kV transmission line from a new southern Calvert County switching station to the existing Hewitt Road switching station (approximately 8 miles (12.9 kilometers)).
- Modify the Hewitt Road switching station to accommodate the new transmission line interconnect.

The new 230 kV single pole, double circuit transmission lines listed above would be installed in an existing 69 kV transmission line right-of-way eliminating the need to acquire and clear new right-of-way. The new 230/69 kV Sollers Wharf switching station would be located near the existing SMECO Calvert Cliffs 69 kV transmission line tap near the intersection of Pardoe Road and Maryland State Route 4. The new 230/66 kV switching station fenced area would cover approximately four acres. The new 230 kV two-mile river crossing under the Patuxent River would be installed from Solomons to Town Creek. The additions at the existing Hewitt Road switching station would be installed within the existing fenced area. This alternative addresses the demand issue for southern Calvert County and the reliability requirements for both Calvert and St. Mary's counties. The Holland Cliff to Hewitt Road 230 kV Line alternative provides the needed capacity, system reliability, and operational flexibility required to greatly reduce the potential for an extended outage contingency on the area transmission system.

3.2 Route Selection

This section summarizes the reasons for selecting the preferred route for the Project. More details about the route itself and the alternatives considered are found in the Macro-Corridor Study report originally submitted to the RUS on August 22, 2008 and updated since then. The updated report is included as Appendix B to this report.

In order to evaluate alternative routes that would meet the needs described earlier in this report, SMECO considered several alternatives. The preferred route selected for the study supporting the BER, which SEMCO assumed would best suit all engineering, economical, and environmental constraints, was to use its existing 69 kV right-of-way for the entire length of the Project. However, before this conclusion was reached, several questions were addressed.

- Is the existing right-of-way width sufficient to accommodate both the existing 69 kV line and the new 230 kV line and meet engineering requirements?
- Even with existing rights-of-way, are there other routes that would have less impact on nearby residents?

- If alternative routes are chosen, what would be the environmental impact even if the impact on nearby residents is minor?
- Can the Project's objectives be better served by selecting a route other than that along the existing SMECO right-of-way?

Wherever the existing right-of-way was located near residential or commercial development, alternative routes were considered. Each of these areas was viewed on color aerial photography to identify land use features, possible constraints, and potential routing alternatives. Alternative routing options were evaluated relative to their distance from existing structures (residences, schools, churches, and hospitals) and the crossing of wooded areas, agricultural lands, parkland, wetlands, waters, United States Navy property, and other state or federal lands.

3.2.1 Use of Existing Rights-of-Way and New Rights-of-Way Required

Because the existing SMECO right-of-way has a 69 kV transmission line on it and is cleared and maintained, the use of existing right-of-way is normally the best option to pursue. Environmentally, it is the option of least impact. From the public's point of view, those who live and work nearby are aware of and may be accustomed to the presence of overhead lines. While placing new and larger structures in the existing right-of-way would have some visual impact, the number of structures in the right-of-way would decrease (by 30% to 40% in number) because of the longer spans that taller structures allow.

Although using the existing right-of-way has appeared to be the best option from the earliest planning stages, SMECO has considered alternative routes where the existing route traverses residential areas. But with one exception, the Broomes Island Road crossing, all of the alternatives were rejected as either having a much greater environmental impact or having an impact on just as many residents, but different ones, as does the existing route. Details on the route alternatives considered can be found in the Macro-Corridor Study Report in Appendix B.

3.2.2 Parallel to Existing Rights-of-Way

This refers to road and utility rights-of way. An opportunity arises if the use of existing rights-of-way owned by others would minimize the visual and environmental impacts of a new transmission line. The new line would be in a corridor already dedicated to utility use or along a road in a highly developed area. Constraints occur if there is not sufficient room in the right-of-way for another overhead transmission line or if placement along a road or highway poses the possibility of a forced relocation for highway widening in the future.

For two of the eight areas evaluated in the Macro-Corridor Study (Appendix B), Dowell Road and State Highway 4, alternatives paralleling that highway in or near to its right-of-way were considered. However, SMECO was notified by letter from the State Highway Administration (SHA), after the completion of the Macro-Corridor Study, that State Utility Policy prohibits the "installation of utilities longitudinally in the Right-of-Way's (sic) of through highways". This policy is based on the Federal Regulations 23, Highways Subparts A and B, Subchapter G, part 645 (the referenced letter from the SHA is included in Appendix J to this document). For this reason, no alternatives that involve the use of state highway rights-of-way or land immediately adjacent to it were considered for the new 230 kV transmission line.

Likewise, one of the alternatives for crossing the Patuxent River—attaching the new 230 kV conductors to the new Thomas Johnson Bridge—is no longer under consideration. SMECO has received another letter from the SHA stating, "Statewide Utility Policy prohibits the attachment of any high voltage electric lines greater than 69 kV to any bridge or structure." Even if attaching a cable to the bridge would be allowed, the new Thomas Johnson Bridge is in the earliest funding stages and no new bridge would be available by 2016, a year after the Project must be completed and the 230 kV transmission line must be in service. The referenced letter from the SHA is included in Appendix J to this document.

3.2.3 Overhead Length and Underground Length

Whether a line is installed, overhead or underground, length speaks primarily to costs and the better option lies with the shorter length. The longer an alterative route is, the higher the costs, in general. However, the length of an alternative route can also be proportional to its impact on the environment if tree or habitat clearing is required or if waterways are crossed. Thus, the greater length of an alternative is a constraint on its use.

3.2.4 Number of Major Angles 30^o and Greater

This has mostly to do with costs because major angle structures have construction costs in the range of 50% to 70% higher than tangent structures. The better option lies with the least number of angled structures.

3.2.5 Residences, Schools, Churches, and Hospitals Close to the Line

SMECO believes that it is important to avoid inhabited structures as much as possible. The fewer of them that are close to the right-of-way, the lower is the visual impact as well as the impact from construction and maintenance activities. Routing new lines close to these structures poses a situation to be avoided if feasible.

3.2.6 Agricultural Land, Woodlands, Parkland

The use of agricultural and woodlands for new transmission lines can pose an opportunity or a constraint depending on the monetary and aesthetic value of the land to be used. Commercial tree farms or common cropland can be an attractive alternative to an existing right-of-way in a congested area. However, natural forests and high-quality farmlands are of limited supply and pose a greater cost of acquisition, both financial and environmental.

3.2.7 U.S. Navy Property Crossed

The use of the Naval Recreation Center near Solomons poses more of an opportunity than a constraint. The land already houses SMECO's 69 kV transmission line and is completely cleared and developed. Discussions with Navy personnel indicate that the new line could be built there with little or no impact on the general public nearby and only minor disruption of activities on the property itself. More information on the Project's crossing of Navy property can be found in Appendix G to this report.

3.2.8 Alternative Routes

The Macro-Corridor study identified eight areas to be evaluated for possible alternatives to the existing right-of-way and route. These were:

- Holland Cliff Shores Subdivision.
- Intersection of the existing SMECO transmission line right-of-way and proposed PEPCO 500 kV transmission lines.
- Whispering Woods Subdivision.
- Broomes Island Road Crossing.
- St. Leonard Shores Subdivision and White Sands Subdivision.
- Dowell Road area just north of Solomons, Maryland.
- State Route 4 area and the crossings of the Patuxent River and Town Creek at Solomons (includes Naval Recreation Center).
- St. Mary's and San Souci area near State Route 235 and the Hewitt Road switching station.

Of these possible alternatives, only the Broomes Island Road Crossing and the Naval Recreation Center/Patuxent River Crossing will be pursued. At the time of submittal of the Macro-Corridor study, the Whispering Woods and St. Leonard Shores/White Sands alternatives were under consideration. Since then, information on new pole placement locations has become available and the greater span length associated with the taller structures has reduced the number of structures in each of these two areas. This has diminished the attractiveness of alternative routes, particularly for St. Leonard Shores/White Sands where several miles of forested land would have to be cleared to accommodate a new route. Recommendations for the Broomes Island Road Crossing and the Naval Recreation Center/Patuxent River Crossing are described in the Macro-Corridor Study report included in Appendix B.

Discussion of why route alternatives were eliminated can be found in Section 3.6.

3.3 Alternative Construction Materials

SMECO considered alternative technical designs for the overhead transmission line, Patuxent River crossing and the switching station facilities in the Project. Alternative construction materials and capital costs were also a primary consideration for each alternative.

3.3.1 Overhead Transmission Line

In addition to the self-supporting single pole tubular weathering steel structures selected for the Project, lattice steel and wood pole structures were considered along with using an underground transmission line in place of the overhead transmission line. The single pole tubular steel structure option was selected because it is more aesthetically pleasing and cost effective than the other pole types. This is because fewer poles are required to accommodate the design requirements. It is also less environmentally intrusive and more cost effective than the underground transmission line.

Latticed steel structures can be designed to provide the same strength as single pole tubular steel structures, but they are much larger (wider) and more visually obtrusive. Latticed steel structures have four legs each and as such require four foundations per structure. This requires more ground space. They are also wider than single pole tubular steel structures and this results in the phase conductors being located further from the centerline of the right-of-way. In addition, during SMECO's open houses for the Project, a large majority of the public voted for weathering steel instead of galvanized steel. Galvanized steel is used for latticed structures because the structures are composed of hundreds of shaped steel members. The member sizes and shapes required are not typically fabricated in weathering grade steel.

Wood poles are not technically appropriate for this application, as they do not have the strength of steel structures. As a result, they are more susceptible to storm events and are therefore not as reliable as steel structures. In addition, the spans would need to be shorter resulting in more poles and a greater visual impact.

An underground transmission line would have much greater impact on the environment during construction than overhead lines. For an underground transmission line, a duct bank would be installed the entire length of the transmission line. A duct bank is constructed by digging a trench, putting conduit into the trench, and back filling the trench with concrete and covering it with native soils. At streams and other bodies of water, the cable would be installed by boring or drilling a hole under the body of water. Conduit would be installed and the cable then pulled through it. For this Project, overhead lines can span the water bodies, except for the Patuxent River crossing.

Underground transmission lines are more difficult to repair. If a cable system fails in the underwater portion, the cable is not accessible for repair work. The only way to repair the cable is to remove the cable and install a new cable in another conduit, which greatly increases repair time.

The cost of underground transmission lines is many times the cost of overhead transmission lines. The uninstalled cost for underground cable is approximately $160 per foot while overhead conductor is approximately $3.10 per foot. As a result, cable costs alone for two three-phase underground circuits is $960 per foot, versus $18.60 per foot for two overhead circuits. Considering all the costs for an underground circuit (i.e. trenches, duct banks), and all the costs for overhead lines (i.e. towers and tower foundations), two underground transmission circuits can be 10 to 15 times the cost of two overhead transmission circuits.

Capital costs were developed for the underground transmission lines in response to questions from the public regarding one area of the route. See Appendix H for more information on costs. Capital and operating costs were not developed for the other alternatives because latticed structures have a greater visual impact and are not fabricated from weathering grade steel, the strong preference of the public. Wood poles are not a technically viable option due to their structural limitations.

3.3.2 Patuxent River Crossing

SMECO determined that installing solid dielectric cable using the horizontal directional drilling method was a better alternative to cross the Patuxent River than using pipe type cable, submarine cable jetted into the riverbed, installing cable on the Thomas Johnson Bridge, or using an overhead transmission line.

A pipe type cable system involves installing a metal pipe under the riverbed using a horizontal directional drilling method and installing a cable insulated with dielectric fluid in the pipe. This approach was not selected for several reasons. First, there is a potential environmental impact if the pipe leaks. Also, this type of system requires pumping stations, which require a building, electrical service and regular maintenance on each end of the cable. The pumping stations pressurize the dielectric fluid to maintain the integrity of the cable insulation. If the pumping stations go offline, the circuit must be shut down. Although this system is a proven technology, this is an "active" type system and adds complexity and maintenance requirements due to the pumping stations. This introduces a potential failure point--the pumping stations--and possibly reduced reliability. The solid dielectric cable system is passive and doesn't require maintenance.

Submarine cable jetted into the riverbed is a passive cable system, but the construction methods have a considerable impact on the environment, in particular the marine life in the area of and downstream from the proposed river crossing route. This construction method involves using water jets to carve a trench in the riverbed and then laying the cable in the trench. This method creates vast amounts of suspended sediment that would wash down stream. The trenches are eventually silted in and thereby closed.

Installing solid dielectric cable on the Thomas Johnson Bridge does not impact the environment. However, this is not a viable option because the SHA does not allow the attachment of any high voltage electric lines greater than 69 kV to any bridge or structure. This is stated in the SHA letter to SMECO found in Appendix J.

An overhead transmission circuit across the Patuxent River has minimal environmental impact, but it would have an adverse aesthetic impact and be a potential hazard to aviation. The span across the river would be approximately 2,000 feet (610 meters) and a span this long would have considerable sag. The Patuxent River is a navigable waterway and the bottom of the Thomas Johnson Bridge is approximately 120 feet (36.6 meters) above the water. Therefore, the lowest conductor would need to be at least 120 feet (36.6 meters), plus electrical clearances, above the water surface. This would require structures on each side of the river that are several hundred feet tall and special conductor that would have the mechanical strength required for the span. Structures this tall would not be aesthetically pleasing and they would be located near the glide slope of aircraft approaching the Patuxent River Naval Air Station.

Capital and operating costs were not developed for the alternatives for the following reasons. The pipe type cable system has a potential environmental impact, is an active system, and is potentially less reliable. The construction method for jetting cable into the riverbed creates an environmental impact to aquatic life. Cable cannot be installed on the Thomas Johnson Bridge due to Maryland's SHA policy. An overhead transmission line is technically practical, but it would have a negative visual impact and it would be a potential aviation hazard.

3.3.3 Switching Stations

In addition to the open air insulated low profile rigid bus design selected for the Sollers Wharf 230 kV/69 kV switching station, strain bus and gas insulated switching stations (GIS) were considered.

Strain bus type switching stations are designed using transmission type conductor strung between structures rather than rigid pipe (bus) supported on structures with insulators. The structures to support the conductor need to be taller than bus support structures and the phase spacing needs to be larger, resulting in a larger footprint. This is necessary because the conductors will sag when they get hot and swing during high winds. Taller structures and larger spacing are required to maintain electrical clearances. The taller structures and larger footprint would have a more negative visual impact.

The GIS approach has a smaller footprint and less environmental impact. The visual impact would also be less, but the cost is approximately twice as much for the 230 kV portion and three times as much for the 69 kV portion of the switching station as compared to conventional air insulated low profile design. Gas insulated switching stations are usually installed in congested areas, such as city centers, because they require less land. The Sollers Wharf switching station is located in a rural part of the county and ample land is available.

Capital and operating costs were not developed for the strain bus design as it requires a larger footprint and has a greater negative visual impact.

3.4 Underground Construction Alternative

Underground transmission lines are suited for areas with high population density, or areas of special concern such as navigable water crossings and near airfields, where overhead line construction is not feasible. The use of underground transmission lines for the Project has been evaluated and the results can be found in Appendix H to this document. A summary of that evaluation is contained here.

3.4.1 Construction

The installation of an underground concrete duct bank requires a large amount of excavation. The trench for the duct bank would be approximately four feet (1.2 meters) wide for a double circuit duct bank. However, this requires a construction area 50 to 60 feet (15.2 to 18.3 meters) wide to accommodate all the needed equipment. The trench is typically installed in a continuous sequential manner. An excavator opening the trench is followed directly by laying of conduit, which is followed by concrete encasement, which is followed by backfilling and restoration. Three to four days are required to open and close each section of trench. Typically, 150 to 300 feet (45.7 to 91.4 meters) of trench would be backfilled and completed each day with 300 to 500 feet (91.4 to 152 meters) of trench being left open at the end of each day, although productivity varies greatly depending on the area, trench depth and obstacles.

In addition to the trench for the duct bank, large underground splicing vaults need to be placed every 1,700 to 1,800 feet (518 to 549 meters). This is necessary because an industry standard size cable reel that can be transported legally over state highways and roads can only accommodate approximately this length of cable. Splicing three 230 kV cables requires splicing vaults that are 24 feet (7.3 meters) long, eight feet (2.4 meters) wide, and eight feet (2.4 meters) high splicing vaults. Each circuit would require separate vaults. Each vault requires one to two weeks to install and to connect to the duct bank.

Certain obstacles, such as large or protected open waterways, cannot be crossed by trenching. At these locations, the duct bank must be installed by a trenchless method such as HDD. HDD is carried out by setting up a large hydraulic drill rig on one side of the obstacle, drilling a path under the obstacle and pulling a bundle of conduits back through the borehole. Typically, HDD is significantly deeper than trenched duct bank and the circuits would likely have to be installed in separate boreholes to maintain the circuit rating. To install the conduits for a single circuit for less than 1,000 feet (305 meters) requires three to four weeks on site.

The increased amount of excavation compared to overhead transmission line construction would increase the environmental impacts of the construction. The possible impacts include nuisance dust, soil erosion, disturbing contaminated soils, wetlands disruption, and disturbing unknown cultural resources.

3.4.2 Impacts after Construction

After construction of an underground transmission line, all of the line is buried except for access lids for the splicing vaults. Each access lid has a six-feet by six-feet (1.8-meter by 1.8-meter) concrete pad poured around the lid.

The area close to and over the duct bank must be kept clear of all trees and brush for a width of 25 to 30 feet (7.6 to 9.1 meters). Vegetation over the duct bank is typically limited to grasses because large vegetation draws water from the soil and would have a de-rating effect on the transmission line. Dry soil has a higher thermal resistivity than damp soil. As excessive heat can damage the cable insulation and ultimately lead to cable failure, the current that the cable can carry must be reduced to control the build-up of heat in the insulation.

3.4.3 Impacts on Operations

Using underground cable as part of an overhead line brings several challenges to operating a transmission line. These challenges include detecting faults in the underground cable and repairing or replacing an underground cable that has been damaged due to a fault. During operation, the most common method of identifying a transmission line fault is to continually monitor the line's impedance. When the impedance of individual line segments is significantly different, such as multiple conversions from overhead to underground, it can be difficult to identify where in the line the fault has occurred.

While underground cable systems are less likely to experience a fault than overhead lines, the time required to restore a damaged cable to service would be much longer, requiring four to six weeks for a cable, splice, or termination failure. An overhead line can typically be restored in two to three days. The cable splices and terminations are the most likely components of a cable system to fail. The addition of more cable terminations in a line, such as when converting from overhead to underground, increases the chances of a cable fault.

Cables have significantly more shunt capacitance than do overhead conductors. This is because capacitance is a function of the distance between the energized conductor and the ground. The insulation of the cable is only a few inches whereas overhead conductors are tens of feet above the ground. Excessive shunt capacitance in a line will cause reactive power flow in the line, which takes the place of real power, and reduces the efficiency of the line. These reactive power flows require compensation with shunt reactors (a large device that resembles a high voltage transformer). Shunt reactors are expensive and take up large amounts of space in a switching station.

3.4.4 Impact on Cost

To respond to an inquiry from the public regarding the feasibility of taking the existing 69 kV line and new 230 kV line underground in one residential area, SMECO estimated costs on a unit basis so that the analysis could be extended to any location along the route. The costs are based on 2008 construction rates and material costs without escalation to the expected construction date for this Project. See Appendix H for a detailed summary of the estimates and the estimate assumptions.

The estimated cost to construct the entire double circuit 230 kV transmission line using an underground installation is approximately $384.2 million, at an average of $13.7 million per mile. To relocate the existing 69 kV overhead line to underground and provide for a future second 69 kV circuit, would add an additional $226.8 million, for total average cost for a four circuit duct bank and three cable circuits of approximately $21.8 million per mile. These costs do not include those associated with reactive compensation and switching station alterations that will be required for a line of this length. They also do not include removal or modification of existing structures and overhead line. The Patuxent River crossing is not included in the above costs.

3.5 Costs of Alternatives

Only two of the proposed alternatives address the reliability and demand concerns in SMECO's service area, Alternatives 6 and 7. The costs for each alternative are summarized in Tables 3.5-1 and 3.5-2. Allowance for contingencies has been added, but land and right-of-way costs are not included in the estimates.

Table 3.5-1
Cost Analysis for Alternative 6

Alternative 6: Chalk Point - Hughesville 230kV Line	**Cost in Millions**
Chalk Point – Hughesville 230 kV Transmission Line (9 miles/14.5 kilometers)	$13.5
Hughesville – Hewitt Road 230 kV Transmission Line (32 miles/51.5 kilometers)	$48.0
Hughesville 230/69 kV switching station	$13.0
Chalk Point 230 kV switching station Interconnect Upgrade	$2.0
Hewitt Road 230 kV switching station Interconnect Upgrade	$2.0
Re-conductor Lines #6705 (6 miles/9.7 kilometers) and #6706(7 miles/11.3 kilometers)	$6.5
Chalk Point to Sollers Wharf 69 kV Transmission Line (20 miles/32.2 kilometers)	$20.0
Project Contingencies and Escalation (20%)	$21.0
TOTAL	**$126.0**

Table 3.5-2
Cost Analysis for Alternative 7

Alternative 7: Holland Cliff – Hewitt Road 230 kV Line	Cost in Millions
Holland Cliff – Sollers Wharf 230 kV Transmission Line (20 miles/32.2 kilometers)	$30.0
Sollers Wharf 230/69 kV switching station	$13.0
Patuxent River 230 kV Underground River Crossing (2 miles/3.2 kilometers)	$21.6
Sollers Wharf – Hewitt Road 230 kV Transmission Line (8 miles/12.9 kilometers)	$12.0
Hewitt Road 230 kV switching station Interconnect Upgrade	$2.0
Project Contingencies and Escalation	$15.7
TOTAL	**$94.3**

3.6 Reasons for Rejection of Alternatives

SMECO has a long history of providing reliable electric service to its customer-members at an economical price. As stated earlier, the number of SMECO's customer-members and their energy use continues to increase. To meet this growth, SMECO is required to continually monitor and upgrade its transmission system to provide adequate and reliable electric service to its customer-members.

Similarly, the Project evaluated in this report will enable SMECO to continue to serve its customer-members in the most reliable and cost-effective manner possible. As presented by this report, SMECO reviewed a number of alternatives in order to address the following:

- Growth of the Southern Maryland area and increased electrical demand.
- Construction of a reliable system that accounts for outage contingencies.

The primary benefits of each of the seven alternatives that were evaluated in detail are summarized in Table 3.6-1.

Table 3.6-1
Summary of Alternatives

Evaluated Alternatives **("X" indicates that the alternative addresses the demand or reliability issue in the column heading.)**	**System Demand**	**Reliability** Northern Calvert	**Reliability** Southern Calvert	**Reliability** St. Mary's
1. Make no improvements to transmission system.				
2. Install new generation.				
3. Interconnect with the Calvert Cliffs nuclear generation facility 500 kV system.	X		X	
4. Upgrade the Calvert County 69 kV transmission system voltage to 138 kV.		X	X	
5. Ryceville/Morgantown – Hewitt Road 230 kV Line.	X			X
6. Chalk Point – Hughesville 230 kV Line.	X	X	X	X
7. Holland Cliff – Hewitt Road 230 kV Line.	X	X	X	X

Only two of the alternatives considered address the reliability and demand concerns in SMECO's service area. Of these two alternatives, Alternative 7 (the Project proposed in this report) provides the greatest long-term reliability benefits to SMECO's customer-members by creating a 230 kV transmission loop through St. Mary's and Calvert counties. Alternative 7 also has less environmental impact because it uses existing right-of-way, has the lower cost to construct as supported by the cost analysis tables (Table 3.5-1 and Table 3.5-2), and provides additional capacity, operational flexibility, and the high reliability required to greatly reduce the chances for extended outages on the area transmission system.

SMECO proposes that Alternative 7 (the Project) be implemented as the best alternative to address the growth in demand and reliability concerns in SMECO's service area. The Project completes a 230 kV transmission system loop through St. Mary's and Calvert counties providing the additional capacity, operational flexibility, and high reliability required to greatly reduce the chances for extended outages on the area transmission system. Engineering design, material procurement, switchyard property acquistion should be timed to support the required fall 2015 in-service date.

4.0 Environmental Impact Analysis

4.1 Meteorology and Ambient Air Quality

4.1.1 Affected Environment

Data obtained from the 2007 Local Climatological Data report for Ronald Reagan Washington National Airport (KDCA), was used to define the general climatology of the Project area. Ronald Reagan Washington National Airport is located in Washington D.C. and is approximately 25.9 miles (41.7 kilometers) to the northwest of the proposed Holland Cliff switching station and 49.4 miles (79.5 kilometers) to the northwest of the existing Hewitt Road switching station, which frame the Project area.

The annual mean daily maximum temperature for this region is 66.4 ^{o}F (19.1 ^{o}C), while the annual mean daily minimum temperature is 48.9 ^{o}F (9.4 ^{o}C). Summers are humid and warm with normal daily maximum temperatures in the upper 80s; the highest normal daily maximum temperature of 87.9 ^{o}F (31.1 ^{o}C) occurs in July. The winters are cold with normal daily minimum temperatures in the upper 20s; the lowest normal daily minimum temperature of 27.3 ^{o}F (-2.6 ^{o}C) occurs in January.

Annual precipitation for this region amounts to approximately 40 inches (102 centimeters). Precipitation is mostly uniform over the course of the year. However, summer rainfall is typically the largest source of precipitation, with July experiencing the highest normal monthly rainfall at 3.99 inches (10.1 centimeters). Winter precipitation is typically lower, with February being the driest month of the year receiving 2.57 inches (6.53 centimeters) of precipitation.

Annual mean wind speeds for this region register at 9.2 miles per hour (mph) (14.8 kilometers per hour) (kph). The highest monthly mean wind speed occurs in March at 10.7 mph (17.2 kph). The lowest monthly mean wind speed occurs in August at 8.1 mph (13.0 kph).

Severe weather in this region is most commonly in the form of thunderstorms, with late spring and summer making up the peak season. The largest threat of these thunderstorms is with heavy rains, which can cause local flooding. Cold winters may also cause flooding due to the ice formation in the Potomac River that blocks the flow of water. Tropical storms and hurricanes can produce heavy rain and greater than normal tides that may cause flooding, but seldom does either produce extensive damage. Tropical storms in this region have produced wind gusts near 100 mph (161.0 kph) and rainfall over 7 inches (18 centimeters). Tornadoes are infrequent in this region but are capable of severe damage on a local scale.

4.1.1.1 Ambient Air Quality. The U.S. Environmental Protection Agency (USEPA) Green Book indicates that Calvert County, Maryland, the location of the proposed Holland Cliff switching station and most of the proposed 230 kV transmission line, is designated as a nonattainment area for the criteria pollutant ozone. St. Mary's County, Maryland, the location of the existing Hewitt Road switching station and several miles of the proposed 230 kV transmission line, is designated as an attainment area for the criteria pollutant ozone. Although Calvert County does not currently meet the ambient air quality standards for ozone, the Project would create only small amounts of nitrogen oxides (NO_x) and volatile organic (VO_x) emissions (the precursor to ozone formation) on a short-term basis during the construction phase and no such air emissions would occur during operation of the Project. Therefore, the Project would have a minimal and temporary impact upon the air quality of the area.

4.1.2 Environmental Consequences

4.1.2.1 Criteria Pollutants. Emissions during the construction period of the Project would occur as a result of dust generation activities and combustion-related activities. These emissions would be short-lived as the construction period is expected to last approximately 43 months in total, but only briefly for any specific area along the route. The following paragraphs describe the types and sources of air emissions and address controls to mitigate impacts.

During construction, atmospheric dust (particulate matter) would be generated from the mechanical disturbance of granular material that becomes exposed to the wind at the construction site. The dust is often referred to as fugitive dust, as its source is particulate matter that cannot be reasonably discharged to the atmosphere in a confined flow stream. Construction activities, including material moving activities, site preparation, and vehicle traffic, all have the potential to generate fugitive dust. The construction activities may be generally broken down into the following three phases as related to generating fugitive dust.

The first phase consists of debris removal. Debris removal consists of removing any manmade or natural obstructions from the construction site. However, this would likely be limited to material loading/unloading, small disturbed areas, and vehicular travel on unpaved surfaces. The second phase consists of site preparation. Site development includes the general site grading and soil stabilization techniques. Typical fugitive dust emission sources during this phase include movement of large earth moving equipment (e.g., excavators and drill rigs) over disturbed surfaces, material/aggregate loading and unloading, and vehicular travel on unpaved surfaces. The third phase consists of general construction. The actual construction phase is the final, but generally the longest, phase of the construction Project. In contrast to the first two phases, fugitive dust emissions during the third phase are somewhat sporadic in nature, depending on the delivery schedule of parts and materials, with many simultaneous operations throughout the construction site.

Fugitive dust emissions result from a variety of activities that can require a multitude of different emission control alternatives. Additionally, the relatively short-term nature of construction activities makes some fugitive dust control methods more cost-effective and practical than others. A wide variety of dust control methods ranging from work practice controls to physical/chemical stabilization, including watering, graveling, and wind fencing, may be employed during the construction Project to help mitigate fugitive dust emissions as necessary. Along the transmission line, construction vehicles would drive on grassed right-of-way, which may cause rutting but not emissions of particulate matter. Soil disturbance by construction equipment would be limited to excavations at pole locations and the flattening of sharp hilltops with blades to allow flat bed trucks and other long vehicles to pass. Water for suppression of dust would be used on an as needed basis depending on the dryness of the soil and the intensity of winds. All such soil disturbances would be of short duration. Site watering would be used on the switching station site until the installation of a rock surface after construction of foundations, conduit, and grounding facilities.

Air quality impacts would also result from the operation of construction equipment's internal combustion. Typically, the types of equipment used for construction projects will release NOx, sulfur oxides (SOx), Carbon Monoxide (CO), Carbon Dioxide (CO_2), particulate matter (PM) $_{10}$, $PM_{2.5}$ and other combustion products. The use of this equipment would produce emissions during the preparation of the site and during the construction of the Project. However, these emissions are temporary and would cease upon the completion of the Project.

The air quality impacts associated with this Project are expected to be minimal and limited primarily to the immediate construction area.

Air quality impacts associated with the operation of the new line would be limited to right-of-way clearing activities, which require the use of gasoline-powered mowers, hand-held power tools, and the vehicles needed to transport them.

Tables 4.1-1 through 4.1-3 provide estimates of actual emissions from construction based on current knowledge information.

Table 4.1-1
Engine Emissions

Engine Emissions Calculation

SCC Description	Equipment	Average Horsepower	Quantity	Emission Factors (lb/hr/unit)							Operation			Total Emissions During Construction Event (tons)						
				VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SO_2	CO_2	hrs/day	days/week	total weeks	VOC	CO	NOx	PM_{10} [3]	$PM_{2.5}$ [3]	SO_2	CO_2
Diesel Cranes	Crane	230.9	2	0.0773	0.2834	1.1250	0.0546	0.0530	0.0251	116.5084	4	5	30	4.64E-02	1.70E-01	6.75E-01	3.28E-02	3.18E-02	1.50E-02	6.99E+01
Diesel Off-Highway Tractors	Timber Jack[2]	725	1	0.3605	2.4135	5.2521	0.3128	0.3034	0.1087	505.1532	4	5	20	7.21E-02	4.83E-01	1.05E+00	6.26E-02	6.07E-02	2.17E-02	1.01E+02
Diesel Chippers/Stump Grinders	Wood Chipper	143.9	1	0.0807	0.3350	0.8146	0.0610	0.0592	0.0161	75.0408	0	0	0							
Diesel Bore/Drill Rigs	Drill Rig	175.6	2	0.0949	0.3933	1.1105	0.0716	0.0695	0.0193	89.6642	8	5	15	5.70E-02	2.36E-01	6.66E-01	4.30E-02	4.17E-02	1.16E-02	5.38E+01
	Hydraulic Vibrator		1								0	0	0				1.16E-05	1.14E-06		
Diesel Off-highway Trucks	Bucket Trucks[1]	782.9	4	0.2749	1.6071	4.8930	0.2317	0.2247	0.1174	545.8736	8	5	20	4.40E-01	2.57E+00	7.83E+00	3.71E-01	3.60E-01	1.88E-01	8.73E+02
Diesel Excavators	Excavator	171.2	2	0.0712	0.3652	0.9454	0.0650	0.0630	0.0259	120.4610	2	5	10	7.12E-03	3.65E-02	9.45E-02	6.51E-03	6.30E-03	2.59E-03	1.20E+01
Diesel Off-highway Trucks	Concrete Truck[1]	782.9	2	0.2749	1.6071	4.8930	0.2317	0.2247	0.1174	545.8736	8	5	15	1.65E-01	9.64E-01	2.94E+00	1.39E-01	1.35E-01	7.05E-02	3.28E+02
Diesel Off-highway Trucks	Pumper Truck[1]	782.9	2	0.2749	1.6071	4.8930	0.2317	0.2247	0.1174	545.8736	6	5	15	1.24E-01	7.23E-01	2.20E+00	1.04E-01	1.01E-01	5.28E-02	2.46E+02
Diesel Off-highway Trucks	Stringing Truck[1]	782.9	1	0.2749	1.6071	4.8930	0.2317	0.2247	0.1174	545.8736	8	5	10	5.50E-02	3.21E-01	9.79E-01	4.63E-02	4.49E-02	2.35E-02	1.09E+02
Diesel Graders	Motor Grader	204.4	1	0.0848	0.3861	1.1314	0.0739	0.0717	0.0307	142.7235	2	5	5	2.12E-03	9.65E-03	2.83E-02	1.86E-03	1.79E-03	7.68E-04	3.57E+00
Diesel Off-highway Trucks	Dump Truck[1]	782.9	2	0.2749	1.6071	4.8930	0.2317	0.2247	0.1174	545.8736	2	5	5	1.37E-02	8.04E-02	2.45E-01	1.16E-02	1.12E-02	5.87E-03	2.73E+01
Diesel Plate Compactors	Compactor	7.5	1	0.0073	0.0312	0.0459	0.0050	0.0049	0.0009	4.1938	0	0	0				1.16E-05	1.14E-06		

Notes:
Emission factors from national average output from the US EPA NONROAD model for 2008 as received from the US EPA in email correspondence on August 12, 2008.
[1] Diesel Off-highway Trucks were assumed to be appropriate for this piece of equipment.
[2] Diesel Off-highway Tractors were assumed to be appropriate for this piece of equipment.
[3] PM_{10} and $PM_{2.5}$ are the combined emissions (tons) for both the combustion and fugitive dust on both paved and unpaved roads.

Table 4.1-2
Paved Road Emissions

Paved Road Emissions Calculation

Emission Factor (EF) Equation [1]

EF = [k * (sL/2)^0.65 * (W/3)^1.5 - C] * (1-(P/(4*N)))

Where:

EF =	particulate emission factor, lb/VMT		
k =	particle size multiplier =	0.082	for TSP [1a]
		0.016	for PM-10 [1a]
		0.0024	for PM-2.5 [1a]
sL =	surface silt loading, g/m^2 =	0.6	Ubiquitous Baseline (ADT <500) [1c]
W =	average vehicle weight, tons =	see Table below	
C =	emission factor for 1980's vehicle fleet exhaust, brake & tire wear	0.00047	for TSP & PM-10 [1b]
		0.00036	for PM-2.5 [1b]
P =	number of days per year with at least 0.01 in of precipitation	114.3	[2]
N =	number of days in the averaging period	365	

Vehicle Traffic - Paved Road Emissions:

Transport Activity	Average Vehicle Weight	Vehicle Mile Traveled	Emission Factor			Potential to Emit Calcu Potential Uncontrolled Emissions		
			TSP	PM-10	PM-2.5	TSP	PM-10	PM-2.5
	tons	VMT/yr	lbs/VMT	lbs/VMT	lbs/VMT	ton/yr	ton/yr	ton/yr
Crane	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Timber Jack	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Drill Rig	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Hydraulic Vibrator	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Bucket Trucks	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Excavator	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Concrete Truck	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Pumper Truck	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Stringing Truck	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Motor Grader	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Compactor	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
Dump Trucks	1.0	1	0.01	0.00	0.00	0.00	0.00	0.00
					Total Uncontrolled Emissions (tons/yr)	**0.00**	**0.00**	**0.00**

Notes [ ]:
1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.1 "Paved Roads". November 2006 (Updated March 7, 2007).
   a. Table 13.2.1-1 "Particle Size Multipliers for Paved Road Equation"
   b. Table 13.2.1-2 "Emission Factor for 1980's Vehicle Fleet Exhaust, Brake Wear and Tire Wear"
   c. Table 13.2.1-3 "Ubiquitous Silt Loading Default Values with Hot Spot Contributions from Anti-Skid Abrasives (g/m^2)"
2. U.S. Department of Commerce. "Local Climatological Data - Annual Summary with Comparative Data". Washington D.C. (KDCA). NCDC, NESDIS, NOAA. 2007.
3. Water flushing/sweeping based on USEPA's document "Control of Open Fugitive Dust Sources", EPA 450-88-088, September 1988.

Table 4.1-3
Unpaved Road Emissions

Emission Factor (EF) Equation [1]

EF = k * (s/12)^a * (W/3)^b * ((365-p)/365)

Where:

EF =	particulate emission factor, lb/ton		
k =	particle size multiplier =	4.9	for TSP
		1.5	for PM-10
		0.15	for PM-2.5
a =	constant =	0.7	for TSP
		0.9	for PM10 & PM2.5
s =	surface material silt content, % =	8.5	for construction site roads [1a]
b =	constant =	0.45	for TSP, PM10, & PM2.5
W =	average vehicle weight, tons =	see Table below	
p =	number of days per year with at least 0.01 in of precipitation	114.3	[2]

Vehicle Traffic - Unpaved Road Emissions:

Transport Activity	Average Vehicle Weight	TSP Emission Factor	PM-10 Emission Factor	PM-2.5 Emission Factor	Vehicle Mile Traveled	Potential to Emit Calculations: Potential Uncontrolled Emissions TSP	PM-10	PM-2.5	Control Method	Control Efficiency [3]	Potential Controlled Emissions TSP	PM-10	PM-2.5
	tons	lbs/VMT	lbs/VMT	lbs/VMT	VMT/yr	ton/yr	ton/yr	ton/yr		%	ton/yr	ton/yr	ton/yr
Crane	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Timber Jack	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Drill Rig	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Hydraulic Vibrator	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Bucket Trucks	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Excavator	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Concrete Truck	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Pumper Truck	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Stringing Truck	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Motor Grader	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Compactor	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Dump Trucks	1.0	1.61	0.46	0.05	1	0.00	0.00	0.00	Watering and Speed Reduction	95	4.03E-05	1.15E-05	1.15E-06
Total Uncontrolled Emissions (ton/yr)						0.01	0.00	0.00	**Total Controlled Emissions (ton/yr)**		0.00	0.00	0.00

Notes [ ]:

1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.2 "Unpaved Roads". November 2006.
   a. Table 13.2.2-1 "Typical Silt Content Values of Surface Material on Industrial Unpaved Roads" - Construction Sites
2. U.S. Department of Commerce. "Local Climatological Data - Annual Summary with Comparative Data". Washington D.C. (KDCA). NCDC, NESDIS, NOAA. 2007.
3. Watering based on EPA-450/3-88-008 (75%), 15 mph speed reduction based on Ohio EPA RACM 1980 document (80%)

4.1.2.2 Carbon Dioxide. Carbon dioxide is a greenhouse gas. Greenhouse gases are among the many chemical compounds found in the earth's atmosphere (including water vapor, carbon dioxide, methane, and nitrous oxide). However, unlike other gases, greenhouse gases trap heat in the atmosphere. When sunlight strikes the earth's surface, some of it is re-radiated back into space as heat. Greenhouse gases inhibit the movement of heat back into space, thus trapping it in the earth's atmosphere and raising temperatures at the earth's surface. This temperature rise may, in turn, produce climate change, which includes changes in precipitation patterns and increases in storm severity and sea level.

Greenhouse gases in the atmosphere occur both naturally and as a consequence of human activity. The latter type is called an "anthropogenic" cause. Carbon dioxide in the atmosphere is currently of particular concern because of the magnitude of emissions from anthropogenic sources such as coal-fired and other fossil-fueled power plants. Of the anthropogenic greenhouse gas emissions in the United States in 2006, nearly 84% were from carbon dioxide, nearly all of this from the energy industry. For this reason, any Project that might generate carbon dioxide emissions, or interfere with the natural sequestration of carbon dioxide, by trees for example, should address the issue of greenhouse gases. Sequestration is the process by which trees remove carbon dioxide from the air and return oxygen through the process of photosynthesis, so the elimination of trees contributes to an increase in greenhouse gases in the atmosphere.

In order to minimize any interference with sequestration resulting from this Project, SMECO proposes to use as much of its existing right-of-way as possible, specifically, more than 95% of the total length of the proposed Project route would be existing (already cleared) right-of-way. Because of this, very few trees would be cleared. One of the alternative routes under consideration for construction (Broomes Island Road Crossing Alternative B from the Macro-Corridor Study) would require the removal of trees along some 500 feet (152 meters) of the route. With a right-of-way width of 150 feet (45.7 meters), approximately 75,000 square feet (6,968 square meters), or 1.7 acres (0.7 hectares), of trees would be removed using this alternative. The only other alternative route under consideration goes through the United States Naval Recreation Center at Solomons, an area already fully developed. There may be some incidental tree removal required, though design is not advanced to the stage of knowing precisely how many trees would be affected.

Sequestration potential varies with climate, tree species, tree health, and tree size. Research for this document found sources claiming as few as 13 pounds (5.9 kilograms) and as many as 50 pounds (22.7 kilograms) (in the tropics) of carbon dioxide sequestered per tree per year, with most of the sources closer to the lower value. Assuming (1) a value of 20 pounds (9.1 kilograms) of carbon dioxide per tree per year, a value more appropriate to Maryland, and (2) 100 trees per acre (247 trees per hectare), which is the minimum density needed to meet the definition of "forest" under the 1991 Maryland Forest Conservation Act, the Project might expect to eliminate at least 3,400 pounds (1.7 tons) (1,542 kilograms) of carbon dioxide sequestration potential. If this amount of forested land needs to be cleared for the Project, SMECO would hire a qualified professional to perform a forest stand delineation and forest conservation plan.

There are no effects of the Project on carbon dioxide emissions from additional power generation. Whether or not SMECO builds the Project, the demand for energy will grow as described in the Project need section of this report. The addition of 230 kV circuits will help to meet that demand and improve service reliability in the region, but will not in any way give rise to or require additional generation of power.

4.1.3 Mitigation Measures

As stated previously, a wide variety of dust control methods are available. Along the transmission line, construction vehicles would drive on grassed right-of-way, which would minimize emissions of particulate matter. Soil disturbance by construction equipment would be limited to excavations at pole locations and the flattening of sharp hilltops with blades to allow flat bed trucks and other long vehicles to pass. For these activities, water for suppression of dust would be used on an as needed basis, depending on the dryness of the soil and the intensity of winds. All such soil disturbances would be of short duration. Site watering would be used on the switching station site until the installation of a rock surface after construction of foundations, conduit, and grounding facilities.

4.2 Physiography

The Project begins at the Holland Cliff switching station in Calvert County, runs southeast through the length of the county, and then crosses the Patuxent River into St. Mary's County. Both counties are located in the Western Shore Uplands Region of the Atlantic Coastal Plain Physiographic Province (Coastal Plain) in Maryland (Edwards, 2001). The Coastal Plain is a low and partially submerged area with many marshes and estuaries (MDSP, 1973). The Western Shore and Eastern Shore areas of the Coastal Plain are separated by the Chesapeake Bay.

4.2.1 Affected Environment

4.2.1.1 Topography. The Project is approximately 30 miles (48.3 kilometers) long and runs through portions of Calvert County and St. Mary's County. The proposed line runs through an approximately 24-mile (38.6-kilometer) long section of Calvert County, and an approximately 4-mile (6.4-kilometer) long section of east-central St. Mary's County.

Calvert County is situated along a topographic ridge that is bordered to the east by the Chesapeake Bay and to the west by the Patuxent River. Generally, the crest of the ridge slopes gently towards the southeast. Steep slopes and ravines are frequently present along the Chesapeake Bay, the Patuxent River and in upland drainage areas. These drainage areas include the central portion of Calvert County where steep slopes and more rugged areas are present due to the headwaters of several streams.

St. Mary's County is situated along a topographic ridge that is bordered by the Patuxent River on the east and the Potomac River on the west. Generally, topography slopes towards the southeast. Steep slopes are frequently present along the Patuxent River, the Potomac River, and in upland drainage areas. In St. Mary's County near the proposed SMECO line, the topography increases less than 10 feet (3.0 meters) between the Patuxent River and the existing switching station located at the southern terminus of the line.

Inland elevations of both counties are generally between 100 feet (30.5 meters) and 150 feet (45.7 meters) above sea level. Local relief is variable and generally increases significantly near drainage features. Steep slopes can occur near the major streams and along the shorelines of the Patuxent River and the Chesapeake Bay. Soil slopes near the proposed SMECO line indicate steep slopes are common (USDA, 2008a). USGS Quadrangle maps of the SMECO route are provided in Appendix I.

4.2.1.2 Geology. The Coastal Plain is underlain by a wedge-shaped sedimentary sequence that unconformably overlies Paleozoic-age crystalline basement rocks. The wedge shape of these sediments is due to subsidence of the coastline since the Mesozoic (Wheeler and Wilde, 1989) Era. The thickness of the sediment wedge ranges from less than one foot (0.3 meters), where exposures of crystalline bedrock define the boundary between the Coastal Plain and Piedmont Physiographic Provinces, to more than 8,000 feet (2,438 meters) near the coastline. Drilling logs near the proposed SMECO transmission line close to the city of Prince Frederick indicate more than 1,600 feet (488 meters) of sediments are present above basement rocks (MGS, 2007).

The geology of the Coastal Plain includes Quaternary to Cretaceous age sediments. Along the proposed SMECO transmission line in Calvert and St. Mary's counties, only Quaternary and Tertiary deposits are present (Cleaves et al., 1968).

Cretaceous sediments and undifferentiated crystalline bedrock are present in the subsurface (see Table 4.2-1). Maps of the geology of Calvert County and St. Mary's County are presented in Figures 4.2-1 and 4.2-2, respectively. The legend for Figures 4.2-1 and 4.2-2 is contained in Figure 4.2-3.

In general, the Cretaceous to Quaternary sediments are semi-consolidated or unconsolidated. The upper formations are the Quaternary Lowland deposits and Tertiary Upland deposits (referred to as the Columbia Group). Both units are dominantly composed of interbedded layers of unconsolidated sand, gravel, sandy clay and clay. Drilling logs indicate the thickness of the Lowland and Upland deposits along the proposed SMECO transmission line are variable and range from less than 15 feet (4.6 meters) to more than 50 feet (15.2 meters). Beneath the Tertiary Upland deposits, the Tertiary Chesapeake Group includes the St. Mary's, the Choptank, and the Calvert formations and is composed of fossiliferous and diatomaceous sands, clayey sands, and sandy clays. The thickness of the Chesapeake Group ranges from approximately 150 feet (45.7 meters) to 250 feet (76.2 meters). Beneath the Chesapeake Group, the Tertiary Pamunkey Group includes the Piney Point, the Nanjemoy, and the Aquia formations and is composed of glauconitic sands and clays. The Marlboro Clay exists between the Nanjemoy and the Aquia formations. The thickness of the Pamunkey Group ranges from approximately 250 feet (76.2 meters) to more than 400 feet (122 meters).

The Cretaceous units include the Monmouth Group, the Magothy Formation, and the Potomac Group. Surface exposures of the Cretaceous units are typically absent in Calvert and St. Mary's counties, but frequent outcrops exist in Maryland further to the north. These units are composed of a complex arrangement of fluvial and lacustrine sands, gravels, clays, and sandy clays with limited lateral extent in several cases. Drilling logs indicate the Magothy Formation and the upper portion of the Potomac Formation are not present in southern Calvert County. Cretaceous-age sediments of the Monmouth Group, Matawan Group, Magothy Formation and the Potomac Group are more than 1,000 feet (305 meters) thick and extend to the crystalline bedrock.

4.2.1.3 Soils. Thirty-one soil units of varying slope are identified along the proposed SMECO transmission line in Calvert County and St. Mary's County (USDA, 2008a). Six major soil units make up more than 63% of the total area. These major soil units include the Sassafras-Westphalia (~22% of the area), the Sassafras (~13%), the Rumsford-Evesboro (~9%), the Matapeake (~8%), eroded land (~ 6%), and mixed alluvial land (~5%). Generally, these soils represent the major soil groups identified in Calvert County where the majority of the proposed SMECO transmission line is located (USDA, 2008b). Tables 4.2-2 and 4.2-3 present the soil units documented along the proposed SMECO transmission line.

Table 4.2-1
Geologic and Hydrostratigraphic Units of Southern Maryland

[Modified from Hansen and Wilson, 1984; McCartan, 1989b; and Achmad and Hansen, 1997; Fm, formation]

ERATHEM	SYSTEM	SERIES	FORMATION (Group)	FORMATION	THICKNESS (feet)	LITHOLOGY	HYDROSTRATIGRAPHIC UNIT
CENOZOIC	QUATERNARY	Holocene & Pleistocene		Lowland deposits	0-150	Sand, gravel, sandy clay, and clay.	SURFICIAL AQUIFER
	NEOGENE	Pliocene		Upland deposits	0-85	Irregularly stratified cobbles, gravel, sand, and clay lenses.	
			Chesapeake Group	Yorktown Fm.	0-20	Fine-grained glauconitic sand.	CHESAPEAKE CONFINING UNIT
		Miocene		Eastover Fm.	0.5-40	Clayey silt with thin laminae of silt, clay, or sand.	
				St. Marys Fm.	0-335	Sand, clayey sand, and sandy clay; fossiliferous and diatomaceous.	
				Choptank Fm.			
				Calvert Fm.			
	PALEOGENE	Oligocene		Old Church Fm.	0-5	Patchy distribution; clayey, glauconitic sand.	PINEY POINT AQUIFER
		Eocene	Pamunkey Group	Piney Point Fm.	0-90	Sand, slightly glauconitic, with intercalated indurated layers; fossiliferous.	
				Nanjemoy Fm.	0-240	Glauconitic sand with clayey layers.	NANJEMOY CONFINING UNIT
		Paleocene		Marlboro Clay	0-30	Pink and gray clay.	
				Aquia Fm.	30-205	Glauconitic, greenish to brown sand with indurated layers; fossiliferous.	AQUIA AQUIFER
				Brightseat Fm.	0-40	Gray to dark-gray micaceous silty and sandy clay.	BRIGHTSEAT CONFINING UNIT
MESOZOIC	CRETACEOUS	Upper	Monmouth Group; Matawan Group	Formations undifferentiated	0-135	Sandy clay and sand, dark gray to black, with minor glauconite; fossiliferous.	
				Magothy Fm.	0-230	Light gray to white sand and fine gravel with interbedded clay layers; contains pyrite and lignite. Includes two sand units in southern Anne Arundel County where the formation is thickest.	MAGOTHY AQUIFER
		— ? —	Potomac Group	Patapsco Fm.	0-1,200	Interbedded sand, clay, and sandy clay; color variegated, but chiefly hues of red, brown and gray; consists of several sandy intervals that function as separate aquifers.	Patapsco aquifer system: UPPER PATAPSCO CONFINING UNIT; UPPER PATAPSCO AQUIFER; MIDDLE PATAPSCO CONFINING UNIT; LOWER PATAPSCO AQUIFER
		Lower		Arundel Fm.	0-400	Red, brown, and gray clay; in places contains ironstone nodules, carbonaceous remains, and lignite.	ARUNDEL CONFINING UNIT
				Patuxent Fm.	100-650	Interbedded gray and yellow sand and clay; kaolinized feldspar and lignite common. Locally clay layers predominate.	PATUXENT AQUIFER
				"Waste Gate Fm."	32*	Light gray to gray tan, fine to medium, clayey sands and clayey silts; feldspathic.	Not a fresh-water aquifer
PALEOZOIC / PRECAMBRIAN	Undifferentiated pre-Cretaceous consolidated-rock basement				Unknown	Igneous and metamorphic rocks; sandstone and shale.	NOT RECOGNIZED

* at Lexington Park

Table 4.2-2
Soil Types in Calvert County

Map Unit Legend

Calvert County, Maryland (MD009)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BIB2	Beltsville silt loam, 2 to 5 percent slopes, moderately eroded	112.6	1.4%
BIC3	Beltsville silt loam, 5 to 10 percent slopes, severely eroded	5.3	0.1%
BtA	Butlertown silt loam, 0 to 2 percent slopes	33.0	0.4%
BtB2	Butlertown silt loam, 2 to 5 percent slopes, moderately eroded	49.8	0.6%
BtC3	Butlertown silt loam, 5 to 10 percent slopes, severely eroded	7.7	0.1%
Co	Coastal beaches	7.1	0.1%
Ek	Elkton silt loam	3.5	0.0%
ErE	Eroded land, steep	482.0	6.2%
EvB	Evesboro loamy sand, 0 to 6 percent slopes	105.8	1.4%
EvC	Evesboro loamy sand, 6 to 12 percent slopes	36.3	0.5%
EvE	Evesboro loamy sand, 12 to 35 percent slopes	59.7	0.8%
FsA	Fallsington sandy loam, 0 to 2 percent slopes	1.3	0.0%
FsB	Fallsington sandy loam, 2 to 5 percent slopes	5.7	0.1%
Gp	Gravel and borrow pits	12.1	0.2%
HoB2	Howell fine sandy loam, 2 to 6 percent slopes, moderately eroded	4.1	0.1%
HoD2	Howell fine sandy loam, 12 to 20 percent slopes, moderately eroded	1.9	0.0%
HyD3	Howell clay loam, 12 to 20 percent slopes, severely eroded	4.4	0.1%
ImB	luka fine sandy loam, local alluvium, 2 to 5 percent slopes	14.2	0.2%
KpA	Keyport silt loam, 0 to 2 percent slopes	7.2	0.1%
KpB2	Keyport silt loam, 2 to 5 percent slopes, moderately eroded	3.8	0.0%
MIB2	Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded	17.3	0.2%

Table 4.2-2 (Continued)
Soil Types in Calvert County

Calvert County, Maryland (MD009)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
MIC2	Marr fine sandy loam, 6 to 12 percent slopes, moderately eroded	3.0	0.0%
MIC3	Marr fine sandy loam, 6 to 12 percent slopes, severely eroded	63.8	0.8%
MID3	Marr fine sandy loam, 12 to 20 percent slopes, severely eroded	20.8	0.3%
MmA	Matapeake fine sandy loam, 0 to 2 percent slopes	1.4	0.0%
MmB2	Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded	0.7	0.0%
MnA	Matapeake silt loam, 0 to 2 percent slopes	31.4	0.4%
MnB2	Matapeake silt loam, 2 to 5 percent slopes, moderately eroded	347.7	4.5%
MnC2	Matapeake silt loam, 5 to 10 percent slopes, moderately eroded	13.6	0.2%
MnC3	Matapeake silt loam, 5 to 10 percent slopes, severely eroded	74.9	1.0%
MnD3	Matapeake silt loam, 10 to 15 percent slopes, severely eroded	11.6	0.1%
MtA	Mattapex fine sandy loam, 0 to 2 percent slopes	5.2	0.1%
MtB2	Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded	10.4	0.1%
MuA	Mattapex silt loam, 0 to 2 percent slopes	12.1	0.2%
MuB2	Mattapex silt loam, 2 to 5 percent slopes, moderately eroded	36.5	0.5%
MuD3	Mattapex silt loam, 5 to 15 percent slopes, severely eroded	7.4	0.1%
My	Mixed alluvial land	393.0	5.0%
OcB	Ochlockonee fine sandy loam, local alluvium, 2 to 5 percent slopes	0.7	0.0%
OtA	Othello silt loam, 0 to 2 percent slopes	12.2	0.2%
OtB	Othello silt loam, 2 to 5 percent slopes	1.6	0.0%
RdB	Rumford loamy sand, 2 to 5 percent slopes	75.1	1.0%

Table 4.2-2 (Continued)
Soil Types in Calvert County

Calvert County, Maryland (MD009)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
RdC2	Rumford loamy sand, 5 to 10 percent slopes, moderately eroded	47.5	0.6%
RdD2	Rumford loamy sand, 10 to 15 percent slopes, moderately eroded	3.0	0.0%
ReB	Rumford-Evesboro gravelly loamy sands, 2 to 6 percent slopes	57.0	0.7%
ReC	Rumford-Evesboro gravelly loamy sands, 6 to 12 percent slopes	350.6	4.5%
ReD	Rumford-Evesboro gravelly loamy sands, 12 to 20 percent slopes	321.9	4.1%
SaA	Sassafras loamy fine sand, 0 to 2 percent slopes	2.1	0.0%
SaB2	Sassafras loamy fine sand, 2 to 5 percent slopes, moderately eroded	96.2	1.2%
SaC2	Sassafras loamy fine sand, 5 to 10 percent slopes, moderately eroded	21.3	0.3%
ShA	Sassafras fine sandy loam, 0 to 2 percent slopes	2.4	0.0%
ShB2	Sassafras fine sandy loam, 2 to 5 percent slopes, moderately eroded	154.0	2.0%
ShC2	Sassafras fine sandy loam, 5 to 10 percent slopes, moderately eroded	65.0	0.8%
ShC3	Sassafras fine sandy loam, 5 to 10 percent slopes, severely eroded	366.3	4.7%
ShD2	Sassafras fine sandy loam, 10 to 15 percent slopes moderately eroded	51.2	0.7%
ShD3	Sassafras fine sandy loam, 10 to 15 percent slopes severely eroded	189.3	2.4%
SlA	Sassafras loam, 0 to 2 percent slopes	6.6	0.1%
SlB2	Sassafras loam, 2 to 5 percent slopes, moderately eroded	21.8	0.3%
SlC3	Sassafras loam, 5 to 10 percent slopes, severely eroded	3.8	0.0%
SpB2	Sassafras-Westphalia gravelly fine sandy loams, 2 to 6 percent slopes, moderately eroded	0.5	0.0%

Table 4.2-2 (Continued)
Soil Types in Calvert County

Calvert County, Maryland (MD009)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
SpC3	Sassafras-Westphalia gravelly fine sandy loams, 6 to 12 percent slopes, severely eroded	14.6	0.2%
SrE	Sassafras and Westphalia soils, steep	1,712.2	21.9%
Tm	Tidal marsh	47.8	0.6%
W	Water	544.6	7.0%
WaC2	Westphalia fine sandy loam, 6 to 12 percent slopes moderately eroded	0.4	0.0%
WaC3	Westphalia fine sandy loam, 6 to 12 percent slope severely eroded	12.6	0.2%
WaD3	Westphalia fine sandy loam, 12 to 20 percent slopes severely eroded	3.1	0.0%
WoA	Woodstown fine sandy loam, 0 to 2 percent slopes	1.3	0.0%
WoB	Woodstown fine sandy loam, 2 to 5 percent slopes	14.8	0.2%

Table 4.2-3
Soil Types in St. Mary's County

St. Mary's County, Maryland (MD037)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Aa	Alluvial land	34.8	0.4%
BIA	Beltsville silt loam, 0 to 2 percent slopes	9.8	0.1%
BIB2	Beltsville silt loam, 2 to 5 percent slopes, moderately eroded	54.9	0.7%
BIC2	Beltsville silt loam, 5 to 10 percent slopes moderately eroded	7.0	0.1%
BIC3	Beltsville silt loam, 5 to 10 percent slopes, severely eroded	22.2	0.3%
Bm	Bibb silt loam	6.4	0.1%
BrB2	Bourne fine sandy loam, 2 to 5 percent slopes, moderately eroded	5.4	0.1%
BrC3	Bourne fine sandy loam, 5 to 10 percent slopes, severely eroded	1.5	0.0%
CaB2	Caroline silt loam, 2 to 5 percent slopes, moderately eroded	6.3	0.1%
CaC2	Caroline silt loam, 5 to 10 percent slopes moderately eroded	16.6	0.2%
CaC3	Caroline silt loam, 5 to 10 percent slopes, severely eroded	43.0	0.6%
CaD2	Caroline silt loam, 10 to 15 percent slopes, moderately eroded	12.6	0.2%

Table 4.2-3 (Continued)
Soil Types in St. Mary's County

St. Mary's County, Maryland (MD037)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CaD3	Caroline silt loam, 10 to 15 percent slopes, severely eroded	5.5	0.1%
ChB2	Chillum loam, 2 to 6 percent slopes moderately eroded	29.3	0.4%
ChC2	Chillum loam, 6 to 12 percent slopes, moderately eroded	15.4	0.2%
ChC3	Chillum loam, 6 to 12 percent slopes, severely eroded	16.6	0.2%
CrD2	Croom gravelly sandy loam, 10 to 15 percent slopes, moderately eroded	2.0	0.0%
Cu	Cut and fill land	2.3	0.0%
Ek	Elkton silt loam	7.8	0.1%
EvB	Evesboro loamy sand, 0 to 8 percent slopes	15.1	0.2%
EvC	Evesboro loamy sand, 8 to 15 percent slopes	21.9	0.3%
EwC2	Evesboro-Westphalia complex, 6 to 12 percent slopes, moderately eroded	13.8	0.2%
EwD2	Evesboro-Westphalia complex, 12 to 20 percent slopes, moderately eroded	102.4	1.3%
EwE2	Evesboro-Westphalia complex, 20 to 45 percent slopes, moderately eroded	26.8	0.3%
KeC3	Kempsville fine sandy loam, 5 to 10 percent slopes, severely eroded	6.6	0.1%
KeD2	Kempsville fine sandy loam, 10 t0 to 15 percent slopes, moderately eroded	6.1	0.1%
MmA	Matapeake fine sandy loam, 0 to 2 percent slopes	29.6	0.4%
MmB2	Matapeake fine sandy loam, 2 to 5 percent slopes moderately eroded	67.0	0.9%
MnA	Matapeake silt loam, 0 to 2 percent slopes	3.7	0.0%
MnB2	Matapeake silt loam, 2 to 5 percent slopes, moderately eroded	12.2	0.2%
MtA	Mattapex fine sandy loam, 0 to 2 percent slopes	24.7	0.3%
MtB2	Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded	16.6	0.2%
MuA	Mattapex silt loam, 0 to 2 percent slopes	3.6	0.0%

Table 4.2-3 (Continued)
Soil Types in St. Mary's County

St. Mary's County, Maryland (MD037)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ot	Othello silt loam	27.9	0.4%
SaB2	Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded	3.8	0.0%
SaC2	Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	6.0	0.1%
SaC3	Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	30.7	0.4%
SaD2	Sassafras sandy loam, 10 to 15 percent slopes moderately eroded	11.4	0.1%
Tm	Tidal marsh	6.8	0.1%
W	Water	228.3	2.9%
Totals for Area of Interest (AOI)		7,803.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially

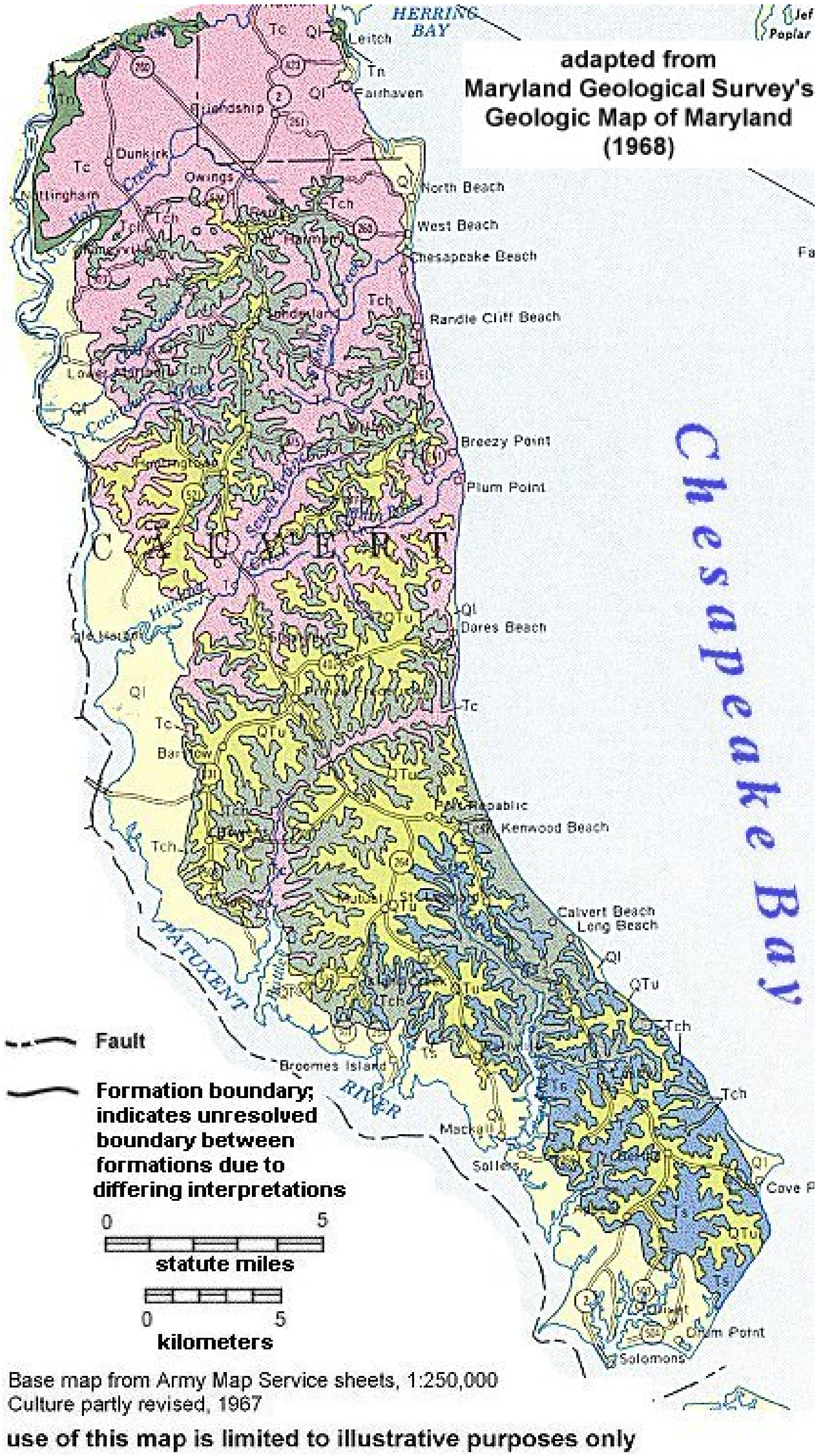


Figure 4.2-1
Calvert County Geological Map

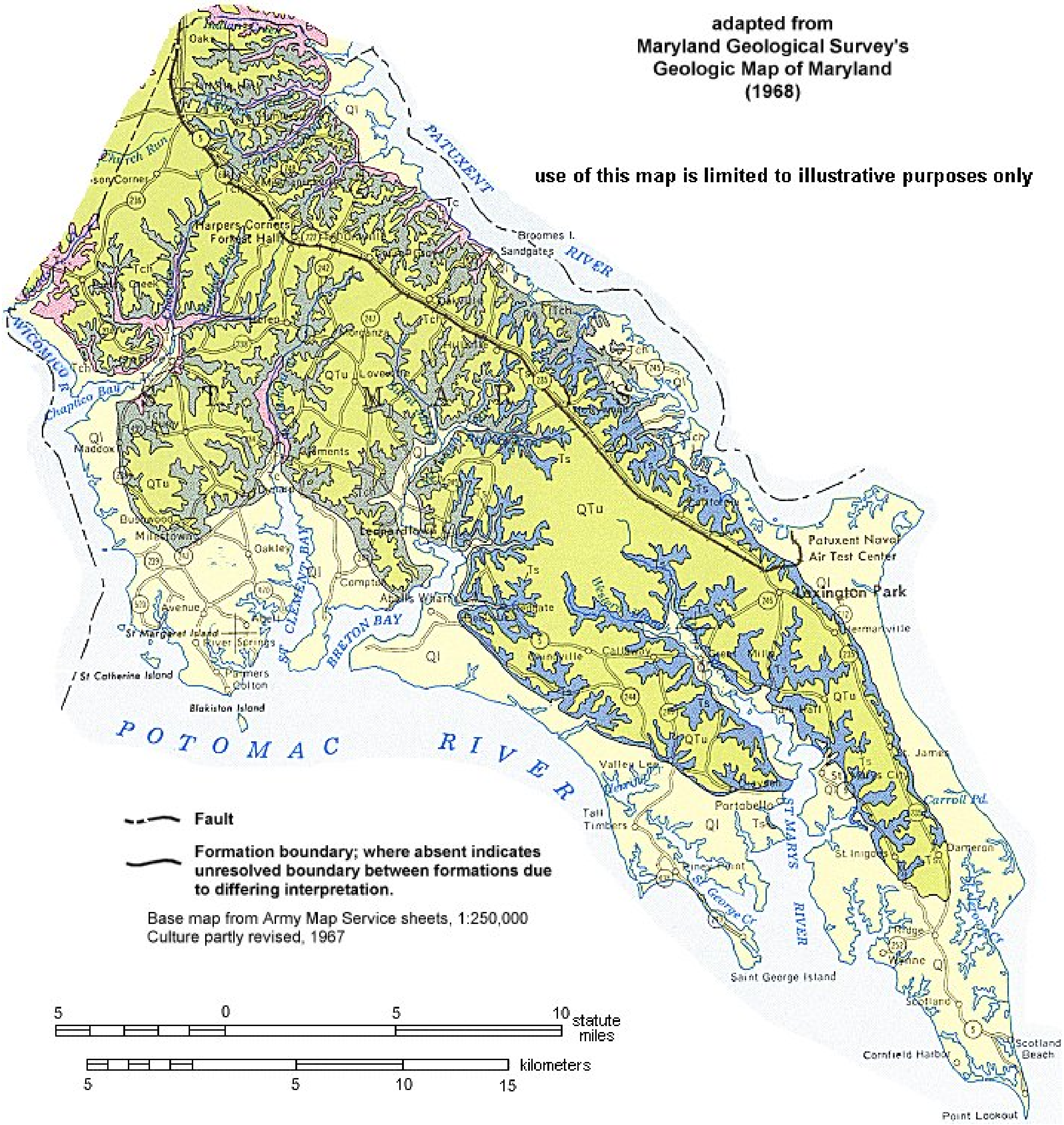


Figure 4.2-2
St. Mary's County Geological Map

Maryland Geological Survey

Geologic Map Leg

BACK HOME

Coastal Plain Rocks and Sediments

contact: Jim Reger (jreger

The information contained on this page was adapted from Maryland Geological Survey's ***Geologic Map of Maryland (1968)***. This information reflects geologic interpretations from over 20 years ago and do not necessarily represent an accurate interpretation of currently accepted geologic theory. We present this information for historic purposes only. Do not use this information for anything other than illustrative purposes. When a corrected and updated geologic map of Maryland is available you will see a notification on our web site.

QUATERNARY

PLEISTOCENE TO RECENT

Qdu — **Lowland Deposits**
Undifferentiated gray to buff sand and gravel, gray to brown lignitic silt and clay, occasional boulders, and rare shell beds.
Surficial deposits occur as intercalated fluvial sands and marsh muds (e.g. in upstream floodplains of the Wicomico and Nanticoke Rivers), well sorted, stabilized sand dunes (e.g. eastern Wicomico County), shell-bearing estuarine clays and silts (e.g. lower Dorchester County and Pocomoke River basin of Worcester County), and beach zone sands (e.g. Fenwick and Assateague Islands). Wisconsin to Holocene in age.
Subsurface deposits of pre-Wisconsin age consist of buff to reddish-brown sand and gravel locally incised into Miocene sediments (e.g. Salisbury area), estuarine to marine white to gray sands, and gray to blue, shell-bearing clays (e.g. Worcester County).

Ql — **Lowland Deposits**
Gravel, sand, silt and clay. Medium- to coarse-grained sand and gravel; cobbles and boulders near base; commonly contains reworked Eocene glauconite; varicolored silts and clays; brown to dark gray lignitic silty clay; contains estuarine to marine fauna in some areas (includes in part Pamlico, Talbot, Wicomico and Sunderland Formations of earlier reports); thickness 0 to 150 feet.

Qu — **Upland Deposits (Eastern Shore)**
Gravel, sand, silt, and clay. Mostly cross-bedded, poorly sorted, medium- to coarse-grained white to red sand and gravel, boulders near base; minor pink and yellow silts and clays; (Wicomico Formation of earlier reports); thickness 0 to90 feet, locally thicker in paleochannels.

PLIOCENE (?)

QTu — **Upland Deposits (Western Shore)**
Gravel and sand, commonly orang-brown, locally limonite-cemented; minor silt and red, white, or gray clay; (includes Brandywine, Bryn Mawr, nad Sunderland Formations of earlier reports); lower gravel member and upper loam member in Southern Maryland; thickness 0 to 50 feet.

TERTIARY

MIOCENE — *Chesapeake Group*

subsurface only — **Yorktown Formation**
Yellowish-white to gray, fine- to medium-grained sand, gray to bluish gray clayey silt, and granule gravel; generally nonfossiliferous; sands locally black or green; present in subcrop of Eastern Shore; thickness 0 to 400 feet.

Ts — **St. Mary Formation**
Greenish-blue to yellowish-gray sandy clays and fine-grained argillaceous sand; thickness 0 to80 feet.

Tch — **Choptank Formation**
Interbedded brown to yellow very fine-grained to fine-grained sand and gray to dark bluish-green argillaceous silt; locally indurated to calcareous sandstone; prominent shell beds; thickness 0 to 50 feet.

Tc — **Calvert Formation**
Plum Point Marls Member: Interbedded dark green to dark bluish-gray, fine-grained argillaceous sand and sandy clay; contains prominent shell beds and locally silica-cemented sandstones. Fairhaven Member: Greenish-blue diatomaceous clay, weathers to pale gray; pale brown to white, fine-grained argillaceous sand and greenish-blue sandy clay; total thickness 0 to 150 feet.

EOCENE — *Pamunkey Group*

subsurface only — **Piney Point Formation**
Light gray to yellowish glauconitic medium- to coarse-grained sand and interbedded shell beds; no known surface outcrop; occurs in subsurface in St. Marys, Calvert, Queen Annes, Talbot, Caroline, Dorchester, Wicomico, and Somerset Counties; thickness 10 to possibly 280 feet.

Tn — **Nanjemoy Formation**
Dark green to gray, argillaceous, glauconitic, fine- to medium-grained sand; minor gray to pale brown clay, Marlboro Clay Member at base: Pink to gray, homogeneous plastic clay with local lenses of very fine-grained white sand; thickness 0 to 30 feet; present west of Chesapeake Bay only; total thickness 0 to 125 feet.

PALEOCENE

Ta — **Aquia Formation**
Dark green to gray-green, argillaceous, highly glauconitic, well sorted fine- to medium-grained sand; locally indurated shell beds; thickness 0 to 100 feet.

Brightseat Formation
Gray to greenish-gray, micaceous, argillaceous, sparsely glauconitic, fine- to coarse-grained sand, locally indurated calcareous beds; phosphatic pebbles; thickness 0 to 20 feet; present in southwestern Prince Georges County only. Mapped as part of Monmouth Formation.

CRETACEOUS

Kmo — **Monmouth Formation**
Dark gray to reddish-brown, micaceous, glauconitic, argillaceous, fine- to coarse-grained sand; basal gravel in Prince Georges County; thickness 0 to 100 feet.

Kma — **Matawan Formation**
Dark gray, micaceous, glauconitic, argillaceous, fine-grained sand and silt; absent in outcrop southwest of Patuxent River; thickness 0 to 70 feet.

Km — **Magothy Formation**
Loose, white, cross-bedded, "sugary", lignitic sands and dark gray, laminated silty clays; white to orange-brown, iron-stained, subrounded quartzose gravels in western Anne Arundel County; absent in outcrop southwest of Patuxent River; thickness 0 to 60 feet.

Kp — **Potomac Group**
Interbedded quartzose gravels; protoquartzitic to orthoquartzitic argillaceous sands; and white, dark gray and multicolored silts and clays; thickness 0 to 800 feet.

Raritan and Patapsco Formations
Gray, brown, and red variegated silts and clays; lenticular, cross-bedded, argillaceous, subrounded sands; minor gravels; thickness 0 to 400 feet.

Arundel Clay
Dark gray and maroon lignitic clays; abundant siderite concretions; present only in Baltimore-Washington area; thickness 0 to 100 feet.

Patuxent Formation
White or light gray to orange-brown, moderately sorted, cross-bedded, argillaceous, angular sands and subrounded quartz gravels; silts and clays subordinate, predominately pale gray; thickness 0 to 250 feet.

MESOZOIC

subsurface only — **Undifferentiated Mesozoic Rocks**
Coarse-grained conglomerate with pebbles of quartzite, pegmatite, serpentine, and vein quartz at base; reddish-brown, gray and green, mottled, fine- to coarse-grained sandstone, silts tone, and shale; present in subsurface; maximum thickness penetrated 600 feet.

PALEOZOIC-PRECAMBRIAN (?)

subsurface only — **Undifferentiated Crystalline Rock**
Weathered schist and mica gneiss with pegmatite dikes, serpentine, and metagabbro encountered in Eastern Shore deep test wells; hornblende gneiss and biotite-quartz gneiss encountered in southern Prince Georges County test wells.

Figure 4.2-3
Maryland Geological Survey

The Sassafras-Westphalia, Rumsford-Evesboro and the eroded land units generally occur on steeply sloped upland areas of the proposed SMECO transmission line that are strongly dissected by ravines. These units are well drained, acidic, typically deep, and composed of fine sandy loams and gravelly loamy sands (USDA, 2008a). Due to clearing of the native land, the dominant sections of these soil units are typically classified as steeply to severely eroded.

The Sassafras and Matapeake units generally occur on moderately sloped upland and midland areas in Calvert County. These units are deep, well drained, acidic, and typically composed of silt loams, loamy fine sands or fine sandy loams (USDA, 2008a). Most sections of the Sassafras and Matapeake units are classified as moderately to severely eroded.

The mixed alluvial deposits are associated with alluvial deposits in midland and lowland floodplains. This unit is poorly drained, acidic, and generally composed of gravelly silt loams (USDA, 2008a).

4.2.2 Environmental Consequences

The effects of the Project on the physiography of the area would be minimal. More than 95% of the length of the Project would be on already disturbed right-of-way and, with the exception of switching station construction and the river crossing, structure placement would be the primary construction activity. The soils in the area are suitable for construction of this Project and the local topography would be left as is with the exception of grading for the new Sollers Wharf switching station.

4.2.3 Mitigation Measures

Soils excavated in the construction areas would be used in the same construction area to the extent that is possible to maintain construction integrity and without adversely affecting slopes and grading. The rest would be hauled off. No other mitigation measures are anticipated for protection of physiography.

4.3 Hydrology

4.3.1 Affected Environment

4.3.1.1 Rivers, Streams and Wetlands. Surface water drainage along the proposed SMECO transmission line right-of-way enters the Patuxent River watershed or flows toward Chesapeake Bay. In general, the western two-thirds of Calvert County drain to the Patuxent River and the eastern third drains to Chesapeake Bay. The portions of Calvert and St. Mary's counties along the proposed SMECO transmission line drain to the Patuxent River.

Streams near the proposed SMECO transmission line that discharge to the Patuxent River or Chesapeake Bay include Hunting Creek, Parker Creek, Battle Creek, St. Leonard Creek, St. Mary's River and several smaller unnamed tributaries. The proposed SMECO transmission line would cross the central portion of Hunting Creek, Mill Creek, Parker Creek, St. Leonard Creek, Planters Wharf Creek, St. Johns Creek, Hellen Creek, St. Paul Branch, Town Creek and Kingston Creek, the south end of the Patuxent River near the discharge to Chesapeake Bay, and tributaries to St. Mary's River. Approximately 16 other unnamed streams or tributaries also would be crossed, most of which are too small (under 10 feet (3.05 meters) wide) to be indicated on U.S. Geological Survey (USGS) topographic maps.

The State of Maryland classifies streams by five Use Designations that define waters suitable for supporting various purposes (MDE, 2000): Water Contact Recreation and Protection of Aquatic Life (Use I), Shellfish Harvesting (Use II), Natural Trout Waters (Use III), Recreational Trout Waters (Use IV) and Public Water Supply (Use I-P, Use III-P and Use IV-P). Near the proposed SMECO transmission line, the Patuxent River, the Little Patuxent River and their tributaries all are designated for Public Water Supply (Use I-P). The Patuxent River estuary and its tributaries are designated for Public Water Supply (Use III-P). All streams near the proposed SMECO transmission line discharging to Chesapeake Bay are designated for Shellfish Harvesting (Class II).

The current list of impaired waters (303-d list of the Clean Water Act) for waters near the proposed SMECO transmission line includes Patuxent River (various) and St. Mary's River (bacteria) (MDE, 2006).

The National Wetland Inventory was used to evaluate potential wetlands in the existing transmission line corridor. These were field-confirmed during a site visit conducted May 19 through May 22, 2008. Additional wetland data was obtained from *Wetland Delineation Report, Cove Point Expansion Project, TL-532, Calvert, Prince George's, and Charles Counties, Maryland* as prepared by GAI Consultants, Inc., dated March 2005 and provided by Dominion Cove Point LNG, L.P.

There are approximately 60 wetlands within the right-of-way or close enough potentially to be affected by work in the right-of-way. Most are located in valley bottoms between steeply sloped hills and typically are associated with small streams. These streams in many cases were well defined, with wetlands occurring where inundation or saturation is frequent enough and persists long enough to support a dominance of hydrophytic vegetation, often just above or on the banks of the stream. Wetlands are also located within or adjacent to several constructed ponds used for stormwater detention adjacent to the right-of-way. Wetlands associated with these constructed features may or may not be jurisdictional under state or federal regulations, but because they are on private property and would not be affected by the transmission line upgrade, the jurisdictional status was not evaluated. A jurisdictional determination ("JD") request for the on-site wetlands would be submitted to the U.S. Army Corps of Engineers (USACE), Baltimore District office. It is anticipated that a Clean Water Act Section 404 permit would be required for a wetland south of Woodland Acres Road (see below). A wetland and two streams near the Sollers Wharf switching station site would not be impacted. SMECO would comply with all applicable permitting requirements.

Power pole placement requires a relatively level elevation, so sharp drops are generally avoided by spanning between two high points in rolling topography. In all but two instances, the existing transmission poles span the streams and wetlands entirely, with the exception of large streams and rivers (e.g., St. Leonard Creek, Patuxent River). The locations where potentially impacted wetlands are located were flagged in the field and all wetlands are indicated on the aerial photographs in the plans and profiles section of Appendix I. One exception is a larger wetland located south of Woodland Acres Road. This seasonally wet area is in a level area that is approximately one-half mile wide within the ROW. It had been mowed before the May 2008 site visits. Two poles are in this wetland for the existing 69 kV transmission line. Based on the site reconnaissance it appeared that at least one pole for the upgraded transmission line would be required in this wetland because so much of this area is at about the same elevation and high points to allow for a large span are absent. The other exception is an unnamed stream that is tributary to Battle Creek. The portion of the stream south of Sequoia Way parallels the transmission line. In addition, the transmission line is angled several times in this area, requiring additional support structures. Because of the line direction and the stream location, some impacts to the stream are likely to occur from construction of the upgraded line.

Access for new pole placement in most other locations may be accomplished from either side of wetlands or streams and these water bodies would not be impacted by construction activities. Where necessary, matting would be used for crossing wetlands to prevent damage by heavy equipment. A permit from USACE would be obtained in advance of any proposed wetland impacts.

4.3.1.2 Floodplains and Coastal Zones. Floodplains as mapped by the Federal Emergency Management Agency (FEMA) are associated with the larger streams and rivers crossed by the existing right-of-way alignment (Hunting Creek, Parker Creek, Battle Creek, St. Leonard Creek, and St. Mary's River). Development in floodplain areas is discouraged because of hazards related to flooding. However, all of these water bodies would be spanned by the Project's new structures. Based on FEMA Flood Insurance Rate Map (FIRM) data the Mosley Branch floodplain does not enter the Sollers Wharf switching station site nor does it enter the larger property containing the switching station site.

The Maryland coastal zone extends inland from the coast to all local jurisdictions bordering the Atlantic Ocean, the Chesapeake Bay and the Potomac River to the city limits of Washington, D.C., including both Calvert and St. Mary's counties in the Project area (MDNR, 2002). Development in the coastal zone authorized by federal actions (e.g., federal permits or approvals) must be reviewed for consistency with the state coastal zone management program.

4.3.1.3 Groundwater. The unconsolidated Quaternary to Cretaceous-age geologic units of the Coastal Plain created a series of aquifers and confining units. Due to the eastwardly slope of the wedge-shaped deposit of unconsolidated material, groundwater generally flows towards the east (MGS, 2007). The aquifers present in descending depth are surficial aquifers composed of Lowland and Upland deposits, the Piney Point Aquifer composed of formations in the Pamunkey Group, the Aquia Aquifer in the Aquia Formation, the Magothy Aquifer of the Cretaceous–age Magothy Formation, and the Cretaceous-age Patapsco aquifer system and the Patuxent Aquifer of the Potomac Group. The Chesapeake Group, the lower portion of the Nanjemoy Formation, the Monmouth Group, the Matawan Group and portions of the Potomac group are classified as confining units. Deeper aquifers are present in the Paleozoic crystalline bedrock units, but typically are not used in the Coastal Plain because of the presence of shallower aquifers.

Recharge to the aquifers is through leakage or infiltration. The surficial aquifer is typically recharged through infiltration from precipitation (MGS, 2007). The Piney Point Aquifer is overlain by the Chesapeake Confining Unit, composed of the Chesapeake Group. Recharge to the Piney Point Aquifer is entirely by leakage through the overlying Chesapeake Confining Unit and the Piney Point Aquifer is considered useful only as a limited water supply. The Aquia Aquifer is separated from the Piney Point Aquifer by the Nanjemoy Confining Unit. The Aquia aquifer is recharged at outcrop exposures of the Aquia Formation west of the proposed SMECO transmission line. This aquifer is used extensively for domestic and major-user supplies. Cones of depression from pumping and a general decrease in groundwater elevations have been documented in Calvert and St. Mary's counties (MGS, 2007).

Aquifers in the Cretaceous-age sedimentary units are found in the Magothy Formation, and the Potomac Group. The Magothy Aquifer is present in southeastern Prince George's County, and central and northern Calvert County, but is absent at the southern end of the proposed SMECO transmission line in Calvert and St. Mary's counties. The Patapsco and Patuxent aquifers are the primary aquifers in the Potomac Group. Only the Patapsco Aquifer is used as a major-use supply in Prince George's, Calvert, and St. Mary's counties (MGS, 2007). The Patuxent Aquifer typically is not used because shallower aquifers are present.

Groundwater quality generally is good in each aquifer. The surficial aquifer is generally used for agriculture and not as a domestic water supply because of its vulnerability to contamination and limited supply potential during droughts (MGS, 2007). The Piney Point Aquifer is a primary groundwater source for domestic water supply near the proposed SMECO transmission line, including the Sollers Wharf switching station. The Aquia Aquifer historically has been used as a public water supply in Calvert and St. Mary's counties. However, several water suppliers want to use deeper aquifers because of arsenic detections above the U.S. Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) (MGS, 2007) in the Aquia Aquifer. The Magothy, Patapsco and Patuxent aquifers are high quality and only occasionally exceed the Secondary MCL determined by the U.S. EPA for iron and manganese (MGS, 2007).

4.3.2 Environmental Consequences

4.3.2.1 Rivers, Streams and Wetlands. The landscape associated with the transmission line right-of-way, including the Sollers Wharf switching station, consists mainly of rolling hills with moderate elevation changes, although some slopes are relatively steep. The predominant land use is forested, with some mixed residential or agriculture in places. Streams, many with associated wetlands, generally are located in low areas between hills. Impacts to these resources would be primarily indirect, since soil disturbance, without mitigative measures, would allow runoff to convey loosened soil into streams and wetlands. The resulting sedimentation could cause a shift in water quality, changes in aquatic species composition to more pollution-tolerant organisms while excluding intolerant species, and in extreme cases, change the drainage channel configuration.

4.3.2.2 Floodplains and Coastal Zones. Because of considerations related to pole position and elevation, floodplains generally would not be impacted by the transmission upgrade. Any indirect impacts from construction near floodplains are temporary and would be restored to pre-construction conditions after construction is completed in that area. SMECO would comply with applicable FEMA-approved state or local floodplain requirements. None of the existing or planned switching stations involved in this Project are located in the 500-year floodplain.

Impacts from coastal zone development may include sedimentation that covers and kills submerged aquatic vegetation (e.g., seagrasses), excessive nutrients from upland stormwater runoff that leads to an oxygen-starved aquatic environment, and increased parasitism of shellfish and fish because of environmental stressors.

4.3.3 Mitigation Measures

4.3.3.1 Rivers Streams and Wetlands. Upgrade of the transmission line within the existing corridor is not likely to impact jurisdictional wetlands primarily because the wetlands are generally associated with streams that would be spanned by the lines. New poles would be placed on high ground on either side of a ravine, well away from stream or wetland areas. The most likely impact would be from soil disturbance related to new pole installation, old pole removal (indirect impacts) and construction equipment access (direct impacts). In most cases, access for pole placement across wetland areas would be accomplished from access points on either side of a wetland or stream, thereby avoiding direct impacts. Where upland access is not possible, matting would be used to prevent damage to wetlands that would need to be crossed to access right-of-way interior areas with no other access.

One wetland and one stream would be directly impacted by the proposed Project (see Section 4.3.1.1), but the area of permanent loss would be small and is limited to the immediate area of pole installation. Appropriate Best Management Practices (BMPs) would be used to limit soil disturbances and areas of temporary impacts would be restored to pre-construction conditions to the extent possible. Pole installation in these locations would be during the dry season to limit soil disturbance. Erosion control using appropriate BMPs to minimize impacts on water quality would be employed and maintained to restrict soil movement into wetlands or streams. Restoration of pre-construction contours and soil stabilization would be initiated within 24 hours after construction work is completed in any location draining to streams or wetlands. All erosion control BMPs would be inspected daily when feasible, but no less frequently than weekly. Inspections also would be conducted following precipitation events to ensure that loosened soil, particularly fine-grained clays, do not enter water bodies draining to Parker Creek. Subsequent to inspections, any problems or incipient failure of BMPs would be repaired immediately.

Creeks and streams in the transmission line right-of-way would be spanned by overhead lines. Standard BMPs to control movement of disturbed soil towards streams would be employed and maintained until construction activities are completed.

4.4 Ecology

4.4.1 Affected Environment

The Project area lies within the Embayed Section of the Coastal Plain Province of the Atlantic Plain as classified by the Natural Resources Conservation Service (NRCS, 2006). This is a nearly level to sharply rolling, dissected coastal plain that has been subjected to episodes of rising and falling sea levels. During low sea levels, eroding streams dissected the area, leaving a series of terraces across the landscape. Elevation ranges from sea level to 330 feet (101 meters). It is less than 165 feet (50.3 meters) in most of the area. This is a region of coastal lowlands, coastal plains, the piedmont, and ridges and valleys. The climate is temperate and humid. The average annual precipitation in this area is 40 to 47 inches (102 to 120 centimeters). Warm season precipitation is slightly higher than during the rest of the year. The average annual temperature is 48 to 56 °F (9 to 13 °C) (NRCS, 2006).

Most of the region is privately owned land, much of which is agricultural. Truck crops, fruits and poultry are important sources of income, particularly on the coastal plains. Forage crops, soybeans, and grain for dairy and beef cattle also are important. Rural residences are on sites where farming is less favorable. Throughout the region, farmland is being converted to urban land at increasing rates, primarily for residential purposes. A narrow belt along the coast is intensively developed for resorts and recreation including numerous marinas or support services.

The major watershed in the Project area is the Patuxent River (USGS Hydrologic Unit Code 20600006), with a small portion of the Upper Chesapeake Bay (HUC 2060001) at the southernmost point. The Patuxent River is designated as a National Wild and Scenic River and an impaired water (Dail et al., 1998).

This area supports pine and hardwoods and most of the area was forested at the time of European settlement. Loblolly Pine (*Pinus taeda*), Virginia Pine (*Pinus virginiana*), Shortleaf Pine (*Pinus echinata*), Southern Red Oak (*Quercus falcata*), Black Oak (*Quercus velutina*), Scarlet Oak (*Quercus coccinea*), Pin Oak (*Quercus palustris*), Willow Oak (*Quercus phellos*), Northern Red Oak (*Quercus rubra*), Black Walnut (*Juglans nigra*), Tuliptree (*Liriodendron tulipifera*), Sweetgum (*Liquidambar styraciflua*) and Red Maple (*Acer rubrum*) are the dominant regional species (NRCS, 2006). Most of the woodland in the area is in smaller farm woodlots, but there are some large holdings. Forested areas are separated by agricultural lands, urban development and related infrastructure.

Wildlife habitat associated with the transmission line corridor consists mainly of open mixed hardwood and coniferous forests, some agricultural land, and urbanized areas. Because of clearing for the transmission line corridor, few Forest Interior

Dwelling species were observed during the May 2008 site visit. Most observed wildlife was either edge-tolerant generalist species or transients using the habitat as a greenway. Portions of the transmission line corridor are located adjacent to or cross riparian areas associated with streams. Many of the streams have associated wetlands within the right-of-way, but none is large enough to support a diverse resident wildlife assemblage except in or near tidal wetlands associated with St. Leonard Creek, St. John's Creek, Hunting Creek or the Patuxent River.

4.4.1.1 Vegetation. Because of past transmission line right-of-way maintenance, the vegetation within the right-of-way is primarily composed of low-profile species, such as grasses, ferns, flowering plants or forbs, shrubs and tree saplings. Many of the species present in the right-of-way may have been planted after clearing to prevent soil erosion, notably Tall Fescue (Schedonorus arundinaceus). In a few places where clearing to maintain the transmission line has not been frequent, taller vegetation is present, but generally the right-of-way is open, with sparse vegetative cover and containing different species than are present in areas adjacent to the right-of-way, which is predominately forested.

Shrubs and small trees tend to be more prevalent in low-lying areas associated with streams crossing the right-of-way, some of which include wetlands. These areas are accessed less frequently because of wetness and the plant community tends to be more diverse and mature than upland locations.

Plant and wildlife species observed during the May 2008 site visit are presented in Table 4.4-1 and Table 4.4-2, respectively. The species listed by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) in Calvert County and St. Mary's County are provided in Table 4.4-3. Only species listed as endangered, threatened or candidate species were included since no federal or state land is intersected by the Project. This list was narrowed down through a comparison of available habitat in the transmission line right-of-way and each species' habitat requirements. For example, species requiring an exclusively marine habitat were excluded because these species would not be affected by the proposed transmission line upgrade. Fish species, whether freshwater, estuarine or marine, generally were excluded because the proposed Project would not affect these habitats. The species-habitat matrix used is presented in Table 4.4-4; habitat used by each species was determined using the available scientific literature. A brief discussion of those USFWS-listed species with some potential to use the transmission line right-of-way follows.

Table 4.4-1
Plant Species Observed in the Transmission Line Corridor
During the May 2008 Site Visit

English Name	Latin Name	State Status*	Federal Status*
Alfalfa	*Medicago sativa*	--	--
American Holly	*Ilex opaca*	--	--
American Hornbeam	*Carpinus caroliniana*	--	--
Annual Bluegrass	*Poa annua*	--	--
Annual Fleabane	*Erigeron annuus*	--	--
Basswood	*Tilia americana*	--	--
Black Locust	*Robinia pseudoacacia*	--	--
Black Medic	*Medicago lupulina*	--	--
Black Walnut	*Juglans nigra*	--	--
Black Willow	*Salix nigra*	--	--
Blackberry	*Rubus* sp.	--	--
Blackseed Plantain	*Plantago rugellei*	--	--
Boneset	*Eupatorium perfoliatum*	--	--
Broadleaf Rosette Grass	*Dichanthelium latifolium*	--	--
Broad-leaved Cattail	*Typha latifolia*	--	--
Broom Sedge	*Andropogon virginicus*	--	--
Canada Wild Rye	*Elymus canadensis*	--	--
Canadian Horseweed	*Conyza canadensis*	--	--
Carolina Geranium	*Geranium carolinianum*	--	--
Chinese Bush Clover	*Lespedeza cuneata*	--	--
Chinkapin Oak	*Quercus muhlenbergii*	--	--
Cinnamon Fern	*Osmunda cinnamomea*	--	--
Clasping Venus' Looking-glass	*Triodanis perfoliata*	--	--
Cleavers	*Galium aparine*	--	--
Common Cinquefoil	*Potentilla simplex*	--	--
Common Hop	*Humulus lupulus*	--	--
Common Ladyfern	*Athyrium filix-femina*	--	--
Common Mullein	*Verbascum thapsus*	--	--
Common Plantain	*Plantago lanceolata*	--	--
Common Reed	*Phragmites australis*	--	--
Common Rush	*Juncus effusus*	--	--
Corn Speedwell	*Veronica arvensis*	--	--
Cutleaf Evening Primrose	*Oenothera laciniata*	--	--

Table 4.4-1 (Continued)
Plant Species Observed in the Transmission Line Corridor
During the May 2008 Site Visit

English Name	Latin Name	State Status*	Federal Status*
Dandelion	*Taraxacum officinale*	--	--
Devil's Walking Stick	*Aralia spinosa*	--	--
Dogfennel	*Eupatorium capillifolium*	--	--
Ebony Spleenwort	*Asplenium platyneuron*	--	--
Elderberry	*Sambucus canadensis*	--	--
False Nettles	*Boehmeria cylindrica*	--	--
Field Chickweed	*Cerastium arvense*	--	--
Field Horsetail	*Equisetum arvense*	--	--
Field Thistle	*Cirsium discolor*	--	--
Flowering Dogwood	*Cornus florida*	--	--
Frost Grape	*Vitis vulpina*	--	--
Fuzzybean	*Strophostyles* sp.	--	--
Hayscented Fern	*Dennstaedtia punctilobula*	--	--
Hazel Alder	*Alnus serrulata*	--	--
Indian Hemp	*Apocynum cannabinum*	--	--
Indian Strawberry	*Duchesnea indica*	--	--
Jack in the Pulpit	*Arisaema triphyllum*	--	--
Jack Pine	*Pinus banksiana*	--	--
Japanese Brome	*Bromus japonicus*	--	--
Japanese Honeysuckle	*Lonicera japonica*	--	--
Joe Pye Weed	*Eupatorium maculatum*	--	--
Kentucky Bluegrass	*Poa pratensis*	--	--
Lady's Thumb	*Polygonum persicaria*	--	--
Lyreleaf Sage	*Salvia lyrata*	--	--
Marsh Cudweed	*Gnaphalium uliginosum*	--	--
Marsh Fern	*Thelypteris palustris*	--	--
Mayapple	*Podophyllum peltatum*	--	--
Mountain Laurel	*Kalmia latifolia*	--	--
Multiflora Rose	*Rosa multiflora*	--	--
Narrowleaf Blue-eyed Grass	*Sisyrinchium angustifolium*	--	--
Narrow-leaved Cattail	*Typha angustifolia*	--	--
Netted Chainfern	*Woodwardia areolata*	--	--
Nodding Fescue	*Festuca subverticillata*	--	--
Nodding Thistle	*Carduus nutans*	--	--

Table 4.4-1 (Continued)
Plant Species Observed in the Transmission Line Corridor
During the May 2008 Site Visit

English Name	Latin Name	State Status*	Federal Status*
Orange Jewelweed	*Impatiens capensis*	--	--
Orchard Grass	*Dactylis glomerata*	--	--
Ox-eye Daisy	*Chrysanthemum leucanthemum*	--	--
Palespike Lobelia	*Lobelia spicata*	--	--
panic grass	*Panicum* sp.	--	--
Path Rush	*Juncus tenuis*	--	--
Paw Paw	*Asimina triloba*	--	--
Pin Oak	*Quercus palustris*	--	--
Pink Azalea	*Rhododendron periclymenoides*?	--	--
Poison Ivy	*Toxicodendron radicans*	--	--
Pokeweed	*Phytolacca americana*	--	--
Potato Dwarfdandelion	*Krigia dandelion*	--	--
Poverty Oatgrass	*Danthonia spicata*	--	--
Prickly Ash	*Zanthoxylum americanum*	--	--
Red Cedar	*Juniperus virginiana*	--	--
Red Clover	*Trifolium pratense*	--	--
Red Maple	*Acer rubrum*	--	--
Red Oak	*Quercus rubra*	--	--
Redbud	*Cercis canadensis*	--	--
Reed Canary Grass	*Phalaris arundinacea*	--	--
Riverbank Grape	*Vitis riparia*	--	--
Roundleaf Greenbrier	*Smilax rotundifolia*	--	--
Royal Fern	*Osmunda regalis*	--	--
Sassafras	*Sassafras albidum*	--	--
Saw-tooth Sunflower	*Helianthus grosseseratus*	--	--
Bristly Sedge	*Carex comosa*	--	--
Sedge	*Carex* sp.	--	--
Sensitive Fern	*Onoclea sensibilis*	--	--
Sheep Sorrel	*Rumex acetosella*	--	--
Smallflowered Woodrush	*Luzula parviflora*	--	--
Smooth Brome	*Bromus inermis*	--	--
Smooth Hawksbeard	*Crepis capilaris*?	--	--
Smut Grass	*Sporobolus indicus*	--	--
Sneezeweed	*Helinium autumnale*	--	--

Table 4.4-1 (Continued)
Plant Species Observed in the Transmission Line Corridor
During the May 2008 Site Visit

English Name	Latin Name	State Status*	Federal Status*
spike rush	*Eleocharis* sp.	--	--
Staghorn Sumac	*Rhus typhina*	--	--
Sugar Maple	*Acer saccharinum*	--	--
Sweetgum	*Liquidambar styraciflua*	--	--
Sycamore	*Platanus occidentalis*	--	--
Tall Fescue	*Schedonorus phoenix*	--	--
Tall Goldenrod	*Solidago altissima*	--	--
Toad Rush	*Juncus bufonius*	--	--
Tree-of-heaven	*Ailanthus altissima*	--	--
Trumpet Creeper	*Campsis radicans*	--	--
Tulip Tree	*Liriodendron tulipifera*	--	--
Virginia Plantain	*Plantago virginica*	--	--
Virginia Creeper	*Parthenocissus quinquefolia*	--	--
Weedy Dwarfdandelion	*Krigia caespitosa*	--	--
White Ash	*Fraxinus americana*	--	--
White Clover	*Trifolium repens*	--	--
Wild Carrot	*Daucus carota*	--	--
Wild Garlic	*Allium schoenprasum?*	--	--
Wild Lupine	*Lupinus polyphyllus*	--	--
Winged Sumac	*Rhus copallinum*	--	--
Winter Vetch	*Vicia villosa*	--	--
Wood Sorrel	*Oxalis stricta*	--	--
Yarrow	*Achillea millefolium*	--	--

? Indicates tentative species identification because of specimen condition.

*Based on *Current and Historical Rare, Threatened, and Endangered Species of* [St. Mary's County and Calvert County], *Maryland*, December 13, 2007, Maryland Department of Natural Resources, Wildlife and Heritage Service.

4.4.1.2 *Fish and Wildlife.* Large mammal species that could be expected to occur in the region of the transmission line corridor include Bobcat (*Lynx rufus*), White-tailed Deer (*Odocoileus virginianus*), Black Bear (*Ursus americanus*), Coyote (*Canis latrans*), Woodchuck (*Marmota monax*), Virginia Opossum (*Didelphis virginiana*), Red Fox (*Vulpes vulpes*) and Raccoon (*Procyon lotor*).

Small mammals that could be expected to occur in the Project vicinity include shrews (*Sorex*, *Blarina* spp.), Eastern Cottontail (*Sylvilagus floridanus*), Eastern Chipmunk (*Tamias striatus*), Eastern Gray Squirrel (*Sciurus carolinensis*), Deer Mouse (*Peromyscus maniculatus*), White-footed Mouse (*Peromyscus leucopus*), Meadow Vole (*Microtus pennsylvanicus*), Woodland Vole (*Microtus pinetorum*), Black Rat (*Rattus rattus*), Norway Rat (*Rattus norvegicus*), House Mouse (*Mus musculus*), and Long-tailed Weasel (*Mustela frenata*).

Wildlife species observed during the May 2008 site visit are presented in Table 4.4-2.

4.4.1.3 *Birds.* Approximately 410 bird species are known in Maryland (MDNR 2006). Roughly 80% of these are considered migratory birds under the Migratory Bird Treaty Act (MBTA). Migratory birds expected to occur in the Project vicinity include Turkey Vulture (*Cathartes aura*), Osprey (*Pandion haliaetus*), Mourning Dove (*Zenaida macroura*), Great Horned Owl (*Bubo virginianus*), Eastern Phoebe (*Sayornis phoebe*), Blue Jay (*Cyanocitta cristata*), American Crow (*Corvus brachyrhynchos*), Barn Swallow (*Hirundo rustica*), American Robin (*Turdus migratorius*), Song Sparrow (*Melospiza melodia*), Dark-eyed Junco (*Junco hyemalis*), and Common Grackle (*Quiscalus quiscula*).

Non-migratory birds expected to occur in the Project vicinity include Black-capped Chickadee (*Poecile atricapillus*), Northern Cardinal (*Cardinalis cardinalis*), Ring-necked Pheasant (*Phasianus colchicus*), Wild Turkey (*Meleagris gallopavo*), Hairy Woodpecker (*Picoides villosus*) and House Sparrow (*Passer domesticus*).

Wildlife observed during the May 2008 site visit are presented in Table 4.4-2.

4.4.1.4 *Reptiles.* Reptiles expected to occur in the Project vicinity include Eastern Box Turtle, (*Terrapene carolina carolina*), Northern Diamond-backed Terrapin, (*Malaclemys terrapin terrapin*), Red-eared Slider, (*Trachemys scripta elegans*), Eastern Spiny Softshell, (*Apalone spinifera spinifera*), Eastern Fence Lizard (*Sceloporus undulatus*), Eastern Six-lined Racerunner (*Aspidoscelis sexlineata sexlineata*), Eastern Gartersnake (*Thamnophis sirtalis sirtalis*), Eastern Hog-nosed Snake (*Heterodon platirhinos*), Northern Black Racer (*Coluber constrictor constrictor*), Northern Copperhead (*Agkistrodon contortrix mokasen*), and Timber Rattlesnake (*Crotalus horridus*), A Six-lined Racerunner and the bottom of a turtle shell (plastron) were observed near the transmission line.

4.4.1.5 Amphibians. Amphibians expected to occur in the Project vicinity include Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*), Eastern Spadefoot (*Scaphiopus holbrookii*), American Toad (*Anaxyrus americanus americanus*), Northern Spring Peeper (*Pseudacris crucifer*), Gray Treefrog (*Hyla versicolor*), Northern Leopard Frog (*Lithobates pipiens*), Northern Green Frog (*Lithobates clamitans melanota*), and American Bullfrog (*Lithobates catesbeianus*).

Very few sightings of these organisms were made during the May 2008 site visit, in part because the spring breeding season had passed and singing or calling was at a minimum. However, a single Northern Green Frog was heard calling and an Eastern Fence Lizard was observed near the right-of-way.

4.4.1.6 Fishes. Surveys for fish in freshwater, brackish or marine waters were not conducted since these areas would not be impacted by the proposed transmission line upgrades. However, data from Maryland Department of Natural Resources (MDNR) (Dail, et al., 1998) indicates that the following species may be present: American Eel (*Anguilla rostrata*), Banded Killifish (*Fundulus diaphanus diaphanus*), Bluegill (*Lepomis macrochirus*), Bluespotted Sunfish (*Enneacanthus gloriosus*), Brown Bullhead (*Ameiurus nebulosus*), Chain Pickerel (*Esox niger*), Creek Chubsucker (*Erimyzon oblongus*), Eastern Mudminnow (*Umbra pygmaea*), Golden Shiner (*Notemigonus crysoleucas*), Largemouth Bass (*Micropterus salmoides*), Mosquitofish (*Gambusia affinis*), Pumpkinseed (*Lepomis gibbosus*), Redfin Pickerel (*Esox americanus americanus*), Spottail Shiner (*Notropis hudsonius*), Striped Bass (*Morone saxatilis*), Tadpole Madtom (*Noturus gyrinus*), Tessellated Darter (*Etheostoma olmstedi*), White Catfish (*Ameiurus catus*), White Perch (*Morone americana*), and Yellow Perch (*Perca flavescens*). None of these species are listed as protected (endangered or threatened) at either the state or federal levels.

Table 4.4-2
Wildlife Species Observed in the Transmission Line Corridor
During the May 2008 Site Visit

English Name	Latin Name	State Status*	Federal Status*
Birds			
American Crow	*Corvus brachyrhynchos*	--	--
American Redstart	*Setophaga ruticilla*	--	--
American Robin	*Turdus migratorius*	--	--
Barn Swallow	*Hirundo rustica*	--	--
Black-capped Chickadee	*Poecile atricapillus*	--	--
Blue Jay	*Cyanocitta cristata*	--	--
Brown Thrasher	*Toxostoma rufum*	--	--
Common Grackle	*Quiscalus quiscula*	--	--
Common Yellowthroat	*Geothlypis trichas*	--	--
Eastern Bluebird	*Sialia sialis*	--	--
Eastern Wood-pewee	*Contopus virens*	--	--
Gray Catbird	*Dumetella carolinensis*	--	--
Hairy Woodpecker	*Picoides villosus*	--	--
House Sparrow	*Passer domesticus*	--	--
Northern Cardinal	*Cardinalis cardinalis*	--	--
Ovenbird	*Seiurus aurocapilla*	--	--
Pine Warbler	*Dendroica pinus*	--	--
Red-tailed Hawk	*Buteo jamaicensis*	--	--
Turkey Vulture	*Cathartes aura*	--	--
Wild Turkey	*Meleagris gallopavo*	--	--
Mammals			
Eastern Cottontail	*Sylvilagus floridanus*	--	--
Eastern Gray Squirrel	*Sciurus carolinensis*	--	--
Groundhog	*Marmota monax*	--	--
White-tailed Deer	*Odocoileus virginianus*	--	--
Amphibians			
Green Frog	*Rana clamitans*	--	--
Reptiles			
Eastern Box Turtle	*Terrapene carolina*	--	--
Six-lined Racerunner	*Cnemidophorus sexlineatus*	--	--

*Based on *Current and Historical Rare, Threatened, and Endangered Species of* [St. Mary's County and Calvert County], *Maryland*, December 13, 2007, Maryland Department of Natural Resources, Wildlife and Heritage Service.

4.4.1.7 Threatened and Endangered Species.

Bald Eagle

The Bald Eagle prefers habitats near seacoasts, rivers, large lakes, and other large bodies of open water with an abundance of fish. Studies have shown a preference for bodies of water with a circumference greater than seven miles (11.3 kilometers), and lakes with an area greater than 3.8 square miles (9.8 square kilometers) are optimal for breeding bald eagles. The Bald Eagle requires old-growth and mature stands of coniferous or hardwood trees for perching, roosting and nesting. Nest trees include pines, spruce, firs, cottonwoods, oaks, poplars and beech. Selected trees must have good visibility, an open structure, and proximity to prey, but the height or species of tree is not as important as an abundance of comparatively large trees surrounding the body of water. Forests used for nesting typically have between 60 percent and 20 percent canopy cover in close proximity to water. The staple food is fish, but they will also feed on waterfowl, rabbits, snakes, turtles, other small animals and carrion. In winter, eagles that nest in northern areas migrate south and gather in large numbers near open water areas where fish and other prey are plentiful.

The Bald Eagle is extremely sensitive to human activity, and it occurs most commonly in areas free of human disturbance. Although there have been rare exceptions, it typically chooses sites more than 0.75 mile (1.2 kilometers) from low-density human disturbance and more than 1.2 miles (1.9 kilometers) from higher density human disturbance.

Although the Bald Eagle is no longer listed under the ESA, the species is protected under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). These statutes restrict human activities near nesting sites during the breeding season (April to June in most locations) and prohibit the taking of individuals, including harassment, without a permit.

In the Maryland/District of Columbia Breeding Bird Atlas, 316 survey blocks contained this species, with 25 blocks near the Project area (BBA Explorer, 2008). Because the transmission line corridor is regularly maintained, including aircraft inspections, and most of the corridor extends through human-inhabited areas, it is highly unlikely that this species would use the corridor except temporarily between other locations. Bald Eagles may forage in fish-bearing streams within and adjacent to the transmission line corridor. The eagles may also fly within the Project area to travel from one foraging or nesting site to another. However, it is unlikely that any eagles nest in or near the transmission right-of-way because large areas of open water containing forage species are not present. Furthermore, large trees suitable for roosting or nesting are not present in the Project vicinity. To help assure migratory bird protections, SMECO would follow guidelines in *Suggested Practices for Avian Protection On power Lines: The State of the Art in 2006* (APLIC, 2006) and the *Avian Protection Plan (APP) Guidelines* prepared by the Edison Electric Institute's Avian Power Line Interaction Committee and USFWS (Edison 2005). This would include spacing conductors at least 7.5 feet (2.3 meters) apart to prevent large birds (e.g., raptors) from becoming electrocuted.

Sedge Wren

Habitats used are characteristically vegetation types and soil moisture regimes that are highly susceptible to drying or flooding from annual and seasonal rainfall variation. Areas that are too wet or too dry or that are dominated by shrubs are shunned. It usually nests among dense, tall growths of sedges and grasses in wet meadows, hayfields, retired croplands, upland margins of ponds and marshes, coastal marshes, and sphagnum bogs. It usually avoids short, sparse, or open vegetative cover, flooded areas and wetlands dominated by cattails. Habitat instability results in high mobility and low site tenacity, with some re-nesting in different habitats on occasion. The Sedge Wren primarily uses grasslands and savanna, especially where wet or boggy; sedge marshes; moist meadows with scattered low bushes; upland margins of ponds and marshes; coastal brackish marshes of cordgrass, herbs, and low shrubs; locally in dry cultivated grainfields. It sings from exposed perch, and otherwise creeps and hops on or near ground in tall grass, sedges or wet tangles at the bases of shrubs. The Sedge Wren nests low in tall dense growths of sedges or grasses, or similar herbage, very near ground, or over shallow water (Herkert et al., 2001).

Seasonal emergent wetlands and other wet areas are present in the transmission line corridor, mostly small areas (less than one acre) associated with small streams crossing the right-of-way. However, wet meadows are infrequent and seldom have shrubs present because of right-of-way maintenance or other factors limiting woody species. Maryland and the northeastern U.S. have sporadic distribution of the species with primarily local distribution (Herkert et al., 2001). Site fidelity in this species is low and relocation within a single breeding season or between seasons is common. In the Maryland/District of Columbia Breeding Bird Atlas, only 12 survey blocks contained this species, none of which includes the Project area (BBA Explorer, 2008). No individuals of this bird species were observed during the May 2008 site visit, and it is unlikely that the Sedge Wren uses the transmission line right-of-way.

Least Tern

Because of vegetation succession and/or erosion, preferred nesting habitat typically is ephemeral. Interior populations nest mainly on riverine sandbars or salt flats that become exposed during periods of low water. Breeding in riverine situations depends on the presence of sandbars, favorable water levels during nesting season, and sufficient food. Adults typically use seacoasts, beaches, bays, estuaries, lagoons, lakes and rivers. It rests and loafs on sandy beaches, mudflats and salt-pond dikes. Its young may use more heavily vegetated areas for cover. The Least Tern nests usually in shallow depression on level ground on sandy or gravelly beaches and banks of rivers or lakes, typically in areas with sparse or no vegetation (often 10% or less total cover). It also nests on dredge spoils, on mainland or on barrier island beaches, and on flat gravel-covered rooftops of buildings (especially in the southeastern U.S.) or other similarly barren artificial sites. Good nesting areas tend to be well beyond the high tide mark, have shell particles, stones or debris for egg camouflage, are not off-road vehicle or public recreation areas, are not subject to unusual predation pressure, and are adjacent to abundant forage (small fishes).

Excluding tidal wetlands associated with Town Creek, St. Leonard Creek, Hunting Creek and the Patuxent River, habitat within the transmission line corridor is not suitable for this species. In the Maryland/District of Columbia Breeding Bird Atlas, 23 survey blocks contained this species, none of which includes the Project area (BBA Explorer, 2008).

Black Rail

The Black Rail uses salt, brackish and freshwater marshes, pond borders, wet meadows and grassy "swamps." It is secretive, but may emerge from cover in early morning. The species nests in or along the edge of marshes, in areas with saturated or shallowly flooded soils and dense vegetation, usually hidden in marsh grass on damp ground, on a mat composed of dead grasses, or over very shallow water.

In northeastern North America, Black Rails breed primarily in salt and brackish marshes. However, they may use wet meadows and freshwater areas of Narrow-leaved Cattail (Typha angustifolia) and River Bulrush (Scirpus fluviatilis). In salt or brackish marshes, home ranges generally include dense stands of Saltmeadow Cordgrass (Spartina patens) mixed with Saltwater Cordgrass (S. alterniflora), Big Cordgrass (S. cynosuroides), Marsh Spikegrass (Distichlis spicata), Black Needlerush (Juncus roemerianus), Black Rush (J. gerardi), or Olney's Three-square (Scirpus olneyi). They also occur in the drier, upland edges of these marshes where saltmeadow cordgrass mixes with Marsh Elder (Iva frutescens) and Groundsel Tree (Baccharis halimifolia) in the saltbush community and with Common Reed (Phragmites australis) in disturbed areas.

Small areas of wetland vegetation are present within the transmission line corridor, but most are dominated by low-growing grasses, sedges or ferns and do not represent optimal habitat for Black Rails. In the Maryland/District of Columbia Breeding Bird Atlas, 18 survey blocks contained this species, none of which includes the Project area (BBA Explorer, 2008). Brackish and saltwater wetlands associated with Hunting Creek, Mill Creek, Parker Creek, St. Leonard Creek, Planters Wharf Creek, St. Johns Creek, and Kingston Creek may provide some suitable habitat, but these wetlands would not be affected by this Project.

Eastern Narrow-mouthed Toad

This species occupies a wide variety of shaded moist habitats, migrating between breeding pools and adjacent non-breeding terrestrial habitats. It burrows into soil or hides in or under surface cover or debris when inactive. Males call from sheltered locations, usually from beneath objects at the edge of water or partially buried in grass. Eggs and larvae develop in lakes, ponds, sloughs, flooded roadside ditches, swamps, stream margins, rain puddles, etc. Both temporary and permanent waters where fish predation is absent or low are used by larvae or for breeding.

Some habitats present within the transmission line corridor may be suitable for this species, but no individuals of the species were encountered during the May 2008 site visit. Since most wetlands crossing the corridor would not be affected, and existing land uses within the corridor would be the same post-construction as before, it is anticipated that any impacts to this species would be minor.

Northeastern Beach Tiger Beetle and Puritan Tiger Beetle

These two tiger beetle species have similar habitat requirements and are combined in this discussion for brevity.

Habitat for the larvae is narrow sandy beaches (16 feet (4.9 meters) or wider) with adjacent well-developed cliffs of sand and clay soil. Adult Puritan tiger beetles emerge during middle to late June, with peak populations in late June to early July, declining in late July. Larvae hatch in August as first instars. Larvae go through two spring seasons and emerge as adults about 22 months after birth. The entire larval cycle is within the larval burrows until emergence as adults. Adult dispersion is into different parts of the beach habitat, typically just above the high surf line, while larval burrows are well above high water. Larvae and adults are sensitive to erosion and compaction and a primary threat is human use of beach habitats.

Flag Lakes and Calvert Cliffs State Park, locations of two known occurrences for these species, are within Calvert County, but at a significant distance from the transmission line. There is no suitable habitat present in the study area (recently formed or active beaches below unvegetated cliffs), so it is considered highly unlikely that either of these species is present.

Plants

According to USFWS and MDNR, 55 plant species are considered threatened or endangered, 36 in Calvert County and 19 in St. Mary's County (Table 4.4-3). Of these, most potential occurrences (based only on habitat as reported in the scientific literature) are in forested habitats. Because forested habitat is not allowed to develop within the transmission line right-of-way for safety and maintenance reasons, these species were not considered further unless encountered during site visits. The only location where tree removal is anticipated is the new Sollers Wharf switching station site. Evaluation of the trees at the site indicates that they represent a low-quality habitat not suitable for the protected or sensitive species most likely to be found in the project area.

Of the remaining plant species, most are predominately hydrophytic species, preferring wet habitats that typically have been avoided in the existing transmission line right-of-way. None of the listed plant species was observed during the May 2008 site visit, although some late-flowering species might have been undetectable during early summer (e.g., *Agalinis* spp.). However, because of past and present disturbance, and the relatively undisturbed conditions the listed plant species require, it is deemed unlikely that any of the listed species are present.

None of the property at the Sollers Wharf substation site is considered to be suitable habitat for any of the threatened or endangered species discussed in this section.

4.4.2 Environmental Consequences

4.4.2.1 Vegetation. The existing transmission line right-of-way is severely disturbed, although a relatively diverse plant community is present. The majority of the transmission corridor consists of woods, with the right-of-way being predominantly open old-field that consists of an herbaceous and grassy plant community with scattered native shrubs and a few small trees. Old-field plant communities are disturbed habitats that have experienced secondary succession. These plant communities often are colonized by a mixture of native and non-native species tolerant of the disturbance conditions and usually are considered lower quality since the resulting plant community represents a more limited species diversity than the climax or near climax community that was

Table 4.4-3
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Calvert County					
Animals					
Acipenser brevirostrum	Shortnose Sturgeon*		E	Rivers, estuaries, and the sea; usually most abundant in estuaries, generally within a few miles of land when at sea. Prefer deep pools with soft substrates and vegetated bottoms, but variation exists among individuals. Adults may move to deeper water of lakes, lower rivers, bays or ocean for winter. Spawning occurs well upriver from summer foraging and nursery grounds. They spawn in sand to boulder-sized substrate with low to medium water flow. Larvae and juveniles have been reported from deep river channels above the salt wedge. Juveniles reside in the saltwater/freshwater interface of a river in deep, cool channels with sand-silt substrate.	Possible at Patuxent R.; habitat not impacted
Acipenser oxyrinchus	Atlantic Sturgeon		C	Primarily marine, but close to shore when not breeding; migrates to rivers for spawning, moves downstream after (may stay upstream in winter in some northern areas). Spawns in fresh water (sometimes tidal) usually over bottom of hard clay, rubble, gravel, or shell. May spawn in brackish water.	Possible at Patuxent R.; habitat not impacted
Cicindela dorsalis dorsalis	Northeastern Beach Tiger Beetle	E	LT	The foredune to the high tide line on ocean and bay beaches. Larvae live in burrows in the sand.	N

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Cicindela puritana	Puritan Tiger Beetle	E	LT	Narrow sandy beaches with adjacent well-developed cliffs of sand and clay soils	N
Cistothorus platensis	Sedge Wren	E		Grasslands and savanna, especially where wet or boggy; sedge meadows; moist meadows with scattered low bushes; upland margins of ponds and marshes; coastal brackish marshes of cordgrass, herbs, and low shrubs; locally in dry cultivated grainfields. Cattail marshes are avoided. Territory size approximately 0.5 acre.	N
Gastrophryne carolinensis	Eastern Narrow-mouthed Toad	E		Occupies a wide variety of shaded moist habitats, burrowing into soil or hiding in or under surface cover or debris when inactive. Eggs and larvae develop in lakes, ponds, sloughs, flooded roadside ditches, swamps, stream margins, rain puddles, etc. Both temporary and permanent waters are used.	Y, but habitat not impacted
Haliaeetus leucocephalus	Bald Eagle	T		Usually nests in tall trees or on cliffs within 3 miles of water. Preferred nest trees include pines, spruce, firs, cottonwoods, oaks, poplars and beech; large trees are selected. The same nest may be used annually, or they may alternate between two or more nest sites in successive years. Bodies of water that with abundant primary food sources including fish, waterfowl, and seabirds are preferred.	Possible, at locations near coast, mainly Patuxent River; nesting habitat not impacted

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Laterallus jamaicensis	Black Rail	E		Salt, brackish and freshwater marshes, pond borders, wet meadows and marshes. Cover of vegetation peripheral to the marsh believed important in reducing predation on rails flushed from marsh margin by high tide.	Y, near Hunting Creek crossing
Sternula antillarum	Least Tern	T		Breeding habitat is level ground on open, sparsely vegetated sandy or gravelly beaches of seacoasts, bays, estuaries, lagoons, lakes and rivers. Resting and loafing is on sandy beaches, mudflats and salt-pond dikes.	N
Plants					
Aeschynomene virginica	Sensitive Joint-vetch	E	LT	Fresh to slightly brackish tidal river shores and estuarine-river marsh borders. Usually within 6 feet of low water mark on raised banks. Peaty, sandy or gravelly substrates.	Y, near Hunting Creek crossing; habitat not impacted
Agalinis obtusifolia	Blunt-leaved Gerardia	E		Seasonally wet pine savannas and flatwoods and hillside bogs in pinelands in dry or moist sandy soils	N
Agalinis setacea	Thread-leaved Gerardia	E		Dry soil in oak woods or pine barrens	N
Antennaria solitaria	Single-headed Pussytoes	T		Slopes or stream banks in moist, rich, deciduous woodlands, forests, sometimes forest openings	Possible in streambank thickets; habitat not impacted
Aristida lanosa	Woolly Three-awn	E		Dry fields, open canopy pine-oak woods, and uplands, chiefly in sandy soil	N
Bidens mitis	Small-fruited Beggar-ticks	E		Marshes, borders of estuaries	N

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Chelone obliqua	Red Turtlehead	T		Wet to moist floodplain forests, swamps, soggy meadows and thickets, and partially shaded seeps and springs, usually in high quality habitat	N
Chenopodium standleyanum	Standley's Goosefoot	E		Open woodlands, woodland borders, thickets, rocky bluffs, and partially shaded roadsides	Possible in streambank thickets; habitat not impacted
Desmodium lineatum	Linear-leaved Tick-trefoil	E		Pine rocklands, presumably in sandy soils	N
Desmodium ochroleucum	Cream-flowered Tick-trefoil	E		Roadsides, right-of-ways, prairies or prairie-like openings, and openings in mixed hardwood temperate forests. Dry to sandy loam soil, especially over limestone.	Y
Desmodium pauciflorum	Few-flowered Tick-trefoil	E		Rich, moist woods, ravines, base of bluffs	N
Desmodium rigidum	Rigid Tick-trefoil	E		Dry sandy woods and thickets	Possible in streambank thickets; habitat not impacted
Diplazium pycnocarpon	Glade Fern	T		Moist deciduous woods and slopes in neutral soil	Possible in streambank thickets; habitat not impacted
Elephantopus tomentosus	Tobaccoweed	E		Dry open woods and thickets	N
Eurybia radula	Rough-leaved Aster	E		Fens, sphagnum bogs, lake and creek shores, edges of or in openings in wet spruce or tamarack forests, open boggy woods, wet meadows, ditches; does not tolerate dense shade	Possible in seep wetland assoc. with St. Paul Branch; habitat not impacted
Gymnopogon brevifolius	Broad-leaved Beardgrass	E		Dry to somewhat moist sandy pine woodlands, usually in loamy soils	N

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Lemna trisulca	Star Duckweed	E		Mesotrophic, quiet waters rich in calcium (aquatic)	Possible in larger streams or rivers; habitat not impacted
Limnobium spongia	American Frog's-bit	E		Floating on slow-moving water of streams, bayous, and lakes or stranded along shore (aquatic)	Possible in larger streams or rivers; habitat not impacted
Lygodium palmatum	Climbing Fern	T		Moist, open woods or thickets in acidic soil; does not tolerate shade	N
Matelea carolinensis	Anglepod	E		Moist woods and thickets; riverbanks, low thickets, woods and less frequently in fields, ditches and along fence rows	Possible in streambank thickets; habitat not impacted
Melica mutica	Narrow Melicgrass	T		Moist or dry areas in open woods and thickets	Possible in streambank thickets; habitat not impacted
Melothria pendula	Creeping Cucumber	E		Rich rocky woods, base of limy cliffs, alluvial woods, along streams	N
Monotropsis odorata	Sweet Pinesap	E		Mature, moist, shaded, rich hardwood forests	N
Morella caroliniensis	Evergreen Bayberry	E		Pocosins, wet savannas, and pine flatwoods; often in sterile soils where little else grows	N
Parnassia asarifolia	Kidneyleaf Grass-of-parnassus	E		Bogs, seepage slopes, stream banks	Y, seep wetland assoc. with St. Paul Branch; habitat not impacted
Pluchea camphorata	Marsh Fleabane	E		Swamps, wet woods, marshes, borders of streams, ponds and ditches	Y, near Hunting Creek crossing
Polygonum densiflorum	Dense-flowered Knotweed	E		Wet, swampy woods, thickets and margins of shallow pools	Possible in streambank thickets; habitat not impacted

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Potamogeton foliosus	Leafy Pondweed	E		Marshes and shallow standing water (aquatic)	Y, in marshes near Hunting Creek crossing; habitat not impacted
Quercus shumardii	Shumard's Oak	T		Mesic slopes and bottoms, streambanks and poorly drained calcareous uplands; full sun or partial shade	N
Rhynchosia tomentosa	Hairy Snoutbean	T		Dry, sandy, mixed pine-hardwood forest and forest margins	N
Sagittaria engelmanniana	Engelmann's Arrowhead	T		Acid waters of ponds, lakes, bogs, and streams	Y, seep wetland assoc. with St. Paul Branch; habitat not impacted
Sesuvium maritimum	Sea-purslane	E		Sandy shores, beaches, dune swales, brackish marshes, banks along or near coasts, waste grounds, ballast	N
Solidago speciosa speciosa	Showy Goldenrod	T		Sandy and gravelly soils, open woods, fields, roadsides	Y
Sporobolus clandestinus	Rough Rushgrass	T		Prairies, limestone glades, limestone cliff edges, along railroads	N
Symphyotrichum concolor	Silvery Aster	E		Sandy and loamy soils, roadsides, oak scrub, pine flatwoods, fields	Possible at roadsides; habitat not impacted
Zizaniopsis miliacea	Southern Wildrice	E		Shallow, fresh- or brackish-water marshes, swamps, streams, lakes, and ditches	Possible in marshes near Hunting Creek crossing; habitat not impacted

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
St. Mary's County					
Animals					
Alasmidonta heterodon	Dwarf Wedge Mussel	E	LE	Typically found in shallow to deep quick running water on cobble, fine gravel, or on firm silt or sandy bottoms. Other habitats used are among submerged aquatic plants, and near stream banks underneath overhanging tree limbs. Substrates commonly used are muddy sand, sand, and gravel bottoms in creeks and rivers of various sizes. It requires areas of slow to moderate current, good water quality, and little silt deposits. Tessellated Darters (*Etheostoma olmstedi*) are preferred glochicial hosts.	N
Centrarchus macropterus	Flier	T		Swamps, lakes, sloughs, low gradient creeks and small rivers, ponds; usually over mud. They are most abundant in well-vegetated waters.	Y; tidal wetland near Town Creek; habitat not impacted
Cicindela dorsalis dorsalis	Northeastern Beach Tiger Beetle	E	LT	The foredune to the high tide line on ocean and bay beaches. Larvae live in burrows in the sand.	N
Cistothorus platensis	Sedge Wren	E		Grasslands and savanna, especially where wet or boggy; sedge meadows; moist meadows with scattered low bushes; upland margins of ponds and marshes; coastal brackish marshes of cordgrass, herbs, and low shrubs; locally in dry cultivated grainfields. Cattail marshes are avoided.	N

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Gastrophryne carolinensis	Eastern Narrow-mouthed Toad	E		Occupies a wide variety of shaded moist habitats, burrowing into soil or hiding in or under surface cover or debris when inactive. Eggs and larvae develop in lakes, ponds, sloughs, flooded roadside ditches, swamps, stream margins, rain puddles, etc. Both temporary and permanent waters are used.	Y, but project is outside of species normal range
Haliaeetus leucocephalus	Bald Eagle	T		Usually nests in tall trees or on cliffs within 3 miles of water. Preferred nest trees include pines, spruce, firs, cottonwoods, oaks, poplars and beech; large trees are selected. The same nest may be used annually, or they may alternate between two or more nest sites in successive years. Bodies of water that with abundant primary food sources including fish, waterfowl, and seabirds are preferred.	Possible, at locations near coast, mainly Patuxent River; nesting habitat not impacted
Sternula antillarum	Least Tern	T		Breeding habitat is level ground on open, sparsely vegetated sandy or gravelly beaches of seacoasts, bays, estuaries, lagoons, lakes and rivers. Resting and loafing is on sandy beaches, mudflats and salt-pond dikes.	N
Plants					
Arnica acaulis	Leopard's-bane	E		Sandy pine woods and clearings, often in damp soils, chiefly on Coastal Plain	N
Carex buxbaumii	Buxbaum's Sedge	T		Fens, wet prairies, seepy areas	N
Carex venusta	Dark Green Sedge	T		Forested swamps, bogs, wet places in pine forests, bays, hammocks, roadside ditches	N

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Chelone obliqua	Red Turtlehead	T		Wet to moist floodplain forests, swamps, soggy meadows and thickets, and partially shaded seeps and springs, usually in high quality habitat	N
Desmodium pauciflorum	Few-flowered Tick-trefoil	E		Rich, moist woods, ravines, base of bluffs	N
Drosera capillaris	Pink Sundew	E		Acidic sandy soils, especially bogs in full sun	N
Eleocharis albida	White Spikerush	T		Coastal saltmarsh edges, sloughs, beaches, dune depressions, ditches near sea level	N
Elephantopus tomentosus	Tobaccoweed	E		Dry open woods and thickets	N
Gratiola viscidula	Short's Hedge-hyssop	E		Bogs, marshes, wet ditches	N
Iris prismatica	Slender Blue Flag	E		Fresh, brackish or salt marshes, shores or meadows along the coast	N
Kyllinga pumila	Thin-leaved Flatsedge	E		Damp grasslands, shorelines, ditches, lawns, gardens	Y
Linum intercursum	Sandplain Flax	T		Open oak or pine woods and open places on the coastal plain in sandy soils and barrens	N
Polygonum glaucum	Seaside Knotweed	E		Coastal beaches, sand dunes, margins of salt ponds	N
Prunus maritima	Beach Plum	E		Dunes, well-drained sandy soils near the coast in full sun	N
Sarracenia purpurea	Northern Pitcher-plant	T		Peat bogs, raised peatlands, alkaline fens, montane seepage bogs, swamps, boreal conifer woodlands, boggy interdune swales, glacial lake and pond margins, moist to wet pitch pine	N

Table 4.4-3 (Continued)
Species Listed as Threatened, Endangered or Candidate Species in Calvert County and St. Mary's County Maryland

Scientific Name	Common Name	State Status**	Federal Status**	Preferred Habitat	Habitat Present in Project Area?
Symphyotrichum concolor	Silvery Aster	E		Sandy and loamy soils, roadsides, oak scrub, pine flatwoods, fields	N
Torreyochloa pallida	Pale Mannagrass	E		Bogs, marshy shores of ponds, lakes, streams, swamps, pools, sloughs, cattail marshes, temporary pools, shallow cold water of shaded stream and pond sides, wet hollows in woods	N
Trachelospermum difforme	Climbing Dogbane	E		Roadsides and disturbed areas, mostly on low, damp ground	Possible in streambank thickets; habitat not impacted
Utricularia inflata	Swollen Bladderwort	E		Lakes, ditches, and swamps in shallow to deep water at low altitudes	N

Species status was based on Maryland Department of Natural Resources, Wildlife and Heritage Service, dated December 13, 2007, accessed on the Internet at http://www.dnr.state.md.us/wildlife/rte/rte07stma.pdf and http://www.dnr.state.md.us/wildlife/rte/rte07calvert.pdf on April 18, 2008.

Habitat data for each species was obtained online from http://www.natureserve.org/explorer and http://www.efloras.org/.

* Added per agency consultation correspondence.

**Federal status codes: LT = Threatened, LE = Endangered, C = Candidate species; State status codes: T = Threatened, E = Endangered.

disturbed. Most woody species (trees, shrubs or woody vines) in the transmission right-of-way are confined to low-lying areas that are inaccessible to maintenance crews because of saturated soils associated with streams or wetlands. The upland portion of the transmission right-of-way is currently maintained by routine hazard tree removal and limb trimming to protect the transmission line.

The primary effects on vegetation arise from construction access by cranes, trucks and other construction equipment. These impacts are considered temporary since pre-construction conditions would be restored following construction to the extent possible. Best Management Practices, such as the use of low-ground pressure construction equipment, check dams, temporary sediment basins, silt fence or other recognized practices that limit the extent of disturbance would be used to limit long-term damage to vegetation.

4.4.2.2 Fish and Wildlife. The existing right-of-way corridor is disturbed by past activities and generally is unattractive to wildlife because of a lack of cover, low forage quality and diminished species diversity relative to the surrounding area. Watercourses traversing the right-of-way generally are moderate gradient streams, many of which are intermittent or ephemeral and would not support a fish assemblage year-round. The right-of-way is more open than the surrounding area, which results in significant temperature, moisture and lighting differences between the two habitats. Periodic maintenance of the right-of-way includes irregular mowing of herbaceous vegetation and removal of shrubs or trees that pose a danger to the existing 69 kV transmission line.

Most construction activities associated with the transmission line upgrade would be temporary, with original conditions restored as much as possible after construction is completed. Construction would include access by cranes and other heavy equipment necessary to install and secure the new poles for the upgraded transmission line. Impacts may include construction traffic on unpaved access roads, soil disturbance from boring for transmission line pole installation and wire (conductor) installation.

The proposed transmission line upgrade would require larger poles to support the conductors, although fewer poles would be used. Existing poles would be removed and the former pole locations restored. The new poles would be taller than the existing poles and could represent roosting habitat for some bird species, particularly raptors. This could in turn mean increased predation pressure for prey species of raptors that venture into the right-of-way from the surrounding woods.

Fish and other aquatic wildlife (e.g., amphibians) may be adversely affected, in the absence of mitigative measures, by soil erosion if soil is disturbed where transport to streams or wetlands is likely. Resulting changes in water quality could diminish intolerant species populations, lower species foraging success, eradicate or alter forage species and allow undesirable or invasive species to become established. However, SMECO would undertake and implement construction Best Management Practices to prevent soil erosion and runoff to streams.

4.4.2.3 Threatened and Endangered Species. Several Endangered, Threatened or Species of Conservation Concern and two important habitats were noted in MDNR correspondence (see Appendix J). These species and approximate locations within the Project area as identified by MDNR are summarized in Table 4.4-4. Impacts to these species could result from habitat disturbance, including construction noise and traffic, and soil disturbance. No impacts to listed species from construction of the Sollers Wharf switching station are anticipated.

Table 4.4-4
Threatened and Endangered Species and Habitats in Project Area

Species Reported	Approximate Location	Confirmed?
Peregrine Falcon (*Falco peregrinus*)	Nesting record under Thomas Johnson bridge	Species not observed
Engelmann's Arrowhead (*Sagittaria engelmanniana*)	Associated with sphagnum seeps or bogs near St. Paul Branch	Seep present; species not observed
Kidneyleaf Grass of Parnassus (*Parnassia asarifolia*)	Associated with sphagnum seeps or bogs near St. Paul Branch	Seep present; species not observed
Rough Rushgrass (*Sporobolus clandestinus*) Hairy Snoutbean (*Rhynchosia tomentosa*) Wooly Three-awn (*Aristida lanosa*)	Bertha, MD area (dry, sandy roadside habitat associated with a transmission line ROW)	Species not observed
Spurred Butterfly-pea	Along Laveel Branch (dry, sandy soil; open woods and clearings)	Species not observed
Blunt leaved Gerardia (*Gerardia obtusifolia*)	Lusby area (grasslands, waste places, pine woods and savannas)	Species not observed
"Barbed" watershed	Parker's Creek; concern for degraded water quality in pristine watershed	
Historic waterfowl concentration and staging area crossed by transmission line	German Chapel Road to Route 231 (St. Leonard Creek)	
Forest Interior Dwelling Birds	Overall route	

4.4.3 Mitigation Measures

4.4.3.1 Vegetation. No permanent impacts on vegetation resources are anticipated from implementation of the Project. Fewer than five acres (2.0 hectares) of forest edge would be removed for construction of the Sollers Wharf switching station, but substantial forest would remain and fragmentation of forest interior would not result from this Project. The vast majority of forest edge would be retained intact along the existing right-of-way. Wildlife using the large forested tracts abutting the right-of-way has adapted to the presence of the existing right-of-way and is not likely to be displaced by the transmission line upgrade because the forest interior would not be affected. Restoration from temporary impacts in the right-of-way would include restoration of contours to pre-construction conditions and maintenance of erosion control BMPs until revegetation stabilizes the disturbed areas. Revegetation would be completed using a mixture of plant species already present in the right-of-way, with an emphasis on species native to Calvert or St. Mary's County, depending on location.

4.4.3.2 Fish and Wildlife. An exceptional shift in species composition in the region surrounding the upgraded transmission line is unlikely, since habitat conditions at ground level would continue to be similar to the existing conditions. Since the habitat for most prey species would be essentially unchanged, an increase in mortality because of taller towers, construction activities or operation and maintenance of the transmission line is considered unlikely. Escape and cover requirements for prey species would not be changed, so mortality is anticipated to be about the same as for the existing structures in the right-of-way. Wildlife in the region has adapted to the presence of the existing transmission line and would likely adapt to the upgraded line in similar fashion. Therefore, it is anticipated that post-construction conditions would allow temporarily displaced species to re-colonize the transmission line right-of-way, thereby re-establishing the existing wildlife community. Therefore, further mitigation is not necessary or warranted.

Impacts to fish are related to sedimentation from soil erosion in upland locations. Because erosion control BMPs would be used at all construction locations, it is anticipated that any impacts would be minor and temporary. Pre-construction conditions would be restored as much as possible after construction and appropriate native vegetation re-established to provide soil stabilization. Crossing of the Patuxent River would be done using horizontal directional drilling outside the stream floodplains. Other streams would be spanned. Therefore, further mitigation is not necessary or warranted.

4.4.3.3 Threatened and Endangered Species. Early reconnaissance indicates that the majority of the transmission right-of-way has been disturbed with enough frequency that it does not contain habitat suitable for most of the listed species in Calvert or St. Mary's County. However, as reported by MDNR, several species or important habitats could be impacted by the Project. These are indicated in Table 4.4-5 along with proposed mitigation. With the exception of the three habitats mentioned, none of the listed species was observed during the May 2008 site visits. However, because suitable habitat is present the occurrence of these species cannot be ruled out. Therefore, mitigation as proposed, including avoidance of irreversible impacts to suitable habitat, is intended to prevent loss of the species.

4.5 Land Use

4.5.1 Affected Environment

4.5.1.1 Land Use. The proposed 230 kV transmission line would be situated within SMECO's existing 69 kV transmission line right-of-way. The existing transmission line right-of-way passes through largely rural, forested, farming, and low density residential areas.

The northern segment of this line begins at the Holland Cliff switching station in Calvert County and passes through a predominately rural area as it proceeds to the southeast. As the line continues to the southeast, the route generally proceeds through a more populated area of the county. The existing right-of-way turns to a south-southwestern direction west of the Calvert Cliffs State Park and then crosses a commercial development as it approaches Dowell and Solomon's Landing. The route then enters the U.S. Naval Recreation Center before crossing the Patuxent River near the Thomas Johnson Memorial Bridge. Once in St. Mary's County, the route travels through a low-density residential area and crosses Maryland Highway 235 before turning sharply to the southeast once more. At this turn, the route passes near a commercial area and then proceeds through a residential area and the Hewitt Road switching station. A detailed discussion of existing land use conditions is provided in Appendix C.

Table 4.4-5
Proposed Mitigation for Reported Species

Species Reported	Proposed Mitigation
Peregrine Falcon (*Falco peregrinus*)	Avoid construction or other activities within 0.25 mile (0.40 kilometer) of nest during March to June (note: the HDD route under the Patuxent River is more than 2000 feet (610 meters) from the bridge at its closest point)
Engelmann's Arrowhead (*Sagittaria engelmanniana*)	Avoid direct impacts to seep or bog wetlands, avoid alteration of groundwater hydrology, including road construction, avoid indirect impacts to wetland (e.g., siltation)
Kidneyleaf Grass of Parnassus (*Parnassia asarifolia*)	Avoid direct impacts to seep or bog wetlands, avoid alteration of groundwater hydrology, including road construction, avoid indirect impacts to wetland (e.g., siltation)
Rough Rushgrass (*Sporobolus clandestinus*) Hairy Snoutbean (*Rhynchosia tomentosa*) Wooly Three-awn (*Aristida lanosa*)	Evaluate transmission right-of-way for suitable habitat, if any species are present conduct further consultation with MDNR, Wildlife and Heritage Service
Spurred Butterfly-pea	Evaluate transmission right-of-way for suitable habitat, if any species are present conduct further consultation with MDNR, Wildlife and Heritage Service
Blunt leaved Gerardia (*Gerardia obtusifolia*)	Evaluate transmission right-of-way for suitable habitat, if any species are present conduct further consultation with MDNR, Wildlife and Heritage Service
"barbed" watershed	Strict erosion controls with regular maintenance weekly and after each rainfall, particularly for fine-grained sediments
historic waterfowl concentration and staging area crossed by transmission line	Avoid construction activities near the St. Leonard Creek area during migration and staging times (March to May and September to November)
Forest Interior Dwelling Birds	Limit forest fragmentation, limit construction activity in forest to between August and May, maintain forest habitat outside the right-of-way, limit mowing in right-of-way until August with an average grass height of 10 inches (25.4 centimeters) or taller within safety limits

4.5.1.2 Socioeconomics. Calvert County has experienced steady growth in population since 1986, increasing from 42,147 to 88,804 in 2006. It is projected that population in the county will continue to increase, reaching 96,000 by 2020. The continued demographic and economic growth is a key factor in SMECO's need for the proposed transmission line. St. Mary's County has a larger population than Calvert County. The population in St. Mary's County has increased from 66,570 in 1986 to 98,854 in 2006. The projected population is expected to reach 108,000 by 2010 and 114,800 by 2020. This growth is reflected in the state of Maryland's population, which is projected to increase from 5.6 million in 2006 to nearly 6.2 million by 2020. A detailed discussion of population growth for both Calvert and St. Mary's counties is included in Appendix C.

Between 2000 and 2008, Calvert County (at 23.6 percent) and St. Mary's County (at 25.7 percent) experienced substantial growth in the labor force relative to the state growth of 11.4 percent. Likewise, in 2000 and 2008, the Calvert County unemployment rate was less than 3.5 percent. The unemployment rate in St. Mary's County was comparable to the state unemployment rate of 4.7 percent in 2000, but down to 2.4 percent in 2008. A detailed discussion of employment, income, and economic profile is included in Appendix C.

Housing data for 2008 for Calvert County and St. Mary's County indicate that there were nearly 33,000 and 42,000 housing units in each county, respectively. Calvert County reported an 8.7 percent vacancy rate while St. Mary's County reported an 11.4 percent vacancy rate. An overwhelming majority of these housing units are designated single unit, detached structures. A detailed discussion of housing for Calvert and St. Mary's counties is included in Appendix C.

Calvert County had 27 public schools in 2005-2006, and a total student population of 17,468. St. Mary's public schools were comparable in size, having 26 public schools and a student population of 16,649. Calvert County public school enrollment is projected to increase by 7.5 percent and St. Mary's County is projected to increase by 16.0 percent between 2006 and 2016. A detailed discussion of education for Calvert and St. Mary's counties is included in Appendix C.

There are numerous parks and recreational facilities within Calvert County and St. Mary's County including: neighborhood, community, and regional parks, special use areas, educational recreation areas, natural resource parks, historical and cultural areas, and private open space recreational areas. The largest of these areas in Calvert County was the private open spaces classification, which accounts for approximately 2,009 acres (813 hectares) followed by the natural resources and open space areas category with nine areas that accounted for approximately 1,562 acres (632 hectares). St. Mary's County boasts four state parks, 12 community parks, seven neighborhood parks, 15 recreational parks, 16 piers and boat ramps, as well as golf courses and county fairgrounds. In total, there are 4,196 acres (1,698 hectares) devoted to recreation within St. Mary's County. A detailed discussion of parks and recreation facilities in Calvert and St. Mary's counties is included in Appendix C.

The primary medical facility in Calvert County is the Calvert Memorial Hospital (CMH), which is located in Prince Frederick. In 2006, there were 8,201 admissions to CMH and an average of 76 beds in use per day. The CMH emergency department sees an average of 100 patients a day. In St. Mary's County, hospital care is primarily provided by St. Mary's Hospital, located in Leonardtown. There were 7,527 admissions in 2006, and the daily average of beds used was 66.

Fire fighting services in Calvert County are provided through seven fire stations, 870 volunteer firefighters, 12 engines and attack pumpers (the average age of these engines is 15 years old), three ladder trucks, five tankers, and a range of other vehicles. In addition, Emergency Medical Service (EMS) volunteers provide service throughout the county. Fire fighting services for St. Mary's County are provided through seven volunteer fire departments and 513 volunteers, nine fire stations, and a total of 75 pieces of equipment including items such as aerial ladder trucks and 1,500 gallon per minute pumpers. In addition, the county has seven volunteer EMS rescue squads and 437 volunteers working out of nine stations. Additional information regarding fire fighting and EMS services in Calvert and St. Mary's counties is included in Appendix C.

The Calvert County Sheriff and the Maryland State Police provide protection within Calvert County (excluding North Beach and Chesapeake Beach, which provide separate protection, but work through the Calvert County Sheriff's Office). The Calvert County Sheriff's department has 135 uniformed officers, 25 civilian personnel, and 135 police vehicles. St. Mary's County Police Protection is provided by the St. Mary's Sheriff's Department and the Maryland State Police. The two agencies maintain a joint Bureau of Criminal Investigation where detectives from both agencies work together on serious crimes in the county. In 2005, the St. Mary's County Sheriff's Department had 109 sworn deputies, 69 correctional officers and 42 civilian support personnel, and six K-9 officers. Additional information regarding police protection services in Calvert and St. Mary's counties is included in Appendix C.

Calvert County has 22 water treatment plants and 14 storage tanks covering the county water districts. In 2005, the county facilities supplied approximately 460 million gallons of water. Currently, most districts have excess capacity. Homes and businesses not receiving water from the public utility use well water. Most of the sanitary waste in Calvert County is collected through septic tanks. There are also three large wastewater treatment plants that have the available capacity to handle the expected population growth for the next several years. St. Mary's County has 27 water systems having a combined 12.5 million gallons (47,300 cubic meters) per day (mgd) pumping capacity. The water systems generally have adequate excess capacity to accommodate growth. Those who do not use water from the public utility acquire it from water wells. St. Mary's County has four wastewater treatment plants and 53 wastewater pumping stations with a combined treatment capacity of 6.3 mgd (23,800 cubic meters per day). These wastewater treatment plants have a relatively low utilization rate with excess treatment capacity. Similar to Calvert County, those not using public systems primarily rely on septic tanks. Additional information regarding water and sanitary sewer infrastructure in Calvert and St. Mary's counties is included in Appendix C.

Solid waste in Calvert County has historically been taken to the landfill located in Appeal; however, to reduce the need to expand the landfill, the county signed an agreement with a private company in 1997 to build and operate a solid waste transfer station in Lusby. The residents of St. Mary's county dispose of their recycling and solid waste at one of six county convenience centers. Additional information regarding solid waste disposal in Calvert and St. Mary's counties is included in Appendix C.

The primary north-south highway in the county is Maryland Highway 4 (MD 4), which connects travelers with Washington D.C. Maryland Highway 2 (MD 2) is another primary roadway and connects the county with Annapolis. County planners view the traffic congestion on MD Routes 4 and 2/4 as a primary concern and over time plan to convert these roadways into a controlled access expressway. St. Mary's County and Calvert County are linked by the Thomas Johnson Memorial Bridge. The major highway transportation route in St Mary's County is Maryland Highway 235. As with Calvert County, St. Mary's County is within commuting distance of Washington D.C., though traffic congestion often results in very long delays. There is one general aviation airport in St. Mary's County, but none in Calvert County, though the area is served primarily by airports in the greater Washington, DC-Baltimore area. CSX and Norfolk Southern are the two Class I rail carriers that provide service to the region. These two railways also connect with Canadian railways for the transportation of goods into Canada. Additional information regarding transportation in Calvert and St. Mary's counties is included in Appendix C.

4.5.2 Environmental Consequences

4.5.2.1 Land Use. The incremental impacts on land use due to the installation of the Project would be minimal, as the proposed line would use the existing SMECO 69 kV line right-of-way. The primary deviation from existing rights-of-way would occur on the

U.S. Naval Recreational Center and in the Town Creek area on the west side of the Patuxent River in St. Mary's County (see the Patuxent River Crossing Report in Appendix F and the Naval Recreation Center Report in Appendix G for more details). Impacts associated with the Sollers Wharf switching would include clearing of up to 4 acres (1.6 hectares) for the station and road access. An additional area for stormwater management and fencing would bring to the total affected area to about 6 acres (2.4 hectares). About 80% of the existing woodland on the larger property surrounding the switching station would remain as screening vegetation. Land use near the switching station is rural, which is expected to be unchanged after the switching station is constructed and in operation. It is expected that the proposed route would not require a significant change in land use along the 30-mile route. Additional information regarding land use impacts associated with this Project is presented in Appendix C.

4.5.2.2 Visual Impacts During Construction and Operation. The construction of this project would occur within the existing right-of-way that SMECO has used for approximately 30 years for the operation of its 69 kV transmission line. For this Project, all of the existing transmission structures (poles) would be removed and replaced with new, weathering steel structures. The surface of the new structures would oxidize to form a dull, rust brown coating. The proposed structures would be taller and stronger than the existing wood structures and would allow for longer spans in between each tower.

The reduction in the number of structures from the existing 69 kV transmission line to the proposed 230 kV line would be between 30% and 40%. On average, there would be approximately seven transmission structures per mile with the proposed line. The proposed transmission structures would extend from 110 feet to 140 feet above ground surface.

Visual impacts from the presence of construction machinery, excavated soil, and stripped vegetation would be temporary and confined to the immediate transmission corridor. The construction equipment would be visible to residents and commercial establishments whose property is located adjacent to the existing right-of-way. Thus, from a visual impact perspective, the construction of the proposed transmission structures would have a minimal effect on adjacent residents, commercial property, and areas surrounding the existing right-of-way.

After construction is complete, the visual impacts of the Project would be limited to the new transmission line structures remaining visible from some of the areas surrounding the existing right-of-way. Forests and tree lines would mask the transmission line in most locations, but it would be visible to the public in areas where the transmission line is located adjacent to residents without benefit of trees, at road crossings, and in commercial areas. Travelers driving along the right-of-way and residents at some distance from the new structures would be more likely to see them than those close to the new line but shielded by trees.

The new substation and access road would be constructed on a portion of 40 acres of land on the west side of the intersection of Pardoe Road and Sollers Wharf Road in southern Calvert County. The access road may be constructed from either road into the substation. The transmission structures within the substation would extend up to 70 feet above ground surface. A 10-foot high security fence would be built around the perimeter of the substation. Visual impacts from the presence of construction machinery, excavated soil, and stripped vegetation would be temporary and confined to the proposed site for the substation. However, these visual impacts are anticipated to be minor because many of the trees on the property would remain in place, thereby masking the construction work and minimizing the visual impact during construction. After construction, the same screening trees would remain. These may be enhanced by volunteers, minimizing the appearance of the switching station.

Although the general appearance of the new structures and lines would be consistent with the existing structures and lines, the new structures would be taller than the existing ones and would exceed the height of adjacent trees in most locations. Travelers driving along the right-of-way and residents at some distance from the new structures would be more likely to see them that those close to the new line but shielded by trees. Figure 4.5-1 contains a photo-simulation of the appearance of one of the new structures in a representative section of right-of-way between the Holland Cliff switching station and Prince Frederick.

The proposed transmission line route would pass west of Calvert Cliffs State Park, approaching no closer than approximately 2,000 feet, and the proposed Sollers Wharf switching station would be located northwest of Calvert Cliffs State Park at a distance greater than one mile. Neither construction nor operation of the transmission line and the switching station is anticipated to have a visual impact on users of Calvert Cliffs State Park because of the forested areas in the park that would conceal the line and substation from view.

Figure 4.5-1
Photo Simulation of New Structure South of Holland Cliff Switching Station

The proposed transmission line route would pass northeast of St. Mary's River State Park and Chancellors Run Regional Park, approaching no closer than approximately 3,000 feet, with residential areas and a densely developed commercial area along State Highway 235 between the park and the transmission line. Again, neither construction nor operation of the transmission line is anticipated to have a visual impact on users of St. Mary's River State Park and Chancellors Run Regional Park because of the forested areas in the park that would conceal the line from view.

The proposed transmission line route would pass through the Naval Recreation Center at Solomons, a facility for U. S. Navy personnel and families, closed to the general public. The structures on this facility would be visible from State Highway 2/4 and from the Naval Recreation Center itself. However, most of new line traversing this facility would be installed underground. See Section 2.7 and Appendix G for more details.

4.5.2.3 Socioeconomics. Construction of the Project would have modest, but positive economic benefits to Calvert County and St. Mary's County. The primary impact would arise from the direct employment and income benefits associated with the construction of the Project. SMECO expects that construction of the Project would begin in the second quarter of 2012 and would be completed in the fourth quarter of 2015, a continuous process covering approximately 3.5 years.

In addition to the direct employment and income effects, a multiplier effect would be created in the local economy as a result of the additional employment, income, and output associated with the transmission line Project.

It is expected that there would be no significant negative socioeconomic impacts during construction of the proposed transmission line. This is because there would not be a large construction workforce relocating to the area that would be expected to place a significant and sudden increase in the demand for local services or housing. There would be potential temporary socioeconomic impacts associated with traffic disruptions as large or over-sized equipment enters or leaves the roadways in selected route areas, or as crews enter and exit the right-of-way. However, given the small size of the construction workforce, approximately 10 to 15 workers per crew, no more than two crews at any given time, and the temporary nature of the construction effort, all impacts associated with traffic disruptions would be negligible.

The proposed transmission line route would pass west of Calvert Cliffs State Park and east of St. Mary's River State Park. The proposed Sollers Wharf switching station would be located near the intersection of Pardoe Road and Sollers Wharf Road. Most of the site for the switching station would be used for a visual buffer, as the fenced-in area would be approximately four acres (1.6 hectares) in size. Neither construction nor operation of the transmission line and the switching station is anticipated to have a visual impact on users of these State parks because the forested areas would mask the view of the structures. The structures proposed for construction on the Naval Recreation Center would be visible from State Highway 2/4 and from some of the Recreation Center; however, most of new line traversing this area and on the opposite side of the Patuxent River would be installed underground.

Additional information regarding socioeconomic impacts associated with this Project is included in Appendix C.

4.5.2.4 Environmental Justice. Calvert County's population in 2006 was estimated by the U.S. Census Bureau to be 88,804 people. Of those 88,804 people, 72,509 were classified as "White alone". St. Mary's County had a 2006 total population of 98,854 people, of which 79.2 percent (78,320) were classified as "White alone". Given these statistics, neither Calvert County nor St. Mary's County qualifies as a minority area under the adopted Nuclear Regulatory Commission's definitions, as minorities make up far less than 50 percent of the overall population and both counties have a smaller portion of minorities than at the state level.

In 2006, there were a total of 23,847 families living in Calvert County and approximately 1.5 percent, or 358, of these families were living in poverty. The 2006 data also show that St. Mary's County had a total of 26,824 families with 5.2 percent or 1,395, of these families living at the poverty level. Based on the analysis of 2006 data, neither Calvert County nor St. Mary's County qualifies as a low income area under the definition of poverty, as the poverty rate for both counties was below 50 percent overall, and is less than 20 percent over the poverty rate for the state.

Additional information regarding environmental justice associated with this Project is presented in Appendix C.

4.5.3 Mitigation Measures

4.5.3.1 Land Use. The proposed line would use the existing SMECO 69 kV transmission line right-of-way except as the line approaches the Patuxent River within the Naval Recreational Center and as it exits the river into St. Mary's County. The area where the transmission line would pass through the Naval Recreation Center is a relatively low population area. The line would traverse the Naval Recreation Center underground, except at entry or exit points near MD 4, and the southwestern parking area. Additionally, the transmission line would cross the Patuxent River under the riverbed. Thus, no mitigation measures are required.

4.5.3.2 Visual Impacts. The proposed transmission line and the Sollers Wharf switching station would largely be shielded by the presence of existing trees. The exception includes those residential and commercial areas that are not afforded tree buffers. Nonetheless, the proposed transmission line would occupy a right-of-way that is currently being used for the 69 kV transmission line, and residents in the area are accustomed to these transmission line features. No mitigation measures are planned for those areas.

4.5.3.3 Socioeconomics. There would be modest beneficial impacts associated with the construction and operation of this Project. These beneficial impacts include direct employment, indirect employment, and income. Additionally, impacts to housing and public services are anticipated to be negligible because there would be 10 to 15 construction workers per crew and no more than two crews at any given time. Thus, no mitigation measures are required.

4.5.3.4 Environmental Justice. While there are minority populations located in both counties, they are not large enough to trigger environmental justice concerns under the adopted definitions. Additionally, while there are some low income families located in each county, they are not large enough to trigger environmental justice concerns under the adopted definitions. Therefore, no mitigation measures are required.

4.6 Acoustical Environment

4.6.1 Affected Environment

In St. Mary's County, noise is regulated in the *St. Mary's County Comprehensive Zoning Ordinance*, Chapter 61, "General Development Standards." The pertinent sections are summarized here.

Section 61.4, Noise Standards, states that except for emergency service land uses, agricultural activities, agricultural operations, and bona fide agricultural uses or activities, or in the event of loss of utility service, no use shall create ambient noise levels that exceed the following standards:

Table 4.6-1
Maximum Noise Levels for Property Zones

Zone of Property Receiving Noise	Maximum Noise Level Ldn[1] or CNEL,[2] dB
Residential Districts: RL, RH, RMX, and RNC	60
Commercial and Mixed use Districts: CC, DMX, CMX, TMX, VMX, RCL, and RSC	65
Office, Business Park: OBP	65
Industrial and Marine Districts: I, CM	70
Planned Development	In accordance with base district

[1]Ldn is day-night sound level.
[2]CNEL is Community Noise Equivalent Level.

dB = Decibel.

The noise standards above must be modified as follows to account for the effects of time and duration on the impact of noise levels:

a. In residential districts, the noise standard shall be 5 dB lower between 10:00 PM and 7:00 AM.

b. Noise that is produced for no more than a cumulative period of five minutes in any hour may not exceed the standards above by 5 dB.

c. Noise that is produced for no more than a cumulative period of one minute in any hour may not exceed the standards above by 10 dB.

For Calvert County, the code does not include any regulations related to noise emissions or sound level limits. In this case, the noise requirements specified in the Maryland Code of Regulations should be considered. In Maryland, noise is regulated in the Maryland Code of Regulations, Title 26, "Department of the Environment." The pertinent sections are summarized here.

Under Section 26.02.03.03, General Regulations, a person may not cause or permit noise levels, which exceed those specified in Table 4.6-2 below except for the following:

a. A person may not cause or permit noise levels emanating from construction or demolition site activities, which exceed 90 dBA during daytime hours, or the levels specified in Table 4.6-2 during nighttime hours.

b. A person may not cause or permit the emission of prominent discrete tones and periodic noises, which exceed a level which is 5 dBA lower than the applicable level listed in Table 4.6-2.

"Prominent discrete tone" means any sound which can be distinctly heard as a single pitch or a set of single pitches. For the purposes of this regulation, a prominent discrete tone shall exist if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the 2 contiguous one-third octave bands by 5 dB for center frequencies of 500 Hz and above and by 8 dB for center frequencies between 160 and 400 Hz and by 15 dB for center frequencies less than or equal to 125 Hz.

Table 4.6-2
Maximum Allowable Noise Levels (dBA)
for Receiving Land Use Categories

Effective Date	Day/Night	Industrial	Commercial	Residential
Upon Adoption	Day	75	67	65
	Night	75	62	55

Daytime hours are defined as 7:00 a.m. to 10:00 p.m. and nighttime hours are defined as 10:00 p.m. to 7:00 a.m. The levels set forth in Table 4.6-2 are defined as "equivalent A-weighted sound levels," or "L_{eq}".

4.6.2 Environmental Consequences

4.6.2.1 Construction Noise. Noise emissions attributable to construction activities are highly variable, depending on the location and operating load of the construction equipment and the type of construction activities. Major construction phases would consist of site preparation, transmission line erection, and site clean up. Noise emissions would vary with each phase of construction depending on the construction activity and the associated equipment required for each phase. Noise emissions during site preparation and equipment installation would be dominated by the noise from the diesel engine powered equipment. Site cleanup would generally result in lower noise emissions than the preceding construction phases.

4.6.2.2 Operational Noise.

Transmission Lines

Overhead transmission line noise emissions can occasionally include crackling and/or humming noises associated with electrical transmission and can vary depending on factors such as electrical capacity and line load, temperature, and moisture levels in the air. Although it is possible for transmission line noise to be audible at certain times and under certain conditions, this type of noise typically can be heard only very near the transmission lines (i.e., within the transmission line right-of-way). The proposed corridor for the transmission lines would be within existing utility right-of-ways where transmission lines currently exist. Given the placement of the transmission lines in existing right-of-way and the limited audible noise associated with transmission lines, no adverse or nuisance impacts due to the transmission line noise emissions are expected. It is also anticipated that any audible transmission line noise would be below the local noise regulations.

Substations

The Project encompasses two switching stations. The existing transformers at the Hewitt Road switching station would be replaced with new transformers and a new transmission line position would be added as part of the expansion there. A new switching station in southern Calvert County would be constructed at a location near the intersection of Pardoe Road and Sollers Wharf Road to be named the Sollers Wharf switching station. The main sources of substation noise are transformers (primarily when operating under maximum cooling) and air-conditioning equipment (associated with the switchgear buildings and control buildings). Each substation must comply with the applicable noise regulations summarized above. Compliance with these noise regulations would be achieved by a combination of strategies including establishing buffer distances between the equipment and property boundaries, installing low-noise equipment as necessary, and incorporating noise mitigation measures such as noise barrier walls. The specific design measures necessary to support compliance with the applicable noise requirements would be determined during detailed design of the Project.

4.6.3 Mitigation Measures

Construction activities would be scheduled during daytime periods (7:00 a.m. to 10:00 p.m.) to the fullest extent possible. Some activities may require extended hours of operation due to scheduling constraints. Any nighttime construction would be limited to low noise activities to the fullest extent possible. All construction activities would be conducted in accordance with the applicable local and state noise regulations. Since construction activities would be of a short-term nature impacts to sensitive receptors are anticipated to be less than significant.

4.7 Electric and Magnetic Fields

The engineering consulting firm Exponent was retained by SMECO to provide an analysis of the potential effects of the 230 kV transmission line on the magnitude of electric and magnetic fields (EMF) within and near the right-of-way. Exponent's report is contained in its entirety in Appendix D to this report.

The fields were calculated at a height of one meter (3.28 feet) above the ground in accordance with governing standards. Exponent made the calculations for both the existing 69 kV line and the proposed double-circuit 230 kV line at 10 locations along the route. Exponent also calculated fields at the one location where the proposed line would be installed underground, on the Naval Recreation Center property.

Complete details of the calculations and the conclusions drawn from them are contained in Appendix D.

4.7.1 Affected Environment

The route of the proposed project follows existing rights-of-way (see Section 2.5.1 for exceptions) between the Holland Cliff and Hewitt Road switching stations. The width of these rights-of-way varies between 75 and 150 feet. The existing sources of EMF on these rights-of-way are 69 kV transmission lines. As the voltage and configuration of these existing lines are constant throughout the route, the electric fields from the lines are constant as well, except where they may be shielded by nearby vegetation or other conductive objects. In contrast, the current flows on the 69 kV lines that connect existing substations, other transmission facilities, and the site of the new Sollers Wharf Switching Station vary considerably and so the magnetic field from these lines on each of the separate sections of the route must be considered individually.

The levels of EMF from the existing lines are highest under the conductors and diminish to lower levels at a distance of ±50 ft from the center of the structures, the most common location of the edges of the rights-of-way. At this distance the levels of the electric and magnetic fields at annual average loading are ≤ 0.08 kilovolts per meter (kV/m) and 5.8 milligauss (mG), respectively. Further from the centerline at ± 150 feet, the field levels are still lower, ≤ 0.01 kV/m and 0.8 mG. On the final section from Solomons to the Hewitt Road switching station, the magnetic fields are about 50 percent higher. For limited hours during the year, peak current flows, and therefore magnetic fields, are higher on all sections of the route where existing lines carry load.

While existing substations and switching stations are also sources of EMF, the transformers and other equipment within these facilities would have little or no impact on exposure to the general public because experience indicates that EMF levels from substations "attenuate sharply with distance and would often be reduced to a general ambient level at the substation property lines. The exception is where transmission and distribution lines enter the substation" (IEEE Std. 1127-1990). Hence, addressing the EMF associated with transmission lines effectively addresses EMF potential exposures from the existing substations and the new Sollers Wharf switching station.

4.7.2 Environmental Consequences

The construction of the new 230 kV lines and rebuilding of the existing 69 kV transmission lines beneath are analyzed below as they affect the levels of EMF across the right-of-way on the two major sections:

- **Holland Cliffs – Sollers Wharf**--Approximately 20 miles of new double-circuit 230 kV (circuits 2330 and 2345) construction on single monopoles, with a single-circuit, 69 kV underbuild, from the Holland Cliff switching station to a new Sollers Wharf switching station.
- **Sollers Wharf – Hewitt Road**--The single-circuit (2345) overhead 230 kV line, with a single-circuit, 69 kV underbuild, would continue south to connect approximately eight miles of the route between the new Sollers Wharf switching station and the Hewitt Road switching station. Towards one end of this section of the route, a new underground line would extend the 230 kV circuit approximately one mile, across the U.S. Naval Recreation Center in Solomons in parallel to the existing 69 kV line, which would remain in place. This underground line would then transition to a conduit bored underneath the Patuxent River for a distance of approximately two miles. On the east side of the Patuxent River at Town

Creek, the 230 kV and 69 kV lines would rejoin on overhead structures to continue en route to the Hewitt Road switching station.

The levels of EMF associated with the operation of the 230 kV and 69 kV lines on these two route sections are compared to those produced by the existing 69 kV lines at annual average loading in Table 4.7-1 below. Graphic profiles of the levels of electric fields and magnetic fields at annual average loading associated with both existing and new transmission lines are presented in Appendix D to this report. Tables of the maximum calculated field levels on the right-of-way, at ± 50 feet and ± 150 feet are also provided in Appendix D.

Table 4.7-1
Summary of Maximum Electric and Magnetic Fields at ± 50 feet*

Section	Scenario	Electric Field (kV/m)	Magnetic Field (mG)
A	Existing	0.8	5.8
	Proposed	0.33	5.7
B (overhead)	Existing	0.08	9.3
	Proposed	0.22	11.6
(underground)	Existing	--	--
	Proposed	--	1.3**

* Between Holland Cliff and Hewitt Road substations at annual average loading.
**The calculated value is for the underground duct bank. Because of closer spacing of the cables in the conduit underneath the Patuxent River the magnetic field levels there will be even lower.

4.7.3 Status of Research on EMF and Health

The World Health Organization, as well as numerous other scientific agencies that have considered whether EMF affects public health, has concluded that the extensive body of research that currently exists does not suggest that power-frequency EMF causes any long-term adverse health effects. Recent research does not provide any evidence to alter these conclusions. In summary, there is no scientific basis to project any adverse health effects as a result of the electric and magnetic fields from typical sources of these fields in our environment, including power distribution lines, transmission lines, electrical appliances, and electrically-powered transportation. In addition, the levels of EMF associated with the proposed project are far lower than recommended limits on public exposure that minimize the possibility of shocks or other stimulation effects that are known to occur at very high levels of exposure. A detailed summary of the status of research on EMF and health is provided in Appendix D.

4.7.4 Mitigation Measures

The Holland Cliff to Hewitt Road Transmission Project incorporates a number of design and siting features that are designed to minimize EMF levels. These include:

- Siting the new line on an existing right-of-way to avoid the need for a new right-of-way.
- Minimizing magnetic field levels by designing the new line for operation at 230 kV rather than lower levels, which will deliver equivalent power with less current flow.
- Combining a new transmission line with an existing transmission line on a single structure to maximize field cancellation.
- Selecting optimal phasing of the 230 kV and 69 kV lines to minimize magnetic fields.

4.8 Cultural Resources and Historic Properties

The cultural resources consulting firm The Ottery Group was retained by SMECO to conduct an archeological assessment of the Project's route. The Ottery Group report is contained in its entirety in Appendix E to this report.

The assessment included background research, field assessment, laboratory processing of artifacts, and reporting. On existing SMECO right-of-way, only one site (18CV151), identified in a 1992 survey, is considered to be National Register-eligible and might have required additional consideration to determine if the Project has the potential for adverse effects. However, the Maryland Historical Trust (MHT) issued a letter on February 13, 2009 stating that it appears that site will not be impacted by the proposed project as currently designed.

On the Naval Recreation Center (NRC) site, the Admiral's Residence (18CV316) has been determined to be eligible for listing in the National Register of Historic Places and three other sites on the Center remain unevaluated for eligibility. Because there is some flexibility in the selection of an exact routing through the Center property, it is unlikely that any of the identified sites would be adversely affected.

This statement was confirmed by a letter issued by the MHT on August 10, 2010. The MHT had been provided an updated map of the NRC site and the latest proposed alignment of the 230 kV underground transmission line through the site. The MHT letter stated that a review of the revised route and consultation with Pax River Naval Air Station Cultural Resource Manager led to a conclusion that the proposed construction is unlikely to have an adverse effect on any historic properties and that Phase II archeological investigations are not warranted. At the MHT's request, the Pax River Naval Air Station Cultural Resource Manager will be contacted prior to the commencement of construction activities and the project area will be monitored by a professional archeologist while ground-disturbing activities take place near site 18CV360, also on the NRC property.

After consultation with responsible Naval Recreation Center personnel, The Ottery Group was informed that there is no need for an Archeological Resources Protection Act (ARPA) permit on Center property.

5.0 Public Involvement and RUS Scoping

5.1 SMECO's Public Outreach Program

For a project of this nature, it is important that the public be informed. All infrastructure projects, even those using existing rights-of-way like this Project, have an impact on the public during and after construction. SMECO has made every effort to reach out to the public with information and requests for input. This section describes those efforts.

Formal public notifications of the Project began in January 2008 and continued into May 2008. The public rollout schedule is provided here.

Public Rollout Schedule: January - May 2008

January and February 2008:

- SMECO briefs Calvert, St. Mary's county and state representatives.
- SMECO briefs additional Senate and House representatives, federal officials, prominent citizens, Holland Cliff citizens.
- SMECO briefs Charles county representatives, regional business leaders, community leaders along proposed route.
- EcoLogix briefs local environmental leaders.

March 2008:

- SMECO briefs all remaining government, business, and community leaders.
- EcoLogix briefs all statewide environmental leaders.

March 10, 2008:

- SMECO reviews Project with employees at management dinner.

March 25-28, 2008:

- SMECO announces Project to employees at safety meetings.
- Letter to homeowners in the immediate vicinity of Holland Cliff.

April 15, 2008:

- SMECO President and CEO Austin J. Slater, Jr. gives presentation to the Calvert County Commissioners on April 15. The meeting was videotaped and aired on the Calvert County cable TV system, as well.
- SMECO creates Web pages dedicated to the Project that are accessible through the Co-op's home page.
- SMECO distributes internal announcement to employees via e-mail.

April 16, 2008:

- Open house invitations mailed to almost 2,700 customers in Calvert County who live within one-half mile of the existing route.
- Business roundtable invitations mailed.
- SMECO publishes open house advertisements in newspapers. (Full schedule below.*)
- Letter to homeowners in the immediate vicinity of Aquasco.

April 21, 2008:

- Nearly 1,000 open house invitations mailed to customers in St. Mary's County located within one-quarter mile of the existing route.

April 22, 2008:

- SMECO gives presentation at St. Mary's County Commissioners' public meeting.

April 24, 2008:

- Prince Frederick, Calvert County, Business roundtable breakfast held in the morning and open house held in the evening.

April 29, 2008:

- Lexington Park, St. Mary's County, Business roundtable breakfast held in the morning and open house held in the evening.
- Letter to Aquasco zip code homeowners.

May 1, 2008:

- Solomons, Calvert County, Business roundtable breakfast held in the morning and open house held in the evening.

Stakeholder Briefings

An early stage of the public outreach program included stakeholder briefings. The briefings conducted for this Project are listed here. They included elected representatives at the county, state, and federal levels, county administrators; community, civic, and business associations; county and state government agencies, and environmental organizations.

- January 8--Calvert County Commissioners President Wilson Parran, by Joe Slater and Tom Dennison.
- January 10--Calvert County Commissioner Gerald Clark, by Joe Slater and Tom Dennison.
- January 14--Calvert County Commissioners Susan Shaw, Barbara Stinnett, and Linda Kelley (individually), by Joe Slater and Tom Dennison.
- January 17--Calvert County Economic Development Director and Utilities Liaison Linda Vassallo, by Tom Dennison
- January 18 and 25--Delegate Tony O'Donnell (R-Calvert/St. Mary's), by Dave Foggo, Joe Slater and Mark MacDougall of SMECO.
- January 23--Calvert County Administrator Doug Parran, by Tom Dennison.
- January 25--Delegate Sally Jameson (D-Charles), by Dave Foggo and Joe Slater.
- January 25--Delegate Murray Levy (D-Charles), by Dave Foggo and Joe Slater
- January 25--Delegate Peter Murphy (D-Charles), by Dave Foggo and Tom Dennison.
- January 25--Delegate Sue Kullen (D-Calvert), by Tom Dennison and Joe Slater
- January 28--Delegates. Jim Proctor & Joe Vallario (D-Pr. Geo.), by Dave Foggo and Tom Dennison.
- January 30--Delegate Johnny Wood (D-St. Mary's), by Dave Foggo and Joe Slater.
- January 30--Senator Roy Dyson & Del John Bohanan (D-St. Mary's), by Dave Foggo and Joe Slater.
- January 30--Senator Mac Middleton (D-Charles), by Dave Foggo and Joe Slater.

- February 29--St. Mary's County Commissioners President Jack Russell, Commissioner Kenny Dement, and St. Mary's County Administrator John Savich, by Joe Slater and Tom Dennison
- February 29--St. Mary's County Commissioners Larry Jarboe and Dan Raley, by Joe Slater and Tom Dennison.
- March 13--Calvert County Sheriff Mike Evans and Calvert County Chamber of Commerce President Carolyn McHugh, by Tom Dennison.
- March 14--Calvert County Director of Planning and Zoning Greg Bowen and Dave Humphries, by Tom Dennison.
- March 24--Hamad Matin, District Director for U.S. Senator Benjamin Cardin and Dick Myers, District Director for U.S. Senator Barbara Mikulski, by Tom Dennison.
- March 25--Betsy Bossart, District Director for U.S. Representative Steny Hoyer, by Tom Dennison.
- March 28--Tri-County Council President Gary Hodge and Charles County Commissioners President Wayne Cooper, by Tom Dennison.

Joint Evaluation Team Meeting on October 22, 2008

SMECO representatives John Bredenkamp, Tom Russell, and Tom Dennison provided a presentation on the Project and sought input from the attendees from the various agencies. The meeting was held at the headquarters of the U. S. Fish and Wildlife Service in Annapolis, Maryland. The following agency representatives were in attendance:

- Bob Tabisz, Maryland Department of Environment, Tidal Wetlands
- Dolden Moore, Maryland Board of Public Works
- Bob Zepp, US Fish and Wildlife Service
- Jim Butch, Environmental Protection Agency
- Kevin Magera, EPA
- Kathy Anderson, Army Corps of Engineers
- Greg Golden, Maryland Department of Natural Resources
- Gary Setzer, MDE
- Eldeo Ghigiarelli, MDE
- Brandie Sebastian, ERM (consultant to Maryland Power Plant Research Group in DNR)
- Connie Faustini, ERM (consultant to Maryland Power Plant Research Group in DNR)

- Sandi Patty, DNR PPRP
- Roby Hurley, DNR
- Bill Clark, Calvert County Soil Conservation
- Dixie Henry, Maryland Historical Trust
- Amanda Sigillito, MDE
- Marian Honeczy, DNR Forest Service
- Roland Limpert, DNR

Attendees were encouraged to contact SMECO representatives with questions and comments as the Project progresses.

In addition to all of these efforts, SMECO provided a toll-free number for interested parties to call to obtain information on the Project and a hold message for customers in the queue at the SMECO Call Center.

Outreach to Environmental Group Stakeholders

EcoLogix Group, Inc. was retained by SMECO to assist in the public outreach efforts, specifically to environmental group stakeholders with an interest in any new infrastructure project in southern Maryland. During the course of this effort, EcoLogix contacted and met with representatives of the following groups:

- Patuxent Riverkeeper.
- Patuxent River Commission (through Maryland Departments of Planning and Natural Resources staff).
- Sierra Club - Southern Maryland Chapter.
- Cove Point Natural Heritage Land Trust.
- Maryland League of Conservation Voters.
- Maryland Public Interest Research Group.
- Chesapeake Bay Foundation.
- Southern Calvert Land Trust.

EcoLogix provided information to the stakeholders on the Project and kept them updated as to the progress of studies and reports related to the Project.

Public/Scoping Meetings and Resultant Comments

Three public meetings, in open house format, were held in late April and early May 2008, all in Maryland and all conducted from 5:00 to 8:00 PM. The meeting on April 24 was held at the SpringHill Suites in Prince Frederick. The meeting on April 29 was held at the Daugherty Center in Lexington Park. The meeting on May 1 was held at the Hilton Garden Inn in Dowell. These locations were chosen based on their proximity to the transmission line route and ease of access to persons living along the route.

Newspaper ads to announce the public meetings were purchased as follows:

- For all three meetings, ads ran on April 16 and April 18 in the St. Mary's Enterprise and the Calvert Recorder.
- For all three meetings, ads ran on April 17 in the County Times, St. Mary's County, and the Washington Post Southern Maryland Extra.
- For all three meetings, ads ran on April 20 in St. Mary's Today and the Washington Post Southern Maryland Extra.
- For the last two meetings, ads ran on April 25 in the St. Mary's Enterprise and the Calvert Recorder.
- For the last two meetings, ads ran on April 27 in the Washington Post Southern Maryland Extra.
- For the last meeting, ads ran on April 30 in the St. Mary's Enterprise and the Calvert Recorder.

All three meetings were planned and organized to meet the requirements of a formal scoping meeting in accordance with the rule requirements at 7 CFR 1794 with the exceptions of the Federal Register (FR) notice and written invitations to federal and state environmental agency personnel.

The formal scoping meeting, held from 5:00 to 8:00 PM on September 11, 2008, at SMECO's Prince Frederick Office, met these requirements as well.

The sequence of events leading up to the scoping meeting is described here.

- On August 27, a Notice of Scoping Meeting appeared in the FR.
- On August 28, SMECO sent letters to several customers with whom it had previous contact to notify them of the scoping meeting.
- On August 29, an ad announcing the scoping meeting appeared in Legal Section of Calvert Recorder and St. Mary's Enterprise, as well as a display ad in the general section of both newspapers directing readers to the ad in the Legal Section.
- On September 5, a full color display ad (8 inches wide and 10 inches high) (20.32 centimeters wide and 25.4 centimeters high) announcing the scoping meeting appeared in Calvert Recorder and St. Mary's Enterprise.

The comments received from local residents and stakeholders who attended the three public meetings and one scoping meeting were primarily concerned with location of the new structures, their appearance, and the effects of EMF. All of these concerns are addressed in this report. Summaries of written comments are contained in Appendix K to this report. Names have been omitted to protect the privacy of the commenters. Residents and all members of the public are encouraged to visit the Project web site at http://www.smeco.com/reliability/ for the most up to date information.

Agency Contacts and Correspondence

Consultation letters and/or written invitations to the September 11, 2008 scoping meeting were sent to the following agencies and agency personnel. Copies of the consultation letters and the responses are contained in Appendix J. One example of the invitation letter is also included in Appendix J.

SMECO will continue its dialogue with agency stakeholders as Project planning progresses.

Table 5.1-1
Agency and Agency Personnel

Name	**Title**	**Agency**
Michael Oliver		Public Works Department NAVFAC
David Rockinson		Patuxent River Naval Air Station
Michael Lewis		NAVFAC - Public Works
Kathy Anderson		U.S. Army Engineer District, Baltimore
Lee Kyker	Air Traffic Operations Support	Federal Aviation Administration
Tansel Hudson	Asst. State Conservationist	USDA - Natural Resources Conservation Service
William Seib	Chief of Maryland Southern Section	U.S. Army Engineer District, Baltimore
William Arguto	EIA 30	U.S. EPA Region 3
Leopold Miranda	Field Supervisor	Chesapeake Bay Field Office U.S. Fish & Wildlife Service
Jim Lecky	Permits, Conservation and Education Division	Office of Protected Resources National Marine Fisheries Service, NOAA
Name	Title	Agency
Howard King		Fisheries Service Maryland Department of Natural Resources
Robert Tabisz		MDE Tidal Wetlands Division
Michael Huber		Maryland Department of Transportation
Chirty Bright		St. Mary's River State Park and Greenwell State Park
J. Rodney Little		Maryland Historical Preservation Office
Lori Byrne	Environmental Review Specialist	Wildlife & Heritage Service Maryland Department of Natural Resources
Terry Romine	Exec. Secretary	Maryland Public Service Commission
Sandra Patty	Manager - Transmission Programs	Maryland Department of Natural Resources
Cynthia Nethen	Project Manager	Nontidal Wetlands & Waterways Division Maryland Department of the Environment
Patrick Bright	Ranger	Calvert Cliffs State Park
Roger Richardson	Secretary	Maryland Department of Agriculture
Richard Hall	Secretary	Maryland State Clearinghouse for Intergovernmental Assistance Maryland Department of Planning
Greg Bowen		Calvert County Department of Planning and Zoning
Jon R. Grimm	Director	St. Mary's County Department of Planning and Zoning

5.2 RUS Scoping Meeting and Public Involvement

One component of the public outreach efforts associated with this project was the scoping meeting conducted in accordance with 7 CFR 1794.52. SMECO conducted this meeting on September 11, 2008 at its offices on Dares Beach Road in Prince Frederick, Maryland. This meeting was in addition to the three public meetings described above.

In preparation for the meeting, SMECO developed and submitted to RUS several documents and notices for approval. Two documents, an Alternatives Evaluation Study Report and a Macro-Corridor Study Report, were submitted to RUS for comments. RUS provided its comments and the reports were finalized in August. SMECO received formal acceptance of the reports from RUS on August 25, 2008.

SMECO also provided text for the public notices required by RUS. These included:

- The RUS Federal Register notice published on August 27.
- A Notice of Intent to Hold a Scoping Meeting published on August 29 in the St. Mary's Enterprise and the Calvert Recorder.
- A detailed notice in the Legal Section of the same newspapers.

There were six information stations at the meeting, titled as follows:

- Station One – Energy Use Is Growing.
- Station Two – To Meet Your Needs, We Need to Upgrade Our System.
- Station Three – Upgrading This Line Means You Will Have More Reliable Power.
- Station Four – This Project Has Limited Impact.
- Station Five – We Will Use Existing Rights-of-Way.
- Station Six – We Will Do This Project the Right Way.

Each of the stations was staffed by one or more professionals from SMECO, Black & Veatch, and Exponent. For SMECO, representatives of executive management, project management, engineering, right-of-way maintenance, environmental management, and public relations were present.

In addition to the information stations, a table for RUS representatives Stephanie Strength and Lauren McGee was set up near the entrance door. Four free-standing display banners providing information about SMECO were located in the middle of the room.

From the public, five people attended and signed in. SMECO received no written comments from those attending the meeting. Conversations with those attending the meeting indicate that the greatest concern is how private property and property values will be affected by the Project.

The full Scoping Meeting Report is included in Appendix K to this report.

6.0 Filing Requirements

6.1 PSC Filing Requirements

The state of Maryland requires electric utilities to obtain a Certificate of Public Convenience and Necessity (CPCN) from the Maryland Public Service Commission (PSC) before constructing or modifying overhead transmission lines designed to carry voltage in excess of 69 kV. Maryland's Power Plant Siting Act of 1971, revised by the Electric Utility Industry Restructuring Act of 1999, provides for a consolidated review of CPCN applications.

This enactment is codified in:

- Section 7-207 and 7-208 of the Public Utility Companies (PUC) Article of the Annotated Code of Maryland.
- Section 3-301 through 3-306 of the Natural Resources Article.

The PSC review and approval process is governed by the PUC Article and the corresponding regulations (Title 20, Subtitle 79, Code of Maryland Regulations [COMAR]). The PSC review and approval process consists of four basic aspects (1) pre-application, (2) application (3) the PSC review process and (4) Power Plant Research Program (PPRP) Review. Figure 6-1 contains a detailed flow chart of the CPCN process as provided by PPRP. Figure 6-1 highlights the PSC and PPRP roles within the CPCN process.

The CPCN application's form and required distribution is included within the enactment's regulations, specifically COMAR 20.79.02.01 and COMAR 20.79.02.02. A listing of the required distribution is contained within Table 6-1. COMAR 20.79.01.04 provides detailed CPCN application filing requirements, including the application's inclusion of sections providing the Project's purpose and justification and descriptions of the environment at and adjacent to the proposed Project, and the effects of the Project's construction and operation.

Table 6-1 summarizes the CPCN filing requirements contained with COMAR 20.79 that are applicable to the construction or modification of overhead transmission lines carrying in excess of 69 kV. COMAR 20.79.01.04, Application Filing Requirements, is an application for a Certificate of Public Convenience and Necessity for the construction of an overhead transmission line. This requirement includes general information about the applicant. COMAR 20.79.01.02, Definitions, explains "Plan" details. COMAR 20.79.04.01, Purpose and Justification, is an application for a proposed transmission line or modification to an existing transmission line. Purpose and Justification includes additional descriptions of the Project. COMAR 20.79.04.02, Description of Transmission Line, provides a description of a proposed transmission line or modification to an existing transmission line. Such description includes engineering and construction features, property information, access roads requirements, location and identification of sites, location and identification of airports, and site maps. COMAR 20.79.040.03, Alternative Transmission Line Routes, describes alternative routes for the transmission line and modifications to existing routes. Finally, COMAR 20.79.040.04, Environmental Information, includes a general description of the area, a summary of environmental and socioeconomic effects of construction and operation, environmental impact studies, and a statement to conform to applicable environmental standards.

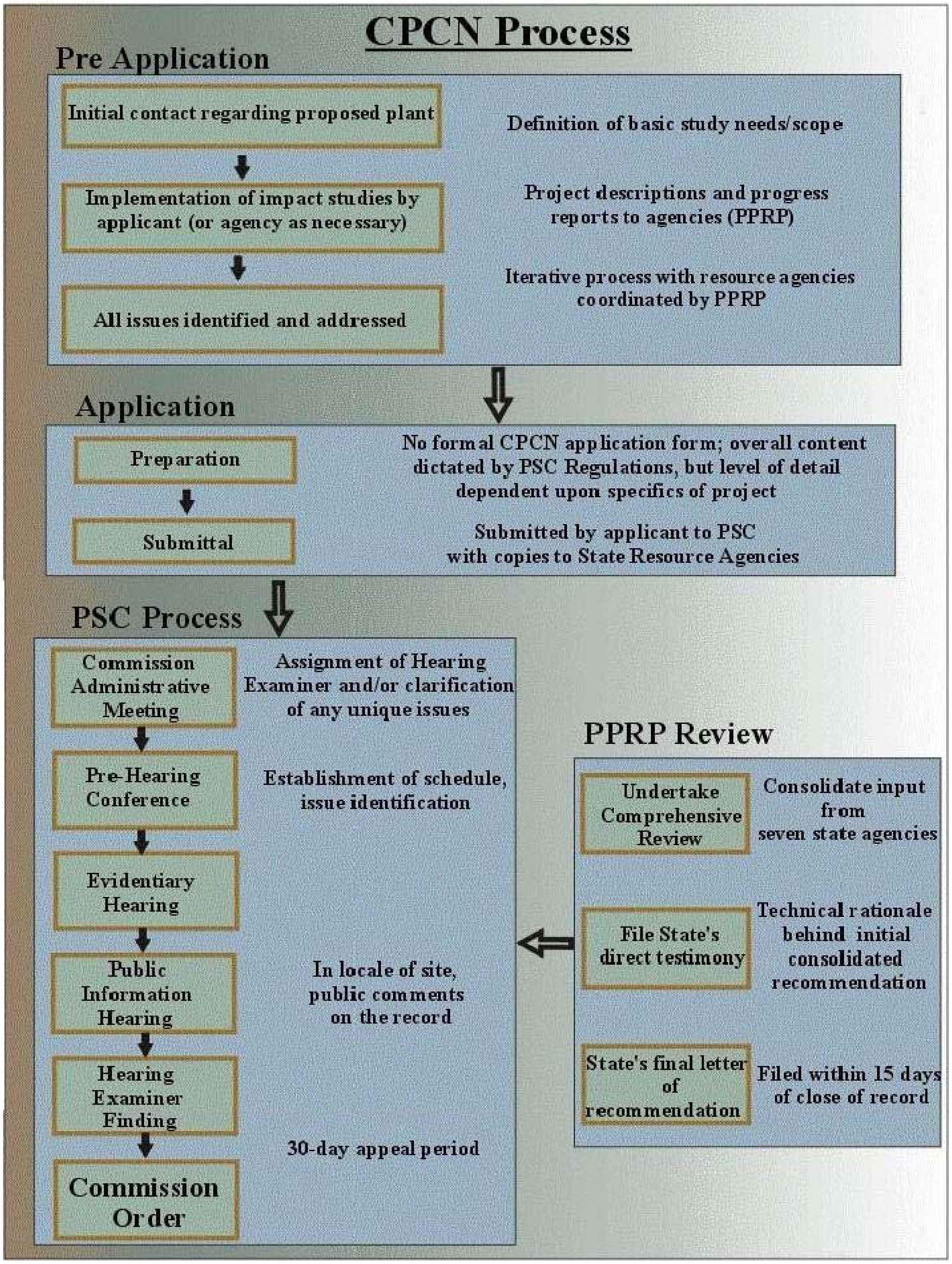


Figure 6-1
CPCN Process Flow Chart as Provided by the PPRP

Table 6-1
Application Distribution per COMAR 20.79.02.02

Entity	Number of Applications to be Submitted
PSC	1 Original Copy 14 Copies (at PSC request, 22 Copies will be submitted) 1 Electronic Copy
Governing body and the planning and zoning commission of each county and municipality in which the Project will be located: • St. Mary's County Department of Planning and Zoning • St. Mary's County Board of County Commissioners • Calvert County Department of Planning and Zoning • Calvert County Board of County Commissioners	 1 Copy 1 Copy 1 Copy 1 Copy
Department of the Environment	4 Copies
Office of Planning	1 Copy
Department of Natural Resources	6 Copies
Department of Business and Economic Development	1 Copy
Department of Transportation	1 Copy
State Aviation Administration	1 Copy
State Highway Administration	1 Copy
U.S. Department of Interior	1 Copy
Federal Energy Regulatory Commission	1 Copy
Federal Aviation Administration	1 Copy
Maryland Energy Administration	1 Copy
Office of People's Counsel	1 Copy
U.S. Fish and Wildlife Service	1 Copy
The local electric company	1 Copy
Any other State or local agency which may be affected: • Maryland Department of Agriculture • Maryland State Clearinghouse for Intergovernmental Assistance • Maryland Historic Preservation Office	 1 Copy 1 Copy 1 Copy

7.0 Resources Used for this Report

Following is the list of resources, including texts, web sites, and guidance documents, used in the development of this report. Additional references may be contained at the end of some of the supporting reports found in the appendices.

1. American Ornithologists' Union. 1983. Check-list of North American Birds. 7th edition. American Ornithologists' Union, Washington, D.C. Accessed on the Internet at http://www.aou.org/checklist/index.php3.

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3. Breeding Bird Atlas Explorer (BBA Explorer). 2008. U.S. Geological Survey Patuxent Wildlife Research Center & National Biological Information Infrastructure. <accessed June 6, 2008>. http://www.pwrc.usgs.gov/bba. Data extracted from: Robbins, Chandler S, senior editor and Erik A. T. Bloom, project coordinator. 1996. Atlas of the Breeding Birds of Maryland and the District of Columbia. Pittsburgh, PA: University of Pittsburgh Press. 479 pp.

4. C. Jones, J. McCann and S. McConville. 2001. A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area, Maryland Department of Natural Resources, Critical Area Commission for the Chesapeake and Atlantic Coastal Bays, Annapolis, Maryland. 63 pp. Accessed on May 29, 2008 on the Internet at the web address: http://www.co.cal.md.us/assets/Planning_Zoning/Environmental/CriticalAreaGuide-FIDs.pdf.

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14. NRCS. 2006. Major Land Resource Regions Custom Report. Data Source: USDA Agriculture Handbook 296 (2006) http://soils.usda.gov/MLRAExplorer [accessed on May 13, 2008].

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20. United States Department of Agriculture (USDA), 2008b, Custom Soil Report for Calvert County, Maryland, Natural Resources Conservation Service, August 1, 2008, < http://websoilsurvey.nrcs.usda.gov/app/>.

21. United States Department of Agriculture (USDA), Rural Utilities Service (RUS) Bulletin 1794A-601 (Revised December 9, 1998), Guide for Preparing an Environmental Report for Electric Projects Requiring an Environmental Assessment.

22. United States Department of Agriculture (USDA), Rural Utilities Service (RUS) Bulletin 1794A-603 (February 2002), Scoping Guide for RUS Funded Projects Requiring Environmental Assessments with Scoping and Environmental Impact Statements.

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Appendix A
Alternatives Evaluation Study

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MD

HOLLAND CLIFF TO HEWITT ROAD
230 KV TRANSMISSION LINE PROJECT
ELECTRIC ALTERNATIVE EVALUATION STUDY

BLACK & VEATCH CORPORATION

B&V Project 146026(G)
B&V File 32.0201

REVISION 1

November 4, 2008

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Electric Alternative Evaluation Study
For the Proposed
Holland Cliff – Hewitt Road 230 kV Transmission Line Project

EXECUTIVE SUMMARY

Southern Maryland Electric Cooperative, Inc. ("SMECO" or "Cooperative") is proposing to construct a new 230 kV double circuit transmission line from SMECO's Holland Cliff switching station in northern Calvert County, Maryland to the SMECO Hewitt Road switching station in St. Mary's County, Maryland. Also proposed as part of this project is the southern Calvert County 230/69 kV switching station that would be connected to this line and be located between the Holland Cliff and Hewitt Road switching stations in the vicinity of the existing SMECO Calvert Cliffs 69 kV transmission line tap near the intersection of Pardoe Road and Maryland State Route 4. The new 230 kV Holland Cliff to Hewitt Road transmission line and associated southern Calvert County 230/69 kV switching station is being proposed to meet growth of electrical energy demands and improve system reliability within SMECO's service area (refer to Figure 1 - Study Area Map on page 2).

Funding for the project can come from any number of sources, including the Rural Utilities Service (RUS), an agency that administers the programs of the USDA Rural Development Utilities Programs (RDUP). The purpose of this study is to identify reasonable electric alternatives considered to address the project need, provide a recommendation for the preferred solution that addresses all aspects of the project need, support the preparation of an Environmental Assessment (EA), and to solicit information and concerns regarding this project from agencies and the Public at the RUS scoping meeting.

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TABLE OF CONTENTS

FIGURES

TABLES

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LIST OF ABBREVIATIONS

CPCN	Certificate of Public Convenience and Necessity
Customer Members	Customers whose electric service is provided by SMECO
EA	Environmental Assessment
kV	kilovolts
MCM	thousand circular mils
MW	megawatts
MWH	megawatt-hour
MVA	megavolt-amperes
PEPCO	Potomac Electric Power company
Proposed Project	Holland Cliff to Hewitt Road 230 kV Transmission Line Project
PSC	Maryland Public Services Commission
RDUP	Rural Development Utilities Program
ROW	Right-of-Way
RUS	Rural Utilities Service
SMECO	Southern Maryland Electric Cooperative, Inc.
USDA	United States Department of Agriculture

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1.0 INTRODUCTION

SMECO is an unaffiliated electric transmission and distribution cooperative headquartered approximately 25 miles (40 kilometers) southeast of Washington D.C. in Hughesville, Maryland. SMECO presently serves more than 140,000 customer-members throughout Calvert, St. Mary's, Charles, and southern Prince George's Counties in southern Maryland.

SMECO's Holland Cliff – Hewitt Road 230 kV Transmission Line Project (the Proposed Project) is an expansion of SMECO's existing 230 kV system, and it provides for long-term growth and system reliability. The Proposed Project is needed to solve several short- and long-term issues regarding the supply of normal electric loads and outage contingency loads. These issues affect SMECO's ability to continue to reliably serve its customer-members in the most efficient, cost-effective manner possible. The system demand and system reliability issues solved by the Proposed Project will be discussed further in Section 3.0 Project Need of this document.

There are four generating plants located in SMECO's service area: Chalk Point Generating Station, Morgantown Generating Station, Calvert Cliffs Nuclear Power Plant, and the Panda-Brandywine Cogeneration Plant. Chalk Point (2,417 MW) and Morgantown (1,492 MW) are coal, oil, gas, and steam plants owned by Mirant. Calvert Cliffs Nuclear Power Plant (1,735 MW) is owned by Constellation Energy. A natural gas-fired combined cycle plant with a capacity of 230 MW, owned by Panda-Brandywine, is located in southern Prince George's County.

SMECO has 3,688 miles (5935 kilometers) of overhead distribution, 5,815 miles (9,358) of underground distribution, and 394 miles (634 kilometers) of transmission line. SMECO's transmission system is primarily energized at 69 kV. Figure 2 – Holland Cliff – Hewitt Road 230 kV Transmission Line Project Map included on page 4 illustrates SMECO's existing and proposed 230 kV transmission line facilities.

SMECO has reviewed many options to address the need for additional capacity throughout SMECO's system and locally within Calvert County, as well as, options to improve reliability in Calvert and St. Mary's counties. These alternatives will be reviewed in Section 4.0 Alternatives.

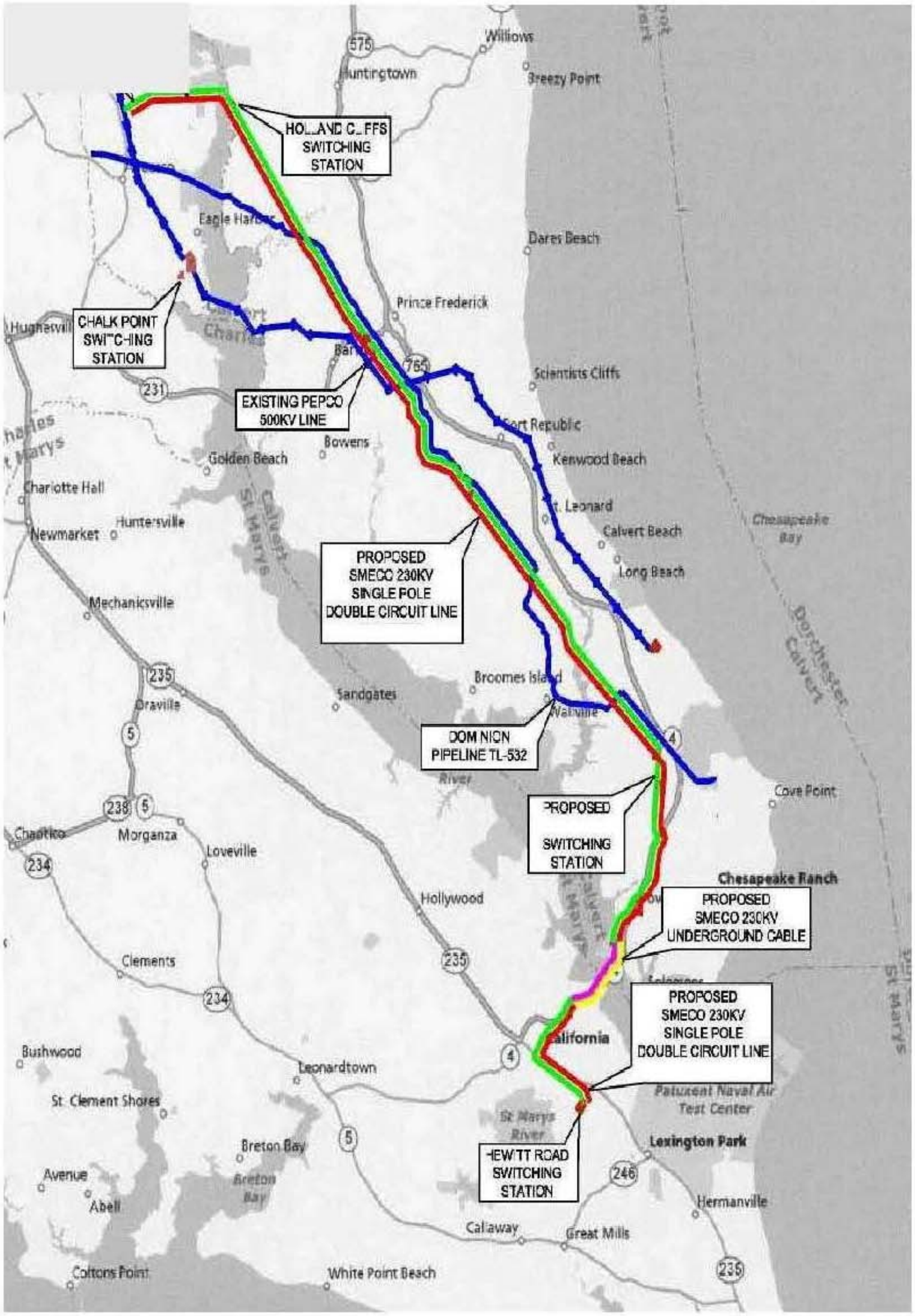

Figure 1 – Study Area Map

2.0 PROJECT DESCRIPTION

As previously indicated the Proposed Holland Cliff – Hewitt Road 230 kV Transmission Line Project will start at the SMECO Holland Cliff switching station and end at the SMECO Hewitt Road switching station and will consist of the following components:

- Install 20 miles (32 kilometers) of new 230 kV single pole, double circuit transmission line from the Holland Cliff station to a new southern Calvert County switching station. The new 230 kV transmission line will be constructed in an existing, 100 foot, 69 kV transmission line right-of-way (ROW).
- Construct a new 230/69 kV switching station located in southern Calvert County in the vicinity of the existing SMECO Calvert Cliffs 69 kV transmission line tap near the intersection of Pardoe Road and Maryland State Route 4. The new 230/66 kV switching station fenced area will cover approximately 4 acres (1.6 hectares).
- Construct a new 230 kV two-mile (three-kilometer) river crossing under the Patuxent River from Solomons to Town Creek.
- Install eight miles (13 kilometers) of new 230 kV single pole, double circuit transmission line from a new southern Calvert County switching station to the existing Hewitt Road switching station in Lexington Park (St. Mary's County). The new 230 kV transmission line will be constructed in an existing 69 kV transmission line ROW.
- Add a new transmission line terminal position in the existing Hewitt Road switching station. The additions at the existing Hewitt Road switching station will be installed within the existing fenced area.

As illustrated in Figure 2, SMECO has an existing 230 kV transmission line that runs through St. Mary's County, from Ryceville (in Charles County) to the Hewitt Road switching station in Lexington Park (in St. Mary's County). SMECO also has a 230 kV transmission line that runs from the Aquasco switching station (in Prince George's County) to the Holland Cliff switching station (in Calvert County). These two 230 kV transmission lines are interconnected to each other by a 230 kV transmission line that runs from Morgantown through Chalk Point to the new Aquasco switching station. The Potomac Electric Power Cooperative, Inc. (PEPCO) owns and operates the 230 kV switching stations at Morgantown, Chalk Point, and Aquasco and the 230 kV transmission lines that connect them. The installation of the proposed Holland Cliff to Hewitt Road 230 kV transmission line will complete the 230 kV transmission loop.

The Electric Alternative Evaluation Study is prepared in support of an Environmental Assessment from the Rural Utilities Service, an agency that administers the programs of the USDA RDUP. The Proposed Project is expected to take more than three years to construct; with a proposed start of construction activities in 2011 resulting in a scheduled completion of construction in 2015. SMECO is also currently developing information required to support the Certificate of Public Convenience and Necessity (CPCN) application for review by the Maryland Public Service Commission (PSC).

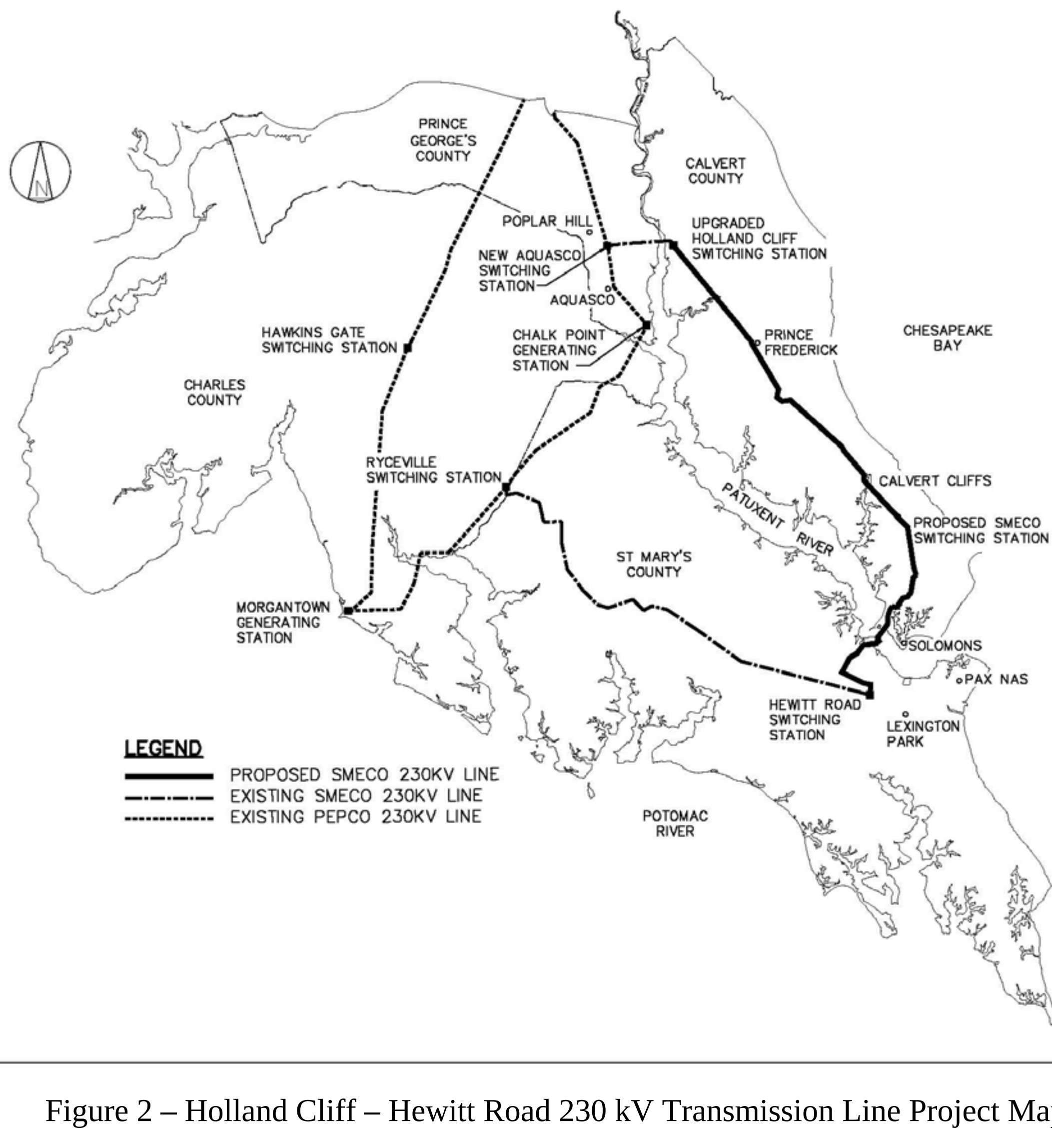

Figure 2 – Holland Cliff – Hewitt Road 230 kV Transmission Line Project Map

3.0 PROJECT NEED

The Holland Cliff – Hewitt Road 230 kV Transmission Line Project is needed to support the increasing system demand and ensure a reliable electric system for the Cooperative's customer-members. Because the demand for electricity is continually increasing on the SMECO system, there is a need to improve the transmission system to ensure continued reliability.

Meet System Demand

Southern Maryland has grown over the past 20 years; it is now the fastest growing region in the state. The population of the tri-county area has increased 67% from 196,661 in 1986 to 328,074 in 2006. Our customer base has doubled since 1986, while annual demand has more than doubled from 331 MW in 1986 to 845 MW in 2006. Energy sales have also more than doubled, from 1,403,757 MWH in 1986 to 3,260,036 MWH in 2006.

SMECO customer-members have also increased in Calvert County, more than doubling from 13,785 in 1986 to 30,109 in 2006. With the increased number of residents comes additional community infrastructure, schools, and businesses to support the growth, resulting in an increase in electrical load. While customer-members have doubled in Calvert County, energy demand has more than tripled from 61 MW in 1986 to 203 MW in 2006. Energy sales over the same period have almost tripled from 242,837 MWH in 1986 to 686,720 MWH in 2006.

Calvert County had only one reliable energy source or transmission line from Chalk Point serving customer demand until 1986 when the 69 kV line was rebuilt from SMECO's Chalk Point Substation to SMECO's Holland Cliff switching station. Not until 1993 was another energy source or transmission line installed into Calvert County. In 1993 SMECO installed a two mile (three-kilometer) 69 kV submarine cable in the lower Patuxent River parallel to the Thomas Johnson Bridge near Solomons. This cable failed in January 2005. Restoring service to southern Calvert County required 69 kV transmission circuits from northern Calvert County to supply power over 21 miles (34 kilometers) on one of the coldest days of the year. SMECO's electrical system studies indicate that there will be insufficient capacity to restore service in this manner by 2015. The Proposed Project addresses this concern and would provide the energy source required to eliminate this issue.

Ensure System Reliability

SMECO's electrical system studies also confirm that the existing SMECO 69 kV and 230 kV electric transmission infrastructure, including the 230/69 kV Holland Cliff switching station presently being constructed, is adequate to handle expected peak system loads in northern Calvert County under normal conditions until 2015. However, these same studies reveal that there are four transmission line outage contingency situations that will be present if the Proposed Project is not completed by the end of 2015. All four outage contingency concerns are eliminated when the Proposed Project infrastructure is operational. The four transmission line outage contingency scenarios include:

1. **Loss of SMECO's 69 kV line #6786 between the Dukes Inn substation and the Mutual substation.** Under this scenario, all load south of Dukes Inn substation must be served via SMECO's 69 kV transmission line #6770 out of the Hewitt Road switching station. Part of the 69 kV transmission line #6770 circuit is comprised of a submarine cable. This cable is rated for ~875 amps. The resultant contingency load is expected to be ~1,014 amps, which would cause an overload on the submarine cable. The Mutual substation load will have to be dumped to prevent the submarine cable from being overloaded if this contingency occurs during peak load conditions. This puts the center of Calvert County at risk of an extended outage that could last from 24 hours to 5 days depending on the amount of damage that must be repaired/replaced.

2. **Loss of the SMECO dual circuit 230 kV pole line #2350 / #2355 between the Aquasco switching station and the Holland Cliff switching station.** Under this scenario, all load north of the Mutual substation in Calvert County will be served by the parallel combination of 69 kV transmission lines #6705 and #6706 and all load south of Mutual substation will be served through the 69 kV transmission submarine cable #6770 discussed in scenario #1 above. Both lines (#6770 and #6706) are at maximum emergency load capacity and line #6705 is loaded to 104% emergency load capacity. In this scenario the Dunkirk substation distribution feeders #21 and #22 will need to be dropped (i.e., all load north of Dunkirk substation) to prevent line #6705 from being overloaded. This puts the northern part of Calvert County at risk of an extended outage that could last from 3 to 10 days depending on the amount of damage that must be repaired/replaced.

3. **Loss of SMECO 69 kV line #6770 between Hewitt Road switching station and Solomons substation.** Under this scenario, all load south of Prince Frederick substation is served by the parallel combination of 69 kV transmission lines #6705

and #6706. Line #6705 is loaded to maximum emergency load capacity and end of line voltage drop is at maximum allowable limits. SMECO's electrical system studies predict that this contingency cannot be supported beyond 2015. This puts the southern part of Calvert County at risk of daily brownout outages during peak load conditions for a period of up to 5 days if the failure occurs on an overhead line section of line #6770 or up to 3 months if the failure occurs on the submarine cable section of line #6770.

4. Loss of the SMECO dual circuit 230 kV pole line #2320E / #2320W between the Ryceville switching station and the Hewitt Road switching station. Under this scenario, all possible load is served via the 69 kV transmission lines #6740 and #6750 out of Hughesville substation. It is assumed that any load that could be shifted from Hughesville substation to other power supply points is appropriately transferred. The two 69 kV transmission lines #6703 and #6704 serving the Hughesville substation are at maximum emergency load capacity and all load south of about Hollywood and Leonardtown substations will be dumped. End of line voltage drop is at maximum allowable limits. This contingency scenario already exists in 2008. This puts all of south St. Mary's County, including Patuxent River Naval Air Station, at risk of an extended outage that could last from three to ten days depending on the amount of damage that must be repaired/replaced.

4.0 ALTERNATIVES

As indicated previously, SMECO's number of customer-members has more than doubled in the past 20 years, and their corresponding energy use has also more than doubled over that same time period. In studying project alternatives, SMECO reviewed a number of possible solutions to address the following main issues:

- Growth of the Southern Maryland area and increased electrical demand.
- Construction of a reliable system that accounts for outage contingencies.

Initially, at least nine different solutions were considered to address the potential overloads of key transmission facilities and to protect against single contingency outage scenarios that would expose sections of the SMECO service territory to extended outages. Based on the initial transmission system studies screening, some of the solutions were eliminated while others were combined to address the electrical demand and reliability issues identified above. The number of solutions involving new construction to be evaluated was reduced to six.

Types of evaluated alternatives include the no action alternative **(Alternative 1)**, the installation of new generation **(Alternative 2),** upgrades to existing transmission facilities **(Alternative 4)**, and construction of new transmission facilities **(Alternatives 3, 5, 6, & 7)**. Other alternatives including underground construction of transmission facilities were considered but eliminated from further consideration (except for the Patuxent River 230 kV Underground River Crossing included in Alternative 7) due to excessive costs. The alternatives evaluated are described in more detail below.

Alternative 1: Make no improvements to transmission system.

This alternative would make SMECO's system vulnerable to long-term outages, because there is a lack of redundancy for the areas served in Calvert County and St. Mary's County's. Thus, reliability needs to be improved to enhance electrical system operational flexibility and reduce the potential for an extended outage contingency on the local transmission system. The 'no action' alternative would increase the potential for wide area blackouts under contingency situations, violate good engineering practices for transmission planning, and indicate neglect of responsibilities by SMECO, which is charged with providing adequate and reliable electric service to its customer-members.

Alternative 2: Install new generation.

SMECO has four generation facilities located in its service area, and a fifth is proposed to be located in Charles County. None of these generation facilities are owned by SMECO. Building an additional plant in Calvert or St. Mary's County would be expensive and unnecessary. This alternative is considered excessive, and does not provide a solution for delivering power to the areas where it is most required, nor does it improve reliability for SMECO's customer-members.

Alternative 3: Interconnect with the Calvert Cliffs nuclear generation facility 500 kV system.

The nuclear plant has a 500 kV transmission system that is built for bulk power transmission and is not available for local service. An interconnection would require the development of major 500 kV electrical interconnection facilities and would not eliminate the need for a large portion of the proposed 230 kV facilities identified in the Holland Cliff – Hewitt Road 230 kV Transmission Line Project. In addition, if SMECO were to connect with Baltimore Gas & Electric transmission system, the interconnection would trigger federal regulations regarding wheeling power through SMECO's existing transmission system. This would require SMECO to make additional modifications to their transmission system as well as change how they operate the system. SMECO currently has no experience with 500 kV equipment, service, nor do they maintain 500 kV spare parts. From both an engineering/construction and operations perspective, this would be a costly solution with limited benefit.

Alternative 4: Upgrade the Calvert County 69 kV transmission system voltage to 138 kV.

This alternative would consist of re-building approximately 60 miles (97 kilometers) of existing 69 kV transmission lines to 138 kV and the installation of 230/138 kV transformers at the Holland Cliff switching station. Although this option could provide a local reliable loop service, it would require rebuilding the affected transmission lines to support a higher voltage and changing all distribution substation transformers. Converting part of SMECO's system to 138 kV, a non-standard SMECO voltage, would also isolate Calvert County from the rest of SMECO's service area and would limit future capacity. SMECO would still need a second line to southern Calvert County because the existing transmission source from Hewitt Road can only be energized at 69 kV which will not provide sufficient capacity in a contingency situation. Also, long duration outages of the existing 69 kV transmission lines to facilitate the rebuilds would significantly reduce the reliability of the SMECO transmission system in Calvert County regardless of the load period. Finally, SMECO currently has no experience with 138 kV equipment, service, nor do they maintain 138 kV spare parts. From both an engineering/construction and operations perspective, this would be a costly solution with limited benefit.

Alternative 5: Ryceville/Morgantown – Hewitt Road 230 kV Line

This alternative would consist of the following sub-projects:

- Install a new 230 kV transmission line from either SMECO's Ryceville switching station (~24 miles/39 kilometers) or PEPCO's Morgantown switching station (~36 miles/58 kilometers).
- Modify either the Ryceville switching station or the Morgantown switching station to accommodate the new transmission line interconnect.
- Modify the Hewitt Road switching station to accommodate the new transmission line interconnect.
- Replace the existing 254 Megavolt Amperes (MVA) transformers located in PEPCO's Chalk Point switching station with larger units to increase service capacity to SMECO's Chalk Point switching station.

A new line from Morgantown to Hewitt Road would need to cross the Wicomico River; otherwise, the line would go from Morgantown to the area near Ryceville and then south to Hewitt Road. This alternative would require new ROW to be acquired and cleared to accommodate the new transmission line. Optimally, the new transmission line would be located away from the ROW where the existing Ryceville – Hewitt Road 230 kV transmission line is located to prevent both lines from being affected by a single event. Similarly, it is not acceptable to tap the existing Ryceville – Hewitt Road 230 kV transmission line as this would also make the sources susceptible to a single failure event. This solution adds capacity and reliability for St. Mary's County and addresses the system demand issue in Calvert County. However, this alternative does not address the system reliability issues in either northern or southern Calvert County, thus leaving those areas susceptible to extended outages on the area transmission system under contingency situations.

Alternative 6: Chalk Point – Hughesville 230 kV Line

This alternative would consist of the following sub-projects:

- Install a new 230 kV transmission line from PEPCO's Chalk Point switching station to SMECO's Hughesville switching station (~9 miles/14 kilometers).
- Install a new 230 kV transmission line from the Hughesville switching station to the Hewitt Road switching station (~32 miles/52 kilometers).
- Expand the existing Hughesville switching station to install a new 230/69 kV interconnection.
- Modify the Chalk Point switching station to accommodate the new transmission line interconnect.
- Modify the Hewitt Road switching station to accommodate the new transmission line interconnect.
- Re-conductor approximately 6 miles (10 kilometers) of existing 69 kV transmission line #6705 and approximately 7 miles (11 kilometers) of existing 69 kV transmission line #6706.
- Install a new 69 kV transmission line from SMECO's Chalk Point switching station to southern Calvert County (~20 miles/32 kilometers).

To support this alternative, SMECO would need to acquire and clear approximately 61 miles (98 kilometers) of new ROW to accommodate the new transmission line construction. The addition of the 230 kV system improvements adds capacity and reliability for St. Mary's County but does not address the system demand or system reliability issues in Calvert County. The Calvert County system demand and reliability issues are addressed by the increase in capacity provided by the re-conductoring of the 69 kV transmission lines (#6705 & #6706) and the addition of the new 69 kV transmission

line to southern Calvert County. Re-conductoring these transmission lines would include installing new poles and replacing the existing 556 thousand circular mils (MCM) aluminum steel reinforced conductor with new 1590 MCM all aluminum conductor or using the existing structures with a high temperature composite core conductor. Voltage degradation would require a regulating transformer or a shunt capacitor bank to support end-of-line voltage on the new 69 kV transmission line. This solution is very costly and provides limited future capacity and reliability benefit for Calvert County.
Total Cost = $126,000,000 (See Table 2 in the Appendix)

Alternative 7: Holland Cliff – Hewitt Road 230 kV Line

This alternative would consist of the following sub-projects:

- Install a new 230 kV transmission line from the Holland Cliff station to a new southern Calvert County switching station (~20 miles/32 kilometers).
- Install a new 230/69 kV switching station located in southern Calvert County.
- Install a new 230 kV underground transmission line circuit under the Patuxent River (~2 miles/3 kilometers).
- Install a new 230 kV transmission line from a new southern Calvert County switching station to the existing Hewitt Road switching station (~8 miles/13 kilometers).
- Modify the Hewitt Road switching station to accommodate the new transmission line interconnect.

The new 230 kV single pole, double circuit transmission lines listed above will be installed in an existing 69 kV transmission line ROW eliminating the need to acquire and clear new ROW. The new 230/69 kV southern Calvert County switching station will be located in the vicinity of the existing SMECO Calvert Cliffs 69 kV transmission line tap near the intersection of Pardoe Road and Maryland State Route 4. The new 230/66 kV switching station fenced area will cover approximately 4 acres (1.6 hectares). The new 230 kV two-mile (three-kilometer) river crossing under the Patuxent River will be installed from Solomons to Town Creek. The additions at the existing Hewitt Road switching station will be installed within the existing fenced area. This alternative addresses the demand issue for southern Calvert County and the reliability requirements for both Calvert and St. Mary's counties. The Holland Cliff – Hewitt Road 230 kV Line alternative provides the needed capacity, system reliability, and operational flexibility required to greatly reduce the chance of an extended outage contingency on the area transmission system.
Total Cost = $94,300,000 (See Table 3 in the Appendix)

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5.0 CONCLUSION

SMECO has a long history of providing reliable electric service to their customer members at an economical price. As stated earlier, SMECO's number of customer members and their energy use continues to increase. To meet these changes SMECO is required to continually monitor and upgrade their transmission system to provide adequate and reliable electric service to its customer-members. An example of SMECO's responsibility to their customer members is the Aquasco – Holland Cliff 230 kV Transmission Line Project presently in construction. The Aquasco – Holland Cliff 230 kV Transmission Line Project is required to provide additional system capacity and resolve system reliability issues in SMECO's northern Calvert County service territory. The Aquasco – Holland Cliff 230 kV Transmission Line Project needs to be operational by December 2009 to adequately address these issues. The Aquasco – Holland Cliff project was approved in 1976 and re-confirmed by the State of Maryland PSC on August 7, 2007 (Mailog #104940).

Similarly, the Holland Cliff – Hewitt Road 230 kV Transmission Line Project being evaluated in this report will ensure SMECO's ability to continue to reliably serve its customer members in the most reliable and cost-effective manner possible. As presented by this report SMECO has reviewed a number of alternatives in order to address the following main issues which are of concern for the existing transmission system:

- Growth of the Southern Maryland area and increased electrical demand.
- Construction of a reliable system that accounts for outage contingencies.

The primary benefits of the each of the seven alternatives that were evaluated in detail are summarized in Table 1 – Summary of Alternatives

Evaluated Alternatives ("X" indicates that the alternative addresses the demand or reliability issue in the column heading.)	System Demand	Reliability		
		Northern Calvert	Southern Calvert	St. Mary's
1. Make no improvements to transmission system.				
2. Install new generation.				
3. Interconnect with the Calvert Cliffs nuclear generation facility 500 kV system.	X		X	
4. Upgrade the Calvert County 69 kV transmission system voltage to 138 kV.		X	X	
5. Ryceville/Morgantown – Hewitt Road 230 kV Line.	X			X
6. Chalk Point – Hughesville 230 kV Line.	X	X	X	X
7. Holland Cliff – Hewitt Road 230 kV Line.	X	X	X	X

Table 1 – Summary of Alternatives

In review of the detailed descriptions for each of the alternatives included in this report it is evident that only two of the proposed alternatives address the reliability and demand concerns in the SMECO Southern Maryland service area. Of these two alternatives, the Holland Cliff – Hewitt Road 230 kV Line alternative (Alternative 7) provides the greater value to SMECO's customer members because of its long term benefit by creating a 230 kV transmission loop through St. Mary's and Calvert Counties. Alternative 7 also has a smaller environmental impact because it uses existing ROW, is the lowest cost to construct as supported by the cost analysis tables (Table 2 and Table 3) included in the Appendix, and provides additional capacity, operational flexibility, and the high reliability required to greatly reduce the chances for extended outages on the area transmission system.

6.0 RECOMMENDATION

SMECO recommends that the Holland Cliff – Hewitt Road 230 kV Line (Alternative 7) be implemented as the chosen solution. The Holland Cliff – Hewitt Road 230 kV Line completes a 230 kV transmission system loop through St. Mary's and Calvert counties providing the additional capacity, operational flexibility, and high reliability required to greatly reduce the chances for extended outages on the area transmission system. Engineering design, material procurement, switchyard property acquistion should be timed to support the required fall 2015 in-service date.

APPENDIX
(Alternatives Cost Analysis)

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Table 2: Cost Analysis for Alternative 6

	Cost in $Millions
Alternative 6: Chalk Point – Hughesville 230 kV Line	
- Chalk Point – Hughesville 230 kV Transmission Line (9 miles/14 kilometers)*	**$13.5**
- Hughesville – Hewitt Road 230 kV Transmission Line (32 miles/52 kilometers)*	**$48.0**
- Hughesville 230/69 kV Switching Station*	**$13.0**
- Chalk Point 230 kV Switching Station Interconnect Upgrade	**$2.0**
- Hewitt Road 230 kV Switching Station Interconnect Upgrade	**$2.0**
- Re-conductor Lines #6705 (6 miles/10 kilometers) and #6706 (7 miles/11 kilometers)	**$6.5**
- Chalk Point – southern Calvert 69 kV Transmission Line (20 miles/32 kilometers)*	**$20**
Project Contingency and Escalation (20%)	**$21**
TOTAL	**$126.0**

* = Land and ROW costs are not included in the estimate.

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Table 3: Cost Analysis for Alternative 7

	Cost in $Millions
Alternative 7: Holland Cliff – Hewitt Road 230 kV Line	
- Holland Cliff – Southern Calvert County 230 kV Transmission Line (20 miles/32 kilometers)	**$30.0**
- Southern Calvert County 230/69 kV Switching Station	**$13.0**
- Patuxent River 230 kV Underground River Crossing (2 miles/3 kilometers)	**$21.6**
- Southern Calvert County – Hewitt Road 230 kV Transmission Line (8 miles/13 kilometers)	**$12.0**
- Hewitt Road 230 kV Switching Station Interconnect Upgrade	**$2.0**
Project Contingency and Escalation (20%)	**$15.7**
TOTAL	**$94.3**

* = Land and ROW costs are not included in the estimate.

Appendix B
Macro-Corridor Study

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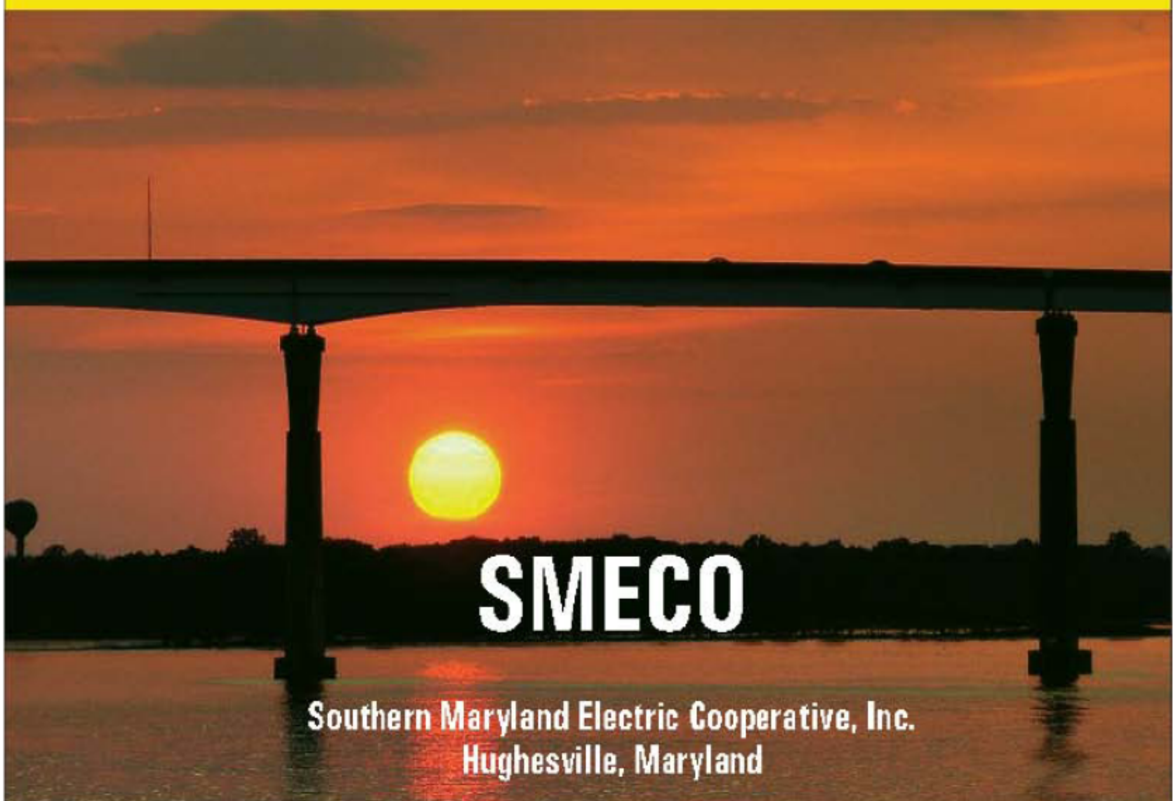
Macro-Corridor Study

Holland Cliff-Hewitt Road
230 kV Transmission Line Reliability Project



Revision 1

November 4, 2008

Study conducted by:

Black & Veatch
Building a world of difference.

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Executive Summary

The Southern Maryland Electric Cooperative, Inc. (SMECO) of Hughesville, Maryland is proposing to construct and operate a new multiple circuit transmission line from the general location of its existing Holland Cliff Switching Station near Holland Cliff, Maryland to its existing Hewitt Road Switching Station on Buck Hewitt Road in St. Mary's County, Maryland. SMECO intends to use an existing right-of-way (right-of-way) to the greatest extent feasible between the two terminal points for the proposed transmission line. The project is located in the counties of Calvert and St. Mary's, and will require the crossing of the Patuxent River at or near Solomons, Maryland.

The proposed transmission line is part of a major reliability improvement program to SMECO's existing transmission network in the two counties. It will complete an essential 230 kilovolt (kV) loop and tie its 230 kV transmission system together in its four-county service area (Calvert, St. Mary's, Prince Georges, and Charles counties). Based on the Alternatives Evaluation Study, the proposal will include the construction of a new double circuit 230 kV transmission line, with provisions for two 69 kV circuits installed on the same structures. The project will also include the construction of a new Southern Calvert Switching Station near State Route 2/4 in the general area of the small community of Lusby. The Hewitt Road Switching Station will also be upgraded. The project may also require minor electrical upgrades to the following existing substations: Prince Frederick Substation, Dukes Inn Substation, Mutual Substation, St. Leonard Substation, Bertha Substation, and Solomons Substation, all within the existing fence lines.

The proposed transmission line will measure approximately 30 miles (48 kilometers) in length. To minimize environmental impacts, and with the exception of the Patuxent River crossing described later in the report, SMECO intends to utilize its existing 69 kV line right-of-way, which is 100 feet (30.5 meters) wide for the majority of its length, between the two terminal points. The transmission line will consist of four circuits (two 230 kV and two 69 kV) on single tubular steel structures, with heights of 110 to 140 feet (33.5 to 42.7 meters), for most of its length.

SMECO recognizes that over the years, numerous land use developments have occurred adjacent to the existing 69 kV transmission line right-of-way. Several occupied single family dwellings and commercial establishments are now located adjacent to the existing line. In 2007, SMECO retained Black & Veatch Corporation (Black & Veatch) to provide engineering design services for the new transmission line, new switching station and substation upgrades. As part of these engineering services, Black & Veatch has conducted a preliminary survey to determine if viable and feasible alternative routing options exist at specified areas of congestion (presence of residential or commercial development very near the right-of-way) along the existing right-of-way. These areas of congestion, identified by SMECO and Black & Veatch, include the following:

- Holland Cliff Shores Subdivision.
- PEPCO 500 kV lines.
- Whispering Woods Subdivision.
- Broomes Island Road Crossing.
- St. Leonard Shores Subdivision and White Sands Subdivision.
- Dowell Road area.
- State Route (SR) 4 area and the crossings of the Patuxent River and Town Creek.
- St. Mary's and San Souci area in the vicinity of State Route 235.

This report addresses possible alternative routing options at these congestion points. It describes the methodology used to select alternative routings, describes the tools used in this process, and discusses each of the alternative routes, including a brief narrative and data table comparing each alternative with the existing right-of-way. Aerial photography is provided that depicts the existing right-of-way (in white) with each potential route alternative highlighted in yellow (for overhead) and red (for underground).

1.0 Introduction

SMECO is an unaffiliated electric transmission and distribution cooperative headquartered approximately 25 miles (40 kilometers) southeast of Washington D.C. in Hughesville, Maryland. SMECO presently serves more than 140,000 customer-members throughout Calvert, St. Mary's, Charles, and southern Prince George's Counties in southern Maryland, a service area of 1,150 square miles (2,978 square kilometers). In addition to its headquarters, SMECO has region offices in Prince Frederick, White Plains, and Leonardtown.

SMECO shares service territory boundaries with two neighboring electric utilities: Potomac Electric Power Company (PEPCO) and Baltimore Gas & Electric (BG&E). There is no overlap, intermingling, or sharing of territory.

SMECO has 3,688 miles (5,935 kilometers) of overhead distribution, 5,815 miles (9,358 kilometers) of underground distribution, 394 miles (634 kilometers) of transmission line, and more than 64,000 transformers. SMECO's transmission system is primarily energized at 69 kV. SMECO purchases all of its power from utilities that operate generating facilities in the area.

SMECO's Holland Cliff - Hewitt Road 230 kV Transmission Line Project is an expansion of SMECO's existing 230 kV system, and its purposes are to meet long-term demand growth and provide better system reliability. To accomplish this, SMECO plans to construct the proposed project which will create a 230 kV transmission system loop. This approach also solves several short- and long-term issues regarding normal electric loads and outage contingency loads. These issues affect SMECO's ability to continue to reliably serve its customer-members in the most efficient, cost-effective manner possible. The system demand and system reliability issues are addressed in more detail in the Alternatives Evaluation Study submitted separately to Rural Utilities Service (RUS), an Agency that administers the programs of the USDA Rural Development Utilities Programs (USDA Rural Development).

Since 1986, SMECO's customer base has doubled in number, while annual energy demand has more than doubled from 331 MW in 1986 to 845 MW in 2006. Southern Calvert County is currently served by a two-mile 69 kV submarine cable in the lower Patuxent River parallel to the Thomas Johnson Bridge near Solomons. This cable failed in January 2005 and restoring service to southern Calvert County required transmission circuits from northern Calvert County to supply power more than 21 miles (34 kilometers) on one of the coldest days of the year. Based on anticipated growth in population and energy demand, there will be insufficient capacity to restore service in this manner by 2015, and no other alternatives exist at this time unless a new 230 kV source in southern Calvert County is added.

The Hewitt Road switching station provides electric service to southern Calvert County and St. Mary's County, including the Patuxent River Naval Air Station. If unexpected maintenance or a natural disaster were to severely damage or destroy a single structure along the 24 mile (39-kilometer) 230 kV double circuit transmission line, nearly one-third of SMECO's system peak load would be out of service including the Patuxent Naval Air Station, and SMECO would have limited no ability to restore service until the 230 kV structure could be repaired or replaced.

Therefore, SMECO proposes to create a 230 kV transmission system loop in which areas that experience a service interruption can be quickly provided power from another direction. In addition to the transmission loop, there will be the need for a new substation to step down the 230 kV transmission line voltage to 69 kV for distribution to customers in the area. Existing distribution substations do not have the space to accommodate the facilities for a 230/69 kV substation. The location of the substation must be near the existing 69 kV line and in an area where enough vacant land is available to accommodate the facilities and to provide a visual buffer from existing residences. The new 230/69 kV switching station fenced area will cover approximately 4-6 acres, thus resulting in approximately 6-10 acres of disturbance. The new 230/69 kV switching station is proposed to be located in southern Calvert County in the vicinity of the existing Calvert Cliffs 69 kV transmission line tap near the intersection of Pardue Road and Maryland State Route 4 (See Figure 1-2).

1.1 Project Description

SMECO proposes to install 20 miles (32 kilometers) of new 230 kV single pole, double circuit transmission line from the Holland Cliff station to a new Southern Calvert County switching station, construct a new 230/69 kV switching station located in Southern Calvert County, construct a new two-mile river crossing from Solomons to Town Creek, install eight miles (13 kilometers) of new 230 kV single pole, double circuit transmission line from a new southern Calvert County switching station to the existing Hewitt Road switching station in Lexington Park (St. Mary's County), and add a new line terminal position in the existing Hewitt Road switching station. Figure 1-1 shows the location of Calvert and St. Mary's County and Figure 1-2 shows the proposed system loop.

The proposed transmission line will measure approximately 30 miles (48 kilometers) in length. After evaluating alternatives for location of the proposed transmission line, SMECO determined that maximizing the use of its existing right-of-way between the upgraded Holland Cliff Switching Station and the Hewitt Road Switching Station is the option with the least impact to the public and to the environment. Approximately 22 miles (35 kilometers) of the 30 mile (48 kilometers) route is in right-of-way of 100 feet (30.5 meters) in width, five miles (8 kilometers) in 150 foot (45.7 meters) wide right-of-way, one mile (1.6 kilometers) in 122 foot (37.2 meters) wide right-of-way, and less than a mile in 75 foot (23 meters) right-of-way. The remainder of the length is at the Patuxent River crossing.

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Figure 1-1
Calvert and St. Mary's Counties

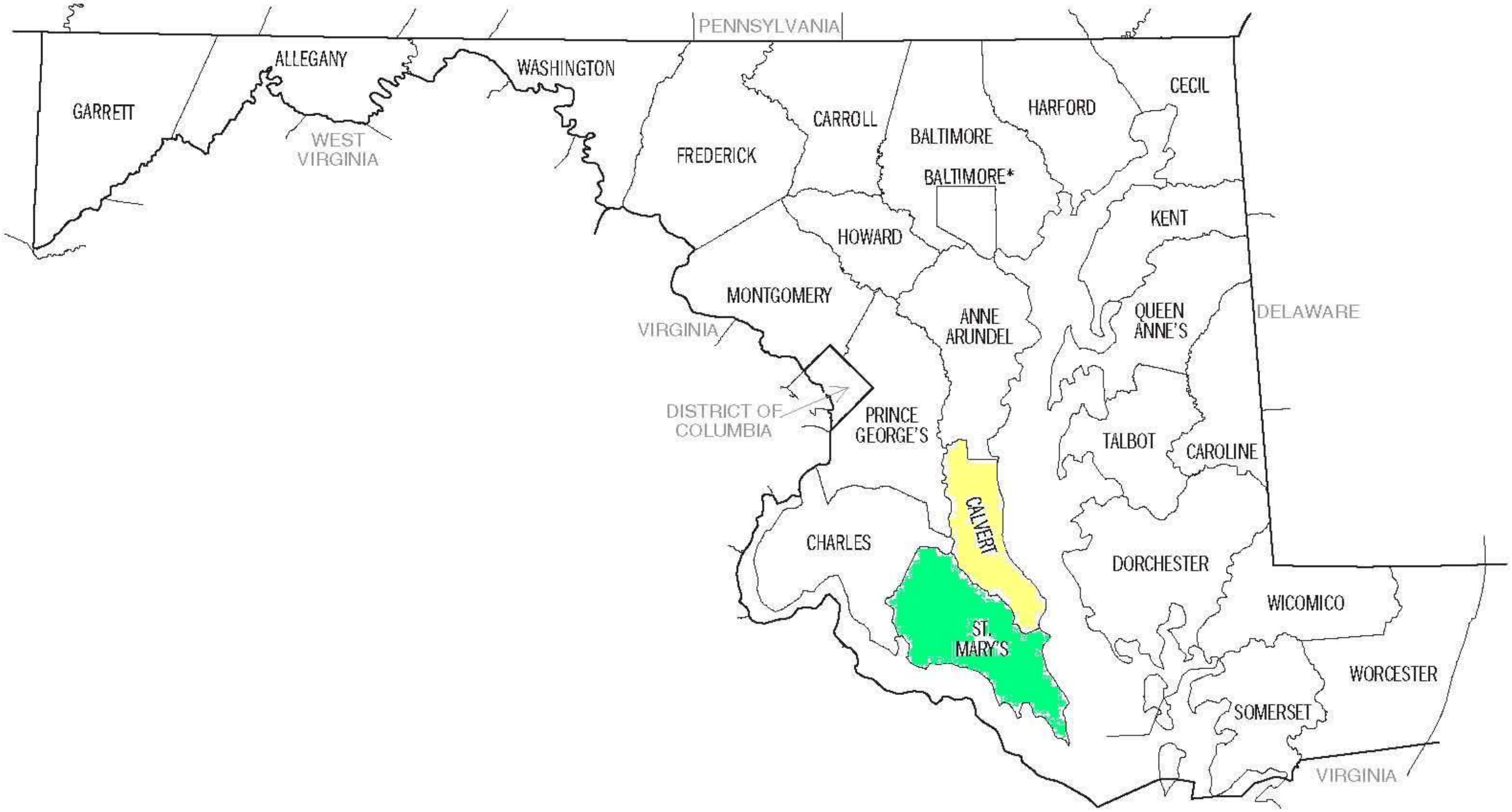

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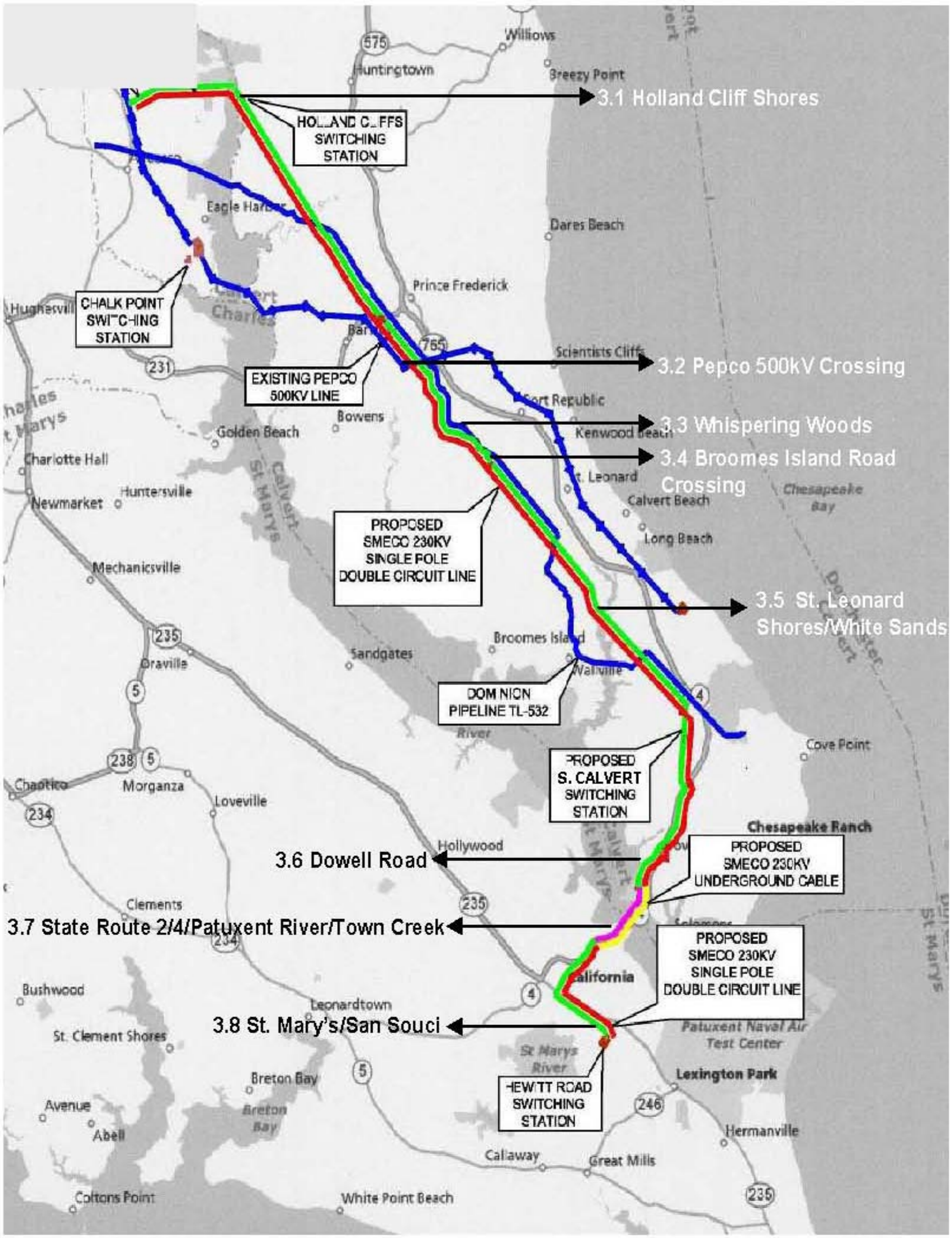
Figure 1-2
Alternate Route Locations



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The existing SMECO right-of-way contains one single circuit 69 kV transmission line on single wood or light duty (LD) steel poles with heights varying from 45 to 65 feet (14 to 20 meters) (see Figure 1-3). The existing 69 kV transmission line from Holland Cliff to the area of Southern Calvert will be replaced by a double-circuit 230 kV transmission line with positions for a double-circuit 69 kV underbuild. Only one 69 kV circuit will be installed initially. The existing 69 kV transmission line from the area of Southern Calvert to the existing Hewitt Road Switching Station will be replaced by a double-circuit 230 kV transmission line with positions for a double circuit 69 kV underbuild. Only one 230 kV circuit and one 69 kV circuit will be installed initially.

At this time, SMECO anticipates that very little new right-of-way is required for the project. However, the ongoing environmental assessment to support the Borrower's Environmental Report will contain additional information needed to confirm the need for new right-of-way. The new Southern Calvert Switching Station will require land acquisition, and upgrades to the Hewitt Road Switching Station will occur within the existing fenced area of the station. It is anticipated that one lot adjacent to the existing Holland Cliff property will need to be purchased to accommodate the egress of the 230 kV transmission lines from the site. It is currently a lightly wooded lot that is part of a residential property. Upgrades at other substations should not require the purchase of additional lands.

Tubular steel poles are being considered for the new line. The tubular steel structures with both the 230 kV and 69 kV circuits will on average measure approximately 110 feet to 140 feet (33.5 to 42.7 meters) in height, depending upon on structure type, terrain, span length, and required conductor spacing. In comparison, the existing 69 kV wood pole structures currently measure 45 to 65 feet (14 to 20 meters) in height. The new poles will be approximately 1.5 to 3 times the height of the existing structures.

Two new 230 kV circuits will be placed near the top of the structures in a vertical configuration. Below the two 230 kV circuits, two 69 kV circuits can be installed in a vertical configuration (Figure 1-3). This arrangement, with the 230 kV lines on top and the 69 kV lines underneath, is called a 69 kV "underbuild." The existing 69 kV line will use one of the two circuit arrangements on the new poles. A single fiber optical ground wire (OPGW) and one overhead shield wire will be strung at the top of each structure to provide lightning protection and a communications path between the various stations and switching facilities.

Typical foundations will consist of large drilled piers, one for each tubular steel structure. Each foundation will measure approximately 8 feet (2.4 meters) in diameter and be 25 feet (7.6 meters) deep. The foundation will consist of rebar and anchor bolts backfilled with concrete, and will sit approximately 6 to 18 inches (15 to 46 centimeters) above grade.

The two 230 kV circuits in a vertical configuration will be suspended on upswept davit arms with I-string insulators. Where the 69 kV underbuild is planned, the two 69 kV circuits will be suspended on horizontal davit arms with I-string insulators. A minimum ground clearance of 22 feet (6.7 meters) for the 69 kV conductors will be maintained along the length of the line and at road crossings.

The proposed transmission line will have a typical span length of approximately 600 feet (183 meters) between the new structures, as compared to approximately 400 feet (122 meters) between the existing wood poles or LD steel structures. In effect, every fourth existing 69 kV structure will be removed from the existing right-of-way, reducing the number of structures by roughly one-quarter with the new construction. No additional right-of-way will be required if SMECO uses its existing right-of-way. The proposed transmission line will cross the Patuxent River and Town Creek. At present, four crossing options are being investigated. These include 1) attachment to a new state highway bridge for State Route 2/4, 2) submarine cables water jetted into the bottom of the river and creek, 3) a directional bore beneath the bottom of the Patuxent River and Town Creek, and 4) an overhead conductor span between large towers on each side of the river channel. In option 2, a high-pressure water jet digs a trench along the river bottom into which the transmission line cable is placed. Silt and mud naturally and immediately start filling the trenches and covering the cable.

The proposed location of the southern Calvert County switching station is in southern Calvert County in the vicinity of the existing Calvert Cliffs 69kV transmission line tap near the intersection of Pardue Road and Maryland State Route 4. SMECO has not yet purchased a site, but anticipates that any site acquired in the area will require tree and brush clearing to accommodate the new facility. Final evaluation of the site property purchased will be in accordance with Section 2.0 of this report. Final engineering will determine the size of the site and the amount of clearing required. Environmental impacts associated with the southern Calvert County switching station will be addressed in the Environmental Assessment. The new 230kV/69kV switching station fenced area will cover approximately 4 acres, thus resulting in approximately 5-6 acres of disturbance. Any upgrades to other existing SMECO substations and the Hewitt Road Switching Station will occur on property already owned by SMECO.

The Macro-Corridor Study is prepared in support of an Environmental Assessment from the Rural Utilities Service, an agency that administers the programs of the USDA Rural Development Utilities Programs (USDA Rural Development). The Proposed Project is expected to take more than three years to construct; with a proposed start of construction activities in 2011 resulting in a scheduled completion of construction in 2015. SMECO is also currently developing information required to support the Certificate of Public Convenience and Necessity (CPCN) application for review by the Maryland Public Service Commission (PSC).

Proposal and construction of this project must comply with the requirements of the National Environmental Policy Act (NEPA). The purpose of NEPA is to establish a policy that sets environmental protection goals and a means of achieving those goals. NEPA requires that federal agencies consider the environmental consequences of actions, or projects, before those actions are taken. The financial assistance that the Rural Development Utilities Program provides is considered a federal action. The determination of environmental consequences is typically made using an Environmental Assessment (EA) and/or an Environmental Impact Statement (EIS). The former is anticipated for this project.

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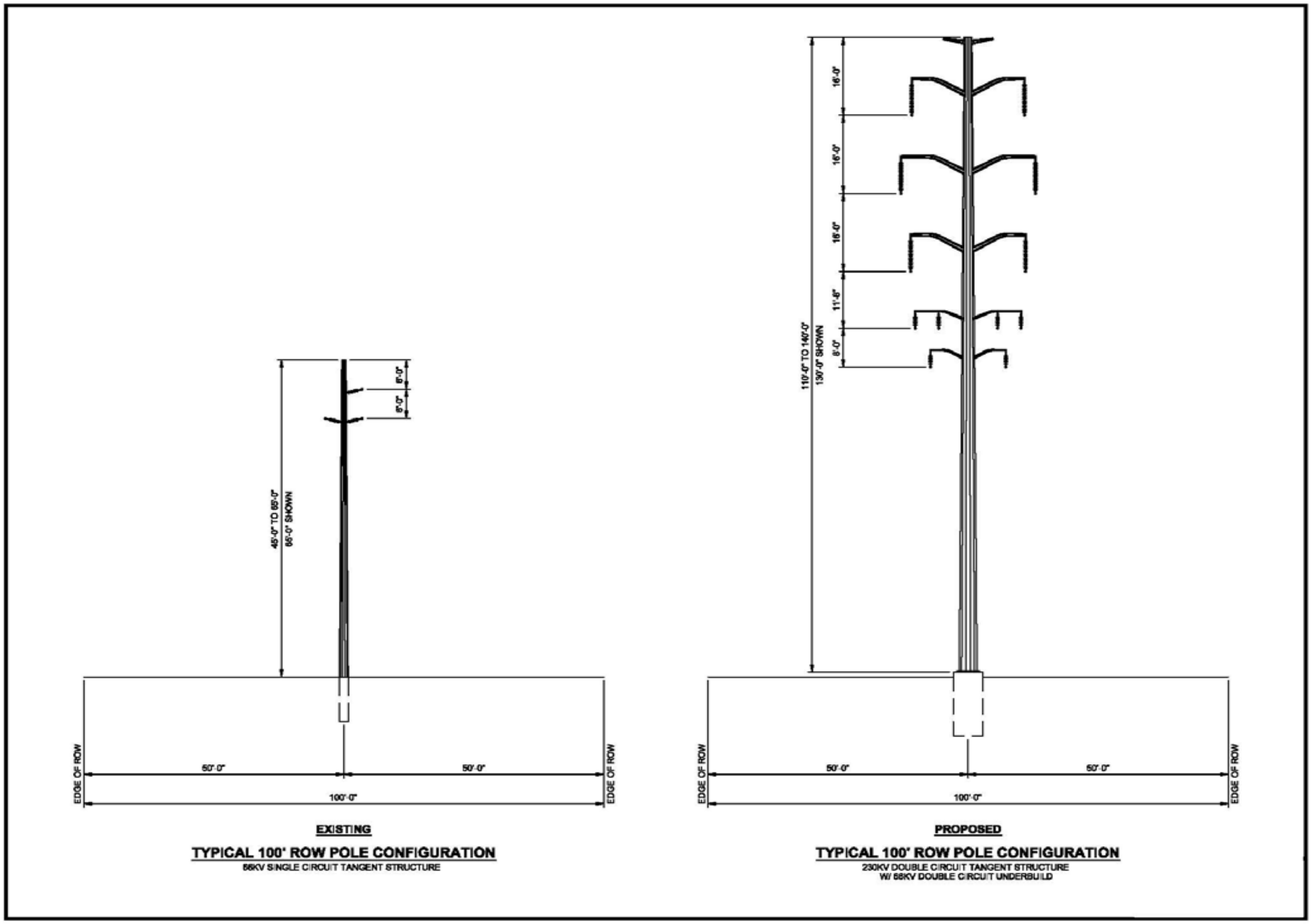
Figure 1-3
Existing and Proposed Pole Configurations



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2.0 Alternative Routing and Siting Methodologies

2.1 Study Area Description

The study area is located in central and southern Calvert County and in a small portion of eastern St. Mary's County. These are the locations in SMECO's service area of greatest population growth and energy demand. The study area was focused on land in and on either side of SMECO's existing 69 kV transmission line right of way because it runs down Calvert County parallel with the county's primary transportation artery, State Highway 2/4. The frequent improvements to the highway over the last 20 years have attracted residential and commercial development to the county. Most of the area is privately owned land.

Despite all the development, much of land near SMECO's right-of-way is agricultural. Truck crops, fruits, and poultry are important sources of income in the area. Forage crops, soybeans, and grain for dairy and beef cattle also are important. Rural residences are on sites where farming is less favorable. But throughout the area, farmland is being converted to urban land at increasing rates, primarily for residential purposes. A narrow belt along the coast is intensively developed for resorts and recreation including numerous marinas or support services.

2.2 Engineering Environment

The existing transmission line is a 69 kV line installed on single-pole structures throughout the 30 miles (48 kilometers) of right-of-way in the study area. The right-of-way width varies generally between 100 and 150 feet (30.5 and 45.7 meters), depending on when the right-of-way was acquired and what constraints there were at the time of acquisition. Approximately 22 miles (35 kilometers) of the 30 mile (48 kilometers) route is in right-of-way of 100 feet (30.5 meters) in width, five miles (8 kilometers) in 150 foot (45.7 meters) wide right-of-way, one mile (1.6 kilometers) in 122 foot (37.2 meters) wide right-of-way, and less than a mile in 75 foot (23 meters) right-of-way. The remainder of the length is at the Patuxent River crossing.

Calvert County is located along a topographic ridge that is bordered to the east by the Chesapeake Bay and to the west by the Patuxent River. Generally, the topography slopes gently towards the southeast. Steep slopes and ravines are frequently present along the Chesapeake Bay, the Patuxent River and in upland drainage areas. These drainage areas include the central portion of Calvert County where steep slopes and more rugged areas are present due to the headwaters of several streams.

Inland elevations of Calvert County are generally between 100 feet and 150 feet (30.5 and 45.7 meters) above sea level. Local relief is variable and generally increases significantly near drainage features. Steep slopes can occur near the major streams and along the shorelines of the Patuxent River and the Chesapeake Bay. Soil slopes near the proposed SMECO right-of-way indicate steep slopes are common.

Drainage along the proposed SMECO line will enter the Patuxent River watershed or the Severn River watershed. In general, the western two-thirds of Calvert County drain to the Patuxent River and the eastern third drains into the Chesapeake Bay. The Severn River watershed runs along the west side of Chesapeake Bay.

2.3 Natural Environment

Named streams crossed by the proposed transmission line include (from north to south) Hunting Creek, Mill Creek, Parker Creek, St. Leonard Creek, Planters Wharf Creek, St. Johns Creek, Helen Creek, St. Paul Branch, Town Creek, and Kingston Creek. Several unnamed streams also are crossed, most of which are too small to be indicated on the US Geological Survey (USGS) topographic maps. There are approximately 60 wetlands within the existing SMECO right-of-way or close enough to be affected by work in the right-of-way. Most are located in valley bottoms between steeply sloped hills and associated with small streams. Wetlands are also located within or adjacent to several constructed ponds used for stormwater detention adjacent to the right-of-way.

The major watershed in the project area is the Patuxent River, with a small portion of the Upper Chesapeake Bay at the southernmost point. This area supports pine and hardwoods and most of the area was forested at one time. Most of the woodland in the area today is in farm woodlots, but there are some large holdings. Forested areas are separated by agricultural lands, urban development and related infrastructure.

Wildlife habitat associated with the transmission line corridor consists mainly of open mixed hardwood and coniferous forests, some agricultural land, and urbanized areas. Portions of the transmission line right-of-way are located adjacent to or cross riparian areas associated with streams. Many of the streams have associated wetlands within the right-of-way, but none is large enough to support a diverse resident wildlife assemblage except in or near tidal wetlands associated with St. Leonard Creek, St. John's Creek, Hunting Creek, or the Patuxent River. A report containing the findings of a wetlands study and threatened and endangered species survey will be part of the Environmental Assessment.

2.4 Routing and Siting Methodology

In order to evaluate alternative routes that would meet the needs described earlier in this report, SMECO considered several alternatives. The most obvious alternative, and the one ultimately selected for this study, was the use its existing 69 kV right-of-way for the entire length of the project. But before this conclusion was reached, several questions were addressed.

- Is the existing right-of-way width sufficient to accommodate both the existing 69 kV line and the new 230 kV line and meet the required engineering requirements?
- Even with existing rights-of-way, are there other routes that will have less impact on nearby residents?
- If alternative routes are chosen, what will be the environmental impact even if the impact on nearby residents is minor?
- Can the project's objectives be better served by selecting a route other than that along the existing SMECO right-of-way?

Wherever the existing right-of-way was considered to be congested-that is, having residential or commercial development very near the right-of-way alternatives routes were sought. Each of these areas of congestion was viewed on color aerial photography that is currently available through the Internet. Photography provided by Google Earth's and MapQuest's Internet sites were used in identifying the existing SMECO right-of-way, various land use features, possible constraints, and potential routing alternatives (if any). The aerial photographs that appear in Section 3.0 of this report were obtained from Google Earth and presented in accordance with Google's attribution requirements. Copyright attribution text and the Google logo appear on each of those images.

Alternative routing options were evaluated relative to distance to existing structures (residences, schools, churches, and hospitals) and the crossing of wooded areas, agricultural lands, parkland, wetlands, waters, US Navy property, and other state or federal lands. Specifically, the information that appears in Tables 3-1 through 3-7 was collected and tabulated for those portions of the existing SMECO right-of-way that occur within an area of congestion and for each alternative route considered to avoid that area of congestion.

The significance of each of the criteria in the tables, with respect to the evaluation of alternative routes, is explained here in terms of constraints and opportunities.

Use of existing right-of-way and new right-of-way required. Because the existing SMECO right-of-way has a 69 kV transmission line on it and is cleared and maintained, the use of existing right-of-way is normally an opportunity to be pursued. Environmentally, it is the option of least impact. From the public's point of view, those who live and work nearby are aware of the presence of overhead lines. While placing new and larger structures in the existing right-of-way will have a visual impact, the number of structures in the right-of-way will decrease due to the longer spans. A constraint in using existing right-of-way occurs where the line is in a very congested area. Larger and taller structures have a greater visual impact and could pose engineering challenges.

Parallel of existing right-of-way. This refers to road and utilities rights-of way. An opportunity arises if the use of existing rights-of-way owned by others would minimize the visual and environmental impacts of a new transmission line. The new line would be in a corridor already dedicated to utility use or along a road in a highly developed area. Constraints occur if there is not sufficient room in the right-of-way for another overhead transmission line or if placement along a road or highway poses the possibility of a forced relocation for highway widening in the future.

Overhead length and underground length. Whether a line is installed overhead or underground, length speaks primarily to costs and the opportunity lies with the shorter length. The longer an alterative route is the higher the costs, in general. However, the length of an alternative route can also be proportional to its impact on the environment if tree or habitat clearing is required or if waterways are crossed. Thus, the greater length of an alternative is a constraint on its use.

Number of major angles 30º and greater. This has mostly to do with costs as major angle structures have construction costs in the range of 50% to 70% higher than for tangent structures. An additional constraint is the area needed to construct a major angle structure because guy wires are needed. The need for guy wires may require that part of a planted field or private property can no longer be used. The opportunity lies with the least number of angled structures.

Residence, schools, churches, and hospitals within 200 feet (61 meters). The opportunity lies with avoiding inhabited structures as much as possible. Therefore, the fewer of them close to the right-of-way, the lower the visual impact, as well as the impact from construction and maintenance activities. Routing new lines close to these structures poses a constraint to be avoided.

Agricultural land, woodlands crossed, parkland crossed. The use of agricultural and woodlands for new transmission lines can pose an opportunity or a constraint depending the on the monetary and aesthetic value of the land to be used. Since commercial tree farms or common cropland may continue operation adjacent to the right-of-way, they can be an attractive alternative to an existing right-of-way in a congested area. However, natural forests and high-quality farmlands are of limited supply and pose a greater cost of acquisition, both financial and environmental. This is the major constraint.

U. S. Navy property crossed. The use of the US Naval Recreation Center near Solomons poses more of an opportunity than a constraint. The land already houses SMECO's 69 kV transmission line and is completely cleared and developed. Preliminary discussions with Navy personnel indicate that the new line could be built there with little or no impact on the general public nearby and only minor disruption of activities on the property itself.

Each alternative needs to be investigated relative to existing and future land use impacts, right-of-way availability, access roads for construction and maintenance, constructability, cost, and additional environmental impacts resulting from establishing a new right-of-way on such features as wetlands, river and stream crossings, woodland clearing and woodlot fragmentation, protected species (threatened and endangered plant and animal species), cultural resources (historic and prehistoric sites, districts and features), and aesthetic (visual) impacts from the proposed transmission line. These same criteria will also be used to further investigate the option of using existing SMECO right-of-way for the proposed transmission line.

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3.0 Alternative Routes and Sites

Eight potential areas of congestion have been identified by SMECO and Black & Veatch along the existing 69 kV transmission line right-of-way. Black & Veatch environmental and transmission line routing specialists performed a preliminary survey of potential alternative routing options at these congested areas. The areas of land use congestion have been identified as follows for alternative routing options, along the existing 69 kV right-of-way and are discussed in the following sections:

- Holland Cliff Shores Subdivision.
- Intersection of the existing SMECO transmission line right-of-way and proposed PEPCO 500 kV transmission lines.
- Whispering Woods Subdivision.
- Broomes Island Road Crossing.
- St. Leonard Shores Subdivision and White Sands Subdivision.
- Dowell Road area just north of Solomons, Maryland.
- State Route 4 area and the crossings of the Patuxent River and Town Creek at Solomons.
- St. Mary's and San Souci area in the vicinity of State Route 235 and the Hewitt Road Switching Station.

3.1 Holland Cliff Shores

Holland Cliff Shores is a small subdivision that is located immediately south of SMECO's existing Holland Cliff Switching Station. The subdivision consists of several single family residences interspersed throughout a wooded area. The main east-west road through the subdivision is Holland Drive. There is one primary north-south road that basically follows and, at times, shares the existing SMECO 69 kV transmission line right-of-way. To the north of Holland Drive, this road is named Power Line Drive. To the south of Holland Drive, the road is named Hidden Hill Drive. The existing 69 kV transmission line is within approximately 200 feet (61 meters) of 13 single family residences, most of which face the existing right-of-way and have their driveway access off of Power Line Drive and Hidden Hill Drive. Rebuilding the existing line to the new 230 kV facility within the existing right-of-way will not place the new line any closer to these or any other residences. It will not require the purchase of any additional land, nor will it cross any active agricultural lands. Some minor selective clearing along the right-of-way edges may be necessary to remove trees with limbs that would be close to the new overhead lines, but traditional clearing measures will not be required.

Two alternative routing options have been identified to route the proposed transmission line around the center of the subdivision. Alternative Route A is located to the west, while Alternative Route B is located to the east.

Alternative A exits the site of the existing Holland Cliff Switching Station to the southwest for a short distance before turning to the southeast. The route remains in a ravine and wooded area for its entire length before returning back to the existing SMECO right-of-way south of the subdivision (Figure 3-1A). The alternative routing would place the new transmission line within approximately 200 feet (61 meters) of seven residences. The primary benefit of this alternative routing is that the new line would be located to the rear of most of these residences instead of in the front yards as is the case with the existing 69 kV line. The alternative measures approximately 0.9 miles (1.4 kilometers) in length whereas the existing 69 kV transmission line right-of-way measure 0.8 miles (1.3 kilometers) in length. However, it will require the acquisition of new right-of-way, three major angle structures will be needed to construct the new 230 kV transmission line along this route, about 11 acres (4.5 hectares) of woodland will have to be cleared, and structures that might be located in a ravine to accommodate required span lengths will be taller than normal to achieve required clearances. But any low lying area identified as a wetland will be avoided for new pole placement if at all possible. If not possible, a wetland delineation will be performed and the required permits obtained, and mitigative measures taken. No threatened or endangered species or their habitats are in this immediate area.

Alternative B provides a routing option to the east of the Holland Cliff Shores Subdivision. It exits the site of the proposed Holland Cliff Switching Station to the southeast, passing between two single family residences on Robinson Road. It continues to the southeast into a large wooded area before turning due south. It passes several residences along Robinson Road before turning back to the southwest to interconnect with the existing SMECO 69 kV transmission line right-of-way (Figure 3-1B). The routing option is located within 200 feet (61 meters) of nine single family residences, passing between and behind these homes. The alternative is about 1.5 miles (2.4 kilometers in length, while SMECO’s original route is 1.3 miles (2.1 kilometers) in length. This option will require 1.5 miles (2.4 kilometers) of new right-of-way, three major angle structures to accommodate the new line along this route and the clearing of approximately 17 acres (6.9 hectares) of woodland.

Table 3-1 provides an initial comparative resource inventory of the two alternative routes as compared to using the existing SMECO right-of-way. If an alternative routing is selected, the impacts associated with using the existing right-of-way are basically shifted to other residents in the area. Alternative A does offer the small advantage of placing the proposed transmission line to the rear of the existing residences. Complete clearing of the new right-of-way along either route will be required, resulting in greater environmental impacts. In addition, project costs will increase due to the need to purchase new right-of-way for either alternative and add at least three major angle structures.

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Figure 3-1A
Holland Cliff Shores – Alternate A

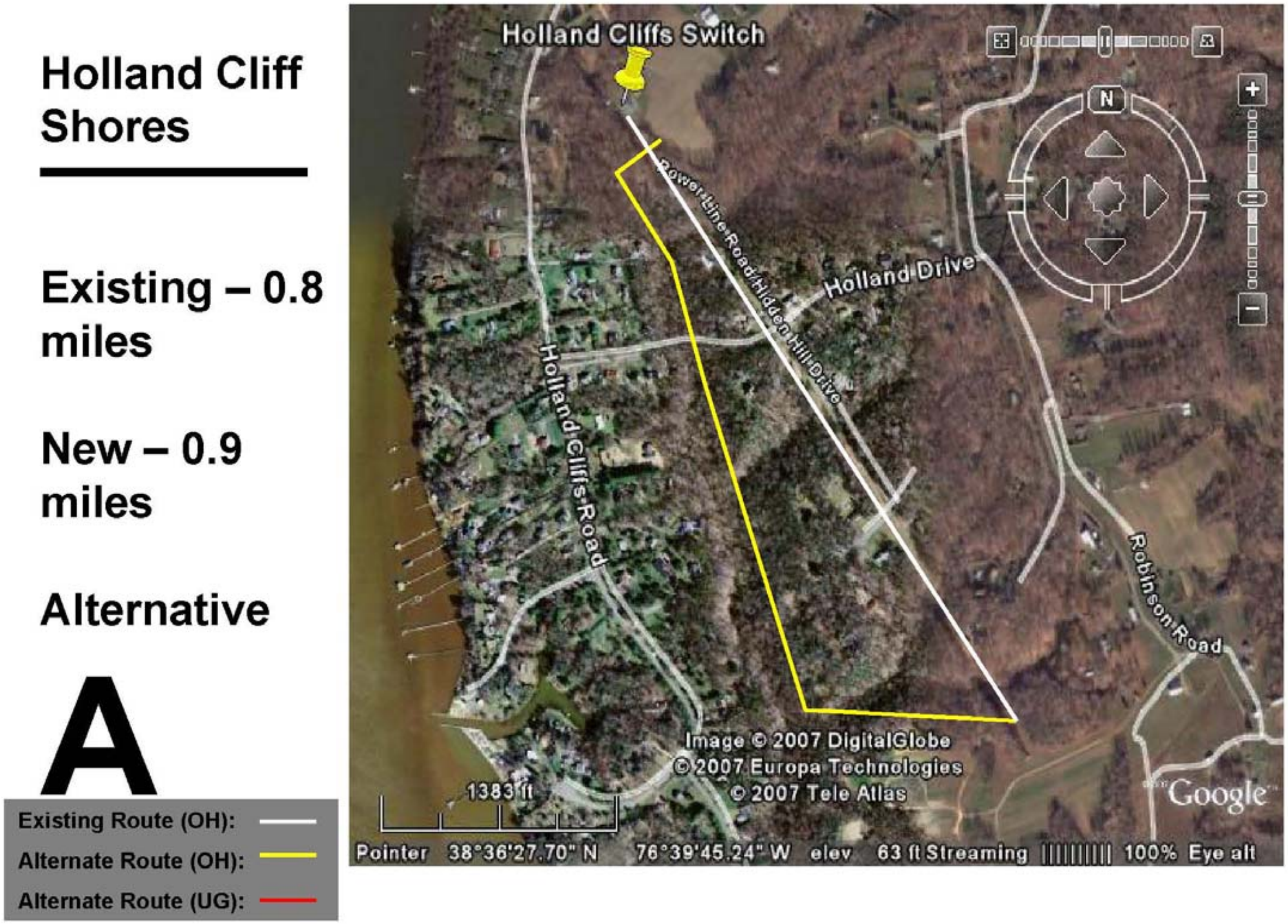

Figure 3-1B
Holland Cliff Shores – Alternate B

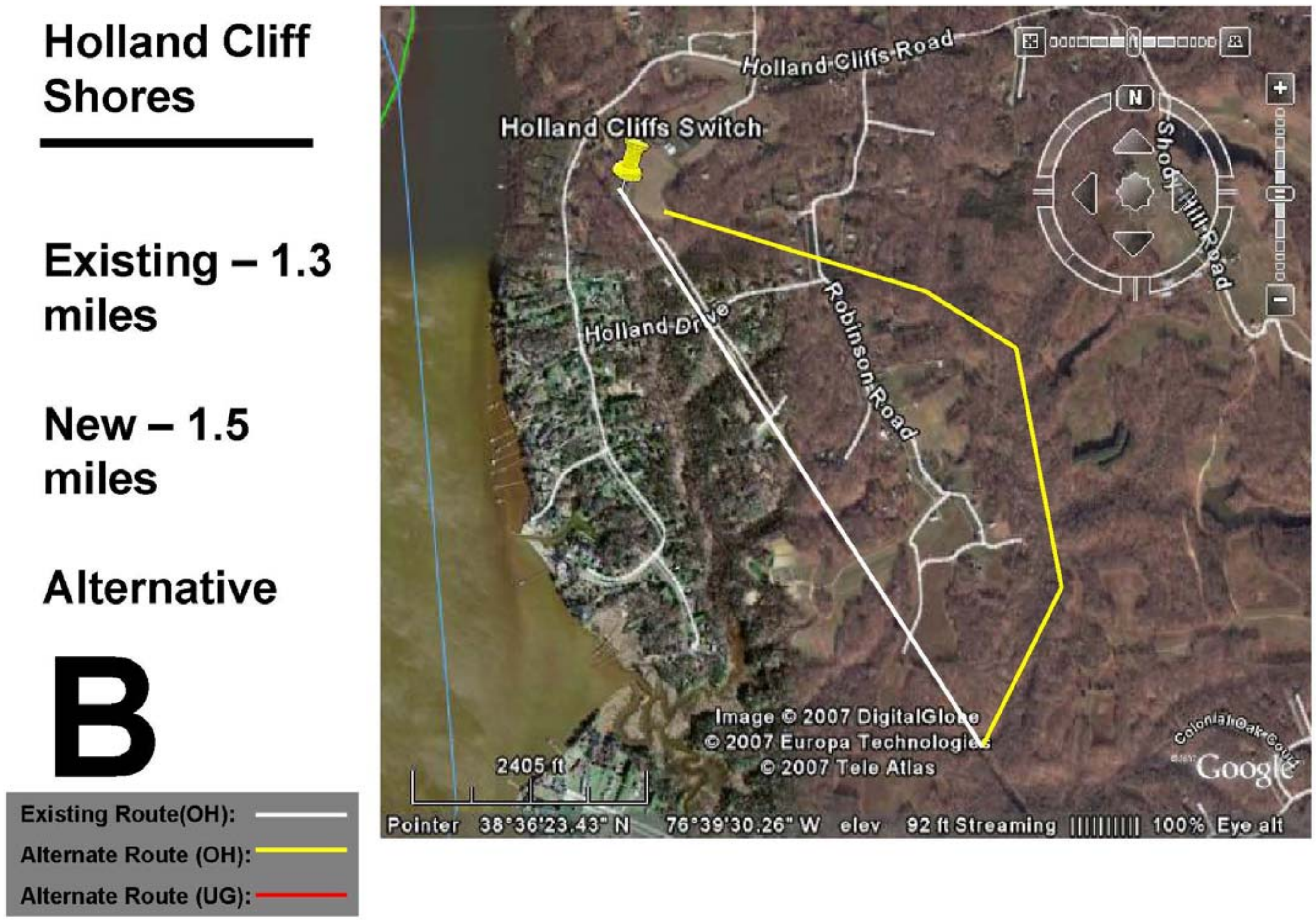

Table 3-1 Holland Cliff Shores Alternative Routes

	Existing ROW	Alternative A	Existing ROW	Alternative B
Length	0.8 miles	0.9 miles	1.3 miles	1.5 miles
Use of Existing ROW	0.8 miles	0 miles	1.3 miles	0 miles
New ROW Required	0 miles	0.9 miles	0 miles	1.5 miles
Parallel of Existing ROW	0 miles	0 miles	0 miles	0 miles
Overhead Length	0.8 miles	0.9 miles	1.3 miles	1.5 miles
Underground Length	0 miles	0 miles	0 miles	0 miles
Number of Major Angles (30º)	0	3	0	3
Residences Within 200 Feet	13	7	13	9
Schools Within 200 Feet	0	0	0	0
Churches Within 200 Feet	0	0	0	0
Hospitals Within 200 Feet	0	0	0	0
Agricultural Land Crossed	0 miles	0 miles	0.2 miles	0 miles
Woodlands Crossed	0 miles	0.9 miles	0 miles	1.4 miles
Parkland Crossed	0 miles	0 miles	0 miles	0 miles
US Navy Property Crossed	0 miles	0 miles	0 miles	0 miles
Creeks/Waters of US/Wetlands/USACE	0.01 mile	0.2 mile	0.01 mile	0.4 mile
Coastal Barriers	0 miles	0 miles	0 miles	0 miles
Federal lands	0 miles	0 miles	0 miles	0 miles

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3.2 PEPCO 500 kV Crossing

Approximately 0.8 miles (1.3 kilometers) south of the city of Prince Frederick, Maryland, and just south of Secretariat Drive, the existing SMECO 69 kV transmission line is crossed by a PEPCO 500 kV transmission line. The 500 kV line crosses over the 69 kV line and then parallels the SMECO line for roughly 0.7 miles (1.1 kilometers) on the east side before turning away from the SMECO right-of-way (Figure 3-2). The line is one of three 500 kV transmission lines emanating from the Calvert Cliffs Nuclear Station. PEPCO plans to add another 500 kV line out of Calvert Cliffs. This line will parallel its existing 500 kV line where it parallels the SMECO right-of-way. As such, SMECO may have to relocate its existing right-of-way, and the proposed new 230 kV transmission line, to the southwest. If relocation is necessary, it will be immediately adjacent to and southwest of SMECO's existing right-of-way.

Several single family residences and small farms are located on German Chapel Road and Hilendale Way. At present, the closest residence to the southwest is more than 700 feet (213 meters) from the edge of the existing SMECO and PEPCO rights-of-way. As such, there is adequate space for SMECO to relocate its right-of-way to allow PEPCO to parallel its existing 500 kV transmission line with a second line. As the entire 0.7 miles (1.1 kilometers) is wooded, expanding the existing right-of-way in the area should not visually impact the residences and farms on German Chapel Road and Hilendale Way. However, any new right-of-way will require clearing of all large woody vegetation. A small pond will have to be crossed, but no agricultural lands will be crossed by the relocated right-of-way. But due to the needed relocation to accommodate the PEPCO 500 kV line, the land clearing and associated impacts would happen regardless of the proposed project.

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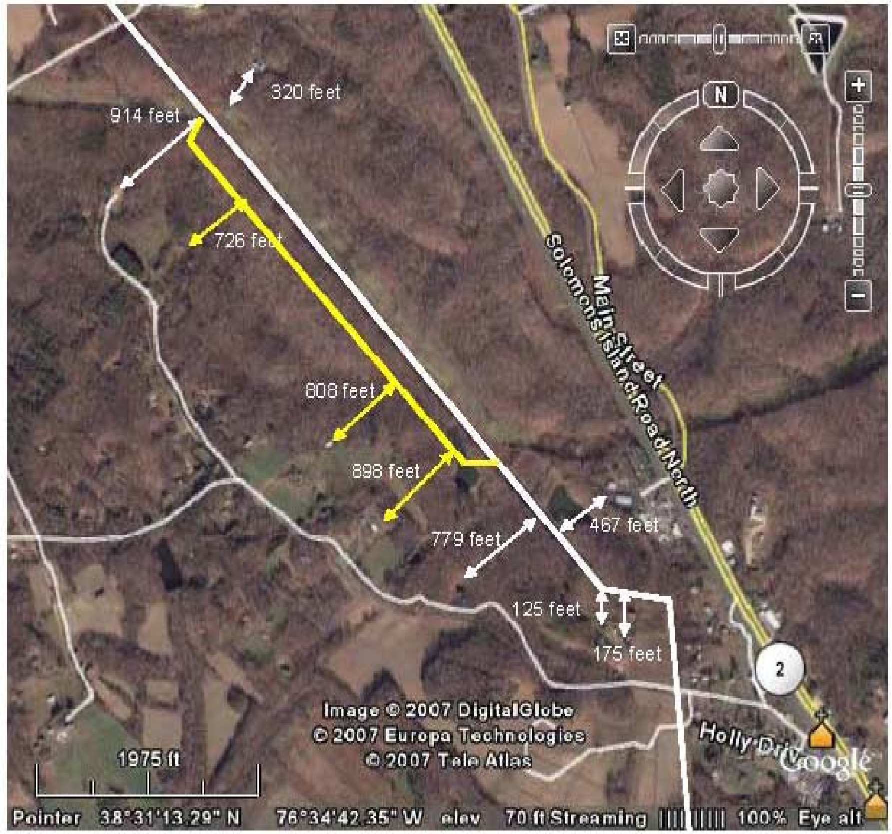
Figure 3-2
Pepco 500 kV Crossing

PEPCO 500 kV Crossing

Distances to Nearby Structures

Distances measured on Google Earth.



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

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3.3 Whispering Woods

Approximately 3.5 miles (5.6 kilometers) south of the city of Prince Frederick, the original alignment of the 69 kV transmission line passed through the center of the Whispering Woods subdivision, crossing the two primary streets in the subdivision, Whispering Drive and Sequoia Way. Some years ago, SMECO relocated its existing 69 kV transmission line to the western edge of the subdivision in response to political pressure from a major landowner in this area. Currently, the existing 69 kV transmission line parallels a gas pipeline and passes through the far western portions of the subdivision. The right-of-way no longer crosses the two subdivision streets, but does cross a long driveway that serves three single family residences. As such, the alignment passes between several residences, with three to the north and three to the south of the line. In total, the existing route passes within 200 feet (61 meters) of 12 single family residences.

Three alternative routing options have been identified for the area. One, Alternative A, removes the transmission line right-of-way altogether from the subdivision, while Alternatives B and C pass through other areas of the subdivision. Alternative A will require new right-of-way, while Alternatives B and C will use a portion of SMECO's original and abandoned right-of-way as it approaches Whispering Woods before requiring new right-of-way.

Alternative A starts at an angle point along the right-of-way and extends south for approximately 1,200 feet (366 meters) before turning east to return to the existing SMECO right-of-way (Figure 3-3A). This location places the routing option to the south of the Whispering Woods subdivision in a wooded area. The alignment is to the rear of homes in the subdivision, with the closest being approximately 300 feet (91.4 meters) away. This alternative has only one residence within 200 feet (61 meters), with a dense wooded area separating this residence from the alternative alignment. Alternative A measures approximately 0.9 miles (1.4 kilometers) as compared to the existing SMECO right-of-way at 0.7 miles (1.1 kilometers). Two major angles will be required with this alternative as compared to one if the existing right-of-way is used. Roughly 10 acres (4.0 hectares) of woodland clearing will be required for this alternative route.

Alternative B makes use of a portion of SMECO's original cleared right-of-way as it approaches the Whispering Woods subdivision. This right-of-way was abandoned due to political opposition when the existing 69 kV line was relocated to parallel the natural gas pipeline. There is reason to believe that the use of the original right-of-way may no longer meet with opposition. Alternative B uses the original right-of-way for approximately 3,400 feet (1,036.3 meters) before turning to the east (Figure 3-3B). It then crosses a wooded area north of the subdivision before turning to the southeast to cross Whispering Drive between two residences. Once past the residences, it turns south through another wooded area to return to SMECO's existing right-of-way. In this area, the alternative is to the rear of residences located on Sequoia Way and Blackberry Lane. Seven single family residences are within 200 feet (61 meters) of the routing option as compared to 12 along the existing right-of-way. The routing option is shorter 1.5 miles (2.4 kilometers) than the existing SMECO right-of-way 1.6 miles (2.6 kilometers) but will require 0.8 miles (1.3 kilometers) of new right-of-way. Four major angles will be required and approximately 10 acres (4 hectares) of woodland will have to be cleared to accommodate the new transmission line.

Alternative C follows a similar path as Alternative B. It makes use of the original SMECO right-of-way and turns east at the same point as Alternative B. However, it extends farther to the east, crossing Whispering Drive near Abigail Court and between two residences. Once east of Whispering Drive, this alternative turns to the southeast for a short distance before turning south to intersect with the existing SMECO right-of-way (Figure 3-3C). The alignment is to the rear of several homes on Abigail Court and Blackberry Lane. It passes within 200 feet (61 meters) of 10 single family residences. The routing option is located in wooded areas, but does cross a small parcel of active agricultural lands. Its length is approximately 1.7 miles (2.7 kilometers), while the existing SMECO right-of-way is 1.6 miles (2.6 kilometers). This alternative will require 1.1 miles (1.8 kilometers) of new right-of-way, six new major angle structures, and the clearing of about 12 acres (4.9 hectares) of area woodlands. The alignment would also place the new transmission line much closer to Maryland State Route 2/4 625 feet (190 meters), thereby increasing the potential for visual impacts to passing motorists.

Of the three alternative routing options identified, only Alternative A offers some potential. It reduces the number of residences within 200 feet (61 meters) from 12 to one, it only requires one additional major angle structure, and the amount of woodland clearing is similar to the other alternatives. Alternatives B and C propose to use former SMECO right-of-way that was relinquished to the property owner when the 69 kV transmission line was relocated to the west to parallel the natural gas pipeline. It is unlikely that the landowner would allow for a reuse of the right-of-way on his 500-acre (202 hectares) parcel, especially since there are preliminary plans to develop this property. Project costs will likely increase with any of the alternative routings because of the need to acquire new right-of-way and add new and expensive angle structures. Table 3-2 provides an initial resource inventory that compares the three alternatives to the existing SMECO right-of-way.

Figure 3-3A
Whispering Woods – Alternate A

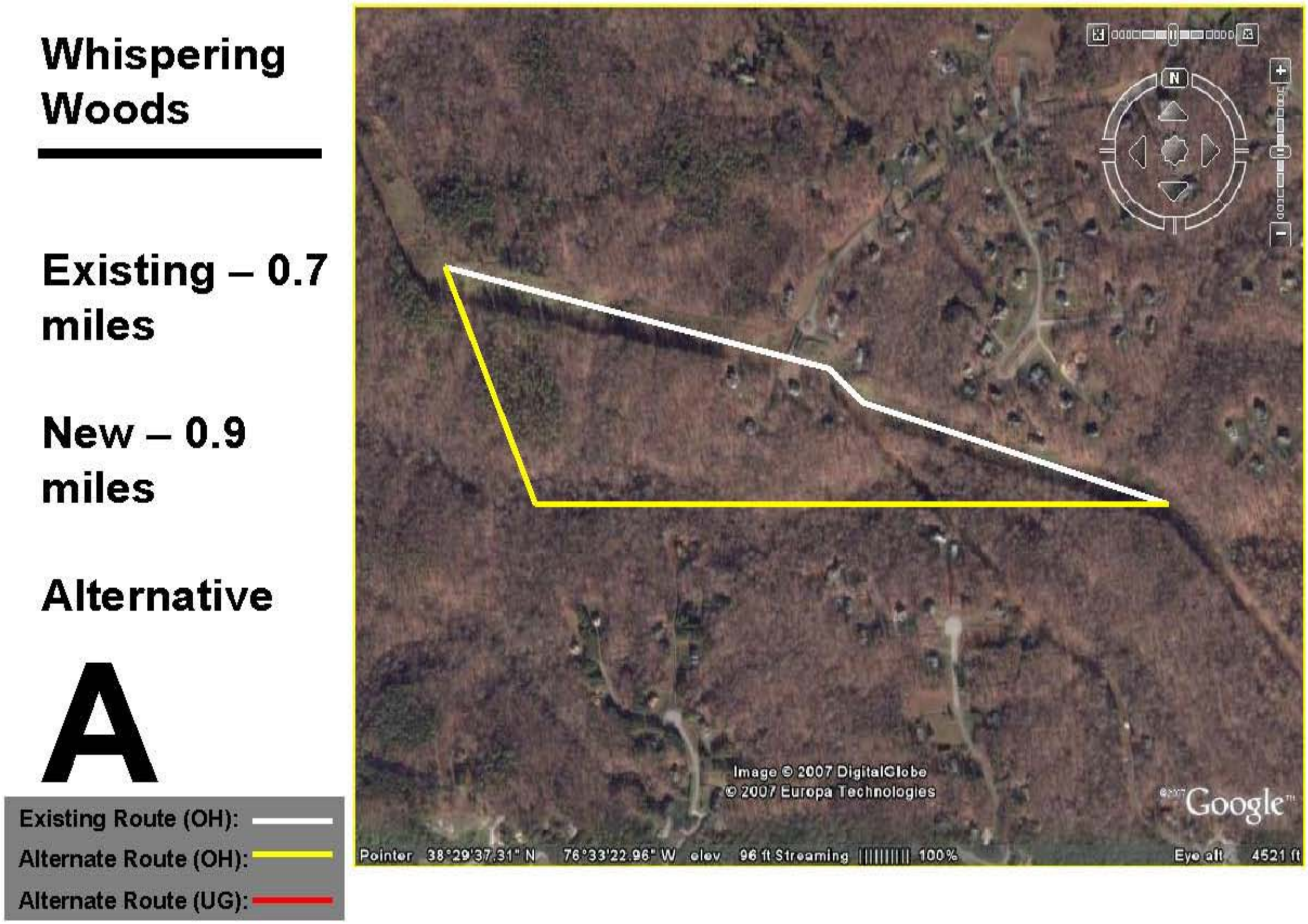


Figure 3-3B
Whispering Woods – Alternate B

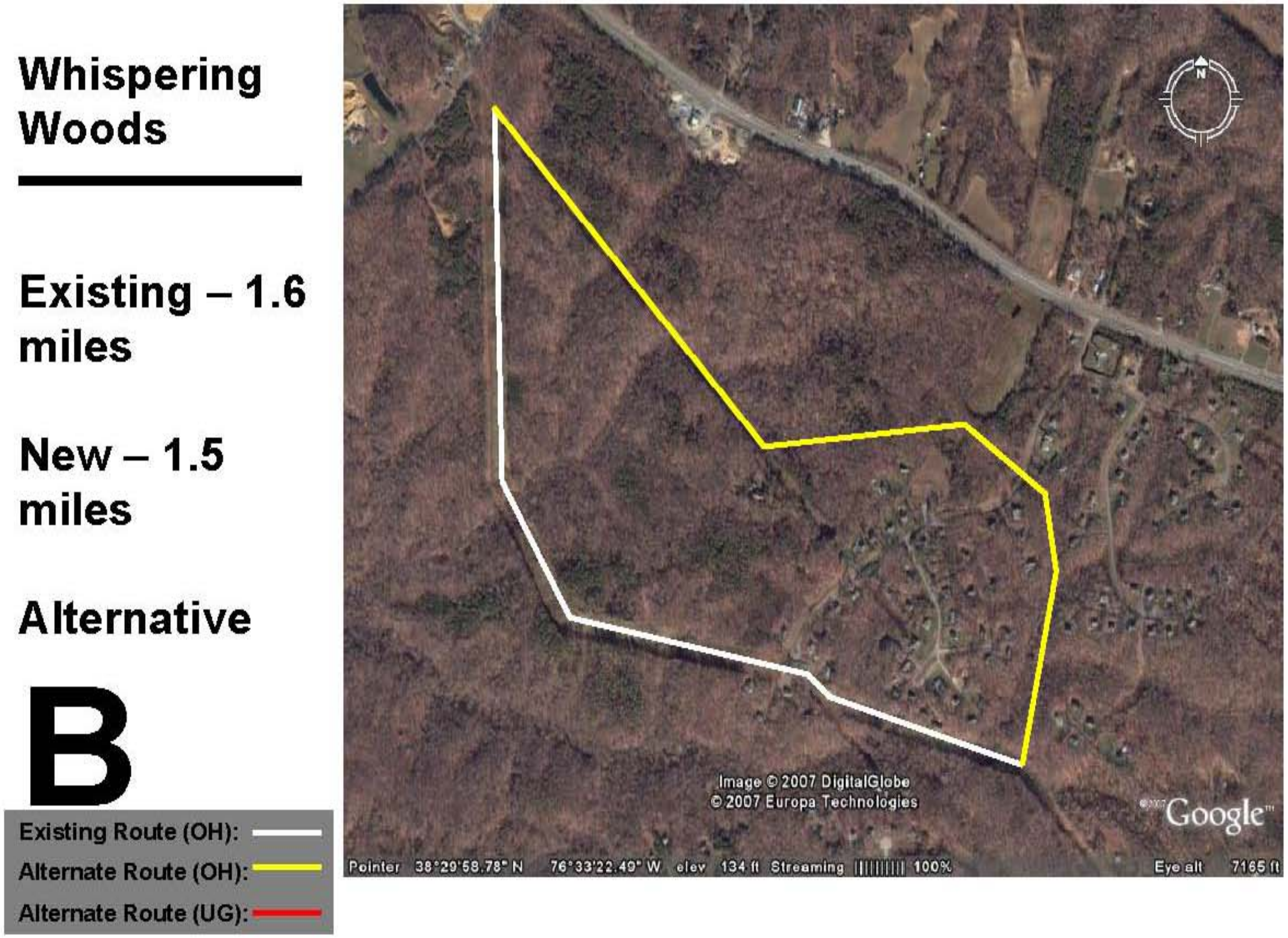


Figure 3-3C
Whispering Woods – Alternate C

Whispering Woods

Existing – 1.6 miles

New – 1.7 miles

Alternative

C

Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

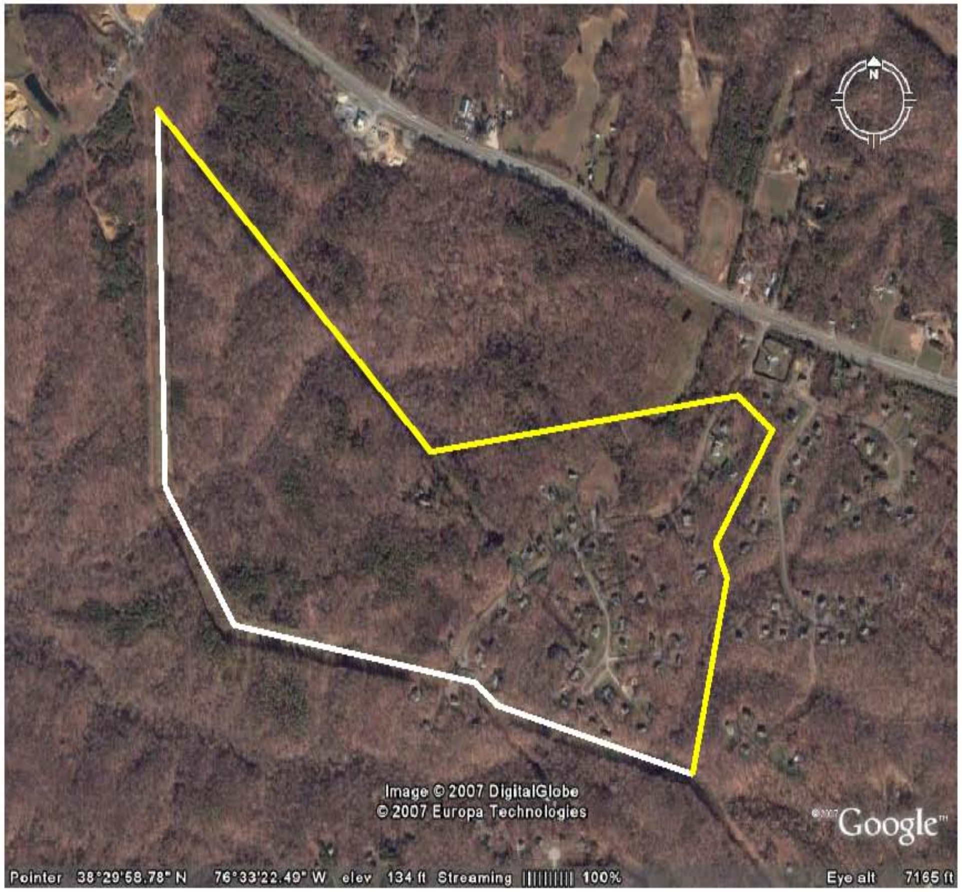


Table 3-2 Whispering Woods Alternative Routes

	Existing ROW	Alternative A	Existing ROW	Alternative B	Alternative C
Length	0.7 miles	0.9 miles	1.6 miles	1.5 miles	1.7 miles
Use of Existing ROW	0.7 miles	0 mile	1.6 miles	0.7 miles	0.6 miles
New ROW Required	0 mile	0.9 miles	0 mile	0.8 miles	1.1 miles
Parallel of Existing ROW	0 mile	0 mile	0 mile	0 mile	0 mile
Overhead Length	0.7 miles	0.9 miles	1.6 miles	1.5 miles	1.7 miles
Underground Length	0 mile	0 mile	0 mile	0 mile	0 mile
Number of Major Angles (30º)	1	2	3	4	6
Residences Within 200 Feet	12	1	12	7	10
Schools Within 200 Feet	0 mile	0 mile	0 mile	0 mile	0 mile
Churches Within 200 Feet	0 mile	0 mile	0 mile	0 mile	0 mile
Hospitals Within 200 Feet	0 mile	0 mile	0 mile	0 mile	0 mile
Agricultural Land Crossed	0 mile	0 mile	0 mile	0 mile	0 mile
Woodlands Crossed	0 mile	0.8 miles	0 mile	0.8 miles	0 mile
Parkland Crossed	0 mile	0 mile	0 mile	0 mile	0 mile
US Navy Property Crossed	0 mile	0 mile	0 mile	0 mile	0 mile
Creeks/Waters of US/Wetlands/USACE	0.1 mile	0.2 mile	0.1 mile	0.3 mile	0.3 mile
Coastal Barriers	0 mile	0 mile	0 mile	0 mile	0 mile
Federal lands	0 mile	0 mile	0 mile	0 mile	0 mile

3.4 Broomes Island Road Crossing

SMECO identified the Broomes Island Road (Maryland State Route 264) crossing as an area that should be investigated for possible alternative alignments. The existing SMECO right-of-way was relocated to the north some years ago to avoid several outbuildings on private property on the west side of the road. The landowner continues to express concerns about the proximity of the existing 69 kV line and may express more concern about any upgrades that increase the voltage levels in the existing right-of-way or the height of the transmission line structures. Though a landowner concern about existing structures is not necessarily a sufficient reason for relocating them, the installation of new structures provide an opportunity to revisit the issue. Once past the residence and outbuildings, the existing line turns to the south and crosses Cloverdale Road, which serves as the driveway to the residence on the property. On the same property along its frontage with Broome's Island Road, an angle structure turns the existing line back to the southeast to continue down SMECO's existing right-of-way. The angle structure that facilitates this turn is approximately 720 feet (220 meters) in front of the residence.

Two possible alternative routing options were identified for this area of concern. Both remove the transmission line from the front of the property on the west side of the road. Alternative A starts about 0.5 miles (0.8 kilometers) northwest of and behind the residence near Sequoia Way (in the Whispering Woods subdivision). It angles more to the south-southeast than the SMECO right-of-way to a point about 1,600 feet (488 meters) northwest of Broome's Island Road. It then passes through a coniferous woodlot and some agriculture land before crossing Broome's Island Road about 325 feet (99.1 meters) south of the existing crossing (Figure 3-4A). It then continues to the southeast and ties back into the SMECO existing right-of-way at the Mutual Substation. This routing option measures approximately 0.9 miles (1.4 kilometers), the same as the existing route. However, this will be all new right-of-way. It reduces the need for three major angles in the existing alignment, requires the clearing of more than six acres (2.4 hectares) of deciduous and coniferous woodlots west of Broome's Island Road, and still has portions of the alternate route on the private property in question. While the existing route has four single family residences with 200 feet (61 meters), this alternate alignment places five residences within 200 feet (61 meters). A similar amount of agriculture land is crossed by this optional route and the existing right-of-way.

A second routing option was identified that just removed the existing line from the front of the private property (Alternative B). The option starts about 680 feet (207 meters) east of the residence at an existing angle in the route. Instead of turning to the south along the existing right-of-way, the option proceeds to the southeast, crosses

Broome's Island Road in an open agricultural area, and continues into a coniferous woodlot, where it turns to the south-southwest to eventually intersect with SMECO's existing right-of-way at the Mutual Substation (Figure 3-4B). The length of the option, 0.3 miles (0.5 kilometers), is the same as the existing route. It too will require two major angles and will need 0.3 miles (0.5 kilometers) of new right-of-way. An additional 1.2 acres (0.5 hectares) of pine woodlot will have to be cleared for this routing option. The option will cross slightly less active agricultural land than the existing route, reducing somewhat the impact to agricultural operations on the farm across Broomes Island Road from the private property in question. However, the upgraded 230 kV transmission line will still be in proximity to the residence and outbuildings.

Table 3-3 provides an initial comparison of the two alternate routes with the existing SMECO right-of-way.

Figure 3-4A
Broomes Island Road Crossing – Alternate A

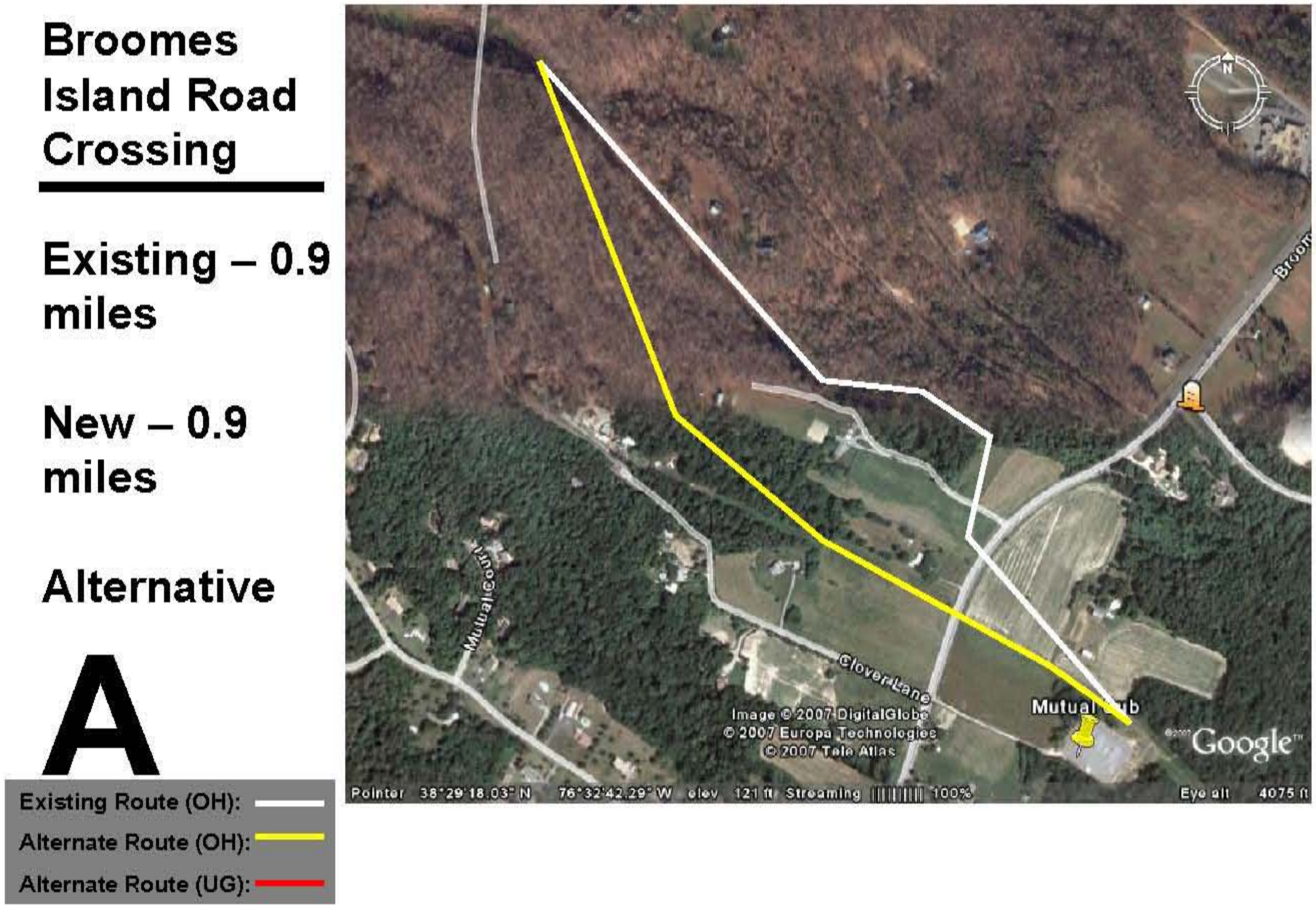


Figure 3-4B
Broomes Island Road Crossing - Alternate B

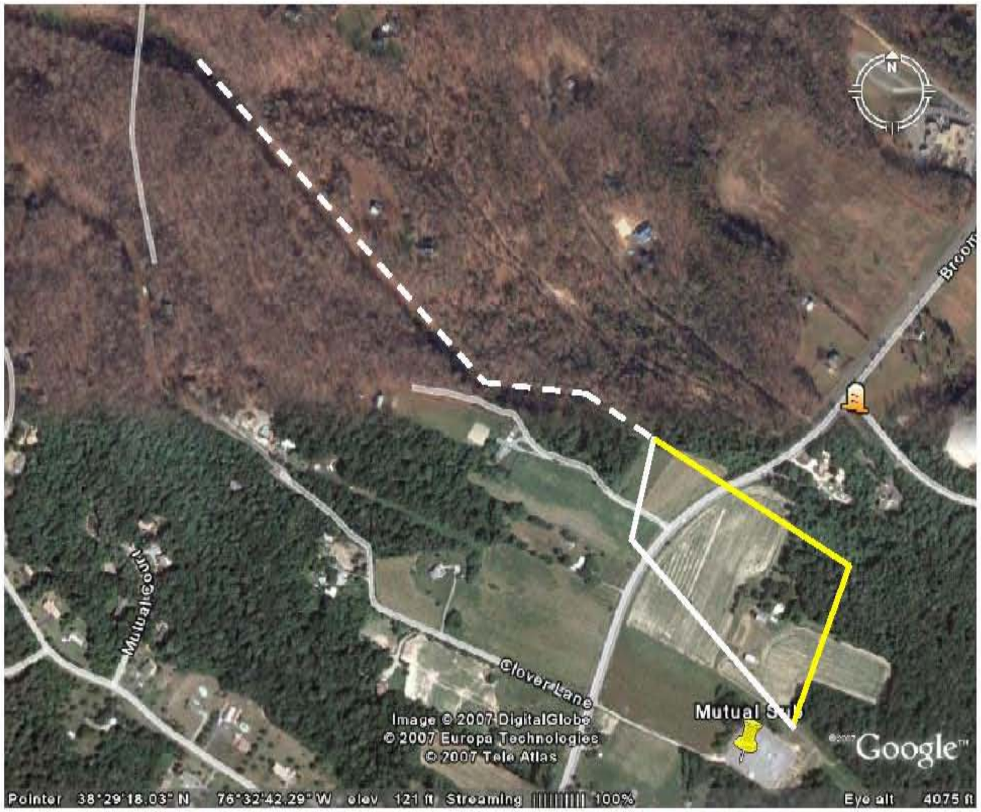
Broomes Island Road Crossing

Existing – 0.3 miles

New – 0.3 miles

Alternative

B



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Table 3-3 Broomes Island Road Crossing Alternative Routes

	Existing ROW	Alternative A	Existing ROW	Alternative B
Length	0.9 miles	0.9 miles	0.3 miles	0.3 miles
Use of Existing ROW	0.9 miles	0 miles	0.3 miles	0 miles
New ROW Required	0 miles	0.9 miles	0 miles	0.3 miles
Parallel of Existing ROW	0 miles	0 miles	0 miles	0 miles
Overhead Length	0.9 miles	0.9 miles	0.3 miles	0.3 miles
Underground Length	0 miles	0 miles	0 miles	0 miles
Number of Major Angles (30º)	3	0	2	2
Residences Within 200 Feet	4	5	2	1
Schools Within 200 Feet	0	0	0	0
Churches Within 200 Feet	0	0	0	0
Hospitals Within 200 Feet	0	0	0	0
Agricultural Land Crossed	0.3 miles	0.3 miles	0.3 miles	0.2 miles
Woodlands Crossed	0 miles	0.5 miles	0 miles	0.1 miles
Parkland Crossed	0 miles	0 miles	0 miles	0 miles
US Navy Property Crossed	0 miles	0 miles	0 miles	0 miles
Creeks/Waters of US/Wetlands/USACE	0.1 mile	0 mile	0 mile	0 mile
Coastal Barriers	0 miles	0 miles	0 miles	0 miles
Federal lands	0 miles	0 miles	0 miles	0 miles

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3.5 St. Leonard Shores/White Sands

About one mile south of the small community of St. Leonard, two subdivisions are crossed by SMECO's existing 69 kV transmission line. The two are separated by St. Leonard Creek, with St. Leonard Shores to the north and White Sands to the south. Both developments are heavily wooded, with residential densities greater in White Sands. The existing transmission line right-of-way basically splits the two subdivisions. In White Sands, two subdivision streets parallel and at times share the SMECO right-of-way. They are identified as Power Drive and Field Road. Some 70 single family residences are within 200 feet (61 meters) of the existing transmission line in White Sands. While no residences in either subdivision will require removal or be physically impacted by the proposed 230 kV transmission line upgrade, some 96 occupied residences will be within 200 feet (61 meters) of the project.

Three alternative routing options were identified for this area. Two (Alternatives A and B) basically bypass these two subdivisions, while the third (Alternative C) maintains the existing SMECO right-of-way through the St. Leonard Shores subdivision but relocates the existing right-of-way to a different area of the White Sands subdivision.

Approximately 540 feet (165 meters) south of the existing tap to the St. Leonard Substation, Alternative A commences. It turns south away from the existing right-of-way and extends in a southerly direction for about 1.2 miles (1.9 kilometers) between Rawlings Road and Parran Road (Figure 3-5A). Just before the alignment crosses Parran Road, it emerges from a wooded area to cross about 1,300 feet (396 meters) of active agricultural lands. At a point about 1,500 feet (457 meters) south of the Parran Road crossing, the alternative turns to the south-southeast and traverses another large wooded area for about one mile before more agricultural lands are crossed. An unnamed private road that serves as access to single family residences and surrounding farmland is crossed by the alternative about 0.4 miles (0.6 kilometers) northwest of Mackall Road (SR 265). Approximately 540 feet (165 meters) of cropland is crossed on either side of this private road.

Once past the private road crossing, the alternative turns more to the southeast for about 1.2 miles (1.9 kilometers), passing through several small woodlots and two small cultivated fields to a point on the east side of St. Leonard Creek. This portion of the alternative crosses two small private roads off of Garrity Road that serve residences on St. Leonard Creek. The crossing of St. Leonard Creek occurs at a narrow point just south of the confluence with John's Creek. The crossing measures approximately 1,000 feet (305 meters) in width as compared to the existing crossing of roughly 430 feet (131 meters). On the east side of the creek, land coverage is a mix of cultivated fields and riparian woodlots, while the west side of the creek is heavily wooded. Once across St.

Leonard Creek, the alternative extends for about 1.5 miles (2.4 kilometers) through a wooded area to return to the existing SMECO right-of-way near the small community of Lusby.

Alternative A completely avoids both the St. Leonard Shores subdivision and the White Sands subdivision. It measures approximately 5.1 miles (8.2 kilometers) in length, all of which will require new right-of-way. It is located near the Dominion gas pipeline route. The existing SMECO right-of-way through the two subdivisions is about 4.4 miles (7.1 kilometers) in length. This alternative reduces the number of occupied residences within 200 feet (61 meters) from roughly 96 along the existing route to 10 along the alternative option. It will cross 0.5 miles (0.8 kilometers) of previously undisturbed agricultural lands as compared to 0.3 miles (0.5 kilometers) along the existing SMECO right-of-way. It should be noted that some of the small cultivated fields crossed by this alternative may be able to be spanned by the new 230 kV transmission line. Furthermore, approximately every other existing wood pole structure in the existing right-of-way will be removed when the transmission line upgrade is completed if the existing right-of-way is used. In some instance, existing wood poles may be removed from cultivated fields and the fields will be spanned by the new line. About 84 percent 4.3 miles (6.9 kilometers) of the alternative is located in wooded areas. While this will offer the potential for seasonal screening, it will also require the clearing of approximately 52 acres (21 hectares) of woodland to accommodate the new 230 kV transmission line. No clearing will required if the existing right-of-way is used, though an occasional danger tree may require removal. The new alignment will require two major angles, similar to the existing route.

Because of the increased distance 1,000 feet (305 meters) to cross St. Leonard Creek, larger and taller structures will be required on each side of the creek to accommodate such a crossing while maintaining required clearances for sailboats that frequent the creek. These structures will be substantially taller than the estimated heights of tangent structures for the new 230 kV line.

The alignment for Alternative B starts at a point about 725 feet (221 meters) south of the crossing of Bond Street in the St. Leonard Shores subdivision. At this point, the alternative turns east for 0.6 miles (1.0 kilometers), crossing a tributary to St. Leonard Creek and an extension of St. Leonard Road (Figure 3-5B). It then parallels Solomons Island Road (SR2/4) for approximately one-quarter mile before turning south again to avoid area residences. It drops south for about 1,500 feet (457 meters), crossing Walnut Cove Road, before again turning to the southeast. It then crosses Tidehead Way, Saw Mill Road, Solomons Island Road South (SR 2/4), and Calvert Cliffs Parkway, which is the main entrance to the Calvert Cliffs Nuclear Station. At the intersection of Tidehead

Way and Saw Mill Road, the alternative passes through an old sawmill yard. The routing option extends for approximately 1.1 miles (1.8 kilometers) in this southeasterly direction, passing through mostly wooded areas. It crosses SR 2/4 on an angle, with fairly dense woods on either side of the highway.

At a point just south of the Calvert Cliffs Parkway crossing, the alternative turns more to the south-southeast. It crosses cultivated fields on either side of the original Calvert Cliffs Nuclear Plant Road and continues south-southeast for another mile before intersecting with SMECO's Calvert Cliffs transmission line tap. Along this one-mile segment, the alternative crosses about 1,300 feet (396 meters) of cultivated cropland. The remainder of this routing segment occurs in wooded areas.

At the intersection with the existing transmission line, the alternative turns back to the southwest and extends some 0.9 miles (1.4 kilometers) back to SMECO's existing right-of-way near the small community of Lusby. Along this segment, the alternative parallels SMECO's existing 69 kV transmission line, but will require clearing along the entire length for the new proposed 230 kV transmission line. A minor reduction in cleared acres is possible, depending upon final design and clearance requirements with the existing line.

Like Alternative A, this alternative avoids most of the St. Leonard Shores subdivision and all of the White Sands subdivision. It measures about 4.1 (6.6 kilometers) miles in length, while the existing right-of-way is 3.3 miles (5.3 kilometers) long. Alternative B will also require all new right-of-way, though there may be a small reduction with required width where it parallels the existing line coming from Calvert Cliffs. This alternative places about 13 occupied residences within 200 feet (61 meters) of the alignment, whereas 86 residences are within 200 feet (61 meters) of the existing SMECO right-of-way. It will cross 0.3 miles (0.5 kilometers) of previously undisturbed agricultural lands and the commercial/industrial/construction storage yard on Saw Mill Road. About 85 percent of its length 3.5 miles (5.6 kilometers) will require woodland clearing 42 acres (17 hectares).

Alternative B will avoid any crossings of navigable portions of St. Leonard Creek. Given its two crossings in wetland areas near SR 2/4, it is unlikely that conductor clearances will have to contend with tall sailboat traffic. However, this routing option does parallel and eventually require two crossings of Solomons Island Road South (SR2/4), which is not viable. The short parallel segment will be visible to passing motorists. While the first crossing of the highway is at an angle and in a wooded area, the industrial appearance of the quadruple circuit 230/69 kV transmission line will present a visual disruption to the wooded landscape along the highway. The second crossing near the community of Lusby will be at an existing transmission line crossing.

To some degree, the visual disruption at the existing highway crossing has already occurred.

Alternatives A and B attempt to avoid most, it not all, of the St. Leonard Shores and White Sands subdivisions. Alternative C is a possible routing option for just the White Sands subdivision. This alternative starts at a point about 700 feet (213 meters) southeast of the existing transmission line's crossing of St. Leonard Creek (Figure 3-5C). In a low wet area, the alignment turns to the east and works its way between homes built at the end of cul-de-sacs in White Sands. The option follows Planters Wharf Creek east through this natural drainage. The wooded hillsides offer some potential to screen portions of the new line along this route segment. The alternative extends east approximately 0.9 miles (1.4 kilometers) before crossing Pine Boulevard in the White Sands subdivision. After crossing Pine Boulevard, the alternative makes a slight deflection to the northeast to avoid existing residences. It then crosses Solomons Island Road South (SR 2/4) and Nursery Road between residential and commercial structures and the Calvary Bible Church. At a point about 1,500 feet (457 meters) southeast of the SR 2/4 crossing, the alternative turns more to the south-southeast and traverses 0.9 miles (1.4 kilometers) of woodland before intersecting with SMECO's Calvert Cliffs tap. It then follows and parallels this existing right-of-way for approximately 0.4 miles (0.6 kilometers) back to the existing SMECO right-of-way near the community of Lusby.

Alternative C measures 2.7 miles (4.3 kilometers) in length, while SMECO's existing right-of-way is 2.2 miles (3.5 kilometers). All of the routing option will require new right-of-way acquisition, though a short portion near Lusby can be less than 100 feet (30.5 meters) in width where it parallels an existing transmission line. The existing right-of-way has approximately 70 single family residences within 200 feet (61 meters). This alternative will place 24 residences within 200 feet (61 meters) of the routing option, most within the White Sands subdivision. In effect, the visual impacts of the new line will be shifted to other White Sands residents while the existing line will be removed. Alternative C will not cross any agricultural lands, but will impact roughly 32 acres (15 hectares) of area woodlands that will require clearing for the new right-of-way. As with Alternative B, this option also has two crossing of the SR 2/4. The first crossing is at a somewhat developed residential/commercial area, while the second crossing occurs near Lusby when the option parallels an existing transmission line across the highway.

For all three alternative considered, the number of occupied residences within 200 feet (61 meters) is substantially reduced along each alternative alignment. Any impacts associated with transmission line construction and operations are shifted to other residents that currently do not experience such impacts. In addition, each alternative requires a significant amount of woodland clearing. The potential for forest fragmentation and impacts to area wildlife are distinct possibilities with each of these alternatives. Table 3-4 summarizes and compares primary features of each of the alternatives to SMECO's existing right-of-way.

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Figure 3-5A
St. Leonard Shores/White Sands - Alternate A

St. Leonard Shores/White Sands

Existing – 4.4 miles

New – 5.1 miles

Alternative

A

Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Figure 3-5B
St. Leonard Shores/White Sands - Alternate B

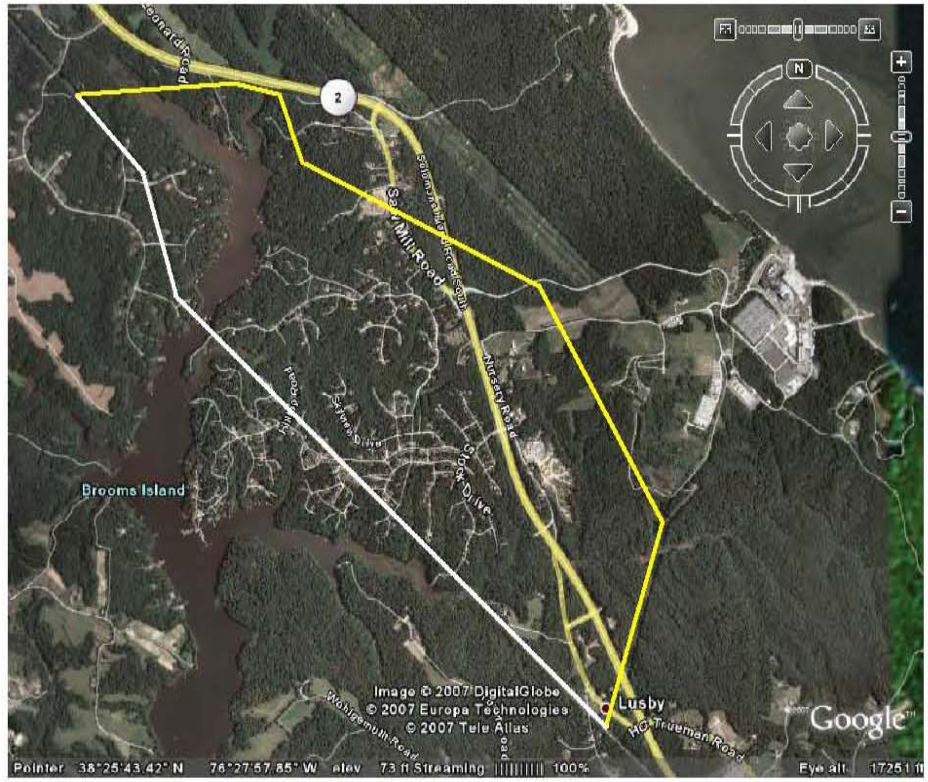
St. Leonard Shores/White Sands

Existing – 3.3 miles

New – 4.1 miles

Alternative

B



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Figure 3-5C
White Sands - Alternate C

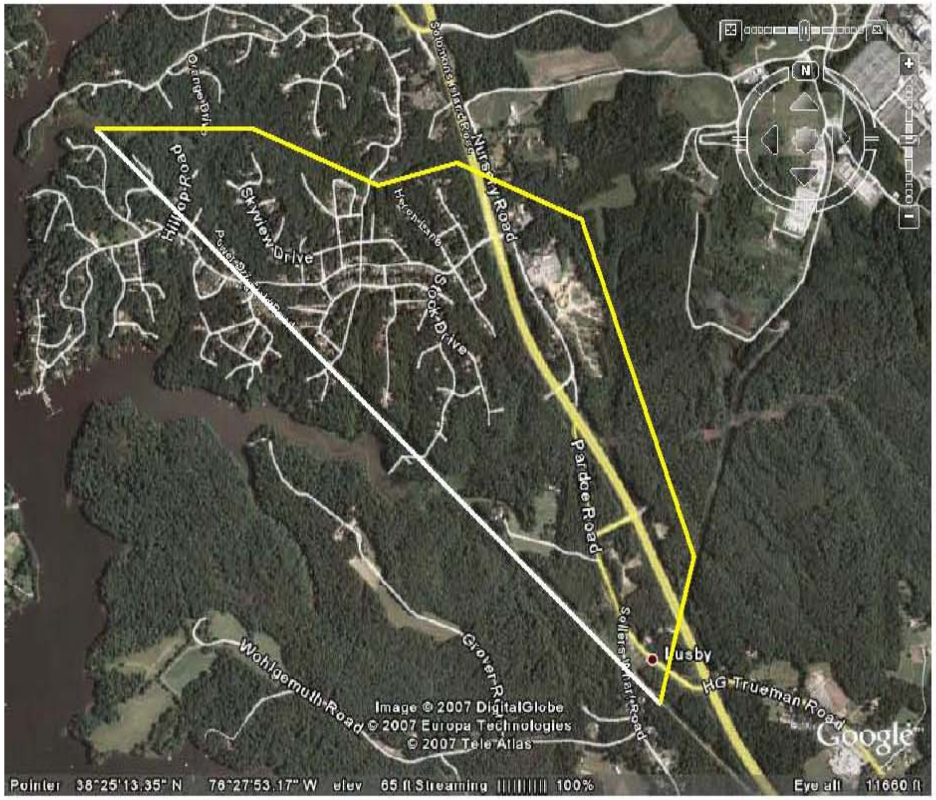
White Sands

Existing – 2.2 miles

New – 2.7 miles

Alternative

C



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Table 3-4 St. Leonard Shores/White Sands Alternative Routes

	Existing ROW	Alternative A	Existing ROW	Alternative B	Existing ROW	Alternative C
Length	4.4 miles	5.1 miles	3.3 miles	4.1 miles	2.2 miles	2.7 miles
Use of Existing ROW	4.4 miles	0 mile	3.3 miles	0 mile	2.2 miles	0 mile
New ROW Required	0 mile	5.1 miles	0 mile	4.1 miles	0 mile	2.7 miles
Parallel of Existing ROW	0 mile	0 mile	0 mile	1.0 mile	0 mile	0.4 miles
Overhead Length	4.4 miles	5.1 miles	3.3 miles	4.1 miles	2.2 miles	2.7 miles
Underground Length	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile
Number of Major Angles (30º)	2	2	2	5	0	6
Residences Within 200 Feet	96	10	86	13	70	24
Schools Within 200 Feet	0	0	0	0	0	0
Churches Within 200 Feet	0	0	0	0	0	1
Hospitals Within 200 Feet	0	0	0	0	0	0
Agricultural Land Crossed	0.3 miles	0.5 miles	0 mile	0.3 miles	0 mile	0 mile
Woodlands Crossed	0 mile	4.3 miles	0 mile	3.5 miles	0 mile	2.6 miles
Parkland Crossed	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile
US Navy Property Crossed	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile
Creeks/Waters of US/Wetlands/USACE	0.4 mile	0.3 mile	0.4 mile	0.6 mile	0.2 mile	1.2 miles
Coastal Barriers	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile
Federal lands	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile

3.6 Dowell Road

The Dowell Road area is located about one mile north of the community of Solomons, Maryland. SMECO's existing Solomons 69 kV Substation is located on the southeast corner of Dowell Road and Newtown Road about 1,000 feet (305 meters) east of Solomons Island Road South (SR 2/4). The area supports a variety of commercial activity and multi-family dwellings in addition to the U. S. Navy Recreation Center, while Solomons has become a popular weekend getaway location for people from the Baltimore and Washington, D.C. areas. On the east side of SR 2/4, SMECO's existing 69 kV transmission line crosses Dowell Road and parallels Newtown Road for some 1,500 feet (457 meters) before the road meanders beneath the existing line. The existing right-of-way width in this area is 150 feet (45.7 meters), with the existing 69kV line located 35 feet (10.7 meters) from the east edge of the right-of-way. The 69 kV line then crosses SR 2/4 at the intersection with Newtown Road.

Along Newtown Road, several single family residences are located on the east side of the road, while commercial establishments are located to the west. Newtown Road and the existing transmission line are located behind these commercial facilities, which have their primary customer entrances on H. G. Trueman Road. Trueman Road is basically a service road along the east side of SR 2/4.

Five alternate routing options have been identified for the new 230 kV transmission line upgrade in the Dowell Road area. These are illustrated in Figures 3-6A through 3-6E. Three are for overhead configurations, while two are underground routing options.

Alternative A generally follows the existing SMECO right-of-way for its entire length. It shifts the route slightly to the west, placing it along the back of the existing commercial establishments, moving it about 40 feet (12 meters) to the west of the existing SMECO right-of-way along Newtown Road (Figure 3-6A). Where the existing line crosses over the road and is in the front yard of a single family residence, Alternative A adds two angles to keep the new route to the west of the road and out of the residence's front yard, where the existing line comes as close as 70 feet (21 meters) from the residence itself. In places, the proposed line using this route may overhang existing parking lots of the retail facilities on Trueman Road, though access to and number of parking spaces would not be affected. In fact, under this alternative, the placement of one or two structures within the parking areas might be determined to be necessary in final engineering design. This could cause the loss of a few (less than five) parking spaces. The alternative is the same length as SMECO's existing right-of-way in the area – 0.4 miles (0.6 kilometers). It will require the acquisition of new right-of-way, and the addition of one major angle. Presently, the existing alignment has 10 occupied single family residences with 200 feet (61 meters) of the route. The slight adjustment of this alternative reduces the number of residences within 200 feet (61 meters) to nine.

Alternative B provides an alignment that removes the right-of-way from much of Newtown Road. Furthermore, it assumes that a portion of the new transmission line upgrade being proposed by SMECO will pass through the existing Solomons Substation. Preliminary engineering indicates that only the 69 kV line will go into Solomons Substation and the 230 kV line must bypass it due to space constraints and the fact that the substation contains no equipment capable of handling 230 kV service.

The Alternative B routing exits the Solomons Substation and makes two 90 degree turns in a wooded area south of Dowell Road before turning to the southwest (Figure 3-6B). It then traverses a wooded area before crossing Newtown Road, after which it then follows the same alignment as Alternative A. This routing option basically is the same length as the existing SMECO right-of-way, and will require the acquisition of new right-of-way for its entire length. It will also require three major angle structures. It crosses about 0.3 miles (0.5 kilometers) of wooded land cover and will require the clearing of about four acres (1.6 hectares) of mature trees. It also is in proximity to a nursing home off of Dowell Road. Approximately 8 residences will be within 200 feet (61 meters) of this alternate as compared to 10 along the existing right-of-way.

Alternative C enables any of the new 230 kV on 69 kV circuits to interconnect with the existing Solomons 69 kV Substation. The routing option begins about 500 feet (152.4 meters) north of Dowell Road. At this point, the option turns due south, passing through a small woodlot, the corner of a cultivated field associated with Ann Marie Gardens, crossing over Dowell Road on an angle, and entering another wooded area east of Dowell Road (Figure 3-6C). The alternative then follows the route previously described alignment for Alternative B. This alternative routing option is 0.7 miles (1.1 kilometers) in length as compared to 0.6 miles (1.0 kilometer) for SMECO's existing right-of-way. New right-of-way will have to be acquired for the entire length and two major angle structures will be required. The number of residences within 200 feet (61 meters) will decrease from 10 to eight. This alternative also passes close to the previously identified nursing home on Dowell Road. The route crosses approximately 0.4 miles (0.6 kilometers) of woodlands. Assuming a 100-foot-wide right-of-way, clearing of about five acres (2.0 hectares) will be required for the new right-of-way.

Alternatives D and E represent underground options for the Dowell Road area. Placing two 230 kV circuits and two 69 kV circuits underground will add approximately $10 million to the overall cost of the project, due to underground line installation unit costs that average ten to eleven times those of overhead lines. While it will reduce visual impacts, construction may temporarily disrupt traffic flow, depending on the location of the final route. Furthermore, if the proposed transmission lines are placed underground in this area, it is assumed that underground construction will continue underground to the south to cross the Patuxent River and Town Creek.

Alternative D commences within the existing SMECO right-of-way just outside the Solomons Substation. The routing option transitions to underground construction in the right-of-way and turns northwest, narrowly crossing the corner of a parking lot and a small portion of an athletic field (Figure 3-6D), though these are not considered to be safety issues as neither crossing is in an occupied area. It makes a turn to the southwest as it crosses Trueman Road and SR 2/4. It then parallels and possibly shares SR 2/4 road right-of-way as it proceeds to a point about 400 feet (122 meters) south of the Newtown Road intersection. It is assumed that, from this point on, the project would continue underground until south of the Patuxent River and Town Creek.

The alternative measures approximately 0.6 miles (1.0 kilometer) in length as compared to SMECO's existing right-of-way at 0.5 miles (0.8 kilometers). While new right-of-way will need to be acquired for this alternative, required right-of-way width will be less than what is required for an overhead configuration. This is because design standards allow underground conductors to be closer to one another and there is no lateral conductor movement from wind as there is with overhead conductors. The distance between structures in overhead lines allows for significant lateral motion, all of which must be well within the right-of-way. In addition, some right-of-way sharing may be possible with the Maryland Department of Transportation right-of-way where the alternative parallels SR 2/4.

Directional boring may be a suitable construction method to place the lines beneath the four lanes of SR 2/4 and the two lanes of Trueman Road, thereby eliminating lane closures and traffic disruptions on these major roads. Some traffic impacts, such as slowdowns and the narrowing of traffic lanes are possible if this underground option is able to share highway right-of-way. But emergency maintenance is not an issue as all such work would be done from manholes on either side of the road crossings, away from vehicular traffic. The number of residences within 200 feet (61 meters) of the route is reduced to eight as compared to 10 along the existing right-of-way, with all eight of these residences being located on the west side of SR 2/4. Furthermore, these residences will only be impacted by noise and fugitive dust during construction. Once the lines are placed underground, they will not be visible to residents in this area. Underground construction may also temporarily impact a portion of a retail establishment's parking lot and a small portion of the athletic field (about 200 feet/61 meters). However, once construction is complete and the lines are underground, current land uses can return to normal activity.

Alternative E is a second underground option that places the four proposed transmission lines underground basically within the existing SMECO right-of-way. Where the existing line crosses over Newtown Road, this alternative proposes that new right-of-way be acquired near the back of retail establishments in order to avoid impacting the Newtown Road during construction (Figure 3-6E). The underground alternative then continues down the existing SMECO right-of-way across Trueman Road and SR 2/4 to a point about 400 feet (122 meters) south of the Newtown Road intersection with SR 2/4. Again, a directional boring method may be able to place the transmission lines beneath Trueman Road and SR 2/4 and eliminate traffic disruptions.

Alternative E is a little shorter in length than the existing right-of-way, and will only require about 800 feet (244 meters) of new right-of-way that will have to be acquired. The number of residences within 200 feet (61 meters) remains the same at 10. However, the existing 69 kV line and the new transmission lines will all be underground, thereby reducing the visual impacts to these 10 residences.

Table 3-5 compares preliminary data for each of these overhead and underground alternatives to SMECO's existing right-of-way.

Figure 3-6A
Dowell Road - Alternate A

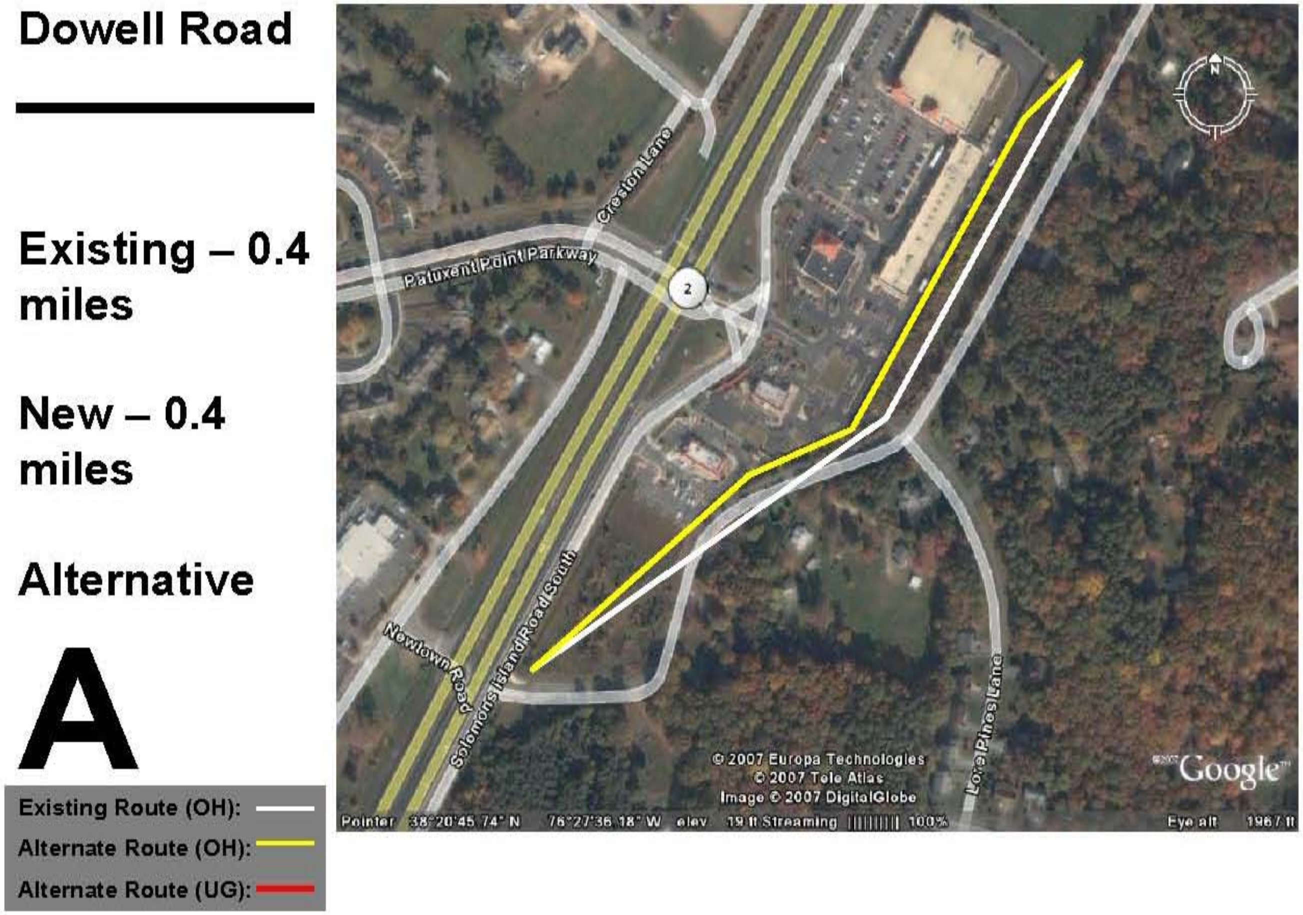


Figure 3-6B
Dowell Road - Alternate B

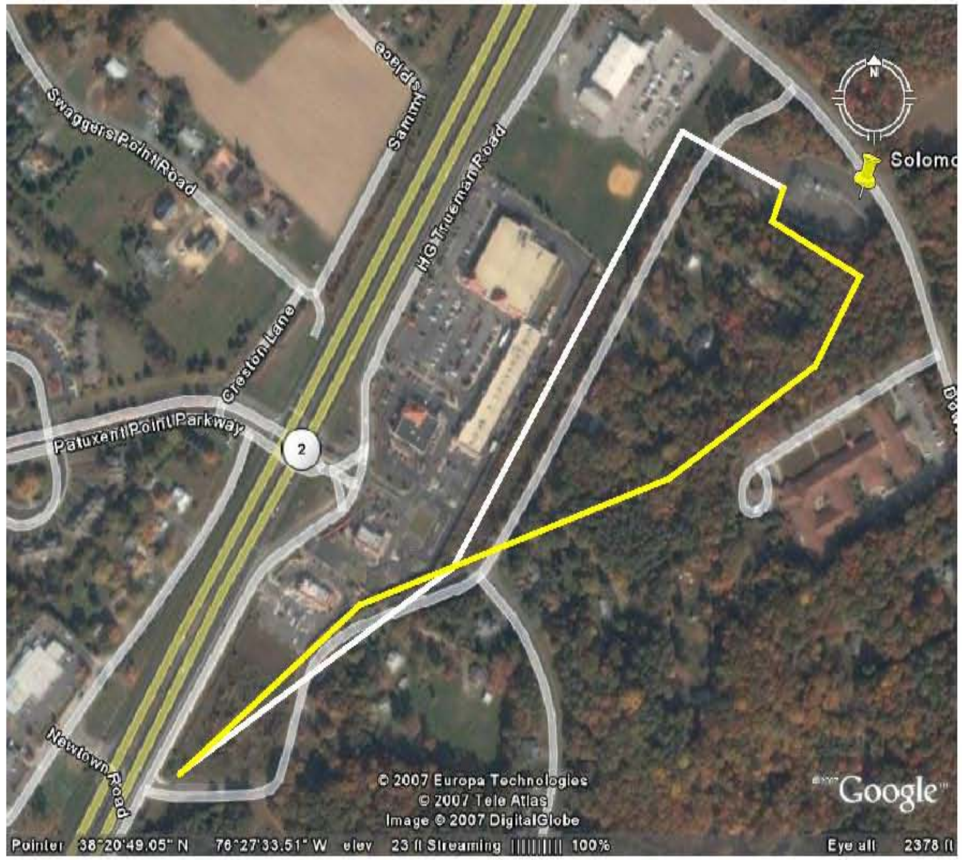
Dowell Road

Existing – 0.5 miles

New – 0.5 miles

Alternative

B



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Figure 3-6C
Dowell Road - Alternate C

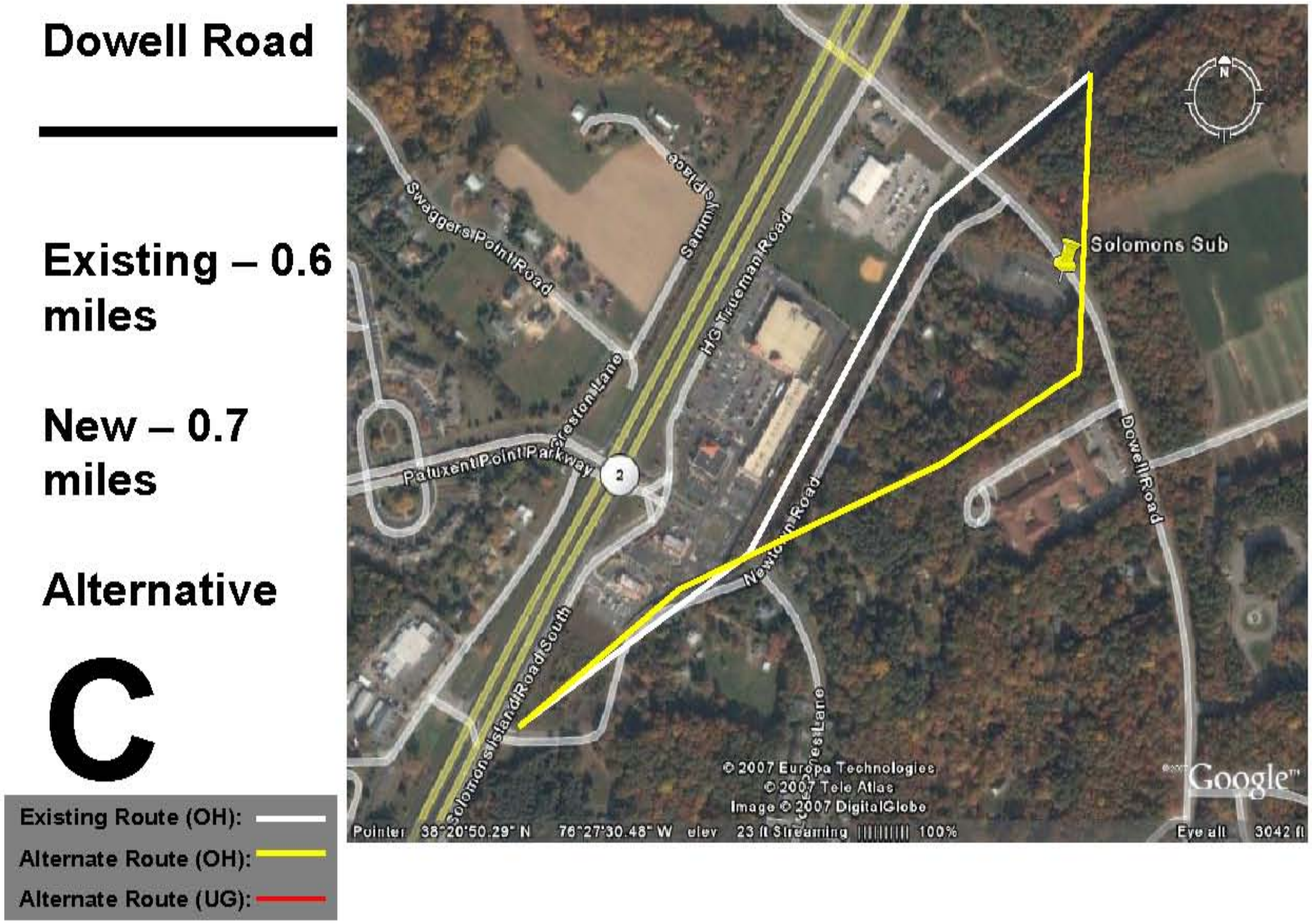


Figure 3-6D
Dowell Road - Alternate D

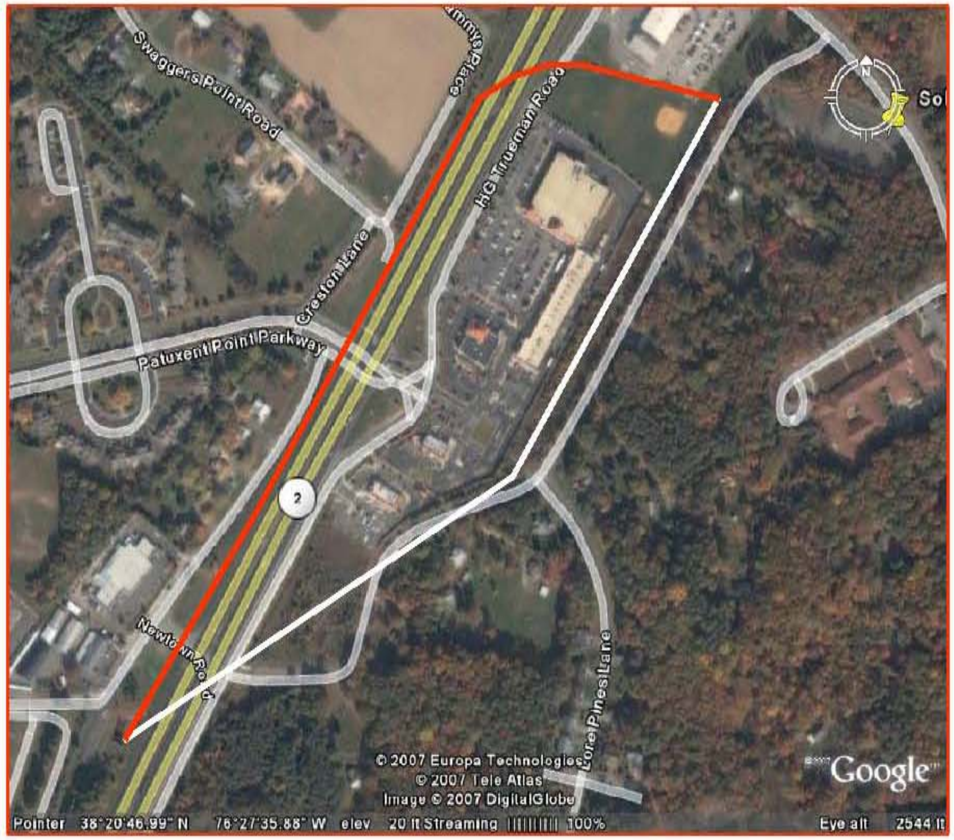
Dowell Road

Existing – 0.5 miles

New – 0.6 miles

Alternative

D



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Figure 3-6E
Dowell Road - Alternate E

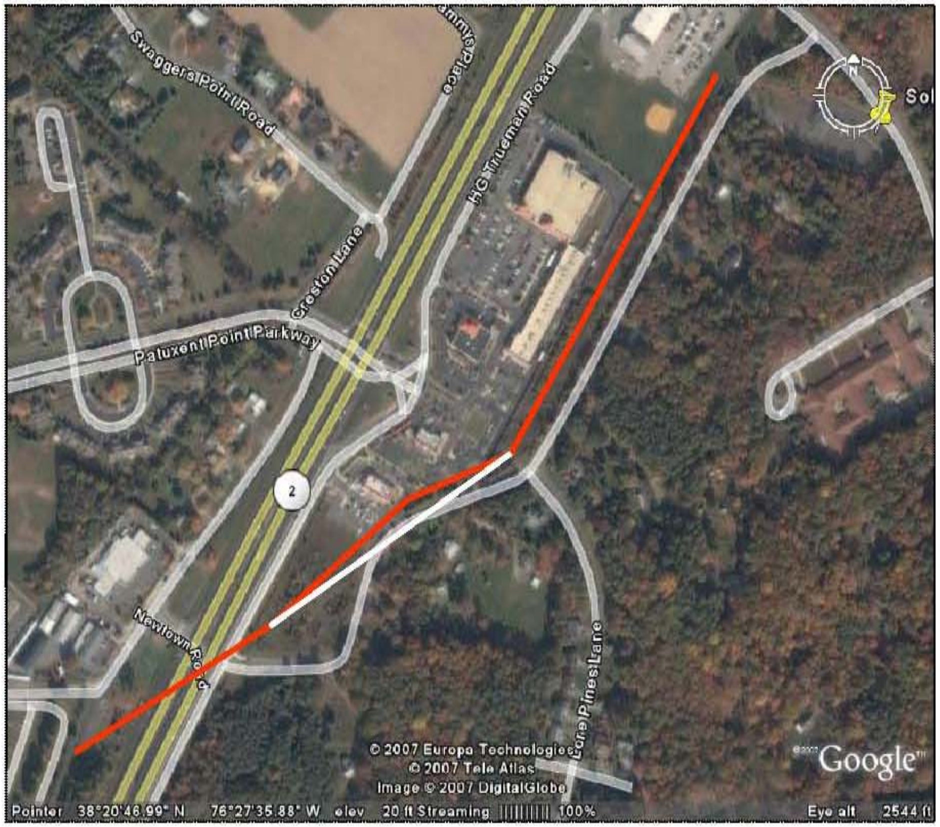
Dowell Road

Existing – 0.6 miles

New – 0.5 miles

Alternative

E



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Table 3-5 Dowell Road Alternative Routes

	Existing ROW	Alternative A	Existing ROW	Alternative B	Existing ROW	Alternative C	Existing ROW	Alternative D*	Existing ROW	Alternative E*
Length	0.4 miles	0.4 miles	0.5 miles	0.5 miles	0.6 miles	0.7 miles	0.5 miles	0.6 miles	0.6 miles	0.5 miles
Use of Existing ROW	0.4 miles	0 mile	0.5 miles	0 mile	0.6 miles	0 mile	0.5 miles	0 mile	0.6 miles	0.4 miles
New ROW Required	0 mile	0.4 miles	0 mile	0.5 miles	0 mile	0.7 miles	0 mile	0.6 miles	0 mile	0.1 miles
Parallel of Existing ROW	0 mile	0.4 miles	0 mile	0.2 miles	0 mile	0.2 miles	0 mile	0.5 miles	0 mile	0.1 miles
Overhead Length	0.4 miles	0.4 miles	0.5 miles	0.5 miles	0.6 miles	0.7 miles	0.5 miles	0 mile	0.6 miles	0 mile
Underground Length	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0.6 miles	0 mile	0.5 miles
Number of Major Angles (30º)	0	1	1	3	0	2	0	NA	0	NA
Residences Within 200 Feet	10	9	10	8	10	8	10	8	10	10
Schools Within 200 Feet	0	0	0	0	0	0	0	0	0	0
Churches Within 200 Feet	0	0	0	0	0	0	0	0	0	0
Hospitals Within 200 Feet	0	0	0	0	0	0	0	0	0	0
Agricultural Land Crossed	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile
Woodlands Crossed	0 mile	0 mile	0 mile	0.3 miles	0 mile	0.4 miles	0 mile	0 mile	0 mile	0 mile
Parkland Crossed	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0.1 miles	0 mile	0 mile
US Navy Property Crossed	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile
Creeks/Waters of US/Wetlands/USACE	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile
Coastal Barriers	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile
Federal lands	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile	0 mile

3.7 State Route 2/4/Patuxent River/Town Creek

SMECO has identified the crossing of the Patuxent River and Town Creek in the vicinity of SR 2/4 at Solomons as an area of concern for the new 230/69 kV transmission line. At present, one existing 69 kV transmission line crosses these two bodies of water with submarine cable laid on the bottom of the river and creek. This crossing takes the line from Calvert County to St. Mary's County. Near the north bank of the Patuxent River, the overhead 69 kV line transitions to a short length of underground cable onshore, then transitions to submarine cable that was jetted into the bottom of the river along the west side of the existing SR 4 highway bridge. It transitions back to underground cable for a short distance on the south bank of the river, crosses Town Creek as a submarine cable jetted into the bottom of the creek, and then transitions back to an underground cable to cross beneath SR 4. East of the SR 4 underground crossing, the existing line resumes its overhead configuration. Preliminary planning indicates that the new 230 kV transmission line will cross the river and creek in one of four ways: 1) as an attachment to a new state highway bridge to be built adjacent to the existing bridge, 2) through the use of submarine cable, 3) by directional boring beneath the bottoms of the river and creek, or 4) an overhead conductor span between large towers on each side of the river channel. The existing 69 kV underground and submarine cable crossing will remain in place to serve as one 69 kV circuit.

Six alternatives were identified for these two areas of concern. Five of the alternatives assume total underground and submarine cable construction (with or without directional boring), while one assumes a combination of underground, submarine cable and overhead construction to accommodate the crossings.

Alternative A is an all-underground/submarine cable routing option. It commences at the intersection of Newtown Road and SR 2/4 within the existing SMECO right-of-way and transitions to an underground configuration on the east side of SR 2/4. It crosses beneath SR 2/4 and continues to the west onto a U.S. Navy recreation facility (formerly the U. S. Naval Surface Weapons Center). It follows Patuxent Drive on Navy property for some 2,500 feet (762 meters) to a point on the east bank of the Patuxent River, where the alternative turns to the southwest and parallels the shoreline for about 4,400 feet (1,341 meters). The underground routing option is located between several residences and naval structures and the river bank. On Point Patience, the alternative makes a slight deflection and crosses beneath Point Patience Drive to a point on the north bank of the Patuxent River (Figure 3-7A). At this location, the transmission line would transition to either an underground directional bore or a submarine cable.

The alternative makes a 4,000-foot (1,220-meter) crossing of the Patuxent River, emerging on the south bank at N. Patuxent Beach Road. SMECO owns a small parcel of land about 400 feet (122 meters) south of the Patuxent River at the intersection of N. Patuxent Beach Road and Clarks Road. It is already cleared, graveled, and fenced and is located favorably for the southern terminus of an under-river directional bore. The plot was originally purchased for the 69 kV line crossing landing, but the crossing was ultimately made at a point further down-river. The directional bore or submarine cable may transition to an underground system at the parcel's location rather than at a site near the south bank of the river in N. Patuxent Beach Road. Using the SMECO property for a transition location would eliminate most traffic disruptions that would be associated with construction in or adjacent to N. Patuxent Beach Road. From the SMECO property, the alternative then proceeds underground to the southwest for approximately 1,700 feet (518 meters), crossing beneath W. Patuxent Beach Road and SR 4 to the location of the existing 69 kV riser structure. At this point, the proposed transmission line would transition back to an overhead configuration.

Alternative A measures approximately 2.6 miles (4.2 kilometers) in length, whereas the existing SMECO right-of-way is approximately 2.5 miles (4.0 kilometers) long. The underground routing option crosses 1.3 miles (2.1 kilometers) of Navy property, and will require 1.8 miles (2.9 kilometers) of new right-of-way. It requires a 0.8-mile crossing of the Patuxent River, but avoids Town Creek. While SMECO's existing 69 kV transmission line, which is a combination of overhead, underground and submarine cable applications, has roughly 30 single family residences within 200 feet (61 meters), Alternative A would have about 80 single and multi-family residences within 200 feet (61 meters). However, as Alternative A is a proposed all-underground application, these residences will only have the potential to be impacted during construction. Once construction is complete, the lines will be underground and no longer be visible to local residents and Navy personnel. An additional benefit, stated in discussions with Navy personnel, is that underground lines are less disruptive to outdoor activities within the recreation facility. Local traffic on Patuxent Drive in the Navy recreation facility may be temporarily impacted by construction activities, as there appears to be inadequate space to place the underground line completely outside of the road surface. Depending upon the construction procedures finally selected by SMECO and approved by the Navy, Patuxent Road could be closed for the duration of construction, the road could be open during construction with only one lane of traffic, or the road would be covered with heavy steel plates at the end of each work day to allow for traffic flow. Construction work would be performed during off-peak times of the year and alternate routes around Patuxent Road are already available within the facility.

Alternative B basically follows the same alignment as Alternative A except that, once on Navy property, it is located in Patuxent Drive to its intersection with B Avenue

(Figure 3-7B). Construction of the underground transmission line would basically impact all of Patuxent Drive (0.9 miles/1.4 kilometers) on the naval facility. At a point south of the B Avenue intersection, it crosses beneath Point Patience Drive and follows the alignment previously described for Alternative A. It has the same length as Alternative A, the same crossing length of the Patuxent River and will require 1.8 miles (2.9 kilometers) of new right-of-way. Because the alternative is located within Patuxent Drive when on Navy property, approximately 97 single, and multi-family residences will be within 200 feet (61 meters) of the route. In addition, there will likely be greater traffic disruptions during construction in Patuxent Drive. However, this alternative removes the underground construction from the east bank of the Patuxent River.

Alternative C is an underground/submarine cable option that uses SMECO's existing right-of-way along the west side of SR 2/4 north of the river (Figure 3-7C). It would then parallel the existing 69 kV submarine cable across the Patuxent River and Town Creek to the existing transition location along the east side of SR 4 in St. Mary's County. The transition from overhead to underground could take place at the existing location north of the Patuxent River. However, for this study, the transition to underground occurs near the intersection of SR 2/4 with Newtown Road well north of the river. The longer underground length will place the new 230 kV transmission line underground along single family residences, a commercial area along the highway and in front of the Solomons Medical Center.

Alternative D is significantly different from the previously described alternative alignments relative to configuration and location. The alternative proposes to use a combination of underground, submarine cable or directional bore, and overhead designs to support the proposed 230 kV transmission line. Alternative D follows the route of Alternative A from the Alternative A transition point on the east side of SR 2/4 through much of the Navy recreation center property. However, at a point about 680 feet (207 meters) southwest of the intersection of Patuxent Drive and B Avenue on Navy property, this alternative commences its crossing of the Patuxent River (Figure 3-7D). The crossing measures about 3,500 feet (1,067 meters) and could be made using submarine cables jetted into the bottom of the river, or by directional boring that would place the transmission lines beneath the bottom of the river. Once on the west bank of the river, this alternative would transition back to an overhead configuration in Myrtle Point Park. It then proceeds in a southwest direction for approximately 2.6 miles (4.2 kilometers), crossing Clearbrook Lane and Lou's Way while paralleling portions of Patuxent Boulevard and SR 4. It terminates at the southwest corner of the intersection of SR 4 and 3 Notch Road (SR 235) at an existing SMECO transmission line.

This alternative measures approximately 4.5 miles (7.2 kilometers) in length. It is roughly 2 miles (3.2 kilometers) longer than the existing SMECO right-of-way and river crossing. The Patuxent River crossing is about the same distance as SMECO's existing submarine cable crossing, but this alternative avoids crossing Town Creek. It utilizes about 1.1 miles (1.8 kilometers) of Navy property and will require the acquisition of new right-of-way for 3.9 miles (6.3 kilometers) of the route. Its total underground/submarine length is 2.0 miles (3.2 kilometers) while its overhead length is 2.5 miles (4.0 kilometers). It will require one major overhead angle at the interconnect point at SR 235.

The alternative will place 60 single and multi-family homes within 200 feet (61 meters) of the route. It will also cross about 0.3 miles (0.5 kilometers) of active agricultural lands, and about 2.0 miles (3.2 kilometers) of woodlands south of the river. This will require the clearing of about 24 acres (9.7 hectares) for the new right-of-way.

While this alternative is feasible and constructible, it can also be expected to cost significantly more than the other identified alternatives, due to its overall length and the acquisition of nearly 4 miles (6.4 kilometers) of new right-of-way. It will also generate more adverse environmental impacts to area residents, land uses and land cover due to the need for tree clearing over a significant portion of the route.

Alternatives E and F are located entirely to the east of SR 2/4 and the existing Governor Thomas Johnson Bridge that carries SR 4 over the Patuxent River. For purposes of this alternatives routing study, it is assumed that the crossing of the Patuxent River for Alternatives E and F could be a submarine cable, a directional bore beneath the river bottom, or as attachments to a new bridge. However, any directional bore or submarine cable east of the existing bridge must consider state plans for the new bridge. The final route must avoid planned footings for the support piers of the new bridge. This assumes the new bridge will be similar in design to the existing bridge.

Alternative E starts at Newtown Road. It transitions to an underground configuration on the north side of the road, crosses beneath Newtown Road, and then parallels Trueman Road (and SR 2/4) on the east right-of-way edge for approximately 1,000 feet (305 meters) (Figure 3-7E). At Lynn Acres Lane, the underground option turns more to the south away from Trueman Road. It passes through a sparsely wooded area and a boat storage yard before crossing Hospitality Drive and Holiday Drive to the rear of several commercial/service establishments. South of Holiday Drive, the routing option is located along the edge of a commercial parking lot and then passes through a cultivated field behind the medical center. It passes through another commercial parking lot before intersecting with Lore Road. At Lore Road, the alternative makes a 90 degree turn to the west and is located in Lore Road to its intersection with Solomons Island Road South (SR 2). It makes another 90 degree turn and runs along the south edge of SR 2 for about 450 feet (137 meters), crossing beneath Island Road, to a point in an agricultural field on the east side of the bridge approach, where the alternative turns to the southwest to cross the Patuxent River. It then parallels the east side of the existing bridge for a 0.6-mile crossing of the river. Once on the south bank in an area named Planters Wharf, it transitions back to an underground line and crosses N. Patuxent Beach Road and Bill Dixon Road. At Town Creek, the alternative reverts back to submarine cable (or a directional bore) on the east side of and parallel to the SR 4 bridge over Town Creek. It continues to parallel SR 4 on the east side to the existing riser structures where it returns to an overhead configuration.

This alternative measures about 2.7 miles (4.3 kilometers) length, or about 0.2 miles (0.3 kilometers) longer than the existing SMECO right-of-way. It will require that 2.1 miles (3.4 kilometers) of new right-of-way be acquired, though this figure could be reduced if the new underground line is able to share right-of-way with some of the local roads. It will place the underground transmission line within 200 feet (61 meters) of approximately 38 single family and multi-family units, several commercial and service establishments, and one medical center. Alternative E is located to the rear of the medical center, but away from emergency room road access. The alignment will also cross about 0.4 miles (0.6 kilometers) of active agricultural lands, and temporarily disrupt commercial activities at the boat storage yard. It will reduce parking spaces in parking lots that it passes through. However, once construction and surface restoration is completed, commercial and parking activities will be able to return to normal. Even if emergency maintenance is required in the future, it will be performed from manholes located outside of the parking areas.

Alternative F maximizes the use of existing public rights-of-way. It proposes to use nearly 3,700 feet (1,128 meters) of Trueman Road from Newtown Road to Lore Road (Figure 3-7F). Once south of the Lore Road intersection, this alternative follows the alignment described above for Alternative E.

This alternative is about 2.6 miles (4.1 kilometers) in length. It will require 2.0 miles (3.2 kilometers) of new right-of-way to be acquired, though use of public road rights-of-way could reduce this distance by almost half. Approximately 34 single and multi-family residential units will be within 200 feet (61 meters) of this alignment. Underground construction for the proposed transmission line will likely require the temporary closure of one lane of traffic on Trueman Road along with the adjoining shoulder. This assumes that existing underground utilities are minimal in Trueman Road and will allow for underground construction. The existence or absence of underground utilities would be confirmed only if Alternative F is selected, over the other alternatives, for further investigation. This routing option also crosses about 0.2 miles (0.3

kilometers) of agricultural land. Like Alternative E, once construction is completed, traffic, access to commercial and service establishment, farming, etc. will return to pre-construction activity levels.

Given the popularity of the Solomons area for tourists and weekend vacationers, all of the previously described alternatives will eliminate any potential visual impacts to this area by placing the proposed 230 kV transmission line completely underground from the Newtown Road area to a point well south of the Governor Thomas Johnson Bridge. Minor traffic disruptions could be expected for very short periods, two to five minutes, when construction equipment crosses the highway (SR 2/4) to be put in position for construction. Table 3-6 provides a summary of initial data to compare the six alternatives to the existing SMECO right-of-way.

A fourth option to cross the Patuxent River is to place the new 230 kV transmission line in an overhead configuration. This will require a span of at least 3,000 to 4,000 feet (1,220 meters) at any of the previously described crossing locations. According to the U. S. Army Corps of Engineers (USACE), an overhead crossing for a 230 kV transmission line must provide a minimum clearance of 26 feet (7.9 meters) above any fixed bridge (existing or planned) across a navigable channel. For the Patuxent River in the Solomons area, the COE states that a fixed bridge must maintain a vertical clearance of at least 140 feet (42.7 meters) above the mean high water mark. Therefore, any overhead 230 kV conductors must provide a clearance of 166 feet (50.6 meters) above the water at maximum sag. As such, structure heights will be well in excess of 300 feet (91.4 meters) on each side of the river. With the Patuxent Naval Air Station to the southeast, it is unlikely that such clearances can be achieved while not posing an obstruction to navigable airspace and flight operations at the Naval Air Station. While an overhead crossing is technically possible, required clearances and structure heights necessary to achieve such clearances make such an option not viable at this location.

Figure 3-7A
State Route 4 / Patuxent River / Town Creek - Alternate A

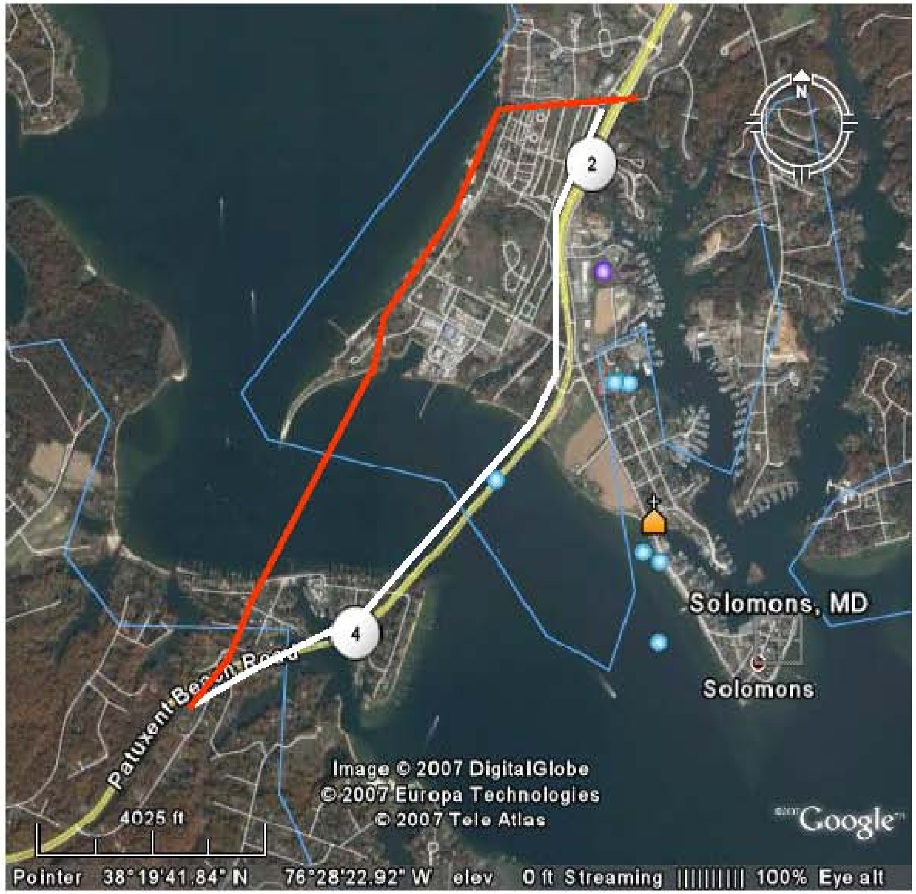
State Route 4 Patuxent River Town Creek

Existing – 2.5 miles

New – 2.6 miles

Alternative

A



Existing Route:
Alternate Route (OH):
Alternate Route (UG):

Figure 3-7B
State Route 4 / Patuxent River / Town Creek - Alternate B

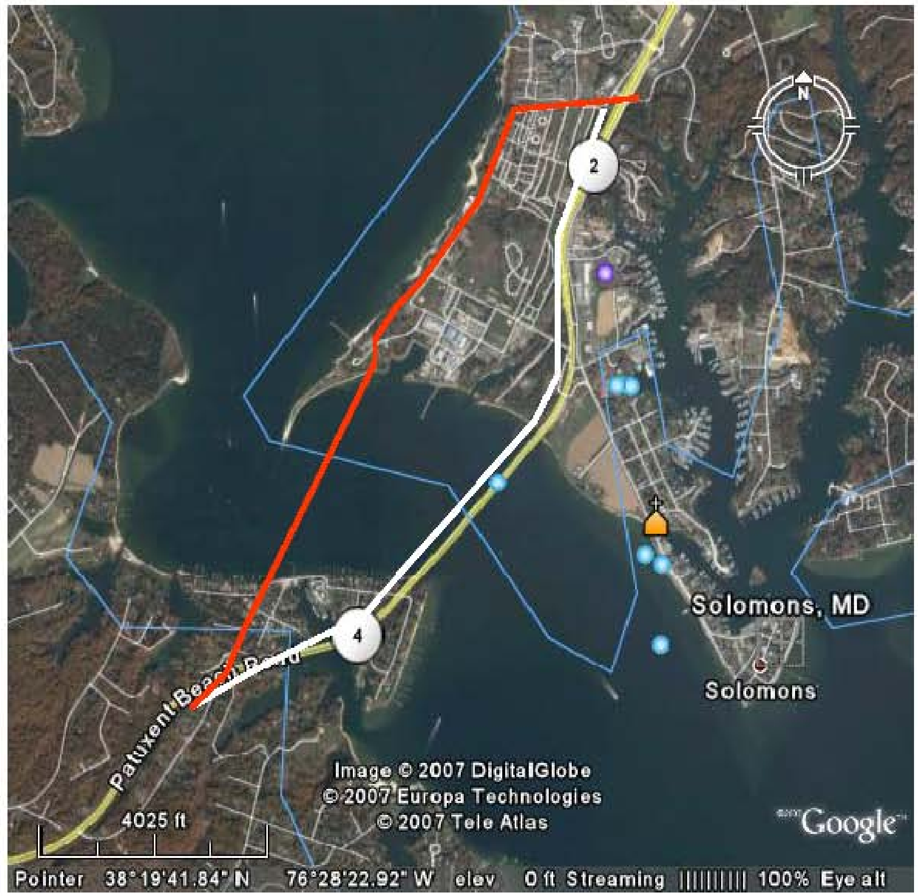
State Route 4
Patuxent River
Town Creek

Existing – 2.5 miles

New – 2.6 miles

Alternative

B



Existing Route:
Alternate Route (OH):
Alternate Route (UG):

Figure 3-7C
State Route 4 / Patuxent River / Town Creek - Alternate C

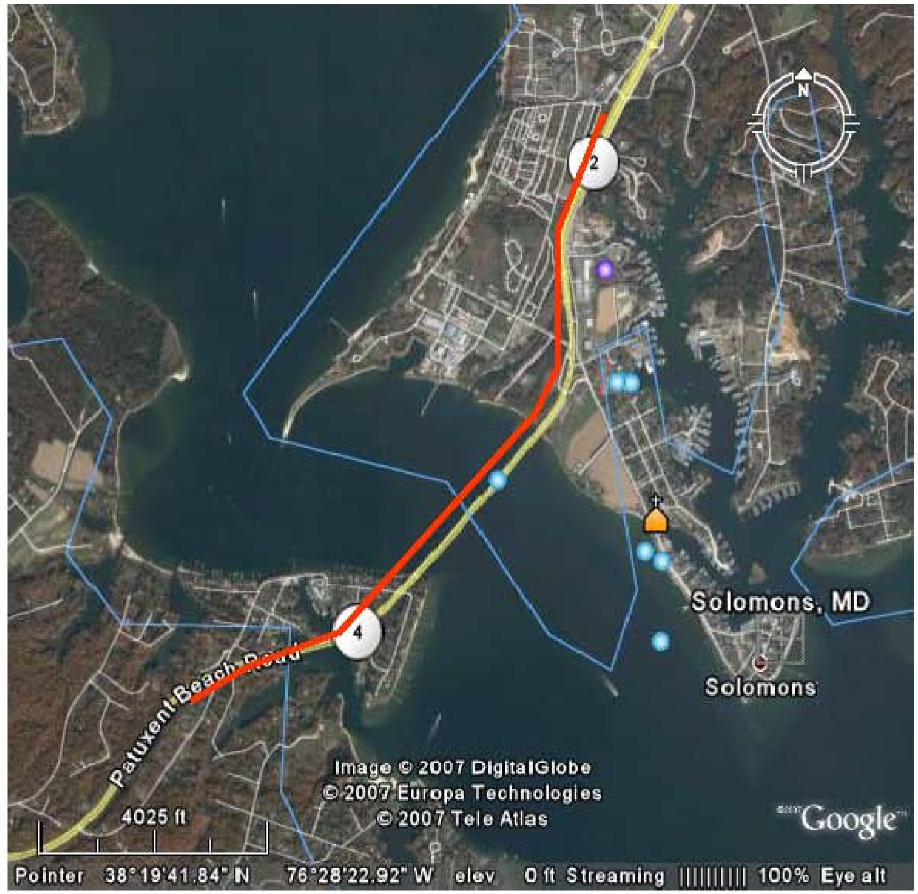
State Route 4
Patuxent River
Town Creek

Existing – 2.5 miles

New – 2.5 miles

Alternative

C



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Figure 3-7D
State Route 4 / Patuxent River / Town Creek - Alternate D

State Route 4
Patuxent River
Town Creek

Existing – 2.5 miles

New – 4.5 miles

Alternative

D

Existing Route:
Alternate Route (OH):
Alternate Route (UG):

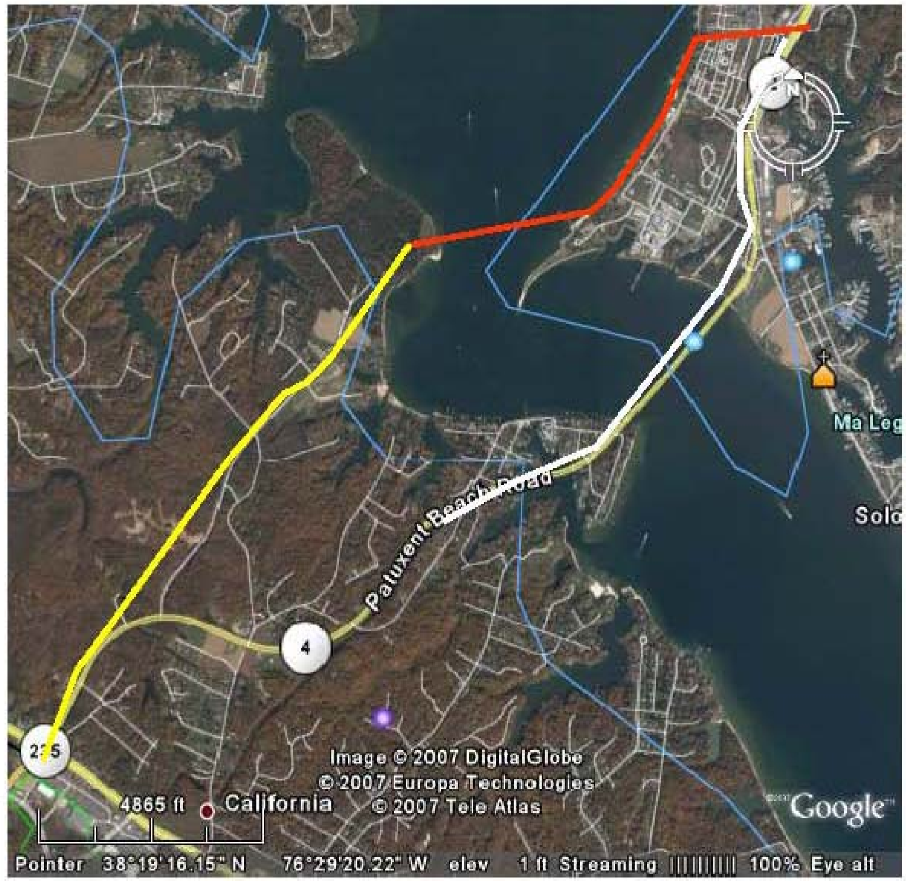


Figure 3-7E
State Route 4 / Patuxent River / Town Creek - Alternate E

State Route 4
Patuxent River
Town Creek

Existing – 2.5 miles

New – 2.7 miles

Alternative

E

Existing Route:	(white)
Alternate Route (OH):	(yellow)
Alternate Route (UG):	(red)

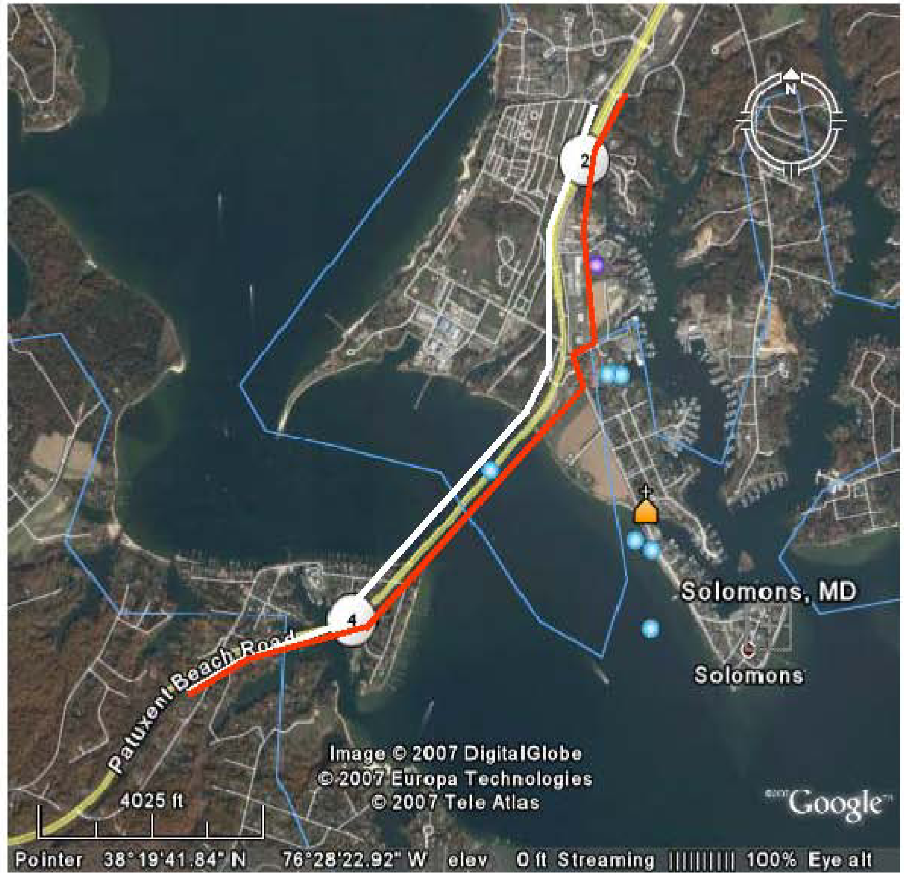


Figure 3-7F
State Route 4 / Patuxent River / Town Creek - Alternate F

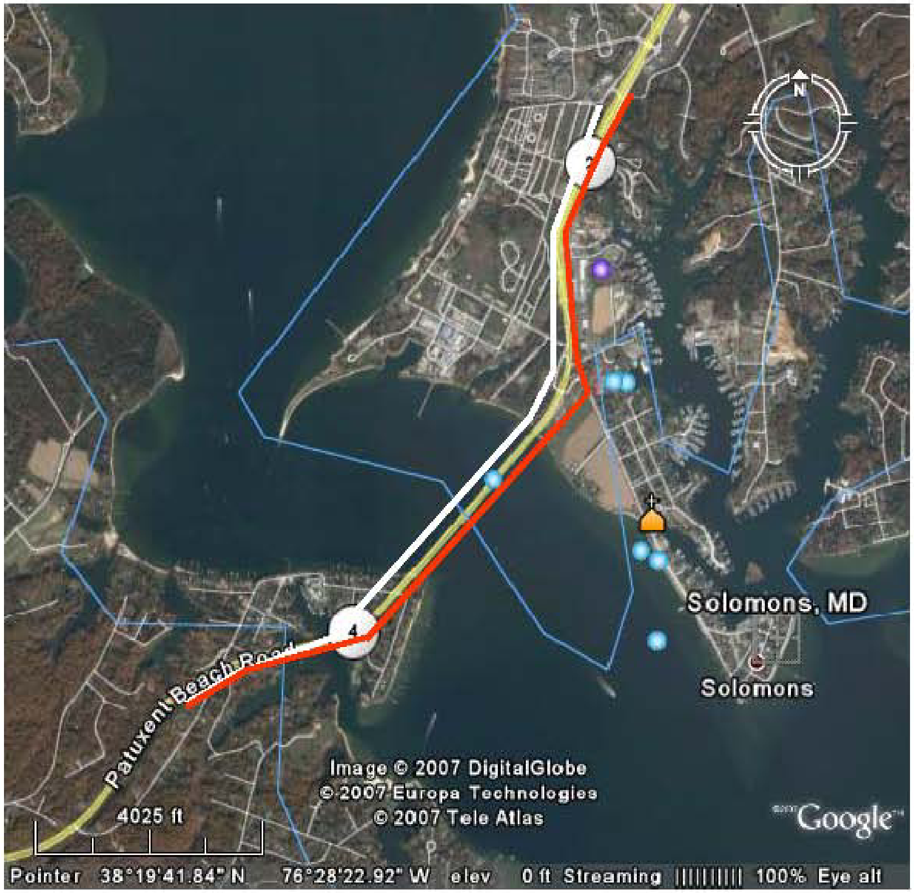
State Route 4
Patuxent River
Town Creek

Existing – 2.5 miles

New – 2.6 miles

Alternative

F



Existing Route:
Alternate Route (OH):
Alternate Route (UG):

Table 3-6 State Route 4 / Patuxent River / Town Creek

	Existing ROW	Alternative A*	Alternative B*	Alternative C*	Alternative D	Alternative E*	Alternative F*
Length	2.5 miles	2.6 miles	2.6 miles	2.5 miles	4.5 miles	2.7 miles	2.6 miles
Use of Existing ROW	1.9 miles	0 miles	0 miles	1.9 miles	0 miles	0 miles	0 miles
New ROW Required	0 miles	1.8 miles	1.8 miles	0 miles	3.9 miles	2.1 miles	2.0 miles
Parallel of Existing ROW	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles
Overhead Length	0.9 miles	0 miles	0 miles	0 miles	2.5 miles	0 miles	0 miles
Underground Length	1.6 miles	2.6 miles	2.6 miles	2.5 miles	2.0 miles	2.7 miles	2.6 miles
Number of Major Angles (30º)	2	NA	NA	NA	1	NA	NA
Residences Within 200 Feet	30	80	97	30	60	38	34
Schools Within 200 Feet	0	0	0	0	0	0	0
Churches Within 200 Feet	0	0	0	0	0	0	0
Hospitals Within 200 Feet	0	0	0	0	0	0	0
Agricultural Land Crossed	0 miles	0 miles	0 miles	0 miles	0.3 miles	0.4 miles	0.2 miles
Woodlands Crossed	0 miles	0 miles	0 miles	0 miles	2.0 miles	0 miles	0 miles
Parkland Crossed	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles
US Navy Property Crossed	1.1 miles	1.3 miles	1.3 miles	0 miles	1.1 miles	0 miles	0 miles
Patuxent River Crossing Length	0.6 miles	0.8 miles	0.8 miles	0.6 miles	0.6 miles	0.6 miles	0.6 miles
Creeks/Waters of US/Wetlands/USACE	underground	underground	underground	underground	0.1 mile	underground or on bridge	underground or on bridge
Coastal Barriers	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles
Federal lands	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles	0 miles

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3.8 St. Mary's/San Souci

The San Souci area in St. Mary's County is experiencing considerable growth in both residential and commercial activity. New single family residential subdivisions are occurring along and south of 3 Notch Road (SR 235). The existing SMECO Hewitt Road Switching Station is surrounded by single family subdivisions. Because of this ongoing growth in the area, SMECO has identified its existing transmission line right-of-way as an area of concern that should be considered for alternatives. The existing right-of-way parallels SR 235 on the south side. In places, it is located between commercial/service establishments on SR 235 and residential developments immediately to the south. In other locations, the existing line is situated between commercial facilities. Because of this development, little space exists even to expand the existing right-of-way.

Three alternative routing options have been delineated for this area of concern. Two will add several miles to the project and cross St. Mary's River State Park, while the third will require a transmission line rebuild within an existing SMECO right-of-way that may physically impact nearby residential structures, requiring their removal.

Alternative A starts about 750 feet (229 meters) north of SR 235 in the community of California. It leaves the existing SMECO right-of-way by deflecting to the southwest for a short distance (Figure 3-8A). It crosses SR 235 in an open undeveloped area and proceeds to the southwest between two commercial structures. It parallels 1st Colony Way between retail establishments and associated parking lots into a mixed hardwood area. Approximately 2,000 feet (610 meters) south of the SR 235 crossing, the alignment enters St. Mary's River State Park, where it then turns due south. It avoids single family residences located along Old Rolling Road and side streets Woodside Way and Miller Lane. It extends for just over a mile through state park property to a point where it crosses over the existing SMECO Ryceville - Hewitt Road double circuit 230 kV transmission line and then turns to the southwest to parallel another existing right-of-way. It parallels this existing right-of-way for about 1.2 miles (1.9 kilometers) through a mostly wooded area. At a point about 1,200 feet (366 meters) north of Indian Bridge Road (SR 471), the alternative turns to the southeast. It extends for just over a mile in a southeasterly direction to avoid a single family residential subdivision, then turns to the northeast to facilitate a crossing of Chancellor's Run Road (SR 237) while avoiding several homes, subdivisions and Chancellors Run Regional Park. It crosses SR 237 in a wooded area between homes built along the road. Immediately east of the SR 237 crossing, the alternative route deflects to the east for about 1,600 feet (488 meters) between two subdivisions. This area can be characterized as being a heavily wooded mixed hardwood landscape. Once east of the subdivisions, the alternative turns due north and then northeast for about 1.4 miles (2.3 kilometers) to reach the existing Hewitt Road

Switching Station. Most of this last 1.4-mile (2.3-kilometer) segment also passes through a heavily wooded area. The routing option crosses an undeveloped and wooded section of Pegg Lane, and just after making a turn to the Hewitt Road Switching Station crosses Hewitt Road in a partially wooded and developing area.

Alternate A measures approximately 6.2 miles (10.0 kilometers) in length, as compared to 2.1 miles (3.4 kilometers) for the existing SMECO right-of-way along SR 235, and will require 6.2 miles (10.0 kilometers) of new right-of-way. Some right-of-way sharing with an existing SMECO 69 kV line may be possible for about 1.2 miles (1.9 kilometers) of the Alternate's north-south route. The additional 4.1 miles (6.6 kilometers) will also require seven major angle structures as compared to two if the existing SMECO right-of-way is used. It reduces the number of residences within 200 feet (61 meters) from 34 to two, and the number of churches from two to zero. However, it will cross 5.6 miles (9.0 kilometers) of deciduous woodlands, requiring some 68 acres (27 hectares) of clearing. One mile of this clearing 12 acres (4.9 hectares) will occur with the St. Mary's River State Park. This alternative also crosses a small piece of agricultural land 0.1 miles (0.2 kilometers) as it parallels an existing SMECO right-of-way. Lastly, if this 230 kV line fails at the crossing of the existing Ryceville-Hewitt Road 230 kV line, it could result in the loss of four 230 kV circuits if high winds or other forces were to topple the new 230 kV line structures.

Alternative B follows the alignment of Alternative A until it crosses SR 237. Just east of the SR 237 crossing, this routing option extends some 4,400 feet (1,341 meters) due east to a point about 500 feet (152 meters) north of Pegg Road, where it intersects with another existing SMECO transmission line (Figure 3-8B). At this point, the alternate turns north for 1.3 miles (2.1 kilometers) while it parallels and is immediately adjacent to this existing transmission line on the west side. It then turns to the northwest, crosses Hewitt Road, and enters the existing Hewitt Road Switching Station.

This alternate measures approximately 6.8 miles (11.0 kilometers) in length as compared to 2.1 miles (3.4 kilometers) for the existing route. It has only two residences within 200 feet (61 meters), but it will require eight major angle structures, require the clearing of more woodlands (74 acres/30 hectares), and it still crosses about one mile of the St. Mary's River State Park. Like Alternative A, this alternate would reduce the potential to impact area residents, but would likely produce greater environmental impacts to the state park, area woodlots, and any associated plant and animal species where such clearing occurs. In addition, there is some historical significance to the state park that would have to be addressed before any routing option through the park could be finalized and approved.

Alternative C follows the first 1.1 miles (1.8 kilometers) of Alternative A and B into the St. Mary's River State Park. The alternative then intersects with an existing SMECO east-west transmission line and turns east-southeast to follow the existing transmission line to the Hewitt Road Switching Station (Figure 3-8C). The routing option measures about 2.9 miles (4.7 kilometers) in length. It crosses Old Rolling Road and Torino Drive as it passes through single family residential developments. In continues in the existing right-of-way for another 0.8 miles (1.3 kilometers) to Chancellor's Run Road (SR 237), where it crosses the road between two large multi-family developments. East of SR 237, it crosses Sayre Drive, MacArthur Boulevard, and Cornwall Drive as it passes between several single family residential developments. About 500 feet (152 meters) east of the Cornwall Drive crossing, the alternative turns to the south to enter the Hewitt Road Switching Station.

SMECO's existing right-of-way along SR 235 is located in a predominantly commercial area along the highway. It is within 200 feet (61 meters) of approximately 34 residences. However, Alternative C is located in a predominantly residential area, and places some 114 homes within 200 feet (61 meters). Furthermore, it is doubtful that the existing east-west right-of-way can accommodate the proposed transmission line as a rebuild or a parallel line. This is because the east-west portion of the Alternative C route is in an existing SMECO 230 kV right-of-way and an on-site examination revealed that the right-of-way does not have the width to accommodate a new 230 kV line in addition to the existing one. In places along this existing right-of-way, there appears to additional lands available to expand the right-of-way. However, in other areas, it appears that the only way to expand the right-of-way is to acquire and remove existing single family residences. The alternate routing option would also require five major angle structures.

While the alternative measures 2.9 miles (4.7 kilometers) in length, it may be able to utilize and share 1.9 miles (3.1 kilometers) of existing right-of-way. It also crosses less of the state park 0.6 miles (1.0 kilometer) and will require much less clearing of wooded landscape. However, the potential to impact many more area residents is probably greatest along this alignment, more so than if the existing SMECO right-of-way along SR 235 were used for the project.

Table 3-7 provides a summary of initial data to compare these three alternatives to the existing SMECO right-of-way for this area of concern.

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Figure 3-8A
St. Mary's/San Souci - Alternate A

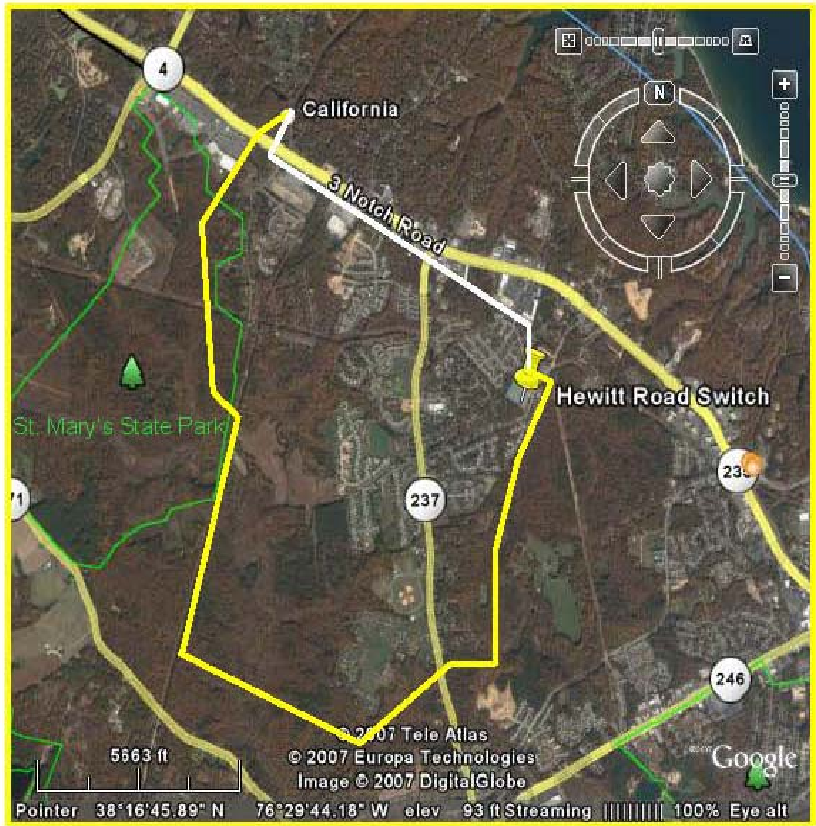
St. Mary's/ San Souci

Existing – 2.1 miles

New – 6.2 miles

Alternative

A



Existing Route (OH):	
Alternate Route (OH):	
Alternate Route (UG):	

Figure 3-8B
St. Mary's/San Souci - Alternate B

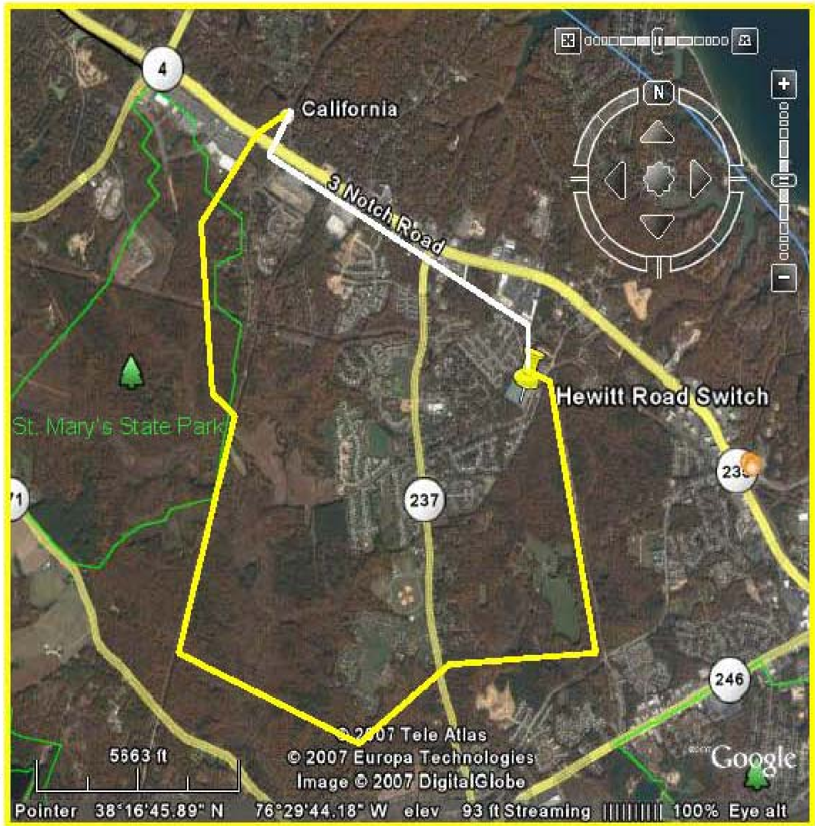
St. Mary's/ San Souci

Existing – 2.1 miles

New – 6.8 miles

Alternative

B



Existing Route (OH):
Alternate Route (OH):
Alternate Route (UG):

Figure 3-8C
St. Mary's/San Souci - Alternate C

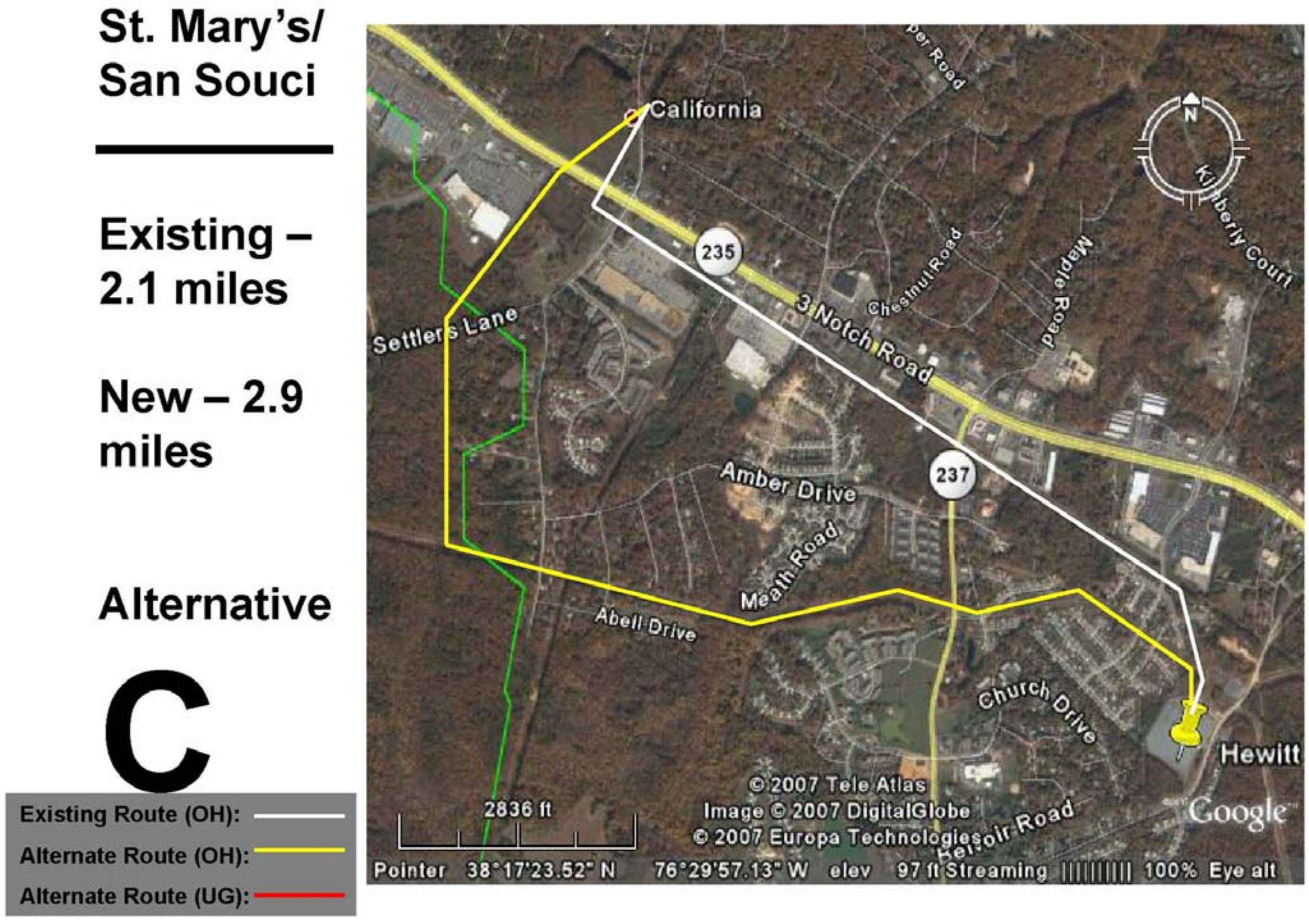


Table 3-7 St. Mary's/San Souci

	Existing ROW	Alternative A	Alternative B	Alternative C
Length	2.1 miles	6.2 miles	6.8 miles	2.9 miles
Use of Existing ROW	2.1 miles	0 mile	0 mile	1.9 miles
New ROW Required	0 mile	6.2 miles	6.8 miles	1.0 mile
Parallel of Existing ROW	0 mile	1.2 miles	2.6 miles	0 mile
Overhead Length	2.1 miles	6.2 miles	6.8 miles	2.9 miles
Underground Length	0 mile	0 mile	0 mile	0 mile
Number of Major Angles (30º+)	2	7	8	5
Residences Within 200 Feet	34	2	2	113
Schools Within 200 Feet	0	0	0	0
Churches Within 200 Feet	2	0	0	0
Hospitals Within 200 Feet	0	0	0	0
Agricultural Land Crossed	0 mile	0.1 miles	0.1 miles	0 mile
Woodlands Crossed	0 mile	5.6 miles	6.1 miles	0.7 miles
Parkland Crossed	0 mile	1.0 mile	1.0 mile	0.6 miles
US Navy Property Crossed	0 mile	0 mile	0 mile	0 mile
Creeks/Waters of US/Wetlands/USACE	0 mile	0.3 mile	0.7 mile	0.1 mile
Coastal Barriers	0	0	0	0
Federal lands	0	0	0	0

3.9 Southern Calvert Substation

Specific alternative sites or properties for the Southern Calvert Substation have not yet been selected, though the general location is known. The proposed substation must be located along and near to the existing 69 kV transmission line near to the town of Lusby. The reason for this location has to do with the need to deliver lower voltage power to the distribution systems in this area that are distant from both the Holland Cliffs and Hewitt Road Substations.

Site characteristics include existing or easily constructed access from a public road, very limited visibility from nearby residences and public areas, and minimal disruption of natural environment (trees, wetlands, and habitat). The new 230/69kV switching station fenced area will cover approximately 4-6 acres, resulting in approximately 6-10 acres of disturbance, but SMECO is seeking a plot of land approximately 25 acres in size to provide a visual buffer from the public.

SMECO is actively pursuing land acquisition in the area located in southern Calvert County in the vicinity of the existing Calvert Cliffs 69kV transmission line tap. This area is located near the intersection of Pardue Road and Maryland State Route 4 (see Figure 1-2).

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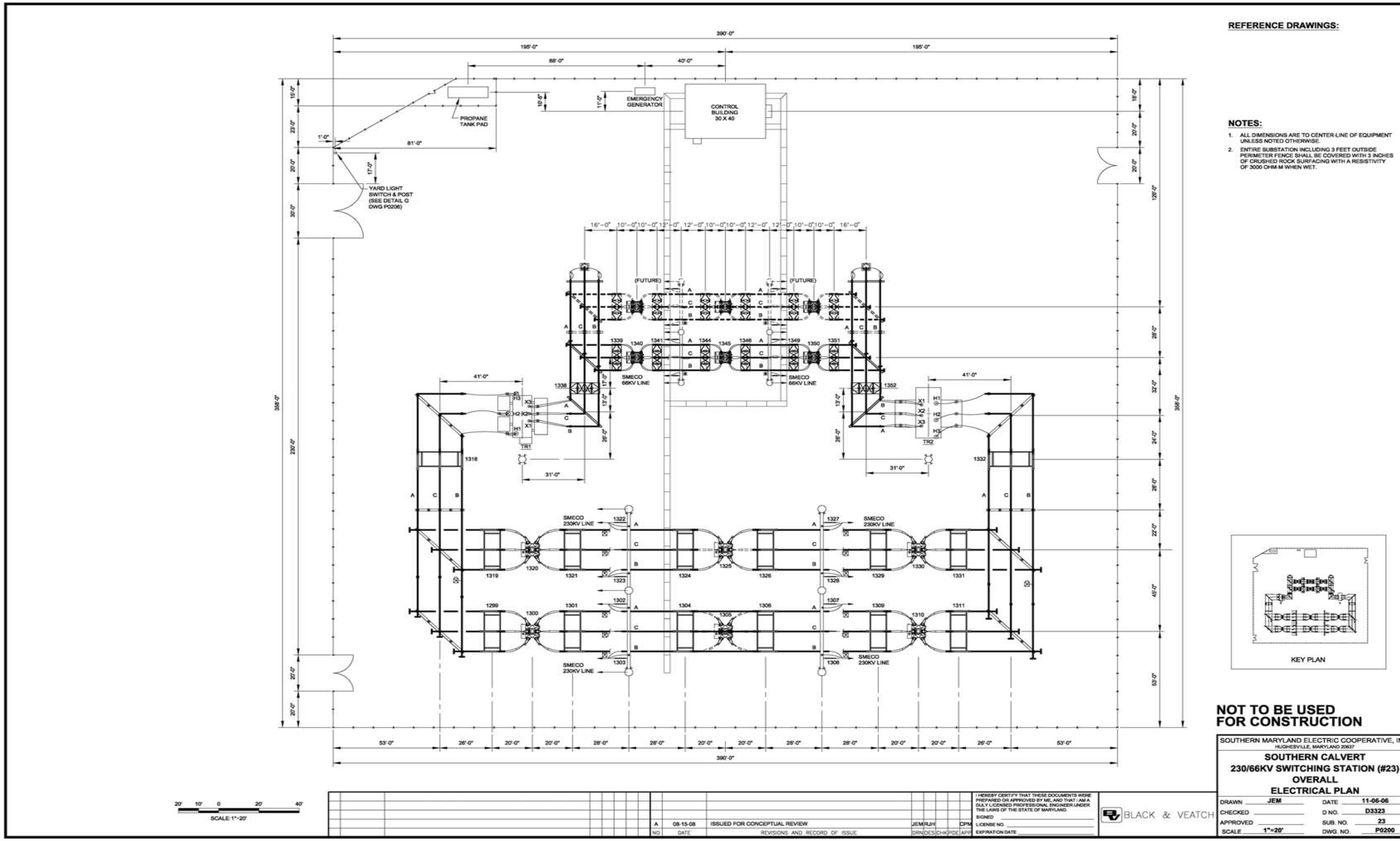
Figure 3-9
Southern Calvert Substation



4.0 Conclusions and Recommendations

While all of the alternatives offered are technically feasible, several of the alternatives are not viable from one or more of the following factors: environmental, economic, land availability, and constructability. Four alternatives are considered to be viable and are recommended for further analysis and consideration by SMECO. They are:

- Whispering Woods – **Alternative A.**
- Broomes Island Road Crossing – **Alternative B.**
- St. Leonard Shores/White Sands – **Alternative A and/or a parallel of the Dominion pipeline route.**
- Patuxent River Crossing – **Alternative B.**

Each of these alternative alignments should now be investigated further relative to existing wetlands and stream crossings and associated permit requirements (Section 404 and Section 10), protected plant and animal species and habitats (Federal and state threatened and endangered species), Patuxent River shell fish industry, known and recorded cultural resources (archaeological and historic sites), highway expansion plans, other utility planning, new residential and commercial developments, etc.

4.1 Holland Cliff Shores

Two alternatives were identified for the Holland Cliff Shores development. Each would shift impacts to other residents in the area. Along Alternative A, the proposed transmission line would follow a wooded ravine and place the proposed transmission line in the back yards of homes, whereas the existing right-of-way has subdivision streets built within and parallel to the right-of-way. The low elevation of the ravine would require much taller structures to meet clearance requirements. Construction would also require clearing about 11 acres (4.5 hectares) of hardwoods and would likely impact the intermittent stream at the bottom of the ravine. While Alternative B is located mostly in uplands, it could require the removal of at least one residence (depending upon final surveying), be in proximity to several other existing and future residences, and require the clearing of approximately 17 acres (6.9 kilometers) of upland forest.

Recommendation – Use existing right-of-way.

4.2 PEPCO 500 kV Crossing

Currently, adequate space exists on the west (or south) side of the PEPCO 500 kV transmission lines and the existing SMECO 69 kV right-of-way for an expanded right-of-way to accommodate the proposed 230 kV transmission line while not conflicting with PEPCO's plans for another 500 kV transmission line in this area.

Recommendation – Acquire the required right-of-way on the west (or south) side of SMECO's existing right-of-way to accommodate the installation of the new 500 kV-230 kV transmission line crossing.

4.3 Whispering Woods

One viable option, Alternative A, is recommended for further environmental, engineering, and economic analysis. While the other two alternatives appear viable on the surface, the old SMECO right-of-way has been relinquished to the current landowner, and there are plans for development of this former SMECO right-of-way and surrounding acreage. Furthermore, Alternatives B and C would shift the right-of-way and subsequent transmission line to the back yards of other residences in Whispering Woods. In addition, it would require the clearing of 10 acres (4 hectares) and 12 acres (4.9 hectares) of woodlands respectively. However, Alternative A places the alignment in a heavily wooded area away from all residences but one, and final surveying may be able to move the right-of-way even farther away from this one residence. Alternative A would also require the clearing of 10 acres (4.0 hectares) of upland woodlots.

Recommendation – Perform further analysis on Alternative A prior to determining final route.

4.4 Broomes Island Road Crossing

Two alternative alignments were identified at the Broomes Island Road crossing. Alternative A shifted the right-of-way to other properties in the area and require the clearing of about six acres (2.4 hectares) of woodlands, while Alternative B removed the existing 69 kV angle structure from the front yard of the private residence on the west side of the road and placed the alignment between two residences in a densely wooded area (requiring less than half the amount of clearing from the other alternative). This alternative should be able to span most of the two agricultural fields that are crossed, and should visually improve the landscape along Broomes Island Road.

Recommendation – Perform further analysis on Alternative B prior to determining final route.

4.5 St. Leonard Shores/White Sands

St. Leonard Shores and White Sands are two subdivisions that have, over the years, built up around the existing SMECO 69 kV right-of-way, with St. Leonard Creek separating the two. Three alternatives were evaluated to bypass these two residential developments. Alternative A relocates the SMECO right-of-way to the south, while Alternatives B and C are more circuitous alignments that require multiple crossings of State Route 2/4, may cross portions of the Calvert Cliffs Nuclear Plant property, and places the potential alignments in proximity to an active church and several residences. Alternative A is located, for the most part, in the general area that has been selected by Dominion Pipeline for a new gas pipeline through the area. It will require clearing of about 52 acres (21 hectares) of woodlands, while Alternatives B and C require the clearing of 42 acres (17 hectares) and 31 acres (12.5 hectares) respectively. However, it appears that Alternatives B and C will encounter more wetlands associated with St. Leonard Creek. Alternative A, or a parallel of the proposed Dominion pipeline (now under construction), would be a viable option to avoid these subdivisions.

Recommendations – Perform further analysis on Alternative A and/or a parallel to the new Dominion pipeline prior to determining final route.

4.6 Dowell Road

Five alternatives were identified for the Dowell Road area. Three are overhead options while two are underground options. However, because SMECO's right-of-way in this area along Newtown Road is 150 feet (45.7 meters) wide instead of 100 feet (30.5 meters), it is recommended that SMECO continue to use its right-of-way for the proposed 230 kV upgrade project, with slight adjustments of new structure locations to minimize visual impacts to residences along Newtown Road.

Recommendation – Use existing right-of-way.

4.7 State Route 2/4/Patuxent River/Town Creek

Six alternatives were identified for this area near Solomons, Maryland. Each required the crossing of the Patuxent River and five also crossed Town Creek. As previously stated, several crossing techniques are under consideration, but the most viable options appear to be either an underground (submarine cable or directional bore) crossing or attaching cable to the State Route 2/4 bridge structure. Using submarine cable or directional boring will facilitate the crossing of the Patuxent River. Once the crossing is complete, underground construction will then continue across Town Creek and State Route 4 to SMECO's existing transition structure location. Other alternatives considered different crossing locations, but were eliminated from further consideration because of environmental factors (Myrtle Point Park and extensive tree clearing) and the potential for future bridge construction across the Patuxent River at Solomons. While the Navy and the Maryland Department of Transportation have not been contacted concerning the use of their facilities, SMECO intends to pursue such discussions in the near future.

Recommendation – Perform further analysis on Alternative B and attaching the cable circuit to the State Route 4 bridge structure prior to determining final route.

4.8 St. Mary's/San Souci

Once south of the Patuxent River, the upgrade project approaches the Hewitt Road Switching Station in a rapidly growing area of St. Mary's County (San Souci). Active commercial and residential growth continues throughout the area. While SMECO has several existing transmission line rights-of-way in the area that approach Hewitt Road, all are fully utilized and cannot be expanded. While three alternatives were presented for this area of congestion, none are viable because of existing utility development within the rights-of-way, the crossing of state parkland, impacts to wooded areas required clearing of up to 74 acres (30 hectares), and surrounding urban and suburban developments. Use of the existing SMECO right-of-way that parallels State Route 235 provides the least impact of all alternatives.

Recommendation – Use existing right-of-way.

Appendix C
Socioeconomic Report

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SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MD

SOCIOECONOMIC STUDY

BLACK & VEATCH CORPORATION

B&V Project 146026
B&V File 32.0202

November 6, 2008

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Table of Contents

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1.0 Project Overview

SMECO's Holland Cliff to Hewitt Road 230 kV Transmission Line Project ("the Project") involves the construction of a 230 kV transmission system loop through Calvert County and St. Mary's County in Maryland. This new transmission line will supplement an already existing 69 kV line, and follow much of the existing route. The primary departure from the existing route will be at the crossing of the Patuxent River, where the preferred route of the new line will involve installation under the river bed. A more detailed description of the proposed route is provided in Section 1.2.

The addition of the new SMECO line will help meet increased customer power demand, as the area's population has tripled over the past thirty years and its energy consumption has increased fivefold. SMECO weighed a number of alternatives and determined the proposed Project to be the best option. The new 230 kV line will allow SMECO to increase current system reliability and to deliver the additional energy needs of the region. The sections below describe the existing utility corridors, the proposed transmission line route, zoning, and land use in Calvert County and St. Mary's County.

1.1 Existing Corridors

In determining the best route for the Project, use of the existing transmission rights-of-way was maximized in order to minimize the impact of the new line. Figure 1-1 shows the primary existing lines in the area.

The existing SMECO 69 kV transmission line runs northwest to southeast in the southern portion of Calvert County and then turns and crosses the Patuxent River and enters St. Mary's County. The northern segment of this line begins at the Holland Cliff switching station in Calvert County and passes through a predominately rural and low-density residential area as it proceeds to the southeast. The right-of-way is frequently bordered by mature trees on each side as is seen in Figure 1-2, and this natural buffer has the effect of minimizing the visual impact of the line from the light residential areas along the route. The largest population area near the northern half of the SMECO 69 kV line segment is Prince Frederick (population of 1,432 in 2000[1]), although the line route is west of this city. As the line continues to the southeast, the route generally proceeds to a more populated area of the county, though the right-of-way avoids moderate and heavy density residential and commercial areas. The largest residential area impacted is the area of White Sands and the residences just to the northwest as is shown in Figure 1-3.

[1] 2006 U.S. Census data not available for Prince Frederick.

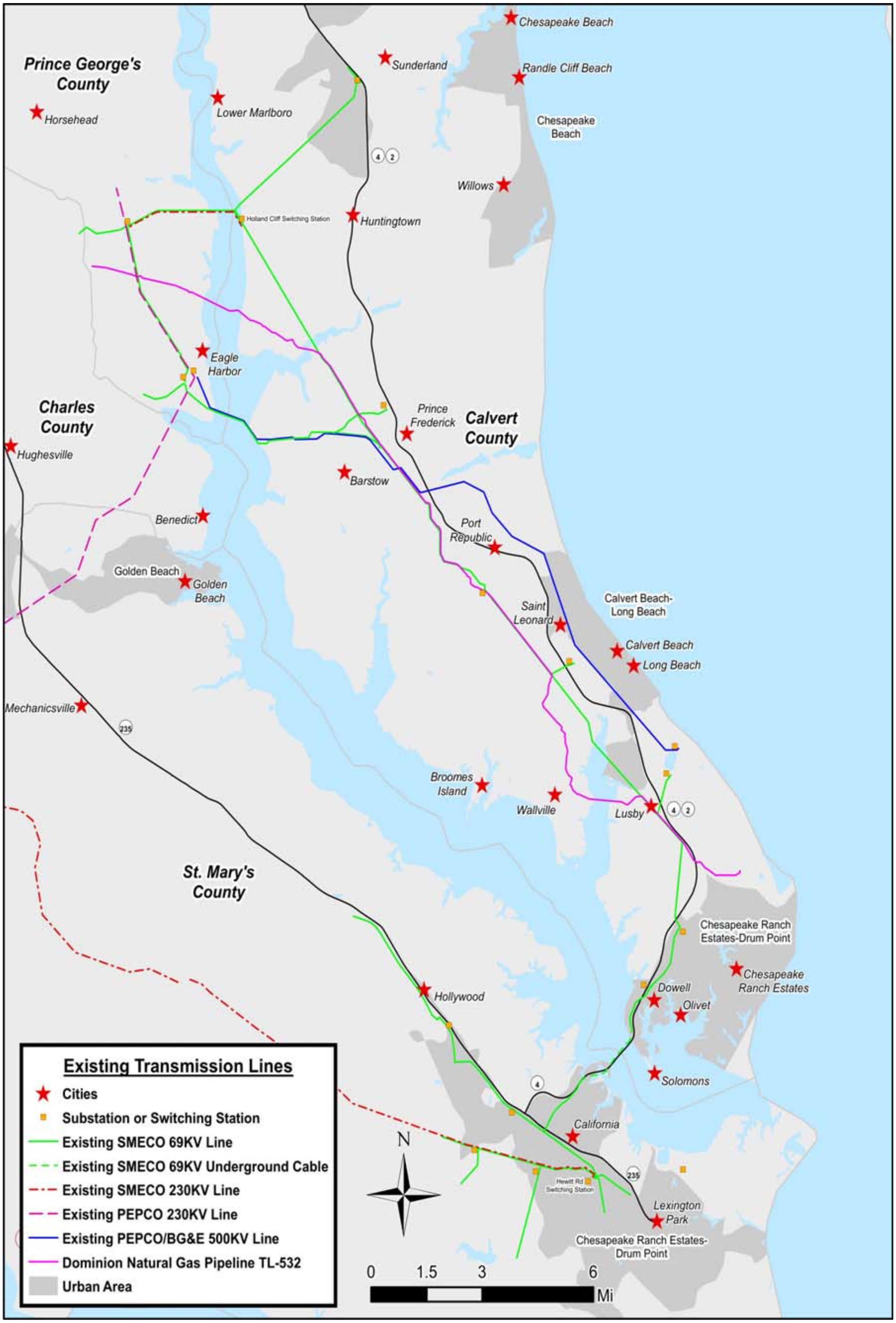
Prince George's County
Horsehead
Lower Marlboro
Sunderland
Chesapeake Beach
Randle Cliff Beach
Chesapeake Beach
Willows
Holland Cliff Switching Station
Huntingtown
Eagle Harbor
Charles County
Hughesville
Prince Frederick
Calvert County
Barstow
Benedict
Port Republic
Golden Beach
Golden Beach
Saint Leonard
Calvert Beach-Long Beach
Calvert Beach
Long Beach
Mechanicsville
Broomes Island
Wallville
Lusby
St. Mary's County
Chesapeake Ranch Estates-Drum Point
Chesapeake Ranch Estates
Dowell
Olivet
Hollywood
Solomons
California
Hewitt Rd Switching Station
Lexington Park
Chesapeake Ranch Estates-Drum Point
Existing Transmission Lines
Cities
Substation or Switching Station
Existing SMECO 69KV Line
Existing SMECO 69KV Underground Cable
Existing SMECO 230KV Line
Existing PEPCO 230KV Line
Existing PEPCO/BG&E 500KV Line
Dominion Natural Gas Pipeline TL-532
Urban Area
N
0 1.5 3 6
Mi

Figure 1-2 Typical View of the Existing 69 kV in Predominately Rural and Forested Areas
Source: Black & Veatch

Figure 1-3 The Current SMECO 69 kV Line in the White Sands Neighborhood
Source: Black & Veatch

The 69 kV right-of-way turns to a south-southwestern direction west of the Calvert Cliffs State Park and then crosses a commercial development as it approaches Dowell and Solomon's Landing. Figure 1-4 is a photograph of the existing line running behind a commercial area near Dowell. The route then enters the U.S. Naval Recreation Center before crossing the Patuxent River on the Thomas Johnson Bridge. Figure 1-5 is a photograph of this bridge taken from St. Mary's County. Once in St. Mary's County, the route travels through a low-density residential area and crosses Maryland Highway 235 before turning sharply to the southeast once more. At this turn, the route passes near a commercial area and then proceeds through a residential area to the Hewitt Road switching station. Figure 1-6 is a photograph of a neighborhood near the Hewitt Road switching station.

1.2 Route of the New SMECO 230 kV Transmission Line

The proposed 30-mile Project line would be built in the counties of Calvert and St. Mary's. Calvert County would contain approximately 24 miles of the line with the remaining 6 miles located in St. Mary's County and under the Patuxent River. The new line would be an extension of SMECO's current transmission system, which consists of 3,688 miles of overhead distribution, 5,815 miles of underground distribution, 394 miles of transmission line, and more than 64,000 transformers.

The new 230 kV line would begin in Calvert County at SMECO's Holland Cliff switching station and end in St. Mary's County at the Hewitt Road switching station (Reference 1). The proposed route for the new 230 kV line is shown in Figure 1-7, which lists the primary residential areas along the route, plus area roads, creeks, and other key land marks and locations. The line routing through or near these areas is further described in this section.

The proposed line would exit SMECO's existing Holland Cliff switching station within the existing SMECO 69 kV line right-of-way. Approximately two-thirds of a mile from the station, the line would reach the subdivision of Holland Cliff Shores. The route would then continue southeast, crossing Hunting Creek Road and the corners of two recently built, small subdivisions, The Oaks and Woodlawn Acres.

In Hunting Creek, the route would extend for approximately 1,000 feet through the stream's valley. Roughly a mile south of Hunting Creek, the Cedar Point Subdivision has been built on either side of the existing right-of-way. The route would then pass through approximately 2,000 feet of this subdivision as it parallels Bowen Road.

The route would then proceed southeast, crossing Stoakley Road and passing through the Hunter's Ridge Subdivision. The line would cross a number of small

Figure 1.4 Commercial Area Near Dowell
Source: Black & Veatch

Figure 1-5 The Memorial Bridge River Crossing (taken from St. Mary's County)
Source: Black & Veatch

Figure 1-6 Neighborhood Near the Hewitt Road Switching Station
Source: Black & Veatch

branches of Mill Creek, and approximately a mile from Mill Creek, the line would pass through The Knolls Subdivision. At that point, the route would cross the PEPCO/BG&E 500 kV transmission line just north of State Route 231 (Hallowing Point Road).

In Prince Frederick, near the intersection of Maryland Highways 231 and 2/4, the PEPCO/BG&E 500 kV transmission line would parallel SMECO's existing right-of-way for approximately 1.3 miles to a point where the 500 kV line branches off to the east just before the SMECO right-of-way crosses the headwaters of Parker Creek. The proposed route would then cross German Chapel Road and Sixes Road (State Route 506). The line would pass through the Whispering Woods Subdivision approximately one mile after crossing Broomes Island Road (State Route 264).

The new transmission line would continue in a southeasterly direction, crossing Ball Road and Parran Road and would then continue through the St. Leonard Shores Subdivision. The proposed line would then cross St. Leonard Creek and enter the residential development of White Sands. For approximately 1.5 miles in this area, there is residential development on either side of the SMECO right-of-way. Heading out of the development to the south, the transmission line would cross Johns Creek and then cross into the unincorporated community of Lusby. After another one-third of a mile, the route crosses Sollers Wharf Road. (Reference 1).

SMECO has proposed to build a switching station in the Lusby area and has signed a letter of intent for property 40 acres in size near the intersection of Pardoe Road

Figure 1-7 Route for SMECO's Proposed 230 kV Line with Cities Neighborhoods and Other Features
Source: Black & Veatch

and Sollers Wharf Road. Most of the site would be used for a visual buffer, as the fenced-in area will be approximately four to six acres in size. Continuing along the proposed route, the transmission line would pass through the unincorporated area of Bertha near the Cove Point Park and Chesapeake Hills Golf Club. The line would continue for approximately one mile until it meets Rousey Hill Road near the Carol Court Subdivision and the unincorporated area of Appeal. From there, the transmission line would pass by the Cherry Hill Subdivision and the unincorporated area of Coster. The line would then cross Dowell Road near the unincorporated areas of Dowell and Solomon's Landing before reaching the U.S. Naval Recreation Area. The line would transition to underground and stay underground throughout most of the U.S. Naval Recreation Area before crossing under the Patuxent River more than one-half mile northwest of the Memorial Bridge.

In St. Mary's County, the line would come ashore near Patuxent Beach and would continue to Twin Creek Manor approximately 2.5 miles from the shore. The line would continue to the unincorporated area of Woodland Acres until just past Three Notch Road (Maryland Highway 235) and then would turn and parallel Three Notch Road along a commercial corridor near the subdivisions of California, Maryland Manor, Barefoot Acres, and Beechwood Estates. In this area, the transmission line would also pass 3000 feet east of St. Mary's River State Park. The line would end approximately a half-mile from Beechwood Estates, near Greenville Knolls and Discovery, at the existing Hewitt Road Switching Station. (Reference 1)

1.3 Zoning

In selecting the preferred route for the proposed SMECO 230 kV route, SMECO examined the zoning and land use patterns and plans in Calvert County and St. Mary's County. The existing zoning in these two counties is described in this section.

Figure 1-8 indicates that there are eight zoning classifications in Calvert County. In total, the proposed SMECO 230 kV transmission line would pass through six zoning classifications: Rural Community, Residential, Town Center, Farm and Forest, Commercial, and Tidal Wetlands classifications.

In terms of the primary zoning classifications associated with the proposed route, Table 1-1 indicates that approximately 27 percent of the route is zoned for farm or forest use, and approximately 23 percent is zoned for residential and rural community use. Only 9.9 percent of the route lies in areas zoned for town center use (and the largest portion of this is the U.S. Naval Recreation Area), and less than one percent is zoned as a tidal wetland area. (Reference 2) Due to the proposed use of the existing right-of-way for

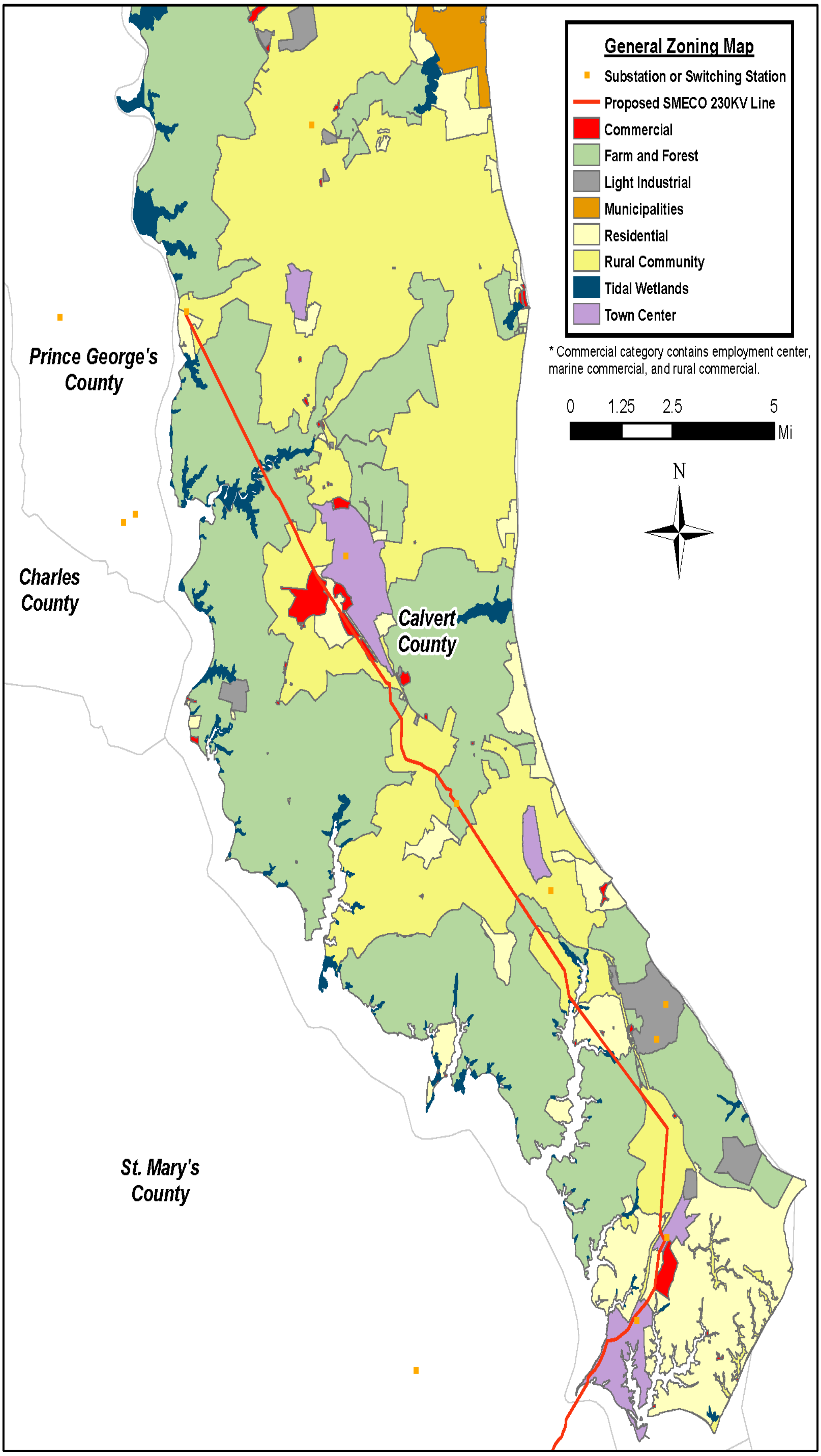

Figure 1-8 Zoning Classifications in Calvert County
Source: Black & Veatch

SMECO's 69 kV line for all but the areas near the crossing of the Patuxent River, the incremental impact on these zoned areas would be minimal.

Table 1-1 Zoning Designation of the Transmission Line Route in Calvert County	
Zoned District	Percentage
Farm and Forest	27.0
Residential	23.4
Rural Community	23.0
Commercial	15.8
Town Center	9.9
Tidal Wetlands	0.9

St. Mary's County has a total of twelve zoning classifications, as seen in Figure 1-9. The proposed route for the new SMECO 230 kV transmission line would cross six zoning classifications: Mixed Use, Low Density Residential, Medium Density Residential, High Density Residential, Commercial, and the Other classification. The percentage of the transmission line in each zone of St. Mary's County is captured in Table 1-2. As indicated in the table, the predominant zoning classification along the proposed route is low density residential, which accounts for 62.5 percent of the route, with another approximately 12.5 percent zoned for medium or high density residential use.

Table 1-2 Transmission Line Route through St. Mary's County	
Zoned District	Percentage
Low Density Residential	62.5
Mixed Use	12.5
Medium Density Residential	6.25
High Density Residential	6.25
Commercial	6.25
Other	6.25

1.4 Land Use

The zoning classifications described above for Calvert and St. Mary's Counties support county government plans for land use and development. As a result, there is a strong correlation between zoning and land use categories. (Reference 3). Figure 1-10 indicates the land use for the impacted portions of Calvert County and St. Mary's County and includes the proposed route of the SMECO 230 kV transmission line. As seen in Figure 1-10, the transmission line passes through largely rural, forested, farming, and low-density residential areas.

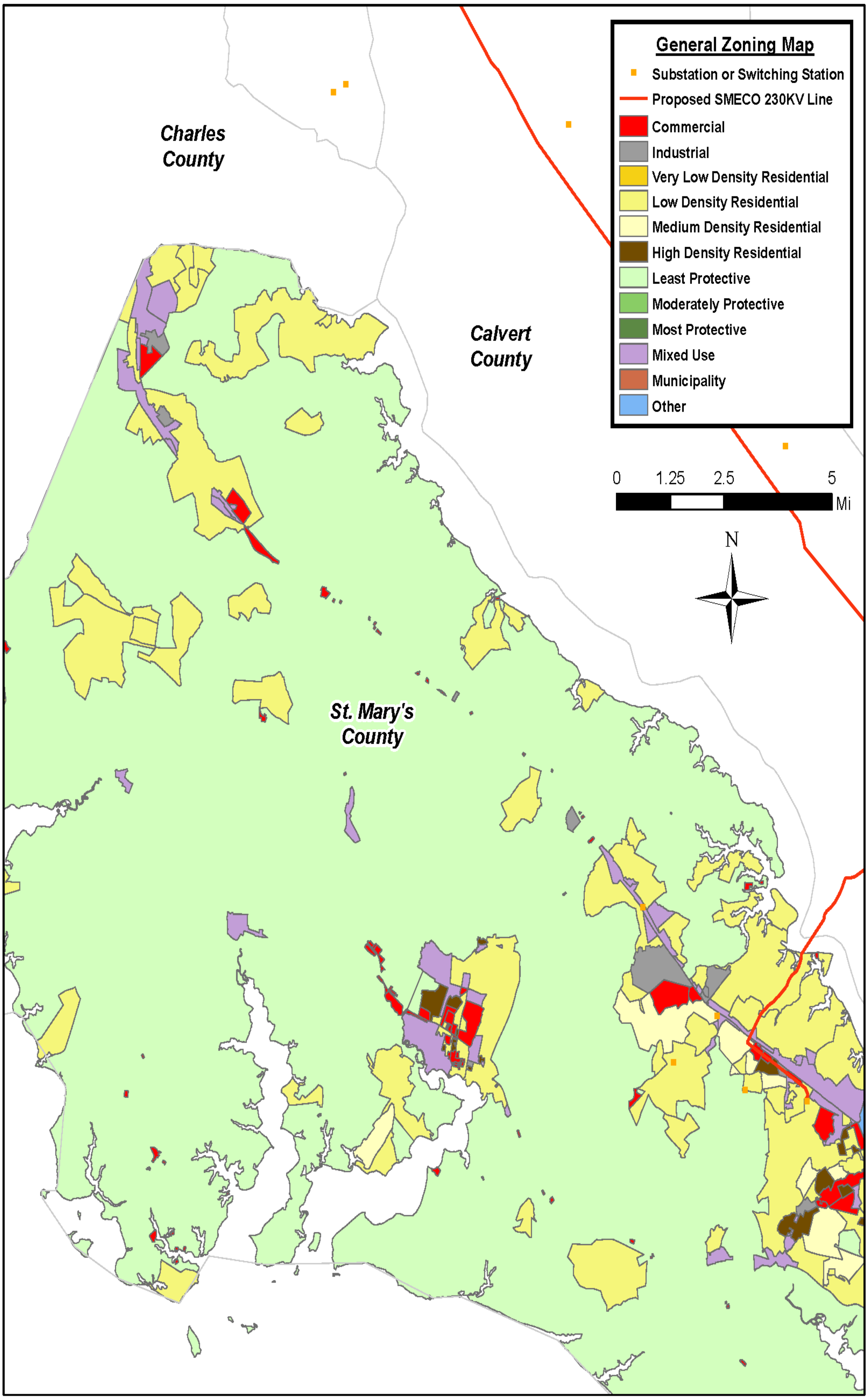

Figure 1-9 Zoning Classifications in St. Mary's County
Source: Black & Veatch

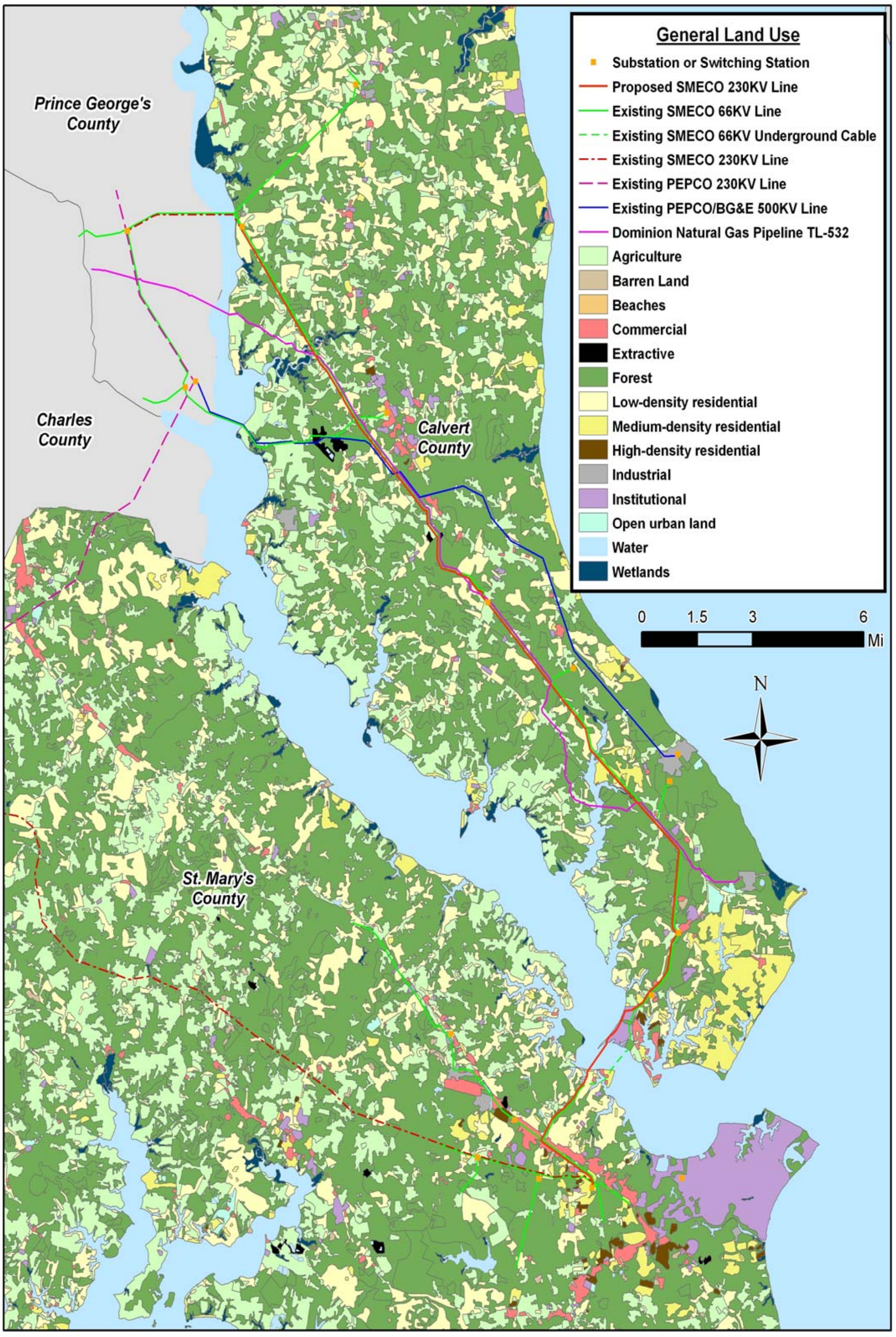

Figure 1-10 Land Use in Calvert County and St. Mary's County
Source: Black & Veatch

1.5 Alternative SMECO 230 kV Routes

SMECO weighed several alternatives during the process of determining the best route for the 230 kV line. While the best alternatives utilized the existing 69 kV right-of-way to a large degree, each involved a temporary divergence from the existing right-of-way in one or more locations. Ultimately, two alternative route segments were chosen and they are shown in Figure 1-11 and described below.

Brooms Island Road Crossing Alternate Route

The Brooms Island Road Crossing Alternate Route also involves a minor departure from the existing 69 kV right-of-way. This change involves less than a half-mile of transmission line and is also located near the Mutual Estates subdivision. In this alternative, the transmission line would continue straight across Broomes Island Road to the southeast, then turn to the south to rejoin the existing right-of-way corridor. This alternative route would not deviate substantially from the current 69 kV corridor and would remove a large structure from the front yard of a residence on the north side of Broomes Island Road.

Patuxent River Crossing and Town Creek

The existing 69 kV line enters the Naval Recreation Center property on the east side of the Patuxent River, transitions to underground, and crosses the river several hundred feet north of the Thomas Johnson Bridge. It enters Town Creek on the west side of the river and stays underground until a transition structure on the south side of Maryland Highway 4. The route for the proposed 230 kV line would also traverse the Naval Recreation Center property, but further to the west of the 69 kV line. It would enter Town Creek further west of the 69 kV line and stay underground until a new transition structure in a location yet to be determined (see the river crossing report in Appendix F to the BER).

Figure 1-11 Alternative Route Segments for the SMECO Proposed 230 kV Line
Source: Black & Veatch

2.0 Socioeconomics

2.1 Demography and Population Projections

Demographic statistics for Calvert County, St. Mary's County, and Maryland are presented in Table 2-1. Calvert County has experienced steady growth in population since 1986, increasing from 42,147 to 74,653 in 2000 and 88,804 in 2006. It is projected that population in the county will continue to increase, reaching 91,000 by 2010 and 96.000 by 2020. The continued demographic and economic growth is a key factor in SMECO's need for the proposed transmission line.

St. Mary's County has a larger population than Calvert County. The population in St. Mary's County has increased from 66,570 in 1986 to 86,211 in 2000 and 98,854 in 2006. The projected population is expected to reach 108,000 by 2010 and 114,800 by 2020. This growth is reflected in the state of Maryland's population, which is projected to increase from 5.6 million in 2006 to nearly 6.2 million by 2020.

Table 2-1 also breaks down the population by gender and age. The 2006 population in Calvert County was comprised of 43,582 (49.08 percent) males and 45,222 (50.92 percent) females. St. Mary's County had a relatively similar male/female ratio with 49,100 (49.67 percent) males and 49,754 (50.33 percent) females. Both counties were slightly more balanced than the statewide mix of 48.36 percent males to 51.64 percent females. The age distribution of Calvert County, St. Mary's, and Maryland were also within a few percentage points of each other in 2006. In Calvert County, 5.93 percent of the population was under 5 years of age, St. Mary's County had 6.93 percent of the population in this category, and in Maryland in 6.56 percent of the population was 5 years old or younger. In 2006, 12.23 percent of Calvert County's population was 62 years of age or older, while St. Mary's County had 11.54 percent of its people in this category, and Maryland was slightly higher with 14.19 percent of its population 62 years or older.

2.2 Employment, Income, and Economic Profile

Table 2-2 lists employment information for Calvert County, St. Mary's County, and Maryland for 2000 and 2006. In 2006, Calvert County had a civilian labor force of 49,575 and an unemployment rate of only 3.3 percent. The labor force made up 1.6 percent of the state labor force of 3.04 million. St. Mary's labor force was 52,371 in 2006. Between 2000 and 2006, Calvert County (at 27.8 percent) and St. Mary's County

Table 2-1
Demographic Statistics, Population, and Population Projections for
Calvert County, St. Mary's County, and Maryland

	Calvert County		St Mary's County		Maryland	
1990 Total Population	51,372		75,974		4,781,468	
2000 Total Population	74,653		86,211		5,296,486	
2006 Total Population	88,804		98,854		5,615,727	
2010 Projection	91,000		108,000		5,897,600	
2020 Projection	96,000		114,800		6,176,075	
	2006 populations	% of 2006 Total Population	2006 populations	% of 2006 Total Population	2006 populations	% of 2006 Total Population
Male	43,582	49.08%	49,100	49.67%	2,715,872	48.36%
Female	45,222	50.92%	49,754	50.33%	2,899,855	51.64%
Under 5 yrs.	5,262	5.93%	6,834	6.91%	368,501	6.56%
18 years and over	66,631	75.03%	74,083	74.94%	4,253,595	75.74%
62 years and over	10,860	12.23%	11,409	11.54%	796,711	14.19%

Reference (4, 5, 6, 7, 8, and 9)
* Note: population projection references come from respective county's comprehensive plans

Table 2-2
Employment Statistics for 2000 and 2006

	Calvert County			St. Mary's County			Maryland		
	2000	2006	Percent Change	2000	2006	Percent Change	2000	2006	Percent Change
Civilian Labor Force	38,786	49,575	27.8	43,032	52,371	21.7	2,737,359	3,036,959	10.9
Employed	37,604	47,954	27.5	41,453	49,794	20.1	2,608,457	2,875,976	10.3
Unemployed	1,182	1,621	37.1	1,973	2,577	30.6	128,902	160,983	24.9
Unemployment Rate (%)	3.0	3.3	0.3	4.5	4.9	0.4	4.7	5.3	0.6
Armed Forces	555	840	51.4	2,606	1,834	-29.6	32,166	22,756	-29.3

References (10, 11, 12, 13, 14, and 15)

(at 21.7 percent) experienced substantial growth in the labor force relative to the state growth of 10.9 percent.

In both 2000 and 2006, the Calvert County unemployment rate was less than 3.5 percent while the unemployment rate in St. Mary's County was comparable to the state unemployment rate of 4.7 percent in 2000 and 5.3 percent in 2006.

Table 2-3 lists the historical and projected labor force for Calvert County, St. Mary's County, and Maryland in selected years from 1970 through 2030. In Calvert County, the labor force is expected to show only slight growth of 1.9 percent from 2010 through 2030, while St. Mary's County and Maryland are projected to experience 32.8 percent and 10.1 percent, respectively, during the same period.

Table 2-4 lists 2006 employment by occupation and industry for the counties of Calvert and St. Mary's, and for Maryland. In Calvert County, the largest employment occupation was in the management, professional, and related area, and this also held for St. Mary's County. At the state level, the largest employment occupation was in the sales and office category, followed by the services occupation.

Employment by industry in Calvert County was led by the educational services, health care, and social assistance industry, followed by public administration. St. Mary's County was led by employment in the public administration industry, followed by employment in the professional and management classification.

At the state level, Table 2-5 indicates that through 2014, employment in all occupations is expected to reach 3.08 million, an increase of nearly 400,000 over the 2.68 million occupational employment in 2004. Leading the way in job growth will be occupational employment in education (36,520 jobs), food preparation and services (34,910), construction and extraction (34,665 jobs), and healthcare practitioners and technical occupations (33,010).

The major employers in Calvert County are listed in Table 2-6. The largest employer in the county is the Calvert Cliffs nuclear power plant owned by Constellation Energy (1,200 employees), followed by the Calvert Memorial Hospital (1,040 employees). Many of the other top employers in the county are in the retail and services industries. Table 2-7 lists the major employers in St. Mary's County. By far, the largest employer in the county is the Naval Air Station at Patuxent River (10,500). DynCorp International (1,050) and St. Mary's Hospital (1,050) are also major employers.

Table 2-8 indicates the average weekly wages by industry in Calvert County and St. Mary's County in 2006. In Calvert County, employees in the Federal Government commanded the highest average weekly wage ($1,235), followed by the information industry ($960) and financial activities industry ($944). In St. Mary's County, Federal

Table 2-3 Projected Area and State Labor Force, 1970-2030 *										
	1970	1980	1990	2000	2005	2010	2015	2020	2025	2030
Maryland	1,655,695	2,108,296	2,639,896	2,769,525	2,918,800	3,125,940	3,283,320	3,355,420	3,396,650	3,441,200
Calvert County	7,521	15,564	28,047	39,341	46,250	51,590	53,520	53,920	53,240	52,580
St. Mary's County	18,404	27,376	41,046	46,032	51,420	58,060	63,850	68,460	72,680	77,090
* Numbers are the sum of rounded male and female labor force. Source: Prepared by the Maryland Department of Planning, Planning Data Services, October 2007. Reference (16)										

Table 2-4 Employment by Occupation and Industry, 2006			
Civilian Employment by Occupation (2006)	Calvert County	St. Mary's County	Maryland
Management, Professional, and Related	19,439	20,020	122,453
Service	7,073	7,933	436,854
Sales and Office	11,632	10,960	718,374
Farming, Fishing, and Forestry	45	444	6,130
Construction, Extraction, Maintenance and Repair	6,756	6,490	256,553
Production, Transportation, and Material Moving	3,009	3,947	233,632
Civilian Employment by Industry (2006)			
Agriculture, Forestry, Fishing and Hunting, and Mining	239	1,104	15,278
Construction	5,851	5,610	220,556
Manufacturing	2,259	1,949	155,944
Wholesale Trade	1,829	523	72,449
Retail Trade	4,900	5,142	292,120
Transportation and Warehousing, and Utilities	2,112	2,105	129,358
Information	1,341	445	82,142
Finance and Insurance, and Real Estate and Rental and Leasing	2,154	1,596	207,009
Professional, Scientific, & Management, and Administrative &Waste Management Services	5,859	9,001	419,027
Educational Services, and Health Care, and Social Assistance	9,106	7,919	610,493
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	3,030	3,716	210,009
Other Services, Except Public Administration	2,548	1,289	153,925
Public Administration	6,726	9,395	307,656
References (11,13, and 15)			

Table 2-5
Maryland Occupational Employment Historical and Projected: 2004 and2014

Occupation	Employment		Employment Change	Annual Wage
	2004	2014		
Total, All Occupations	2,681,875	3,077,670	395,795	34,796
Management Occupations	170,230	198,940	28,710	83,894
Business and Financial Operations Occupations	138,015	162,135	24,120	56,992
Computer and Mathematical Occupations	97,745	125,750	28,005	74,027
Architecture and Engineering Occupations	57,105	66,635	9,530	69,754
Life, Physical, and Social Science Occupations	41,930	49,165	7,230	65,191
Community and Social Services Occupations	33,425	41,285	7,860	39,606
Legal Occupations	27,425	32,185	4,760	56,570
Education, Training, and Library Occupations	153,315	189,835	36,520	45,393
Arts, Design, Entertainment, Sports, and Media Occupations	43,970	48,780	4,810	41,713
Healthcare Practitioners and Technical Occupations	134,485	167,490	33,010	62,709
Healthcare Support Occupations	60,935	81,035	20,100	25,755
Protective Service Occupations	65,575	74,670	9,095	35,986
Food Preparation and Serving Related Occupations	193,335	228,250	34,910	16,883
Building and Grounds Cleaning and Maintenance Occupations	103,040	122,535	19,495	1/
Personal Care and Service Occupations	79,655	95,260	15,605	20,469
Sales and Related Occupations	290,960	316,205	25,245	22,943
Office and Administrative Support Occupations	438,365	462,530	24,170	30,992
Farming, Fishing, and Forestry Occupations	5,615	5,860	245	22,102
Construction and Extraction Occupations	173,655	208,320	34,665	36,095
Installation, Maintenance, and Repair Occupations	110,400	124,195	13,795	38,839
Production Occupations	106,225	103,460	-2,770	30,353
Transportation and Material Moving Occupations	156,460	173,150	16,695	26,663

Note: 1/ For some occupations, wages and/or education code may be blank due to publication standards.
Reference (17)

Table 2-6 Calvert County Major Employers		
Employer	Product/Service	Employment
Constellation Energy/Calvert Cliffs Nuclear Power Plant	Nuclear Power Generation	1,200
Calvert Memorial Hospital	Medical Services	1,040
Wal-Mart	Consumer Goods	605
DynCorp International	Technological Services	450
ARC of Southern Maryland	Medical & Social Services	344
Giant Food	Groceries	310
Safeway	Groceries	302
Recorded Books	Audio books	251
DirectMail.com	Printing, Fulfillment Services.	250
Calvert County Nursing Ctr.	Medical Services	194
Food Lion	Groceries	175
Asbury Solomons Island	Nursing Care	158
Chesapeake Biological Laboratory	Fisheries Research	150
Solomons Nursing Center	Nursing Care	147
All American Ambulance & Transport	Ambulance Services	122
College of Southern Maryland	Higher Education	121
Navy Recreation Center*	Military Recreation Facility	120
K-Mart	Consumer Goods	117
Edward B. Howlin	Ready-Mix Concrete	113
Dominion Cove Point LNG	Liquefied natural gas	100
Gott Company	Convenience stores	100
Holiday Inn Select	Hotel	100
Rod 'N Reel Restaurant	Restaurant	100
American Metal Fabricators	Fabricated steel	76
Ruby Tuesday	Restaurant	71

Note: Excludes post offices, state and local governments; includes public higher education institutions.
*Employee counts for federal and military facilities exclude contractors. Source: Calvert County Department of Economic Development; Maryland Department of Business and Economic Development.
Reference (18)

Table 2-7 St. Mary's County Major Employers		
Employer	Product/Service	Employment
Naval Air Station Patuxent River*	Military Installation	10,500
DynCorp International	Professional & Technical Services	1,050
St. Mary's Hospital	Medical Services	1,050
BAE Systems	Technical Products and Services	918
Wyle Laboratories	Tech., Sci. Research Services	760
Eagan, McAllister Assoc.	Engr., Sci. and Mgt. Services	473
McKay's Foodland	Groceries	430
Charlotte Hall Vets. Home	Nursing Care	427
General Dynamics	Aeronautics, Systems Engr.	420
St. Mary's Coll. of Maryland	Higher Education	418
CSC Applied Technologies	Professional and Tech. Services	400
Wal-Mart	Consumer Goods	400
ManTech International	Systems, Software Development	375
Northrop Grumman	Systems, Software Development	329
Booz Allen Hamilton	Systems Engineering & Management	315
Food Lion	Groceries	280
Sabre Systems	Engineering Services	250
Target	Consumer Goods	250
Burch Oil	Fuel Oil	241
J.F. Taylor	Technology Simulations	240
St. Mary's Nursing Center	Nursing Care	226
DCS	Technology Simulations	215
Paul Hall Center for Maritime Training & Education	Seamanship Training	210
Eagle Systems	Systems Engineering & Management	200
Lowe's	Home Improvement	192
National Technological Association	Systems Engineering & Management	150
Note: Excludes post offices, state and local governments; includes public higher education institutions. *Employee counts for federal and military facilities exclude contractors. Source: St. Mary’s County Department of Economic & Community Development; Maryland Department of Business and Economic Development. Reference (19)		

Table 2-8
2006 Employment Wages by Industry

	Average Weekly Wage ($)	
	Calvert County	St. Mary's County
Federal Government	$1,235	$1,622
State Government	$717	$760
Local Government	$868	$763
Private Sector	$696	$778
Natural Resources & Mining	$829	$583
Construction	$861	$719
Manufacturing	$759	$1,022
Trade, Transportation & Utilities	$828	$566
Information	$960	$848
Financial activities	$944	$683
Professional & Business Services	$724	$1,211
Educational & Health Services	$693	$699
Leisure & Hospitality	$274	$224
Other Services	$464	$490

Source: Maryland Department of Labor, Licensing and Regulation, Office of Workforce Information and Performance.
Reference (18 and 19)

Government workers also commanded the highest weekly wage ($1,622) followed by professional and business services workers ($1,211) and workers in the manufacturing sector ($1,022).

Table 2-9 lists the average 2007 hourly wage rates by occupation within southern Maryland and includes the counties of Calvert, Charles, and St. Mary's. Highest paying occupations include engineering and other office professional occupations (accountants, computer system analysts). Lower paying occupations include packagers and material movers.

Household incomes for Calvert County, St. Mary's County and Maryland are shown in Table 2-10. In Calvert County, the largest income category for 2006 was those households having an income of $100,000 to $149,999 (23.07 percent), while those households in the $50,000 to $74,999 range (17.52 percent) and the $75,000 to $99,999 range (16.69 percent) were the second and third largest income categories, respectively.

In St. Mary's County, the largest household income category was in the $50,000 to $74,999 category (21.04 percent), followed by those in the $100,000 to $149,999 category (19.05 percent) and in the $75,000 to $99,999 category (16.63 percent). The median household income in Calvert County in 2006 was $84,891 and this was higher than the median household income in St. Mary's County at $71,158 and in Maryland at $65,144.

2.3 Housing

Table 2-11 presents housing data for 2006 from the U.S. Census Bureau. In 2006, there were 32,106 housing units in Calvert County and 40,150 housing units in St. Mary's County. The Calvert County figure composed 1.4 percent of the 2,300,749 total housing units in Maryland, and St. Mary's county made up just over 1.7 percent of the state total. Of the 32,106 housing units in Calvert County, 30,284 (94.3 percent) were occupied and 1,822 (5.7 percent) units were vacant. St. Mary's County had 36,354 (90.5 percent) occupied units and 3,796 (9.5 percent) vacant units. State-wide, Maryland had 2,089,031, (90.8 percent) occupied units and 211,718 (9.2 percent) vacant units.

Table 2-11 also provides details on the number of units in the structure, the year of construction, and the number of rooms per unit. The majority of structures in Calvert County and in St. Mary's County are single unit detached structures. This category comprises 87.5 percent of the structures in Calvert County and 74.5 percent in St. Mary's County; these percentages are well above the 51.8 percent mark for the state of Maryland.

A graph depicting the year structures were built can be seen in Figure 2-1. Most structures

Table 2-9
Hour Wage Rates by Occupation within Southern Maryland (2007)

Selected Occupations	Median	Entry	Experienced
Accountants	$31.00	$21.75	$39.50
Bookkeeping/accounting clerks	$16.75	$11.75	$19.75
Computer support specialists	$23.75	$17.25	$26.50
Computer systems analysts	$33.50	$26.00	$39.50
Customer service representatives	$13.25	$8.50	$16.75
Electrical engineers	$41.00	$26.50	$46.00
Electronic engineering technicians	$33.25	$20.25	$37.25
Freight, Stock and Material Movers	$10.50	$8.25	$12.50
Industrial truck operators	$16.50	$11.75	$19.00
Machinists	$21.50	$17.00	$24.75
Network administrators	$29.50	$22.75	$35.50
Packers and packagers, hand	$9.75	$7.50	$11.75
Secretaries	$15.75	$11.50	$19.00
Shipping/receiving clerks	$13.00	$8.50	$16.00
Team assemblers	$14.00	$9.25	$17.25

Note: These wages are an estimate of what workers might expect to receive in Southern Maryland (Calvert, Charles and St. Mary's Counties). Wages may vary by industry, employer, and locality.
Source: Maryland Department of Labor, Licensing and Regulation, Office of Workforce Information and Performance.
Reference (18)

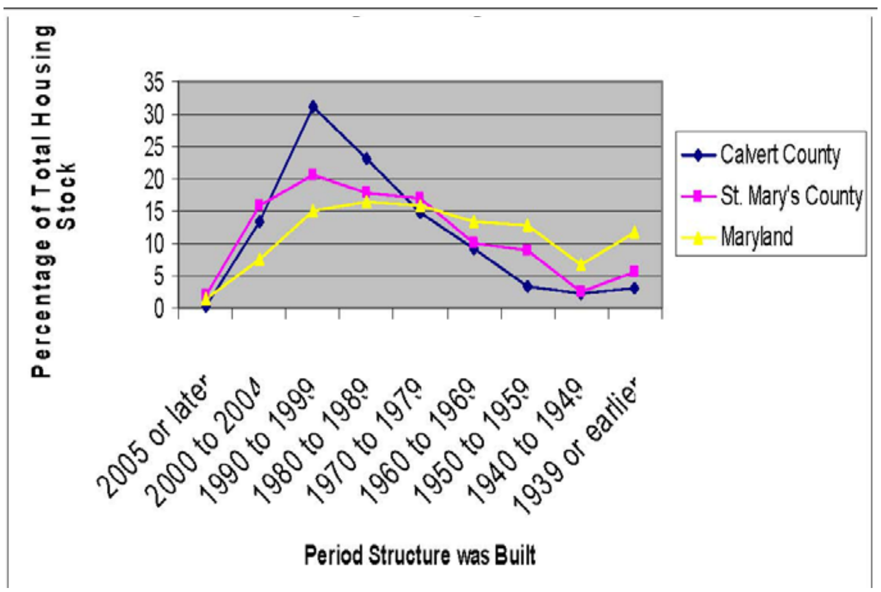

Figure 2-1 Age of Housing Stock
Source: (References 20, 21, and 22)

Table 2-10 Household Incomes (2006 dollars)						
	Calvert County		St. Mary's County		Maryland	
Total households	30,284	Percent of Total	36,354	Percent of Total	2,089,031	Percent of Total
Households less than $10,000	768	2.54%	2,381	6.55%	105,858	5.07%
$10,000 to $14,999	622	2.05%	791	2.18%	77,534	3.71%
$15,000 to $24,999	1,523	5.03%	1,938	5.33%	152,631	7.31%
$25,000 to $34,999	2,679	8.85%	2,830	7.78%	181,053	8.67%
$35,000 to $49,999	2,258	7.46%	4,007	11.02%	266,923	12.78%
$50,000 to $74,999	5,307	17.52%	7,649	21.04%	409,196	19.59%
$75,000 to $99,999	5,055	16.69%	6,045	16.63%	301,238	14.42%
$100,000 to $149,999	6,988	23.07%	6,927	19.05%	346,972	16.61%
$150,000 to $199,999	3,142	10.38%	2,448	6.73%	132,434	6.34%
$200,000 or more	1,942	6.41%	1,338	3.68%	115,192	5.51%
Median household income (dollars)	84,891		71,158		65,144	
Mean household income (dollars)	96,225		83,375		83,367	
References (11,13, and 15)						

Table 2-11
Housing Statistics for Calvert County, St. Mary's County, and Maryland (2006)

	Calvert County		St. Mary's County		Maryland	
Total Housing Units	32,106	Percent of Total	40,150	Percent of Total	2,300,749	Percent of Total
Occupied Housing Units	30,284	94.3	36,354	90.5	2,089,031	90.8%
Vacant Housing Units	1,822	5.7	3,796	9.5	211,718	9.2%
Homeowner Vacancy Rate	1.8		1.5		1.4	
Rental Vacancy Rate	3.5		9.4		7.6	
	Calvert County		St. Mary's County		Maryland	
Units In Structure	Housing Units	Percent of Total	Housing Units	Percent of Total	Housing Units	Percent of Total
1-unit, detached	28,082	87.5	29,914	74.5	1,192,544	51.8
1-unit, attached	1,545	4.8	2,103	5.2	484,688	21.1
2 units	193	0.6	951	2.4	42,100	1.8
3 or 4 units	244	0.8	672	1.7	58,222	2.5
5 to 9 units	392	1.2	2,329	5.8	128,226	5.6
10 to 19 units	442	1.4	712	1.8	189,375	8.2
20 or more units	858	2.7	1,381	3.4	166,998	7.3
Mobile home	350	1.1	2,088	5.2	38,421	1.7
Boat, RV, van, etc.	0	0.0	0	0.0	175	0.0
	Calvert County		St. Mary's County		Maryland	
Year Structure Built		Percent of Total		Percent of Total		Percent of Total
Built 2005 or later	86	0.3	755	1.9	29,922	1.3
Built 2000 to 2004	4,254	13.2	6,309	15.7	169,755	7.4
Built 1990 to 1999	9,937	31.0	8,270	20.6	342,201	14.9
Built 1980 to 1989	7,423	23.1	7,186	17.9	374,299	16.3
Built 1970 to 1979	4,726	14.7	6,782	16.9	362,031	15.7
Built 1960 to 1969	2,939	9.2	4,028	10.0	302,582	13.2
Built 1950 to 1959	1,039	3.2	3,606	9.0	295,172	12.8
Built 1940 to 1949	737	2.3	1,014	2.5	154,562	6.7
Built 1939 or earlier	965	3.0	2,200	5.5	270,225	11.7

Table 2.-11
Housing Statistics for Calvert County, St. Mary's County, and Maryland (2006) (Continued)

	Calvert County		St. Mary's County		Maryland	
Rooms	Housing Units	Percent of Total	Housing Units	Percent of Total	Housing Units	Percent of Total
1 room	40	0.1	124	0.3	9,135	0.4
2 rooms	146	0.5	657	1.6	55,882	2.4
3 rooms	1,343	4.2	1,486	3.7	187,798	8.2
4 rooms	2,077	6.5	4,497	11.2	297,723	12.9
5 rooms	4,421	13.8	8,540	21.3	378,015	16.4
6 rooms	6,172	19.2	8,348	20.8	415,177	18.0
7 rooms	6,542	20.4	7,106	17.7	325,973	14.2
8 rooms	3,795	11.8	3,738	9.3	264,036	11.5
9 rooms or more	7,570	23.6	5,654	14.1	367,010	16.0
Median (rooms)	6.8		6.1		6.0	
References 20, 21, and 22						

within Calvert County and St. Mary's County are relatively new; both counties had the most structures built from the years 1990 to 1999 while the largest percentage of structures in Maryland were built from 1980 to 1989.

Table 2-12 provides a further breakdown of area housing statistics. Within Calvert County, of the 30,284 occupied units, 25,717 (84.9 percent) were owner occupied and 4,567 (15.1 percent) were renter occupied. In St. Mary's County, of the 36,354 occupied units, 26,149 (71.9 percent) were owner occupied and 10,205 (28.1 percent) were renter occupied. Maryland has similar proportions to St. Mary's County for occupied units with 1,450,411 (69.4 percent) owners and 638,620 (30.6 percent) renters. Also, as seen in Table 2-12 and in Figure 2-2, most households in Calvert County and St. Mary's County moved into their current residence in the period from 2000 to 2004.

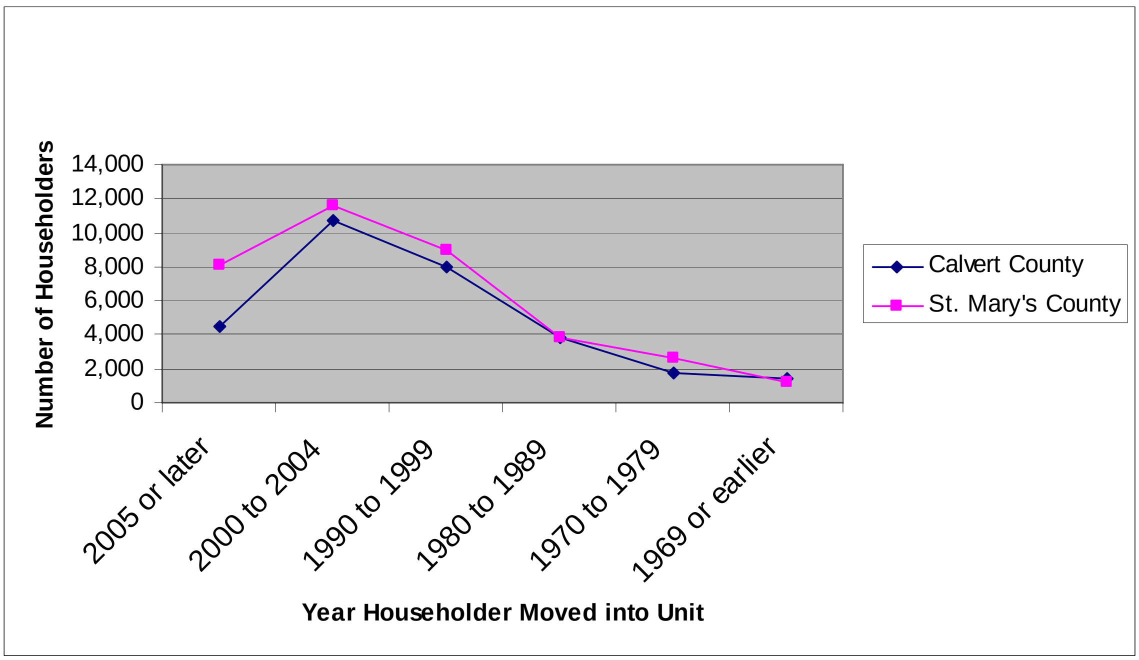

Figure 2-2 Housing Tenure
Source: (References 20 and 21)

Table 2-12
Housing Occupancy Statistics for Calvert County,
St. Mary’s County, and Maryland (2006)

	Calvert County	St. Mary's County	Maryland
Occupied Housing Units	30,284	36,354	2,089,031
Owner-occupied	25,717	26,149	1,450,411
Renter-occupied	4,567	10,205	638,620
Average household size of owner-occupied unit	3.02	2.75	2.74
Average household size of renter-occupied unit	2.19	2.38	2.34
Year Householder Moved Into Unit			
Moved in 2005 or later	4,480	8,107	412,015
Moved in 2000 to 2004	10,720	11,561	676,979
Moved in 1990 to 1999	8,032	8,948	499,384
Moved in 1980 to 1989	3,876	3,878	236,104
Moved in 1970 to 1979	1,774	2,635	137,451
Moved in 1969 or earlier	1,402	1,225	127,098
Value of Owner Occupied Units			
Less than $50,000	191	621	33,301
$50,000 to $99,999	61	647	77,007
$100,000 to $149,999	496	778	94,207
$150,000 to $199,999	909	2,847	127,696
$200,000 to $299,999	5,867	6,693	291,764
$300,000 to $499,999	9,973	10,688	483,969
$500,000 to $999,999	7,640	2,750	297,896
$1,000,000 or more	580	1,125	44,571
Median (dollars)	394,700	322,000	334,700
Renter Occupied Units/ Gross Rent Paid			
Less than $200	N	222	20,164
$200 to $299	N	90	16,169
$300 to $499	N	554	34,311
$500 to $749	N	2,291	97,359
$750 to $999	N	2,196	166,872
$1,000 to $1,499	N	3,032	200,136
$1,500 or more	N	377	72,277
No cash rent	N	1,443	31,332
Median (dollars)	1,021	896	953

Note: An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
References (20, 21, and 22)

The last section of Table 2-12 indicates housing costs for Maryland and the study area. The median price of owner occupied units in Calvert County in 2006 was $394,700; this was followed by Maryland as a whole, which had a median price of $334,700. St. Mary's County median price for owner occupied housing was $322,000. Renter occupied units followed the same trend as owner occupied units with Calvert County being the most costly with a median gross rent of $1,021, followed by Maryland at $953, and St. Mary's at$896.

2.4 Education

Educational information for Calvert County and St. Mary's County is shown in Table 2-13 for the 2005-2006 school year. Calvert County had 27 public schools in 2005-2006, and a total student population of 17,468. St. Mary's public schools were comparable in size, having 26 public schools and a student population of 16,649. The Calvert County public school had 1,076.6 full time equivalent (FTE) teachers in 2005-2006. The student to teacher ratio for the schools was 16.2. In St. Mary's County public schools, there were 1,053.7 FTE teachers in 2005-2006 and the student to teacher ratio was 15.8.

Table 2-13
Teacher/ Student School District Information for the 2005-2006 School Year

	Calvert County Public Schools	St. Mary's Public Schools
Total Schools:	27	26
Total Students:	17,468	16,649
Classroom Teachers (FTE):	1076.6	1,053.7
Pre-kindergarten:	9.0	17.0
Kindergarten:	41.0	48.0
Elementary:	541.0	561.4
Secondary:	485.6	427.3
Ungraded:		N/A
Student/Teacher Ratio:	16.2	15.8

FTE-Full Time Equivalent
References (23, 24, 25, and 26)

Table 2-14 indicates the projected K-12 public school enrollment through 2016 for Maryland, Calvert County, and St. Mary's County. For all three areas, the public school enrollment is expected to increase gradually over the forecast period. The total percentage change in Maryland is projected to be 4.0 percent. By comparison, Calvert County public school enrollment is projected to increase by 7.5 percent and St. Mary's County is projected to increase by 16.0 percent between 2006 and 2016.

Table 2-15 lists the budget information for Calvert County and St. Mary's County school districts for the 2004-2005 school year. The Calvert County revenue for the school year was $179 million and the budget for St. Mary's County was $172 million. For each county, the largest source of revenue was from local sources, followed by state and local revenues. The largest expenditures were for instructional expenditures for each county, followed by the cost of operations including food service.

2.5 Parks and Recreation Facilities

2.5.1 Calvert County

There are numerous parks and recreational facilities within Calvert County including neighborhood, community, and regional parks, special use areas, educational recreation areas, natural resource parks, historical and cultural areas, and private open space recreational areas. The largest of these areas is the private open spaces classification which accounts for approximately 2,009 acres followed by the natural resources and open space areas category containing nine areas that accounted for approximately 1,562 acres. Figure 2-3 indicates the general location of the major recreational areas in the county.

In Maryland, based on the Program Open Space Law, the 23 counties plus Baltimore City are required to submit local Land Preservation, Parks, and Recreation Plans every six years, and the state then sets targets for the acreage of land that each county should strive to have classified as parks and recreational facilities. In total, Calvert County has 74 recreational areas encompassing 4,282 acres of recreational land. When compared to the state standard, the county is approximately 219 acres short of the recommended total recreational area, as only 2,440 acres of the 4,282 acres are counted toward the state goal because only one-third of the natural resource and private open space is counted toward this goal. (Reference xxvii) By 2010, the state's goal for Calvert County will increase to approximately 2,598 acres. (Reference xxviii)

The implication from the Program Open Space Law is that Calvert County will need to continue to provide more park and recreational acreage for its rising population.

Figure 2-3
Calvert County Parks and Recreation Facilities
Source: (Reference xxvii)

Table 2-14 Total Public School Enrollment (Grades K-12), Actual (2006) & Projected (2007-2016)											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Percent Change
Maryland	825,966	822,300	818,860	817,390	817,080	819,370	824,010	830,040	837,760	847,170	858,940	4.0
Calvert County	17,112	17,100	17,080	17,070	17,140	17,240	17,410	17,560	17,760	18,040	18,400	7.5
St. Mary's County	15,911	16,060	16,180	16,370	16,600	16,820	16,980	17,290	17,610	17,950	18,450	16.0
Reference (29)												

Table 2-15 Fiscal Information for the Calvert and St. Mary's School Districts for the 2004-2005 School Year						
	Calvert County			St. Mary's County		
	Amount	Amount per Student	Percent	Amount	Amount per Student	Percent
Total Revenue:	$178,957,000	$10,255		$171,909,000	$10,377	
Revenue by Source						
Federal:	$8,492,000	$487	5%	$14,332,000	$865	8%
Local:	$98,317,000	$5,634	55%	$86,148,000	$5,200	50%
State:	$72,148,000	$4,134	40%	$71,429,000	$4,312	42%
Total Expenditures:	$174,701,000	$10,011		$168,429,000	$10,167	
Total Current Expenditures:	$157,573,000	$9,029		$145,527,000	$8,784	
Instructional Expenditures:	$99,546,000	$5,704	63%	$84,974,000	$5,129	58%
Student and Staff Support:	$12,886,000	$738	8%	$14,253,000	$860	10%
Administration:	$14,444,000	$828	9%	$14,369,000	$867	10%
Operations, Food Service, other:	$30,697,000	$1,759	19%	$31,931,000	$1,927	22%
Total Capital Outlay:	$11,578,000	$663		$18,652,000	$1,126	
Construction:	$15,000	$1		$373,000	$23	
Total Non El-Sec Education & Other:	$0	$0		$0	$0	
Interest on Debt:	$1,678,000	$96		$2,141,000	$129	
References (30 and 31)						

Table 2-16 2007 Annual Average Daily Traffic (AADT) Counts for Calvert and St. Mary's County			
County	Route	Location (Where Count was Taken)	AADT
Calvert	CO 16	Boyds Turn Rd-0.40 Mi N Of MD60	6,212
Calvert	CO 17	5th St Ext-0.10 Mi E Of Boyds Turn Rd	5,322
Calvert	CO 28	Pond Woods Rd-0.10 Mi E Of MD2	3,112
Calvert	CO 36	Wilson Rd-0.10 Mi S Of MD63	1,501
Calvert	CO 41	Bowie Shop Rd-0.10 Mi W Of MD2	3,112
Calvert	CO 47	Barstow Rd-0.10 Mi N Of MD231	1,152
Calvert	CO 244	West Dares Beach Rd-0.10 Mi W Of MD2	4,392
Calvert	CO 249	Jewell Rd-0.10 Mi E Of MD260	2,352
Calvert	CO 250	Skinners Turn Rd-0.20 Mi E Of MD4	3,010
Calvert	CO 644	9th St-0.02 Mi S Of Chesapeake Ave	71
Calvert	CO 939	Holbrook La-0.10 Mi N Of Pond Woods Rd	171
Calvert	CO1090	Solomons Island Rd S-0.10 Mi N Of Langley La	6,051
Calvert	MD 2	North Of Dowell Rd	25,494
Calvert	MD 2	0.40 Mi S Of MD760	25,541
Calvert	MD 2	0.50 Mi S Of MD497	21,651
Calvert	MD 2	0.50 Mi N Of MD497	23,211
Calvert	MD 2	0.20 Mi N Of MD765q (Pardoe Rd)	25,461
Calvert	MD 2	0.10 Mi N Of Western Shores Blvd	23,791
Calvert	MD 2	0.10 Mi S Of MD264	29,120
Calvert	MD 2	0.50 Mi N Of MD264	33,361
Calvert	MD 2	0.50 Mi N Of MD506	35,401
Calvert	MD 2	0.20 Mi S Of MD231	32,091
Calvert	MD 2	0.50 Mi N Of MD231	39,731
Calvert	MD 2	0.10 Mi S Of MD263	47,681
Calvert	MD 2	0.10 Mi N Of MD263	37,191
Calvert	MD 2	0.30 Mi S Of MD4 (Sunderland)	39,911
Calvert	MD 2	0.10 Mi N Of MD4 (Sunderland)	15,451
County	Route	Location (Where Count was Taken)	AADT
Calvert	MD 2	0.50 Mi S Of MD260	12,571
Calvert	MD 2L	Parran Rd-0.10 Mi W Of MD2	2,531
Calvert	MD 4	0.10 Mi N Of MD262	30,652
Calvert	MD 4	0.20 Mi S Of MD260 Struc #4030	34,572
Calvert	MD 231	0.40 Mi E Of Charles Co/L	10,852
Calvert	MD231	0.10 Mi W Of MD2	16,542
Calvert	MD 260	0.50 Mi E Of MD4	14,192
Calvert	MD 260	0.20 Mi W Of MD261	14,432
Calvert	MD 261	0.50 Mi N Of MD263	6,830
Calvert	MD 261	0.20 Mi S Of MD260	14,420
Calvert	MD 261	0.20 Mi N Of Chesapeake Beach Rd	8,690

Table 2-16 2007 Annual Average Daily Traffic (AADT) Counts for Calvert and St. Mary's County (Continued)			
County	Route	Location (Where Count was Taken)	AADT
Calvert	MD 262	0.50 Mi W Of MD4	4,032
Calvert	MD263	0.50 Mi E Of MD2	7,640
Calvert	MD 263	0.10 Mi W Of MD261	6,210
Calvert	MD 263	0.20 Mi E Of Wilson Rd	710
Calvert	MD 264	0.50 Mi N Of Ballard Rogers Rd	862
Calvert	MD 264	0.20 Mi S Of MD265	5,072
Calvert	MD 264	0.20 Mi S Of MD2	6,742
Calvert	MD 265	0.50 Mi S Of MD264	2,730
Calvert	MD402	0.20 Mi E Of MD2	8,450
Calvert	MD402	0.30 Mi W Of Wilson Rd	6,290
Calvert	MD497	0.20 Mi E Of MD2	8,490
Calvert	MD506	0.30 Mi E Of MD508	1,850
Calvert	MD508	0.20 Mi S Of MD231	2,822
Calvert	MD509	0.20 Mi E Of MD765	872
Calvert	MD 521	0.10 Mi N Of Lowery Rd	2,032
Calvert	MD 521	0.20 Mi W Of MD524	6,812
Calvert	MD 524	0.10 Mi N Of MD2	8,321
Calvert	MD 760	0.20 Mi S Of MD765	11,280
Calvert	MD 765	0.20 Mi S Of MD509	2,871
Calvert	MD 765A	0.20 Mi N Of MD231	4,350
Calvert	MD 765J	Calvert Beach Rd-0.10 Mi E Of MD2	5,091
Calvert	MD765Q	Hg Truman Rd-0.10 Mi S Of MD760	9,082
Calvert	MD765Q	Hg Truman Rd-0.10 Mi N Of MD497	4,092
Calvert	MD765Q	Pardoe Rd-0.10 Mi N Of MD2	862
Calvert	MD765R	Solomons Island Rd-0.10 Mi S Of MD2v/Dowell Rd	7,202
Calvert	MD 768	0.10 Mi N Of MD402	862
St. Mary's	CO 4	0.10 Mi E Of Pocohontas Dr	5,322
St. Mary's	CO 169	Wathen Rd-0.10 Mi W Of MD243	281
St. Mary's	CO 269	Millstone Landing Rd-0.40 Mi N Of MD235	2,152
St. Mary's	CO 272	Pegg Rd-0.10 Mi W Of MD235	8,292
St. Mary's	CO 334	Willows Rd-0.10 Mi S Of Shangri-La Dr	6,412
St. Mary's	CO 349	Franklin Rd-0.02 Mi W Of Saratoga Dr	411
St. Mary's	CO 352	Hermanville Rd-1.50 Mi S Of MD235	2,252
St. Mary's	CO 426	Buck Hewitts Rd-0.10 Mi S Of MD235	2,452
St. Mary's	CO 604	Southwell La-0.02 Mi N Of Vista Rd	61
St. Mary's	MD 4	0.20 Mi N Of MD5	10,472
St. Mary's	MD 4	0.40 Mi S Of MD235	18,392

Table 2-16 2007 Annual Average Daily Traffic (AADT) Counts for Calvert and St. Mary's County (Continued)			
County	Route	Location (Where Count was Taken)	AADT
St. Mary's	MD 5	1.0 Mi S Of MD235	1,891
St. Mary's	MD 5	0.10 Mi S Of Bauer Rd	5,070
St. Mary's	MD 5	0.20 Mi N Of MD 584	6,651
St. Mary's	MD 5	0.10 Mi S Of MD 489	6,991
St. Mary's	MD 5	1.0 Mi S Of MD 246	8,911
St. Mary's	MD 5	0.10 Mi N Of MD 246	19,031
St. Mary's	MD 5	0.10 Mi S Of MD 249	18,001
St. Mary's	MD 5	0.50 Mi S Of MD 244	13,121
St. Mary's	MD 5	0.20 Mi N Of MD 4	24,741
St. Mary's	MD 5	0.10 Mi N Of MD 245	25,951
St. Mary's	MD 5	0.30 Mi S Of MD 234	21,191
St. Mary's	MD 5	0.50 Mi S Of MD 247	9,091
St. Mary's	MD 5	0.30 Mi N Of MD 247	7,381
St. Mary's	MD 5	0.50 Mi N Of MD 238	9,301
St. Mary's	MD 5	0.20 Mi S Of MD 235	10,261
St. Mary's	MD 5	0.10 Mi N Of MD 235	30,711
St. Mary's	MD 5	0.20 Mi S Of Charles Co/L	38,131
St. Mary's	MD 5BU	0.20 Mi N Of Fenwick St	7,271
St. Mary's	MD 6	0.50 Mi W Of MD 5	5,762
St. Mary's	MD 6	0.10 Mi E Of MD 5	3,242
St. Mary's	MD 6	0.10 Mi N Of MD 235	1,942
St. Mary's	MD 234	0.30 Mi N Of MD 238	8,802
St. Mary's	MD 234	0.30 Mi S Of MD 238	6,452
St. Mary's	MD 234	0.20 Mi W Of MD 242	6,452
St. Mary's	MD 234	0.20 Mi W Of MD 5	9,292
St. Mary's	MD 235	1.0 Mi N Of MD 5	3,030
St. Mary's	MD 235	0.10 Mi N Of Trapp Rd	5,170
St. Mary's	MD 235	0.10 Mi N Of Mattapany Rd	8,060
St. Mary's	MD 235	0.50 Mi S Of MD 712	8,400
St. Mary's	MD 235	0.30 Mi S Of MD 246	14,620
St. Mary's	MD 235	0.50 Mi N Of MD 246	23,990
St. Mary's	MD 235	0.10 Mi N Of Town Creek Dr	48,260
St. Mary's	MD 235	0.50 Mi S Of Clarks Landing Rd	28,100
St. Mary's	MD 235	0.50 Mi S Of MD 245	29,090
St. Mary's	MD 235	1.0 Mi N Of MD 245	25,710
St. Mary's	MD 235	0.20 Mi N Of MD 247	21,350
St. Mary's	MD 236	0.50 Mi S Of MD 5	3,512

Table 2-16 2007 Annual Average Daily Traffic (AADT) Counts for Calvert and St. Mary's County (Continued)			
County	Route	Location (Where Count was Taken)	AADT
St. Mary's	MD 237	0.10 Mi S Of MD 235	15,912
St. Mary's	MD 238	0.50 Mi N Of MD 242	1,352
St. Mary's	MD 238	0.50 Mi S Of MD 234	1,942
St. Mary's	MD 238	0.30 Mi E Of MD 234	2,032
St. Mary's	MD 239	0.30 Mi W Of MD 520	270
St. Mary's	MD 242	0.10 Mi S Of Waterloo Rd	762
St. Mary's	MD 242	0.30 Mi S Of MD 238	3,312
St. Mary's	MD 242	0.50 Mi S Of MD 234	5,372
St. Mary's	MD 242	0.50 Mi N Of MD 234	2,232
St. Mary's	MD 242	0.10 Mi S Of MD 5	2,332
St. Mary's	MD 243	0.10 Mi S Of Bayside Rd	980
St. Mary's	MD 243	0.20 Mi S Of MD 5	7,540
St. Mary's	MD 244	1.0 Mi E Of MD 5	2,681
St. Mary's	MD 244	0.20 Mi W Of MD 249	2,001
St. Mary's	MD 245	0.50 Mi N Of MD 5	10,410
St. Mary's	MD 245	0.30 Mi S Of MD 235	7,470
St. Mary's	MD 245	1.0 Mi N Of MD 235	2,810
St. Mary's	MD 246	0.50 Mi E Of MD 5	21,841
St. Mary's	MD 247	0.50 Mi S Of MD 235	4,290
St. Mary's	MD 249	0.10 Mi S Of Lighthouse Rd	2,071
St. Mary's	MD 249	0.40 Mi S Of MD 244	5,391
St. Mary's	MD 249	0.20 Mi N Of MD 244	6,681
St. Mary's	MD 470	0.50 Mi S Of MD 242	1,200
St. Mary's	MD 471	0.30 Mi N Of MD 5	4,370
St. Mary's	MD 472	0.20 Mi N Of MD 235	2,840
St. Mary's	MD 489	0.10 Mi W Of MD 235	1,940
St. Mary's	MD 520	0.10 Mi S Of MD 239	750
St. Mary's	MD 712	0.20 Mi N Of MD 235	7,270
St. Mary's	MD 944	Mervell Dean Rd-0.40 Mi S Of MD 235	2,952
Source (references 32			

To the degree that added infrastructure can be provided by utilizing existing rights-of-way and conserving land used for other purposes, the county will be aided in its on-going effort to comply with the state recommended parks and recreational acreage levels.

2.5.2 St. Mary's County

Located within St. Mary's County are 4 state parks, 12 community parks, 7 neighborhood parks, 15 recreational parks, 16 piers and boat ramps, as well as golf courses and county fairgrounds (Reference 33). In total there are 4,196 acres devoted to recreation within St. Mary's County. Of this land 1,348 acres are run by the county and 2,848 are controlled by the state. In addition, the state and county control 3,983 acres of resources land that can be used for recreation and environmental education. The specific geographic location of the parks, school recreation parks, county parks (including museums), state owned land, and public water access points can be seen in Figure 2.4. According to the "Quality of Life in St. Mary's County," St. Mary's county is approximately 1,100 acres short of Maryland's recommended standard for recreational facilities (Reference 33).

2.6 Local Public Facilities and Social Services

An important aspect of the socioeconomic profile of any area is the local facilities and services that could be impacted by a new project. Key areas addressed in this section include medical facilities, fire fighting capabilities, police protection, water and sewer, and solid waste facilities, both for Calvert County and St. Mary's County.

2.6.1. Medical Facilities

2.6.1.1 Calvert County. The primary medical facility in Calvert County is the Calvert Memorial Hospital (CMH), which is located in Prince Frederick. This facility is accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). As of 2006, CMH employed 1,040 people, of which 289 were members of the medical staff. The medical staff included 157 active medical staff, 73 consulting physicians, 2 honorary physicians, 30 allied health professionals, and 27 telemedicine physicians. There were 120 licensed beds in the hospital although, in the case of large-scale emergencies, the hospital is able to accommodate up to 157 beds. In 2006, there were 8,201 admissions to CMH and an average of 76 beds in use per day. (Reference 34)

In 2006, the CMH emergency department had 19 beds and 5 fast-track beds meant for those with minor illnesses or injuries. The emergency department sees an average of 100 patients a day. In the fall of 2007 the emergency department completed a $33 million expansion including development of a 35-bed emergency department, a 10-bed intensive care unit, an expanded laboratory, 26 new monitored beds, and a new patient concourse. (References 34 and 35)

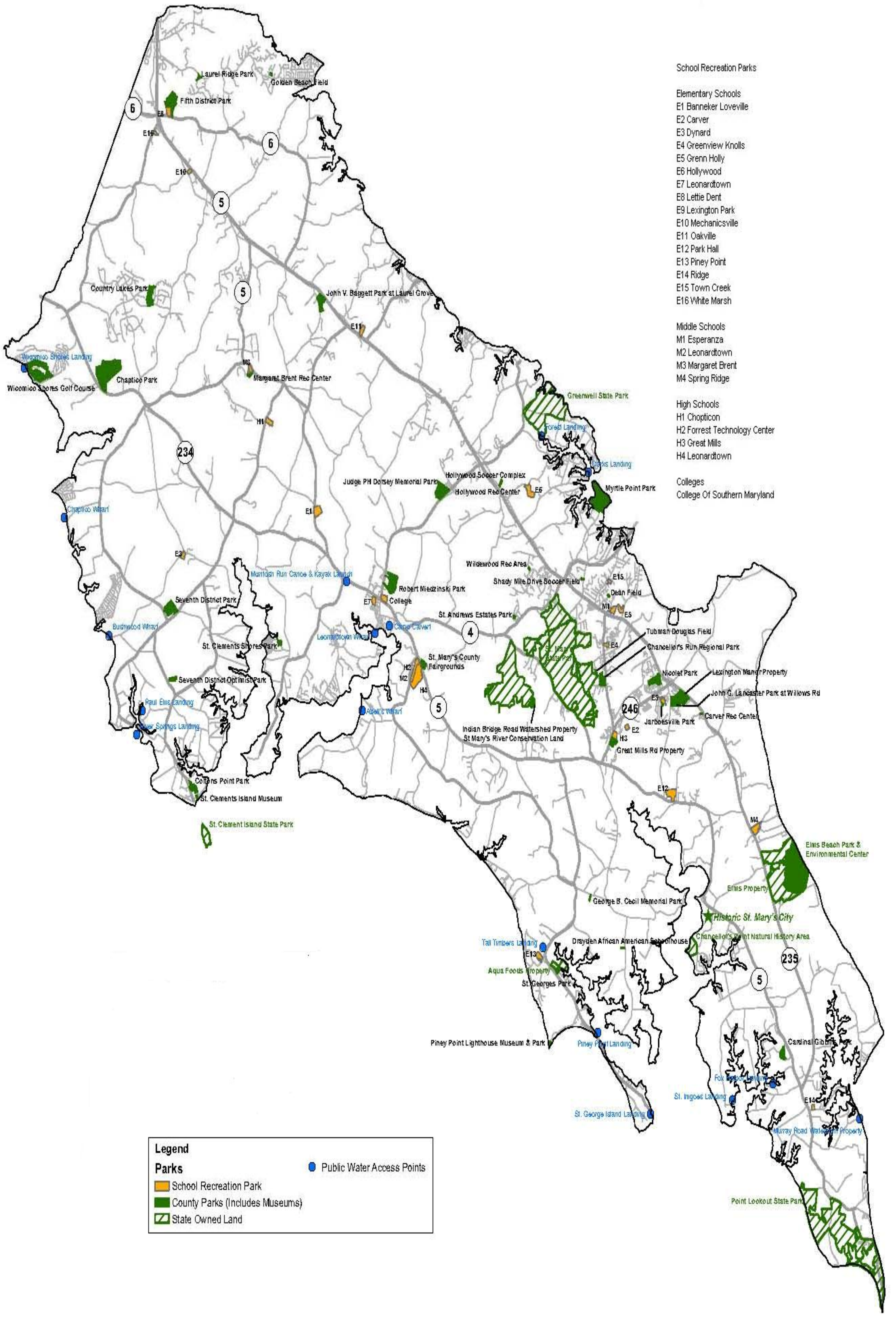

Figure 2-4
St. Mary’s Parks and Recreation Facilities
Source: (Reference 36)

In addition to this main facility in Prince Frederick, the county also has urgent care centers in Durkirk and Solomons, as well as a community health care facility in North Beach.

2.6.1.2 St. Mary's County. In St. Mary's County, hospital care is primarily provided by St. Mary's Hospital, located in Leonardtown. The hospital is JCAHO accredited and has 107 certified beds. (Reference 37) In 2006, St. Mary's hospital had 109 registered nurses and a total staff of 732 employees. There were 7,527 admissions in 2006, and the daily average of beds used was 66 (References 34 and 37). In addition to the hospital staff, St. Mary's County had 135 physicians practicing 35 different specialties within the county according to 2006 data. (Reference 34).

2.6.2 Fire Fighting/ Emergency Medical Service (EMS)

2.6.2.1 Calvert County. Fire fighting services in Calvert County are provided through 7 fire stations, 870 volunteer firefighters, 12 engines and attack pumpers (the average age of these engines is 15 years old), 3 ladder trucks, 5 tankers, and a range of other vehicles. (Reference xxviii)

In addition, Emergency Medical Service (EMS) volunteers provide service throughout the county. The fire/EMS services have approximately 500 emergency medical technicians (EMTs). In 2002, there were fire-rescue-EMS stations located in Huntingtown, Dunkirk, North Beach, St. Leonard, Solomons, and Price Frederick. (Reference 34)

The EMS handled 5,715 calls in 1993 and this grew nearly three-fold by 2003 when 16,223 calls were registered. (Reference xxviii) All fire and EMS services are staffed by volunteers in the county.

2.6.2.2 St. Mary's County. Fire fighting services for St. Mary's County are provided through 7 volunteer fire departments and 513 volunteers, 9 fire stations, and a total of 75 pieces of equipment including items such as aerial ladder trucks and 1,500 gallon-per-minute pumpers. (Reference 38)

In addition, the county has 7 volunteer EMS rescue squads and 437 volunteers working out of 9 stations. The EMS resources include 29 ambulances and 8 command and utility vehicles. There is also an Advanced Life Support Unit funded by the county. (Reference 38). In 2005, this unit responded to 132 calls that resulted in 175 hospitalized patients. (Reference 34)

2.6.3 Police Protection

2.6.3.1 Calvert County. The Calvert County Sheriff and the Maryland State Police provide protection within Calvert County (excluding North Beach and Chesapeake Beach, which provide separate protection, but work through the Calvert County Sheriff's Office). Both offices are located in Prince Frederick. (Reference xxviii) The Sheriff's department has 135 uniformed offices, 25 civilian personnel, and 135 police vehicles (Reference 34). The Sheriff's Office consists of four divisions: Civil Process/Court Security, Patrol Division, Criminal Investigations, and Correctional Services.

2.6.3.2 St Mary's. St. Mary's County Police Protection is provided by the St. Mary's Sheriff's Department and the Maryland State Police. The two agencies currently have a joint Bureau of Criminal investigation where detectives from both agencies work together on serious crimes that occur within the county. (Reference 38) The St. Mary's County Sheriff's Department provides numerous services including, but not limited to, general patrol functions, criminal investigations, traffic enforcement, protective orders, and assisting other agencies. In 2005, the Sheriff's department had 109 sworn deputies, 69 correctional officers and 42 civilian support personnel, and 6 K-9 officers. (Reference 38)

2.6.4 Water and Sewer

2.6.4.1 Calvert County. Calvert County has 22 water treatment plants and 14 storage tanks covering the county water districts. In 2005, the county facilities supplied approximately 460 million gallons of water. Currently, most districts have excess capacity and the utilization rate ranged from a low of 4.7 percent in the Summit Highlands Water district to a high of 70 percent utilization in the White Sands Water District. Homes and businesses not receiving water from the public utility use well water. (Reference 34)

Most of the sanitary waste in Calvert County is collected through onsite sewage disposal systems (septic tanks). There are also three large wastewater treatment plants that have the available capacity to handle the expected population growth for the next several years. The three wastewater systems support the communities of Prince Frederick, Solomons, and Chesapeake Beach and North Beach. Prince Frederick and Solomons are land application systems where as the Chesapeake Beach and North Beach systems discharge into the Chesapeake Bay after treatment. (Reference xxviii)

2.6.4.2 St. Mary's. St. Mary's County has 27 water systems having a combined 12.5 million gallons per day (mgd) pumping capacity and an average daily flow of 5.4 million gallons. The combined systems provide water for 41,000 residents. The water systems generally have adequate excess capacity to accommodate growth; the lowest utilization is 2.7 percent in the Hearts Desire water treatment district and the high is a 66.0 percent capacity utilization rate in the Lexington Park water district. Those not using water from the public utility acquire it from water wells. (Reference 34)

The county has four wastewater treatment plants located in Leonardtown, Pine Run, St. Clement's Shores, and Wicomico Shores, respectively. The four treatment plants have 53 wastewater pumping stations, a 6.3 mgd treatment capacity, and a 5.0 mgd flow rate. The treatment plants serve approximately 36,000 customers. The utilization capacity of these facilities ranges from 56.7 percent for the Pine Hill Run System to a high of 85.0 percent capacity factor for the Wicomico Shores systems. Similar to Calvert County, those not using public system primarily rely on septic tanks. (Reference 34)

2.6.5 Solid Waste

2.6.5.1 Calvert County. Solid waste in Calvert County, historically, has been taken to the double-lined landfill located in Appeal, which was opened in 1993. To reduce the need to expand the landfill, the county signed a 20-year agreement with a private company in 1997 to build and operate a solid waste transfer station in Lusby, and this has helped extend the life of the existing landfill. The county is a leader in recycling and in 2000, Calvert County citizens recycled 32 percent of their waste. This was more than double the 15 percent state average. (Reference xxviii)

2.6.5.2 St. Mary's County. The residents of St. Mary's county dispose of their solid waste, free of charge, at one of six county convenience centers. These centers are equipped to handle recycling in addition to solid waste. Residents are allowed to dispose of up to four 35-gallon trash bags into the solid waste compactors, and waste in excess of this amount is to be taken to St. Andrews Landfill. The St. Andrews Landfill Facility stopped landfilling operations in July 2001 with solid waste now being transferred to King George's Virginia. (Reference 39)

2.7 Transportation

2.7.1 Highway

2.7.1.1 Calvert County. Calvert County is located in southwestern Maryland, southeast of Washington D.C. and south of Baltimore. The primary north-south highway in the county is Maryland Highway 4, which connects travelers with Washington D.C. Maryland Highway 2 is another primary roadway and connects the county with Annapolis to the north after it splits from Highway 4 near Sunderland.

The close proximity of Calvert County to Washington D.C. makes it a prime residential location for commuters, though traffic volumes on Highway 4 have doubled in recent decades and have led to longer commuting times into the nation's capitol. Data from the 2000 U.S. Census indicates that 61 percent of the county residents employed commute to jobs located outside of Calvert County, and more than one-quarter of the labor force has a commuting time in excess of one hour.

County planners view the traffic congestion on MD Routes 4 and 2/4 as a primary concern and over time plan to convert these roadways into a controlled access expressway. As seen in Table 2-16, the 2007 annual average daily traffic (AADT) count for MD 2/4 was as high as 47,681 just south of MD 263. The county intends to implement traffic relief measures that include expansion of public transportation, and the promotion of carpools to keep the number of vehicles on county highways at a manageable level.

2.7.1.2 St. Mary's County. St. Mary's County and Calvert County are linked by the Thomas Johnson Bridge. The major highway transportation route in St Mary's County is Maryland Highway 235 (MD 235) that runs southeast to northwest, intersecting with U.S. Highway 301 north of the county. As shown in Table 2-16, in 2007, the high AADT for MD 235 was 48,260. As with Calvert County, St. Mary's County is within commuting distance of Washington D.C., though traffic congestion often results in long delays. One of the challenges moving forward will be to maintain the level of service at acceptable levels and yet allow for continued growth in the county. The county's Comprehensive Zoning Plan links the approval of any new residential, commercial, or industrial construction to an adequate plan to address and mitigate transportation impacts.

2.7.2 Regional Airports, Rail and Shipping

2.7.2.1 Airports. The only commercial airport within Calvert or St. Mary’s County is the St. Mary’s County Regional Airport, for general aviation, located more than two miles northwest of the proposed 230 kV transmission line where it crosses Maryland Highway 235. There are three major airports within the Baltimore-Washington D.C. area that service the region. These include the Baltimore/Washington International Thurgood Marshall Airport (BWI), the Reagan National Airport (DCA) in Washington D.C., and the Washington Dulles International Airport (IAD) in northern Virginia. Both BWI and IAD are full service international airports and DCA offers flights to the United States, Canada, and the Caribbean. The largest of the three airports is IAD handling 24 million passengers a year, followed by BWI (21 million passengers annually), and DCA (18 million passengers annually). (Reference 40)

2.7.2.2 Shipping. The primary arm of Chesapeake Bay lies to the east of Calvert County. This intra-coastal waterway extends north to Annapolis and Baltimore where commercial ships load or unload cargo. The Patuxent River runs on the western side of Calvert County and separates it from St. Mary's County. The river narrows significantly to the north and no major ports are serviced by the river; therefore nearly all river boat traffic is recreational. To the south and west of St. Mary's County, the Potomac River flows into Chesapeake Bay and provides water access to the Washington D.C. area. These waterways will not be affected by Project construction or operation as the crossing of the Patuxent River will occur under the riverbed.

2.7.2.3 Rail. There are two long haul Class I rail carriers that provide service to the region: CSX Transportation and Norfolk Southern. These long haul carriers also make connections with Canadian Pacific and Canadian National Railways to transport goods into Canada. In addition to these Class I carriers, there is a connecting network of short line railroads (e.g. Canton Railroad and Eastern Shore Railroad) that provide service from Western Maryland to the Delmarva Peninsula[2]. (Reference 41)

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[2] The Delmarva Peninsula is East Coast of the U.S, occupied by portions of Delaware, Maryland, and Virginia.

3.0 Socioeconomic Impacts of Construction and Operation

3.1 Socioeconomic Impacts of Construction

In any utility project, there is the potential for positive and negative socioeconomic impacts. Positive socioeconomic impacts associated with the construction of the SMECO 230 kV transmission line would include beneficial impacts in employment and income, plus added tax revenues to local jurisdictions. These impacts are discussed in more detail in the following paragraphs.

It is expected that there would be no significant negative socioeconomic impacts during construction of the proposed transmission line. This is because there would not be a large construction workforce relocating to the area to place a significant and sudden burden on local services or housing. There would be potential temporary socioeconomic impacts associated with traffic disruptions as large or over-sized equipment enters or leaves the roadways in selected route areas, or as crews enter and exit the right-of-way. However, given the small size of the construction workforce, approximately 10 to 15 workers per crew, and the temporary nature of the construction effort, all impacts associated with traffic disruptions would be negligible.

Construction of SMECO's proposed 230 kV would have modest, but positive economic benefits to Calvert County and St. Mary's County. The primary impact would arise from the direct employment and income benefits associated with the construction of the Project. SMECO expects that construction of the Project would begin in the second quarter of 2012 and will be completed in the fourth quarter of 2015, a continuous process covering approximately 3.5 years. As indicated in Figure 3-1, construction would occur in segments, beginning with the Holland Cliff to southern Calvert segment. The final segment expected to be completed would be the southern Calvert to Hewitt Road segment. The river crossing would begin during the fourth quarter of 2013 and would be suspended during the second and third quarters of 2014 and then resume in the fourth quarter of 2014, finishing in the first quarter of 2015.

Construction of the Project would involve no more than two crews of approximately 10 to 15 workers each, working at any given time, and operating sequentially in each section of the corridor. The sequence of construction events would involve preparation the right-of-way for construction, installation of the poles, and installation of the lines. Assuming an average total construction workforce of 30 full time equivalents (two crews of 15 each) and an average wage rate of $35/hour, it is expected that the 3.5 year construction period would result in approximately 105 job-years of employment and $7.64 million in direct wages for the construction workforce.

This estimate does not include the cost of Project engineering and procurement that would be likely conducted by specialists outside the immediate Project vicinity.

In addition to the direct employment and income effects, a multiplier effect would be created in the local economy as a result of the additional employment, income, and output associated with the Project. Southern Maryland would experience the majority of the impact associated with employment as it would be the site of construction.

One way to estimate the multiplier impact of a new investment in a region is through the use of a regional input-output model, which can estimate an expected industry multiplier to be applied to the direct impact estimates. Input-output models typically use an accounting matrix that shows the change in output, earnings, or employment in all industries due to a change in investment in one industry. For estimating the impact of the SMECO line construction, the Regional Input-Output Modeling System (RIMS II model), developed and maintained by the U.S. Bureau of Economic Analysis was used.

The RIMS II model also includes multipliers for roughly 500 industry classifications and, as a static equilibrium model, can predict the total impact associated with an initial investment, although it does not predict the timing of impacts. The RIMS II model requires the user to select a geographical area of study for which multipliers will be estimated. Typically, this consists of contiguous counties near the investment location, sometimes referred to as the "primary impact area". For the SMECO analysis, the primary impact area was defined to include the counties of Calvert and St. Mary's, because the proposed line would run primarily in Calvert County and partially in St. Mary's County. Therefore, due to the relatively small workforce and the geographic confinement of the proposed work it is assumed that no other counties would incur any substantial impacts. After the primary impact area was selected, the RIMS II model simulation produced direct-effect multipliers for earnings and employment. The resulting multipliers can be applied to the direct employment and earnings associated with the Project.

The analysis of the multiplier results are summarized in Table 3-1. Listed within the table are the direct earnings and employment figures associated with the SMECO Project, the projected indirect effects on earnings and employment, and the total estimated impact on regional earnings and employment. The RIMS II modeling results show that, in total, the $7.64 million in direct construction earnings is projected to generate $11.17 million in regional earnings. Further, the RIMS II modeling results show that the 105 direct man-years of employment would help generate a total of 172 man-years of regional employment when the indirect effects are also considered.

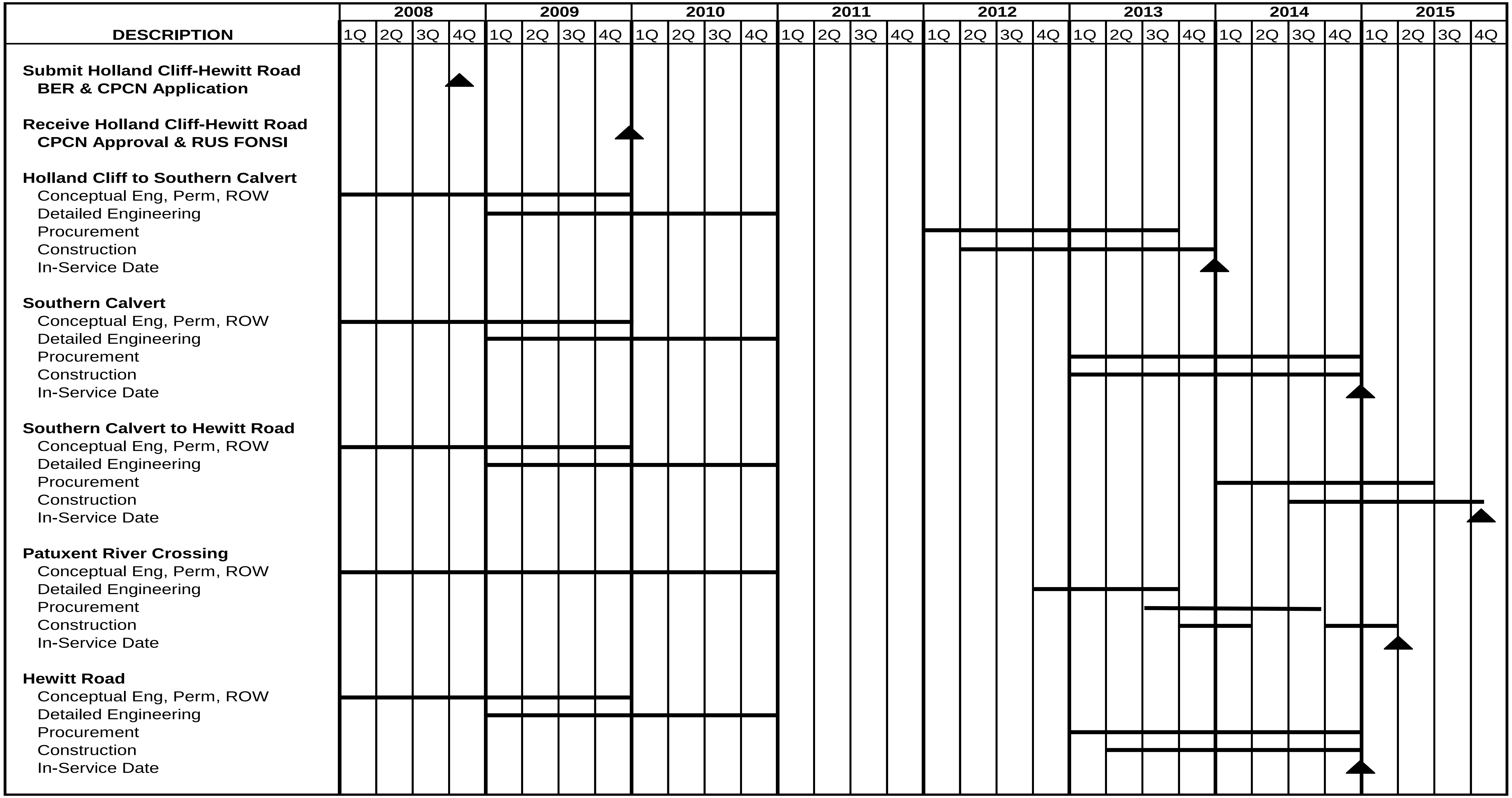

Figure 3-1
Proposed 230 kV Transmission Line Construction Schedule
Source: Black & Veatch

Table 3-1 Projected Multiplier Impacts Associated with the SMECO Project			
Period	Impact Category	Earnings ($ millions)	Employment (job-years)
Construction	Direct	$7.64	105
	Indirect	$3.53	67
	Total	$11.17	172

3.2 Impacts of Operation

Once the proposed 230 kV transmission line is in operation, the operating and maintenance costs would be minimal. The primary activity would involve the clearing of the right-of-way every five years. In addition, there would be periodic inspection of the transmission line. In that the transmission line would predominately lie within the existing 69 kV right-of-way and since this right-of-way is currently cleared and maintained, the incremental labor and cost of maintaining this right-of-way would be minor.

3.3 Impacts on Zoning & Land Use

The incremental impacts on zoning and land use due to the installation of the Project would be minimal, as the proposed line would use the existing SMECO 69 kV line right-of-way. Where existing right-of-way will not be used, primarily through the Naval Recreational Center and in Town Creek, the line will be underground. In addition, the proposed line will cross the Patuxent River under its riverbed. Therefore, the Project will have a minimal impact on zoning and land use.

By using the existing SMECO right-of-way for the new line, SMECO would be able to remove the existing poles for the 69 kV transmission line and would be able to place both the existing 69 kV line and the new 230 kV line on the same new transmission line towers. The new towers will be taller than the existing transmission line poles, thereby increasing the visibility of the towers from further distances, but one of the benefits is that taller transmission line structures allow greater distances between each structure and therefore fewer structures will be required than are currently installed for the 69 kV line alone.

4.0 Environmental Justice

The Environmental Justice analysis presented in this section has its impetus in Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which was issued on February 11, 1994. Executive Order 12898 was designed to focus the attention of federal agencies on the human health and environmental conditions in minority and low-income communities. This Executive Order has been adopted by licensing agencies in various ways. The EPA objectives concerning environmental justice, for example, include "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (Reference 42). The Nuclear Regulatory Commission (NRC) also addresses environmental justice issues in its licensing activities, and its reviews identify minority and low-income populations that may be affected by an activity, the significance of such effects, whether the minority and low-income populations are disproportionately high and adverse compared to the population at large within the geographic area, and if so, what mitigative measures are available and will be implemented (Reference 43). Given the presence of the Calvert Cliffs nuclear project located in Calvert County and the NRC guidelines that allow a quantitative assessment of environmental justice impacts, the NRC guidelines have been adopted for the present environmental justice analysis.

4.1 Minority Populations

For purposes of making an environmental justice determination, a "minority" racial population is defined as "American Indian or Alaskan Native; Asian; Native Hawaiian or Pacific Islander; Black races; or Hispanic ethnicity". A "minority population" is defined to exist if 1) the percentage of minorities within an environmental impact area exceeds the percentage of minorities in the state in which the impact area is located by 20 percentage points or more, or 2) if the percentage of minorities in the impact area is 50 percent or greater (Reference 44).

Maryland had a 2006 total population of 5,615,727 people. Of this number 3,275,189 were classified as "White alone". Therefore, approximately 58.3 percent of Maryland's population is White and the remaining 41.7 percent is considered minority. Of this minority population the largest contingent is the "Black or African American alone" with 1,611,113 people or approximately 28.7 percent, followed by the "Hispanic or Latino (of any race)" with 333,390 people or 6.0 percent, and the "Asian alone" category with 274,309 people or 4.8 percent (Reference 45).

Calvert County's population in 2006 was estimated by the U.S. Census Bureau to be 88,804 people. Of those 88,804 people 72,509 were classified as "White alone", equating to 81.6 percent of the population; therefore, 18.4 percent of the population is categorized as minority. The largest minority groups are "Black or African alone" with 10,717 people (12.1 percent of the total population), the "Two or more races" category with 1,977 people (2.2 percent of the total population), and the "Hispanic or Latino category (of any race) with 1,906 people (2.1 percent of the total population) (Reference 46).

St. Mary's County had a 2006 total population of 98,854 people, of which 79.2 percent (78,320) were classified as "White alone" and 20.8 percent were classified as minority. The largest minority groups in St. Mary's County in 2006 were the "Black or African American alone" with 13,700 persons (13.9 percent of the total population), the "Hispanic or Latino (of any race)" with 2,402 people (2.4 percent of the total population), followed closely by the "Asian alone" category with 2,091 people (2.1 percent of the total population) (Reference 47).

Given these statistics, it is apparent that neither Calvert County or St. Mary's County qualify as a minority area under the adopted definitions, as minorities make up far less than 50 percent of the overall population and both counties have a smaller portion of minorities than at the state level. Thus, while there are minority populations located in both counties, they are not large enough to trigger environmental justice concerns under the adopted definitions, and no mitigation is required.

4.2 Low-Income Populations

The U.S. Census Bureau determines the number of low-income families in a given area by comparing the actual income of a family against the low-income threshold established for the corresponding family category, which includes the variables of family size, the number of children, and the age of the householder (Reference 44). For purposes of evaluating environmental justice impacts, a low-income population is defined to exist in an area if: 1) the percentage of households within an environmental impact area living below the poverty level exceeds the percentage of low-income households within the state by 20 percentage points, or 2) the percentage of low-income households in the impact area is 50 percent or greater (Reference [48]).

According to 2006 U.S. Census data, there were a total 1,405,655 families in Maryland. Approximately 5.3 percent (74,499 families) of these families had an income that was below the poverty level. In 2006, there were a total of 23,847 families living in Calvert County. Approximately 1.5 percent, or 358 of these families, had incomes below the poverty level. The 2006 data also shows that St. Mary's County had a total of 26,824 families with 5.2 percent, or 1,395, of these families living at the poverty level.

Based on the analysis of 2006 data, neither Calvert County nor St. Mary's County qualify as a low income area under the definition pf poverty, as the poverty rate for both counties was below 50 percent overall, and is less than 20 percent over the poverty rate for the state. Therefore, while there are some low income families located in each county, they are not large enough to trigger environmental justice concerns under the adopted definitions. Therefore, no mitigation activities are required.

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Appendix D
Electric and Magnetic Field (EMF) Report

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APPENDIX D

Exponent®

SMECO®
Southern Maryland Electric Cooperative

EMF Study for the Holland Cliff-Hewitt Road Project

November 14, 2008

EMF Study for the Holland Cliff-Hewitt Road Project

Prepared for

Black & Veatch
Acting as the Agent
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November 14, 2008

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Electric and Magnetic Field Calculations

Introduction

The Southern Maryland Electric Cooperative (SMECO) has proposed the Holland Cliff to Hewitt Road Project to improve import capability and reliability to Southern Maryland. Portions of the project involve the construction of 230-kV transmission lines that will follow existing overhead 69-kV transmission-line routes between the Holland Cliff and Hewitt Road substations. The existing 69-kV transmission lines will be rebuilt on the same structures as the proposed 230-kV lines along these route segments. One portion of the proposed project crossing the Patuxent River involves the construction of a new 230-kV underground/underwater duct bank. This duct bank does not follow an existing 69-kV corridor.

This section of the report provides calculations of the 60-Hz electric and magnetic fields (EMF) along cross-sections perpendicular to the sections of the route listed in Table 1 between the Holland Cliff and Hewitt Road substations. Existing and proposed conditions on these route segments will be compared to assess project-related changes to EMF.

Input Data

Input Data and Modeling Methods

Black & Veatch, the lead design engineer for SMECO for this project, provided information on the configuration and loading of existing and proposed lines at annual average and peak loading. The configuration of the existing 69-kV lines is shown in Figure 1. The configurations of the proposed double circuit 230-kV structures with 69-kV rebuild underneath, and the proposed underground design are shown in Figure 2. The sections of the proposed route that were modeled are summarized in Table 1. Note that the route of the underground section is not contained within the existing right-of-way and therefore is shown separately in Table 1.

The modeling of EMF levels from existing and proposed transmission lines was performed using computer algorithms developed by the Bonneville Power Administration (BPA), an agency of the U.S. Department of Energy (BPA, 1991). These algorithms have been shown to accurately predict EMF measured near power lines. The inputs to the program are data regarding voltage, current flow, circuit phasing, and conductor configurations. The resultant fields associated with power lines were estimated along profiles perpendicular to lines at the point of lowest conductor sag, i.e., closest to the ground. All calculations were referenced to a height of 1 m (3.28 ft) above ground according to standard practice (IEEE, 1994). The program assumed that the transmission conductors were at a typical mid-span height for the entire distance between structures and flat terrain, and was instructed to model balanced currents on all phases. The electric field from the overhead line conductors was also calculated using the typical mid-span height. The program assumed an overvoltage condition of 5 percent for transmission lines. As magnetic field exposures at peak loading would be expected to occur only for a limited number of hours, on a limited number of days each year, the calculated field levels at annual average loading provide a better estimate of typical potential exposures and so are summarized in both tables and graphical profiles. The modeling results for the electric field and magnetic fields at peak loading are summarized in tables. The loading on the transmission lines used in the modeling of magnetic fields are summarized in Table 2.

Table 1. Cross sections modeled for this report

From	To	Proposed configuration	Line Designators			
			Existing	Proposed		
Holland Cliff	Prince Frederick	Double circuit 230 kV	6783	6783	2340	2345
Prince Frederick	Pr. Frederick Tap	Double circuit 230 kV	6706	6706	2340	2345
Pr. Frederick Tap	Dukes Inn	Double circuit 230 kV	6706	6706	2340	2345
Dukes Inn	Mutual	Double circuit 230 kV	6786	6786	2340	2345
Mutual	St. Leonard Tap	Double circuit 230 kV	6781	6781	2340	2345
St. Leonard Tap	Calvert Cliff	Double circuit 230 kV	6781	6781	2340	2345
Calvert Cliff	Bertha		6797	–	–	–
Calvert Cliff	Southern Calvert County	Double circuit 230 kV	N/A	6787CC	2340	2345
Southern Calvert County	Bertha	Single circuit 230 kV	N/A	6787B	2330	–
Bertha	Solomons	Single circuit 230 kV	6788	6788	2330	–
Solomons	Hewitt Road	Single circuit 230 kV	6770	6770	2330	–
Solomons	Hewitt Road	Underground	–	–	2330	–

Table 2. Peak and average loads used for the calculations in this report

[redacted]

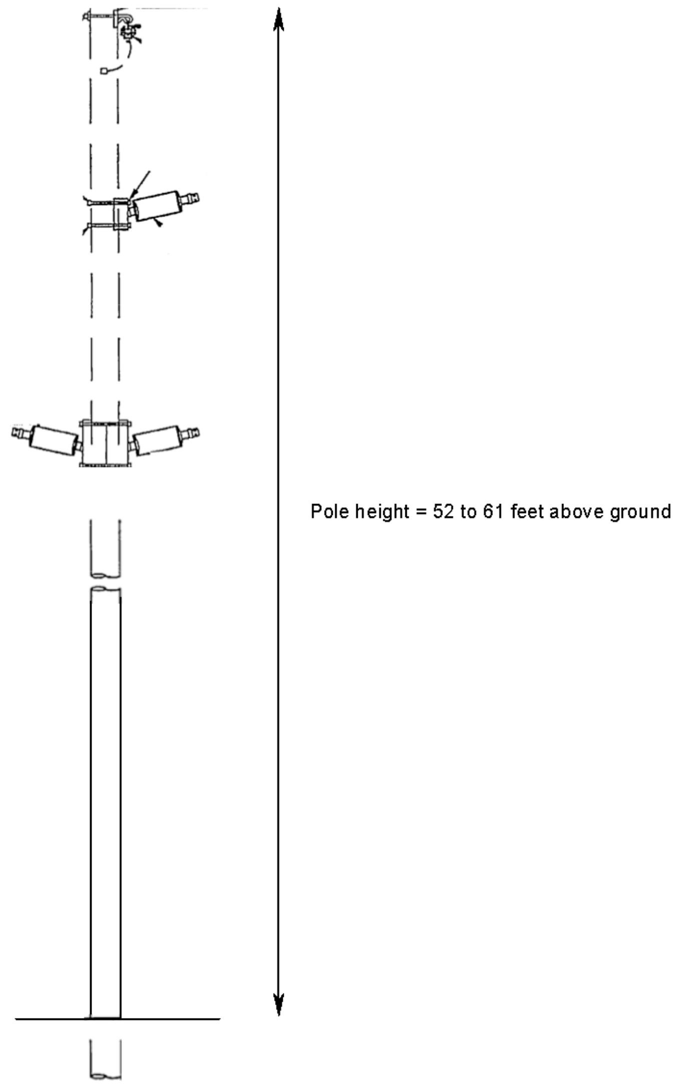

Figure 1. Existing 69-kV pole design. The 69-kV conductors are attached at the three horizontal standoffs at the top of the pole.

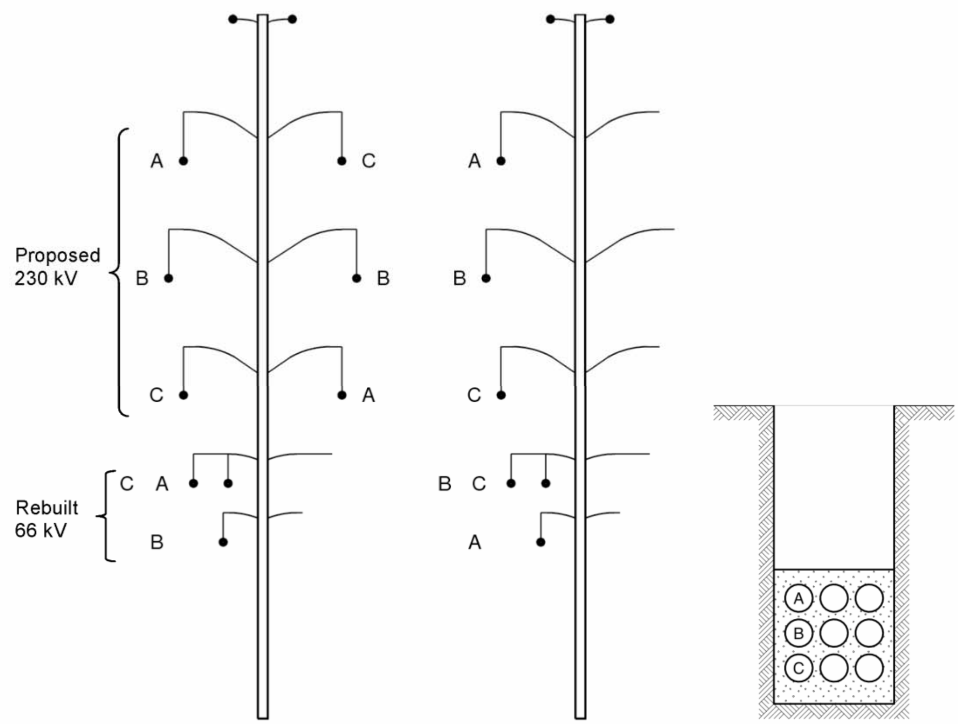

Figure 2. Proposed 230-kV designs.

From left to right: (1) double-circuit 230-kV with existing 69-kV lines rebuilt below proposed 230-kV lines; (2) single-circuit 230-kV with existing 69-kV lines rebuilt below proposed 230-kV lines; and (3) underground duct bank with A, B, and C phases of proposed 230-kV line in separate conduits. The phasing of the double circuit 230-kV lines and the rebuilt 69-kV lines has been selected to minimize the magnetic field at the ROW edge.

Magnetic field calculations

Magnetic fields can be measured around conductors that carry current. Because current increases as the power delivered by a transmission line increases, the magnetic fields near transmission lines vary with the line's "loading," i.e., with the power delivered on the line. Even if two segments of a transmission-line corridor have the same structures, phasing, voltage, and conductor heights, the magnetic field that can be measured in the two segments will be different if power enters or exits at an intervening substation. The "From" and "To" columns in

Table 1 are terminal substations for different segments of the project, and each row of Table 1, therefore, is considered separately when calculating the magnetic field. Table 5 shows the loading for existing 69-kV transmission lines, proposed 230-kV transmission lines, and rebuilt 69-kV lines, which was used to calculate magnetic fields under average and peak demand.

There are three basic proposed configurations for the proposed 230-kV transmission line: double circuit, single circuit, and underground. The double- and single-circuit configurations are overhead designs adjacent to the rebuilt 69-kV lines. The project incorporates a 69-kV phasing design that minimizes the fields produced by the proposed 230-kV lines, which is consistent with recommendations of the World Health Organization to reduce fields along transmission rights-of-way (WHO, 2007). To predict the effect of various phasing alternatives for the rebuilt 69-kV lines, the peak-load magnetic fields were calculated under different 69-kV phasing alternatives between the St. Leonard’s Tap and Calvert Cliff, and between the Southern Calvert County switching station and Bertha substation. These segments carry the highest apparent power, and were modeled under 69-kV phase permutations to select the phasing design that would produce the lowest magnetic fields at a 50-foot distance from the transmission centerline, on the side nearest the rebuilt 69-kV lines. The selected phasing design between St. Leonard Tap and Calvert Cliff (Figure 3) was used for all subsequent magnetic- and electric-field calculations between Holland Cliff and Southern Calvert County. The phasing design between the Southern Calvert County switching station and Bertha substation (Figure 4) was used for all subsequent magnetic- and electric-field calculations between Southern Calvert County and Hewitt Road.

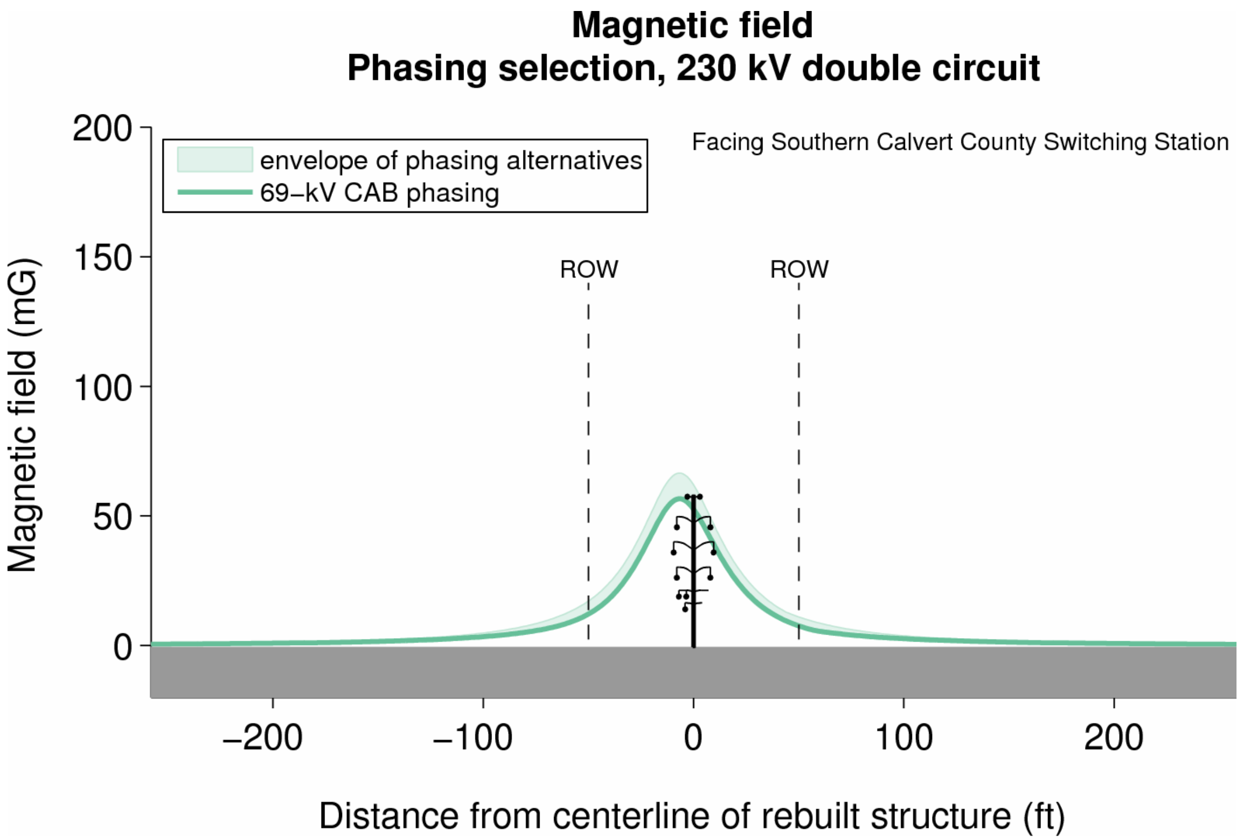

Figure 3. Phasing design between St. Leonard Tap and Calvert Cliff, selected to minimize the magnetic field at -50 feet on the figure shown. View facing Southern Calvert County.

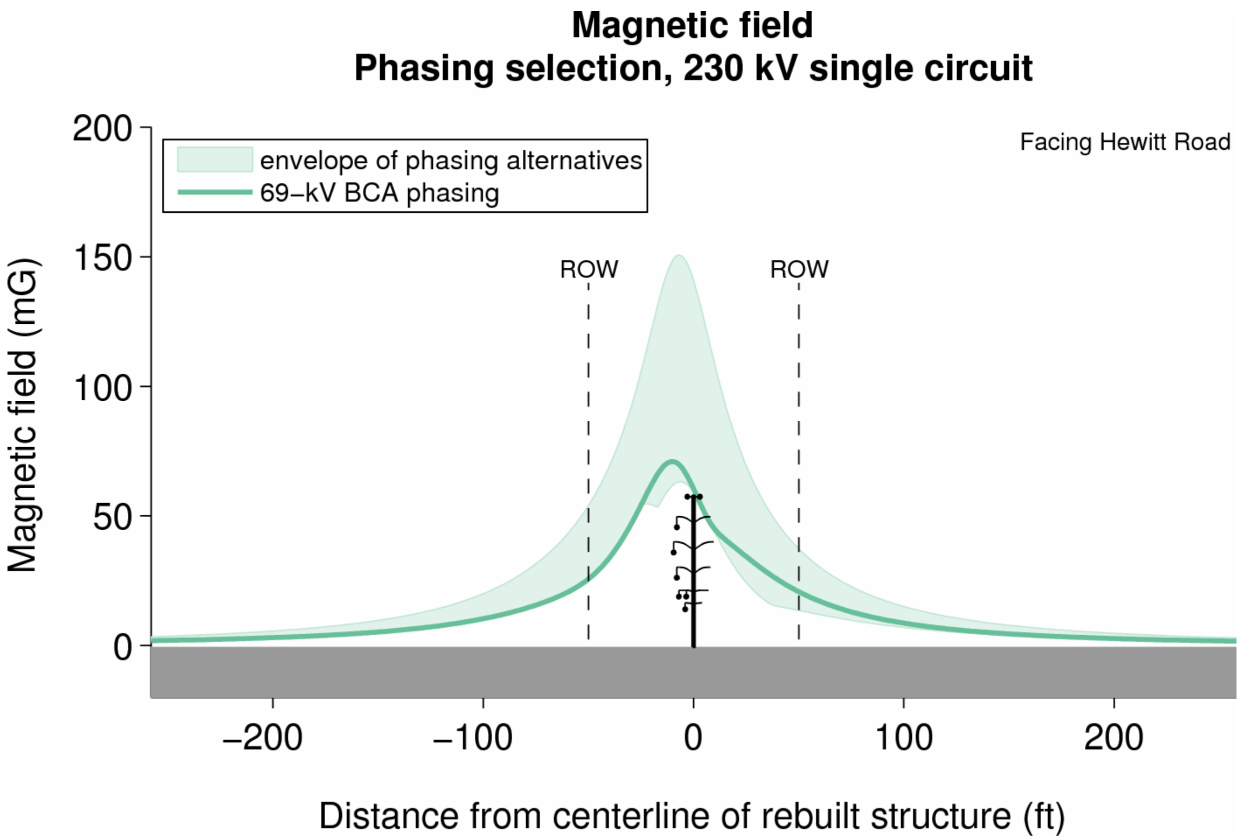

Figure 4. Phasing design between the Southern Calvert County switching station and Bertha Substation, selected to minimize the magnetic field at -50 feet on the figure shown. View facing Hewitt Road.

With the phasing design selected to minimize project-related magnetic fields, magnetic fields were calculated for the route segments in Table 1. The IEEE Std. 0644-1994 stipulates that magnetic fields are to be measured 1 m (3.29 ft) above the ground. To facilitate comparison of calculated values with field measurements, the magnetic fields were calculated at 1M (3.29 ft.) above the ground line. The calculated values are reported as the maximum value of the field ellipse at each location along a transect perpendicular to the transmission centerline. The magnetic fields for existing and proposed cases at average power demand are compared in Figures 5 through 15.

The 69-kV ground clearance used in the calculations was 24 feet at midspan, based upon a design ground clearance 2 feet higher than the minimum ground clearance of 22 feet. The lowest 230-kV conductor was modeled at a separation of 19′-8″ from the lowest 69-kV conductor, based upon the design of the pole. In the underground portion of the line 2330 route, a minimum burial depth of 3 feet to the top of the duct-bank concrete was assumed for the calculations.

Table 2 summarizes the calculated magnetic-field values on the ROW, at edge of the ROW (±50 feet from the centerline), and 100 feet beyond the edge of the ROW (±150 feet from the centerline) for average-load conditions, the same conditions depicted in Figures 5 through 15. Table 3 summarizes the calculated magnetic-field values at the same locations as Table 2 for peak-load conditions, corresponding to the "peak load case" entries in Table 5. Tables 2 and 3 include field values calculated at a 100' setback from the ROW edge to indicate how EMF decreases with distance from the transmission-line conductors.

Electric field calculations

Electric fields can be measured around conductors that are held at an elevated electric potential or voltage. Unlike magnetic fields, electric fields do not depend on current or loading. For this reason, the numerous load cases considered along the proposed 230/69-kV line in the calculation of magnetic fields do not need to be considered when calculating the electric field. Likewise, the electric field under average- and peak-demand conditions does not vary too appreciably because minimum conductor heights were assumed for the models of the electric field under all loading conditions. The calculated profiles of the electric field for existing and proposed conditions are shown in Figures 16 and 17. Only two cross-sections are required to describe the single-circuit and double-circuit overhead pole configurations. No cross section is depicted for the underground portion of the proposed 230-kV route, since the shielding of the electric field by the duct bank and backfill material will preclude any contribution change to the background electric field produced by other sources above ground.

Table 3 summarizes the calculated electric-field values on the ROW, at edge of the ROW (±50 feet from the centerline), and 100 feet beyond the edge of the ROW (±150 feet from the centerline) for the cross-sections in Figures 16 and 17.

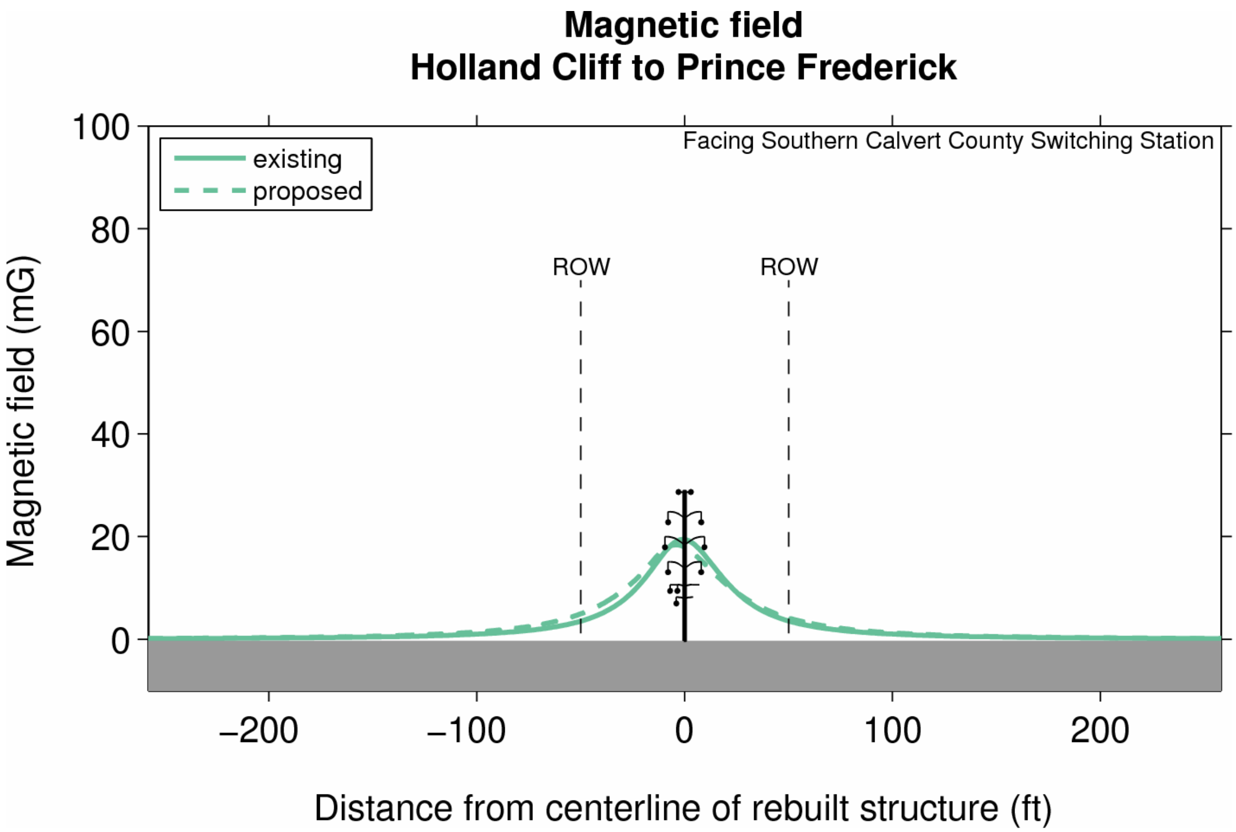

Figure 5. Calculated average-load magnetic-field profile for a representative section of the proposed route between Holland Cliff and Prince Frederick. View facing Southern Calvert County.

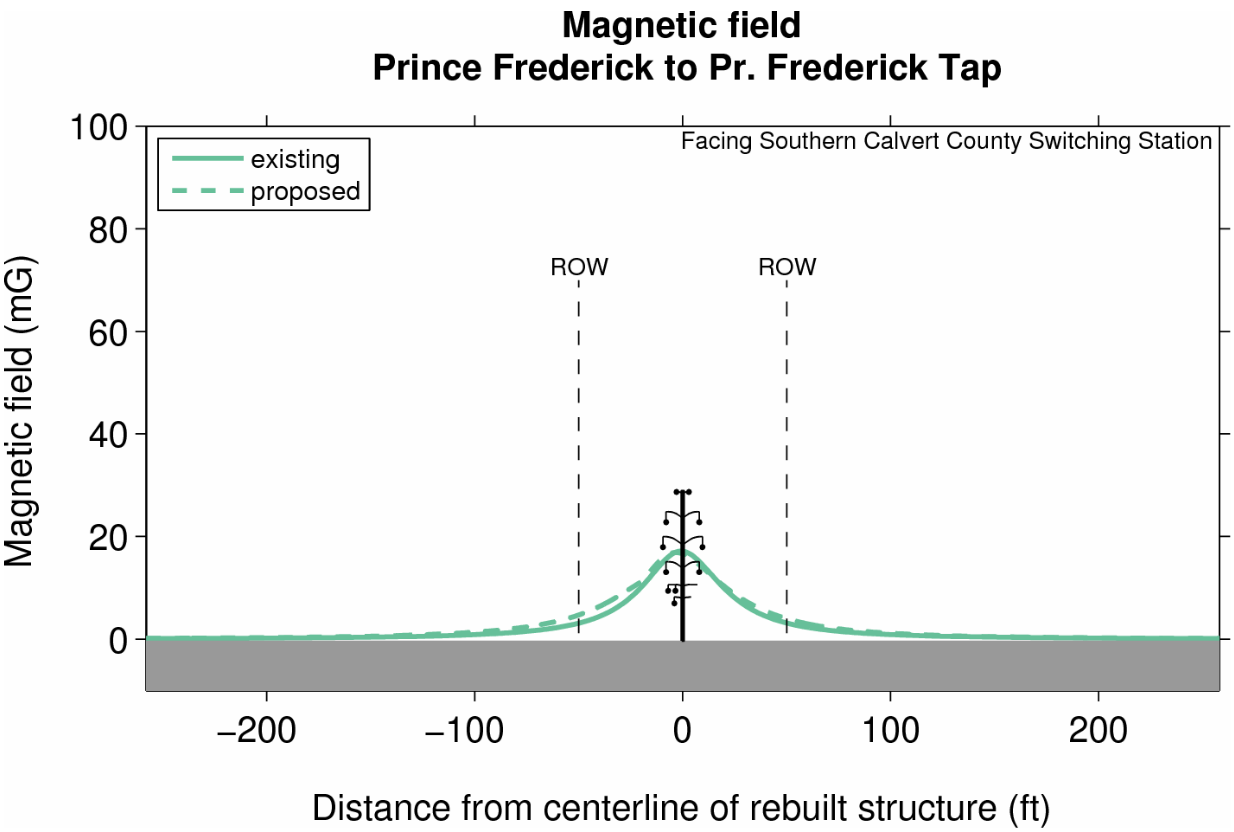

Figure 6. Calculated average-load magnetic-field profile for a representative section of the proposed route between Prince Frederick and Prince Frederick Tap. View facing Southern Calvert County.

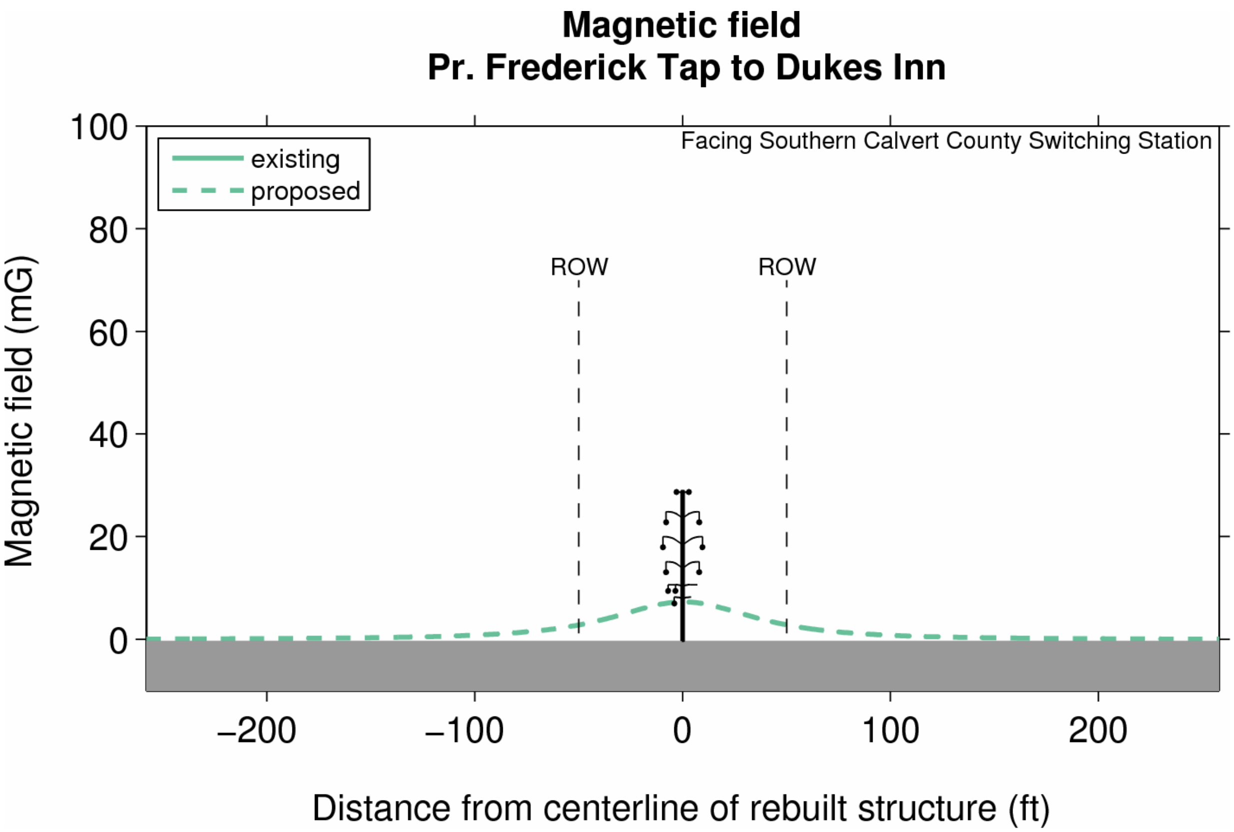

Figure 7. Calculated average-load magnetic-field profile for a representative section of the proposed route between Prince Frederick Tap and Dukes Inn. View facing Southern Calvert County. Under existing average-load conditions, the 69-kV line carries no load and produces no magnetic field.

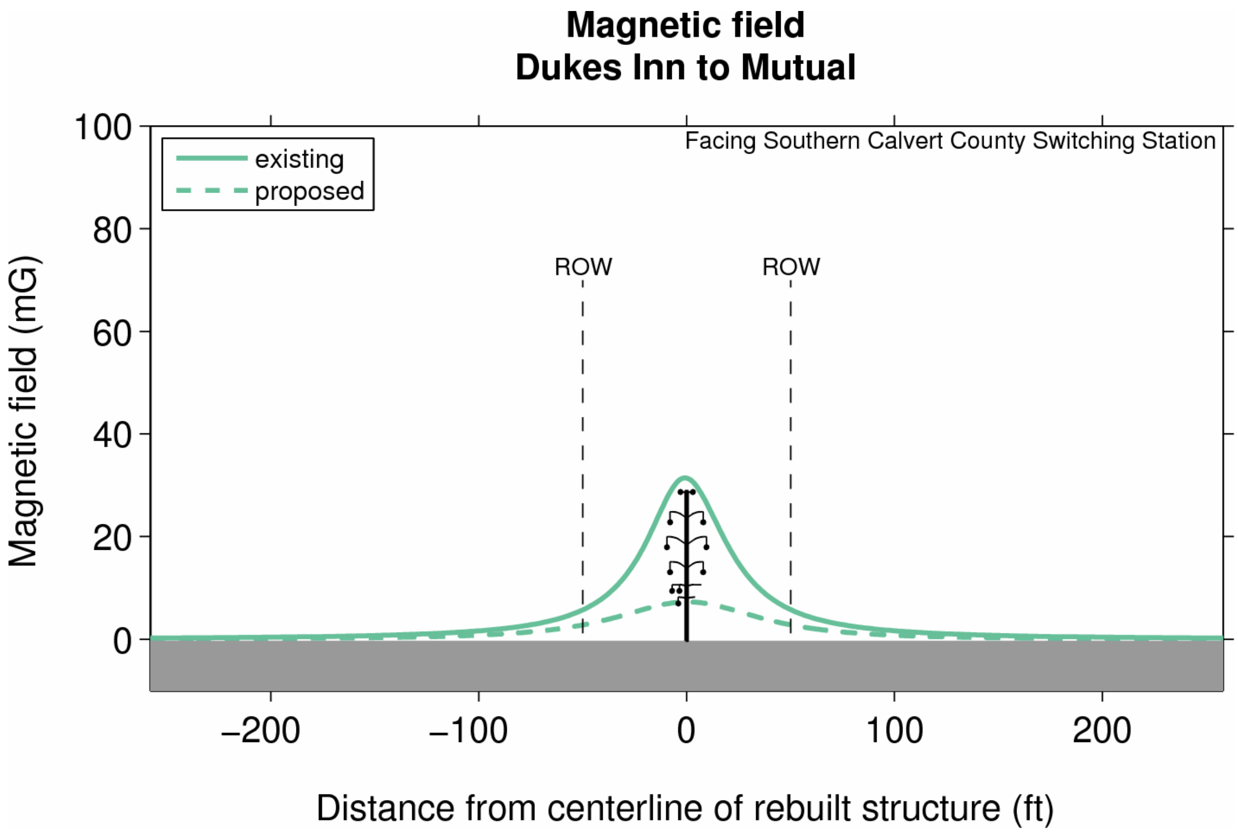

Figure 8. Calculated average-load magnetic-field profile for a representative section of the proposed route between Dukes Inn and Mutual.

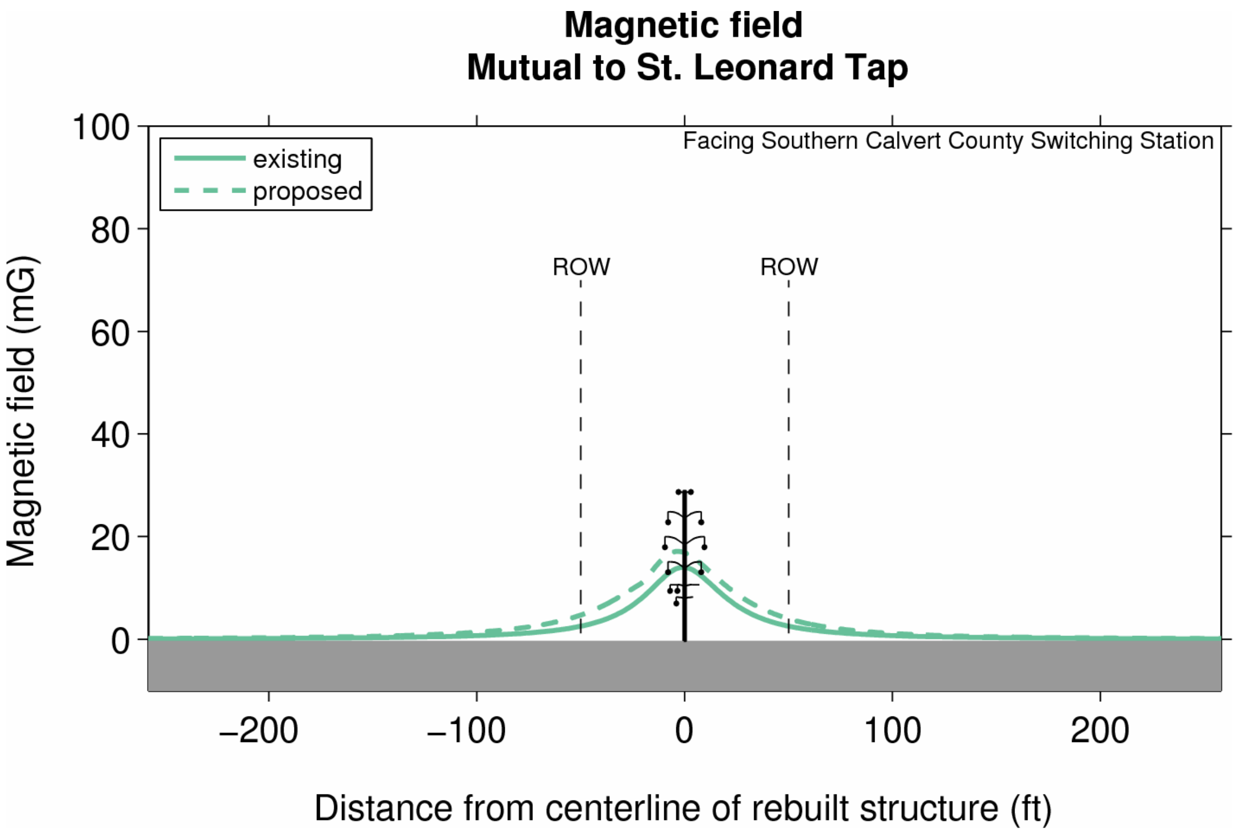

Figure 9. Calculated average-load magnetic-field profile for a representative section of the proposed route between Mutual and St. Leonard's Tap.

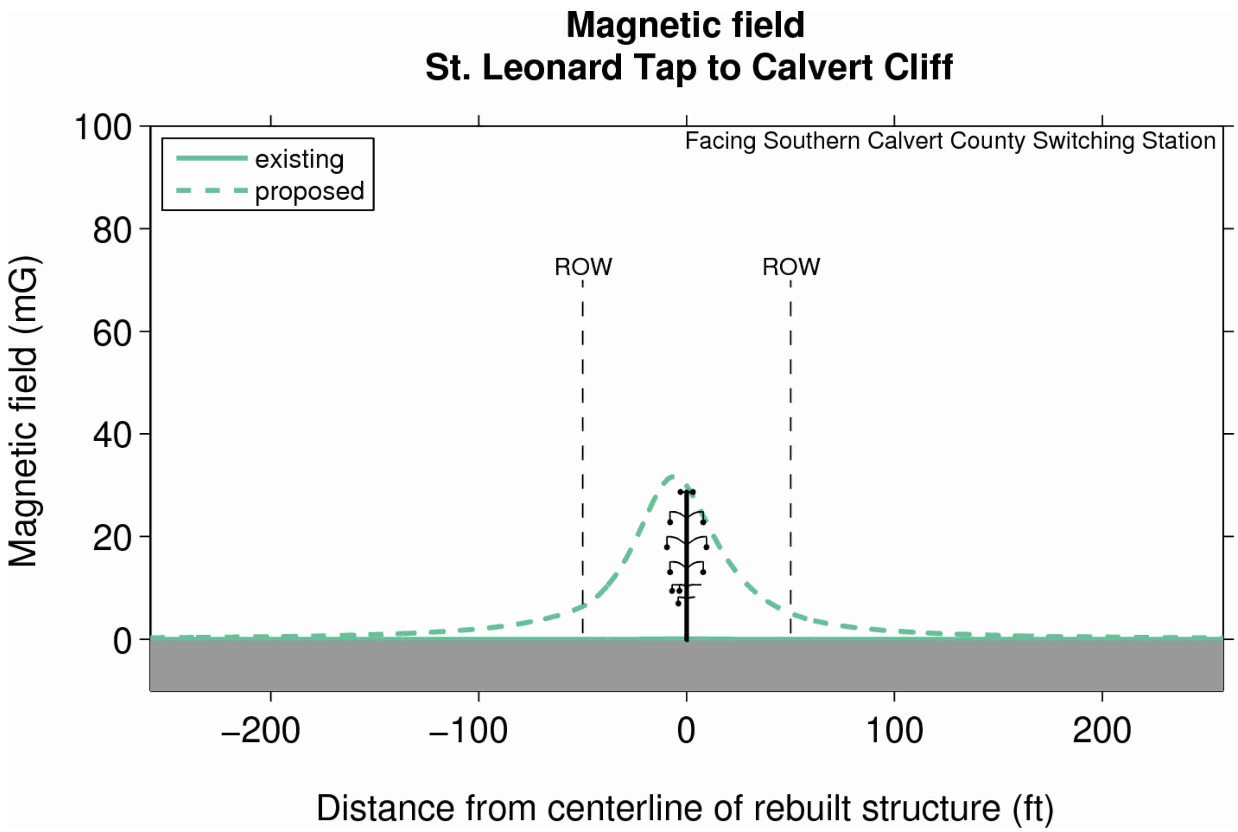

Figure 10. Calculated average-load magnetic-field profile for a representative section of the proposed route between St. Leonard's Tap and Calvert Cliff. Under existing average-load conditions, the 69-kV line carries no load and produces no magnetic field.

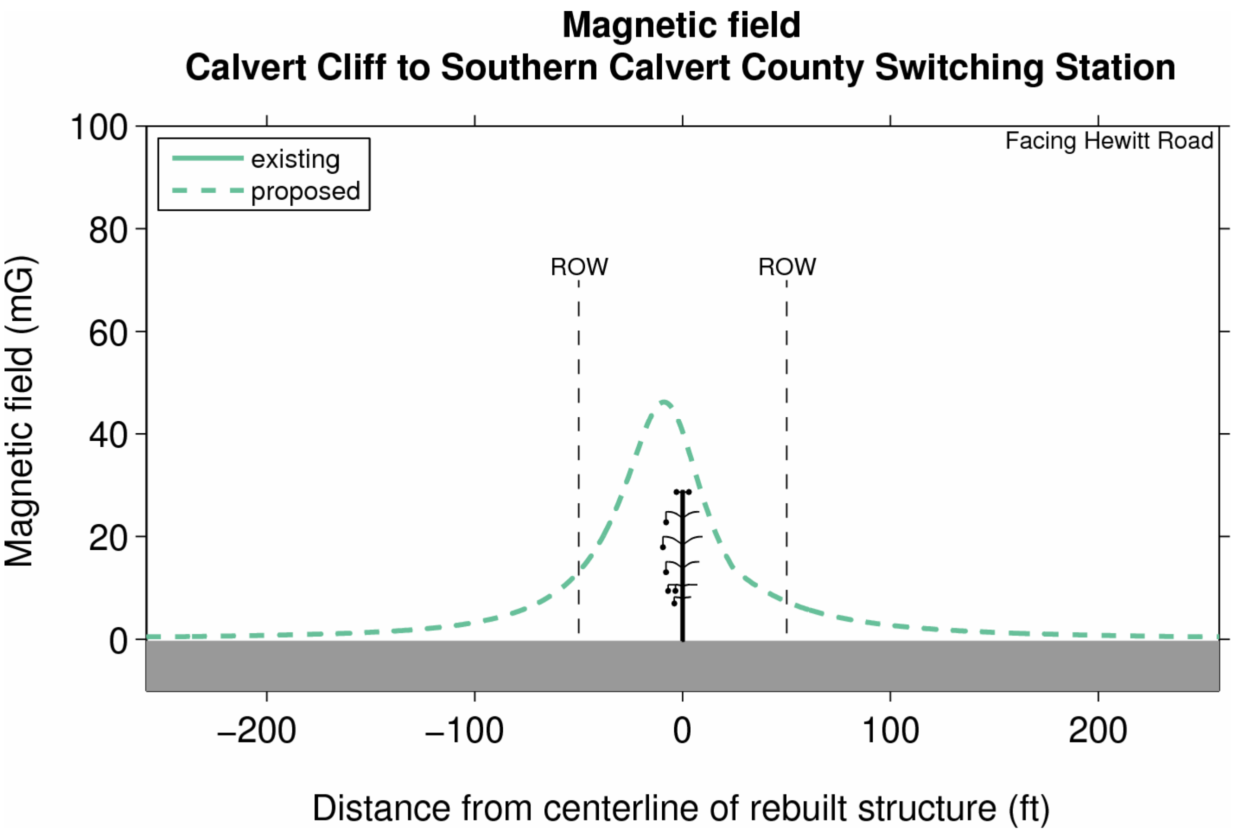

Figure 11. Calculated average-load magnetic-field profile for a representative section of the proposed route between Calvert Cliff and Southern Calvert County. Under existing average-load conditions, the 69-kV line carries no load and produces no magnetic field.

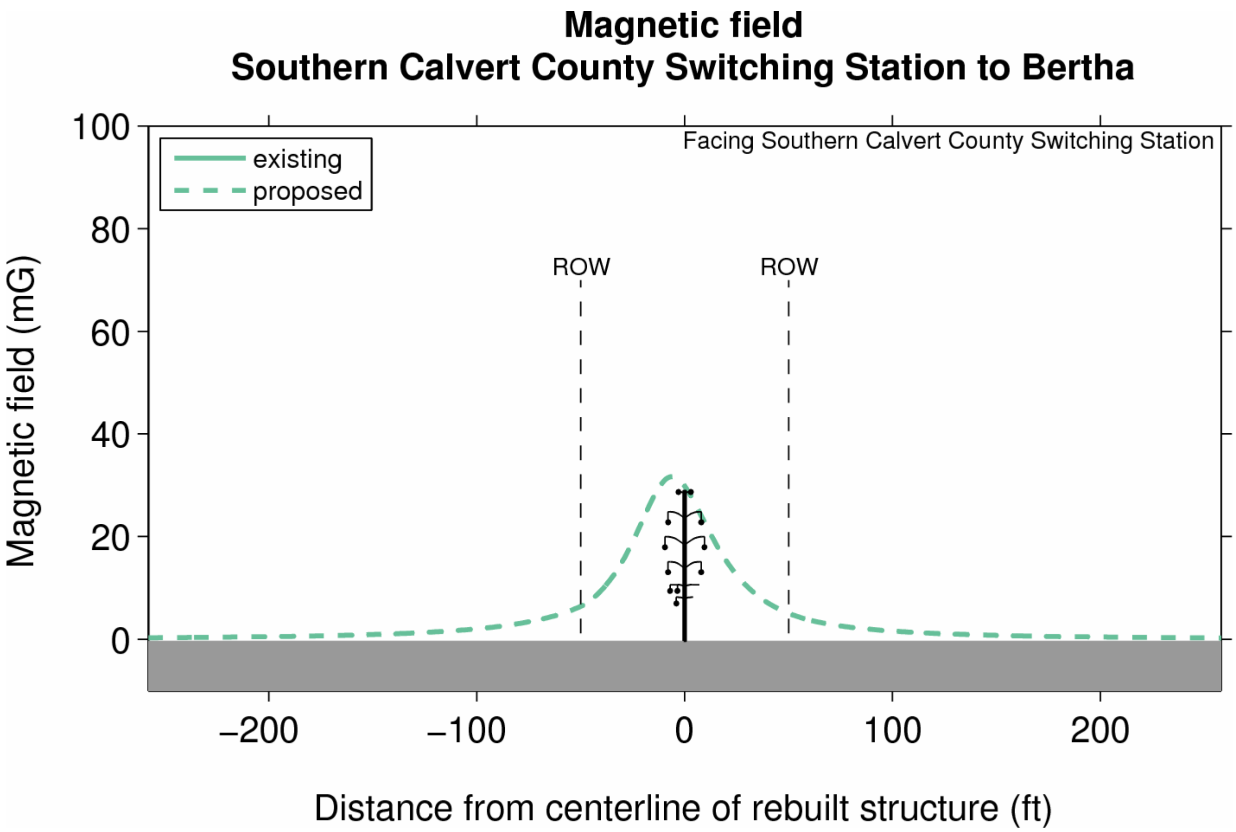

Figure 12. Calculated average-load magnetic-field profile for a representative section of the proposed route between Southern Calvert County and Bertha. Under existing average-load conditions, the 69-kV line carries no load and produces no magnetic field.

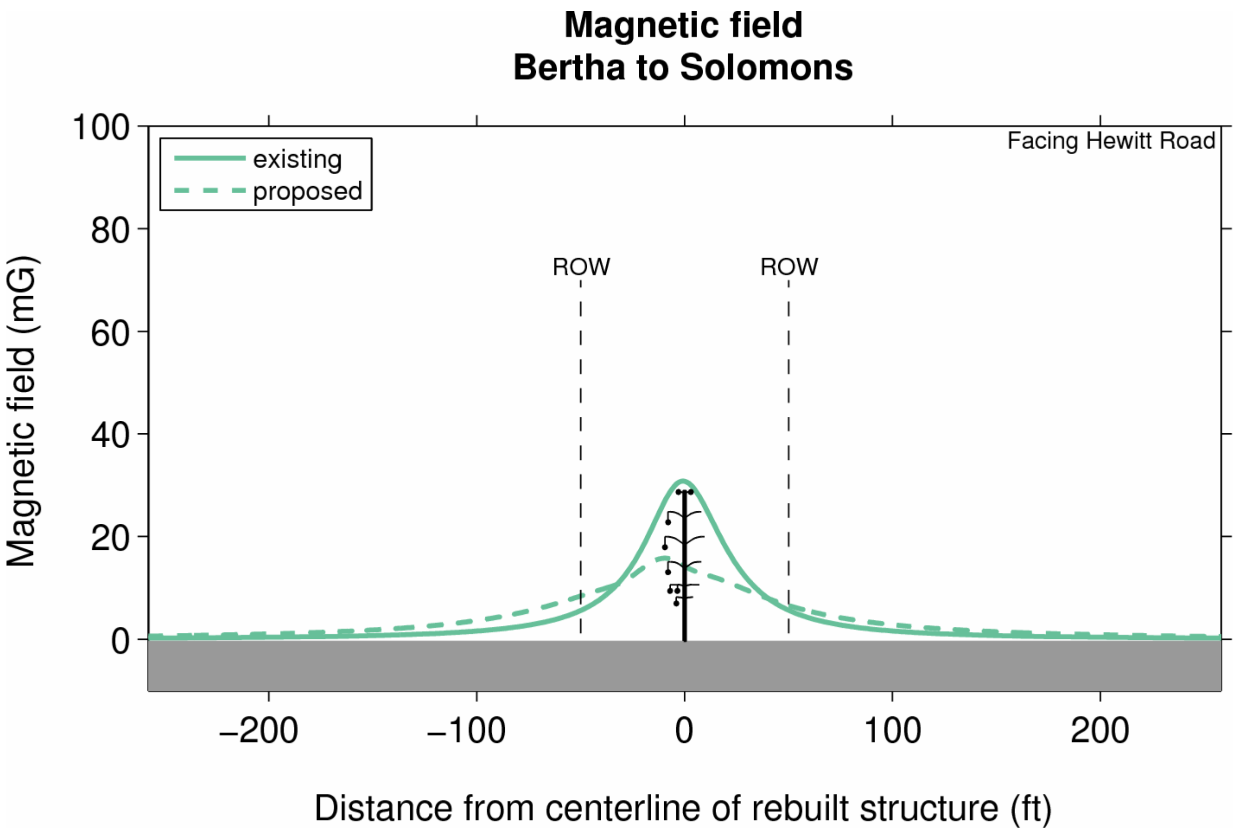

Figure 13. Calculated average-load magnetic-field profile for a representative section of the proposed route between Bertha and Solomons.

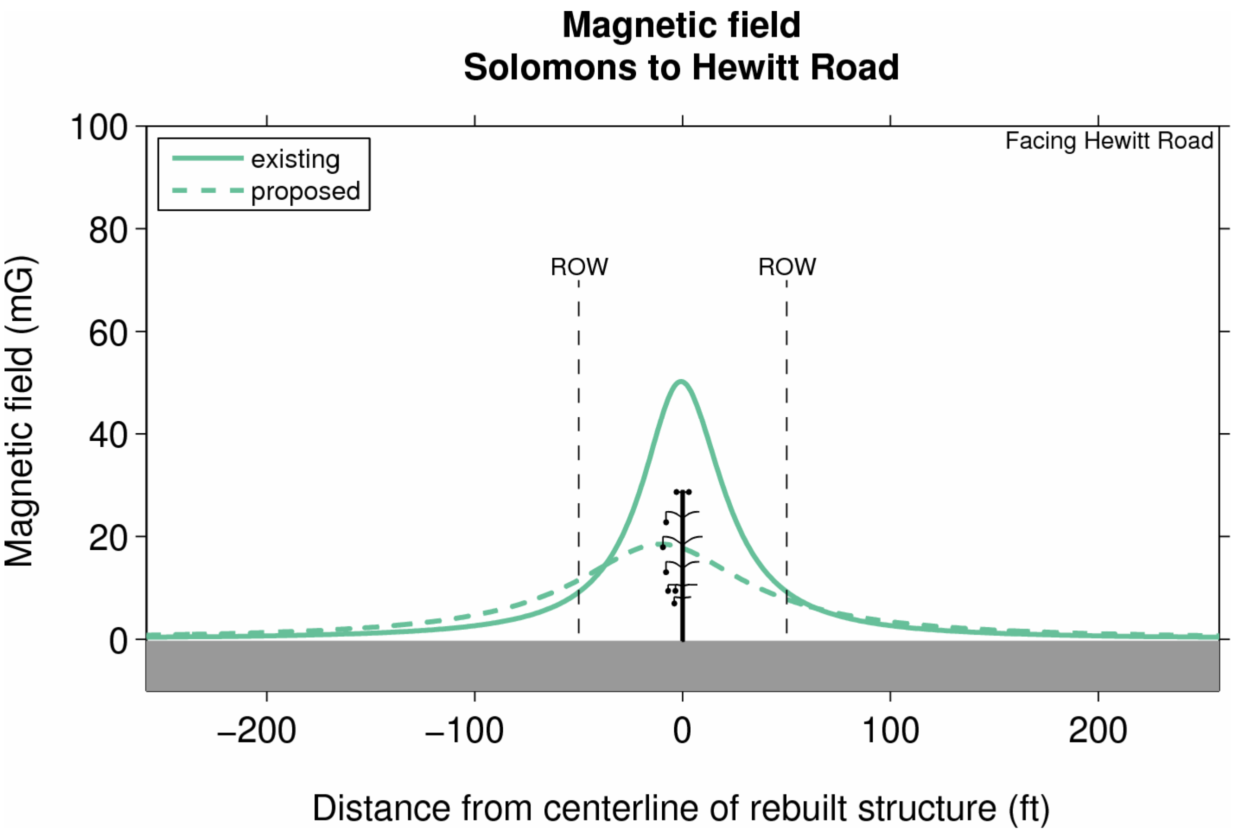

Figure 14. Calculated average-load magnetic-field profile for a representative section of the proposed route between Solomons and Hewitt Road.

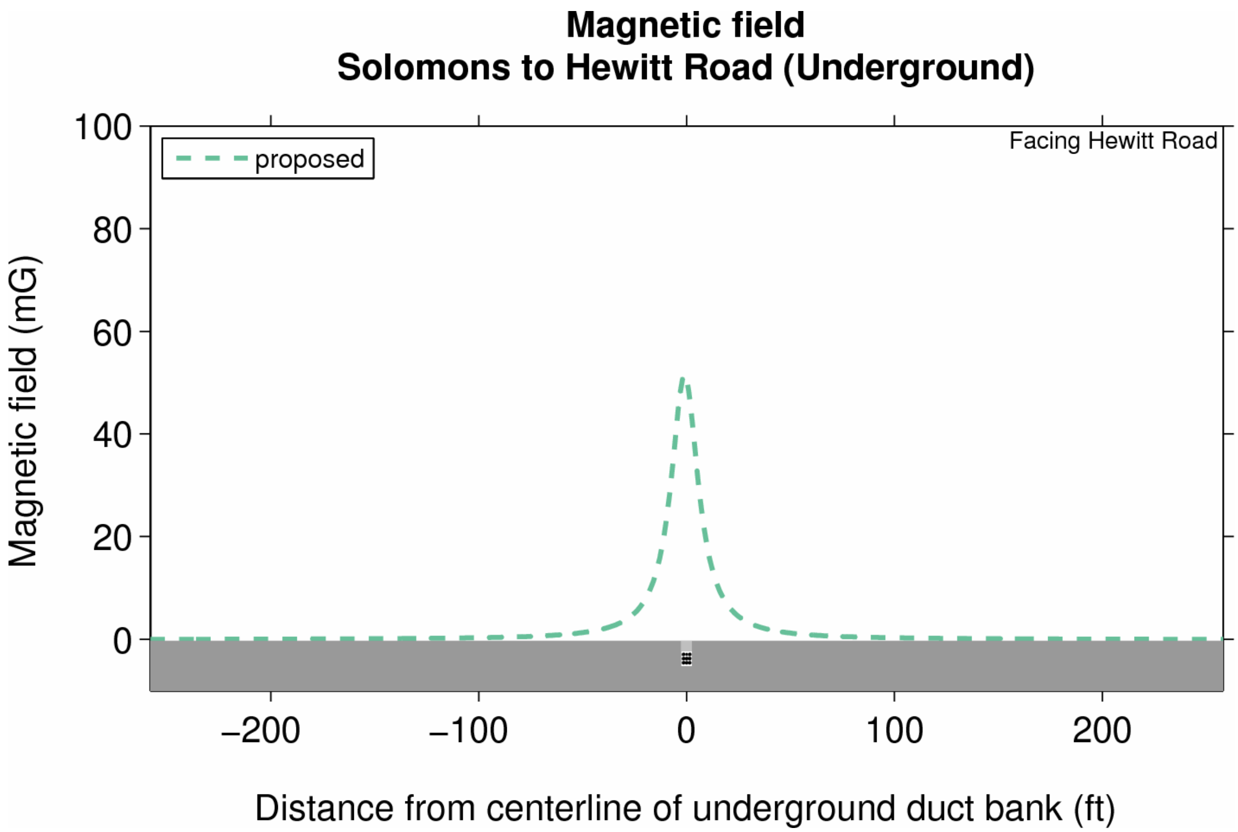

Figure 15. Calculated average-load magnetic-field profile for a representative section of the proposed underground route between Solomons and Hewitt Road.

Table 3. Existing and proposed magnetic field levels (mG) under average-load conditions for the sections depicted in Figures 3-15

			Distance from pole centerline (ft)				
Condition	From	To	-150	ROW -50	Max on ROW	ROW +50	+150
Existing	Holland Cliff	Prince Frederick	0.5	3.6	19.5	3.6	0.5
	Prince Frederick	Pr. Frederick Tap	0.4	3.1	17.2	3.2	0.4
	Pr. Frederick Tap	Dukes Inn	0.0	0.0	0.0	0.0	0.0
	Dukes Inn	Mutual	0.8	5.8	31.4	5.8	0.8
	Mutual	St. Leonard Tap	0.3	2.6	14.0	2.6	0.3
	St. Leonard Tap	Calvert Cliff	0.0	0.0	0.1	0.0	0.0
	Calvert Cliff	Bertha	0.0	0.0	0.0	0.0	0.0
	Bertha	Solomons	0.7	5.6	30.8	5.7	0.8
	Solomons	Hewitt Road	1.2	9.2	50.3	9.3	1.2
Proposed	Holland Cliff	Prince Frederick	0.6	5.0	18.4	4.2	0.6
	Prince Frederick	Pr. Frederick Tap	0.6	4.7	16.9	4.0	0.5
	Pr. Frederick Tap	Dukes Inn	0.3	2.8	7.3	2.8	0.3
	Dukes Inn	Mutual	0.3	2.8	7.3	2.8	0.3
	Mutual	St. Leonard Tap	0.6	4.7	17.1	4.0	0.5
	St. Leonard Tap	Calvert Cliff	1.0	6.4	31.7	5.1	0.8
	Calvert Cliff	Southern Calvert County	1.0	6.4	31.7	5.1	0.8
	Southern Calvert County	Bertha	1.4	13.2	46.3	7.3	1.4
	Bertha	Solomons	1.8	8.5	15.8	6.6	1.5
	Solomons	Hewitt Road	2.3	11.6	18.5	7.8	1.8
	Solomons	Hewitt Road UG	0.1	1.3	51.6	1.2	0.1

Table 4. Existing and proposed magnetic field levels (mG) under peak-load conditions for the sections depicted in Figures 3-15

			Distance from pole centerline (ft)				
Condition	From	To	-150	-50	Max on ROW	50	150
Existing	Holland Cliff	Prince Frederick	0.7	5	27.2	5.0	0.7
	Prince Frederick	Pr. Frederick Tap	0.6	4.3	23.5	4.3	0.6
	Pr. Frederick Tap	Dukes Inn	0.0	0.0	0.0	0.0	0.0
	Dukes Inn	Mutual	1.1	8.4	46.1	8.5	1.1
	Mutual	St. Leonard Tap	0.5	3.7	20.0	3.7	0.5
	St. Leonard Tap	Calvert Cliff	0.0	0.0	0.0	0.0	0.0
	Calvert Cliff	Bertha	0.0	0.0	0.0	0.0	0.0
	Bertha	Solomons	1.0	7.3	39.8	7.3	1.0
	Solomons	Hewitt Road	1.6	12.4	67.7	12.5	1.7
Proposed	Holland Cliff	Prince Frederick	0.9	6.5	27.1	5.3	0.8
	Prince Frederick	Pr. Frederick Tap	0.8	6.2	25.5	5.2	0.7
	Pr. Frederick Tap	Dukes Inn	0.4	3.3	8.5	3.3	0.4
	Dukes Inn	Mutual	0.4	3.3	8.5	3.3	0.4
	Mutual	St. Leonard Tap	1.0	6.7	30.3	5.5	0.8
	St. Leonard Tap	Calvert Cliff	1.6	12.2	56.6	7.6	1.3
	Calvert Cliff	Southern Calvert County	1.6	12.2	56.6	7.6	1.3
	Southern Calvert County	Bertha	5.2	25.6	71.0	20.8	4.5
	Bertha	Solomons	6.6	31.5	40.8	22.1	5.2
	Solomons	Hewitt Road	7.4	36.4	58.4	24.6	5.8
	Solomons	Hewitt Road UG	0.5	4.2	162.3	3.9	0.5

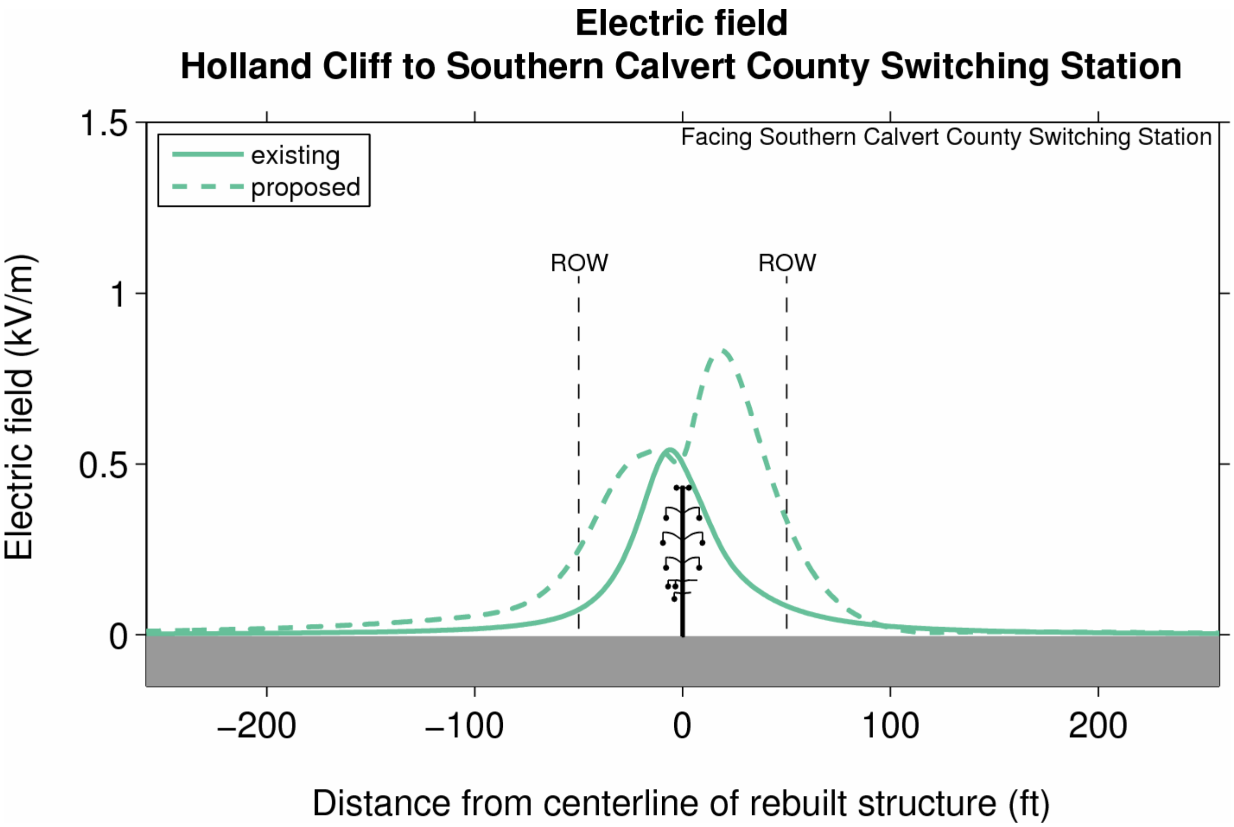

Figure 16. Calculated electric-field profile for a representative section of the proposed route between Holland Cliff and Southern Calvert County.

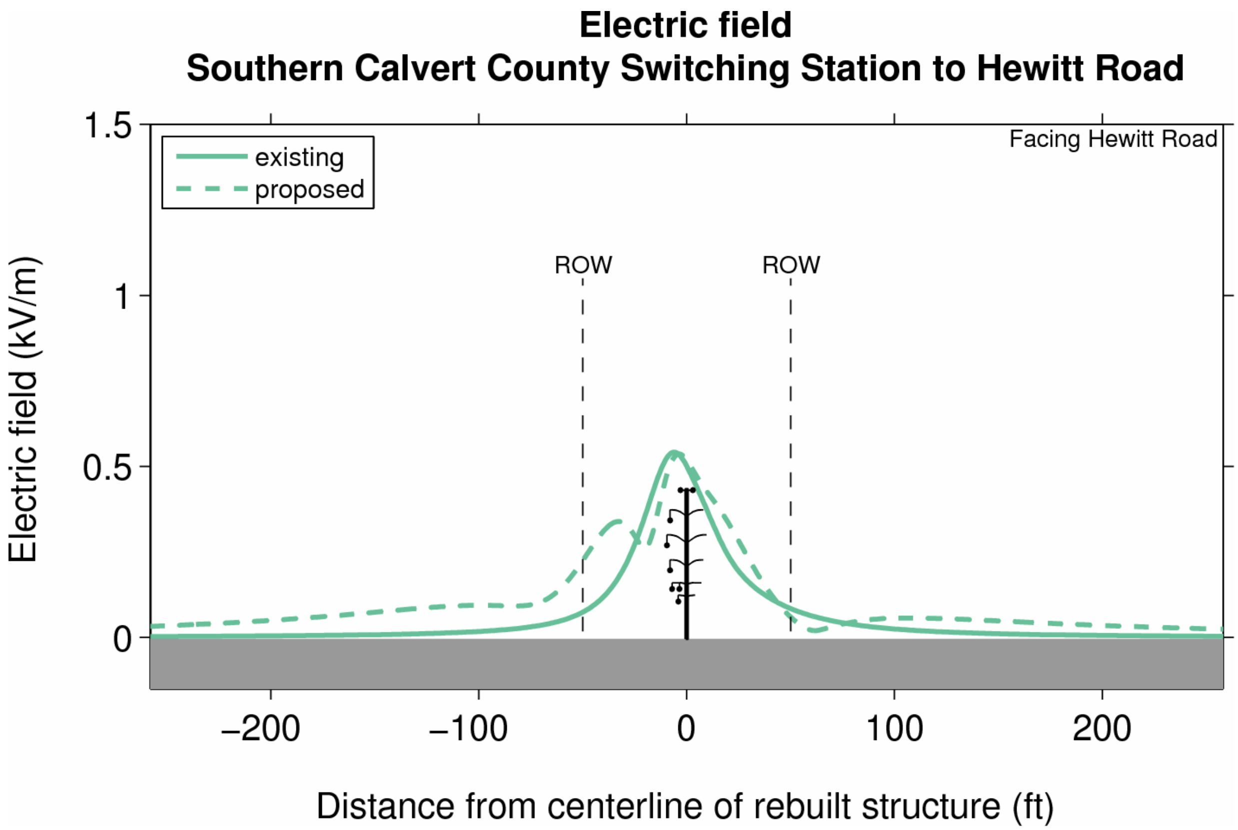

Figure 17. Calculated electric-field profile for a representative section of the proposed route between Southern Calvert County and Hewitt Road.

Table 5. Existing and proposed electric field levels (kV/m) for the sections depicted in Figures 16 and 17

			Distance from pole centerline (ft)				
Condition	From	To	-150	-50	Max on ROW	50	150
Existing	Holland Cliff	Southern Calvert County	0.01	0.07	0.54	0.08	0.01
	Southern Calvert County	Hewitt Road	0.01	0.07	0.54	0.08	0.01
Proposed	Holland Cliff	Southern Calvert County	0.03	0.25	0.83	0.33	0.01
	Southern Calvert County	Hewitt Road	0.07	0.22	0.54	0.06	0.05

Electric and Magnetic Fields & Health

Introduction

Electric and magnetic fields (EMF) are produced by natural and man-made sources. The earth and the normal electrical activity of the human heart, for example, both produce a magnetic field. Man-made EMF is present wherever electricity is generated, transmitted, or used. As a result, EMF is ubiquitous – electrical appliances, power lines, and electrical wiring in homes or offices are all examples of man-made sources of EMF. Certain appliances are the major sources of EMF indoors, while power lines are the major sources outdoors.

Extremely low frequency (ELF) EMF is part of the electromagnetic spectrum ranging from 30 to 300 Hertz (Hz). The electrical power system in the United States (US) operates at a frequency of 60 Hz. In contrast, radio and television signals, microwaves from ovens, and radiofrequency fields from cellular phones are examples of higher frequency fields on the electromagnetic spectrum; these fields can have frequencies up to billions of Hz. This difference in frequency is important to consider when evaluating how EMF interacts with living organisms. For example, ELF fields have wavelengths that are so long – over 3,000 miles at 60 Hz – that they do not couple well with organisms. Radiofrequency fields, on the other hand, can heat tissues at sufficiently high intensities because they have wavelengths on the order of centimeters that facilitate coupling to the body.

ELF electric fields and magnetic fields have some similar and some differing properties from each other. An important characteristic of both fields is that their strength diminishes with increasing distance from a source. This is similar to the way that the heat from a flame diminishes with distance from the flame. Electric fields are the result of voltages applied to electrical conductors and equipment. Electric fields, unlike magnetic fields, are blocked by ordinary objects, such as trees and walls. Magnetic fields are produced when current is flowing, such as when an appliance is turned on. Unlike electric fields, magnetic fields can pass through ordinary objects. For this reason, evaluations of health outcomes in relation to EMF have focused primarily of magnetic field exposure.

Over approximately the last forty years, research has been conducted in the US and around the world to examine whether exposures to EMF might affect health. The objective of this section of the report is to provide a summary of this research. The information is organized in two major sections, followed by a summary section. In the section titled “Assessing Risk from Environmental Exposures,” the methods that scientists use to evaluate potential risks from environmental exposures are described. In the section titled “Comprehensive Reviews,” conclusions from national and international health agencies that have conducted comprehensive reviews of EMF and health research are described, along with an overview of any recent publications.

Assessing Risk from Environmental Exposures

Epidemiology Studies

Epidemiology is the study of how disease is distributed in populations and what factors influence or determine this distribution (Gordis, 2000). Epidemiologic studies evaluate people's exposures and their risk of disease risk as they go about their ordinary lives; therefore, these studies are not highly controlled like studies that are conducted in the laboratory. Cohort, case-control, and cross-sectional studies are three types of studies used to evaluate the relationship between exposure and disease.

In a cohort study, the exposure status of a group of individuals is evaluated and they are subsequently followed over time to evaluate their risk of developing disease. In a case-control study, the sequence is reversed – a group of people with a particular disease (i.e., cases) are compared to a similar group of people without that disease (i.e., controls) to determine whether there are any differences in exposures. In a cross-sectional study, both the exposure and the disease status are measured at the same time.

Study design heavily influences our interpretation of the results. For example, cohort studies can provide a direct estimate of the association between exposures and disease, whereas case-control studies provide an indirect estimate since their results only compare the relative differences in the exposures of the case and control subjects. Cross-sectional studies provide an estimate of the proportion of people in the population with a disease and an exposure, but do not provide an estimate of risk.

Epidemiologic studies can help suggest risk factors that may contribute to a disease risk, but they rarely provide the sole basis for drawing inferences about cause-and-effect relationships. Since epidemiologists do not have control over the many other factors to which people are exposed (e.g., genetics, pollution, infections, etc.) and diseases are caused by the complex interaction of many factors, the results of epidemiologic studies must be interpreted carefully. A single epidemiologic study is rarely unequivocally supportive or non-supportive of causation. Epidemiologic support for causality is based on high-quality studies reporting consistent results across many different populations and study designs.

A key reason that results of epidemiologic studies cannot provide evidence for cause-and-effect directly is the presence of bias. Bias is defined as "any systematic error in the design, conduct or analysis of a study that results in a mistaken estimate of an exposure's effect on the risk of disease" (Gordis, 2000). In other words, sources of bias are factors or research situations that can mask a true association or misrepresent an association that does not exist. As a result, the extent of bias as well as its types and sources are important considerations in the interpretation of epidemiologic studies. Since it is not possible or ethical to fully control human populations, bias will exist in some form in all epidemiology studies of human health.

Epidemiologists must also assess the potential role of a particular bias called confounding. Confounders are any exposure (e.g., family income) that may be related potentially to the exposure of interest (e.g., EMF) and the outcome of interest (e.g., cancer) and may distort the association epidemiologists observe between the exposure of interest and outcome. Confounding factors make it difficult to detect the true association.

In research studies, statistics are utilized to compare risk across populations and determine whether a difference exists between exposed and unexposed populations, or diseased and non-diseased populations. To assess whether a computed statistic could arise through sampling error, scientists assess the strength of associations relative to variability in the observations. This assessment helps to determine the likelihood that the results obtained could have arisen by chance alone. The terms “statistically significant” or “statistically significant association” are used in epidemiologic studies to describe an association that is not likely to be due to chance alone. Statistically significant associations, however, are not automatically an indication of cause-and-effect. The interpretation of statistically significant associations depends on many factors associated with the design and conduct of the study, such as how the data were collected, the possibly for bias and confounding, and the size of the study, among other things.

Experimental Studies

Epidemiologic research studies are one of two major groups of research studies that are used to assess health effects in relation to environmental exposures. The other major type of research that is utilized to evaluate health and environmental exposures are experimental studies on animals, cells, and tissues in laboratory settings. Experimental studies can also be conducted in humans. *In vivo* studies are most frequency conducted in laboratory animals, but the ‘gold standard’ for assessing health effects in people is the randomized clinical trial. A randomized clinical trial is an experimental study conducted in humans where two groups of people are randomly assigned; one group to receive one exposure and the other group to receive a different exposure or not receive an exposure at all. It is unethical, however, to assign people to exposures that are well established to be harmful in some regard (e.g., smoking) and it is not possible to randomize ubiquitous environmental exposures; therefore, many experimental studies are conducted in animals. *In vitro* studies are conducted in cells and tissues.

Experimental studies provide a way to control for other factors in the environment and do not have the same problems of bias as epidemiologic studies. The results of experimental studies of animals and isolated tissues or cells, however, may not always be directly extrapolated to what happens in human populations. Thus, using both major epidemiologic and experimental research to evaluate potential exposures that may be harmful to humans is desirable and necessary.

Almost any conclusion can be supported by selecting a single study, but decisions about health are too important not to consider all of the available research studies. The scientific process entails looking at all the evidence on a particular issue in a systematic and thorough manner to see if the overall data presents a logically coherent and consistent picture. This is often referred to as a weight-of-evidence review, in which all studies are considered together, giving more weight to studies of higher quality and using an established analytic framework to arrive at a conclusion about a possible causal relationship. Comprehensive reviews of this nature on EMF and health are discussed in the following section.

Comprehensive Reviews

The following sections describe the conclusions of comprehensive reports by national and international scientific agencies or groups related to EMF exposure and health outcomes. In the past 40 years, many scientific organizations have published reviews of EMF and health outcomes. A summary of the reviews performed for major national and international health agencies in the past 10 years is presented in Table 6 and a brief outline of these agencies and their mandates is provided below.

The World Health Organization Report

The World Health Organization (WHO) report, published in June 2007, is the most comprehensive and up-to-date report. The WHO report includes studies published only through the beginning of 2006, due to the time lag needed to review these studies critically and publish their findings. Following a review of the WHO conclusions related to each broad outcome (cancer, reproduction/developmental outcomes, neurological diseases, and the immune system), epidemiologic research published since early 2006 is discussed to determine if and how recent findings alter conclusions from these comprehensive reviews. New experimental research published after the WHO report is not considered here because there is little controversy about this body of research.

National and International Scientific Agencies and Their Mandates

The World Health Organization

The WHO is a scientific organization within the United Nations system whose mandate includes providing leadership on global health matters, shaping the health research agenda, and setting norms and standards. The WHO established the International EMF Project in 1996, in response to public concerns about exposures to EMF and possible adverse health outcomes. The project's membership includes 8 international organizations, 8 collaborating institutions and over 54 national authorities. The overall purpose of the project is to assess health and environmental effects of exposure to static and time varying ELF EMF in the frequency range 0-300 GHz. A key objective was to evaluate the scientific literature and make a status report on health effects to be used as the basis for a coherent international response, including the identification of important research gaps and the development of internationally acceptable standards for EMF exposure. The WHO's review was published in June 2007 as part of their Environmental Health Criteria (EHC) Programme.

The review used standard scientific procedures, as outlined in the document's Preamble, to conduct its review. The Task Group responsible for the report's overall conclusions consisted of 21 scientists from around the world with expertise in a wide range of disciplines. The Task Group relied on the conclusions of previous weight-of-evidence reviews, where possible, and with regard to cancer mainly focused on evaluating studies published after an International Agency for Research on Cancer (IARC) review in 2002. Specific terms were used by the Task Group to describe the strength of the evidence in support of causality. Limited evidence describes a body of research where the findings are inconsistent or where there are outstanding questions about study design or other methodological issues that preclude making strong conclusions. Inadequate evidence describes a body of research where it is unclear whether the data is supportive or unsupportive of causation because there is a lack of data or there are major quantitative or qualitative issues.

The Health Protection Agency (formerly the National Radiological Protection Board)

In April 2005, the Health Protection Agency (HPA) of Great Britain was established, replacing the HPA Special Health Authority (SpHA) and the National Radiological Protection Board (NRPB). The responsibility of the NRPB was to provide advice on exposure guidelines for EMF in the frequency range of 0-300 GHz. In 2004, the NRPB published a document reviewing the scientific evidence in relation to possible adverse health effects of exposure to EMF in the frequency range of 0-300 GHz. The development of the review involved advice from individual British and international scientific experts and from published comprehensive reviews by expert groups, as well as advice from an *ad hoc* expert group on weak electric field effects and concerns expressed at a public open meeting.

The International Agency for Research on Cancer

The IARC is a part of the WHO. IARC's mission is to coordinate and conduct research on the causes of human cancer and the mechanisms of carcinogenesis, and to develop scientific strategies for cancer control. The IARC Monographs are a series of topical publications that review environmental factors that may be associated with the risk of human cancer. For the development of these monographs, interdisciplinary working groups of scientists review the published studies and evaluate the weight-of-evidence that an exposure can increase the risk of cancer. The IARC has a standard method with standard terminology for classifying exposures based on scientific research in support of carcinogenicity. The categories used to describe exposures are (from highest to lowest risk): carcinogenic to humans, probably carcinogenic to humans, possibly carcinogenic to humans, unclassifiable, and probably not carcinogenic to humans.

National Institute for Environmental Health Sciences

The National Institute for Environmental Health Sciences (NIEHS) is a part of the US National Institutes of Health (NIH). It is the primary federal agency for conducting and supporting medical research in the US. The mission of the NIH is "science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability." In 1992, the US Congress authorized the Electric and Magnetic Fields Research and Public Information Dissemination Program (EMF-Rapid Program) in the Energy Policy Act. As part of this program, NIEHS, along with other governmental departments, was instructed to direct and manage a program of research and analysis aimed at clarifying the potential for health risks from ELF-EMF exposure. The 1999 report was provided upon completion of the program. The report underwent scientific and public review prior to the release of the final document.

Table 6. Major comprehensive reviews of EMF and health research by national and international scientific health agencies in the past 10 years

Agency	Year Published	Scope of Review and Review Title
World Health Organization	2007	Evaluated the research literature of EMF and health outcomes, including neurological, cardiovascular, immune function, reproduction and development, and cancer. *"Extremely Low Frequency Fields Environmental Health Criteria Monograph No. 238"*
National Radiological Protection Board of Great Britain	2004	Evaluated the research literature of EMF and health outcomes, including cancer, neurodegenerative diseases, suicide and depressive illness, cardiovascular, and reproduction. *"Review of the Scientific Evidence for Limiting Exposure to Electromagnetic Fields (0-300 Hz)"*
International Agency for Research on Cancer	2002	Evaluated the research literature of EMF and health outcomes, including cancer, reproduction, immune function, hematological function, and endocrine function. *"Volume 80 Non-Ionizing Radiation, Part 1: Static and Extremely Low-Frequency (ELF) Electric and Magnetic Fields"*
National Institute of Environmental Health Sciences	1999	Evaluated the research literature of EMF and health outcomes, including cancer, reproduction and development, neurological and neurobehavioral conditions, and cardiovascular conditions. *"Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields"*

Major Epidemiology Studies Published After the WHO Report

This section considers whether epidemiology studies published after the WHO report support or update the conclusions reached regarding EMF and adult cancers and childhood leukemia.

Cancer

Research on EMF has focused mainly on the possibility of a relationship with cancer, including (but not limited to) leukemia, lymphoma, breast cancer, and brain cancer. In performing reviews for health agencies, scientists have evaluated epidemiologic and experimental research regarding cancer and EMF exposure. The conclusions of their reviews are summarized in Table 7 below.

Table 7. Conclusions regarding cancer and ELF-EMF from national and international agencies in the past 10 years

Agency	Conclusions
World Health Organization (2007)	"New human, animal, and *in vitro* studies, published since the 2002 IARC monograph, do not change the overall classification of ELF as possible human carcinogen." The IARC usage of "*possible*" denotes an exposure in which epidemiologic evidence points to a statistical association, but other explanations cannot be ruled out as the cause of that statistical association (e.g., bias and confounding).
National Radiological Protection Board of Great Britain (2004)	"There is some epidemiological evidence that time-weighted average exposure to power frequency magnetic fields above 0.4µT [4 mG] is associated with a small increased in the absolute risk of leukaemia in children … In the absence of clear evidence of a carcinogenic effect in adults, or of a plausible explanation from experiments on animals or isolated cells, AGNIR [Advisory Group on Non-Ionizing Radiation] has concluded that the epidemiological evidence is currently not strong enough to justify a firm conclusion that such fields cause leukaemia in children."
International Agency for Research on Cancer (2002)	As a result of two pooled analyses reporting an association between high, average magnetic field exposure and childhood leukemia, the epidemiologic data was classified as providing "limited evidence of carcinogenicity" in relation to childhood leukemia. With regard to all other cancer types, the epidemiologic evidence was classified as inadequate. The IARC panel also reported that studies of experimental animals provided "inadequate evidence of carcinogenicity." Overall, magnetic fields were evaluated as "possibly carcinogenic to humans."
National Institute of Environmental Health Sciences (1999)	Using criteria developed by the International Agency for Research on Cancer, none of the Working Group considered the evidence strong enough to label ELF-EMF exposure as a "known human carcinogen" or "probable human carcinogen." A majority of the members of this Working Group (19 of 28 voting members), however, concluded that exposure to power-line frequency ELF-EMF is a "possible" human carcinogen. This decision was based largely on "limited evidence of an increased risk for childhood leukemias with residential exposure and an increased occurrence of CLL (chronic lymphocytic leukemia) associated with occupational exposure." For other cancers and for non-cancer health endpoints, the Working Group categorized the experimental data as providing much weaker evidence or no support for effects from exposure to ELF-EMF.

Adult Cancers

Five studies have been published since early 2006 that evaluate exposure to EMF or magnetic fields in relation to adult leukemia (Johansen et al., 2007; Röösli et al., 2007a), lymphomas (Mester et al., 2006; Karipidis et al., 2007a; Röösli et al., 2007a), or a combined category of leukemia and lymphoma (Lowenthal et al., 2007). In the two studies with data on leukemia, the leukemia was evaluated in relation to estimated occupational exposure to magnetic fields. One study was conducted among Danish utility workers (Johansen et al., 2007), and the other study was conducted among Swiss railway workers (Röösli et al., 2007a). Neither study found a statistically significant association between estimated higher magnetic field exposure and leukemia overall. The fifth study (Mester et al., 2006) is not considered further because the only source of information about exposure was self-reported.

In an Australian case-control study of non-Hodgkin lymphoma (NHL), occupational history was evaluated to assess the association between NHL and estimated magnetic field exposures (Karpidis et al., 2007a). The authors estimated cumulative exposure to magnetic fields based on reported occupations. No categories of magnetic field exposure were significantly associated with NHL when other factors were adjusted for, but a significant increasing trend of stronger associations with increasing cumulative exposure was observed. The highest category of magnetic field exposure had a non-significant 1.3-fold association, relative to the lowest category of exposure. In the study of Swiss railway workers, however, there was no association between more highly-exposed occupations and NHL mortality (Röösli et al., 2007a). In another Australian case-control study, Lowenthal et al. (2007) evaluated residential proximity to high voltage transmission lines and combined categories of leukemia and lymphoma in children and adults, called lymphoproliferative disorders (LPD) or myeloproliferative disorders (MPD). The authors observed that there was no statistically significant association with LPD/MPD for groups that had ever lived within 50 meters or within 51-300 meters of high-voltage transmission lines. The authors did note an association with proximity (<300 meters) of residence during younger years of life and LPD/MPD, with a trend of a stronger association for exposure at younger ages. The main limitation of this study is the combined category LPD/MPD contains a myriad of cancers with quite different etiologies.

In addition to these five studies, an update of a previous meta-analysis on occupational EMF exposure and adult leukemia and brain cancer was published (Kheifets et al, 2008). The authors of this update concluded that there was no clear pattern of EMF exposure and leukemia risk. Similar to the studies summarized in the WHO report, these recent studies do not provide a consistent picture of an association between adult leukemia or lymphoma and EMF exposure.

Four studies have been published since the WHO report that evaluate exposure to occupational magnetic fields in relation to adult brain cancer, including the two cohort updates described above (Johansen et al., 2007; Röösli et al., 2007a). In these retrospective cohort studies of all brain tumors, Johansen et al. and Röösli et al. classified magnetic field exposure based on occupation in Danish utility workers and Swiss railway workers, respectively. No associations of magnetic field exposure were observed for brain tumor incidence in the Danish study or mortality in the Swiss study. Two other studies evaluated specific brain cancer types, acoustic neuroma and glioma (Forssén et al., 2006; Karipidis et al., 2007b, respectively). Acoustic neuroma is a type of brain tumor that is usually benign, and glioma is a type of malignant brain tumor. In Forssén et al., magnetic field exposure was classified in Swedish men and women based on their occupations, and no associations or trends were observed for acoustic neuroma in any of the categories of exposure. Karipidis et al. (2007b) evaluated the occupational magnetic field exposures of persons with glioma in a case-control study of men and women in Melbourne, Australia. No statistically significant association was observed for men or for women based on any of three exposure classifications. In addition to these four studies, the meta-analysis update published by Kheifets et al. (2008), mentioned above, studied brain cancer in addition to leukemia. The authors of this update concluded that there was a lack of a clear pattern of EMF exposure and brain cancer. Overall, the results of these four studies and the meta-analysis update do not support an association between occupational EMF exposure and brain tumors in adults.

Since the publication of the WHO report, two case-control studies have estimated the association between magnetic field exposure and breast cancer, both of which focused on *occupational* magnetic field exposures (McElroy et al., 2007; Ray et al., 2007).[1] In a study in the US, women were classified according to likely occupational EMF exposure (background, low, medium, or high) based on industry, job title, and job duties, as reported by the study participants (McElroy et al., 2007). A non-statistically significant 1.2-fold association was observed for the high exposure category, compared with the background exposure category.

In a study of women in Shanghai, China, EMF exposure was estimated according to a job-exposure matrix and categorized according to years of exposure (Ray et al., 2007). The authors observed no association between breast cancer in any of the categories of exposure, nor did they observe any trends. Neither of these two recently published studies on breast cancer and EMF exposure provides persuasive evidence contradicting the WHO conclusion, which is based on stronger evidence, that there is no association between ELF magnetic field exposure and breast cancer.

One study was identified that evaluated ELF-EMF exposure and thyroid cancer. Lope et al. (2006) conducted a retrospective cohort study of 2,992,166 Swedish male and female workers. Exposure to magnetic fields was assessed using job exposure matrices. The workers were followed for disease incidence for 19 years. A large number of thyroid cancer cases were observed in the study – 1,103 in men and 1,496 in women. The authors concluded that occupational ELF-EMF exposure "showed no effect on the risk of thyroid cancer in the study."

Childhood Leukemia

The research that has received the most attention involves childhood leukemia. Researchers have been investigating a wide range of hypotheses including magnetic field exposure because little is known about this most common type of childhood cancer. Research on EMF was prompted by an epidemiologic study of children in the US that reported a statistical association between childhood leukemia and a higher predicted magnetic field level in the home, based on characteristics of nearby distribution and transmission lines (Wertheimer and Leeper, 1979). Subsequently, some epidemiologic studies reported that children with leukemia were more likely to live closer to power lines or have higher estimates of magnetic field exposure (compared to children without leukemia), while other epidemiologic studies did not report this statistical association.

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[1] An additional case-control study was published post-2005 that examined residential magnetic field exposure and breast cancer (Davis and Mirick, 2007), although it was not fully evaluated in this report because it is a re-analysis of a study published by the same investigators in 2001 (Davis et al., 2001a) with the addition of a few variables.

Of note, the largest and best designed epidemiologic studies of childhood leukemia that measured personal magnetic field exposure (as opposed to estimating exposure through calculations or distance) did not report evidence to support a causal relationship, nor did they report a dose-response relationship with exposure to higher magnetic field levels (Linet et al., 1997; McBride et al., 1999; UKCCS, 1999). When a number of the relevant studies were combined in a single analysis, however, no association was evident at lower exposure levels but a weak association was reported between childhood leukemia and estimates of average magnetic field exposures greater than 3-4 mG (Ahlbom et al., 2000; Greenland et al., 2000). These reviews suggest an overall consistency with the literature.

As a result of their review, the WHO concluded that several factors might be fully, or partially, responsible for the consistent association observed between high, average magnetic fields and childhood leukemia in meta-analyses, including misclassification of magnetic field exposure due to poor exposure assessment methods, confounding from unknown risk factors, and selection bias. The WHO concluded that reconciling the epidemiologic data on childhood leukemia and the negative (i.e., no hazard or risk observed) experimental findings through innovative research is currently the highest priority in the field of ELF-EMF research. Given that few children, however, are expected to have average magnetic field exposures greater than 3-4 mG, the WHO stated that the public health impact of magnetic fields on childhood leukemia would be low if the association were causal.

Since the WHO report, a case-control study of children in Mexico City evaluated the risk of childhood leukemia in children with Down syndrome (who have a 20-fold higher risk of leukemia due to a genetic predisposition). Spot measurements of magnetic fields at residences were compared between 42 children with acute leukemia and Down syndrome (cases) and 124 Down syndrome children without leukemia (controls) (Mejia-Arangure et al., 2007). When considering other factors, such as traffic density, location of residence, age, and sex, the authors observed that children with spot measurements greater than 6.0 mG had a statistically significant 3.7-fold association compared to children with less than 1.0 mG exposure. There were no associations for children with spot measurements between 1.0 and 6.0 mG, compared to children with less than 1.0 mG exposure. The study provides a preliminary suggestion that there may be an association in this genetically predisposed group of children, but given its limitations (i.e., poor exposure assessment), further confirmatory research is needed.

Two recent studies evaluated whether magnetic fields are associated with a worse prognosis among those already diagnosed with childhood leukemia (Foliart et al., 2006, 2007; Svendsen et al., 2007). The results of both of these studies suggest that there may be some association between death and magnetic field exposure in children with acute leukemia. Both studies, however, were limited in their sample size and measurement of possible confounders, and the authors did not conclude that these studies provided proof for a causal relationship.

It has been hypothesized that nighttime residential exposure may be a more biologically relevant measurement of risk in children. This hypothesis was evaluated in a study by Schüz et al. (2007), in which magnetic field exposure was based on measurements obtained between 10:00 PM and 6:00 AM. The authors observed similar risk in relation to nighttime exposures as to the original 24-48-hour exposures (Ahlbom et al., 2000), leading them to conclude that the results "do not support the hypothesis that leukemia risk in children is more strongly associated with residential ELF EMF exposure measurements taken at night" and that the similarity of risk estimates between measurements "indicates that the nighttime component cannot, on its own, account for the pattern observed."

The recent literature also includes one case-control study that was conducted in a non-Western population, i.e., Iran (Feizi and Arabi, 2007).[2] The result of this study was consistent with previous work; an association was observed between the category of acute leukemia and acute myeloid leukemia combined and living close to high voltage lines or with estimated magnetic field exposures greater than 0.45 microtesla (μT). The validity of this study is limited significantly by its small size, possible selection bias, lack of assessment of possible confounding variables (such as socioeconomic status and mobility), and reliance upon distance as a proxy for exposure.

These recent studies, like some early studies, have observed associations between estimates of high average magnetic field exposure and childhood leukemia, although recent data suggests that control selection bias may play some role in this observed association (Mezei et al, 2008a, b). None of these recent studies are sufficiently strong methodologically, nor do the findings display causal patterns (exposure-response, consistency and strength) to alter previous conclusions that the epidemiologic evidence on magnetic fields and childhood leukemia is limited. Chance, confounding, and several sources of bias cannot be ruled out.

Reproduction and Development

Epidemiologic studies have been conducted to observe whether maternal or paternal EMF exposures are associated with adverse reproductive effects, including effects on fertility, reproduction, miscarriage, and prenatal and postnatal growth and development. A body of experimental studies of animals is also available on this topic. Early studies on the potential effect of EMF exposures on reproductive outcomes were limited because the majority of the studies used surrogate measures of exposure (including visual display terminal use, electric blanket use or ratings of the type and proximity of power lines) or assessed exposure retrospectively.

Table 8 summarizes the conclusions of the comprehensive reviews with regard to ELF-EMF and reproductive and developmental outcomes.

[2] Lowenthal et al. (2007) also included cases of leukemia among children, although most cases were among adults so this study is included in the adult leukemia section.

Table 8. Conclusions regarding reproduction and development and ELF-EMF exposure from national and international agencies in the past 10 years

Agency of Scientific Group	Conclusions
World Health Organization (2007)	"Overall the evidence for developmental effects and for reproductive effects in inadequate."
National Radiological Protection Board of Great Britain (2004)	"The overall evidence from studies of maternal exposure to ELF EMFs in the workplace does not indicate an association with adverse pregnancy outcomes, while studies of maternal exposure in the home are difficult to interpret. Results from studies of male fertility and of birth outcome and childhood cancer in relation to parental occupational exposure to ELF EMFs have been inconsistent and unconvincing."
International Agency for Research on Cancer (2002)	"Taken as a whole, the results of human studies do not establish an association of adverse reproductive outcomes with exposure to ELF electric and magnetic fields."
National Institute of Environmental Health Sciences (1999)	"Low birth weight, intrauterine growth retardation, preterm birth and congenital anomalies arising from the father's exposure were not associated with occupational exposures to ELF-EMF. The risk for congenital anomalies in relation to the mother's use of heated waterbeds and electric blankets around the time of conception was evaluated in three studies, no association was observed for heated waterbed in any study, and inconsistent results were reported for electric blanket use."

Since the WHO report, no studies were identified that evaluated EMF exposure and adverse reproductive outcomes. An additional study, however, was published related to developmental outcomes. Fadel et al. (2006) evaluated growth in 780 Egyptian children ranging in age from 0-12 years. The study was a cross-sectional survey of 390 children living in Abu-Sultan, with residences within 50 meters of high-voltage power lines and 390 children in El-Shiekh Zayed, with residences not located near power lines. Considering males and females separately, the authors observed that children living near power lines were lighter at birth, and were shorter and had smaller head and chest circumferences than the "unexposed" children at all years of age. The greatest difference in average height observed between the two groups was 1.5 centimeters for females at six years of age. No differences in weight, arm circumference, tricep-skinfold thickness, body mass index, arm muscle area, and arm fat area were observed. In a randomly selected subset of 200 of the children, the authors observed, in children age three and older, the children living near power lines had statistically significant lower bone age, ranging from 83-95% of that expected, based on chronological age. Although the authors noted that the socioeconomic status was similar between the two regions, they did not collect or provide data to support this assertion, nor did they account for some key factors that might influence growth, such as nutrition, in the analyses.

Neurological and Neurobehavioral Disease

Research into the possible effect of magnetic fields on the development of neurodegenerative diseases began in 1995, and the majority of research since then has focused on Alzheimer's disease and a specific type of motor neuron disease called amyotrophic lateral sclerosis (ALS), which is also known as Lou Gehrig's disease. Neurobehavioral studies have focused primarily on depression and suicide. Table 9 summarizes the conclusions of the comprehensive reviews with regard to ELF-EMF and neurological and neurobehavioral outcomes.

Table 9. Conclusions regarding neurological and neurobehavioral conditions and ELF-EMF exposure from national and international agencies in the past 10 years

Agency of Scientific Group	Conclusions
World Health Organization (2007)	"There is only inconsistent and inconclusive evidence that exposure to ELF electric and magnetic fields causes depressive symptoms or suicide. Thus, the evidence is considered inadequate." "Overall, these data do not indicate that ELF electric and/or magnetic fields affect the neuroendocrine system in a way that would have an adverse impact on human health and the evidence is thus considered inadequate." "Altogether, the evidence for an association between ELF exposure and Alzheimer's disease is inadequate."
National Radiological Protection Board of Great Britain (2004)	"Studies of occupational exposure to ELF EMFs do not provide strong evidence of associations with neurodegenerative diseases. The only possible exception concerns people employed in electrical occupations who appear to have an increased risk of developing amyotrophic lateral sclerosis; however, this may be due to effects of electric shocks rather than any effect of long-term exposure to the fields *per se.* Studies of suicide and depressive illness have inconsistent results in relation to ELF EMF exposure."
International Agency for Research on Cancer (2002)	"Apart from established perceptual response in humans to ELF electric fields at levels of tens of kilovolts per meter and the occurrence of magnetophosphenes (faint, flickering visual sensations) in response to exposure to relatively strong ELF magnetic field (>10 mT at 20 Hz), few behavioural effects of exposure to ELF electric and magnetic fields have been observed. Changes in electroencephalograms, cognition, mood, sleep electrophysiology and cardiac response tend to be few, subtle and transitory when they do occur during exposure. The evidence from epidemiological studies of residential and occupational exposure to ELF electric and magnetic fields in relation to the incidence of neurodegenerative disease, depression and suicide and cardiovascular disease is generally weak and inconsistent."
National Institute of Environmental Health Sciences (1999)	With regard to ELF EMF and Alzheimer's disease, NIEHS concluded "These data are inadequate for interpreting the possibility of an association." With regard to studies amyotrophic lateral sclerosis, NIEHS concluded "Adequate adjustment could not be made for known risk factors (electric shocks or a family history of amyotrophic lateral sclerosis) making these studies difficult to interpret." "Suicide and depression were studies in three occupational epidemiological studies. These studies do not support an association with ELF-EMF exposure."

Five studies have been published after the studies reviewed by the WHO report (Davanipour et al., 2007; Röösli et al., 2007b; Seidler, 2007; Sorohan and Keifets, 2007; Huss, 2008). Davanipour et al. (2007) extended the early hypothesis-generating study by Sobel et al. by collecting cases from eight California Alzheimer's Disease Diagnostic and Treatment Centers (Sobel et al. examined the 9th Center in 1996). In this case-control study, participants were classified as having high or medium magnetic field exposure based on their self-reported primary occupation. The authors observed an association between Alzheimer's disease and the combined high/medium category, but not for the high category itself.

Death from several neurodegenerative conditions was evaluated in a cohort of Swiss railway workers (Röösli et al, 2007b). Magnetic field exposure was characterized by specific occupations; station masters were considered to be in the lowest exposure category, train drivers were considered to have the highest exposure, and shunting yard engineers and train attendants were considered to have exposure intermediate to these two groups. The authors did not observe an association between death from multiple sclerosis, Parkinson's disease, ALS, senile dementia including Alzheimer's disease, or isolated Alzheimer's disease for any of the three occupational groups, compared with station masters.

Occupational magnetic field exposure was also evaluated in relation to death from Alzheimer's disease, Parkinson's disease, and motor neuron disease in a cohort of general and transmission electricity workers in the United Kingdom (Sorohan and Kheifets, 2007). Analyses were conducted based on associations with occupation and estimated cumulative magnetic field exposure. The authors observed, "Based on serial mortality rates for England and Wales, deaths from Alzheimer's disease and motor neuron disease were unexceptional. There was an excess of deaths from Parkinson's disease of borderline significance."

Seidler et al. (2007) conducted a case-control study of dementia and occupational magnetic field exposures. Cases were recruited from general practices in Germany, and controls were recruited from the general practices and the general population. The authors did not observe statistically significant associations between dementia and magnetic field exposure, as assessed by expert rating of potential occupational exposures. The authors concluded "Our study does not support a strong association between occupational exposure to low-frequency magnetic fields and dementia."

Huss et al. (2008) examined the relationship between distance from transmission lines and mortality from neurodegenerative diseases. The authors reported that relatively more persons for which Alzheimer's Disease was listed on the death certificate had lived within 50 m of 220 - 380 kV power lines than at distances greater than 600 m. The association was stronger and statistically significant only for 10 and 15 year periods of residency. Weaker or no associations were observed for other neurodegenerative diseases. Huss et al. interpreted this result as a "possible association," noting that the role of environmental factors, including ELF-EMF is controversial and that the results must be interpreted with caution. A recent meta-analysis of occupational exposures to EMF also suggested an association with Alzheimer's disease but noted the numerous limitations associated with these studies, including the difficulty of assessing EMF exposure during the appropriate time period, case ascertainment issues due to diagnostic difficulties, and differences in control selection.

Overall, these five studies contribute new information to the body of literature regarding magnetic field exposure and neurodegenerative conditions. Limited inferences can be made, however, because of limitations in the study designs, e.g., estimated cumulative magnetic field exposure was based solely on occupation in four of the studies and many of the studies relied on death certificates which under-report difficult and latent diagnoses like Alzheimer's disease. The results of these studies do not appear to provide evidence to contradict the conclusions of the WHO or NRPB regarding EMF exposure and neurodegenerative conditions. Further studies are still required, however, to address the numerous limitations of the existing body of literature.

Cardiovascular Disease

In the WHO report, studies of heart rate variability, blood pressure, and cardiovascular disease mortality in relation to EMF were discussed. The authors of the WHO report concluded that "Overall, the evidence does not support an association between ELF exposure and cardiovascular disease." Similarly, the authors of the NRPB report concluded that "…evidence for a link with cardiovascular disease is weak." Also, the NIEHS concluded "Lacking additional epidemiological studies to collaborate these results [of two occupational studies], these data are inconclusive regarding an association between cardiovascular disease and exposure to ELF-EMF." No recent studies of ELF-EMF and cardiovascular outcomes in human populations were identified since the completion of the WHO report.

Immune and Hematological Systems

At the time of the WHO report, studies had been published that evaluated natural kill cell activity and white blood cell counts. The conclusion in the WHO report regarding the immune system was, "Evidence for the effects of ELF electric or magnetic fields on components of the immune system is generally inconsistent." There are relatively few studies related to the hematological system. The summary conclusion by the WHO (2007) for these health outcomes was "Overall … the evidence for effects of ELF electric or magnetic fields on the immune system and haematological system is considered inadequate." Similarly, IARC concluded that "Due to the small number of immunological and haematological studies in humans and very small sample sizes within the reported studies, no health-related conclusions can be drawn from the data on immunological and haemoatological effects after exposure to ELF electric and magnetic fields." No recent studies of ELF-EMF and immune or hematological system outcomes in human populations were identified since the completion of the WHO report.

Standards and Guidelines

Several scientific organizations have published guidelines for exposure to EMF based on acute health effects that can occur at very high field levels. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) reviewed the epidemiologic and experimental evidence through 1997 and concluded that there was insufficient evidence to warrant the development of standards or guidelines on the basis of hypothesized long-term adverse health effects such as cancer; rather, the guidelines put forth in their 1998 document set limits to protect against acute health effects (i.e., the stimulation of nerves and muscles) that occur at much higher field levels. The ICNIRP recommends a screening value of 833 mG for the general public and an occupational exposure screening value of 4,200 mG (ICNIRP, 1998). If exposures exceed these screening values, then additional dosimetry evaluations are needed to determine whether basic restrictions on induced current densities are exceeded.

The International Committee on Electromagnetic Safety (ICES) also recommends limiting magnetic field exposures at high levels because of the risk of acute effects, although their guidelines are higher than ICNIRP's guidelines at 60 Hz; the ICES recommends a residential exposure limit of 9,040 mG and an occupational exposure limit of 27,100 mG (ICES, 2002). Both guidelines incorporate large safety factors.

The ICNIRP and ICES guidelines provide guidance to national agencies and only become legally binding if a country adopts them into legislation. The WHO strongly recommends that countries adopt the ICNIRP guidelines, or use a scientifically sound framework for formulating any new guidelines (WHO, 2006).

There are no national or state standards in the US limiting exposures to ELF fields based on health effects. Only two states, Florida and New York, have enacted standards to limit magnetic fields at the edge of the ROW from transmission lines (150 mG and 200 mG, respectively) (NYPSC, 1978; FDER, 1989; NYPSC, 1990; FDEP, 1996). The basis for limiting magnetic fields from transmission lines in Florida and New York was to maintain the "status quo" so that fields from new transmission lines would be no higher than those produced by existing transmission lines.

EMF & Health Summary

Electric energy is a beneficial and indispensable component of human society. Because of the universal exposure of the public to electric energy through appliances, power lines, and other sources, it is important to consider the impact that electric energy may have on human disease risk. This section of the report provided information about EMF, discussed how to interpret health research, and provided an up-to-date summary and assessment of current research on EMF and health and a discussion of relevant exposure guidelines and standards.

When evaluating whether EMF may have an adverse impact on human health, it is important to consider the type and strength of the research being considered. Key factors to consider include how EMF was measured or estimated and the type of study (e.g., epidemiologic or experimental). Epidemiologic, *in vivo,* and *in vitro* health studies vary in their quality and in their capacity to extrapolate findings to the population at large.

Several organizations have published comprehensive reviews of EMF and health outcomes. The most comprehensive and up-to-date report on EMF and human health was published by the WHO in 2007 and critically reviewed the literature through early 2006, taking into account the strength and quality of the studies. In addition to summaries of conclusions for adult cancer, childhood leukemia, reproductive and developmental outcomes, neurodegenerative and neurobehavioral conditions, cardiovascular conditions, and immune-related conditions, a summary of the literature published after the WHO report is provided in this section.

In general, recent studies have not provided strong evidence to contradict the conclusions made by the WHO and other organizations.

The WHO, as well as the numerous other scientific agencies that have considered this issue, has concluded that the extensive body of research that currently exists does not suggest that power-frequency EMF causes any long-term adverse health effects. Recent research does not provide any evidence to alter these conclusions. In summary, there is no scientific basis to project any adverse health effects as a result of the electric and magnetic fields from typical sources of these fields in our environment including power distribution lines, transmission lines, electrical appliances, and electrically-powered transportation.

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Appendix E
Cultural Resources Study

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ARCHEOLOGICAL ASSESSMENT
FOR THE
SOUTHERN MARYLAND 230 KV HOLLAND CLIFF TO HEWITT ROAD PROJECT
CALVERT AND ST. MARY'S COUNTIES
MARYLAND

Prepared For:

SMECO Southern Maryland Electric Cooperative

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Prepared By:

THE OTTERY GROUP

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Thomas Bodor, RPA (Principal Investigator)
and
Joseph Moore

November 2008

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Executive Summary

This report presents the findings of archeological assessment for the proposed Southern Maryland 230 kV Holland Cliff to Hewitt Road Project. The Southern Maryland Electric Cooperative (SMECO) is proposing to install a new 230 kV transmission line that will extend from Holland Cliffs in Calvert County to Hewitt Road in St. Mary's County, Maryland. The project is partially sponsored by the Rural Development Utilities Program of the United States Department of Agriculture (USDA) and is therefore considered an undertaking subject to regulations contained in Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (36 CFR 800).

This report was prepared to assist project proponents in assessing the likelihood that undocumented or unevaluated archeological sites may, or may not, be affected by the proposed undertaking. Specifically, this report will be part of a Borrowers Environmental Report (BER) used to obtain funding from the Rural Development Utilities Program. The BER will be part of an application for a Certificate of Public Convenience and Necessity (CPCN) from the Maryland Public Service Commission.

The Ottery Group, Inc. of Olney, Maryland completed the assessment and prepared this report on behalf of SMECO. The methods for completing this assessment generally follow guidance of the Maryland Historical Trust (MHT) as described in their *Standards and Guidelines for Archeological Investigations In Maryland* (Shaffer and Cole 1994). Each key technical staff assigned to this project meets the *Secretary of the Interior's Professional Standards for Archeology* (36 CFR 61).

The proposed undertaking consists of the installation of a new transmission line primarily within existing SMECO rights-of-way in Calvert and St. Mary's Counties. The new conductors will require either pole replacement or new pole structures in most locations within the existing transmission line corridor. The total length of the existing corridor is approximately 30 miles from end to end. In addition to the work proposed for the existing SMECO right-of-way, the project will entail alternative routing within new rights-of-way. The total length of proposed new rights-of-way is 0.5 to 2 miles. The proposed routing alternatives are contained entirely within the Naval Recreation Center property in Solomon's Island (Calvert County) Maryland.

The assessment included the completion of four primary tasks: Background Research, Field Assessment, Laboratory Processing and Analysis, and Reporting. The results of the assessment are documented in the following chapters. This report is organized in accordance with the MHT's reporting standards, and includes project recommendations pertaining to potential adverse effects to historic properties by the proposed undertaking.

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Appendices

List of Figures

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1.0 Introduction

This report presents the findings of archeological assessment for the proposed Southern Maryland 230 kV Holland Cliff to Hewitt Road Project. The Southern Maryland Electric Cooperative (SMECO) is proposing to install a new 230 kV transmission line that will extend from Holland Cliffs in Calvert County to Hewitt Road in St. Mary's County, Maryland. The project is partially sponsored by the Rural Development Utilities Program of the United States Department of Agriculture (USDA) and is therefore considered an undertaking subject to regulations contained in Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (36 CFR 800).

The project area is located within the Western Shore Uplands Region of the Coastal Plain physiographic province, and the Council for Maryland Archeology Research Unit 9 – Estuarine Patuxent Drainage (Figure 1.1). The project area is contained on a portion of the existing SMECO transmission line and substation as well as an adjacent SMECO property near Holland Cliffs Road in Calvert County.

The Ottery Group, Inc. of Olney, Maryland completed the assessment and prepared this report on behalf of SMECO. The methods for completing this assessment generally follow guidance of the Maryland Historical Trust (MHT) as described in their *Standards and Guidelines for Archeological Investigations In Maryland* (Shaffer and Cole 1994). Each key technical staff assigned to this project meets the *Secretary of the Interior's Professional Standards for Archeology* (36 CFR 61).

The proposed undertaking consists of the installation of a new transmission line primarily within existing SMECO rights-of-way in Calvert and St. Mary's Counties. The new conductors will require either pole replacement or new pole structures in most locations within the existing transmission line corridor. The total length of the existing corridor is approximately 30 miles from end to end. In addition to the work proposed for the existing SMECO right-of-way, the project will entail alternative routing within new rights-of-way. The total length of proposed new rights-of-way is 0.5 to 2.0 miles. The proposed routing alternatives are solely contained within the current Naval Recreation Center property in Solomons (Calvert County) Maryland.

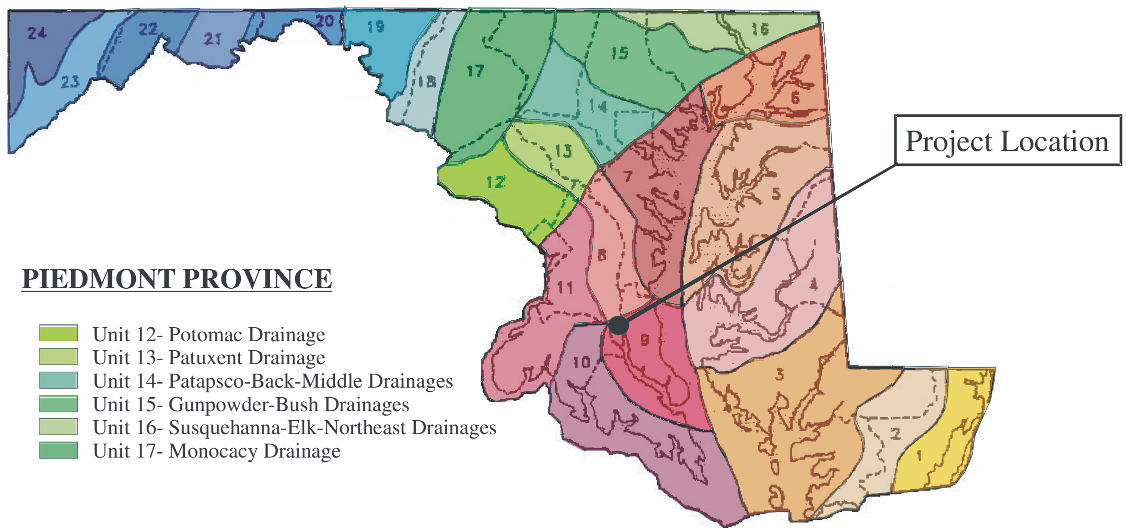
The assessment included the completion of four primary tasks: Background Research, Field Assessment, Laboratory Processing and Analysis, and Reporting. The results of the assessment are documented in the following chapters. This report is organized in accordance with the MHT's reporting standards, and includes project recommendations pertaining to potential adverse effects to historic properties by the proposed undertaking.

The field assessment was conducted in August and September of 2008. The field assessment involved a pedestrian survey of the entire existing transmission corridor, judgmental shovel testing, and recordation of observations pertaining to soil type, condition, and presence or absence of surface artifacts.

Thomas Bodor, RPA served as Principal Investigator for the project. Field directors for the project included Adam Fracchia and Joseph Moore, who is co-author of this report. They were assisted in the field by Wes Stewart and Matt Ristau.

APPALACHIAN PROVINCE

- Unit 18- Catoctin Creek Drainage
- Unit 19- Antietam Creek-Conococheague Creek Drainages
- Unit 20- Licking Creek-Tonoloway Creek-Fifteen Mile Creek Drainages
- Unit 21- Town Creek Drainage
- Unit 22- Evitts Creek-Georges Creek Drainages
- Unit 23- Potomac-Savage Drainages
- Unit 24- Youghiogheny-Casselman Drainages



PIEDMONT PROVINCE

- Unit 12- Potomac Drainage
- Unit 13- Patuxent Drainage
- Unit 14- Patapsco-Back-Middle Drainages
- Unit 15- Gunpowder-Bush Drainages
- Unit 16- Susquehanna-Elk-Northeast Drainages
- Unit 17- Monocacy Drainage

COASTAL PLAIN PROVINCE

- Unit 1- Atlantic Drainage
- Unit 2- Pocomoke Drainage
- Unit 3- Nanticoke-Wicomico-Manokin-Big Annemessex Drainages
- Unit 4- Choptank Drainage
- Unit 5- Chester River-Eastern Bay Drainages
- Unit 6- Sassafras-Elk-Northeast-Bush-Susquehanna Drainages
- Unit 7- Gunpowder-Middle-Back-Patapsco-Magothy-Severn-South-Rhode-West Drainages
- Unit 8- Riverine Patuxent Drainage
- Unit 9- Estuarine Patuxent Drainage
- Unit 10-Estuarine Potomac Drainage
- Unit 11- Riverine Potomac Drainage

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Figure 1.1:
Location of the Project Area in Maryland
Archeological Research Unit 9

Scale
0 10 20
Miles

2.0 Project Area Location and Description

The project area consists of approximately 30 miles of existing SMECO transmission corridor and approximately 0.5 to 2 miles of new right-of-way located in Calvert and St. Mary's Counties in Maryland. The existing corridor extends from the Holland Cliffs substation in Calvert County to the existing Hewitt Road substation in St. Mary's County (Figure 2.1). The project involves the replacement of existing overhead lines and poles with new wires and poles. In addition, a new substation is proposed for a location in St. Mary's County, but the specific location and site logistics were not available at the time this assessment was prepared.

The existing corridor crosses private farms, roads, creeks and rivers, and commercial and residential developments and almost all of the corridor could be characterized as rural agricultural, except in the more developed areas of Solomon's Island and the corridor's terminus at Hewitt Road. These more populated areas have seen rapid growth and development in the past 20 years.

In most locations of the existing corridor, vegetation has been consistently trimmed or cleared to facilitate maintenance of the right-of-way and to allow for easier access to the existing wooden poles that run through the center of the corridor. Based on observations made during this assessment, it is apparent that the initial construction of the corridor in the 1950s or 1960s involved wholesale clearing and grubbing of trees and vegetation within the right-of-way. The initial clearing and subsequent maintenance of the corridor resulted in increased erosion on the tops of knolls and ridges, leaving behind a hard-packed gravelly surface soil. Portions of the corridor that cross agricultural fields or in low-lying flat areas have not experienced as much erosion as those areas along steep slopes or narrow ridges.

While some of the natural drainage systems have been disrupted and altered by development near the transmission lines, the bulk of the drainages appear intact near the project area. Deep gulleys from heavy and active erosion are evident along the drainages within the project area.

In addition to the existing corridor, the 0.5 to 2.0 miles of new right-of-way will include a portion of the Navy Recreation Center (NRC) property in Solomon's (Calvert County) Maryland. There are currently two proposed alternatives for the new right-of-way on the NRC property. SMECO has reviewed aerial photography of the NRC and has identified two potential routes for the duct bank on the Navy property and the river crossing. The Preferred Route begins in the overhead line corridor approximately 750' north of the intersection of A Avenue and Patuxent Beach Road (MD-4). The new cable circuits will be installed by open trenching until they reach the horizontal directional drilling (HDD) end point. The duct bank route will follow the existing overhead corridor for 750 feet to A Avenue. The route will turn onto A Avenue, and travel down A Avenue for approximately 2,200 feet to 3rd Street. The route continues down 3rd Street to B Avenue. The route continues down B Avenue to Point Patience Drive. The route follows Point Patience Drive to the HDD end point. The overall trenched duct bank will be approximately 5,300 feet in length. The Preferred Route HDD from Point Patience is a straight line across the Patuxent River, with an overall length of approximately 4,500 feet.

The Alternate Route begins at the same point as the Preferred Route but takes Ramp Road from A Avenue to the HDD end point east of the second cove, east of Point Patience. The overall trenched duct bank for the Alternate Route would be approximately 2,800 feet. The Alternate Route HDD from the second cove would include a slight horizontal bend and have an approximate length of 5,600 feet.

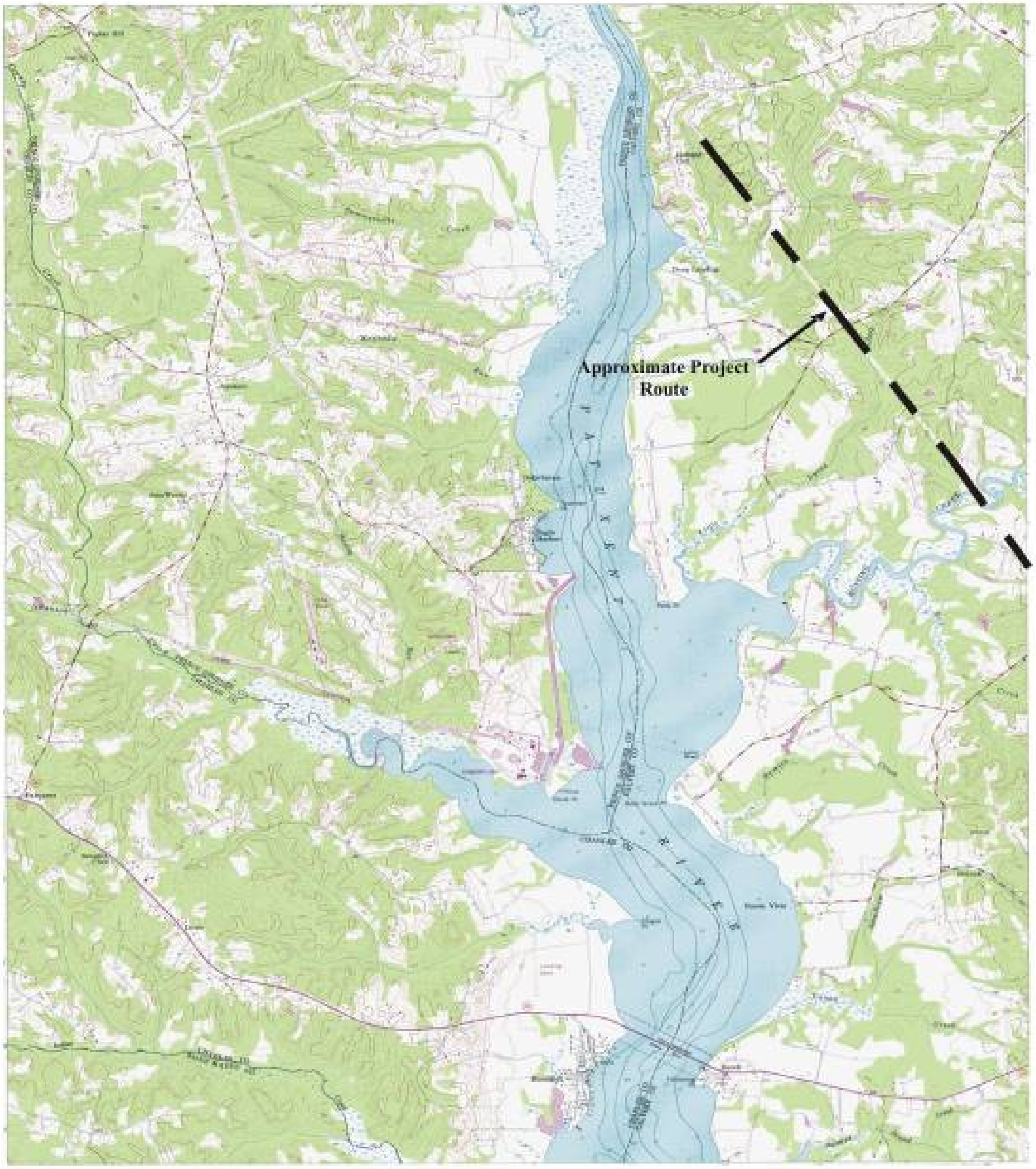

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Figure 2.1:

Project Route
(USGS 1987 Benedict Quadrangle)

(Not to scale)

THE OTTERY GROUP 3420 Morningwood Drive Olney, MD 20832 phone (301) 562-1975 fax (301) 562-1976	**Figure 2.2:** Project Route (USGS 1993 Prince Frederick Quadrangle)	N **(Not to scale)**

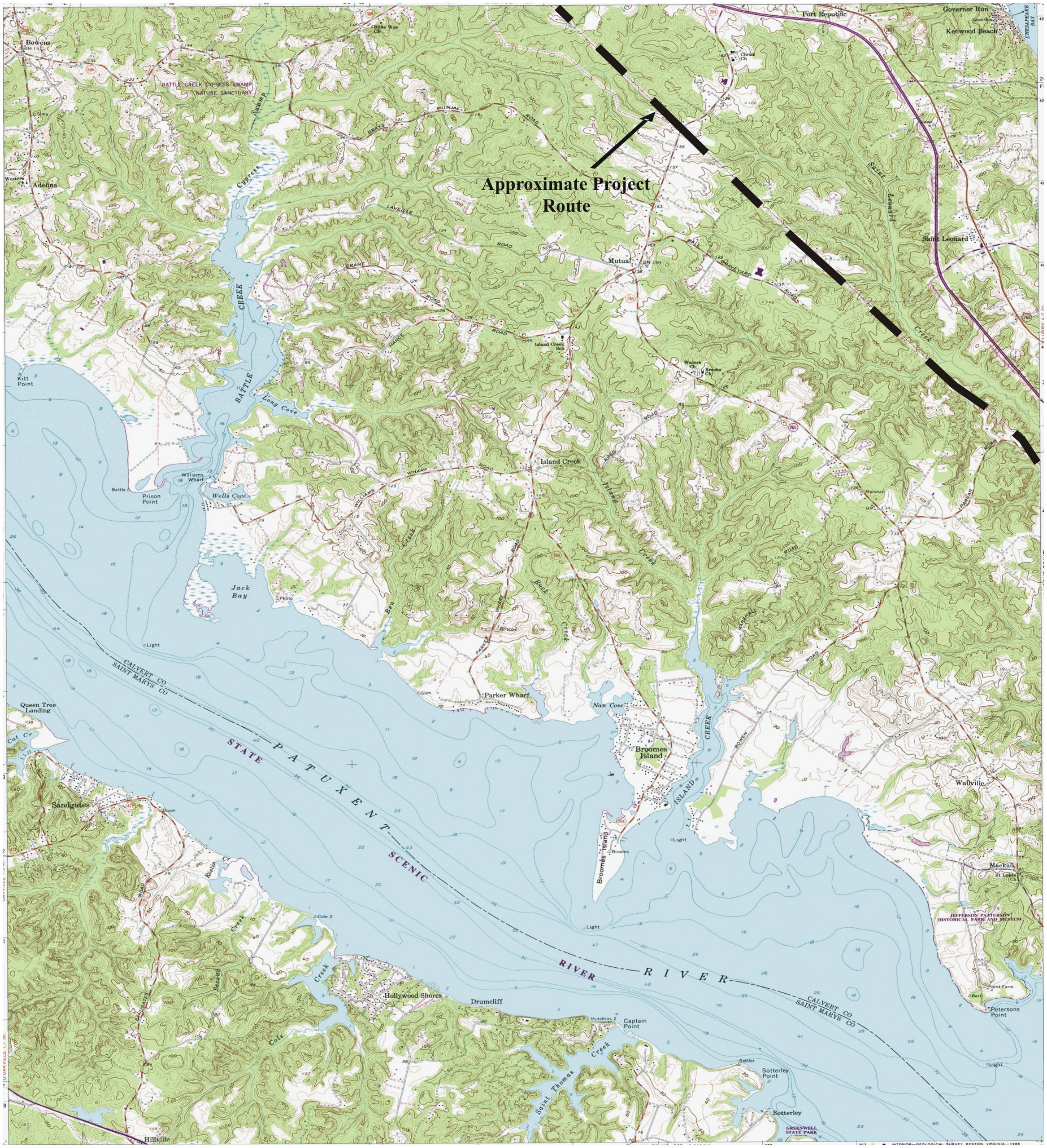

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Figure 2.3:
Project Route
(USGS 1986 Broomes Island Quadrangle)

(Not to scale)

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Figure 2.4:
Project Route
(USGS 1986 Cove Point Quadrangle)

(Not to scale)

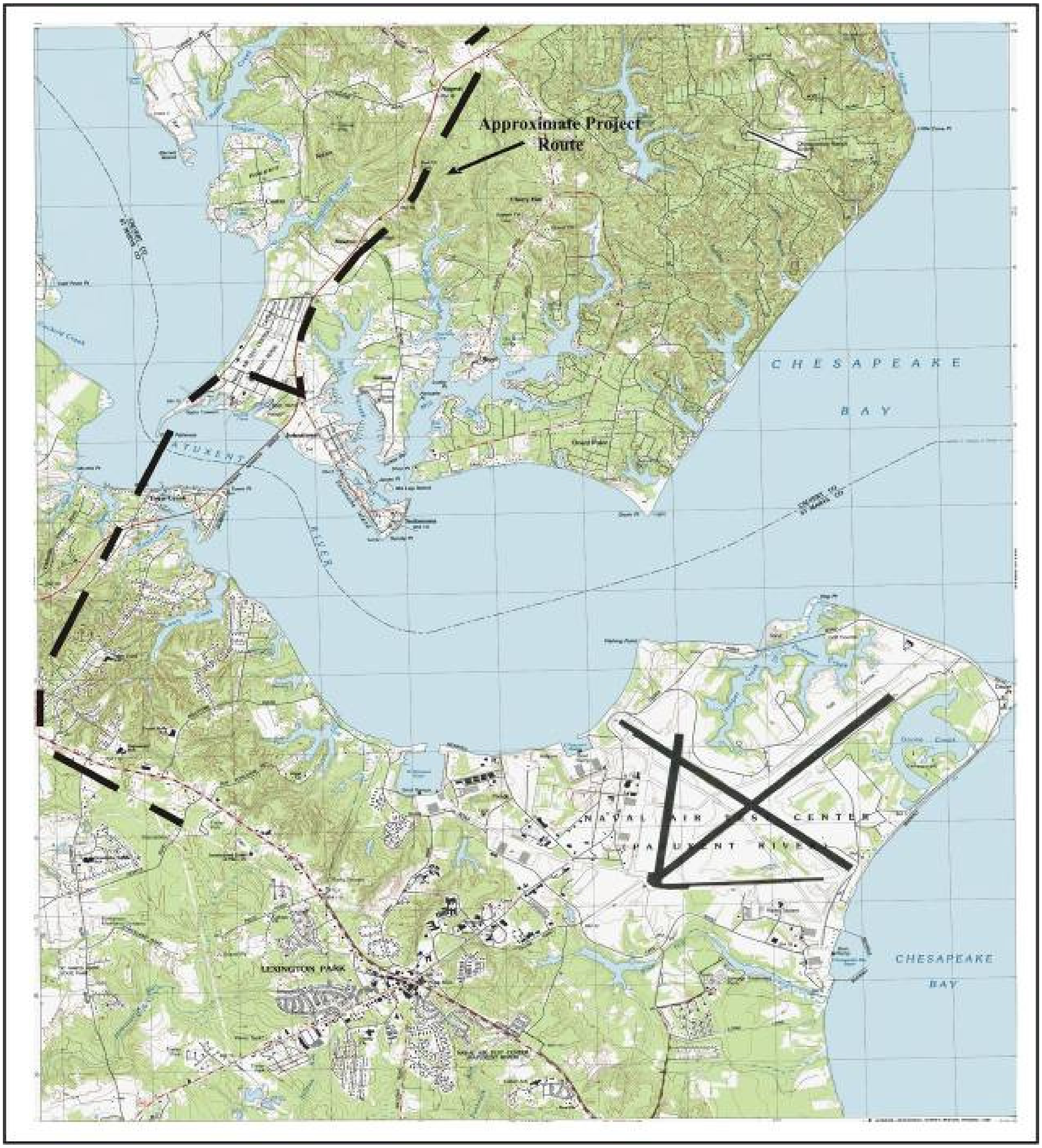

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Figure 2.5:

Project Route
(USGS 1986 Solomon's Island Quadrangle)

(Not to scale)

3.0 Environmental and Historical Background

3.1 Environmental Context

The natural environment has been an important determinant of settlement and subsistence patterns during prehistoric and historic occupations of the region. Specific environmental characteristics, such as soils and proximity to water, influenced the quantity and variety of resources available to prehistoric peoples (i.e., wild plants, animals, and raw lithic materials for the manufacture of stone tools). In a broader sense, climate effects the distribution of fauna, flora, and the nature and distribution of soils. Climate also influences where people travel or settle and how they exploit natural resources in their surroundings. Throughout the Middle Atlantic region, the locations and types of prehistoric sites are closely correlated with the modern biophysical environment (ca. 3,000 BP-Present) and with paleoenvironments (ca. 12,000-3,000 BP). Portions of this background are paraphrased from Levinthal, Franz, and Bodor (2007) and Bodor and Fracchia (2007).

3.1.1 Paleo-Climate

The climate of the Middle Atlantic region underwent a series of changes following the retreat of the glaciers at the end of the Pleistocene. An understanding of climatic change is important in understanding the environmental conditions facing prehistoric peoples and how adaptation to these conditions shaped human settlement patterns and subsistence. Climatic episodes defined by Carbone (1976) for the Shenandoah Valley are broadly applicable to the project area. The vegetation history of the project area may be inferred from general vegetation histories of the Middle Atlantic region that have been developed from data provided by fossilized pollen. Plant communities also influence the faunal resources that were available in the past.

The last glacial episode reached its peak at approximately 18,000 BP. The glaciation occurring at the terminal Pleistocene had profound effects upon the climate of the Middle Atlantic region. The climate during this time was cool and wet, and average temperatures were several degrees lower than present (Carbone 1976). Surface runoff from the retreating glaciers and heavy precipitation resulted in numerous upland bogs and poorly drained lowlands (Custer and Wallace 1982). A relatively open forest dominated by spruce and pine was the predominant vegetative cover.

Moist climatic conditions during this episode promoted the development of uplands and increased wetland areas associated with stream drainages. These vegetation communities would have provided unique sets of resources and unique resource distributions for Paleoindian and Early Archaic populations.

Between 10,000 and 8,500 BP, the effects of the ice sheet began to diminish. The primary change during this time was the rise in sea levels resulting in the slow inundation of many river valleys. The most pronounced embayment in the Middle Atlantic region occurred with the drowning of the Susquehanna River, which eventually resulted in the formation of what we now call the Chesapeake Bay. This rise in sea level would have affected all tributaries to the Bay, including locations far away from its shores. Possible results of this rise include a cessation of stream incision, a decrease in stream competency that resulted in an increase in deposition throughout the drainage basin, and an increase in headwater erosion. During this time, seasonality increased and deciduous forests spread. Many Pleistocene fauna became extinct or migrated out of the region altogether.

Between 8,500 and 5,000 BP, the climate was warmer and more humid (Custer 1984), becoming increasingly warmer and drier, with the warmest and driest period from 5,000 to 4,000 BP (Carbone

1976). With increasing deciduous constituents, the resources available to Middle Archaic occupations changed. An increase in nut-bearing trees also might have resulted in an increase in small foraging animals. Anadromous fish increased in number by the end of this climatic episode. The warmer and drier climatic conditions resulted in the draining of bogs and pocosins, which decreased the number of water sources available across the landscape.

The period between 5,000 and 3,000 BP has been interpreted as a xerothermic climate regime (Carbone 1976), which resulted in fewer lower order streams and a concentration of resources in lowlands (Custer and Wallace 1982). By the end of this climatic episode, climax forests dominated by mixed oak-hickory-pine were established composing a community similar to modern forest communities. The Late Holocene (3,000 to the present) represents essentially modern climatic conditions, although several climatic perturbations are suggested after the beginning of this period.

3.1.2 Modern Climate, Flora, and Fauna

Calvert and St. Mary's Counties have humid, temperate climates with well-defined seasons. Weather conditions for the area are typical of its position in the middle latitudes, where airflow generally is from west to east across the continent. The proximity of both counties to the Chesapeake Bay and the Atlantic Ocean subjects the area to regular fluctuations in temperature and humidity.

3.2 Prehistoric Cultural Sequence

There are three general prehistoric cultural traditions recognized in the Middle Atlantic region: Paleo-Indian, Archaic, and Woodland. Originally developed as cultural historical units primarily intended to treat temporal and spatial questions, these traditions are defined by diagnostic artifact forms and assemblages. In more recent years, this scheme has been modified to emphasize cultural adaptations to changing ecological conditions. While the various terms continue to be used, their use is now as much behavioral as classificatory.

3.2.1 Paleo-Indian Period

The Paleo-Indian period (ca. 12,000-6,500 BP) represents human occupation and utilization of the lands representing a tundra-like environment following the retreat of the Wisconsin glaciers circa 11,000 B.C. (Dent 1995). Classical models of PaleoIndian traditions propose a hunting and foraging subsistence pattern focused around extinct megafauna, pursued by highly mobile, opportunistic populations organized as bands composed of multiple family groups.

These models, largely derived from PaleoIndian sites identified west of the Appalachian chain, have proved to be not directly applicable to eastern North America, where direct association between PaleoIndian artifacts and extinct megafauna has not been identified. Instead, researchers have proposed that eastern populations utilized transitional tundra populations like caribou and elk, and evolving modern populations like white tailed deer (Dent 1995). Material evidence also supports the hypothesis that Eastern Paleo-Indian populations exploited of a wider range of resources, perhaps most notably the findings at the Shawnee-Minisink site along the Delaware River in the Upper Delaware Valley (McNett 1985). Thus, Paleo-Indian populations were mobile, frequently changing location throughout the year within a territory in order to utilize available resources. Gardner's research at the Flint Run Complex in Virginia (Gardner 1974, 1977, 1979) has identified several types of sites organized around the base camp, which was the main focus of habitation by aggregate bands. Base camps tend to have heterogeneous artifact assemblages, in contrast to smaller special purpose sites that were occupied by smaller groups for shorter periods of time to make use of seasonally available resources. Base camps were tied to quarry sites where high-quality cryptocrystalline lithic materials were extracted for stone tool manufacture (Gardner 1977, Goodyear 1979). Smaller camps and special-use sites radiate from the base camps in varying distances. Gardner (1974) and Witthoft (1953) have also proposed that upland settings were utilized as they offered a vantage point from which to observe migrating animals.

Gardner (1974) notes that Paleo-Indians placed an emphasis on hunting, although it is most likely that exploitation of available floral resources also was a critical component of Paleo-Indian subsistence strategies. In many areas, Paleo-Indian sites are associated with large Pleistocene megafauna such as mammoth and mastodon, however, Gardner (1980) notes that the hunting economy probably focused on deer, elk, and possibly caribou. Diagnostic projectile point forms include (from earliest to latest) Clovis, Mid-Paleo, and Dalton-Hardaway.

3.2.2 Archaic Period

The Archaic Period (8,500-3,000 BP) spans a great amount of time and substantial cultural change in the eastern United States. Traditionally, it is divided into three subperiods: Early, Middle, and Late. Generally, the Archaic Period refers to pre-ceramic sites associated with nomadic hunter-gatherer populations that occupied the emerging Holocene deciduous forests. This was considered distinct from the Paleo-Indian period that was characterized by highly mobile hunters reliant on big game for their livelihood. Warmer and drier climatic conditions at the onset of the Holocene resulted in a more varied floral and faunal resource base, and resulted in cultural adaptations during the Archaic period. Settlement patterns were seasonally oriented, and groups were still semi-nomadic, with a subsistence base focused on hunting and gathering. An increase in population density appears to have resulted in both a larger number of sites and an increase in site revisitation, especially during the Late Archaic. In all probability, the geographical range of individual populations during the Archaic was smaller and more seasonally defined compared with the range of human groups during the Paleo-Indian period. Still, evidence points to increased trade between distant groups, such as the rise in the quantity in eastern sites of rhyolite quarried from the Catoctin Mountains in Maryland and Uwharrie Mountains in North Carolina.

Research over the last two decades has revealed that the transition between the Paleo-Indian and Early Archaic was not as great as previously thought. The transition to the Archaic appears to have been more gradual and characterized by exploitation of an increasingly broad range of local resources and decreasing mobility. Thus, the Early Archaic sub-period (8,500-7,500 BP) is viewed as a continuation of the earlier Paleo-Indian lifeways, with an emphasis on the use of cryptocrystalline lithic materials for tool making. Lithic technology, however, shifted to a variety of corner-notched types, including Hardway, Palmer and Kirk, as well as bifurcate-base types such as Lecroy during the transition to the Middle Archaic period (Dent 1995). This shift in projectile point form may indicate diversification within the system of production, as economies shifted from a concentration on hunting deer and other large game to more diverse faunal exploitative patterns focused on smaller game. By the end of this sub-period, less emphasis was placed upon high-quality cryptocrystalline stone, suggesting that the settlement system based on quarry-related base camps became less important.

The Middle Archaic (7,500-5,000 BP) is cited as a time when hunting and gathering groups began to develop a subsistence strategy that incorporated a diverse array of seasonally available resources. This strategy is indicated by the addition of specialized plant processing tools in Middle Archaic assemblages. A wider variety of projectile point styles also is evidenced during this time, though the use of cryptocrystalline stone for tool production is nearly abandoned. Diagnostic artifacts include Stanley, Morrow Mountain, Guilford, and Halifax point types. Tool kits are seen as becoming increasingly diversified during this period, with many more ground- and rough-stone implements (Dent 1995). The focus of settlement is at seasonally occupied base camps located on the floodplains of major drainages where seed plants could be exploited. Hunting and limited-use sites are located in the uplands, along lower-order streams and near lithic sources, and adjacent to interior swamps and swampy floodplains of low order drainages.

The Late Archaic sub-period (5,000-3,000 BP) is characterized by cultures that made efficient use of their local environments, and as a result, there was an increased degree of regional distinction that is visible in the archeological record. During this time semi-sedentary settlement systems expanded, possibly as a result of greater aridity that tethered groups to critical resources, or an increase in population that resulted in territorial circumscription.

Increased use of riverine and estuarine resources is evident. The development of estuaries throughout the Coastal Plain from the continued rise in sea levels resulted in the increased distribution of crabs and oysters and extensive seasonal runs of anadromous fish. Steatite bowls were introduced into the technology inventory. The majority of projectile points representative of this time period consist of side-notched and stemmed varieties, which are typically manufactured from quartz.

The Late Archaic represents the culmination of what Caldwell (1958) termed primary forest efficiency. Caldwell stressed the variety and availability of food sources in the eastern forests, and stressed that prehistoric groups could move seasonally to maximize resource acquisition. Thus, in the eastern United States in general, Middle and Late Archaic groups are seen as mobile hunting and gathering peoples who exploited seasonal resources and scheduled their movements accordingly. In parts of the Middle Atlantic region, the Late Archaic period also is associated with large bivalve middens. Scattered campsites focused on major rivers appear to form a major element within the settlement pattern; short-term campsites in upland zones along small streams have also been documented.

Culturally-diagnostic artifacts for this period include the Savannah River and Susquehanna Broadspear projectile point types, which appear to be represented in different frequencies above and below the Fall Line separating the Piedmont and Coastal Plain. The presence of steatite bowls in assemblages is also a diagnostic artifact of this period.

3.2.3 Woodland Period

The Woodland period is divided into three sub-periods: Early Woodland (1,000-300 B.C.), Middle Woodland (300 B.C.-A.D. 900), and Late Woodland (A.D. 900-A.D. 1600). The Woodland period was defined originally in the 1930s by the appearance of ceramics, maize agriculture, and sedentary villages. At the time, it was believed that ceramics, food production, and sedentary village life were mutually inclusive. Research over the last few decades, however, has revealed that the transition between the Archaic and Woodland were not as great as previously thought. Witthoft (1953) has defined a Transitional Period linking the Archaic and the Woodland periods that was restricted in appellation to the cultural sequences of the northeastern and Middle Atlantic regions of the United States. Custer (1989; Custer and Wallace 1982) considers the Late Archaic through Middle Woodland as a related continuum.

The Early Woodland period represents a continuation of trends begun during the Middle and Late Archaic periods towards increased exploitation of local resources and decreased mobility. The increased productivity of coastal and estuarine resources resulted from the stabilization of sea levels; marshes developed and estuarine areas rapidly became places on the landscape in which fish, waterfowl, and shellfish could be easily exploited. Floodplains were increasingly the focus of plant harvesting.

Early Woodland technology included two sets of diagnostics. The first is a series of projectile points, typified by fishtail and by contracting stemmed varieties. The second set of diagnostics is ceramics. Characteristic ceramics of the period include steatite-tempered Marcey Creek and Seldon Island types, and sand-tempered Accokeek ceramics.

During the Middle Woodland (300 B.C.-A.D. 900) sub-period, villages grew in size and became more permanent. Handsman and McNett (1974:26) have suggested that there was a greater reliance on horticulture resulting from an increasing population. Diagnostic artifacts include Popes Creek ceramics that are more frequent in the Coastal Plain, and Albermarle wares which are more common in the Piedmont, as well as shell-tempered Mockley wares.

Sedentism and subsistence based on food production were solidly established by the Late Woodland (A.D. 900-1,600). Large, permanent villages were located on the floodplains of major rivers. By A.D. 1,350, there is evidence of stockaded villages, suggesting extensive warfare throughout the Middle Atlantic region. Shell-tempered Townsend series ceramics are predominant in Late Woodland assemblages, while crushed-rock-tempered Potomac Creek wares are prevalent in the Inner Coastal Plain to the Fall Line zone. Triangular projectile points also are typical of this period.

After contact with European settlers, the traditional lifeways were disrupted. European settlement rapidly led to the nearly complete elimination of Native American groups in the Middle Atlantic region. Settlement and subsistence of historic Native Americans at the time of contact were most likely a continuation of patterns observed in the Late Woodland period.

At the time of European arrival into the Chesapeake region, the coastal area of northern Virginia and Maryland was inhabited by the Algonquian speaking groups, most notably the Piscataway, or Conoy. Algonquian speaking groups occupied much of the land on both sides of the Potomac River up to the Fall Line. Jennings (1978) claims that Iroquoian speaking Susquehannock were primarily located north and west of Anne Arundel County, but proved significant during the early colonial period. However, as European settlements began encroaching into former Indian lands, many of these original inhabitants left the area or were ravaged by diseases for which they had little resistance.

3.3 Historic Background

The following background briefly summarizes the history of Calvert and portions of northern St. Mary's Counties. This history includes the historical sections from sources such as Bodor and Franz (2005) and the Maryland-National Capital Park and Planning Commission or MNCPPC (1993) as well as the Calvert County Government.

3.3.1 Contact and Early Colonial Period

Archaeological evidence indicates that prior to European contact a complex network of Native American trade existed that extended into the early seventeenth century. By 1608, John Smith had explored the area. For the next twenty-five years, English traders had frequent contact with Native groups (MNCPPC 1993). These Native groups included the Piscataway, whose villages ran from the Anacostia River into St. Charles and St. Mary's Counties and the Susquehannock who roamed and hunted in the northern portion of Prince George's County (Virta 1996).

In 1629, King Charles I granted Maryland to George Calvert, the first Lord Baltimore. Five years later, Governor Leonard Calvert sailed to the Piscataway's principal town on Piscataway Creek in the southern Prince George's County to consult with the Native group prior to the establishment of St. Mary's City (MNCPPC 1993). As the colony prospered, settlements expanded. Within thirty years, new counties were created and the Potomac and Patuxent River were lined with farms and plantations (MNCPPC 1993).

Bodor and Franz (2005) characterize the complex relationship between Native Americans and Europeans as well as between Europeans themselves throughout the mid- and late-seventeenth century as tumultuous. Trade, fighting, missionary activity, settlement, and population decline all mark this period of transition. The English Civil War overflowed into the colony with "Ingle's Rebellion" which resulted in damage and destruction to settlements and many deaths. After the restoration of Lord Calvert's leadership, Maryland moved to stabilize situations. By this time, many of the Native groups, such as the Susquehannock, suffered from new diseases and warfare from Europeans and other Native peoples (Bodor and Franz 2005).

During the contact and early colonial period, Maryland became an economy based largely on the cash crop of tobacco. The prominence of tobacco is evident in its use as the economic standard from the colony and legal tender. The soils and climate of the Chesapeake coastal plain were conducive for tobacco cultivation though this intense focus on tobacco had profound effects on the regional landscape. Since tobacco seriously depleted soils, Chesapeake farmers with vast tracts of land had to leave much of their land fallow. Since only a small parcel of a plantation was utilized during any given season, Chesapeake planters required a small workforce, which towards the end of the seventeenth century, increasingly consisted of slave labor (Bodor and Franz 2005). The combination of large plantations and small workforces stalled the development of urban centers; planters exported their product directly rather than in urban markets (Bodor and Franz 2005, Morgan 1998:28-36).

3.3.2 Rural Agricultural Intensification Period

The Rural-Agricultural Intensification Period (1680-1776) covers a period of rapid expansion in Maryland. In 1695, the colonial capital of Maryland was moved from St. Mary's City to the new settlement at Annapolis, reflecting the shift of the population center northward. This demographic trend continued as Baltimore City replaced the small port towns as the primary focus of commerce and manufacturing in Maryland by the late eighteenth century (Franz and Bodor 2005).

This period witnessed the creation of large plantations and a diversified economy based on the production of tobacco and grains. As the region became more profitable, the population expanded. New settlers moved northward and westward along the Potomac and Patuxent Rivers. For a period, this land was part of Charles and Calvert Counties. Calvert County was founded in 1654 (Calvert County Government 2007). "Established by Cecelius Calvert, the second Lord Baltimore, English gentry were the first settlers, followed by Puritans, Huguenots, Quakers and Scots. In 1695, Calvert County was partitioned into St. Mary's, Charles and Prince George's, and its boundaries became substantially what they are today" (Calvert County Government 2007)

The major waterways in Calvert and neighboring Prince Georges Counties served as highways and as a result towns, including Marlborough, Bladensburg, Queen Anne, Piscataway, and Nottingham developed along the water's edge. Though a network of roads continued to grow in Calvert County, the Patuxent River served as an important means for transporting tobacco crops to market. The tobacco economy resulted in a social and economically diverse society. Most new European settlers arrived primarily from the British Isles to work as merchants, planters, small yeoman farmers, indentured servants, and skilled laborers (MNCPPC 1993:9). Because profitable tobacco cultivation required relatively little labor, yeoman husbandry proved economically viable (Franz and Bodor 2005, Morgan 1998:36). Still, large plantations continue to emerge, relying on the steady stream of enslaved Africans.

Tobacco fueled the growth of Calvert County throughout the eighteenth century. Although Calvert County developed, it remained largely agricultural. Tobacco created wealth that enabled residents to construct churches, plantations, and foster the arts as well as import goods from all over the world (MNCPPC 1993). Yet as the eighteenth century progressed, events outside the county altered the course of the county. An incident in Annapolis illustrates aspects of popular sentiment in the colony. In 1774, Anthony Stewart, captain of the ship *Peggy Stewart*, attempted to land approximately one ton of taxed, English tea. However, after the events in Boston, his efforts met with resistance. Eventually, Stewart agreed with his fellow, angry Marylanders and destroyed his ship and cargo. The repercussions of these and similar events were felt throughout the colonies leading to the American Revolution.

3.3.3 Agricultural – Industrial Transition

The Agricultural-Industrial Transition (1776-1870) encompasses a period that begins with revolution, weathers continued international threats, divides nationally in a Civil War, and concludes with post-war reconstruction.

Besides supporting the Revolution materially and with soldiers, citizens of Calvert County were amongst the Continental Congress and later the signers of the Constitution. While Calvert County saw limited destruction and occupation during the Revolution, it would prove to be a crucial location in the War of 1812. In 1814, an English fleet sailed up the Patuxent River and landed a portion of their troops at Benedict. From Benedict, the British forces marched towards Washington D.C., spending the night of August 21 in Nottingham and continuing through Croom before stopping for the night in Upper Marlboro (Bodor and Franz 2005). Meanwhile, the remainder of the British fleet, under Admiral George Cockburn, landed a contingent of Royal Marines who relieved the army at Upper Marlboro and allowed for their advance to Washington. American naval forces, unable to repel the British in the Patuxent River, burned their ships. Meeting no resistance, and unable to proceed further, Cockburn returned down the Patuxent River. On August 24, 1814, British troops defeated American defenders at Bladensburg and subsequently marched into Washington D.C. and burned the city (Virta 1996). On their return to Upper Marlboro on the August 26th, the British arrested Dr. William Beanes, taking him to Baltimore with the English fleet. Francis Scott Key, attempting to secure the doctor's release witnessed the bombardment of Fort McHenry and penned the poem that would become the national anthem. During their invasion, the English burned many houses and manors along the Patuxent River as well as Huntingtown which was later relocated to its present location, three miles to the north.

In the 1830s, innovations in transportation systems, specifically the railroads, began to encroach upon the coastal trade. Although port cities like Annapolis and Baltimore, still thrived as mercantile centers, the silting of deep-water portages became a major concern in many parts of the Chesapeake Bay (Bodor and Franz 2005, Bradford 1977).

By the 1860s, Maryland had become harshly divided. Though Maryland sided with the union, Calvert County relied heavily on slave labor for its tobacco crop and many in the County sympathized with the South (Calvert County Government 2007). With end of the war, emancipation brought end to the tobacco society. "Out of necessity, the economy of the county turned away from large plantations dependent on cheap labor and to the livelihood available in the waters" (Calvert County Government 2007).

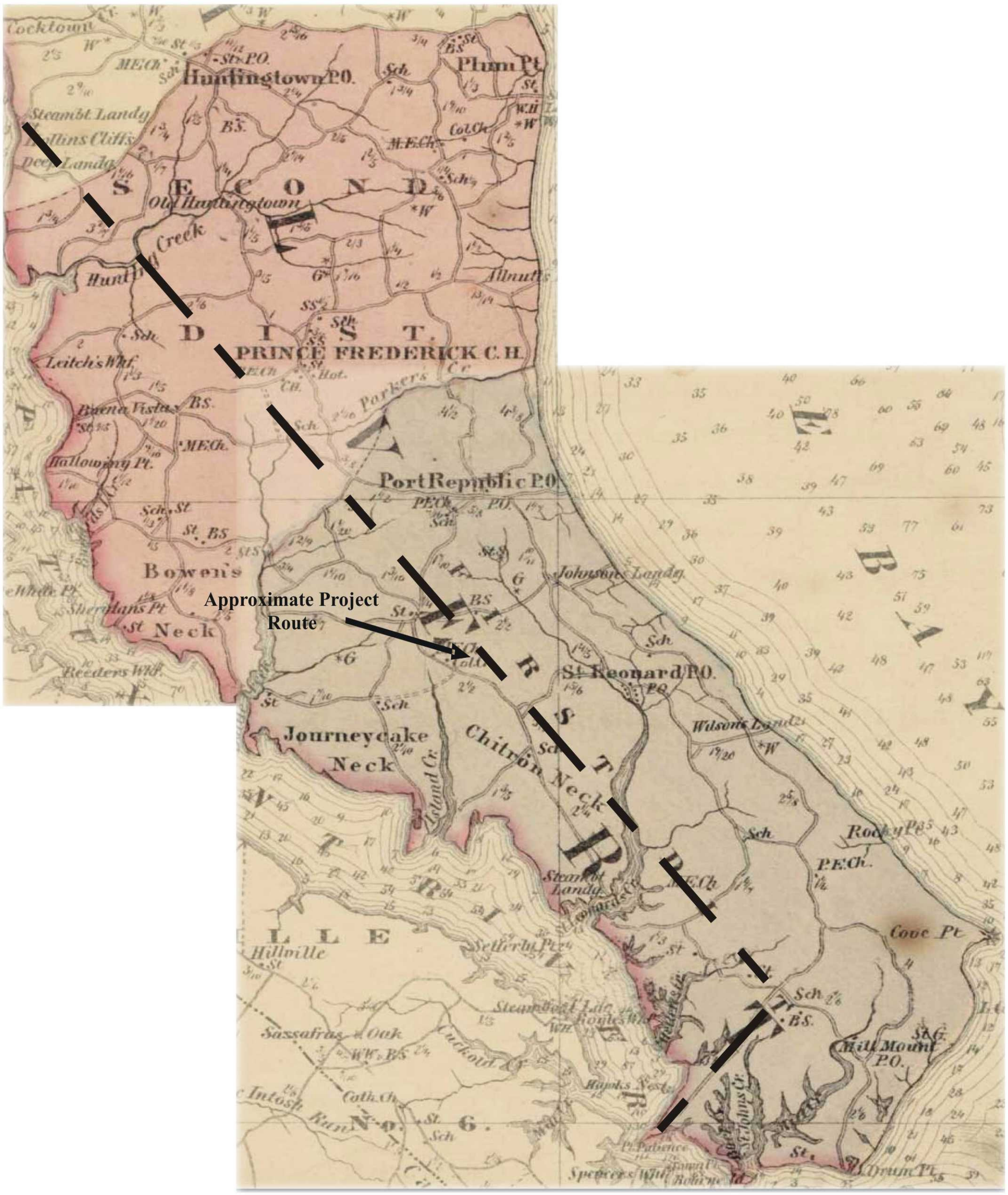


Figure 3.1:

Composite of Martenet Map (1865) of Calvert County

(Huntingfield Collection MSA SC 1399-1-75)

(Not to scale)

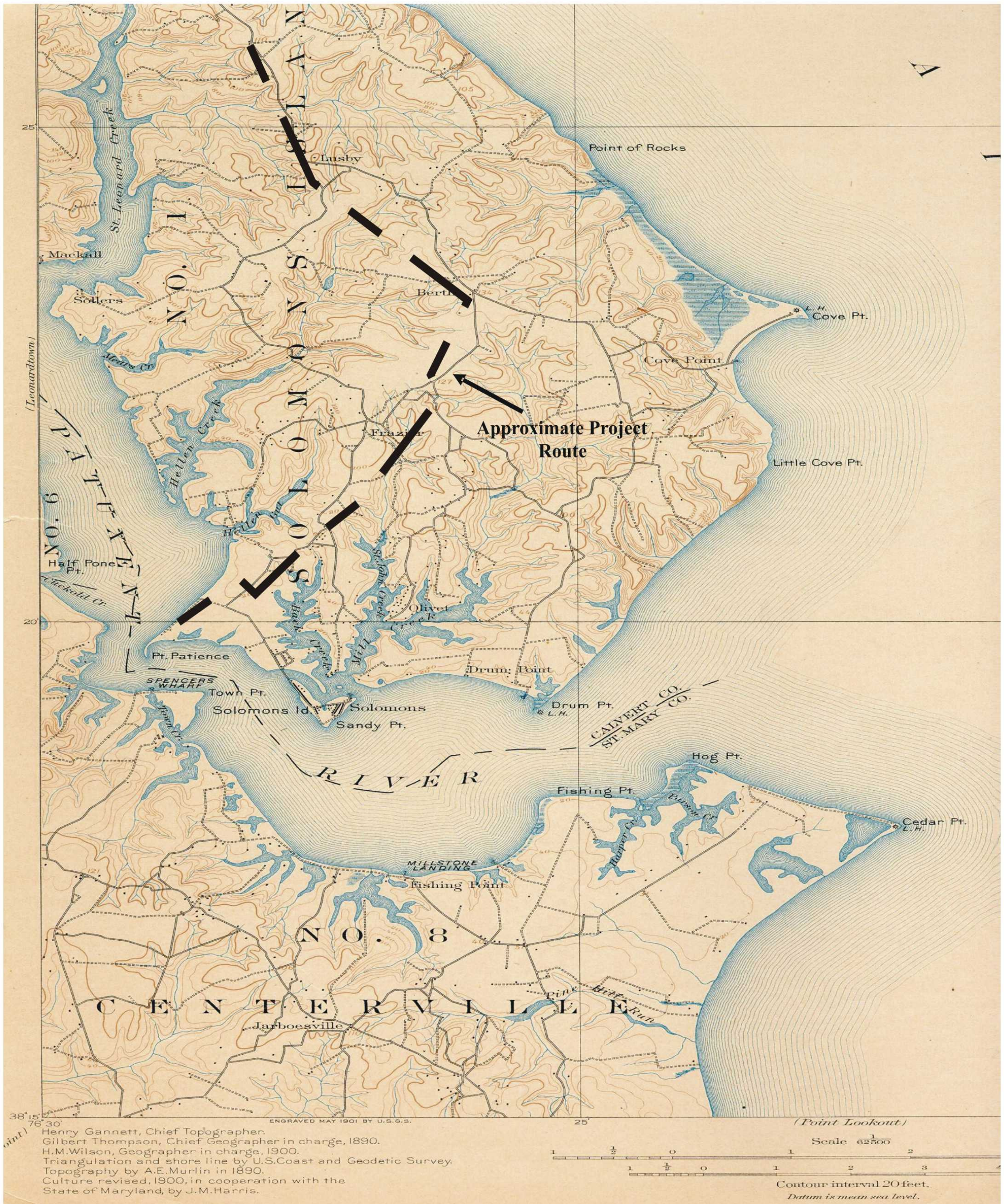
THE OTTERY GROUP
3420 Morningwood Drive
Olney, MD 20832
phone (301) 562-1975
fax (301) 562-1976

Figure 3.2:

USGS Quadrangle (Drum Point) 1892

(Not to scale)

THE OTTERY GROUP
3420 Morningwood Drive
Olney, MD 20832
phone (301) 562-1975
fax (301) 562-1976



THE OTTERY GROUP
3420 Morningwood Drive
Olney, MD 20832
phone (301) 562-1975
fax (301) 562-1976

Figure 3.3:

USGS Quadrangle (Drum Point) 1902

(Not to scale)

3.3.4 The Industrial-Urban Dominance period (1870-1930)

The Industrial-Urban Dominance period (1870-1930) represents the continued growth of the industrial economy and urban centers following the Civil War. As a result of emancipation, the economy remained precariously balanced on the tobacco and grain production until a period of revitalization followed the Civil War. This revitalization was tied to an increasingly diversified agricultural economy and the cultivation of tomatoes, watermelons, strawberries, cucumbers, and other crops (Bodor and Franz 2005). Maryland's overall economic basis shifted from a primarily agricultural one to one of industry and commerce. Baltimore dominated in shipbuilding, metal production and flour milling, and began to diversify into other industrial enterprises. Renewed industrialization forced the Baltimore & Ohio Railroad to expand its tracts, tying the economies of central and western Maryland to the rest of the nation (Bodor and Franz 2005, Bradford 1977). Calvert and portions of St. Mary's Counties saw a diversification into fishing fleets, boatbuilding, and cannery enterprises (Calvert County Government 2007).

3.3.5 The Modern Period (1930-Present)

The Modern Period represents the period from the 1930s to the present. Maryland's proximity to the nation's capital ensured both political and economic growth and development. However, Calvert and northern St. Mary's Counties remained relatively unchanged by the twentieth century. For example, by 1936, the Calvert County had only 15.2 miles of paved roads and electrification did not reach the county until 1939, when Southern Maryland Electric Cooperative (SMECO) began service in the area (Calvert County Government 2007). With these improvements and the ever increasing urbanization of the Baltimore-Washington area, Calvert and northern St. Mary's Counties have experienced growth, especially in the last decade.

3.4 Typical Archeological Site Types Expected in the Project Area

With the close proximity of different topographic settings, several different archaeological resources may be located in the project area. In the upland setting, small prehistoric camps near seasonal or small streams may have been utilized during hunting. A lowland setting may have seen more intensive occupation during the late prehistoric and throughout the historic period due to the rich bottom soil (for crop cultivation and agriculture), abundant natural resources, and transportation access associated with the Patuxent River and its tributaries.

Lothrop et al. (2006) and Barse (1988) made similar findings with respect to environmental setting and prehistoric archaeological potential. Barse (1988:133-134) states that lowland settings along the middle portion of the Patuxent River had the widest ecological variability and saw the largest number and greatest variety of sites. These sites included prehistoric base camps, seasonally-occupied or short-term camps, and large multi-component sites (Barse 1988:134). For example, the Aquasco Farm Site (18PR99) on the Prince George's County side of the Patuxent River, is a Late Archaic and Woodland Period short-term resource procurement site near the river.

Upland areas between the 50 and 75 foot contour interval and adjacent to the Patuxent River also have a high probability for prehistoric sites, especially areas overlooking the mouths of drainage ravines and vary from the traditional interpretation that they are associated with transient hunting and quarrying activities (Barse 1988:134). Further, Barse (1988:134) finds that interior upland areas above 40 foot contour have a moderate to low probability for sites such as short-term camps, transient hunting stations or cobble reduction sites while areas overlooking water courses or springheads are more likely to contain sites.

The project area is situated within the Patuxent River drainage and includes lowlands and uplands adjacent to feeder tributaries to the Patuxent River. Thus, it would a prime location for a wide range of sites. Further, its location near the Patuxent River makes it highly probable that the project area saw historic activity associated or linked with the transport of goods

3.5 Previously Identified Archeological Resources within the Project Area

Several prior archeological investigations have occurred within and adjacent to the SMECO transmission right-of-way from Holland Cliffs to Hewitt Road. As noted by Lothrop et al. (2006: 56), the general project vicinity saw early antiquarian and sporadic professional study until the early 1970s when southern Maryland saw several professional archaeological investigations.

In 1978, Ingersoll and Kenney examined the right of way for a new 230 kV line from Chalk Point to the Patuxent River along parts of the existing line near the northern terminus at Holland Cliffs. A portion of the right of way extended across the Patuxent, but the right of way did not include the current project area. Ingersoll and Kenney (1978) identified several sites though none are noted at the MHT.

In 1989 and 1992, Gibb surveyed several section of the SMECO powerline from Holland Cliff to Calvert Cliffs. Areas designated for study by the MHT were sampled at 50 ft. intervals with shovel test pits and pedestrian reconnaissance. Four historic archeological sites were located in this survey.

In 1991, Ballweber and Michael conducted an archeological survey in the right-of-way for a proposed Washington Gas Light Company pipeline that included a portion of the Navy Recreation Center property.

In 2004, Lothrop et al. (2004) and Munford et al. (2006) conducted an extensive Phase I survey for a Dominion TL-532 pipeline right-of-way that overlaps a significant portion of the SMECO right-of-way. Using pedestrian survey and STPs, GAI Consultants located 41 sites. Of these, 6 sites are located on the overlapping or parallel transmission corridors, and would therefore be potentially included in the area of potential effects for the SMECO 230 kV transmission line project.

The Ottery Group, Inc. of Olney, Maryland conducted a Phase I Archeological Survey and Assessment on the proposed Aquasco to Holland Cliff Transmission Line project in 2006. Using a controlled pedestrian surface survey and 64 shovel test pits, one archeological site, 18CV488, was identified at the location of the proposed Holland Cliff substation, which is the northern terminus for the current study area. This site, 500 ft. by 400 ft., consisted of two separate components, prehistoric and historic. The prehistoric scatter consisted of a Woodland ceramic (undecorated, quartz temper), jasper tool, hammerstone, possible tool/core, and quartz cores. The historic scatter was intermixed with the prehistoric and included creamware, stoneware, decorated whiteware, and stoneware. Dates for these ceramics range from the mid-eighteenth century to the mid-nineteenth century. Additionally, olive glass, window glass, and brick were collected. Subsequently, archeological monitoring of the site grading was undertaken, resulting in the discovery and data recovery of two cellar features associated with 18CV488. That effort is documented in a 2008 report prepared by The Ottery Group, Inc. for SMECO.

While several archeological sites have been recorded in, or adjacent to, the existing SMECO right-of-way, none was determined to be eligible for listing in the National Register of Historic Places. However, this is not the case with regards to the portion of the SMECO project that crosses the Navy Recreation Center (NRC) property in Solomon's, Maryland. The NRC was comprehensively surveyed for archeological sites in 1996, though several professional investigations had already occurred on the property. From the 1996 survey, ten archeological sites were recorded on the NRC property that contained artifacts dating from the Archaic Period through the late-nineteenth century.

Several sites on the NRC property that are potentially within the proposed SMECO right-of-way are considered to be eligible for National Register listing. These include 18CV151, 18CV316, 18CV356, 18CV357, 18CV360. As of the preparation of this assessment report, each of these sites is considered by the MHT to be in need of evaluation or has been determined as National Register-eligible under Criterion D, for their potential to yield information important to an understanding of prehistory and history. As such, the further consultation with the MHT would likely be required to evaluate these archeological sites and to resolve any future adverse effects.

Table 3.2 lists the known archeological sites within or adjacent to the project area.

Table 3.2: Archeological Sites within or adjacent to the Project Area

Site Number	Description	NR Eligibility
18CV151	Historic – 18th Century Domestic	Eligible
18CV152	Historic – unknown	Not Eligible
18CV321	Historic – 18th Century Domestic	Not Eligible
18CV322	Historic – 18th Century Domestic	Not Eligible
18CV316	Prehistoric – Woodland Period Historic – 17th-19th Century Domestic	Eligible
18CV356	Prehistoric – Woodland Period Historic – 19th-20th Century Domestic	Eligible
18CV357	Historic – 17th-19th Century Domestic	Eligible
18CV360	Prehistoric – Woodland Period Historic – 19th Century	Eligible
18CV361	Historic – 17th-19th century Domestic	Not Eligible
18CV451	Prehistoric	Unevaluated
18CV452	Historic	Not Eligible
18CV456	Historic	Not Eligible
18CV462	Historic	Not Eligible
18CV488	Historic – 18th-19th Century Domestic	Not Eligible

4.0 Research Design and Methods

4.1 Research Design

The Ottery Group, Inc completed this archeological assessment in order to assist project proponents in considering the potential for adverse effects to archeological resources that are, or may be, present within the project's area of potential effects. While preliminary in nature, this assessment provides useful information on known sites within the existing SMECO transmission corridor, as well as sites on the NRC property, where SMECO is proposing to install the proposed 230 kV line underground. This assessment is provided to assist agency reviewers as part of their review responsibilities pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended.

The general design of this effort included archival research, pedestrian reconnaissance, and the preparation of this report.

Thomas Bodor, RPA served as Principal Investigator for the project, and was assisted by Joseph Moore, Adam Fracchia, Wes Stewart, and Matt Ristau.

The project area was treated as one study area for the purpose of the assessment of archeological resources. During pedestrian reconnaissance, the entire existing right-of-way was traversed by foot to observe and record pertinent information on the existing condition of the corridor, land use, previous disturbance, and the presence or absence of surface or subsurface archeological materials. Judgmental shovel testing was conducted in locations of the proposed new pole replacements, or in locations where the transmission line would be buried underground, as is proposed for the portion of the project that crosses the Navy Recreation Center at Solomon's, Maryland.

For each excavated shovel test pit, all soil was screened through 0.25 in. wire mesh screen for cultural material. Artifacts were documented and collected in labeled bags according to their horizontal and vertical provenience for further processing. All excavations were taken down to culturally sterile soils unless physical obstructions prevented excavation beyond the depth of the obstruction.

The locations of all tests were plotted on a proposed site plan provided by the project engineers. All maps, field notes, shovel test forms, catalog forms, photographs, and other project related information are on file with The Ottery Group in Olney, Maryland.

5.0 Field Assessment

This section provides the results of the archeological field assessment for SMECO's 230 kV Transmission line from Holland Cliff (Calvert County) to Hewitt Road (St. Mary's County).

5.1 Holland Cliff Substation to Navy Recreation Center

The entire segment of the existing SMECO right-of-way in this section was inspected during the current archeological assessment. The proposed project in this segment involves replacing existing wooden poles with taller metal structures that will carry additional overhead power lines. The pedestrian reconnaissance of this segment involved a traversing the corridor on foot and the excavation of judgmental shovel tests in the approximate location of the newly proposed poles. A total of 99 shovel test pits was excavated in the right-of-way between Holland Cliff and the entrance to the NRC. No new archeological sites were identified during the reconnaissance.

The combined pedestrian reconnaissance and shovel testing indicate that much of the existing corridor has been previously disturbed by both natural and human actions. The initial clearing of this corridor, believed to have been done in the 1950s or early 1960s required wholesale clearing and grubbing of trees and vegetation. The long-term effect of this clearing, and subsequent maintenance, is heavy erosion on the tops and slopes of the hilly terrain. In some areas, agricultural activities have reclaimed the ground, resulting in less surface erosion in such areas that are topographically flat.

Substantial portions of the existing SMECO right-of-way from Holland Cliff to the entrance to the Navy Recreation Center have been the focus of prior professional archeological investigations that focused primarily on those geographic locations that had favorable conditions for containing prehistoric or historic archeological sites. These previous investigations are briefly summarized in Section 3 of this report. The most pertinent previous studies are the Phase I survey conducted by Gibb (1992) and the Phase I and II investigations conducted by GAI Consultants in 2005 and 2006 (Lothrop et al. 2006). These studies have resulted in the identification of 8 archeological sites within or adjacent to the existing SMECO right-of-way. Of these 8 sites, only two (18CV151 and 18CV451) have been determined eligible for the National Register.

In reviewing current design plans for the SMECO project, it appears that site 18CV151 and 18CV451 would not be impacted by the proposed installation of new poles and overhead lines.

It is unlikely that the segment of the SMECO right-of-way as it extends from Holland Cliff to the Navy Recreation Center entrance would contain additional archeological sites that would be affected by the proposed project.

5.2 Naval Recreation Center

The archeological assessment of the Navy Recreation Center property involved a general review of known sites on the property and an assessment of the likelihood that the proposed underground installation of the SMECO 230 kV line would adversely affect these sites.

The NRC property has been the focus of several archeological investigations since the early 1990s. The investigations most relevant to the current assessment are those that focused on the southern portion of the NRC. These include Ballweber and Michael (1991), Harmon et al. (1996), and Fiedel et al. (2001). These past investigations have resulted in the discovery of four sites on the NRC property that are within or adjacent to the proposed SMECO right-of-way.

While the specific route of the SMECO right-of-way has not yet been determined, the field assessment of the NRC focused on areas selected by SMECO and the project engineers as the most viable alternatives. These 'alternatives' included three separate routes, each of which originate at the sealed southern entrance to the NRC, where it intersects with Maryland Rt. 2/4.

The route would be buried beneath existing pavement until it reaches the parking area at Quarter's A (site 18CV316). At this point, the exact location of the staging and operations area needed for the directional boring required to cross the Patuxent River is undetermined. In order to gather information on the nature of the soils, the presence of artifacts, and the extent of prior disturbance along the viable alternatives, judgmental shovel testing was undertaken as part of the field assessment.

A total of 23 shovel test pits was excavated on the property of the Naval Recreation Center in Solomon's Island, Calvert County, Maryland. Most of the tests were placed along routes specified by SMECO and the project engineers. Of the 23 total STPs, several are discussed in more detail below.

A single shovel test pit was excavated along the northern portion of the access road for the Second Cove Marina. The test was excavated on the east side of the access road just south of its intersection with "A" Avenue. Most of the alternate route has been previously disturbed by the construction of the access road, the marina, and the helicopter landing pad. Excavation of the shovel test revealed an 8cm thick very dark grayish brown (10YR3/2) sandy loam and gravel A-horizon. This stratum overlies a deep strong brown (7.5YR5/8) dry, compact, sandy loam and gravel subsoil. No cultural material was recovered.

Ten judgmentally placed shovel tests were excavated north and south of "A" Avenue. With minor exception, none of the shovel test pits contained cultural materials, and no new archeological sites were identified.

Three shovel test pits were excavated along the front driveway of the Quarter's A, the Admiral's House. Each of the shovel tests contained either prehistoric and/or historic artifacts. Excavations in this area ceased when it was determined that site 18CV316 had already been determined eligible for National Register listing.

5.3 Navy Recreation Center to Hewitt Road

After crossing beneath the Patuxent River, the transmission line will continue underground through the Town Creek area in St. Mary's County. The line will then come above ground and continues along the existing SMECO corridor to the Hewitt Road substation.

With the exception of the underground segment of the proposed transmission line, the entire corridor between the NRC and the Hewitt Road substation has been routinely cleared and maintained. The existing corridor runs through a heavily developed area of commercial buildings and infrastructure that has resulted in extensive landscape alteration.

Each of the proposed pole locations was inspected during the field assessment, which included photographs and judgmental shovel testing. No cultural materials were observed on the surface or recovered from shovel testing. The field assessment of this segment of the SMECO 230 kV transmission line indicates that there is little to no potential for archeological sites to be affected by the installation of the line.

6.0 Conclusions and Recommendations

This report presents the results of an archeological assessment for the proposed Southern Maryland 230 kV Holland Cliff to Hewitt Road Project by the Southern Maryland Electric Cooperative (SMECO). The project is partially sponsored by the Rural Development Utilities (RDU) Program of the United States Department of Agriculture (USDA) and is therefore considered an undertaking subject to regulations contained in Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (36 CFR 800). The RDU is the lead federal agency involved in the project.

This report, prepared on behalf of SMECO, is intended to assist project proponents in assessing the likelihood that undocumented or unevaluated archeological sites may be affected by the proposed undertaking. Specifically, this report will be part of a Borrowers Environmental Report (BER) used to obtain funding from the RDU Program. The BER will be part of an application for a Certificate of Public Convenience and Necessity (CPCN) from the Maryland Public Service Commission.

6.1 Existing SMECO Right-of-Way

The archeological assessment involved a review of previously compiled cultural resource investigations and sites that have been conducted within and surrounding the projects roughly 30-mile corridor between the now-underway Holland Cliffs (Calvert County) substation to a new substation at Hewitt Road, near the town of Lexington Park (St. Mary's County), Maryland. That research revealed that the MHT has already reviewed several projects that pertain specifically to SMECO's existing right-of-way for this project. These include a 1992 archeological survey by Gibb, which resulted in the identification, and re-location, of four sites within or adjacent to the right-of-way. With the exception of site 18CV151, the sites were determined to be not eligible for listing in the National Register of Historic Places. Site 18CV151 is considered National Register-eligible and would require additional consideration if the current project has the potential for adverse effects to that site.

Of all the sites identified within the Dominion TL-532 right-of-way (Lothrop et al. 2006), which parallels the SMECO right-of-way in several long segments, only site 18CV451 is unevaluated for it's National Register eligibility. Additional consultation may be required to determine if the SMECO project will adversely affect site 18CV451.

The portion of the SMECO right-of-way that extends into St. Mary's County, from Town Creek to the Hewitt Road substation, runs through a heavily developed area of the county. No archeological sites are known to exist in this portion of the right-of-way. Pedestrian survey conducted for this assessment confirmed that this portion of the project has little potential for adverse effects to significant archeological sites due to past extensive disturbance from the initial construction of the corridor, subsequent maintenance, and intensive development adjacent to the right-of-way.

6.2 Navy Recreation Center

SMECO has reviewed aerial photography of the NRC and has identified two potential routes for the duct bank on the Navy property and the river crossing. The Preferred Route begins in the overhead line corridor approximately 750' north of the intersection of A Avenue and Patuxent Beach Road (MD-4). The new cable circuits will be installed by open trenching until they reach the horizontal directional drilling (HDD) end point. The duct bank route will follow the existing overhead corridor for 750 feet to A Avenue. The route will turn onto A Avenue, and travel down A Avenue for approximately 2,200 feet to 3rd Street. The route continues down 3rd Street to B Avenue. The route continues down B Avenue to Point Patience Drive. The route follows Point Patience Drive to the HDD end point. The overall trenched duct bank will be approximately 5,300 feet in length. The Preferred Route HDD from Point Patience is a straight line across the Patuxent River, with an overall length of approximately 4,500 feet.

The Alternate Route begins at the same point as the Preferred Route but takes Ramp Road from A Avenue to the HDD end point east of the second cove, east of Point Patience. The overall trenched duct bank for the Alternate Route would be approximately 2,800 feet. The Alternate Route HDD from the second cove would include a slight horizontal bend and have an approximate length of 5,600 feet.

The portion of the 230 kV transmission line that runs through the NRC will be run entirely underground from the entrance off of Route 2/4 to a staging area located in the immediate vicinity of Quarter's A at Point Patience. Quarter's A, or the Admiral's Residence, is also known as site 18CV316, which has been determined by the MHT to be eligible for listing in the National Register of Historic Places. In addition, site's 18CV356, 18CV357, and 18CV360 remain potentially eligible for the National Register.

6.3 Recommendations

As stated above, the existing right-of-way currently utilized by SMECO has been previously surveyed during several compliance-related investigations. Given the past surveys of the existing SMECO right-of-way, and the parallel Dominion TL-532 right-of-way, the proposed 230 kV transmission line is believed to have little or no potential to adversely affect significant archeological resources within the previously developed right-of-way. However, further consultation between the Rural Development Utilities Program of the United States Department of Agriculture, the Maryland Historical Trust, and SMECO should be undertaken to identify whether the proposed 230 kV transmission line project will adversely affect archeological sites, in particular those located on the Navy Recreation Center property in Solomon's, Maryland.

Current plans involve trenching from the NRC secondary entrance off Route 2/4 and installing a buried transmission line that extends beneath existing paved roadways until reaching Point Patience. The transmission line will, at that point, be bored underneath the Patuxent River. SMECO will require a temporary staging and operations area at Point Patience to facilitate the directional boring required to install the line across the river. As such, the required construction work at the NRC and at Point Patience, specifically in the vicinity of Quarter's A, will have the potential to adversely affect up to four archeological sites that would require further consultation to determine the extent of, and to resolve, adverse affects to those sites.

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APPENDIX A

PHOTOGRAPHS

NAVY RECREATION CENTER

Location of STP 1 Facing West.

Location of STP 2 Facing South.

Location of STP 3 and STP 5 Facing West.

Location of STP 4, STP 6, and STP 7 Facing East.

Location of STP 8, STP 10, and STP 11 Facing West.

Location of STP 9 Facing West.

Location of STP 12 and STP 13.

Location of STP 14 and STP 15.

Location of STP 16 and STP 17 Facing North.

Location of STP 18 Facing Northeast.

Location of STP 19 Facing North.

Location of STP 20 Facing East.

Location of STP 21, STP 22, and STP 23 Facing South.

Location of East Yard of Admiral's House Facing North.

Third Street Between "B" Avenue and "A" Avenue showing prior disturbance Facing North

ST. MARY'S COUNTY

Pole Location 203 Facing Northeast.

Pole Location 204 Facing Southwest.

Pole Location 205 Facing South.

Pole Location 206 Facing Northeast.

Pole Location 207 Facing Northeast.

Pole Location 208 Facing Northeast.

Pole Location 209 Facing Southwest.

Pole Location 210 Facing Southwest.

Pole Location 211 Facing Southwest.

Pole Location 212 Facing Southwest.

Pole Location 213 Facing Southwest

Pole Location 214 Facing Southwest.

Pole Location 215 Facing Northeast.

Pole Location 216 Facing Northeast.

Pole Location 217 Facing Northeast.

Pole Location 218 Facing North.

Pole Location 219 Facing North.

Pole Location 220 Facing North.

Pole Location 221 Facing West.

Pole Location 222 Facing West.

Pole Location 223 Facing West.

Pole Location 224 Facing West.

Pole Location 225 Facing West.

Pole Location 226 Facing West.

Pole Location 227 Facing West.

Pole Location 228 Facing West.

Pole Location 229 Facing East.

Pole Location 230 Facing East.

Pole Location 231 Facing West.

Pole Location 232 Facing East.

Pole Location 233 Facing South.

Pole Location 234 Facing North.

Location of Hewitt Road Switching Station.

APPENDIX B:

Open House Survey Results from April and May Public Meeting Information

Scoping Meeting Notices

Appendix F
Patuxent River Crossing Report

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SOUTHERN MARYLAND RELIABILITY PROJECT
HUGHESVILLE, MD

Options for Crossing the Patuxent River North of MD-4

BLACK & VEATCH CORPORATION

B&V Project 146030
B&V File 53.0000

November 14, 2008

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1.0 INTRODUCTION

The Southern Maryland Electric Cooperative, Inc. (SMECO) of Hughesville, Maryland is proposing to construct and operate a new multiple circuit transmission line from the existing Holland Cliff Substation to the existing Hewitt Road Switching Station. SMECO intends to route the majority of the new transmission line along the same corridor as the existing 69kV transmission lines.

The project will require crossing the Patuxent River north of the Thomas Johnson Memorial Bridge, carrying Maryland Route 4. The crossing is planned to be completed by horizontal directional drilling (HDD) a duct bank for underground transmission cables below the river bed, and open trenching duct bank from the HDD endpoints to overhead to underground transitions. Horizontal directional drilling is a trenchless installation method described further in Section 3.0.

One end of the proposed HDD will be on the property of the Navy Recreation Center (NRC) on the north side of the Patuxent River. SMECO has reviewed aerial photography of the Navy Recreation Center and has identified two potential routes for the duct bank on the Navy property and three for crossing the river.

The other end of the HDD will be in Town Creek, MD, St Mary's County. SMECO owns a one-acre lot on Patuxent Beach Road and has a 75 foot right of way from the SMECO lot along Patuxent Beach Road to Route 4. However, SMECO must secure right of way between the existing SMECO lot and the Patuxent River. The right-of way from the Patuxent River down Patuxent Beach Road across Route 4 will be used as the termination point for the HDD and for the duct bank installation that will extend to an existing 69kV riser pole near MD route 4.

This report discusses the differences between the potential routes and the related construction activities.

1.1 SUMMARY

The route map in Appendix A shows the three routes proposed by SMECO, i.e the north, center, and south routes.

The north route is the most direct route and the end point would be in the one-acre SMECO lot. Conceptual design indicates that the HDD bore would need to pass under or very near two or three residences that are between SMECO's property and the river. Due to the potential impact of the boring process on the foundations, the houses would need to be purchased by SMECO. The north route has the largest impact to the public and for this reason it is not the preferred route and was not investigated further.

The center route is the preferred route. Although the center route requires more trenched duct bank than the south route, it needs approximately 1000 feet less HDD duct bank. The shorter HDD duct bank allows the use of conventional underground type cable for the center route. Conventional underground type cable can not be used for the south route because it doesn't have the mechanical strength to withstand the increased pulling tensions required for the longer south route.

The south route presents greater engineering and construction challenges because it requires the use of an armored, reinforced cable in order to be pulled the extra 1,000'. The use of armor on the cable will reduce the individual cable ampacity, or carrying capacity, requiring more cables to be used for each circuit. In addition, the armored cable is significantly heavier and bulkier than typical underground cable. Armored cable is similar in size and appearance to submarine cable. The armored cable would be significantly more difficult to handle and transport.

The additional cables required for the south route would require additional conduits installed in separate HDD's. The center route would require ten conduits installed in two HDD bores. The south route would require thirty conduits installed in six HDD bores. Each HDD bore needs to be separated from the other bores by approximately 30'. Landing six HDD's on the Navy property would require approximately a 200' wide right of way compared to 75' for the center route.

The additional conduits would also increase the number of crews and the length of time required to construct the duct bank and install the HDDs, thereby increasing the impacts to the Navy facilities. There is not a clear lay down area near the longer south route to assemble the pipe. It would be necessary to clear trees on both sides of Avenue A and block the Avenue A gate during pipe assembly.

For these reasons the center route reduces the impacts to the Navy Recreation Center, requires less engineering, has a shorter construction schedule, and greatly reduces the installed cost.

2.0 ROUTE BREAKDOWN

2.1 CENTER (PREFERRED) ROUTE

Underground transmission lines are often placed under the pavement or in the shoulder of roads to minimize the right-of-way required and impact to the public. The center route begins in the overhead line corridor approximately 750' north of the intersection of Navy Recreational Center A Avenue and Maryland State Route 4. The new cable circuits will be installed by open trenching until they reach the HDD end point. The duct bank route will follow the existing overhead corridor for 750 feet to A Avenue. The route will turn onto A Avenue, and travel down A Avenue for approximately 2,800 feet to Patuxent Dr. The route continues down Patuxent Drive 600' to the southwest picnic area. The route continues through the picnic area on limited (no vehicle) access dirt road. From the picnic area the route crosses the parking for the Sunset Pier to the HDD end point. The overall trenched duct bank will be approximately 5,350 feet in length.

The HDD from Point Patience is a straight line across the Patuxent River, with an overall length of approximately 4,500 feet and will terminate in Town Creek .Town Creek is on the south shore of the Patuxent River in St. Mary's County. SMECO owns a one acre parcel on Patuxent Beach Road that may be able to be used as a termination point or manhole location. However, SMECO must secure at least a 75' right of way between the existing SMECO lot and the Patuxent River. This means SMECO will need to purchase Lot 20 which is approximately two acres (0.8 hectares) either for the termination point of the horizontal directional drilling or for the HDD right of way. In addition, SMECO will need right of way to cross Patuxent Beach Road to the existing SMECO lot and the start of the 75' right of way.

2.2 SOUTH ROUTE

The south route begins at the same point as the center route but takes Ramp Road from A Avenue to the HDD end point east of the second cove, east of Point Patience. The overall trenched duct bank for the south route would be approximately 2,800 feet.

The south route HDD from the second cove would include a slight horizontal bend and have an approximate length of 5,600 feet. The HDD will terminate on the Town Creek side of the river at the same location as the center route. The route on the Town Creek side of the river will be the same as the center route.

2.3 DESIGN CONSIDERATIONS

The difference in HDD length between the center and south routes is critical. The cable is installed into the duct bank by pulling from one end. The cables are limited in the amount of force that can be applied without damaging the cable. The center route with a HDD length of 4,500 feet is near the realistic maximum length of duct bank for a conventional cable design. A conventional cable design with a 3500 kcmil conductor can be pulled a maximum of approximately 4,600 feet with the elevation change required to cross the river. The south route, with a HDD length of 5,600 feet will require an armored, reinforced cable design. Preliminary cable pulling calculations are shown in Appendix B.

Armored cables resemble submarine cables, in that a conventional cable is surrounded by layers of stainless steel or copper wires covered with an external jacket. An armored cable does not have the extra water barriers of a submarine cable. Armored cables are installed by pulling on the outer armor layers, as opposed to the cable conductor in a conventional design. Using armored cables greatly adds to the cost and complexity of the cable system design and installation. A cross-section of a typical high voltage underground cable and a high voltage armored cable can be found in Appendix C.

For the center route, preliminary calculations to determine the size of the cable conductor indicate that a single cable per phase, for a total of three cables per circuit, will be sufficient to carry the load for each circuit. The armored cable required for the longer south route HDD will de-rate, or reduce the capacity of each individual cable. This means the south route will require three cables per phase, or nine cables per circuit, to carry the same load. Preliminary ampacity calculations can be found in Appendix C. The ampacity calculations are based on conservative assumptions for the soil thermal properties and will be refined after soil testing is performed.

The additional cables will require additional conduits. Each set of three cables requires a bundle of five conduits to be installed in a separate HDD bore hole. The center route requires two sets of conduits for a total of 10 conduits; the south route requires six sets of conduits for a total of 30 conduits. Each HDD bore needs to be spaced approximately 30' apart to prevent interference issues during drilling and minimize mutual heating issues during operation of the cable. Due to this spacing, the south route will require a right of way approximately 200' wide where the drill comes on shore, compared to 75' for the center route.

3.0 CONSTRUCTION ACTIVITIES

3.1 GENERAL DESCRIPTION OF CONSTRUCTION ACTIVITIES

The work required for the river crossing falls into four parts; preconstruction activities, installation of the duct bank under the Patuxent River by HDD, installation of the duct bank by open trenching, and the installation of high voltage cables in duct bank.

The following is a list of the major activities that are required to complete the installation of the overhead, underground and river crossing portions of the transmission lines.

- Preconstruction Activities
    - Ground Survey
    - Soil Borings
    - Bathymetric/Marine Surveying
    - Engineering Investigations
    - Pre-Bid and Pre-Construction Right-of-Way (ROW) Visits
- HDD Duct Bank Installation
    - Construction Staking
    - Horizontal Directional Drill
    - Right of Way Restoration
- Open Trenched Duct Bank Installation
    - Construction Staking
    - Splicing Vault Installation
    - Duct Bank Installation
    - Right of Way Restoration
- Underground Cable Installation Activities
    - Cable Pulling
    - Cable Splicing
    - Cable Terminating
    - Cable Testing

The following descriptions are based on the center route. The activities required for the south route would be similar; however the south route option would result in a longer construction schedule with more impact due to more crews and more work being carried out simultaneously.

3.2 PRECONSTRUCTION ACTIVITIES

3.2.1 Ground Survey

The survey will be performed to identify and document the existing features of the proposed ROW. These features include existing utilities, drains, property lines, adjacent property ownership, and topographic contours. The surveyor will utilize GPS surveying equipment to gather the data. The surveying data is then used to prepare the planimetric drawings of the route.

3.2.2 Soil Borings

Soil borings along the proposed ROW will be performed to gather soil samples for testing to determine the thermal properties and geotechnical properties of the soil to be disturbed. It is expected that four soil samples will be taken on the NRC, two samples on the Town Creek side of the river, and four samples in the river itself. Any damage to the asphalt will be cold patched as it is anticipated that repaving of disturbed roadways will occur after the duct bank is constructed. The soil properties will be used to design the structure foundations, the HDD methods, and verify the soil thermal properties for the cable installation. A tire mounted drill rig will be used to collect the samples on land.

3.2.3 Bathymetric/Marine Surveying

Baythmetric surveying will be required to identify the elevations and contours of the river bottom. The surveying will be performed from a boat or barge and will require multiple lanes to be run back and forth across the river between the HDD entry and exit points.

In addition to the bathymetric surveying, soil borings or corings will need to be taken of the soils beneath the river bottom. These soil samples will be taken using a vibratory corer from a barge on the river.

3.2.4 Engineering Investigations

An engineering team will need access to the ROW to gather data for preparation of the construction documents. Data will include confirmation of designs, identification of possible obstructions, and verification of existing features.

3.2.5 Pre-Bid and Pre-Construction Meetings

SMECO will hold prebid meetings for the prospective construction bidders for this project. Multiple meetings will likely be required for the different portions of the work. During these meetings, the bidders will be taken along the route of the project to allow them the opportunity to see the different parts of the route and assess the degree of difficulty of each section of the project. Representatives of SMECO will contact the Navy in advance of these meetings to coordinate access requirements on Navy property and schedule the visits. The purpose of viewing the property is to give the construction bidders the opportunity to become familiar with the work, and the specific access requirements to enter the site.

SMECO will conduct a pre-construction meeting with the successful bidders prior to the start of construction activities, to discuss specific details of the construction. These details include but are not limited to site access, work hours and revisions since the bid was completed. Multiple meetings may be required for different portions of the work.

3.3 HDD DUCT BANK INSTALLATION OVERVIEW

Horizontal Directional Drilling (HDD) is a pipeline and conduit installation method that bores a path under the ground without disturbing the surface. HDD's are accomplished by drilling a pilot hole using a guided drill string. The pilot hole is then enlarged by reaming or compacting to a suitable diameter to install the conduit or pipe. The conduit bundle is then pulled into the bore hole.

Each set of three cables will require a duct bank made up of five (5) 8" conduits; three conduits for the cables, one spare conduit, and one conduit for communications. To get the needed capacity out of both circuits in the HDD, the duct banks for each set of three cables will need to be separated under the river. To achieve the separation, each duct bank will be installed in a separate bore. Two bores will be required for the center route, one for the proposed circuit, and one for the future circuit. The south route will require six separate bores, three for each circuit. See Appendix D for conceptual drill cross sections and work areas.

3.3.1 Construction Staking

A survey crew will place construction stakes to identify the designed bore pit locations and drill alignment prior to the construction contractor mobilizing to the project site.

3.3.2 Conduit Assembly

The conduit used for the HDD installation of underground transmission lines needs to be a non-metallic material capable of being pulled the length of the drill, and withstanding the crush pressures due to depth. For both drills the only material that meets these requirements is fusible polyvinyl chloride (fPVC) pipe. In order to be pulled as a single long string, the fPVC pipe must be thermally fused to create a single long pipe. The pipe will need to be assembled and laid out as a complete string prior to the drilling operations.

For the center route the pipe could be floated out onto the river during assembly along side the Navy property in order to minimize impacts to the NRC. Laying out the pipe for the south route would require assembling pipe in the area east of Ramp Road near the boat wash and storage facility. Tree clearing would be necessary for the pipe to be pulled from this location into the bore. Additional tree clearing may be required in order for the pipe to extend the necessary 5,600’ along MD-4 and towards the main gate. It will also be necessary to suspend the pipe across A Avenue and Overflow Road if it is determined that these roads must maintain a constant thoroughfare.

A third option would be to assemble the PVC pipe on the Town Creek side of the river. This is by far the most difficult and expensive option. As the pipe is assembled, it will have to be elevated over several roadways along North Patuxent Beach Rd. Additional pipe suspension would be required over the waterway that runs under MD-4 (west of North Patuxent Beach Rd.) The suspension method would likely incorporate the use of large cranes and a significant amount of tree clearing along MD-4 would be necessary for both the pipe and the cranes.

3.3.3 Horizontal Directional Drilling and Conduit Installation

The first stage of the HDD operation consists of directionally drilling a small diameter pilot hole along a predetermined path to the exit point. This process uses environmentally safe bentonite as a drilling fluid and lubricant. The second stage involves enlarging this pilot hole to a diameter which will accommodate the PVC pipes, approximately 30” in diameter. Then the pipes are pulled into the enlarged hole. A drill string will remain in the hole at all times until the PVC pipes are in place.

SMECO’s plan is to complete the HDD installation between November 2013 and March 2014. SMECO anticipates that the center route will take approximately ten (10) weeks to assemble the pipe, and six to seven (6-7) weeks to drill the pilot holes, enlarge the holes, and install the pipes to be used as conduits. For the south route, pipe assembly will require 18 weeks with an additional 18 weeks for the drilling the pilot holes and pipe installation. This would result in the HDD installation for the south route extending from October 2013 thru April 2014.

3.3.4 Restoration

After the HDD operation has been completed, all areas disturbed during construction will be graded and restored by seeding or paving to its condition prior to start of construction.

3.4 OPEN TRENCHED DUCT BANK INSTALLATION

Between the overhead line corridor and the HDD end points the cable will be installed in concrete encased duct bank. The number of cables required across the river will need to be continued all the way to the overhead corridor as multiple cables can not be spliced together at 230kV. See Appendix E for typical duct bank cross sections.

3.4.1 Construction Staking

A survey crew will place construction stakes on the designed trench centerline and splicing vault locations prior to the construction contractor mobilizing to the project site. Offset construction stakes will also be placed approximately 20 feet off the trench centerline. These stakes will be used to restore the construction stakes disturbed during construction.

3.4.2 Splicing Vaults

Splicing vaults are required every 1600' to 1800' due to limits on the typical amount of cable that can be shipped and installed as one continuous piece. A pre-cast concrete splicing vault will be installed to provide a clean, dry area for splicing the cable. The splicing vaults will have internal dimensions of approximately 8 feet wide, 24 feet long, and 8 feet deep, and will be provided in two or three pieces. Eight splicing vaults will be required, in four sets of two for the center route. The south route will require three sets of four vaults, for a total of 12 vaults. See Appendix E for typical splicing vault drawings.

An excavator, e.g., track hoe, will remove the soil required to place the splicing vault. All spoils will be removed from the work site for proper disposal. The splicing vaults will be delivered to the excavation on flat bed trucks and will be lowered into the excavation using a large crane. The splicing vaults will be backfilled with a minimum 1'-6" of native soil cover over the top of the splicing vault.

Each splicing vault will have two 30" manhole lids for access. Six (6) foot square concrete pads will be poured around each manhole cover to provide an even and clean working area. The manhole cover and pad will be the only visible portion of the installation after completion. When complete, the manhole covers will be level with the grade, such that they will pose no obstruction. SMECO's present schedule targets the splicing vault installation to be completed in November and December of 2013 and will take approximately eight (8) weeks.

3.4.3 Open Trenched Duct Bank Installation

The duct bank for the center route will require nine (9) 8" and two (2) 2" schedule 40 polyvinyl chloride (PVC) conduits. The conduit will be encased in 3000 psi thermal concrete for protection. The trench will be backfilled with native soils and the surface restored to match the existing conditions. The duct bank for the center route will be 3'-6" wide by 3'-6" high, with a minimum of 36" of cover over the duct bank.

The duct bank for the south route will be built in the same manner as the center route but will require a total of twenty-eight (28) 8" and six (6) 2" schedule 40 PVC conduits due to requiring three times as many cables. The duct bank for the south route would be 7'-6" wide by 4'-6" high, with a minimum of 36" of cover over the duct bank.

This duct bank installation will take up half a roadway. For the center route traffic can be maintained by keeping a single lane open at a time. In the case of the south route, traffic on Ramp Road will be significantly impacted, and the road may need to be closed for a minimum of one week to get past the building south of A Avenue.

The duct bank for the south route will require trenching through and near an area that recently underwent a munitions clean-up operation. Special care will need to be taken in this area, in case ordnance remains.

The concrete encased duct bank will be constructed in a sequential fashion, where each stage of the work follows the previous stage of the work. Approximately the same amount of trench is opened and closed each day. The sequencing of the construction is intended to keep the amount of open trench at any given time to a minimum and to maximize efficiencies.

The first step will be removal of the soil for the trench by an excavator. The removal of spoils to an offsite disposal area will require a continuous procession of trucks into and out of the property during this activity.

Following the excavation, the conduit and reinforcement will be placed in the bottom of the trench. At the end of each day the installed conduit will be encased in thermal concrete. This will require several concrete trucks to enter and exit the property during each pour.

After the concrete has been allowed to set up, 12 to 24 hours, the trench will be backfilled and compacted in 6"-12" lifts. In order to increase productivity, a backfill material called fluidized thermal backfill (FTB) may be used. FTB is a low strength "diggable" concrete mixture that is designed to set up quickly, provide the required thermal characteristics, and to be removable using hand tools in case of future construction in the area.

The top 12"–18" of the trench will be restored to match the existing surface. This includes pavement and roadbed in roadways and sidewalks or topsoil outside of pavement.

The duct bank installation for the center route is expected to be approximately 5300 feet in length and require 11 weeks to complete. The duct bank work is expected to be completed between December 2013 and March 2014.

3.4.4 Restoration

After the duct bank construction has been completed, all areas disturbed during construction will be graded and restored by seeding or paving to its condition prior to start of construction.

3.5 OVERHEAD TO UNDERGROUND TRANSITION

The transition from the overhead transmission line to underground transmission line will require a transition station located in the existing transmission line right of way. The transition will be accomplished by using a series of self supported mono-pole steel structures. A separate transition structure will be used for each circuit. The actual transition between overhead conductor and underground cable will occur in the air on the transition structure. The underground cable will be routed up the structure to approximately the height of the overhead conductor. It is anticipated that addition right-of-way will not be required for the transition station.

SMECO would require periodic access to the transition station for maintenance and monitoring activities.

3.6 UNDERGROUND CABLE INSTALLATION ACTIVITIES

3.6.1 CABLE TRANSPORTATION

Cable is transported on large reels. Typical reel sizes are approximately 13' in outside diameter, 8' in width, and weigh up to 60,000 lbs. Both of the routes proposed will require larger reels. The reel diameters and widths will change depending on the cable manufacturers handling equipment and preferences.

For the shorter, center HDD, using conventional underground cable construction, the reels will be approximately 13' in diameter, 12'-14' feet in width, and weigh 145,000 lbs loaded. These reels would likely require barges to transport them on the river, and a large crane to move them to shore, near the drill end point. Cable handling equipment has been developed to handle reels this size.

For the longer south HDD, using armored cable, the reels will need to be approximately 50% larger, and weigh approximately 260,000 lbs loaded. These cables will require barges to transport them on the river, and a very large crane to move them to shore, near the drill end point. The cable reels and handling equipment will also need to be specially built to handle the reels and cable weight.

The open-trenched duct bank sections will require reels slightly smaller than the typical reel. These reels can be transported over the roadways or by barge with the reels for the HDD installations.

3.6.2 Cable Pulling

The cable pulling will take place after the entire duct bank system connecting the overhead lines on both sides of the river is completed. The cable pulling activities will require the cable contractor to place trucks and pulling rigs or cable reel trailers at each splicing vault.

The cable pulling activity is planned to be completed in November and December of 2014 and will require eight (8) weeks on site.

3.6.3 Cable Splicing

After the cables are installed in the duct bank system, they need to be spliced together in the splicing vaults. This splicing activity requires a splicing van to be parked directly over the splicing vaults and a few accessory vehicles parked near the splicing operations.

Splicing operations will require three to five personnel for approximately 12 to 14 hours per day, for a period of two to three (2 to 3) weeks for each splicing vault.

The total cable splicing operations will require eight weeks and is expected to be completed in December 2014 and January 2015.

3.6.4 Cable Terminating

Where the underground transmission line meets the overhead transmission line, the cables will be routed up the cable riser structures within the transition station discussed in section 3.5. Underground cable terminations will be connected to overhead transmission line conductors via conductor jumpers. Termination operations will require approximately four (4) weeks for each circuit.

The total cable terminating operations will require eight (8) weeks and is expected to be completed in January and February 2015.

3.6.5 Cable Testing

Cable testing will be performed in two phases. Immediately after splicing and terminating the cables system, the cable installer will verify the cable bonding and grounding system integrity. After the entire circuit is completed, including the overhead sections not on the Navy property, the cable system will be tested again using the expected system voltage. For both sets of tests, access to the splicing vaults will be required, but no significant disruption will occur.

3.7 AFTER INSTALLATION ACCESS

3.7.1 Maintenance

SMECO will require occasional access to the splicing vaults for maintenance and inspection activities after the cable system has been energized. Normal maintenance inspections require two to four people for one to two hours at each splicing vault every 12 to 24 months. Additional inspections may be performed during the first year of operation or after an overload event on the circuit.

3.7.2 Repair

In the unexpected and unlikely event of the failure of the cable system, it will be necessary for SMECO to have immediate access to the splicing vaults to initiate repair procedures. Cable system repairs, although not common, will typically require four to eight weeks, depending on the specifics of the failure and the availability of materials and repair technicians.

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4.0 SCHEDULING

4.1 SCHEDULE ASSUMPTIONS AND WORK RESTRICTIONS

In order to minimize impacts to the operation of the Navy Recreation Center facilities, SMECO intends to schedule the work in the off-season, from the first of November to the end of March. SMECO will coordinate work on the St. Mary's side of the river to support construction activities on Navy property. The following timelines represent the latest dates the work can be started. See Appendix F for detailed schedules.

4.2 CENTER ROUTE

The center route will require construction activities to begin in November 2013 to complete work on the Navy property by March 2015. Detailed design, contracting and procurement activities will need to begin in late 2012, approximately 12 months in advance of construction.

In order to meet the work period restrictions, the project will be broken into three phases, an HDD installation phase, an open-trenched duct bank phase, and a cable installation phase. The following provides the planned construction periods for the three planned construction phases:

- HDD installation phase: November 2013 to March 2014
- Open trenched duct bank phase: November 2013 to March 2014
- Cable installation phase: November 2014 to March 2015

4.3 SOUTH ROUTE

The South route will require a longer construction schedule than the Center route, and will require more work crews and several tasks to be performed simultaneously, causing significantly more widespread disruption on the NRC for a longer period of time.

The South route will require construction activities to begin in November 2013 to complete work on the Navy property by April 2015. Detailed design, contracting and procurement activities will need to begin in mid 2012, approximately 14 months in advance of construction.

In order to minimize the impacts to the NRC, the project will be broken into three phases similar to the Center route, an HDD installation phase, an open-trenched duct bank phase, and a cable installation phase. The following provides the planned construction periods for the three planned construction phases:

- HDD installation phase: October 2013 to April 2014
- Open trenched duct bank phase: November 2013 to March 2014
- Cable installation phase: October 2014 to April 2015

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5.0 ESTIMATED COSTS

5.1 SUMMARY OF ESTIMATES

To install the circuit using the Center route would cost approximately $21.6 million. To install the circuit using the South route would cost approximately $53.3 million. Even though the South route is shorter overall, it requires three times as many cables, and duct bank, to carry the same load. In addition, the armored cables required for the long HDD cost approximately 30% more than conventional high voltage cables.

The following table summarizes the estimated costs for the crossing alternatives.

Table 7.1 Estimated Costs

Crossing Alternative	Total Est. Cost (Millions $)	Cable & Acc. (Millions $)	Trenched Duct Bank (Millions $)	HDD Duct Bank (Millions $)	Eng. & CM (Millions $)
Center route	$21.6 M	$9.0 M	$6.3 M	$5.2 M	$1.1 M
South route	$53.3 M	$24.5 M	$9.0 M	$18.6 M	$1.2 M
Center route, 2 Circuits*	$30.4 M	$17.8 M	$6.3 M	$5.2 M	$1.1 M

*This option includes installing both circuits completely to improve reliability.

5.2 BASIS OF ESTIMATES

The estimates are based on the installation of cable for a single circuit, and the installation of duct bank for two circuits The estimates are based on 2008 dollars and pricing without escalation. The estimates were made using recent pricing for the state of Maryland. The estimates include a 10% contingency. The estimates include rough costs for engineering and construction management based on number of personnel and time assigned to the project. Summaries of the individual estimates are included as Appendix G.

5.3 CENTER ROUTE, SECOND CIRCUIT

When a circuit is installed as two or three cables per phase, it can be operated at a reduced loading if one set of the cables is damaged. To maintain this flexibility in the center route with a single cable per phase installation, an estimate has been included based on installing both circuits at the same time. The two sets of cables would be able to be operated as two circuits, or a single circuit using two cables per phase.

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APPENDIX A

Proposed Route Map

LEGEND:

(solid green line)	CENTER ROUTE
(solid yellow-green line)	SOUTH ROUTE
(solid orange line)	TOWN CREEK ROUTE
(dashed blue line)	NORTH ROUTE HDD
(dashed green line)	CENTER ROUTE HDD
(dashed yellow-green line)	SOUTH ROUTE HDD
(solid magenta line)	OVERHEAD LINE

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

PROPOSED HDD OPTIONS PLAN

DRAWN	EGS	DATE	06/19/08
CHECKED		D NO.	DS-001
APPROVED		SUB. NO.	
SCALE	NO SCALE	DWG. NO.	

N:\LAND DEVELOPMENT PROJECTS\146030-SMECO\WORKING\ROUTE OPTION MAP

APPENDIX B

CABLE PULLING TENSIONS

PULL-PLANNER™ 2000

PULL I.D.: SMECO 4100 Feet

CONDUIT INNER DIAMETER: 7.9 INCHES   CONDUIT FILL: 48 %

TOTAL OF 1 CABLES OF 1 DIFFERENT TYPES BEING PULLED.

CABLE # 1   1 CABLES   O.D. OF 5.5 INCHES   WEIGHT OF 32.2 LBS/FT

TOTAL CABLE WEIGHT: 32.2 LBS/FT

CALCULATED WEIGHT CORRECTION FACTOR: 1

CONFIGURATION: SINGLE CABLE

JAM/CLEARANCE ANALYSIS: JAMMING NOT POSSIBLE

COF= 0.2   INCOMING TENSION= 1000 LBS

	STRA SECT ANGL	Up OR Down	STRA SECT LEN(ft)	BEND TYPE	Up OR Down	BEND RAD(ft)	BEND ANGLE	TENSION(lbs)	SW PRES (lbs/ft)
SEG 1	12	Down	511	NONE	NA	0	0	798	0
SEG 2	12	Down	0	VCUP	Down	2000	12	2140	1
SEG 3	0	NA	2768	NONE	NA	0	0	19966	1
SEG 4	0	NA	0	VCUP	Up	2000	12	19512	10
SEG 5	12	Up	511	NONE	NA	0	0	26152	10

PULL-PLANNER™ 2000

PULL I.D.: SMECO 5100 Feet

CONDUIT INNER DIAMETER: 7.9 INCHES CONDUIT FILL: 67 %

TOTAL OF 1 CABLES OF 1 DIFFERENT TYPES BEING PULLED.

CABLE # 1 1 CABLES O.D. OF 6.5 INCHES WEIGHT OF 45 LBS/FT

TOTAL CABLE WEIGHT: 45 LBS/FT

CALCULATED WEIGHT CORRECTION FACTOR: 1

CONFIGURATION: SINGLE CABLE

JAM/CLEARANCE ANALYSIS: JAMMING NOT POSSIBLE

COF= 0.2 INCOMING TENSION= 1500 LBS

	STRA SECT ANGL	Up OR Down	STRA SECT LEN(ft)	BEND TYPE	Up OR Down	BEND RAD(ft)	BEND ANGLE	TENSION(lbs)	SW PRES (lbs/ft)
SEG 1	12	Down	511	NONE	NA	0	0	1218	0
SEG 2	12	Down	0	VCUP	Down	2000	12	3098	2
SEG 3	0	NA	3268	NONE	NA	0	0	32510	2
SEG 4	0	NA	0	VCUP	Up	2000	12	32073	16
SEG 5	12	Up	511	NONE	NA	0	0	41352	16

APPENDIX C

High Voltage Cable Cross-Section
and Preliminary Ampacity Calculations

Summary Results

Study: SMECO Southern Maryland 230 kV reliabilty project

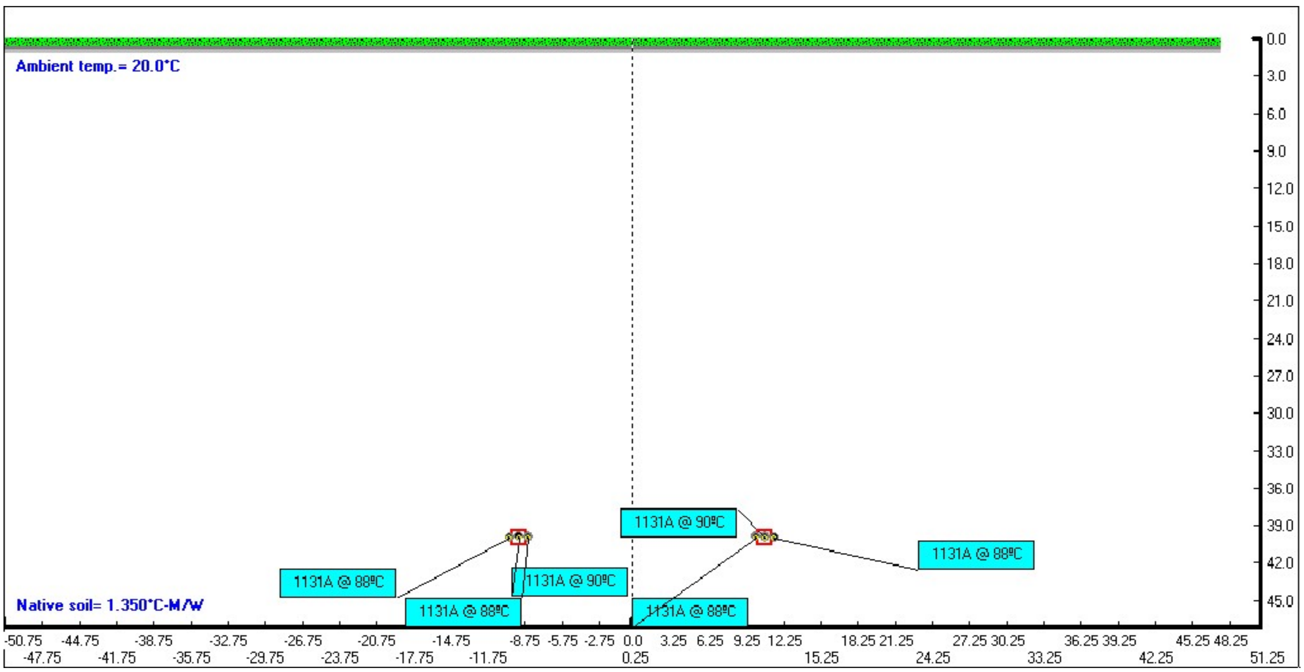
Execution: HDD Under Patuxent River, Slick Bore, 2 Circuits, Seperate

Date: 11/6/2008

Frequency: 50 Hz

Conductor Resistances: IEC-228

Installation Type: Buried Ducts		
Parameter	**Unit**	**Value**
Ambient Soil Temperature at Installation Depth	°C	20
Thermal Resistivity of Native Soil	°C.m/W	1.35
Non-Isothermal Earth surface modeling	Enabled/Disabled	Disabled



Summary Results							
Solution converged							
Cable\Cable type no	Circuit	Phase	Location		Load Factor	Temperature	Ampacity
			X[ft]	Y[ft]	[p.u.]	[°C]	[A]
1 \ 1	1	A	-9.25	40	0.8	90	1131.2
2 \ 1	1	B	-10	40	0.8	87.7	1131.2
3 \ 1	1	C	-8.5	40	0.8	88.3	1131.2
4 \ 1	2	A	10.75	40	0.8	90	1131.2
5 \ 1	2	B	10	40	0.8	88.3	1131.2
6 \ 1	2	C	11.5	40	0.8	87.7	1131.2

Cables input data

Study: SMECO Southern Maryland 230 kV reliabilty project
Execution: HDD Under Patuxent River, Slick Bore, 2 Circuits, Seperate
Date: 11/6/2008

No	Description	Unit	1
General cable information			
1	Cable type no		1
2	Number of cores		1
3	Voltage	kV	230
4	Conductor area	$inch^2$	3.1419
5	Maximum Steady-State Conductor Temperature	°C	90
6	Maximum Emergency Conductor Temperature	°C	105
Construction			
Conductor			
7	Material		copper
8	Resistivity @20°C	uΩ.cm	1.7241
9	Temperature coefficient	1/K	0.00393
10	Construction		4 segments
11	Is cable dried?		No
12	ks (Skin effect coefficient)		0.44
13	kp (Proximity effect coefficient)		0.37
14	Diameter	inch	2.225
Conductor shield			
15	Is layer present?		Yes
16	Thickness	inch	0.04
17	Diameter	inch	2.305
Insulation			
18	Is layer present?		Yes
19	Material		XLPE (unfilled)
20	Thermal resistivity	K.m/w	3.5
21	Dielectric loss factor - (tan δ)		0.001
22	Relative permeability (ε)		2.5
23	Thickness	inch	0.925
24	Diameter	inch	4.155
Insulation screen			
25	Is layer present?		Yes
26	Material		semi-conducting
27	Thickness	inch	0.06
28	Diameter	inch	4.275
Sheath			

29	Is layer present?		Yes
30	Is around each core? (Only for Three core cable)		No
31	Material		lead
32	Resistivity @20°C	uΩ.cm	21.4
33	Temperature coefficient	1/K	0.004
34	Corrugated construction		Non-corrugated
35	Thickness	inch	0.125
36	Diameter	inch	4.525
Jacket			
37	Is layer present?		Yes
38	Material		polyethylene
39	Thermal resistivity	K.m/w	3.5
40	Thickness	inch	0.15
41	Diameter	inch	4.825
Overall cable diameter			
42	Diameter	inch	4.825

No	Description / Value	Unit	1
SPECIFIC INSTALLATION DATA			
Bonding			
1	1-CON, sheaths single point bonded, flat configuration		Yes
Loss factor constant			
2	Loss factor constant		0.3
Duct construction			
3	PVC duct in concrete or buried		Yes
4	Resistivity (RH)		0
Cables touching			
5	Single conductor cables NOT touching		Yes
Duct / Pipe dimensions			
6	Inside diameter of Duct/Pipe	inch	7.7600002
7	Outside diameter of Duct/Pipe	inch	9.0500003

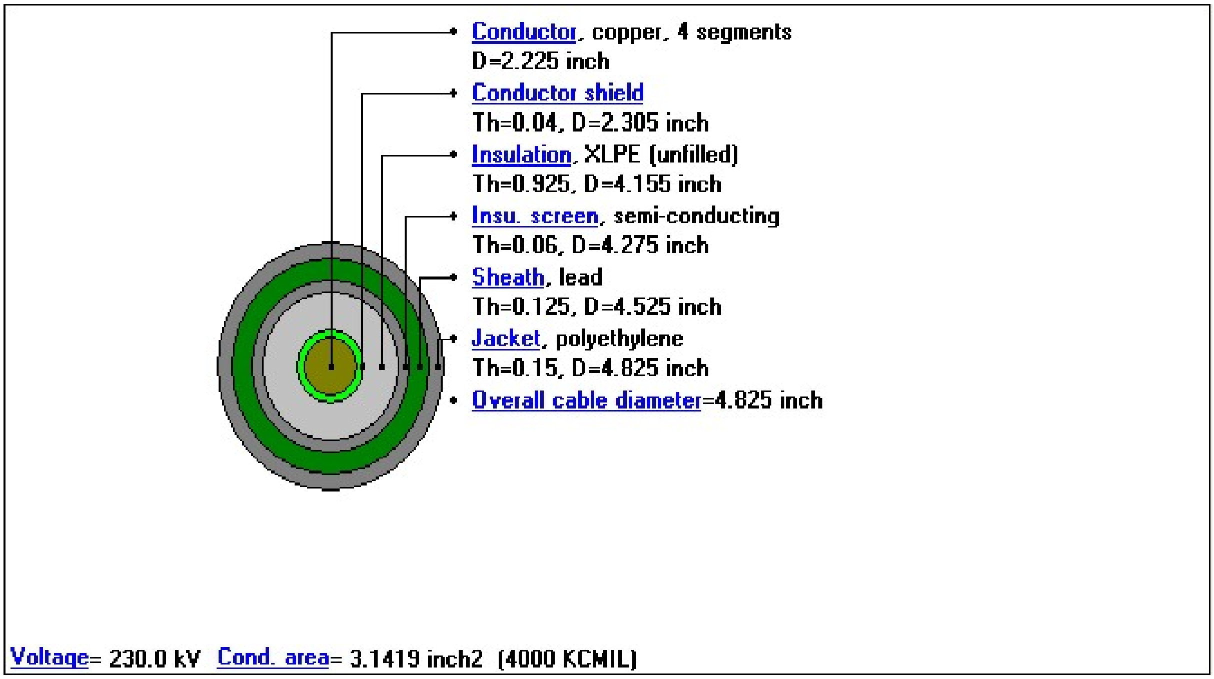
No	Symbol	Description	Unit	1	2	3	4	5	6
Temperature calculations									
1		Cable type no		1	1	1	1	1	1
2		Circuit no		1	1	1	2	2	2
3		Phase		A	B	C	A	B	C
4	θ_c	Conductor temperature	°C	90	87.7	88.3	90	88.3	87.7
5	θ_i	Sheath/Shield temperature	°C	83.8	81.5	82.1	83.8	82.1	81.5
6	θ_j	Armour/Pipe or Jacket temperature	°C	83.1	80.8	81.4	83.1	81.4	80.8
7	θ_s	Exterior duct temperature	°C	76.2	73.9	74.5	76.2	74.5	73.9
8	θ_a	Ambient temperature	°C	20	20	20	20	20	20

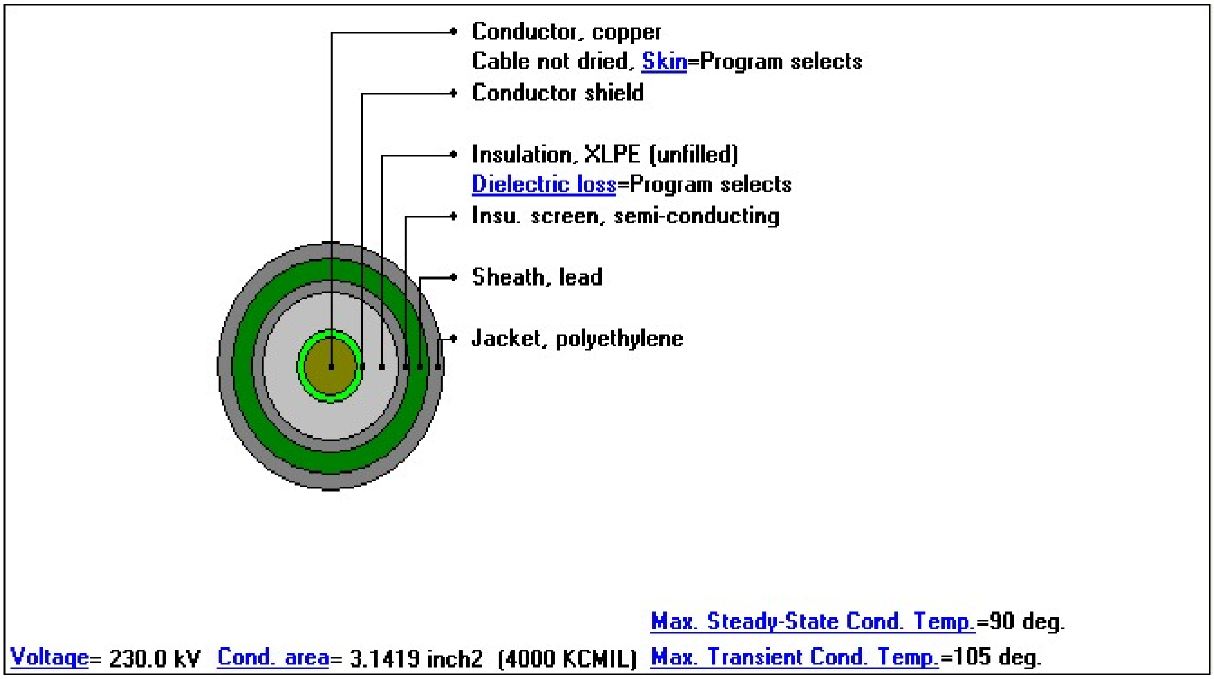
Cable type no: 1

Cable type: EXTRUDED

Cable ID: 230,4000KS

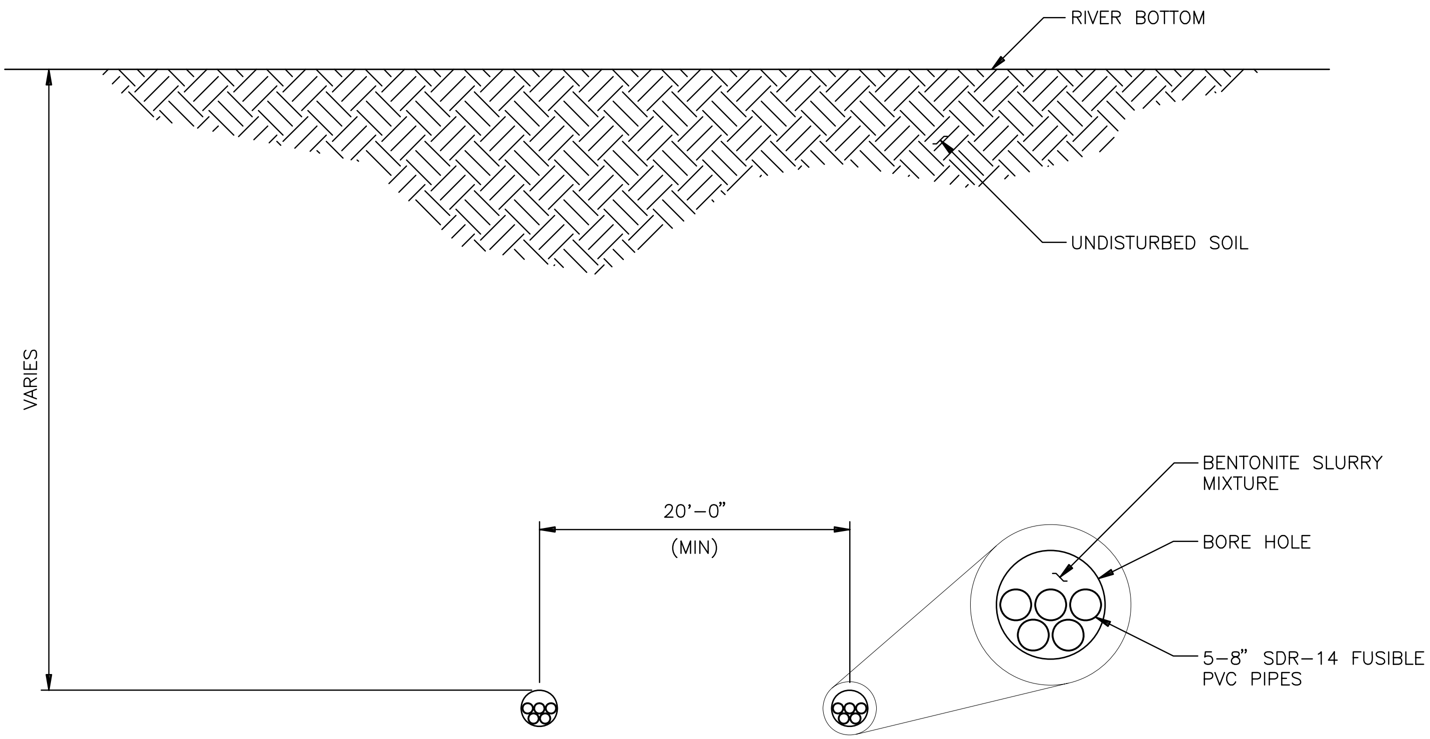
Cable title: 230kV, 4000 kcmil Cu seg, 925 mils XLPE





APPENDIX D

HORIZONTAL DIRECTIONAL DRILLING
TYPICAL CROSS SECTION
AND WORK AREAS

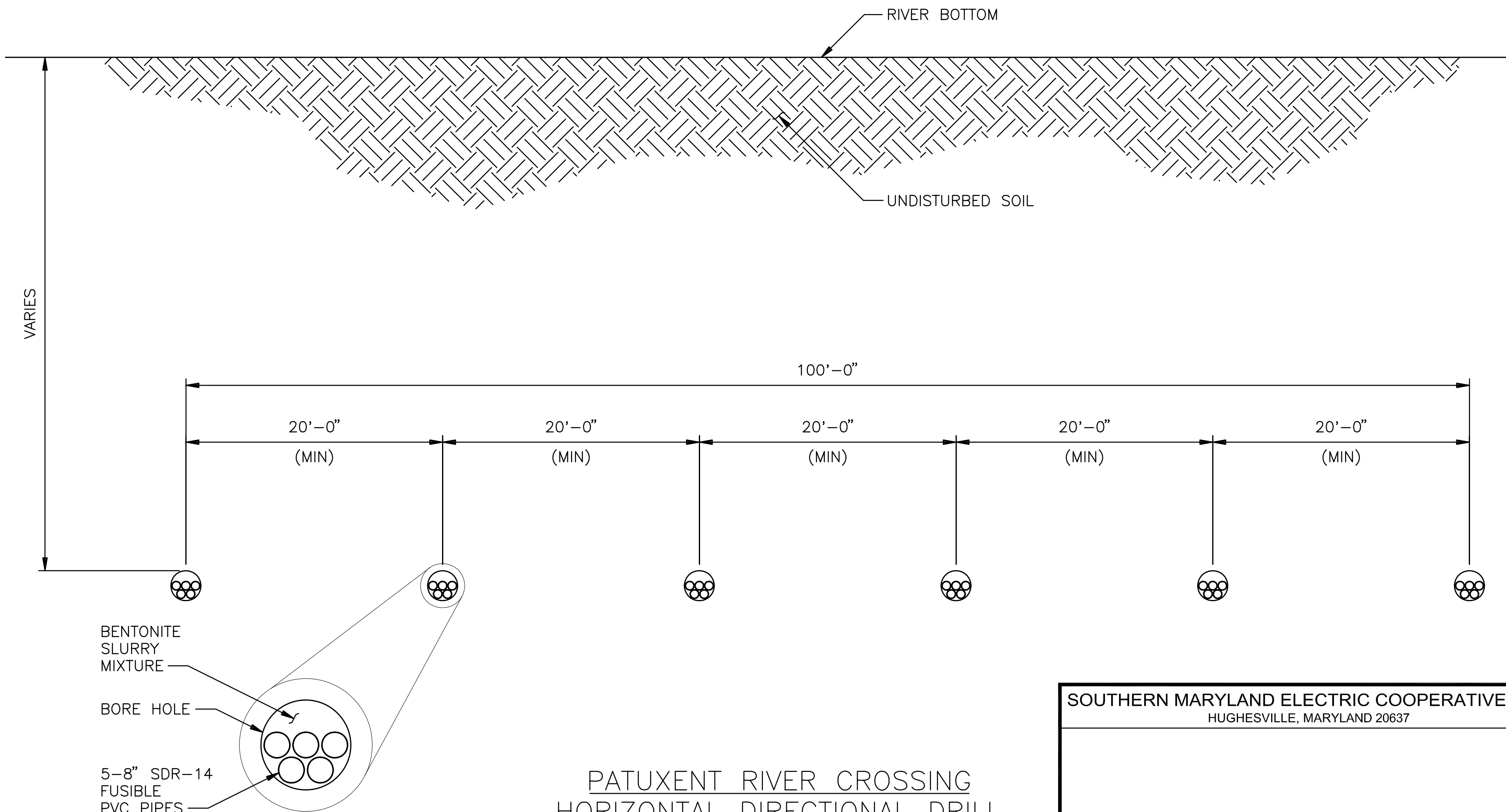


PATUXENT RIVER CROSSING
HORIZONTAL DIRECTIONAL DRILL
SINGLE CABLE PER PHASE
TYPICAL CROSS SECTION

SCALE: 1/8"=1'–0"

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

DRAWN	EGS	DATE	07/02/08
CHECKED		D NO.	
APPROVED		SUB. NO.	
SCALE	AS NOTED	DWG. NO.	DS–0013



PATUXENT RIVER CROSSING
HORIZONTAL DIRECTIONAL DRILL
THREE CABLES PER PHASE
TYPICAL CROSS SECTION

SCALE: 1/8"=1'–0"

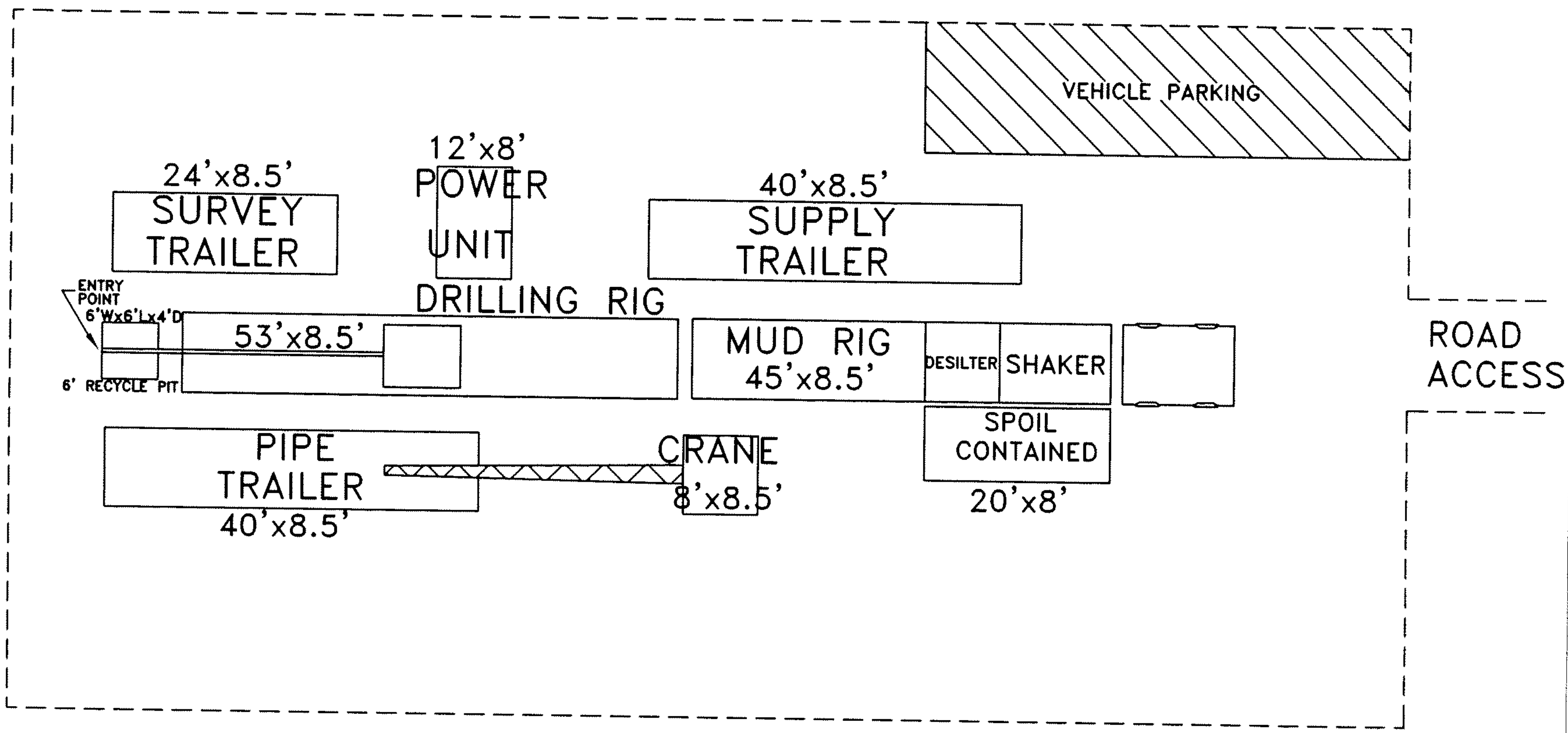
SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

DRAWN	EGS	DATE	07/02/08
CHECKED		D NO.	
APPROVED		SUB. NO.	
SCALE	AS NOTED	DWG. NO.	DS–0012

TYPICAL ENTRY SITE

EQUIPMENT LAYOUT

150' x 75'



NOTE: THIS IS A TYPICAL SITE SET-UP. THERE ARE VARIOUS CONFIGURATIONS USED DEPENDING UPON SITE RESTRICTIONS. FIELD MODIFICATIONS TO SUIT SITE.

NOTE: BENTONITE SLURRY PUMPED FROM PIT, COLLECTED & RECYCLED OR DISPOSED OF AT AN APPROVED LOCATION

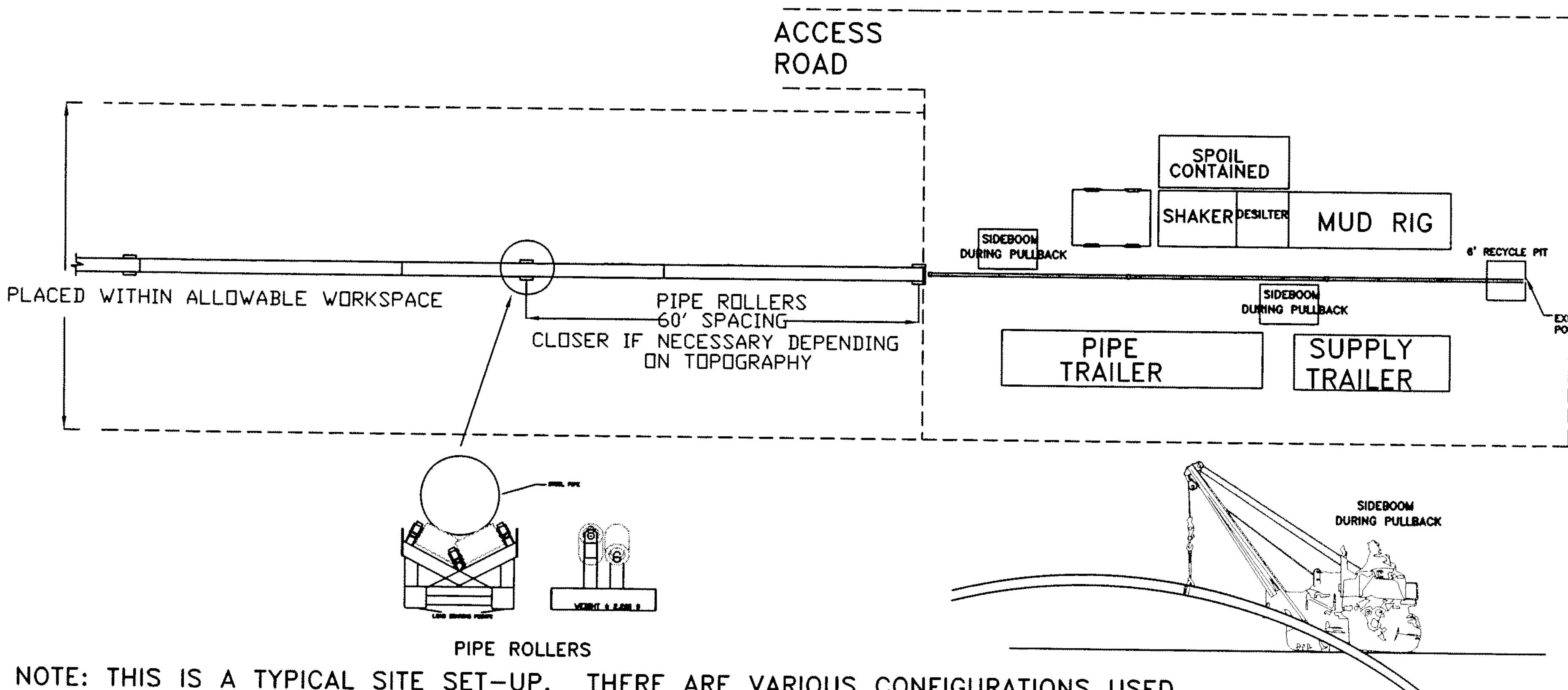
TYPICAL EXIT SITE

EQUIPMENT LAYOUT & PRODUCT LINE SUPPORT

WORK AREA 65' x 100'

PIPE STRING OUT AREA

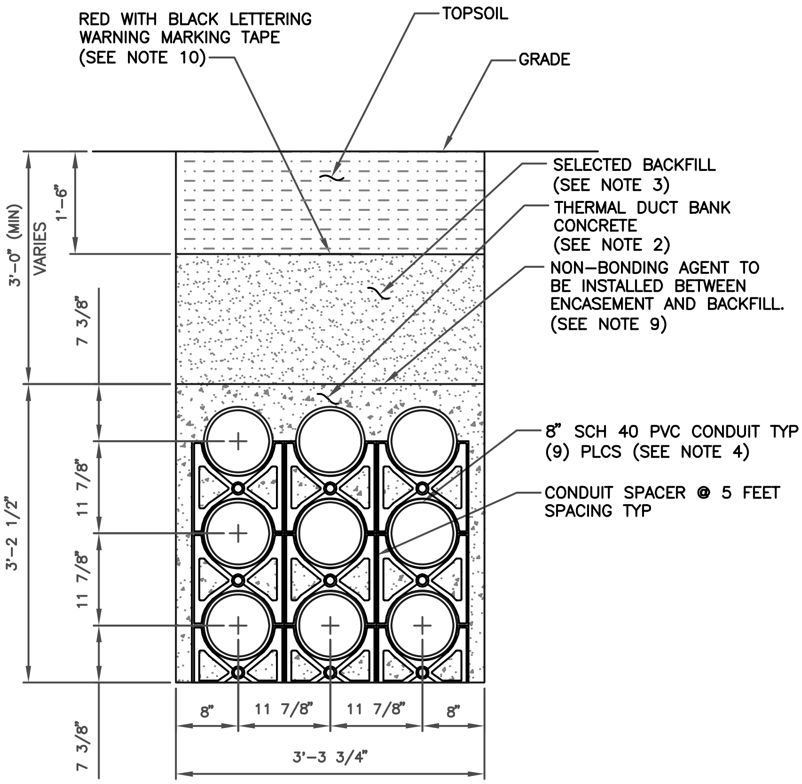
LENGTH OF INSTALL x 50' WIDE



NOTE: THIS IS A TYPICAL SITE SET-UP. THERE ARE VARIOUS CONFIGURATIONS USED DEPENDING UPON SITE RESTRICTIONS. FIELD MODIFICATIONS MADE TO SUIT THE SITE.

APPENDIX E

DUCT BANK AND
SPLICING VAULT DRAWINGS



POWER CABLE
DUCT BANK

SCALE: 1/2"=1'-0"

NOTES:

1. ALL DUCTBANK DIMENSIONS ARE MINIMUMS.
2. THERMAL CONCRETE FOR DUCT BANK ENCASEMENT SHALL MEET PROJECT SPECIFICATIONS. MIX DESIGN SHALL BE TESTED AND APPROVED PRIOR TO INSTALLATION.
3. BACKFILL FOR DUCTBANK SHALL BE THERMALLY ACCEPTABLE. FLOWABLE THERMAL BACKFILL (FTB), SELECTED GRANULAR FILL, AND NATIVE SOIL ARE POSSIBLE BACKFILL MATERIALS. ALL BACKFILL MATERIALS SHALL BE APPROVED BEFORE INSTALLATION. ALL BACKFILL SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS.
4. CONDUIT SHALL BE RESTRAINED TO PREVENT FLOATING DURING ENCASEMENT. ONLY NON-METALLIC RESTRAINTS SHALL BE USED.
5. CONDUIT SPACERS SHALL BE ANCHORED BY MEANS OF REBAR STAKES OR ACCEPTABLE EQUAL.
6. ALL REINFORCING SHALL BE AT LEAST 2-INCHES FROM PVC CONDUITS, FITTINGS AND ANCHORS, AND SHALL HAVE 3-INCHES MINIMUM CONCRETE COVER.
7. WHEN DUCT BANK IS LOCATED WITHIN CITY STREETS PAVEMENT SHALL BE RESTORED TO CITY SPECIFICATIONS.
8. ALL CONDUIT SHALL BE SEALED AT THE END OF EACH WORKING DAY.
9. NON-BONDING AGENT TO BE INSTALLED BETWEEN ENCASEMENT CONCRETE AND FTB. NON-BONDING AGENT TO BE PLASTIC SHEETING OR ACCEPTABLE EQUAL. NON-BONDING AGENT IS NOT REQUIRED BETWEEN ENCASEMENT CONCRETE AND GRANULAR OR NATIVE BACKFILL.
10. CONTRACTOR TO INSTALL WARNING MARKING TAPE ABOVE THE DUCTBANK 12 TO 18 INCHES BELOW GRADE.
11. 3" EDGE TO EDGE SPACING SHALL BE MAINTAINED BETWEEN 8" CONDUITS AT ALL LOCATIONS.

BLACK & VEATCH

ENGINEER JRB | DRAWN TKH
CHECKED JRB | DATE 06/02/2008

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

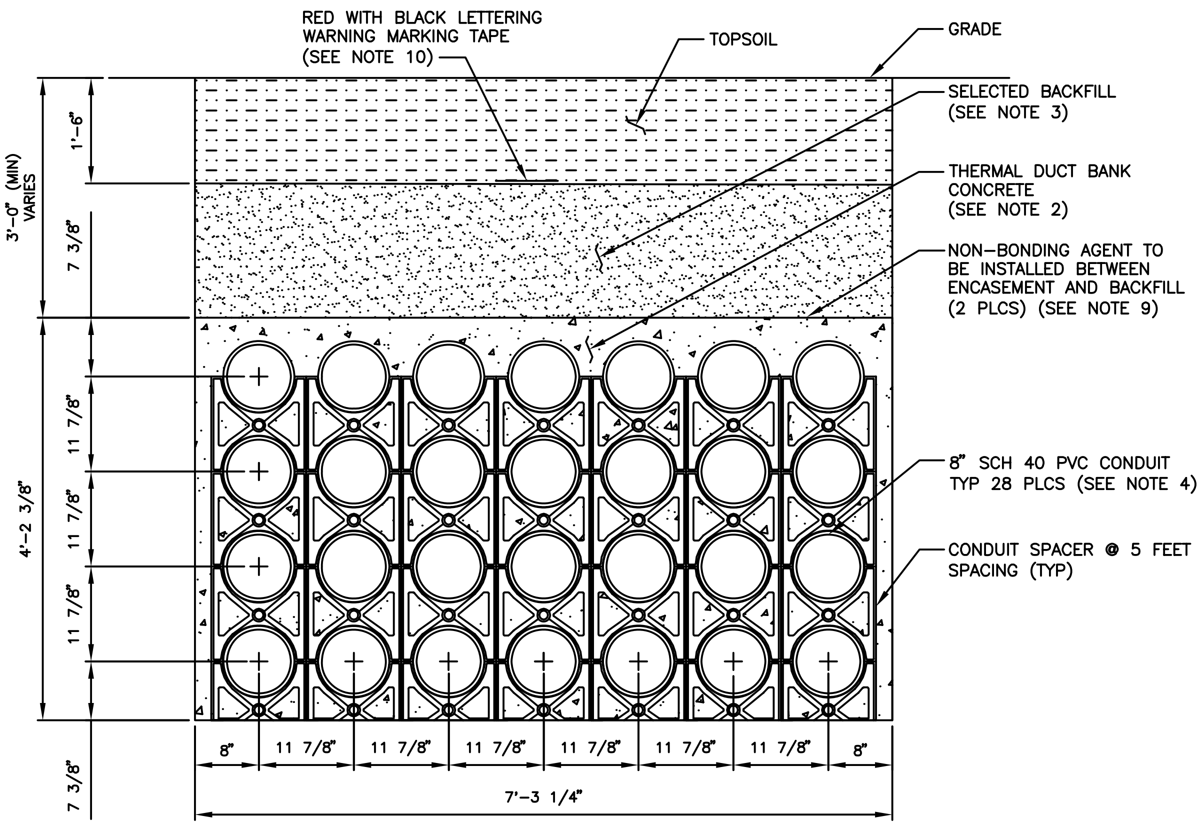
SMECO, SOUTHERN MARYLAND
230kV RELIABILITY PROJECT

PROJECT 146026 | DRAWING NUMBER | REV A

DOUBLE CIRCUIT DUCT BANK

CODE
AREA

SK-DBK1-060208



POWER CABLE
DUCT BANK

SCALE: 1/2"=1'–0"

NOTES:

1. ALL DUCTBANK DIMENSIONS ARE MINIMUMS.
2. THERMAL CONCRETE FOR DUCT BANK ENCASEMENT SHALL MEET PROJECT SPECIFICATIONS. MIX DESIGN SHALL BE TESTED AND APPROVED PRIOR TO INSTALLATION.
3. BACKFILL FOR DUCTBANK SHALL BE THERMALLY ACCEPTABLE. FLOWABLE THERMAL BACKFILL (FTB), SELECTED GRANULAR FILL, AND NATIVE SOIL ARE POSSIBLE BACKFILL MATERIALS. ALL BACKFILL MATERIALS SHALL BE APPROVED BEFORE INSTALLATION. ALL BACKFILL SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS.
4. CONDUIT SHALL BE RESTRAINED TO PREVENT FLOATING DURING ENCASEMENT. ONLY NON–METALLIC RESTRAINTS SHALL BE USED.
5. CONDUIT SPACERS SHALL BE ANCHORED BY MEANS OF REBAR STAKES OR ACCEPTABLE EQUAL.
6. ALL REINFORCING SHALL BE AT LEAST 2–INCHES FROM PVC CONDUITS, FITTINGS AND ANCHORS, AND SHALL HAVE 3–INCHES MINIMUM CONCRETE COVER.
7. WHEN DUCT BANK IS LOCATED WITHIN CITY STREETS PAVEMENT SHALL BE RESTORED TO CITY SPECIFICATIONS.
8. ALL CONDUIT SHALL BE SEALED AT THE END OF EACH WORKING DAY.
9. NON–BONDING AGENT TO BE INSTALLED BETWEEN ENCASEMENT CONCRETE AND FTB. NON–BONDING AGENT TO BE PLASTIC SHEETING OR ACCEPTABLE EQUAL. NON–BONDING AGENT IS NOT REQUIRED BETWEEN ENCASEMENT CONCRETE AND GRANULAR OR NATIVE BACKFILL.
10. CONTRACTOR TO INSTALL WARNING MARKING TAPE ABOVE THE DUCTBANK 12 TO 18 INCHES BELOW GRADE.
11. 3" EDGE TO EDGE SPACING SHALL BE MAINTAINED BETWEEN 8" CONDUITS AT ALL LOCATIONS.

BLACK & VEATCH®

ENGINEER JRB | DRAWN TKH

CHECKED JRB | DATE 06/02/2008

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

SMECO, SOUTHERN MARYLAND
230kV RELIABILITY PROJECT

PROJECT 146026

DRAWING NUMBER

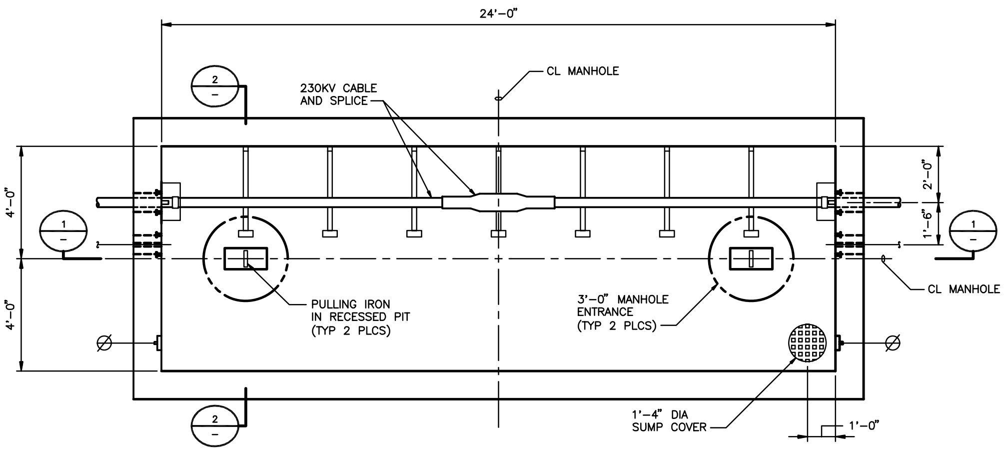
REV A

TWO CIRCUITS, 3 CABLES/PHASE DUCT BANK

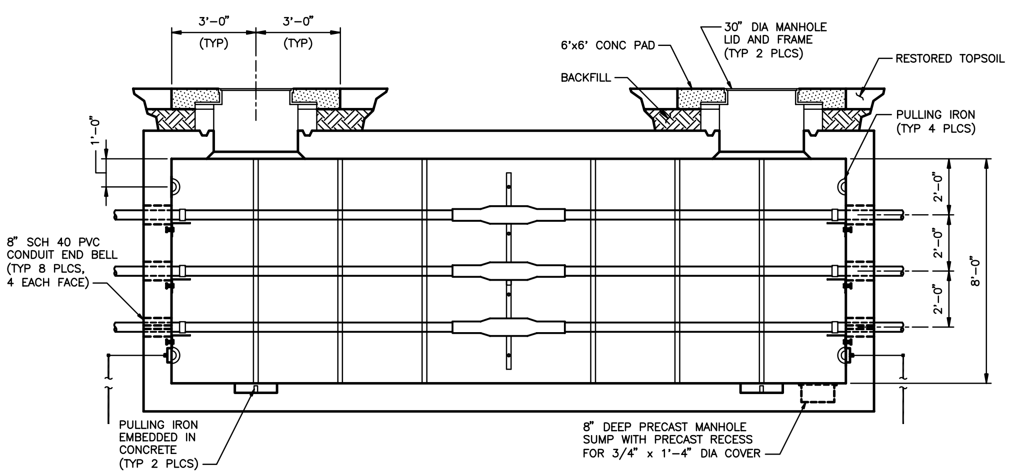
CODE

AREA

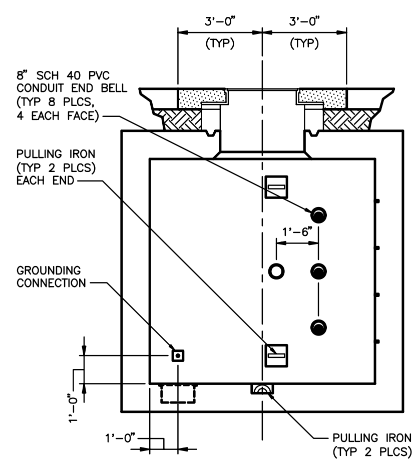
SK–DBK3–070208



PLAN VIEW
NO SCALE



SECTION 1
NO SCALE



SECTION 2
NO SCALE

NOT TO BE USED
FOR CONSTRUCTION

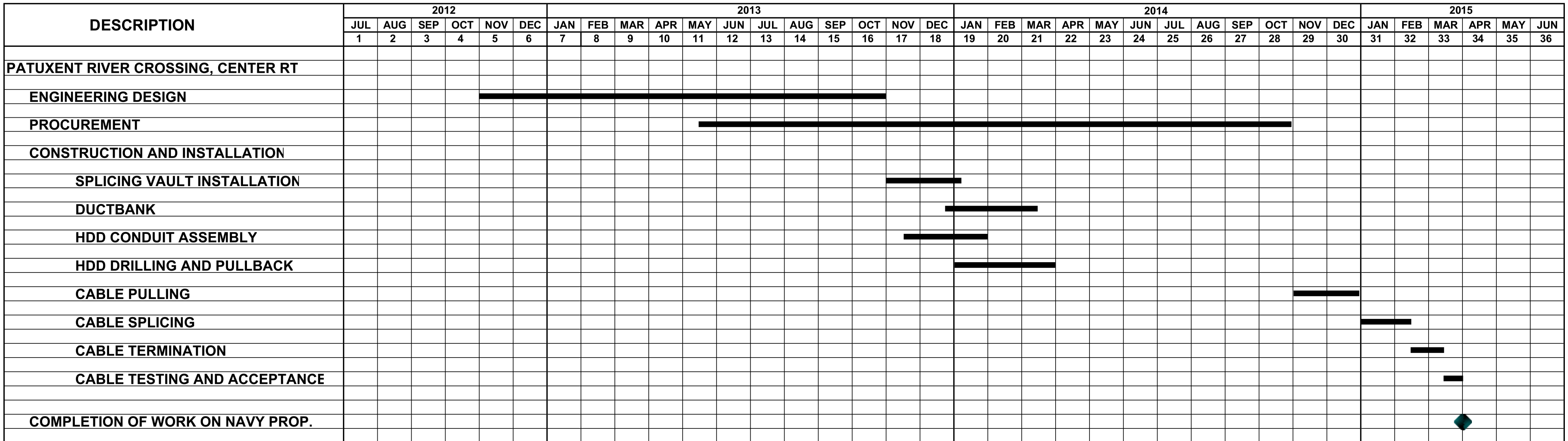
SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

TYPICAL SPLICING VAULT

DRAWN	EGS	DATE	06/26/08
CHECKED		D NO.	
APPROVED		SUB. NO.	
SCALE	NONE	DWG. NO.	DS-0010

APPENDIX F

PRELIMINARY SCHEDULES



NO	DATE	REVISIONS & RECORD OF ISSUE	BY	CHK	APP	FLM

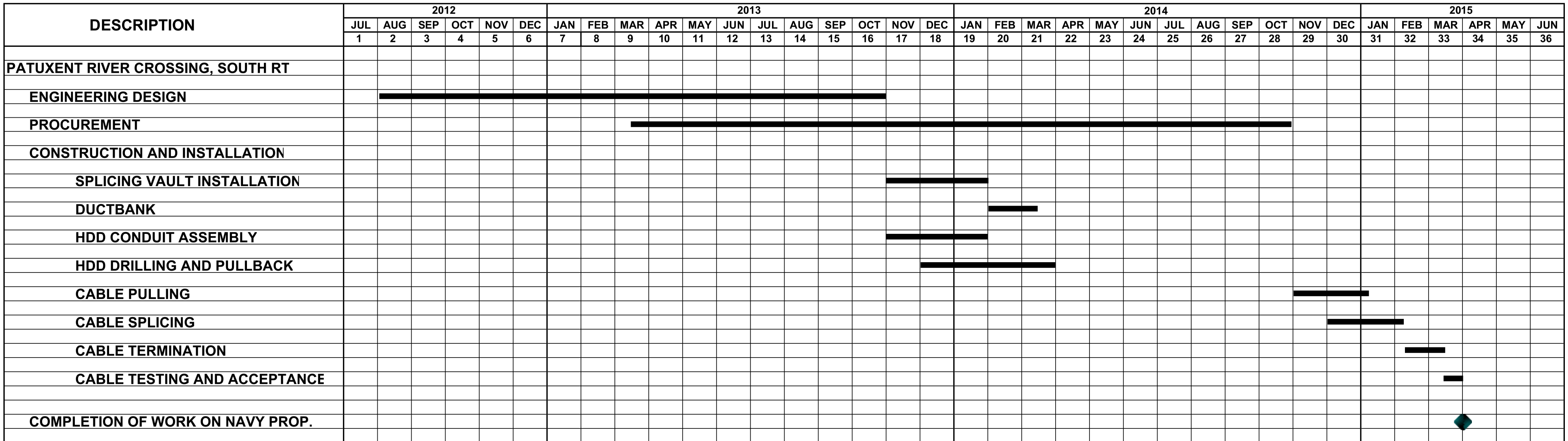
ENGINEER: J BARDWELL
DRAWN: J BARDWELL
CHECKED:
DATE: 1-Jul-08

SMECO

PATUXENT RIVER CROSSING, CENTER ROUTE ON THE NAVY PROPERTY

PRELIMINARY PROJECT SCHEDULE

DRAWING NUMBER: **PSCH-PREF-070108**
REV:
CODE:
AREA:



NO	DATE	REVISIONS & RECORD OF ISSUE	BY	CHK	APP	FLM

ENGINEER: J BARDWELL
DRAWN: J BARDWELL
CHECKED:
DATE: 1-Jul-08

SMECO

PATUXENT RIVER CROSSING, SOUTH ROUTE ON THE NAVY PROPERTY

PRELIMINARY PROJECT SCHEDULE

DRAWING NUMBER: **PSCH-PREF-070108**
REV

CODE

AREA

APPENDIX G

CONCEPTUAL ESTIMATES

Owner	SMECO	Computed By	J. Bardwell
Project	Southern Maryland 230kV Reliability Project, Patuxent River Crossing	Date	25-Aug-08
B&V File No.	146026.53.0000	Checked By	
Title	River Crossing, Center Route	Date	
Estimate Overall Route Length	1.97 Miles	1 Circuits	
	10402 Feet; 4 Splices per Circuit	1 Cables per Phase	

Item	Qty	Unit	Material Unit Cost	Total Mat'l Cost	Labor Unit Cost	Total Labor Cost	TOTAL COST
CABLE SYSTEM FURNISH AND INSTALL							
UG CABLE AND ACCESSORIES SUBTOTAL				**$6,795,120**		**$1,079,400**	**$7,874,520**
Cable cost per route foot (1 Circuit)	$630.00	(Does not include Accessories)					
COMMUNICATIONS							
CABLE SYSTEM COMMUNICATIONS (FO) SUBTOTAL				**$71,310**		**$91,731**	**$163,040**
DISTRIBUTED TEMPERATURE SENSING SYSTEM							
DTS SUBTOTAL				**$0**		**$0**	**$0**
CIVIL WORK							
GENERAL SUBTOTAL				**$0**		**$224,625**	**$224,625**
STRUCTURES SUBTOTAL				**$144,855**		**$175,914**	**$320,769**
SPLICING VAULT SUBTOTAL				**$248,000**		**$180,800**	**$428,800**
DUCTBANK INSTALLATION				**$1,833,017**		**$2,937,655**	**$4,770,672**
Ductbank cost per route foot (2 Circuits)	$808.37						
HDD INSTALLATION SUBTOTAL				**$1,350,000**		**$3,393,000**	**$4,743,000**
HDD Ductbank cost per route foot (2 Ckts)	$1,054.00						
JACK AND BORE SUBTOTAL				**$0**		**$0**	**$0**
ESTIMATED LABOR & MATERIAL COST				**$10,442,302**		**$8,083,125**	**$18,525,427**
ESCALATION (Not Included)	**0**	**Years @**	**10.00%**	**$0**		**$0**	**$0**
ESCALATED CONSTRUCTION COST				**$10,442,302**		**$8,083,125**	**$18,525,427**
CONTINGENCY/MISCELLANEOUS	**10.0%**	**of Est. Labor & Mat.**		**$1,044,000**		**$808,000**	**$1,852,000**
ESTIMATED PROJ COST				**$11,486,302**		**$8,891,125**	**$20,377,427**
STATE SALES TAX	**0.0%**	**of Materials**		**$0**			**$0**
TOPOGRAPHIC SURVEYING/SOIL EXPLORATION @ $25,000/mi							**$49,250**
ENGINEERING AND CONSTRUCTION SUPPORT							**$675,000**
CONSTRUCTION MANAGEMENT							**$450,000**
ESTIMATED TOTAL PROJ COST							**$21,551,677**
	UNDERGROUND PROJECT TOTAL					**(rounded)**	**$21,600,000**

SMECO
Southern Maryland 230kV Reliability Project, Patuxent River Crossing
River Crossing, Center Route
J. Bardwell 8/25/2008
146030.53.0000

#	ESTIMATE ASSUMPTIONS
1	The estimate does not include life-cycle costs (repair, losses).
2	The estimate is based on 2008 dollar values, and does not include escalation.
3	The estimate is based on a double circuit, 1 cable per phase 230 kV installation 10,402 feet
4	The estimate is based on installing one circuit, and duct bank for a future second circuit.
5	The estimate includes two termination poles for the installed circuit.
6	Cable Termination poles are estimated as self-supporting overhead dead-ends with cable termination support arms.
7	A state material sales tax was not included in the estimate.
8	The estimate includes a 10% contingency adder.
9	The estimate does not include costs for permitting.
10	The estimate does not include costs for ROW or Land Acquisition.
11	The estimate does not include any costs related to wildlife habitat remediation, protection or work restrictions. The estimate includes no tree clearing.
12	The estimated engineering cost is based on a 12 month long design duration.
13	The construction management is based on 3 CMs for 5 months each.
14	The estimate includes shoring for 100% of the open trenched duct bank route.
15	The estimate includes paving for the entire trenched duct bank.
16	The estimate is based on concrete encased ductbank 3.5' wide, 3.5' high.
17	The estimate assumes an average of 4.5' of cover over the ductbank, 8' bottom of trench.
18	The estimate assumes nine (9) 8" Sch. 40 PVC Conduits in the ductbank.
19	The estimate includes four (4) 24' long splice vaults for each circuit.
20	Splice quantity is based on a 1,800' typical duct length.
21	The estimate assumes two (2) separate HDD's will be required
22	The estimate does not include any Jack and Bore installations.
23	The estimate includes cable installation, splicing, and termination.
24	The estimate does not include traffic control.
25	The estimate does not include any allowances for rock excavation.
26	The estimate does not include any allowances for testing and disposal of contaminated soils and water.
27	The estimate does not include allowances for facility relocations.
28	The estimate includes four (4) 2" innerducts for each circuit for future communications.
29	The estimate includes two (2) 48 fiber, fiber-optic cables for communications.
30	The estimate does not include Distributed Temperature Monitoring equipment.

Owner	SMECO		Computed By	J. Bardwell
Project	Southern Maryland 230kV Reliability Project, Patuxent River Crossing		Date	25-Aug-08
B&V File No.	146026.53.0000		Checked By	
Title	River Crossing, Center Route, 2 Circuits		Date	
Estimate Overall Route Length	1.97 Miles		2 Circuits	
	10402 Feet	4 Splices per Circuit	1 Cables per Phase	

Item	Qty	Unit	Material Unit Cost	Total Mat'l Cost	Labor Unit Cost	Total Labor Cost	TOTAL COST
CABLE SYSTEM FURNISH AND INSTALL							
UG CABLE AND ACCESSORIES SUBTOTAL				**$13,515,040**		**$2,048,400**	**$15,563,440**
Cable cost per route foot (2 Circuit)	$1,260.00	(Does not include Accessories)					
COMMUNICATIONS							
CABLE SYSTEM COMMUNICATIONS (FO) SUBTOTAL				**$70,710**		**$91,005**	**$161,714**
DISTRIBUTED TEMPERATURE SENSING SYSTEM							
DTS SUBTOTAL				**$0**		**$0**	**$0**
CIVIL WORK							
GENERAL SUBTOTAL				**$0**		**$224,625**	**$224,625**
STRUCTURES SUBTOTAL				**$289,710**		**$351,828**	**$641,538**
SPLICING VAULT SUBTOTAL				**$248,000**		**$180,800**	**$428,800**
DUCTBANK INSTALLATION				**$1,833,017**		**$2,937,655**	**$4,770,672**
Ductbank cost per route foot (2 Circuits)	$808.37						
HDD INSTALLATION SUBTOTAL				**$1,350,000**		**$3,393,000**	**$4,743,000**
HDD Ductbank cost per route foot (2 Ckts)	$1,054.00						
JACK AND BORE SUBTOTAL				**$0**		**$0**	**$0**
ESTIMATED LABOR & MATERIAL COST				**$17,306,477**		**$9,227,313**	**$26,533,790**
ESCALATION (Not Included)	**0**	**Years @**	**10.00%**	**$0**		**$0**	**$0**
ESCALATED CONSTRUCTION COST				**$17,306,477**		**$9,227,313**	**$26,533,790**
CONTINGENCY/MISCELLANEOUS	**10.0%**	**of Est. Labor & Mat.**		**$1,731,000**		**$923,000**	**$2,654,000**
ESTIMATED PROJ COST				**$19,037,477**		**$10,150,313**	**$29,187,790**
STATE SALES TAX	**0.0%**	**of Materials**		**$0**			**$0**
TOPOGRAPHIC SURVEYING/SOIL EXPLORATION @ $25,000/mi							**$49,250**
ENGINEERING AND CONSTRUCTION SUPPORT							**$675,000**
CONSTRUCTION MANAGEMENT							**$450,000**
ESTIMATED TOTAL PROJ COST							**$30,362,040**
	UNDERGROUND PROJECT TOTAL					**(rounded)**	**$30,400,000**

SMECO
Southern Maryland 230kV Reliability Project, Patuxent River Crossing
River Crossing, Center Route, 2 Circuits
J. Bardwell 8/25/2008
146030.53.0000

#	ESTIMATE ASSUMPTIONS
1	The estimate does not include life-cycle costs (repair, losses).
2	The estimate is based on 2008 dollar values, and does not include escalation.
3	The estimate is based on a double circuit, 1 cable per phase 230 kV installation 10,402 feet
4	The estimate is based on installing both circuits.
5	The estimate includes two termination poles for the installed circuit.
6	Cable Termination poles are estimated as self-supporting overhead dead-ends with cable termination support arms.
7	A state material sales tax was not included in the estimate.
8	The estimate includes a 10% contingency adder.
9	The estimate does not include costs for permitting.
10	The estimate does not include costs for ROW or Land Acquisition.
11	The estimate does not include any costs related to wildlife habitat remediation, protection or work restrictions. The estimate includes no tree clearing.
12	The estimated engineering cost is based on a 12 month long design duration.
13	The construction management is based on 3 CMs for 5 months each.
14	The estimate includes shoring for 100% of the open trenched duct bank route.
15	The estimate includes paving for the entire trenched duct bank.
16	The estimate is based on concrete encased ductbank 3.5' wide, 3.5' high.
17	The estimate assumes an average of 4.5' of cover over the ductbank, 8' bottom of trench.
18	The estimate assumes nine (9) 8" Sch. 40 PVC Conduits in the ductbank.
19	The estimate includes four (4) 24' long splice vaults for each circuit.
20	Splice quantity is based on a 1,800' typical duct length.
21	The estimate assumes two (2) separate HDD's will be required
22	The estimate does not include any Jack and Bore installations.
23	The estimate includes cable installation, splicing, and termination.
24	The estimate does not include traffic control.
25	The estimate does not include any allowances for rock excavation.
26	The estimate does not include any allowances for testing and disposal of contaminated soils and water.
27	The estimate does not include allowances for facility relocations.
28	The estimate includes four (4) 2" innerducts for each circuit for future communications.
29	The estimate includes two (2) 48 fiber, fiber-optic cables for communications.
30	The estimate does not include Distributed Temperature Monitoring equipment.

Owner **SMECO**
Project Southern Maryland 230kV Reliability Project, Patuxent River Crossing
B&V File No. 146026.53.0000
Title River Crossing, South Route, UG Construction Estimate
Estimate Overall Route Length 1.87 Miles
9874 Feet

Computed By J. Bardwell
Date 25-Aug-08
Checked By
Date

3 Splices per Circuit
1 Circuits (+1 Future)
3 Cables per Phase

Item	Qty	Unit	Material Unit Cost	Total Mat'l Cost	Labor Unit Cost	Total Labor Cost	TOTAL COST
CABLE SYSTEM FURNISH AND INSTALL							
UG CABLE AND ACCESSORIES SUBTOTAL				**$18,570,176**		**$2,765,760**	**$21,335,936**
Cable cost per route foot (1 Circuit)	$2,025.00	(Does not include Accessories)					
COMMUNICATIONS							
CABLE SYSTEM COMMUNICATIONS (FO) SUBTOTAL				**$66,792**		**$85,171**	**$151,963**
DISTRIBUTED TEMPERATURE SENSING SYSTEM							
DTS SUBTOTAL				**$0**		**$0**	**$0**
CIVIL WORK							
GENERAL SUBTOTAL				**$0**		**$223,375**	**$223,375**
STRUCTURES SUBTOTAL				**$434,566**		**$527,742**	**$962,308**
SPLICING VAULT SUBTOTAL				**$372,000**		**$271,200**	**$643,200**
DUCTBANK INSTALLATION				**$3,307,809**		**$3,848,685**	**$7,156,494**
Ductbank cost per route foot (2 Circuits)	$1,674.58						
HDD INSTALLATION SUBTOTAL				**$4,368,000**		**$12,499,200**	**$16,867,200**
HDD Ductbank cost per route foot (2 Ckts)	$3,012.00						
JACK AND BORE SUBTOTAL				**$0**		**$0**	**$0**
ESTIMATED LABOR & MATERIAL COST				**$27,119,342**		**$20,221,133**	**$47,340,476**
ESCALATION (Not Included)	**0**	**Years @**	**10.00%**	**$0**		**$0**	**$0**
ESCALATED CONSTRUCTION COST				**$27,119,342**		**$20,221,133**	**$47,340,476**
CONTINGENCY/MISCELLANEOUS	**10.0%**	**of Est. Labor & Mat.**		**$2,712,000**		**$2,022,000**	**$4,734,000**
ESTIMATED PROJ COST				**$29,831,342**		**$22,243,133**	**$52,074,476**
STATE SALES TAX	**0.0%**	**of Materials**		**$0**			**$0**
TOPOGRAPHIC SURVEYING/SOIL EXPLORATION @ $25,000/mi							**$46,750**
ENGINEERING AND CONSTRUCTION SUPPORT							**$750,000**
CONSTRUCTION MANAGEMENT							**$450,000**
ESTIMATED TOTAL PROJ COST							**$53,321,226**
	UNDERGROUND PROJECT TOTAL					**(rounded)**	**$53,300,000**

SMECO
Southern Maryland 230kV Reliability Project, Patuxent River Crossing
River Crossing, South Route, UG Construction Estimate
J. Bardwell 8/25/2008
146030.53.0000

#	ESTIMATE ASSUMPTIONS
1	The estimate does not include life-cycle costs (repair, losses).
2	The estimate is based on 2008 dollar values, and does not include escalation.
3	The estimate is based on a double circuit, 3 cable per phase 230 kV installation 9874 feet lo
4	The estimate is based on installing one circuit, and duct bank for a future second circuit.
5	The estimate includes six termination poles for the installed circuit.
6	Cable Termination poles are estimated as self-supporting overhead dead-ends with cable termination support arms.
7	A state material sales tax was not included in the estimate.
8	The estimate includes a 10% contingency adder.
9	The estimate does not include costs for permitting.
10	The estimate does not include costs for ROW or Land Acquisition.
11	The estimate does not include any costs related to wildlife habitat remediation, protection or work restrictions.
12	The estimated engineering cost is based on a 15 month long design duration.
13	The construction management is based on 3 CMs for 5 months each.
14	The estimate includes shoring for 100% of the trenched duct bank route.
15	The estimate includes paving for the entire trenched duct bank.
16	The estimate is based on concrete encased ductbank 7.5' wide, 4.5' high.
17	The estimate assumes an average of 4.5' of cover over the ductbank, 9' bottom of trench.
18	The estimate assumes twenty-eight (28) 8" Sch. 40 PVC Conduits in the ductbank.
19	The estimate includes six (6) 24' long splice vaults for each circuit.
20	Splice quantity is based on a 1,800' typical duct length.
21	The estimate assumes six (6) seperate HDD's will be required
22	The estimate does not include any Jack and Bore installations.
23	The estimate includes cable installation, splicing, and termination.
24	The estimate does not include traffic control.
25	The estimate does not include any allowances for rock excavation.
26	The estimate does not include any allowances for testing and disposal of contaminated soils and water.
27	The estimate does not include allowances for facility relocations.
28	The estimate includes four (4) 2" innerducts for each circuit for future communications.
29	The estimate includes two (2) 48 fiber, fiber-optic cables for communications.
30	The estimate does not include Distributed Temperature Monitoring equipment.

Appendix G
Naval Recreation Center Report

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SMECO
Southern Maryland Electric Cooperative

SOUTHERN MARYLAND RELIABILITY PROJECT
HUGHESVILLE, MD

CONSTRUCTION ACTIVITIES AND ROUTE COMPARISON FOR UNDERGROUND TRANSMISSION LINES ON THE NAVY RECREATION CENTER

BLACK & VEATCH CORPORATION

B&V Project 146030
B&V File 53.0000

September 23, 2008

BLACK & VEATCH
Building a world of difference.

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SOUTHERN MARYLAND ELECTRIC COOPERATIVE
NAVY PROPERTY
CONSTRUCTION ACTIVITIES

1.0 INTRODUCTION

The Southern Maryland Electric Cooperative, Inc. (SMECO) of Hughesville, Maryland is proposing to construct and operate a new multiple circuit transmission line from the existing Holland Cliff Substation to the existing Hewitt Road Switching Station. SMECO intends to route the majority of the new transmission line along the same corridor as the existing 69kV transmission lines.

The project will require crossing the Patuxent River north of the Thomas Johnson Memorial Bridge, carrying Maryland Route 4. The crossing is planned to be completed by horizontal directional drilling (HDD) a duct bank for underground transmission cables below the river bed, and open trenching a duct bank from the HDD endpoint to the overhead riser pole. HDD is a trenchless installation method described further in Section 3.0.

One end of the proposed HDD will be on the property of the Navy Recreation Center (NRC) on the north side of the Patuxent River. SMECO has reviewed aerial photography of the Navy Recreation Center (NRC) and has identified two potential routes for the duct bank on the Navy property and the river crossing. This report discusses the differences between the two potential routes and the related construction activities on the Navy property.

1.1 SUMMARY

The route map in Appendix A shows the routes proposed by SMECO. The route with the shorter HDD is referred to as the Preferred Route through the rest of this report. The route with the longer HDD is referred to as the Alternate Route. Even though the route with the short HDD has more trenched duct bank, and is longer overall, it is preferred due to the HDD installation being approximately 1,000' shorter.

The longer HDD presents greater engineering and construction challenges because it requires the use of an armored, reinforced cable in order to be pulled the extra 1,000'. The use of armor on the cable will reduce the individual cable ampacity, or carrying capacity, requiring more cables to be used for each circuit. In addition the armored cable is significantly heavier and bulkier than typical underground cable. Armored cable is similar in size and appearance to submarine cable. The armored cable would be significantly more difficult to handle and transport.

The additional cables required for the longer HDD would require additional conduits installed in separate HDD's. The Preferred Route would require ten conduits installed in two HDD bores. The Alternate Route would require thirty conduits installed in six HDD bores. Each HDD bore needs to be separated from the other bores by approximately 30'. Landing six HDD's on the Navy property would require almost a 200' wide right of way compared to 75' for the Preferred Route.

The additional conduits would also increase the number of crews and the length of time required to construct the duct bank and install the HDDs, increasing the impacts to the Navy facilities. There is no clear lay down area near the longer Alternate Route HDD to assemble the pipe. It would be necessary to clear trees on both sides of Avenue A and block the Avenue A gate during pipe assembly.

For these reasons the Preferred Route requires less engineering, has a shorter construction schedule, reduces the impacts to the Navy Recreation Center, and greatly reduces the installed cost.

2.0 ROUTE BREAKDOWN

2.1 PREFERRED ROUTE

Underground transmission lines are often placed under the pavement or in the shoulder of roads to minimize the right-of-way required and impact to the public. The Preferred Route begins in the overhead line corridor approximately 750’ north of the intersection of A Avenue and Patuxent Beach Road (MD-4). The new cable circuits will be installed by open trenching until they reach the HDD end point. The duct bank route will follow the existing overhead corridor for 750 feet to A Avenue. The route will turn onto A Avenue, and travel down A Avenue for approximately 2,200 feet to 3rd Street. The route continues down 3rd Street to B Avenue. The route continues down B Avenue to Point Patience Drive. The route follows Point Patience Drive to the HDD end point. The overall trenched duct bank will be approximately 5,300 feet in length.

The Preferred Route HDD from Point Patience is a straight line across the Patuxent River, with an overall length of approximately 4,500 feet.

2.2 ALTERNATE ROUTE

The Alternate Route begins at the same point as the Preferred Route but takes Ramp Road from A Avenue to the HDD end point east of the second cove, east of Point Patience. The overall trenched duct bank for the Alternate Route would be approximately 2,800 feet.

The Alternate Route HDD from the second cove would include a slight horizontal bend and have an approximate length of 5,600 feet.

2.3 DESIGN CONSIDERATIONS

The difference in HDD length between the preferred and Alternate Routes is critical. The cable is installed into the duct bank by pulling from one end. The cables are limited in the amount of force that can be applied without damaging the cable. The Preferred Route with a HDD length of 4,500 feet is near the realistic maximum length of duct bank for a conventional cable design. A conventional cable design with a 3500 kcmil can be pulled a maximum of approximately 4,600 feet with the elevation change required to cross the river. The Alternate Route, with a HDD length of 5,600 feet will require an armored, reinforced cable design. Preliminary cable pulling calculations are shown in Appendix B.

Armored cables resemble submarine cables, in that a conventional cable is surrounded by layers of stainless steel or copper wires, without the extra water barriers of a submarine cable. Armored cables are installed by pulling on the outer armor layers, as opposed to the cable conductor. Using armored cables greatly adds to the cost and complexity of the cable system design and installation. A cross-section of a typical high voltage underground cable and a high voltage armored cable can be found in Appendix C.

For the Preferred Route, preliminary calculations to determine the size of the cable conductor indicate that a single cable per phase, for a total of three cables per circuit, will be sufficient to carry the load for each circuit. The armored cable required for the longer Alternate Route HDD will de-rate, or reduce the capacity of each individual cable. This means the Alternate Route will require three cables per phase, or nine cables per circuit, to carry the same load.

The additional cables will require additional conduits. Each set of three cables requires a bundle of five conduits to be installed into a separate HDD bore hole. The Preferred Route requires two sets of conduits for a total of 10 conduits; the Alternate Route requires six sets of conduits for a total of 30 conduits. Each HDD bore needs to be spaced approximately 30’ apart to prevent interference issues during drilling and minimize mutual heating issues during operation of the cable. Due to this spacing the Alternate Route will require a right of way approximately 200’ wide where the drill comes on shore, compared to 75’ for the Preferred Route.

3.0 CONSTRUCTION ACTIVITIES

3.1 GENERAL DESCRIPTION OF CONSTRUCTION ACTIVITIES

The work on the Navy property falls into four parts; preconstruction activities, installation of the duct bank under the Patuxent River by HDD, installation of the duct bank across the Navy recreation center by open trenching, and the installation of high voltage cables in duct bank.

The following is a list of the major activities that are required to complete the installation of the overhead, underground and river crossing portions of the transmission lines.

- Preconstruction Activities
  - Ground Survey
  - Soil Borings
  - Bathymetric/Marine Surveying
  - Engineering Investigations
  - Pre-Bid and Pre-Construction Right-of-Way (ROW) Visits
- HDD Duct Bank Installation
  - Construction Staking
  - Horizontal Directional Drill
  - Right of Way Restoration
- Open Trenched Duct Bank Installation
  - Construction Staking
  - Splicing Vault Installation
  - Duct Bank Installation
  - Right of Way Restoration
- Underground Cable Installation Activities
  - Cable Pulling
  - Cable Splicing
  - Cable Terminating
  - Cable Testing

The following descriptions are based on the Preferred Route. The activities required for the Alternate Route would be similar; however the Alternative Route option would result in a longer construction schedule with more impact to the facility due to more crews and more work being carried out simultaneously.

3.2 PRECONSTRUCTION ACTIVITIES

3.2.1 Ground Survey

The survey will be performed to identify and document the existing features of the proposed ROW. These features include existing utilities, drains, property lines, adjacent property ownership, and topographic contours. The surveyor will utilize GPS surveying equipment to gather the data. The surveying data is then used to prepare the planimetric drawings of the route.

3.2.2 Soil Borings

Soil borings along the proposed ROW will be performed to gather soil samples for testing to determine the thermal properties and geotechnical properties of the soil to be disturbed. It is expected that four soil samples will be taken at the NRC, one at the HDD endpoint, two located along the centerline of the underground duct bank, and one for the proposed structure location. The samples will be taken either in the roadway itself or on the shoulder. Any damage to the asphalt will be cold patched as it anticipated that repaving of disturbed roadways will occur after the duct bank is constructed. The soil properties will be used to design the structure foundations, the HDD methods, and verify the soil thermal properties for the cable installation. A tire mounted drill rig will be used to collect the samples for testing.

3.2.3 Bathymetric/Marine Surveying

Baythmetric surveying will be required to identify the elevations and contours of the river bottom. The surveying will be performed from a boat or barge and will require multiple lanes to be run back and forth across the river between the HDD entry and exit points.

In addition to the bathymetric surveying, soil borings or corings will need to be taken of the soils beneath the river bottom. These soil samples will be taken using a vibratory corer from a barge on the river.

3.2.4 Engineering Investigations

An engineering team will need access to the ROW to gather data for preparation of the construction documents. Data will include confirmation of designs, identification of possible obstructions, and verification of existing features.

3.2.5 Pre-Bid and Pre-Construction Meetings

SMECO will hold prebid meetings for the prospective construction bidders for this project. Multiple meetings will likely be required for the different portions of the work. During these meetings, the bidders will be taken along the route of the project to allow them the opportunity to see the different parts of the route and assess the degree of difficulty of each section of the Project. Representatives of SMECO will contact the Navy in advance of these meetings to coordinate access requirements on Navy property and schedule the visits. The purpose of viewing the property is to give the construction bidders the opportunity to become familiar with the work, and the specific access requirements to enter the site.

SMECO will conduct a pre-construction meeting with the successful bidders prior to the start of construction activities, to discuss specific details of the construction. These details include but are not limited to site access, work hours and revisions since the bid was completed. Multiple meetings may be required for different portions of the work.

3.3 HDD DUCT BANK INSTALLATION

Horizontal Directional Drilling (HDD) is a pipeline and conduit installation method that bores a path under the ground without disturbing the surface. HDD's are accomplished by drilling a pilot hole using a guided drill string. The pilot hole is then enlarged by reaming or compacting to a suitable diameter to install the conduit or pipe. The conduit bundle is then pulled into the bore hole.

Each set of three cables will require a duct bank made up of five (5) 8" conduits; three conduits for the cables, one spare conduit, and one conduit for communications. To get the needed capacity out of both circuits in the HDD, the duct banks for each set of three cables will need to be separated under the river. To achieve the separation, each duct bank will be installed in a separate bore. Two bores will be required for the Preferred Route, one for the proposed circuit, and one for the future circuit. The Alternate Route will require six separate bores, three for the proposed circuit and three for the a future circuit. See Appendix D for conceptual drill cross sections and work areas.

3.3.1 Construction Staking

A survey crew will place construction stakes to identify the designed bore pit locations and drill alignment prior to the construction contractor mobilizing to the project site.

3.3.2 Conduit Assembly

The conduit used for underground transmission lines needs to be a non-metallic material capable of being pulled the length of the drill, and withstanding the crush pressures due to depth. For both drills the only material that meets these requirements is polyvinyl chloride (PVC) pipe. In order to be pulled as a single long string the PVC pipe must be thermally fused to create a single long pipe. The assembled pipe will need to be assembled and laid out as complete string prior to the start of drilling operations.

For the Preferred Route the pipe could be floated out onto the river during assembly along side the Navy property in order to minimize impacts to the NRC. Laying out the pipe for the Alternate Route would require assembling pipe in the area east of Ramp Road near the boat wash and storage facility. Tree clearing would be necessary for the pipe to be pulled from this location into the bore. Additional tree clearing may be required in order for the pipe to extend the necessary 5,600' along MD-4 and towards the main gate. It will also be necessary to suspend the pipe across A Avenue and Overflow Road if it is determined that these roads must maintain a constant thoroughfare.

A third option would be to assemble the PVC pipe on the Town Creek side of the river. This is by far the most difficult and expensive option. As the pipe is assembled, it will have to be elevated over several roadways along North Patuxent Beach Rd. Additional pipe suspension would be required over the waterway that runs under MD-4 (west of North Patuxent Beach Rd.) The suspension method would likely incorporate the use of large cranes and a significant amount of tree clearing along MD-4 would be necessary for both the pipe and the cranes.

3.3.3 Horizontal Directional Drilling and Conduit Installation

The first stage of the HDD operation consists of directionally drilling a small diameter pilot hole along a predetermined path to the exit point. This process uses environmentally safe bentonite as a drilling fluid and lubricant. The second stage involves enlarging this pilot hole to a diameter which will accommodate the PVC pipes, approximately 30" in diameter. Then the pipes are pulled into the enlarged hole. A drill string will remain in the hole at all times until the PVC pipes are in place.

SMECO's plan is to complete the HDD installation between November 2013 and March 2014. SMECO anticipates that the Preferred Route will take approximately ten (10) weeks to assemble the pipe, and six to seven (6-7) weeks to drill the pilot holes and install the pipes in the pilot holes for two bores. For the Alternate Route, pipe assembly will require 18 weeks with an additional 18 weeks for the drilling the pilot holes and pipe installation. This would result in the HDD installation for the Alternative Route extending from October 2013 thru April 2014.

3.3.4 Restoration

After the HDD operation has been completed, all areas disturbed during construction will be graded and restored by seeding or paving to its condition prior to start of construction.

3.4 OPEN TRENCHED DUCT BANK INSTALLATION

Between the overhead line corridor and the HDD end points the cable will be installed in concrete encased duct bank. The number of cables required across the river will need to be continued all the way to the overhead corridor as multiple cables can not be spliced together at these voltages. See Appendix E for typical duct bank cross sections.

3.4.1 Construction Staking

A survey crew will place construction stakes on the designed trench centerline and splicing vault locations prior to the construction contractor mobilizing to the project site. Offset construction stakes will also be placed approximately 20 feet off the trench centerline. These stakes will be used to restore the construction stakes disturbed during construction.

3.4.2 Splicing Vaults

Splicing vaults are required every 1600’ to 1800’ due to limits on the typical amount of cable that can be shipped and installed as one continuous piece. A pre-cast concrete splicing vault will be installed to provide a clean, dry area for splicing the cable. The splicing vaults will have internal dimensions of approximately 8 feet wide, 24 feet long, and 8 feet deep, and will be provided in two or three pieces. Six splicing vaults will be installed on Navy property, in three sets of two for the Preferred Route. The Alternate Route will require two sets of four vaults, for a total of eight vaults. See Appendix E for typical splicing vault drawings.

An excavator, e.g., track hoe, will remove the soil required to place the splicing vault. All spoils will be removed from the work site for proper disposal. The splicing vaults will be delivered to the excavation on flat bed trucks and will be lowered into the excavation using a large crane. The splicing vaults will be backfilled with a minimum 1’-6” of native soil cover over the top of the splicing vault.

Each splicing vault will have two 30” manhole lids for access. Six (6) foot square concrete pads will be poured around each manhole cover to provide an even and clean working area. The manhole cover and pad will be the only visible portion of the installation after completion. When complete, the manhole covers will be level with the grade, such that they will pose no obstruction. SMECO’s present schedule targets the splicing vault installation yo be completed in November and December of 2013 and will take approximately eight (8) weeks.

3.4.3 Open Trenched Duct Bank Installation

The duct bank for the Preferred Route will require nine (9) 8” and two (2) 2” schedule 40 polyvinyl chloride (PVC) conduits. The conduit will be encased in 3000 psi thermal concrete for protection. The trench will be backfilled with native soils and the surface restored to match the existing conditions. The duct bank for the Preferred Route will be approximately 3'-6" wide by 3'-6" high, with a minimum of 36" of cover over the duct bank.

The duct bank for the Alternate Route will be built in the same manner as the Preferred Route but will require a total of twenty-eight (28) 8" and six (6) 2" schedule 40 PVC conduits due to requiring three times as many cables. The duct bank for the Alternate Route would be approximately 7'-6" wide by 4'-6" high, with a minimum of 36" of cover over the duct bank.

This duct bank installation will take up half a roadway. For the Preferred Route traffic can be maintained by keeping a single lane open at a time. In the case of the Alternate Route, traffic on Ramp Road will be significantly impacted, and the road will need to be closed for a minimum of one week to get past the building south of A Avenue.

The duct bank for the Alternate Route will require trenching through and near an area that recently underwent a munitions clean-up operation. Special care will need to be taken in this area, in case ordnance remains.

The concrete encased duct bank will be constructed in stages where one stage works out ahead of the next stage. The staging of the construction is intended to keep the amount of open trench at any given time to a minimum and to maximize efficiencies.

The first step will be removal of the soil for the trench by an excavator. The removal of spoils to an offsite disposal area will require a continuous procession of trucks into and out of the property during this activity.

Following the excavation, the conduit and reinforcement will be placed in the bottom of the trench. At the end of each day the installed conduit will be encased in thermal concrete. This will require several concrete trucks to enter and exit the property during each pour.

After the concrete has been allowed to set up, 12 to 24 hours, the trench will be backfilled and compacted in 6"-12" lifts. In order to increase productivity a backfill material called fluidized thermal backfill (FTB) may be used. FTB is a low strength "diggable" concrete mixture that is designed to set up quickly, provide the required thermal characteristics, and to be removable using hand tools in case of future construction in the area.

The top 12"–18" of the trench will be restored to match the existing surface. This includes pavement and roadbed in roadways and sidewalks or topsoil outside of pavement.

The duct bank installation for the Preferred Route is expected to be approximately 5300 feet in length and require approximately eleven (11) weeks to complete. The duct bank work is expected to be completed between December 2013 and March 2014.

3.4.4 Restoration

After the duct bank construction has been completed, all areas disturbed during construction will be graded and restored by seeding or paving to its condition prior to start of construction.

3.5 OVERHEAD TO UNDERGROUND TRANSITION

The transition from the overhead transmission line to underground transmission line will require a transition station located in the existing transmission line right of way. The transition station would consist of an “H-frame” structure to dead-end the overhead line, several substation type structures to terminate the cable, and a small control enclosure. The transition station would be constructed like a small substation and be enclosed with a chain link fence. The transition station would be approximately 100 feet wide and 180 feet long.

SMECO would require periodic access to the transition station for maintenance and monitoring activities.

3.6 UNDERGROUND CABLE INSTALLATION ACTIVITIES

3.6.1 CABLE TRANSPORTATION

Cable is transported on large reels. Typical reel sizes are approximately 13’ in outside diameter, 8’ in width, and weigh up to 60,000 lbs. Both of the routes proposed will require larger reels. The reel diameters and widths will change depending on the cable manufacturers handling equipment and preferences.

For the shorter, preferred HDD, using conventional underground cable construction, the reels will be approximately 13’ in diameter, 12’-14’ feet in width, and weigh 145,000 lbs loaded. These reels would likely require barges to transport them on the river, and a large crane to move them to shore, near the drill end point. Cable handling equipment has been developed to handle reels this size.

For the longer drill, using armored cable, the reels will need to be approximately 50% larger, and weigh approximately 260,000 lbs loaded. These cables will require barges to transport them on the river, and a very large crane to move them to shore, near the drill end point. The cable reels and handling equipment will also need to be specially built to handle the reels and cable weight.

The open-trenched duct bank sections will require reels slightly smaller than the typical reel. These reels can be transported over the roadways or by barge with the reels for the HDD installations.

3.6.2 Cable Pulling

The cable pulling will take place after the entire duct bank system connecting the overhead lines on both sides of the river is completed. The cable pulling activities will require the cable contractor to place trucks and pulling rigs or cable reel trailers at each splicing vault.

The cable pulling activity is planned to be completed in November and December of 2014 and will require approximately eight (8) weeks on site.

3.6.3 Cable Splicing
After the cables are installed in the duct bank system, they need to be spliced together in the splicing vaults. This splicing activity requires a splicing van to be parked directly over the splicing vaults and a few accessory vehicles parked near the splicing operations. Splicing operations will require three to five personnel for approximately 12 to 14 hours per day, for a period of two to three (2 to 3) weeks for each splicing vault.

The total cable splicing operations on the Navy property will require six (6) weeks and is expected to be completed in January and February 2015.

3.6.4 Cable Terminating
Where the underground transmission line meets the overhead transmission line, the cables will be routed up the cable riser structures within the transition station discussed in section 3.5. Underground cable terminations will be connected to overhead transmission line conductors via conductor jumpers. Termination operations will require approximately four (4) weeks for each circuit.

The total cable terminating operations on the Navy property will require four (4) weeks and is expected to be completed in January and February 2015.

3.6.5 Cable Testing
Cable testing will be performed in two phases. Immediately after splicing and terminating the cables system, the cable installer will verify the cable bonding and grounding system integrity. After the entire circuit is completed, including the overhead sections not on the Navy property, the cable system will be tested again using the expected system voltage. For both sets of tests, access to the splicing vaults will be required, but no significant disruption will occur.

3.7 AFTER INSTALLATION ACCESS

3.7.1 Maintenance
SMECO will require occasional access to the splicing vaults for maintenance and inspection activities after the cable system has been energized. Normal maintenance inspections require two to four people for one to two hours at each splicing vault every 12 to 24 months. Additional inspections may be performed during the first year of operation or after an overload event on the circuit.

3.7.2 Repair
In the unexpected and unlikely event of the failure of the cable system, it will be necessary for SMECO to have immediate access to the splicing vaults to initiate repair procedures. Cable system repairs, although not common, will typically require four to eight weeks, depending on the specifics of the failure and the availability of materials and repair technicians.

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4.0 SCHEDULING

4.1 SCHEDULE ASSUMPTIONS AND WORK RESTRICTIONS

In order to minimize impacts to the operation of the Navy Recreation Center facilities, SMECO will attempt to schedule the work in the off-season, from the first of November to the end of March. SMECO will coordinate work on the St. Mary's side of the river to support construction activities on Navy property. The following timelines represent the latest dates the work can be started. See Appendix F for detailed schedules.

4.2 PREFERRED ROUTE

The Preferred Route will require construction activities to begin in November 2013 to complete work on the Navy property by March 2015. Detailed design, contracting and procurement activities will need to begin in late 2012 at the latest, approximately 12 months in advance of construction.

In order to meet the work period restrictions, the project will be broken into three phases, an HDD installation phase, an open-trenched duct bank phase, and a cable installation phase. The following provides the planned construction periods for the three planned construction phases:

- HDD installation phase: November 2013 to March 2014
- Open trenched duct bank phase: November 2013 to March 2014
- Cable installation phase: November 2014 to March 2015

4.3 ALTERNATE ROUTE

The Alternate Route will require a longer construction schedule than the Preferred Route, and will require more work crews and several tasks to be performed simultaneously, causing significantly more widespread disruption on the NRC for a longer period of time.

The Alternate Route will require construction activities to begin in October 2013 to complete work on the Navy property by April 2015. Detailed design, contracting and procurement activities will need to begin in mid 2012 at the latest, approximately 14 months in advance of construction.

In order to minimize the impacts to the NRC, the project will be broken into three phases similar to the Preferred Route, an HDD installation phase, an open-trenched duct bank phase, and a cable installation phase. The following provides the planned construction periods for the three planned construction phases:

- HDD installation phase: October 2013 to April 2014
- Open trenched duct bank phase: November 2013 to March 2014
- Cable installation phase: October 2014 to April 2015

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5.0 ESTIMATED COSTS

5.1 SUMMARY OF ESTIMATES

To install the circuit using the Preferred Route would cost approximately $21.6 million. To install the circuit using the Alternate Route would cost approximately $53.3 million. Even though the Alternate Route is shorter overall, it requires three times as many cables, and duct bank, to carry the same load. In addition the armored cables required for the long HDD cost approximately 30% more than conventional high voltage cables.

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APPENDIX A

Proposed Route Map

LEGEND:

- PREFERRED ROUTE
- ALTERNATE ROUTE
- SHORT HDD (4500' APPROX.)
- LONG HDD (5600' APPROX.)
- OVERHEAD LINE
- SHORT HDD SURVEY BOUNDARY
- LONG HDD SURVEY BOUNDARY
- B-0 SOIL BORING LOCATION (WATER)

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

PROPOSED HDD OPTIONS PLAN

DRAWN	EGS	DATE	06/19/08
CHECKED		D NO.	DS-001
APPROVED		SUB. NO.	
SCALE	1"=1000'	DWG. NO.	

APPENDIX B

CABLE PULLING TENSIONS

PULL-PLANNER™ 2000

PULL I.D.: SMECO 4500 Feet

CONDUIT INNER DIAMETER: 7.9 INCHES   CONDUIT FILL: 48 %

TOTAL OF 1 CABLES OF 1 DIFFERENT TYPES BEING PULLED.

CABLE # 1   1 CABLES   O.D. OF 5.5 INCHES   WEIGHT OF 32.2 LBS/FT

TOTAL CABLE WEIGHT: 32.2 LBS/FT

CALCULATED WEIGHT CORRECTION FACTOR: 1

CONFIGURATION: SINGLE CABLE

JAM/CLEARANCE ANALYSIS: JAMMING NOT POSSIBLE

COF= 0.2   INCOMING TENSION= 500 LBS

	STRA SECT ANGL	Up OR Down	STRA SECT LEN(ft)	BEND TYPE	Up OR Down	BEND RAD(ft)	BEND ANGLE	TENSION(lbs)	SW PRES (lbs/ft)
SEG 1	12	Down	560	NONE	NA	0	0	279	0
SEG 2	12	Down	0	VCUP	Down	2000	12	1599	1
SEG 3	0	NA	2574	NONE	NA	0	0	18176	1
SEG 4	0	NA	0	VCUP	Up	2000	12	17646	9
SEG 5	12	Up	560	NONE	NA	0	0	24923	9

Allowable Pulling Tension: 28,000 lbs.

Estimated Max. Tension: 24,923 lbs.

Estimate<Allowable: Pull OK

PULL-PLANNER™ 2000

PULL I.D.: SMECO 5600 Feet

CONDUIT INNER DIAMETER: 7.9 INCHES   CONDUIT FILL: 48 %

TOTAL OF 1 CABLES OF 1 DIFFERENT TYPES BEING PULLED.

CABLE # 1   1 CABLES   O.D. OF 5.5 INCHES   WEIGHT OF 32.2 LBS/FT

TOTAL CABLE WEIGHT: 32.2 LBS/FT

CALCULATED WEIGHT CORRECTION FACTOR: 1

CONFIGURATION: SINGLE CABLE

JAM/CLEARANCE ANALYSIS: JAMMING NOT POSSIBLE

COF= 0.2   INCOMING TENSION= 500 LBS

	STRA SECT ANGL	Up OR Down	STRA SECT LEN(ft)	BEND TYPE	Up OR Down	BEND RAD(ft)	BEND ANGLE	TENSION(lbs)	SW PRES (lbs/ft)
SEG 1	12	Down	560	NONE	NA	0	0	279	0
SEG 2	12	Down	0	VCUP	Down	2000	12	1599	1
SEG 3	0	NA	3674	NONE	NA	0	0	25260	1
SEG 4	0	NA	0	VCUP	Up	2000	12	25033	13
SEG 5	12	Up	560	NONE	NA	0	0	32310	13

Allowable Pulling Tension: 28,000 lbs.

Estimated Max. Tension: 32,310 lbs.

Estimate > Allowable: Pull Exceeds Limits

PULL-PLANNER™ 2000

PULL I.D.: SMECO 5600 Feet_Armored

CONDUIT INNER DIAMETER: 7.9 INCHES CONDUIT FILL: 67 %

TOTAL OF 1 CABLES OF 1 DIFFERENT TYPES BEING PULLED.

CABLE # 1 1 CABLES O.D. OF 6.5 INCHES WEIGHT OF 50 LBS/FT

TOTAL CABLE WEIGHT: 50 LBS/FT

CALCULATED WEIGHT CORRECTION FACTOR: 1

CONFIGURATION: SINGLE CABLE

JAM/CLEARANCE ANALYSIS: JAMMING NOT POSSIBLE

COF= 0.2 INCOMING TENSION= 750 LBS

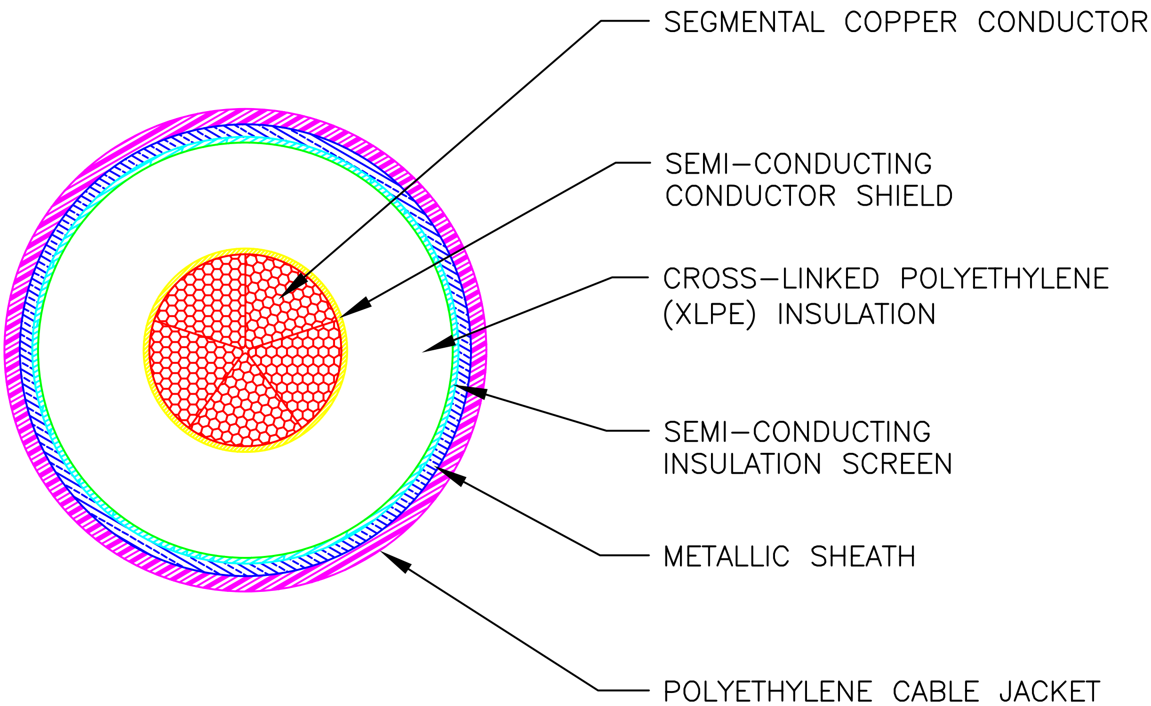
	STRA SECT ANGL	Up OR Down	STRA SECT LEN(ft)	BEND TYPE	Up OR Down	BEND RAD(ft)	BEND ANGLE	TENSION(lbs)	SW PRES (lbs/ft)
SEG 1	12	Down	560	NONE	NA	0	0	406	0
SEG 2	12	Down	0	VCUP	Down	2000	12	2454	1
SEG 3	0	NA	3674	NONE	NA	0	0	39194	1
SEG 4	0	NA	0	VCUP	Up	2000	12	38840	19
SEG 5	12	Up	560	NONE	NA	0	0	50139	19

Armored Cable will be designed for the allowable pulling tension to exceed the estimate pulling tension.

Calculation for reference only.

APPENDIX C

High Voltage Cable Cross-Section



NOTES:
CABLE DIAMETER IS APPROXIMATELY 5.25 INCHES
CABLE WEIGHT IS APPROXIMATELY 32 LBS PER LINEAR FOOT

BLACK & VEATCH

ENGINEER	JRB	DRAWN	TKH
CHECKED	JRB	DATE	06/02/2008

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

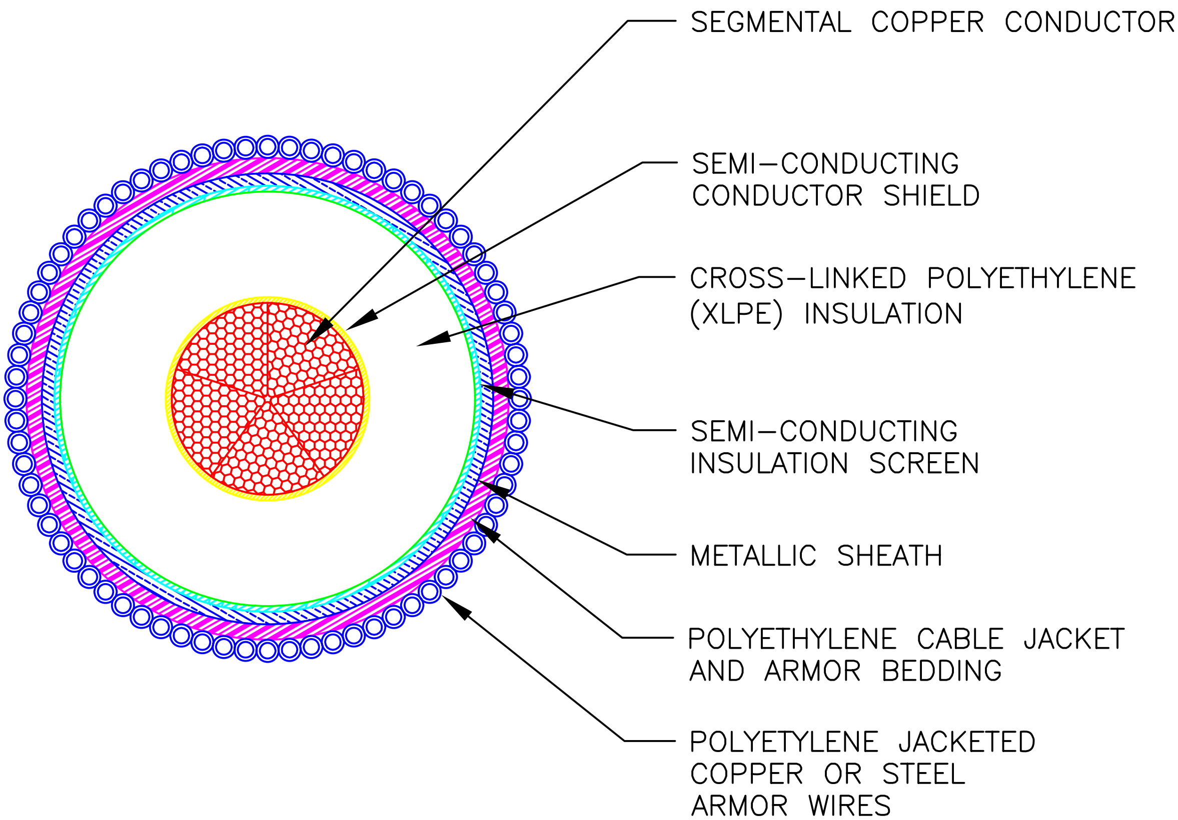
SMECO, SOUTHERN MARYLAND
230kV RELIABILITY PROJECT

PROJECT 146026
DRAWING NUMBER
REV A

TYPICAL CABLE CROSS-SECTION
230kV, 3500 KCMIL, SEGMENTAL COPPER XLPE

CODE
AREA

SK-CBL-060608



NOTES:

CABLE DIAMETER IS APPROXIMATELY 5.75 INCHES
CABLE WEIGHT IS APPROXIMATELY 45 LBS PER LINEAR FOOT

BLACK & VEATCH

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

ENGINEER JRB	DRAWN TKH
CHECKED JRB	DATE 09/17/2008

SMECO, SOUTHERN MARYLAND
230kV RELIABILITY PROJECT

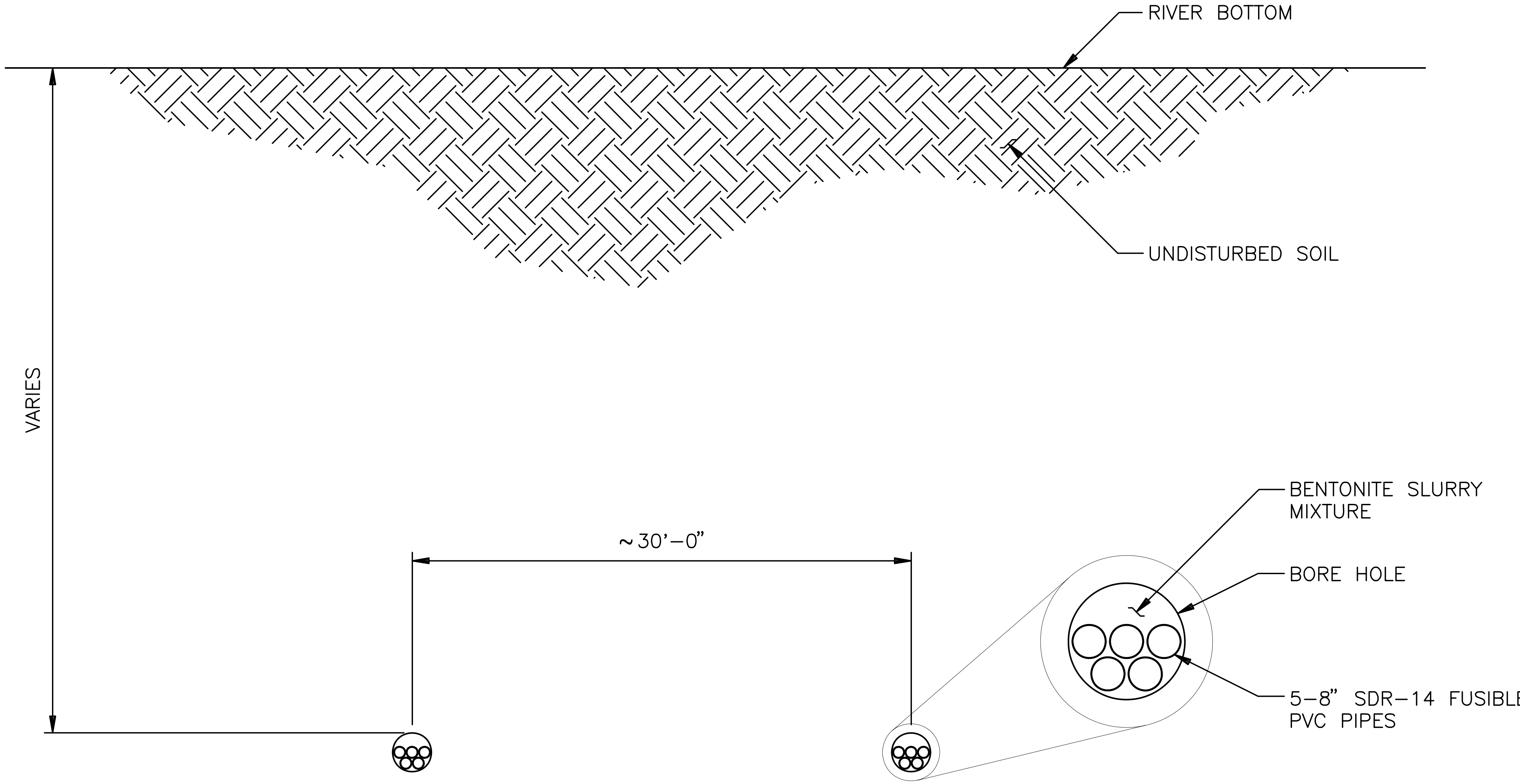
PROJECT	DRAWING NUMBER	REV
146026		A

ARMORED CABLE CROSS-SECTION
230kV, 3500 KCMIL, SEGMENTAL COPPER XLPE

CODE	SK-CBL-091708
AREA	

APPENDIX D

HORIZONTAL DIRECTIONAL DRILLING
TYPICAL CROSS SECTION
AND WORK AREAS

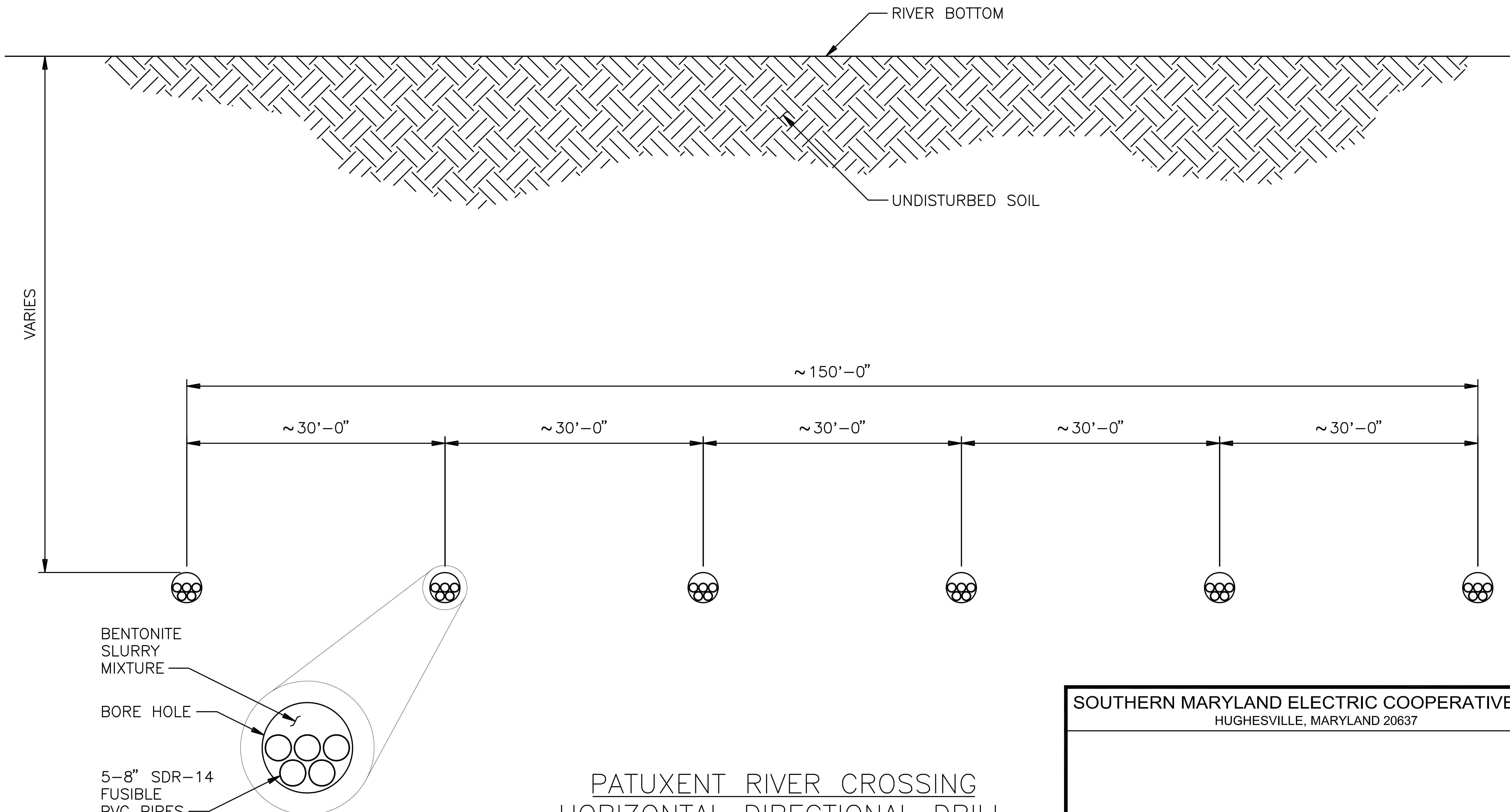


PATUXENT RIVER CROSSING
HORIZONTAL DIRECTIONAL DRILL
SINGLE CABLE PER PHASE
TYPICAL CROSS SECTION

SCALE: 1/8"=1'-0"

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

DRAWN EGS	DATE 09/23/08
CHECKED	D NO.
APPROVED	SUB. NO.
SCALE AS NOTED	DWG. NO. DS-0013



PATUXENT RIVER CROSSING
HORIZONTAL DIRECTIONAL DRILL
THREE CABLES PER PHASE
TYPICAL CROSS SECTION

SCALE: NO SCALE

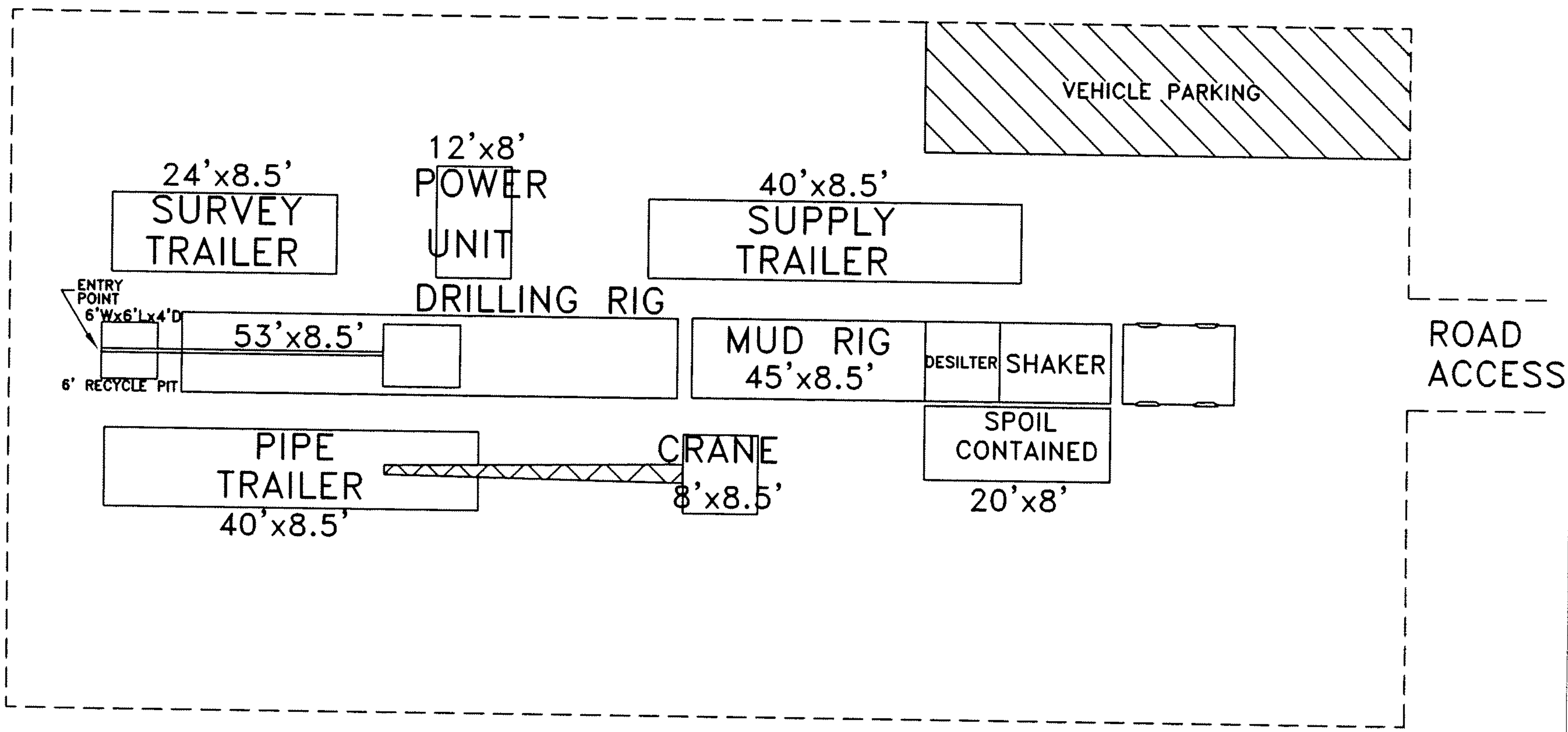
SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

DRAWN EGS	DATE 09/23/08
CHECKED	D NO.
APPROVED	SUB. NO.
SCALE NO SCALE	DWG. NO. DS–0012

TYPICAL ENTRY SITE

EQUIPMENT LAYOUT

150' x 75'



NOTE: THIS IS A TYPICAL SITE SET-UP. THERE ARE VARIOUS CONFIGURATIONS USED DEPENDING UPON SITE RESTRICTIONS. FIELD MODIFICATIONS TO SUIT SITE.

NOTE: BENTONITE SLURRY PUMPED FROM PIT, COLLECTED & RECYCLED OR DISPOSED OF AT AN APPROVED LOCATION

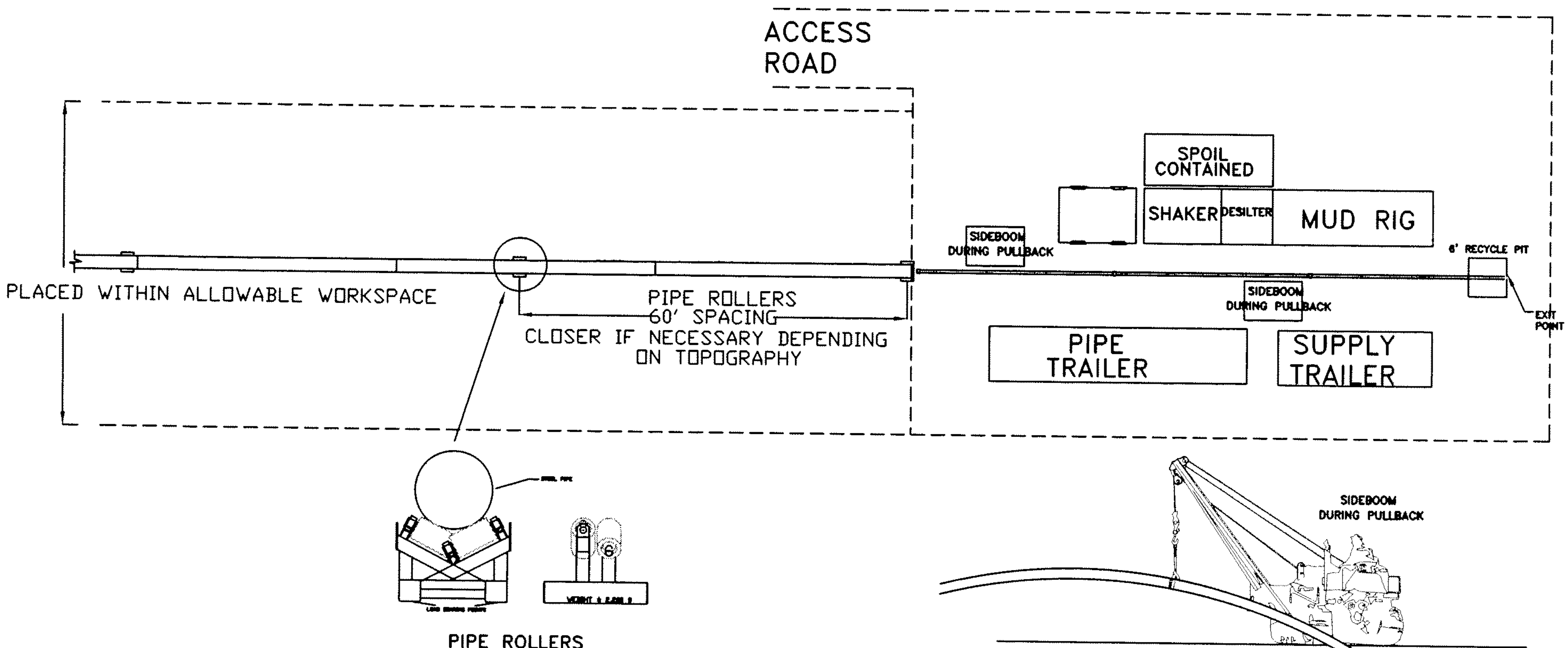
TYPICAL EXIT SITE

EQUIPMENT LAYOUT & PRODUCT LINE SUPPORT

WORK AREA 65' x 100'

PIPE STRING OUT AREA

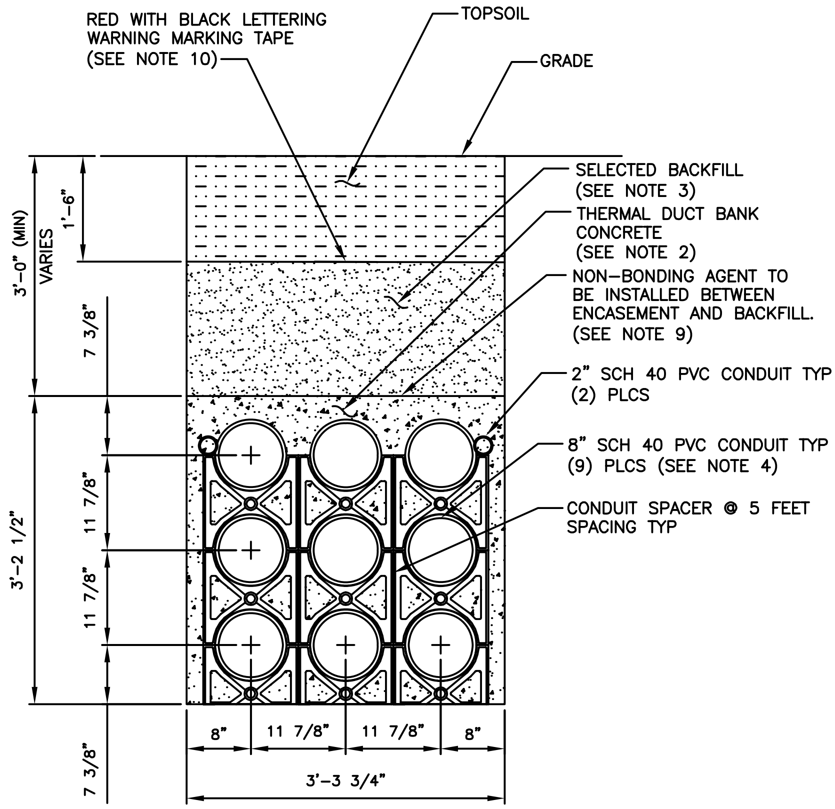
LENGTH OF INSTALL x 50' WIDE



NOTE: THIS IS A TYPICAL SITE SET-UP. THERE ARE VARIOUS CONFIGURATIONS USED DEPENDING UPON SITE RESTRICTIONS. FIELD MODIFICATIONS MADE TO SUIT THE SITE.

APPENDIX E

DUCT BANK AND SPLICING VAULT DRAWINGS



POWER CABLE DUCT BANK

SCALE: 1/2"=1'–0"

NOTES:

1. ALL DUCTBANK DIMENSIONS ARE MINIMUMS.

2. THERMAL CONCRETE FOR DUCT BANK ENCASEMENT SHALL MEET PROJECT SPECIFICATIONS. MIX DESIGN SHALL BE TESTED AND APPROVED PRIOR TO INSTALLATION.

3. BACKFILL FOR DUCTBANK SHALL BE THERMALLY ACCEPTABLE. FLOWABLE THERMAL BACKFILL (FTB), SELECTED GRANULAR FILL, AND NATIVE SOIL ARE POSSIBLE BACKFILL MATERIALS. ALL BACKFILL MATERIALS SHALL BE APPROVED BEFORE INSTALLATION. ALL BACKFILL SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS.

4. CONDUIT SHALL BE RESTRAINED TO PREVENT FLOATING DURING ENCASEMENT. ONLY NON–METALLIC RESTRAINTS SHALL BE USED.

5. CONDUIT SPACERS SHALL BE ANCHORED BY MEANS OF REBAR STAKES OR ACCEPTABLE EQUAL.

6. ALL REINFORCING SHALL BE AT LEAST 2–INCHES FROM PVC CONDUITS, FITTINGS AND ANCHORS, AND SHALL HAVE 3–INCHES MINIMUM CONCRETE COVER.

7. WHEN DUCT BANK IS LOCATED WITHIN CITY STREETS PAVEMENT SHALL BE RESTORED TO CITY SPECIFICATIONS.

8. ALL CONDUIT SHALL BE SEALED AT THE END OF EACH WORKING DAY.

9. NON–BONDING AGENT TO BE INSTALLED BETWEEN ENCASEMENT CONCRETE AND FTB. NON–BONDING AGENT TO BE PLASTIC SHEETING OR ACCEPTABLE EQUAL. NON–BONDING AGENT IS NOT REQUIRED BETWEEN ENCASEMENT CONCRETE AND GRANULAR OR NATIVE BACKFILL.

10. CONTRACTOR TO INSTALL WARNING MARKING TAPE ABOVE THE DUCTBANK 12 TO 18 INCHES BELOW GRADE.

11. 3" EDGE TO EDGE SPACING SHALL BE MAINTAINED BETWEEN 8" CONDUITS AT ALL LOCATIONS.

BLACK & VEATCH

ENGINEER JRB	DRAWN TKH
CHECKED JRB	DATE 06/02/2008

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

SMECO, SOUTHERN MARYLAND
230kV RELIABILITY PROJECT

PROJECT 146026

DRAWING NUMBER

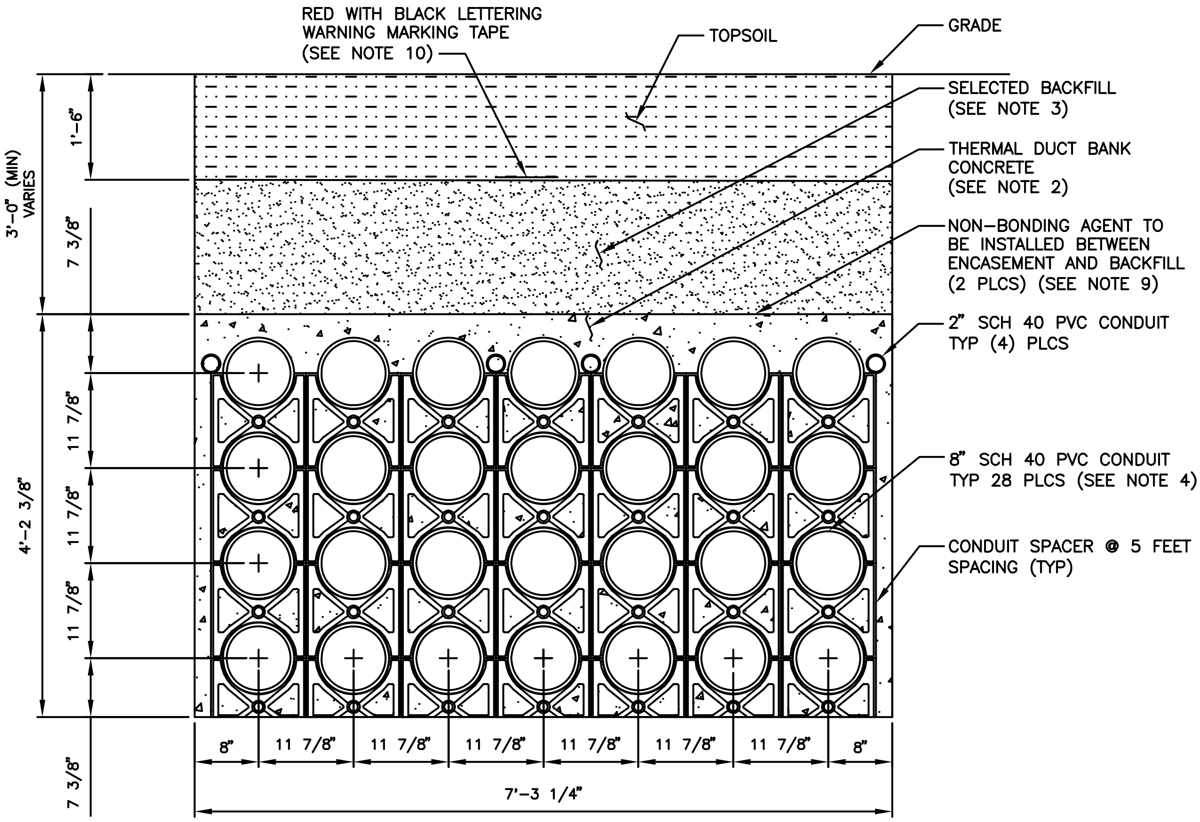
REV A

DOUBLE CIRCUIT DUCT BANK

CODE

AREA

SK–DBK1–060208



POWER CABLE
DUCT BANK

SCALE: 1/2"=1'-0"

NOTES:

1. ALL DUCTBANK DIMENSIONS ARE MINIMUMS.
2. THERMAL CONCRETE FOR DUCT BANK ENCASEMENT SHALL MEET PROJECT SPECIFICATIONS. MIX DESIGN SHALL BE TESTED AND APPROVED PRIOR TO INSTALLATION.
3. BACKFILL FOR DUCTBANK SHALL BE THERMALLY ACCEPTABLE. FLOWABLE THERMAL BACKFILL (FTB), SELECTED GRANULAR FILL, AND NATIVE SOIL ARE POSSIBLE BACKFILL MATERIALS. ALL BACKFILL MATERIALS SHALL BE APPROVED BEFORE INSTALLATION. ALL BACKFILL SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS.
4. CONDUIT SHALL BE RESTRAINED TO PREVENT FLOATING DURING ENCASEMENT. ONLY NON-METALLIC RESTRAINTS SHALL BE USED.
5. CONDUIT SPACERS SHALL BE ANCHORED BY MEANS OF REBAR STAKES OR ACCEPTABLE EQUAL.
6. ALL REINFORCING SHALL BE AT LEAST 2-INCHES FROM PVC CONDUITS, FITTINGS AND ANCHORS, AND SHALL HAVE 3-INCHES MINIMUM CONCRETE COVER.
7. WHEN DUCT BANK IS LOCATED WITHIN CITY STREETS PAVEMENT SHALL BE RESTORED TO CITY SPECIFICATIONS.
8. ALL CONDUIT SHALL BE SEALED AT THE END OF EACH WORKING DAY.
9. NON-BONDING AGENT TO BE INSTALLED BETWEEN ENCASEMENT CONCRETE AND FTB. NON-BONDING AGENT TO BE PLASTIC SHEETING OR ACCEPTABLE EQUAL. NON-BONDING AGENT IS NOT REQUIRED BETWEEN ENCASEMENT CONCRETE AND GRANULAR OR NATIVE BACKFILL.
10. CONTRACTOR TO INSTALL WARNING MARKING TAPE ABOVE THE DUCTBANK 12 TO 18 INCHES BELOW GRADE.
11. 3" EDGE TO EDGE SPACING SHALL BE MAINTAINED BETWEEN 8" CONDUITS AT ALL LOCATIONS.

BLACK & VEATCH

ENGINEER JRB	DRAWN TKH
CHECKED JRB	DATE 06/02/2008

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

SMECO, SOUTHERN MARYLAND
230kV RELIABILITY PROJECT

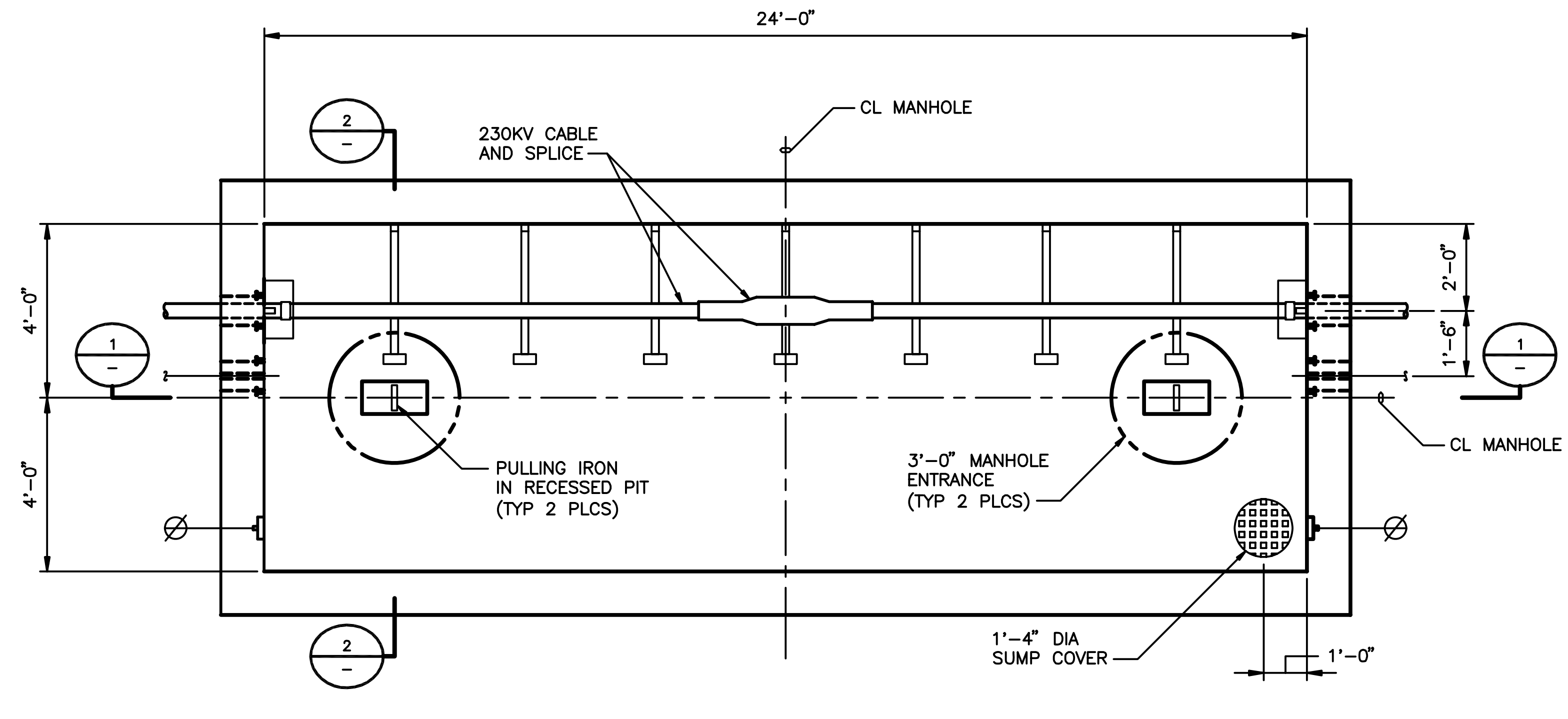
PROJECT	DRAWING NUMBER	REV
146026		A

TWO CIRCUITS, 3 CABLES/PHASE DUCT BANK

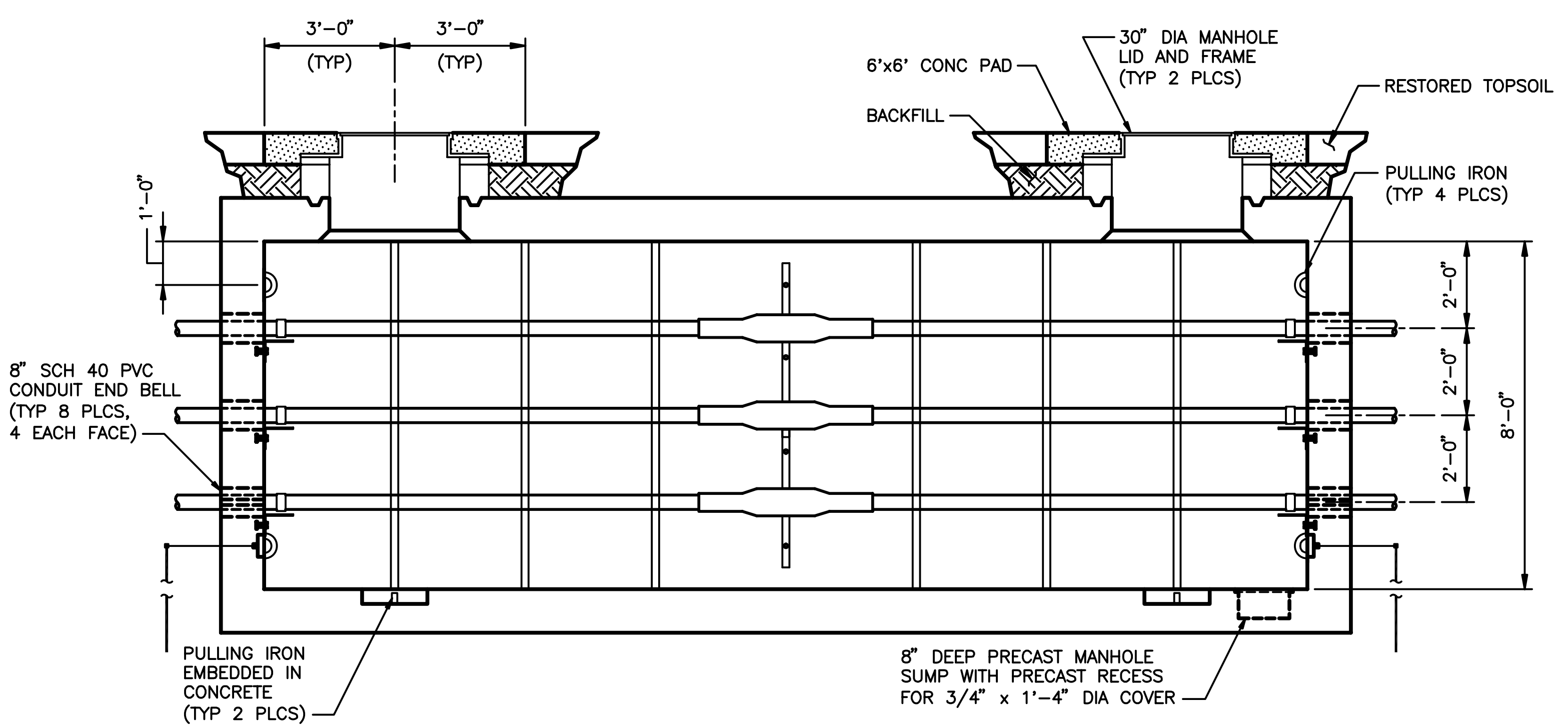
CODE

AREA

SK-DBK3-092308



PLAN VIEW
NO SCALE



SECTION 1
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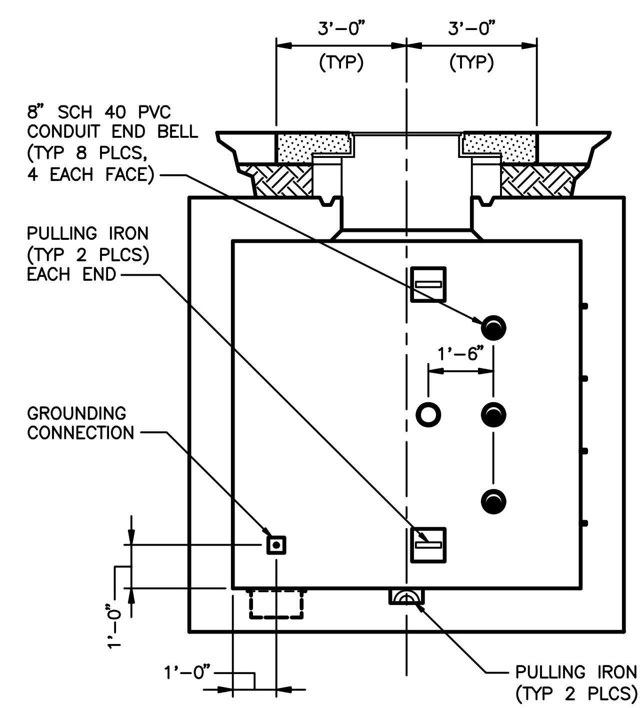


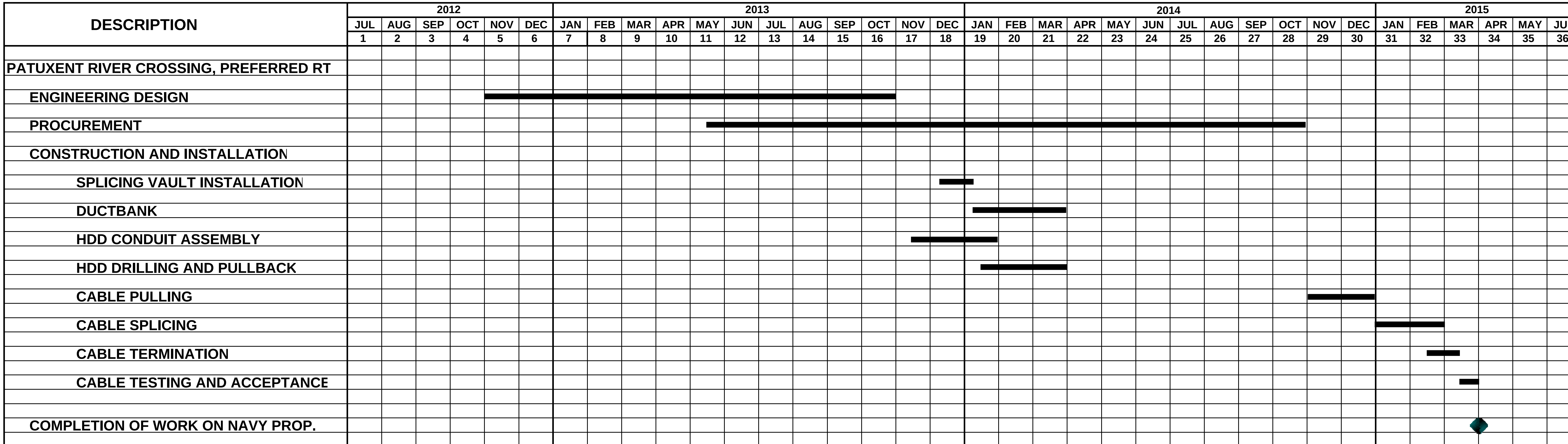
SECTION 2
NO SCALE

NOT TO BE USED
FOR CONSTRUCTION

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC. HUGHESVILLE, MARYLAND 20637	
TYPICAL SPLICING VAULT	
DRAWN EGS	DATE 06/26/08
CHECKED	D NO.
APPROVED	SUB. NO.
SCALE NONE	DWG. NO. DS-0010

APPENDIX F

PRELIMINARY SCHEDULES



NO	DATE	REVISIONS & RECORD OF ISSUE	BY	CHK	APP	FLM

ENGINEER: J BARDWELL
DRAWN: J BARDWELL
CHECKED:
DATE: 1-Jul-08

SMECO

PATUXENT RIVER CROSSING, PREFERRED ROUTE ON THE NAVY PROPERTY

PRELIMINARY PROJECT SCHEDULE

DRAWING NUMBER: **PSCH-PREF-070108**
REV:
CODE:
AREA:

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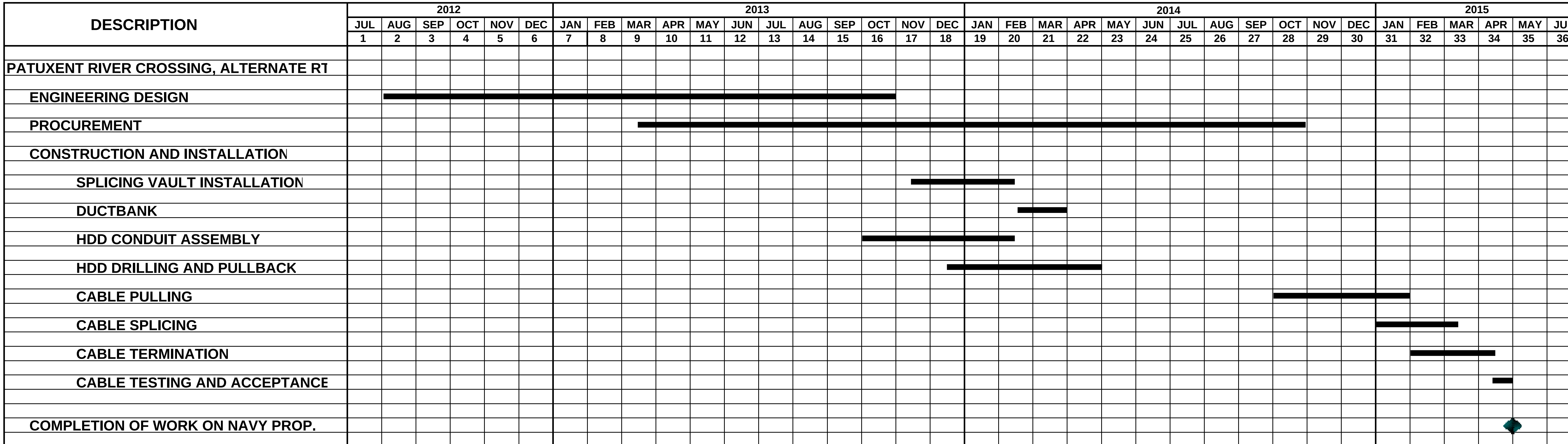

NO	DATE	REVISIONS & RECORD OF ISSUE	BY	CHK	APP	FLM

ENGINEER: J BARDWELL
DRAWN: J BARDWELL
CHECKED:
DATE: 1-Jul-08

SMECO

PATUXENT RIVER CROSSING, ALTERNATE ROUTE ON THE NAVY PROPERTY

PRELIMINARY PROJECT SCHEDULE

DRAWING NUMBER: **PSCH-PREF-070108**
REV
CODE
AREA

Appendix H
Impacts from Underground Transmission Lines

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SMECO
Southern Maryland Electric Cooperative

SOUTHERN MARYLAND RELIABILITY PROJECT
HUGHESVILLE, MD

HOLLAND CLIFF TO HEWITT ROAD
IMPACTS FROM UNDERGROUND TRANSMISSION LINES

BLACK & VEATCH CORPORATION

B&V Project 146030
B&V File 53.0000

September 30, 2008

BLACK & VEATCH
Building a world of difference.

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to detail the impacts to the public, environment, project budget, and system operation of constructing significant portions of the Holland Cliff to Hewitt Road transmission line as an underground transmission line.

1.2 EXECUTIVE SUMMARY

Underground transmission lines are suited for areas with high population density, or areas of special concern such as navigable water crossings and near airfields, where overhead line construction is not feasible.

There are no significant financial, system operations, construction impacts, or environmental reasons for extensive use of underground transmission lines in the SMECO Southern Maryland Reliability Project including the Holland Cliff to Hewitt Road Transmission Line.

The Patuxent River crossing is proposed as underground cable for reasons such as the lack of existing right of way, interference with aircraft from the nearby airfield, maintaining navigable clearance on the river, and the existing crossing is underground.

1.3 DESCRIPTION OF UNDERGROUND TRANSMISSION LINES

Underground transmission lines are high voltage insulated cable systems. The cable system being evaluated for this project consists of multiple separate solid dielectric insulated cables installed in a concrete encased PVC conduit duct bank.

The cables consist of a copper conductor, surrounded by cross-linked polyethylene insulation (XLPE), protected by a metallic sheath and an outer jacket. The metallic sheath can be made of aluminum, copper or lead. No fluids are included in this cable design.

Typical cable and duct bank cross-sections are shown in Attachment A.

2.0 IMPACTS TO THE PUBLIC

2.1 IMPACTS DURING CONSTRUCTION

The construction of underground duct bank has a large amount of impact to the public during construction. A double-circuit duct bank would be installed in a continuous trench 4' wide, requiring a large amount of excavation. The typical method of installation for a duct bank is for an excavator to open the trench, the conduit to be assembled, laid, and encased in concrete, followed by an excavator backfilling and closing the trench. Approximately 150 to 300 feet of trench can be closed each day, with the excavator opening only the amount of trench needed each day. Typically 300 to 500 feet of trench will be left open at the end of each day. Productivity can vary greatly, depending on the area, trench depth, and obstacles encountered.

In addition to the trench for the duct bank, large underground splicing vaults need to be placed every 1700-1800 feet. Splicing three 230kV cables requires 24' long, 8' wide, and 8' high splicing vaults. These vaults are required because there are limits on the maximum length of cable that can be transported on a single reel over roads. Typical high voltage cable reels are approximately 13' feet in diameter, 8' wide, and weigh between 40,000 and 60,000 lbs. For safety reasons each circuit will need to be installed separate splicing vaults. Each vault requires one to two weeks to install and to connect to the duct bank.

Certain obstacles, such as large or protected open waterways can not crossed by trenching. At these locations the duct bank will need to be installed by a trenchless method such as Horizontal Directional Drilling (HDD). HDD is carried out by setting up a large hydraulic drill rig on one side of the obstacle, drilling a path under the obstacle and pulling a bundle of conduits back through the bore hole. Typically HDD installation is significantly deeper than trenched duct bank and the circuits will likely have to be installed in separate bore holes to maintain the circuit rating. To install the conduits for a single circuit for less than 1000' will require 3-4 weeks on site.

The increased amount of excavation compared to overhead transmission line construction will increase the environmental impacts of the construction. The possible impacts include nuisance dust, soil erosion, disturbing contaminated soils, wetlands disruption, and disturbing unknown cultural resources.

2.2 IMPACTS AFTER CONSTRUCTION

After construction, an underground transmission line is buried with the exception of the access lids for the splicing vaults. Each access lid will have a 6' by 6' concrete pad poured around the lid.

The area close to and over the duct bank will need to be kept clear of all trees and brush. Vegetation over the duct bank is typically limited to grasses. Large vegetation draws water from the soil, increasing the soil's resistance to heat and this will reduce the capacity of the transmission line. Transmission line ratings are governed by the lines ability to dissipate heat. Excessive heat in an underground cable will accelerate the aging of the insulation.

Underground transmission lines have a higher concentration of magnetic fields than overhead transmission lines (approximately 105mG for two 448 MVA, 230kV circuits) directly over the duct bank due to the close proximity of the cables. However the magnetic fields from underground transmission lines decrease in intensity at a faster rate than magnetic fields from overhead lines. As a result, the magnetic fields at ground level directly over the underground cables will be higher than the magnetic fields at ground level directly under overhead lines. However, the underground cable's magnetic fields will be significantly lower at the edge of the right of way.

3.0 EFFECTS ON SYSTEM OPERATION AND RESTORATION

Using underground cables as part of an overhead line brings several challenges to operating a transmission line. These challenges include detecting and locating faults, repairing damaged cable, and reactive power flows.

3.1 CIRCUIT FAULTS AND RESTORATION

During operation, the most common method of identifying a transmission line fault is to continually monitor the line's impedance. When the impedance of individual line segments is significantly different, such as conversions from overhead to underground, it can be difficult to identify where in the line the fault has occurred.

A common technique to restore an overhead line to service quickly is to re-close the line immediately after a fault. Reclosing overhead lines allows for a quick restoration in case of a temporary fault. Re-closers are not typically used on cable systems due to the stress multiple reclosings can put on the cable. This requires faults on a line with cable and overhead installations to be manually identified, cleared and restored, requiring more time for restoration.

While cable systems are less likely to be damaged than overhead lines, the time required to restore a damaged cable to service will be much longer, 4-6 weeks for a cable, splice, or termination failure. An overhead line can typically be restored in 2-3 days. The cable splices and terminations are the most likely components of a cable system to fail. The addition of more cable terminations in a line, such as when converting from overhead to underground, increases the chances of a cable fault.

3.2 SYSTEM OPERATION

Cables have significantly more shunt capacitance than overhead conductors. Capacitance is an inverse function of the distance between an energized conductor and the ground plane. The ground plane for a cable is approximately an inch from the conductor, compared to tens of feet for an overhead line. Excessive shunt capacitance in a line will cause reactive power flow in the line which takes the place of real power, and reduces the efficiency of the line. These reactive power flows may require compensation with shunt reactors (a large device that resembles a high voltage transformer). Shunt reactors are expensive and take up large amounts of space in a substation. This requires the substation to be larger and take up more land.

Overhead lines are more versatile in their ability to handle short term overloads. Overhead lines can carry heavier loads during favorable weather conditions, such as cooler temperatures or steady winds as these conditions allow the conductors to better dissipate heat. Underground lines are not significantly affected by the weather.

If future load growth requires it, overhead lines can be reconductored, increasing their capacity, for significantly less cost than underground lines.

4.0 ESTIMATED COST

4.1 HOLLAND CLIFF TO HEWITT ROAD

In order to facilitate the estimating of installing short sections of the proposed line underground, the costs have been estimated on a unit basis. These costs are based on 2008 construction and material costs without escalation to the expected construction date. See Attachment B for a detailed summary of the estimates, and the estimate assumptions.

The estimated cost to construct the entire double circuit 230 kV transmission line using an underground installation is approximately $384.2 million, at an average of $13.7 million per mile. To relocate the existing 66 kV overhead line to underground and provide for a future second 66 kV circuit, will add an additional $226.8 million, based on a total average cost for a four circuit duct bank with three cable circuits installed of approximately $21.8 million per mile.

These costs do not include costs associated with reactive compensation and substation alterations that will be required for a line of this length. These costs do not include removal or modification of existing structures and overhead line. The Patuxent River crossing is not included in the above costs.

4.2 HOLLAND CLIFF TO THE END OF HIDDEN HILL DRIVE (DPN051)

The total estimated cost to construct the first 0.81 miles of the route south of Holland Cliff substation as underground transmission line is approximately $13.3 M for the two (2) 230 kV circuits. To include removing the existing 69kv line and placing it along with a future 69kv line underground increases the total to $20.5 M. See Attachment C for the area under consideration.

5.0 CONCLUSION

Underground transmission lines are commonly used in areas where overhead lines are not feasible. Underground transmission lines greatly increase costs and impacts on the public during construction and do not provide significant environmental benefits.

The majority of the Southern Maryland Reliability Project traverses rural or suburban areas using an existing right-of-way. For the most part, the construction will be on previously cleared right-of-way, eliminating most of the benefits of underground construction.

The following is a summary of the reasons why underground is not a viable solution for the majority of the Holland Cliff to Hewitt Road installation:

1. Overhead construction is feasible and lines already exist.
2. Underground construction has more impact to the environment and landowners.
3. Problems on underground lines are harder to identify and take longer to restore.
4. Overhead lines provide more operational flexibility.
5. The cost for Underground construction would be approximately 13 times the cost for overhead construction.

Installing the line underground in the area near Hidden Hill Drive would have the following impacts:

1. New right of way would be required at the end of Hidden Hill Drive for the overhead to underground transition. The overhead line is designed for two (2) 230 kV circuits and two (2) 69 kV circuits. A four bay steel H-frame type termination structure approximately 70' tall and 150' long would be used to make the transition from underground to overhead for these circuits. To provide electrical safety clearances for the public and to allow room to perform maintenance and repair, an estimated fenced area of approximately 100' X 210' would be required.
2. The Hidden Hill Drive section of the transmission line is approximately 2.9% of the overall transmission line length. However, installing this single short section of the line underground would increase the cost of the entire transmission line by approximately 43%, or $19,500,000. The cost of underground transmission lines is many times the cost of overhead transmission lines because the uninstalled cost for underground cable is approximately $160 per foot while overhead conductor is approximately $3.10 per foot. As a result, cable costs alone for two three phase 230 kV underground circuits is $960 per foot vs. $18.60 per foot for two overhead circuits. Considering all the costs for an underground circuit, i.e. trenches, duct banks, and all the costs for overhead lines, i.e. towers and tower foundations, the costs for putting a transmission line underground is considerably more expensive than overhead lines. The construction techniques required for underground transmission lines are continuous (day after day during normal working hours) and much longer then what is required for overhead lines. As a result, installing the transmission line underground vs. overhead will have a much greater impact on the residents along the route. A trench approximately six to eight feet deep and six to eight feet wide will need to be opened along Hidden Hill Drive. At any given time, 300' to 500' will be open. Due to the width and depth of the trench, it is unlikely that a temporary bridge

or cribbing can be placed over it so that residents can use their driveways while the trench is open in front of their house. Where the trench is opened, Hidden Hill Drive will most likely be restricted to one lane traffic. Therefore, residents may need to park several hundred feet from their homes and walk to and from their vehicles during this time.

3. The trench will be constructed using backhoes and the dirt will be hauled away with dump trucks and disposed of or stock piled. After the ductbank is constructed, the stock piled dirt will be hauled back and used to cover the ductbank. The ductbank is constructed by encasing plastic conduits in concrete and normal concrete trucks are used to deliver and place the concrete. Therefore, it is expected that there will be relatively constant heavy truck traffic on Hidden Hill Drive during the entire trench construction period.
4. The construction techniques required for overhead transmission lines are localized and less intrusive to residents along the route. Construction work will only be required where poles are to be installed. A hole five to six feet wide and 35’ to 40’ deep will be drilled using a special truck mounted drill rig. The dirt is hauled away with dump trucks, but the number of truck loads per hole is minimal. For each pole location, the hole can be dug and the dirt hauled away in a single day. Then the foundation is constructed by placing rebar and the structure anchor bolts in the hole and filling it with concrete. Typically, one day is required to install rebar, anchor bolts, and concrete for each foundation. During the detailed design, the poles and hence the foundations, will be located so that driveways are not impacted. Therefore, residents can continue to use their driveways during the entire construction time.

ATTACHMENT A

TYPICAL CABLE &
DUCTBANK CROSS-SECTIONS

ATTACHMENT B

UNDERGROUND CONSTRUCTION ESTIMATES

ESTIMATE 1: DOUBLE CIRCUIT 230 kV FROM HOLLAND CLIFF TO HEWITT ROAD (EXCLUDES RIVER CROSSING)

ESTIMATE 2: DOUBLE CIRCUIT 66 kV FROM HOLLAND CLIFF TO HEWITT ROAD (EXCLUDES RIVER CROSSING)

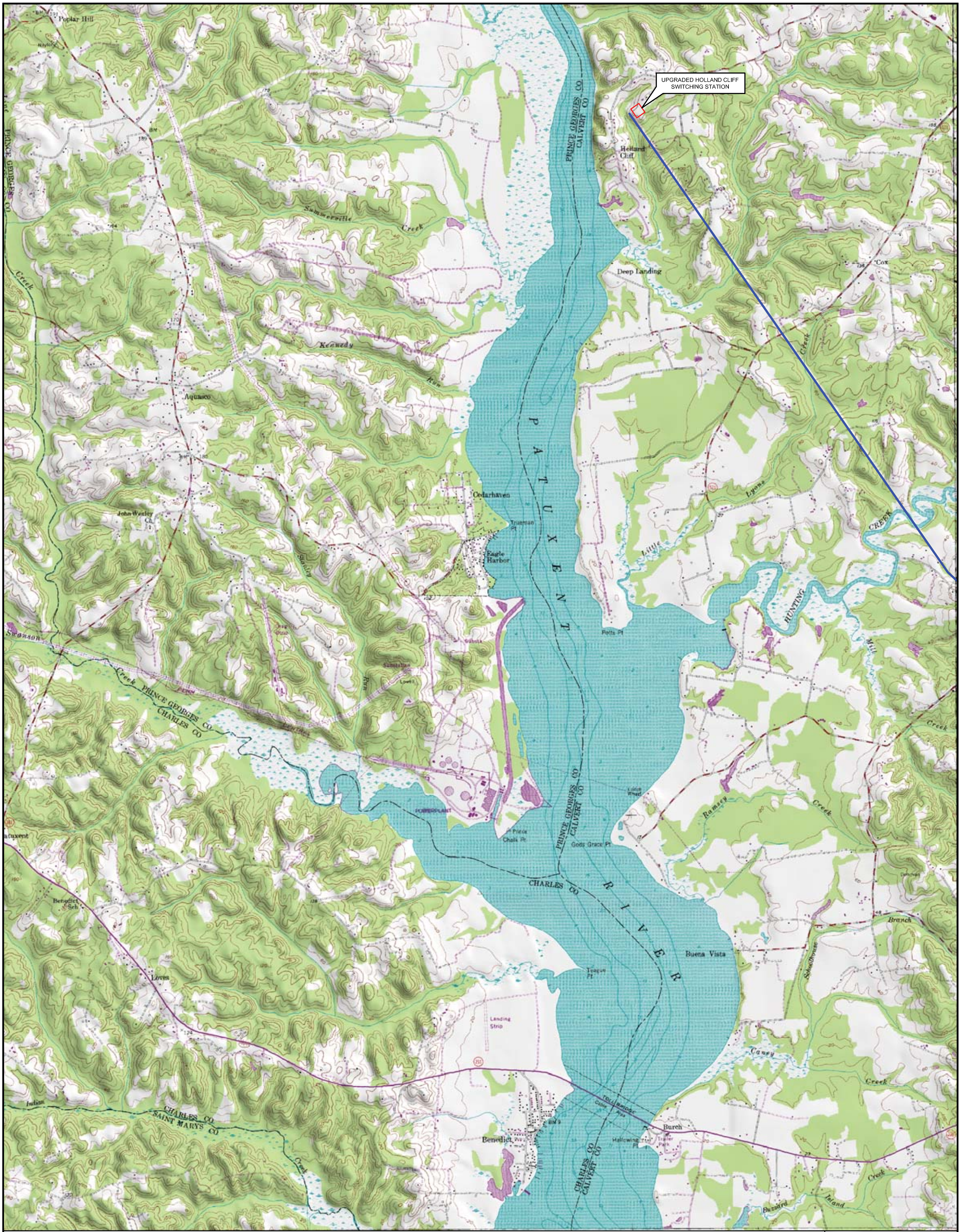
ESTIMATE 3: DOUBLE CIRCUIT 230 kV FROM HOLLAND CLIFF SUBSTATION TO DPN051 (0.8 MILES)

ESTIMATE 4: DOUBLE CIRCUIT 230 kV & DOUBLE CIRCUIT 66 kV FROM HOLLAND CLIFF SUBSTATION TO DPN051 (0.8 MILES)

ATTACHMENT C

HOLLAND CLIFF TO DPN051
UNDERGROUND ALTERNATE
ROUTE MAP

Appendix I
Topographic and Plan and Profile Route Drawings



1000' 500' 0 1000' 2000'
SCALE: 1"=1000'

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.
SIGNED ______
LICENSE NO. ______
EXPIRATION DATE ______

BLACK & VEATCH

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

230/66KV TRANSMISSION LINE
HOLLAND CLIFF TO HEWITT ROAD
TOPOGRAPHIC ROUTE MAP
BENEDICT, MD

DRAWN	JWS/B&V	DATE	11-21-08
CHECKED		D NO.	
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SCALE	1"=1000'	DWG. NO.	

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SCALE: 1"=1000'

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.
SIGNED ____________
LICENSE NO. ____________
EXPIRATION DATE ____________

BLACK & VEATCH

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

230/66KV TRANSMISSION LINE
HOLLAND CLIFF TO HEWITT ROAD
TOPOGRAPHIC ROUTE MAP
PRINCE FREDERICK, MD

DRAWN	JWS/B&V	DATE	11-21-08
CHECKED		D NO.	
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SCALE	1"=1000'	DWG. NO.	

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1000' 500' 0 1000' 2000'
SCALE: 1"=1000'

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.
SIGNED
LICENSE NO.
EXPIRATION DATE

BLACK & VEATCH

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

230/66KV TRANSMISSION LINE
HOLLAND CLIFF TO HEWITT ROAD
TOPOGRAPHIC ROUTE MAP
BROOMES ISLAND, MD

DRAWN	JWS/B&V	DATE	11-21-08
CHECKED		D NO.	
APPROVED		SUB. NO.	
SCALE	1"=1000'	DWG. NO.	

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

SIGNED ______

LICENSE NO. ______

EXPIRATION DATE ______

BLACK & VEATCH

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

230/66KV TRANSMISSION LINE
HOLLAND CLIFF TO HEWITT ROAD
TOPOGRAPHIC ROUTE MAP
COVE POINT, MD

DRAWN	JWS/B&V	DATE	11-21-08
CHECKED		D NO.	
APPROVED		SUB. NO.	
SCALE	1"=1000'	DWG. NO.	

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.

SIGNED ____
LICENSE NO. ____
EXPIRATION DATE ____

BLACK & VEATCH

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MARYLAND 20637

230/66KV TRANSMISSION LINE
HOLLAND CLIFF TO HEWITT ROAD
TOPOGRAPHIC ROUTE MAP
SOLOMONS ISLAND, MD

DRAWN	JWS/B&V	DATE	11-21-08
CHECKED		D NO.	
APPROVED		SUB. NO.	
SCALE	1"=1000'	DWG. NO.	

Appendix J
Agency Consultation Letters

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April 21, 2008

Ms. Lori Byrne
Environmental Review Specialist
Maryland Department of Natural Resources
Wildlife & Heritage Service
580 Taylor Avenue, Suite E-1
Annapolis, MD 21401

RE: Southern Maryland Electrical Cooperative
Southern Maryland Reliability Project
Holland Cliff substation to Hewitt Road substation

Dear Ms. Byrne:

Our client, Southern Maryland Electric Cooperative (SMECO), is proposing to upgrade the electrical capacity of an existing overhead transmission line between the existing Hewitt Road substation and the Holland Cliff substation. The route will follow the existing right-of-way (ROW) owned by SMECO, with the possible exception of the Patuxent River crossing, which is still under evaluation. The project area is approximately 30 miles long, begins in western Calvert County and ends in Southern St. Mary's County. A map is enclosed for reference, illustrating the route alignment. The alternative routes are not shown.

Black & Veatch has been retained by SMECO to conduct an environmental review and prepare the appropriate permit applications for the project. The following is a description of the proposed project work.

Proposed Holland Cliff Substation Upgrade and Expansion

The existing substation will be expanded to accommodate anticipated future needs. SMECO will upgrade its existing 66 kV substation at Holland Cliff to allow the transmission line to be energized at 230 kV. The upgrades at the Holland Cliff substation will be located entirely on the existing substation property, which is owned by SMECO. No additional property will be acquired for this substation. All substation expansion will occur on land owned by SMECO. The site is large enough to accommodate the operation and maintenance of the facility as well as to comply with ingress and egress requirements.

Proposed Upgrade to 230 kV Transmission Line Route

SMECO plans to upgrade an existing 30-mile section of overhead transmission line from 66 kV to 230 kV between the new Hewitt Road substation and the Holland Cliff substation by installing conductors on the second set of circuit arms of existing poles in the existing right of way. Options for crossing the Patuxent River and alternative routes around previously developed portions of the existing ROW are still under consideration.

Maryland Department of Natural Resources
Ms. Lori Byrne

B&V Project – 146026
April 21, 2008

The conductors installed on the first set of circuit arms will remain in place and can accommodate the increased voltage. No new ROW is required for the upgraded transmission line with the possible exception of alternative routes around development. These alternatives are still under evaluation. The existing poles will continue to be used and will not be moved from their current locations. New poles will be installed in locations where necessary, but these will be placed close to the exiting poles so new areas will not be affected.

Proposed Upgrade to Holland Cliff Substation

A portion of the environmental review process includes examining the project lands for the occurrence of state protected plants and animals. Please review the project vicinity for known or potential occurrences of protected plants and animals, and their habitats. Comments can be mailed to me at the letterhead address or, if more convenient for you, emailed to me at ShadrickEJ@bv.com. Please provide your comments by May 16, 2008, if possible. I can be reached at (913) 458-4129 or by e-mail if you have questions regarding the project or this request.

Very truly yours,

BLACK & VEATCH CORPORATION

ORIGINAL SIGNED BY ED SHADRICK

Ed Shadrick
Senior Ecologist
Environmental Management Services

Cc: John Bredenkamp, SMECO
Thomas Russell, SMECO
Rich Jacober, Black & Veatch

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor
John R. Griffin, Secretary
Eric Schwaab, Deputy Secretary

June 19, 2008

Mr. Ed Shadrick
Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211

RE: Environmental Review for Southern Maryland Electrical Cooperative (SMECO) – Southern Maryland Reliability Project, Holland Cliff Switching Station to Hewitt Road Switching Station, Calvert and St. Mary's County, Maryland.

Dear Mr. Shadrick:

Thank you for taking the time to speak with me the other day in regard to this project. I understand that most of the existing right-of-way has been maintained as grass or shrubby habitat with a few trees where it may have succeeded, and that there may be forest clearing at one or more of the switching stations proposed for construction or expansion.

It is important to note that the utilization of state funds, or the need to obtain a state authorized permit may warrant additional evaluations that could lead to protection or survey recommendations by the Wildlife and Heritage Service. If there is to be substantial disturbance or clearing proposed within the project route, then we may ask for surveys of certain species to be conducted prior to any work.

Proposed SMECO 230kV Route

Solomons Island Quad

There is a nesting record for Peregrine Falcon (*Falco peregrinus anatum*) located underneath the Thomas Johnston Bridge itself. The Peregrine Falcon is a species with In Need of Conservation status in Maryland, and disturbance to this nest site should be avoided. Such disturbance may result from attaching the cable to the underside of the Thomas Johnston Bridge, or other related activities within an approximate ¼-mile radius of the nest during the Peregrine Falcon nesting season. It is important to note that this species also has federal protection under the Migratory Bird Treaty Act and we suggest that you also consult with Mary Ratnaswamy, U.S. Fish & Wildlife Service, 177 Admiral Cochrane Drive, Annapolis, MD 21401.

Cove Point Quad

1. The project route as proposed directly crosses the Solomons Water Treatment Facility & Landfill property which supports a population of state-listed threatened Engelmann's Arrowhead (*Sagittaria engelmanniana*). This species occurs in a sphagnous seep associated with St. Paul Branch under the existing powerline right-of-way which is proposed for work. A survey of this area should be conducted to determine the full extent of this population of Engelman's Arrowhead. Please contact Katharine McCarthy of WHS at (410) 260-8569 to develop protection measures to avoid detrimental impacts to this important plant population.

2. Also occurring along St. Paul Branch is state-listed endangered Kidneyleaf Grass-of-Parnassus (*Parnassia asarifolia*). This species is generally found in: bogs and seepage slopes (Radford et al 1968); bogs, wet woods and rocky banks (Fernald 1950). If suitable habitat for this species is found in the limits-of-disturbance of the nearby project route, then we recommend surveys be conducted by a qualified observer and following our RT&E plant survey protocol, so that we can ensure that adequate protection measures are adopted.

3. In the Bertha area there are records for the following RT&E species. They are located in dry, sandy roadside habitat associated with a transmission line corridor:

Scientific Name	Common Name	State Status
Sporobolus clandestinus	Rough Rushgrass	Threatened
Rhynchosia tomentosa	Hairy Snoutbean	Threatened
Aristida lanosa	Woolly Three-awn	Endangered

If suitable habitat for these species is found in the limits-of-disturbance of the nearby project route, then we recommend surveys be conducted by a qualified observer and following our RT&E plant survey protocol, so that we can ensure that adequate protection measures are adopted.

4. Along Laveel Branch is a record for state rare Spurred Butterfly-pea (*Centrosema virginianum*), and in the Lusby area there is state-listed endangered Blunt-leaved Gerardia (*Agalinis obtusifolia*). Habitat for Spurred Butterfly-pea is described as: Dry, sandy soil (Tatnall 1946); open woods and clearings (Radford et al 1968). Habitat for Blunt-leaved Gerardia is described as: Grasslands, waste places, pine woods and savannahs (Radford et al 1968); dry to moist siliceous or argillaceous pinelands, thickets and openings of Coastal Plain (Fernald 1950). If suitable habitat for these species is found in the limits-of-disturbance of the nearby project route, then we recommend surveys be conducted by a qualified observer and following our RT&E plant survey protocol, so that we can ensure that adequate protection measures are adopted.

Prince Frederick Quad

The portion of the project route from German Chapel Road north to Route 231 is within the drainage of Parker's Creek. Parkers Creek is unusual in that it is a "barbed" watershed, and supports several RT&E species. Topography, geology, and hydrology combine to produce a flora in the Parkers Creek ravines that is very unusual for the Coastal Plain. North-facing slopes, calcareous soils, and wetland seeps create microhabitats that are more characteristic of the mountain and Piedmont physiographic provinces--cool, nutrient-rich, and moist.

Our concerns in this area are for changes to water quality or hydrology in this important watershed. As such we encourage the applicant to pay special attention to implementing and monitoring sediment and erosion control measures. Stabilization of soil should occur immediately (within 24 hours). Special effort should be made to retain fine particle silt, sand and clay sediments including the incorporation of redundant/additional control measures in the sediment and erosion control plan to ensure maximum filtration of any sediment-laden runoff (e.g., accelerated stabilization, super silt fence instead of silt fence, etc.). All measures should be inspected daily to ensure that they are functional from the very initial stages through final construction, and any problems should be corrected immediately.

Proposed Alternate SMECO 230 kV Route:

Cove Point Quad

The portion of St. Leonard Creek where the project route is proposed to cross is designated as an historical waterfowl concentration and staging area. For further technical assistance regarding potential impacts to this waterfowl concentration area, please contact Larry Hindman of the WHS at (410) 221-8838.

Overall Project Route:

Our analysis of the information provided suggests that the forested area on or adjacent to the proposed and alternate routes contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird Species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of FIDS habitat is strongly encouraged by the Department of Natural Resources. The following general guidelines could be used to help minimize the project's impacts on FIDS and other native forest plants and wildlife:

1. Avoid placement of new utility lines or related construction in the forest interior. If forest loss or disturbance is absolutely unavoidable, restrict development to the perimeter of the forest (i.e., within 300 feet of the existing forest edge), and avoid line placement in areas of high quality FIDS habitat (e.g., old-growth forest). Maximize the amount of remaining contiguous forested habitat.

2. Do not remove or disturb forest habitat during May-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.

3. Maintain forest habitat as close as possible to the utility line, and maintain canopy closure where possible.

4. Maintain grass height at least 10" during the breeding season (May-August).

According to the April 21, 2008 request letter, other alternate routes are not shown on the map that was included. If alternative routes are proposed, they would need to be sent to DNR Wildlife and Heritage Service for review in order to evaluate any potential impacts to RT&E species or protected habitat. Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8573.

Sincerely,

Lori A. Byrne

Lori A. Byrne,
Environmental Review Coordinator
Wildlife and Heritage Service
MD Dept. of Natural Resources

ER# 2008.0844.ct/sm
Cc: S. Patty, DNR
T. Larney, DNR
K. McCarthy, DNR
L. Hindman, DNR
L. Hoerger, CAC
G. Golden, DNR

Southern Maryland Reliability Project
Holland Cliff to Hewitt Road 230 kV Transmission Line

September 8, 2008

Mike Huber, District 5 Utility Engineer
Maryland State Highway Administration
138 Defense Highway
Annapolis, MD 21401

Subject: State Route 4 Right of Way Use for SMECO 230 kV Transmission Line.

Dear Mr. Huber:

Southern Maryland Electric Cooperative, Inc. (SMECO) is proposing to construct a new 230 kV double circuit transmission line from SMECO's Holland Cliff switching station in northern Calvert County, Maryland, to the SMECO Hewitt Road switching station in St. Mary's County, Maryland. The new 230 kV Holland Cliff to Hewitt Road transmission line is being proposed to meet the growth in electrical energy demands and improve system reliability within SMECO's service area.

The preferred route is SMECO's existing 69 kV transmission corridor from the Holland Cliff to Hewitt Road facilities. To be in compliance with state and federal guidelines for the permitting of high-voltage transmission lines, SMECO is required to identify and evaluate reasonable alternative routes for the construction of the proposed transmission line.

Some of the alternative routes include the installation of a portion of the 230 kV overhead transmission line directly adjacent to State Route 4 in Calvert County. The installation of the 230 kV overhead transmission line along State Route 4 would require that the transmission line share a portion of the State Highway right-of-way and create a "joint use" right-of-way between SMECO and the Maryland State Highway Department. The possible alternate routes along Maryland State Route 4 extend from approximately one mile south of Prince Frederick, Maryland, to the Navy Recreation Facility in Solomons, Maryland.

SMECO acknowledges that implementation of such an the alternative route would involve State Highway Administration input, review, and approval if pursued. However, the purpose of this document is to verify whether or not using State Route 4 right of way in Calvert County for a portion of the new SMECO 230 kV Transmission Line is feasible and should warrant further review.

We appreciate State Highway Administration's review of this request and look forward to your formal response. Please contact me at 240-528-9810 or john.bredenkamp@smeco.coop with any questions or comments you may have.

Sincerely,

John Bredenkamp
Project Manager

cc: Ken Capps
Gary Durdock
Tom Russell
Rich Jacober, B&V
Project File

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor

SHA State Highway Administration

John D. Porcari, Secretary
Neil J. Pedersen, Administrator

September 15, 2008

John Bredenkamp
SMECO
15035 Burnt Store Road
Hughesville, MD 20637

Dear Mr. Bredenkamp,

Thank you for your letter regarding the possible installation of your facilities in the MD Route 4 Right-of-Way. I hope I can clarify the State Highway Administration's (SHA) position on this installation. Please be advised that SHA cannot condone the installation of the 230 KV transmission line as proposed in your submission of September 8, 2008. In accordance with the "State Utility Policy", generally, installation of utilities longitudinally in the Right-of-Way's of through highways is prohibited in the policy. The revised policy is based upon on Federal Regulations 23, Highways Subparts A and B Subchapter G, part 645 and part 645. This would be in direct contradiction with proposed installation along MD Route 4.

If you have any questions, or if I may be of further assistance, please contact me at 410-841-1039, 800-331-5603 or via email at mhuber@sha.state.md.us.

Sincerely,

Michael Huber
District Utility Engineer
District 5

MH/cad

cc: Gregory Welker

Maryland Department of Planning

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary
Matthew J. Power
Deputy Secretary

October 24, 2008

Mr. Salvatore Falcone
Project Manager
Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211

STATE CLEARINGHOUSE REVIEW – ADDITIONAL REVIEWER COMMENTS RECEIVED

State Application Identifier: MD20080903-0902
Project Description: Scoping & Agency Meeting prior to Environmental Assessment on behalf of Southern Maryland Electric Cooperative: proposed construction of 230kV transmission line; a new switching station; an expanded switching station; and crossing of the Patuxent River
Project Address: Pardue Road, MD Route 4
Project Location: Counties of Calvert, Charles, Prince George's, and St. Mary's
Clearinghouse Contact: Bob Rosenbush

Dear Mr. Falcone:

We are forwarding the comments made by the State Highway Administration, a modal administration of the Maryland Department of Transportation, and this Department regarding the referenced project for your information. The State Highway Administration addressed issues relating to planning coordination. See the attached response form.

This Department stated that not all of the lands in the study area are located within priority funding areas. If State funding, loans, and/or technical assistance are required to complete the project, its location may be significant.

Should you have any questions, contact the State Clearinghouse staff person noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. Your cooperation and attention to the review process is appreciated.

Sincerely,

Linda C. Janey mab

Linda C. Janey, J.D., Assistant Secretary
for Clearinghouse and Communications

LCJ:BR

cc: Cindy Johnson - MDOT

08-0902_OLRR.OTH.doc

Please Complete Your Review & Recommendation Before October 8, 2008

Return Completed Form To: Linda C. Janey, J.D., Assistant Secretary for Clearinghouse and Communications, Maryland Department of Planning, 301 West Preston Street, Room1104, Baltimore, MD 21201-2305 Phone: 410-767-4490 Fax: 410-767-4480

State Application Identifier: MD20080903-0902		**Clearinghouse Contact:** Bob Rosenbush, 410-767-4490 brosenbush@mdp.state.md.us	
Location:	CHAS, CLVT, PGEO, STMA		
Applicant:	Black & Veatch Corporation		
Description:	Scoping & Agency Meeting prior to Environmental Assessment on behalf of Southern Maryland Electric Cooperative: proposed construction of 230kV transmission line; a new switching station; an expanded switching station; and crossing of the Patuxent River		

Based on a Review of the Information Provided, We Have Checked (☛) the Appropriate Determination Below

		CONSISTENT RESPONSES - (For Use By STATE AGENCIES Only)
NA	**C1**	**It is Consistent** with our plans, programs, and objectives
	C2	**It is Consistent** with the policies contained in Executive Order 01.01.1992.27 (Maryland Economic Growth, Resource Protection, and Planning Act of 1992), Executive Order 01.01.1998.04 (Smart Growth and Neighborhood Conservation Policy), and our plans, programs, and objectives.
	C3	(MHT ONLY) It has been determined that the project will have "no effect" on historic properties and that the federal and/or State historic preservation requirements have been met.
	C4	(DNR ONLY) It has been determined that this project is in the Coastal Zone and is not inconsistent with the Maryland Coastal Zone Management Program.
	C7	(MDP ONLY) It is consistent with the requirements of State Finance and Procurement Article 5-7B-02; 03; 04 and 05 Smart Growth and Neighborhood Conservation (Priority Funding Areas).
		CONSISTENT RESPONSES - (For Use By *COUNTY & LOCAL AGENCIES* Only)
	C5	**It is Consistent** with our plans, programs, and objectives.
	C6	**It is Consistent** with the Economic Growth, Resource Protection, and Planning Visions (Planning Act of 1992), State Finance and Procurement Article 5-7B – Smart Growth and Neighborhood Conservation (Priority Funding Areas), and our plans, programs, and objectives.
		OTHER RESPONSES - (For Use By ALL)
X	**R1**	**GENERALLY CONSISTENT WITH QUALIFYING COMMENTS:** It is generally **Consistent** with our plans, programs and objectives, but the attached qualifying comment is submitted for consideration.
	R2	**CONTINGENT UPON CERTAIN ACTIONS:** It is generally **Consistent** with our plans, programs and objectives contingent upon certain actions being taken as noted in the attached comment(s).
	R3	**NOT CONSISTENT:** It raises problems concerning compatibility with our plans, programs, objectives, or Planning Act visions/policies; or it may duplicate existing program activities, as indicated in the attached comment(s). If a meeting with the applicant is requested, please check here: ☐
	R4	**ADDITIONAL INFORMATION REQUESTED:** Additional information is required to complete the review. The information needed is identified below. If an extension of the review period is requested, please check here: ☐
	R5	**FURTHER INTEREST:** Due to further interest/questions concerning this project, we request that the Clearinghouse set up a conference with the applicant.
	R6	**SUPPORTS:** Supports "Smart Growth" and Federal Executive Order 12072 (Federal Space Management), which directs federal agencies to locate facilities in urban areas.

Attach additional comments if necessary OR use theses spaces: See attached.

Name: Mary Deitz
Organization: State Highway Administration
Address: 707 N. Calvert Street
Baltimore, MD 21202

Signature: [signature]
Phone: (410) 545-5560
Date Completed: 10/1/09

_ **Check here if comments are attached.**

MDPCH-1A

State Clearinghouse Review Process
No. MD20080903-0902

It appears on the attached map that the existing and proposed transmission lines are within or close to Maryland state highways. All work done within or crossing State Highway Administration (SHA) right-of-way must be coordinated with Mr. Michael Huber, SHA's utility engineer for our District 5 office. Mr. Huber can be reached at 410-841-1039, via email at mhuber@sha.state.md.us or by mail at
State Highway Administration, 138 Defense Highway, Annapolis MD 21401.

It should also be noted that there is a project planning study being conducted by the SHA for the Thomas Johnson Bridge. There are a number of alternates being proposed including redecking the existing bridge and/or constructing a new bridge adjacent to the existing one which could impact or be impacted by the proposed transmission line. The study is currently 30 percent complete. Location approval for a new bridge is anticipated by the Spring of 2011. Please coordinated with the project planning project engineer, Mr. Russell Andersen at 410-545-8511, via email at randersen@sha.state.md.us or by mail at State Highway Administration, 707 N. Calvert Street, Baltimore MD 21202.

SMECO®
Southern Maryland
Electric Cooperative
1-888-440-3311 www.smeco.coop

Southern Maryland Reliability Project
Holland Cliff to Hewitt Road 230 kV Transmission Line

September 8, 2008

Mike Huber, District 5 Utility Engineer
Maryland State Higheway Administration
138 Defense Highway
Annapolis, MD 21401

Subject: Thomas Johnson Bridge Use for SMECO 230kv Transmission Line River Crossing.

Dear Mr. Huber:

Southern Maryland Electric Cooperative, Inc. ("SMECO") is proposing to construct a new 230kV double circuit transmission line from SMECO's Holland Cliff switching station in northern Calvert County, Maryland to the SMECO Hewitt Road switching station in St. Mary's County, Maryland. The new 230kV Holland Cliff to Hewitt Road transmission line is being proposed to meet growth in electrical energy demands and improve system reliability within SMECO's service area.

In compliance with state and federal guidelines for the permitting of high-voltage transmission lines, SMECO is required to identify and evaluate reasonable alternative routes for the construction of the proposed transmission line.

SMECO is evaluating the lower Patuxent River crossing near Solomon's Island, Maryland. One options is the installation of solid dielectric 230kV underground transmission cable across the Patuxent River on the existing State Highway Thomas Jefferson Bridge or possibly on a new bridge currently being studied by State Highway Administration

SMECO acknowledges that any attachment to the existing or future Patuxent River bridge will involve State Highway Administration input, review, and approval if pursued. The purpose of this document is to verify (1) if attaching conduit to the existing bridge for a SMECO 230kv transmission line is feasible and should be pursued and (2) the probability of a new bridge being installed by 2016, which can include provision for a SMECO 230kv transmission circuit.

We appreciate State Highway Administration review of this request and look forward to your formal response. Please contact me at 240-528-9810 or john.bredenkamp@smeco.coop with any questions or comments you may have.

Sincerely,

John Bredenkamp
Project Manager

cc: Ken Capps
Gary Durdock
Tom Russell
Rich Jacober, B&V
Project File

Martin O'Malley, *Governor*
Anthony G. Brown, *Lt. Governor*

State Highway Administration

John D. Porcari, *Secretary*
Neil J. Pedersen, *Administrator*

Maryland Department of Transportation

September 26, 2008

Subject: Installation of SMECO 230kv Transmission Line at Patuxent River Crossing

Mr. John Bredenkamp
Project Manager
SMECO
15035 Burnt Stone Road
Hughsville, Md. 20637

Dear Mr. Bredenkamp,

We have received your letter of September 8, 2008 concerning SMECO's proposal to construct a new 230kv transmission line at the Lower Patuxent River crossing either on the existing bridge or the proposed bridge now under consideration. We are providing you with the following comments in regard to that installation.

1. The SHA Statewide Utility Policy prohibits the attachment of any high voltage electric lines greater than 69kv to any bridge or structure. That regulation therefore, prohibits SMECO from attaching the proposed 230kv line to the Thomas Johnson Bridge, including the existing bridge or any bridge built in the future.

2. We recommend that SMECO consider the use of submarine cable at the Patuxent River crossing. We are including for your reference a copy of the plan of the Naval Academy Bridge over the Severn River where submarine cable was installed at this major river crossing, similar to the Lower Patuxent River crossing. The submarine cable was installed approximately 250 feet from the bridge at a minimum depth of two feet below the river bottom.

3. In regard to the construction of a new Thomas Johnson Bridge, right now there is only funding for the planning stage. There is no funding for the design or construction stages of a new bridge. There are too many variables to give a definite date as to when the bridge would be complete. Based on the general planning, design and construction time frames as a guide coupled with the funding problems; there will not be a new bridge available by 2016.

Mr. John Bredenkamp
September 26, 2008
Page two

If we can be of any further assistance, please do not hesitate to contact us.

Very truly yours,

Earle S. Freedman, Director
Office of Bridge Development

Cc: Mike Huber, District 5 Utilities
Glenn Vaughn
Russ Anderson
Raja Veeramachaneni

ESF: AWF:kmi

Maryland Department of Planning

Martin O'Malley
Governor
Anthony G. Brown
Lt. Governor

Richard Eberhart Hall
Secretary
Matthew J. Power
Deputy Secretary

September 3, 2008

Mr. Salvatore Falcone
Project Manager
Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211

STATE CLEARINGHOUSE REVIEW PROCESS

State Application Identifier: MD20080903-0902
Reviewer Comments Due By: October 8, 2008
Project Description: Scoping & Agency Meeting prior to Environmental Assessment on behalf of Southern Maryland Electric Cooperative: proposed construction of 230kV transmission line; a new switching station; an expanded switching station; and crossing of the Patuxent River
Project Address: Pardue Road, MD Route 4
Project Location: Counties of Calvert, Charles, Prince George's, and St. Mary's
Clearinghouse Contact: Bob Rosenbush

Dear Mr. Falcone:

Thank you for submitting your project for intergovernmental review. Participation in the Maryland Intergovernmental Review and Coordination (MIRC) process helps ensure project consistency with plans, programs, and objectives of State agencies and local governments. MIRC enhances opportunities for approval and/or funding and minimizes delays by resolving issues before project implementation. The following agencies and/or jurisdictions have been forwarded a copy of your project for their review: the Maryland Departments of Transportation, the Environment, Natural Resources, Agriculture; the Maryland Energy Administration, the Public Service Commission; the Counties of St. Mary's, Calvert, Prince George's, and Charles; and the Maryland Department of Planning; including the Maryland Historical Trust. They have been requested to contact your agency directly by **October 8, 2008** with any comments or concerns and to provide a copy of those comments to the State Clearinghouse for Intergovernmental Assistance. Please be assured that after **October 8, 2008** all MIRC requirements will have been met in accordance with Code of Maryland Regulations (COMAR 14.24.04). The project has been assigned a unique State Application Identifier that should be used on all documents and correspondence. NOTE TO THE REVIEW COORDINATORS: An evaluation study, and corridor report can be accessed via the Internet. See the "Southern Maryland Electric Cooperative" heading by scrolling down the page at

http://www.usda.gov/rus/water/ees/ea.htm

If you need assistance or have questions, contact the State Clearinghouse staff noted above at 410-767-4490 or through e-mail at brosenbush@mdp.state.md.us. Thank you for your cooperation with the MIRC process.

Sincerely,

Linda C. Janey

Linda C. Janey, J.D., Assistant Secretary
for Clearinghouse and Communications

LCJ:BR
Enclosures
cc: Beth Cole – MHT*
08-0902_NDC.NEW.doc
Cindy Johnson – MDOT*
Joane Mueller – MDE*
Roland Limpert – DNR*
Gloria Minnick – MDA*
Macolm Woolf – MEA*
Donald Eveleth – PSC*
John Savich – STMA*
Gregory Bowen – CLVT*
Beverly Warfield – PGEO*
David Umling – CHAS*
Mike Paone – MDPLS*
Steve Allan – MDPL*

BLACK & VEATCH
Building a world of difference.

April 21, 2008

Howard King
Maryland Department of Natural Resources
Fisheries Service
580 Taylor Avenue, Suite B-2
Annapolis, MD 21401

RE: Southern Maryland Electrical Cooperative
Southern Maryland Reliability Project
Holland Cliff substation to Hewitt Road substation

Dear Mr. King:

Our client, Southern Maryland Electric Cooperative (SMECO), is proposing to upgrade the electrical capacity of an existing overhead transmission line between the existing Hewitt Road substation and the Holland Cliff substation. The route will follow the existing right-of-way (ROW) owned by SMECO, with the possible exception of the Patuxent River crossing, which is still under evaluation. The project area is approximately 30 miles long, begins in western Calvert County and ends in Southern St. Mary's County. A map is enclosed for reference, illustrating the route alignment. The alternative routes are not shown.

Black & Veatch has been retained by SMECO to conduct an environmental review and prepare the appropriate permit applications for the project. The following is a description of the proposed project work.

Proposed Holland Cliff Substation Upgrade and Expansion

The existing substation will be expanded to accommodate anticipated future needs. SMECO will upgrade its existing 66 kV substation at Holland Cliff to allow the transmission line to be energized at 230 kV. The upgrades at the Holland Cliff substation will be located entirely on the existing substation property, which is owned by SMECO. No additional property will be acquired for this substation. All substation expansion will occur on land owned by SMECO. The site is large enough to accommodate the operation and maintenance of the facility as well as to comply with ingress and egress requirements.

Proposed Upgrade to 230 kV Transmission Line Route

SMECO plans to upgrade an existing 30-mile section of overhead transmission line from 66 kV to 230 kV between the new Hewitt Road substation and the Holland Cliff substation by installing conductors on the second set of circuit arms of existing poles in the existing right of way. Options for crossing the Patuxent River and alternative routes around previously developed portions of the existing ROW are still under consideration. The conductors installed on the first set of circuit arms will remain in place and can accommodate the increased voltage. No new ROW is required for the upgraded transmission line with the possible exception of alternative routes around development. These alternatives are still under evaluation. The existing poles will continue to be used and will not be moved from their current locations. New poles will be installed in locations where necessary, but these will be placed close to the exiting poles so new areas will not be affected.

Proposed Upgrade to Holland Cliff Substation

A portion of the environmental review process includes examining the project lands for the occurrence of state protected plants and animals. Please review the project vicinity for known or potential occurrences of protected aquatic plants and animals, and their habitats. Comments can be mailed to me at the letterhead address or, if more convenient for you, emailed to me at ShadrickEJ@bv.com. Please provide your comments by May 16, 2008, if possible. I can be reached at (913) 458-4129 or by e-mail if you have questions regarding the project or this request.
Very truly yours,

BLACK & VEATCH CORPORATION

ORIGINAL SIGNED BY ED SHADRICK

Ed Shadrick
Senior Ecologist
Environmental Management Services

Cc: John Bredenkamp, SMECO
Thomas Russell, SMECO
Rich Jacober, Black & Veatch

BLACK & VEATCH
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April 21, 2008

Mr. Jim Lecky
Permits, Conservation, and Education Division
National Marine Fisheries Service, NOAA
Office of Protected Resources
1315 East-West Highway, SSMC3
Silver Springs, MD 20910

RE: Southern Maryland Electrical Cooperative
Southern Maryland Reliability Project
Holland Cliff Switching Station to Hewitt Road Switching Station

Dear Mr. Lecky:

Our client, Southern Maryland Electric Cooperative (SMECO), is proposing to upgrade the electrical capacity of an existing overhead transmission line between the existing Holland Cliff switching station and the Hewitt Road switching station. The route will follow the existing right-of-way (ROW) owned by SMECO, with the possible exception of the Patuxent River crossing, which is still under evaluation. The project area is approximately 30 miles long, begins in western Calvert County and ends in southern St. Mary's County. A map is enclosed for reference, illustrating the route alignment. Potential alternative routes are not shown, but if needed, will be close to the existing alignment.

Black & Veatch has been retained by SMECO to conduct an environmental review and prepare the appropriate permit applications for the project. The following is a description of the proposed project work.

The Holland Cliff-to-Hewitt Road transmission project comprises five project segments that include (1) the installation of 20 miles of new 230kV single pole, double-circuit transmission line from the Holland Cliff switching station to a new switching station located in southern Calvert County; (2) the installation of the new southern Calvert County 230/69kV switching station; (3) the installation of 8 miles of new 230kV single pole, double-circuit transmission line from the new southern Calvert County switching station to the existing Hewitt Road switching station; (4) the installation of 2 miles of 230kV underground transmission cable circuit across the lower Patuxent River; and (5) the expansion of the existing Hewitt Road switching station to accommodate the new 230kV transmission line from the new southern Calvert County switching station. No new ROW is required for the upgraded transmission line with the possible exception of alternative routes around existing residential or commercial development. These alternatives are still under evaluation. The following provides a little more detail of the work associated with the Holland Cliff-to-Hewitt Road transmission project.

Holland Cliff to Southern Calvert County Transmission Line. The Holland Cliff-to-southern Calvert County transmission line will include construction of a new 230kV, single pole, double-circuit transmission line from the Holland Cliff switching station to a new switching station to be located in southern Calvert County. The routing of the new 230kV double-circuit transmission line will be in the existing 69kV transmission line right-of-way going southeast from the Holland Cliff switching station. The new 230kV double-circuit transmission line will be designed and constructed using single tubular steel poles with two sets of circuit arms. This configuration will allow the use of the existing 69kV transmission line right-of-way and preclude the need for additional right-of-way land acquisition.

New 230/69kV Switching Station in Southern Calvert County. The new 230/69kV switching station will be designed and constructed to include a five-position 230kV ring bus, two 230/69kV step-down transformers, and a two-position 69kV breaker-and-a-half bus arrangement. The station site will be on a site of approximately 10 acres in size and either on or very near the existing line's right-of-way. The proposed location of the new switching station has not been identified but will be in southern Calvert County possibly near Lusby, Maryland. SMECO is currently in the process of identifying properties in the area to purchase for the switching station site.

Southern Calvert County to Hewitt Road Transmission Line. The Southern Calvert County-to-Hewitt Road transmission line will consist of the construction of a new 230kV, single pole, double-circuit transmission from the new switching station to the existing Hewitt Road switching station located in St. Mary's County. The Patuxent River divides the 10 miles of new 230kV single-circuit transmission line into two segments. There is the 5-mile segment of the new transmission line from the proposed switching station to the southern Calvert County shoreline near the Thomas Johnson Bridge, the 3-mile segment from the other end of the Bridge to the Hewitt Road switching station, and the 2-mile segment representing the river crossing and described in the next section of this project description.

The routing of the new 230kV double-circuit transmission line is expected to parallel the existing 69kV transmission lines sharing the same right-of-way going south from the proposed switching station site. The new 230kV double-circuit transmission line will be designed and constructed using single tubular steel poles with two sets of circuit arms and provisions for 69kV double-circuit "under-build". The proposed 230kV single pole, double-circuit transmission line can be installed in the existing 150 foot wide, 69kV transmission line right-of-way in southern Calvert County, thus eliminating the need for additional right-of-way land acquisition.

Patuxent River Underground Cable Crossing. The center section of the 230kV transmission line between the new southern Calvert County switching station and the existing Hewitt Road switching station will include an approximate 2-mile section of 230kV underground transmission line to cross the Patuxent River. The planned location of the 230kV river crossing is in the vicinity of the existing 69kV underground transmission line near the Thomas Johnson Bridge. SMECO is presently examining

National Marine Fisheries Service
Mr. Jim Lecky

B&V Project – 146026
April 21, 2008

alternative crossing locations for the circuit, as well as other construction options in order to improve maintenance capabilities, mitigate environmental impact, and reduce project costs. Options presently under review include (1) installation of a submarine cable jetted into the floor of the Patuxent River; (2) installation of a conventional underground cable installed in a directionally bored conduit below the Patuxent River bottom; and (3) attaching the 230kV underground cable circuit to the existing bridge or a future bridge planned for crossing the Patuxent River near the existing Thomas Johnson Bridge.

Hewitt Road 230/69kV Switching Station Expansion. The existing Hewitt Road 230kV switching station will be expanded to accommodate the new transmission line position required for the new 230kV Southern Calvert to Hewitt Road transmission line. Control and relaying equipment required for the new transmission line will be installed in the existing Hewitt Road control enclosure. The expansion of the Hewitt Road 230kV switching station will be completed on the Hewitt Road site property currently owned by SMECO.

A portion of the environmental review process includes examining the project lands for the occurrence of state protected plants and animals. Please review the project vicinity for known or potential occurrences of protected marine plants and animals, and their habitats. Comments can be mailed to me at the letterhead address or, if more convenient for you, emailed to me at ShadrickEJ@bv.com. Please provide your comments by May 16, 2008, if possible. I can be reached at (913) 458-4129 or by e-mail if you have questions regarding the project or this request.

Very truly yours,

BLACK & VEATCH CORPORATION

ORIGINAL SIGNED BY ED SHADRICK

Ed Shadrick
Senior Ecologist
Environmental Management Services

Cc: John Bredenkamp, SMECO
Thomas Russell, SMECO
Rich Jacober, Black & Veatch
Salvatore Falcone, Black & Veatch

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

MAY 16 2008

Ed Shadrick
Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, Kansas 66211

Dear Mr. Shadrick,

This is in response to your letter addressed to NOAA's National Marine Fisheries Service (NMFS) dated April 23, 2008. Your letter requested information on the presence of federally listed species along a transmission corridor operated by the Southern Maryland Electric Cooperative. The proposed project will involve the installation of new aerial transmission lines, the installation of a new switching station, the expansion of an additional switching station, and the installation of 2 miles of transmission cable under the Patuxent River.

Several species of listed sea turtles and the endangered shortnose sturgeon (*Acipenser brevirostrum*) are known to be present in the Chesapeake Bay and several of its tidal tributaries. The proposed project will not affect listed sea turtles. The only aspect of the proposed project that has the potential to impact the shortnose sturgeon is the installation of the cable under the Patuxent River. If a directional drill is used, there is little to no potential for impacts to this species. However, if jetting or another method of installation is used which involves the disruption of the riverbed, further coordination with NMFS on the proposed project may be necessary. Should you have any questions regarding these comments, please contact Julie Crocker at (978)281-9328 x6530.

NMFS' Habitat Conservation Division is responsible for overseeing programs related to Essential Fish Habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act and other NOAA trust resources. As the proposed project will involve work in the Patuxent River, coordination with NMFS' HCD should be pursued. John Nichols of the Maryland Field Office can be reached at (410)295-3154 or by e-mail (John.Nichols@Noaa.Gov).

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
for Protected Resources

Cc: Nichols, F/NER4

File Code: Sec 7 tech assist 2008 - Southern Maryland Electric transmission line
PCTS: T/NER/2008/02988

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April 21, 2008

Leopoldo Miranda
Field Supervisor
Chesapeake Bay Field Office
U.S. Fish & Wildlife Service
177 Admiral Cochrane Drive
Annapolis, MD 21401

RE: Southern Maryland Electrical Cooperative
Southern Maryland Reliability Project
Holland Cliff substation to Hewitt Road substation

Dear Mr. Miranda:

Our client, Southern Maryland Electric Cooperative (SMECO), is proposing to upgrade the electrical capacity of an existing overhead transmission line between the existing Hewitt Road substation and the Holland Cliff substation. The route will follow the existing right-of-way (ROW) owned by SMECO, with the possible exception of the Patuxent River crossing, which is still under evaluation. The project area is approximately 30 miles long, begins in western Calvert County and ends in Southern St. Mary's County. A map is enclosed for reference, illustrating the route alignment. The alternative routes are not shown.

Black & Veatch has been retained by SMECO to conduct an environmental review and prepare the appropriate permit applications for the project. The following is a description of the proposed project work.

<u>Proposed Holland Cliff Substation Upgrade and Expansion</u>
The existing substation will be expanded to accommodate anticipated future needs. SMECO will upgrade its existing 66 kV substation at Holland Cliff to allow the transmission line to be energized at 230 kV. The upgrades at the Holland Cliff substation will be located entirely on the existing substation property, which is owned by SMECO. No additional property will be acquired for this substation. All substation expansion will occur on land owned by SMECO. The site is large enough to accommodate the operation and maintenance of the facility as well as to comply with ingress and egress requirements.

<u>Proposed Upgrade to 230 kV Transmission Line Route</u>
SMECO plans to upgrade an existing 30-mile section of overhead transmission line from 66 kV to 230 kV between the new Hewitt Road substation and the Holland Cliff substation by installing conductors on the second set of circuit arms of existing poles in the existing right of way. Options for crossing the Patuxent River and alternative routes around previously developed portions of the existing ROW are still under consideration.

US Fish and Wildlife Service
Mr. Leopoldo Miranda

B&V Project – 146026
April 21, 2008

The conductors installed on the first set of circuit arms will remain in place and can accommodate the increased voltage. No new ROW is required for the upgraded transmission line with the possible exception of alternative routes around development. These alternatives are still under evaluation. The existing poles will continue to be used and will not be moved from their current locations. New poles will be installed in locations where necessary, but these will be placed close to the exiting poles so new areas will not be affected.

Proposed Upgrade to Holland Cliff Substation

A portion of the environmental review process includes examining the project lands for the occurrence of state protected plants and animals. Please review the project vicinity for known or potential occurrences of protected terrestrial or aquatic plants and animals, and their habitats. Comments can be mailed to me at the letterhead address or, if more convenient for you, emailed to me at ShadrickEJ@bv.com. Please provide your comments by May 16, 2008, if possible. I can be reached at (913) 458-4129 or by e-mail if you have questions regarding the project or this request.

Very truly yours,

BLACK & VEATCH CORPORATION

ORIGINAL SIGNED BY ED SHADRICK

Ed Shadrick
Senior Ecologist
Environmental Management Services

Cc: John Bredenkamp, SMECO
Thomas Russell, SMECO
Rich Jacober, Black & Veatch

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore, Maryland 21230
410-537-3000 • 1-800-633-6101 • http://www.mde.state.md.us

MDE

October 22, 2008

Mr. Salvatore Falcone
Black & Veatch Corporation
11401 Lamar Avenue
Overland Park, KS 66211

RE: State Application Identifier: MD20080903-0902
Project: Scoping & Agency Meeting...Southern Maryland Electric Cooperative

Dear Mr. Falcone:

Thank you for the opportunity to review the above referenced project. The document was circulated throughout the Maryland Department of the Environment (MDE) for review,. The project is generally consistent with our plans, programs and objectives contingent upon certain actions being taken as noted in the following comments.

1. Construction, renovation and/or demolition of buildings and roadways must be performed in conformance with State regulations pertaining to "Particulate Matter from Materials Handling and Construction" (COMAR 26.11.06.03D), requiring that during any construction and/or demolition work, reasonable precaution must be taken to prevent particulate matter, such as fugitive dust, from becoming airborne.

2. If boilers or other equipment capable of producing emissions are installed as a result of this project, the applicant is requested to obtain a permit to construct from MDE's Air and Radiation Management Administration for this equipment, unless the applicant determines that a permit for this equipment is not required under State regulations pertaining to "Permits, Approvals, and Registration" (COMAR 26.11.02.). A review for toxic air pollutants should be performed. Please contact Dr. Justin Hsu, Ph.D., P.E., New Source Permits Division, Air and Radiation Management Administration at (410) 537-3230 to learn about the State's requirements and the permitting processes for such devices.

3. If a project receives federal funding, approvals and/or permits, and will be located in a nonattainment area or maintenance area for ozone or carbon monoxide, the applicant should determine whether emissions from the project will exceed the thresholds identified in the federal rule on general conformity. If the project emissions will be greater than 25 tons per year, contact the Planning Division of the Planning and Monitoring Program, Air and Radiation Management Administration, at (410) 537-3240 for further information regarding threshold limits.

4. Fossil fuel fired power plants emit large quantities of sulfur oxide and nitrogen oxides, which cause acid rain. In addition, nitrogen oxide emissions contribute to the problem of global warming and also combine with volatile organic compounds to form smog. The MDE supports energy conservation, which reduces the demand for electricity and therefore, reduces overall emissions of harmful air pollutants. For these reasons, MDE recommends that the builders use energy efficient lighting, computers, insulation and any other energy efficient equipment. Contact the U.S. EPA at (202) 233-9120 to learn more about the voluntary Green Lights Program which encourages businesses to install energy-efficient lighting systems.

5. Calvert County is in nonattainment with the National Ambient Air Quality Standards (NAAQS) for pm 2.5 and ozone. Therefore, general conformity requirements will need to be followed for this project.

6. Any above ground or underground petroleum storage tanks that may be utilized must be installed and maintained in accordance with applicable State and federal laws and regulations. Contact the Oil Control Program at (410) 537-3442 for additional information.

7. Any solid waste including construction, demolition and land clearing debris, generated from the subject project, must be properly disposed of at a permitted solid waste acceptance facility, or recycled if possible. Contact the Solid Waste Program at (410) 537-3318 for additional information.

Additional information from MDE's Science Services Administration is enclosed.

Again, thank you for giving MDE the opportunity to review this project. If you have any questions or need additional information, please feel free to call me at (410) 537-4120.

Sincerely,

Joane D. Mueller
MDE Clearinghouse Coordinator
Science Services Administration

Enclosure
cc: Bob Rosenbush, State Clearinghouse

Southern Maryland Electric Cooperative Holland Cliff-Hewitt Road Transmission Line Project

Maryland Department of the Environment - Science Services Administration

REVIEW FINDING: R1 Generally Consistent with Qualifying Comments (LP2008 0903-0902)

The following additional comments are intended to alert interested parties to issues regarding water quality standards. The comments address:

Special protections for high-quality waters in the local vicinity, which are identified pursuant to Maryland's anti-degradation policy;

Anti-degradation of Water Quality: Maryland requires special protections for waters of very high quality (Tier II waters). The policies and procedures that govern these special waters are commonly called "anti-degradation policies."

Tier II waters are not present in the area of the project but this is subject to change. Any future project study should take into consideration these waters.

Planners should be aware of legal obligations related to Tier II waters described in the Code of Maryland Regulations (COMAR) 26.08.02.04 with respect to current and future land use plans. Information on Tier II waters can be obtained online at:
http://www.dsd.state.md.us/comar/26/26.08.02.04%2D1.htm

Planners should also note that since the Code of Maryland Regulations is subject to periodic updates. A list of Tier II waters pending Departmental listing in COMAR can be found, with a discussion and maps for each county, at the following website:
http://www.mde.state.md.us/ResearchCenter/Data/waterQualityStandards/Antidegradation/index.asp

ADDITIONAL COMMENTS

Sensitive Areas

The project should consider streams and stream side forestation. With the removal of all trees and shrubs from the Right of Way, this action can have several effects not only visual but also on water quality.

After removal the impacts can include:

1) Erosion of Stream Banks
2) Sedimentation and loss of in-stream habitat due to erosion
3) Increase in Nutrients and other pollutants entering the stream
4) Increase in stream temperature

Such impacts can cause degradation in local water quality.

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April 21, 2008

Cynthia Nethen
Maryland Department of the Environment
Project Manager – Nontidal Wetlands and Waterways Division
1800 Washington Boulevard
Baltimore, MD 21230

RE: Southern Maryland Electrical Cooperative
Southern Maryland Reliability Project
Holland Cliff substation to Hewitt Road substation

Dear Ms. Nethen:

Our client, Southern Maryland Electric Cooperative (SMECO), is proposing to upgrade the electrical capacity of an existing overhead transmission line between the existing Hewitt Road substation and the Holland Cliff substation. The route will follow the existing right-of-way (ROW) owned by SMECO, with the possible exception of the Patuxent River crossing, which is still under evaluation. The project area is approximately 30 miles long, begins in western Calvert County and ends in Southern St. Mary's County. A map is enclosed for reference, illustrating the route alignment. The alternative routes are not shown.

Black & Veatch has been retained by SMECO to conduct an environmental review and prepare the appropriate permit applications for the project. The following is a description of the proposed project work.

Proposed Holland Cliff Substation Upgrade and Expansion
The existing substation will be expanded to accommodate anticipated future needs. SMECO will upgrade its existing 66 kV substation at Holland Cliff to allow the transmission line to be energized at 230 kV. The upgrades at the Holland Cliff substation will be located entirely on the existing substation property, which is owned by SMECO. No additional property will be acquired for this substation. All substation expansion will occur on land owned by SMECO. The site is large enough to accommodate the operation and maintenance of the facility as well as to comply with ingress and egress requirements.

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accommodate the increased voltage. No new ROW is required for the upgraded transmission line with the possible exception of alternative routes around development. These alternatives are still under evaluation. The existing poles will continue to be used and will not be moved from their current locations. New poles will be installed in locations where necessary, but these will be placed close to the exiting poles so new areas will not be affected.

Proposed Upgrade to Holland Cliff Substation

A portion of the environmental review process includes examining the project lands for the occurrence of state protected plants and animals. Please review the project vicinity for known or potential occurrences of protected aquatic plants and animals, and their habitats. Comments can be mailed to me at the letterhead address or, if more convenient for you, emailed to me at ShadrickEJ@bv.com. Please provide your comments by May 16, 2008, if possible. I can be reached at (913) 458-4129 or by e-mail if you have questions regarding the project or this request.
Very truly yours,

BLACK & VEATCH CORPORATION

ORIGINAL SIGNED BY ED SHADRICK

Ed Shadrick
Senior Ecologist
Environmental Management Services

Cc: John Bredenkamp, SMECO
Thomas Russell, SMECO
Rich Jacober, Black & Veatch

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August 15, 2008

Robert Tabiz
MDE Tidal Wetlands Division
1800 Washington Boulevard
Baltimore, MD 12130

RE: Southern Maryland Electrical Cooperative
Southern Maryland Reliability Project
Holland Cliff substation to Hewitt Road substation

Dear Mr. Tabiz:

Our client, Southern Maryland Electric Cooperative (SMECO), is proposing to upgrade the electrical capacity of an existing overhead transmission line between the existing Holland Cliff switching station and the Hewitt Road switching station. The route will follow the existing right-of-way (ROW) owned by SMECO, with the possible exception of the Patuxent River crossing, which is still under evaluation. The project area is approximately 30 miles long, begins in western Calvert County and ends in southern St. Mary's County. A map is enclosed for reference, illustrating the route alignment. Potential alternative routes are not shown, but if used, these will be close to the existing alignment.

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Holland Cliff to Southern Calvert County Transmission Line The Holland Cliff-to-southern Calvert County transmission line will include construction of a new 230kV, single pole, double-circuit transmission line from the Holland Cliff switching station to a new switching station to be located in southern Calvert County. The routing of the new 230kV double-circuit transmission line will be in the existing 69kV transmission line right-of-way going southeast from the Holland Cliff switching station. The new 230kV double-circuit transmission line will be designed and constructed using single tubular steel poles with two sets of circuit arms. This configuration will allow the use of the existing 69kV transmission line right-of-way and preclude the need for additional right-of-way land acquisition.

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Southern Calvert County to Hewitt Road Transmission Line The Southern Calvert County-to-Hewitt Road transmission line will consist of the construction of a new 230kV, single pole, double-circuit transmission from the new switching station to the existing Hewitt Road switching station located in St. Mary's County. The Patuxent River divides the 10 miles of new 230kV single-circuit transmission line into two segments. There is a 5-mile segment of the new transmission line from the proposed switching station to the southern Calvert County shoreline near the Thomas Johnson Bridge, a 3-mile segment from the other end of the Bridge to the Hewitt Road switching station, and a 2-mile segment representing the river crossing and described in the next section of this project description.

The routing of the new 230kV double-circuit transmission line is expected to parallel the existing 69kV transmission lines sharing the same right-of-way going south from the proposed switching station site. The new 230kV double-circuit transmission line will be designed and constructed using single tubular steel poles with two sets of circuit arms and provisions for 69kV double-circuit "under-build". The proposed 230kV single pole, double-circuit transmission line can be installed in the existing 150 foot wide, 69kV transmission line right-of-way in southern Calvert County, thus eliminating the need for additional right-of-way land acquisition.

Patuxent River Underground Cable Crossing The center section of the 230kV transmission line between the new southern Calvert County switching station and the existing Hewitt Road switching station will include an approximate 2-mile section of 230kV underground transmission line to cross the Patuxent River. The planned location of the 230kV river crossing is close to the existing 69kV underground transmission line near the Thomas Johnson Bridge. SMECO is presently examining alternative crossing locations for the circuit, as well as other construction options in order to improve maintenance capabilities, mitigate environmental impact and reduce project costs. Options presently under review include (1) installation of a submarine cable jetted into the floor of the Patuxent River; (2) installation of a conventional underground cable installed in a directionally bored conduit below the Patuxent River bottom; and (3) attaching the 230kV underground cable circuit to the existing bridge or a future bridge planned for crossing the Patuxent River near the existing Thomas Johnson Bridge.

Hewitt Road 230/69kV Switching Station Expansion The existing Hewitt Road 230kV switching station will be expanded to accommodate the new transmission line position required for the new 230kV Southern Calvert to Hewitt Road transmission line. Control and relaying equipment required for the new transmission line will be installed in the existing Hewitt Road control enclosure. The expansion of the Hewitt Road 230kV switching station will be completed on the Hewitt Road site property currently owned by SMECO.

A portion of the environmental review process includes examining the project lands for the occurrence of state protected plants and animals. Please review the project vicinity for known or potential occurrences of protected plants and animals, and their habitats in tidal wetlands. Comments can be mailed to me at the letterhead address or, if more convenient for you, emailed to me at ShadrickEJ@bv.com. Please provide any comments as soon as possible. I can be reached at (913) 458-4129 or by e-mail if you have questions regarding the project or this request.

Very truly yours,

BLACK & VEATCH CORPORATION

Ed Shadrick
Senior Ecologist
Environmental Management Services

Cc: John Bredenkamp, SMECO (without enclosures)
Thomas Russell, SMECO (without enclosures)
Rich Jacober, Black & Veatch (without enclosures)
Salvatore Falcone, Black & Veatch (without enclosures)
SMECO file (with enclosures)

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September 5, 2008

Mrs. Kathy Anderson
US Army Engineer District, Baltimore
Operations Division
City Crescent Building
10 South Howard Street
Baltimore, MD 21201

Subject: Scoping and Agency Meeting for Southern Maryland Electric Cooperative's 230 kV Project

Dear Mrs. Anderson:

The Rural Utilities Service (RUS), an agency that administers the programs of USDA's Rural Development, is preparing an Environmental Assessment (EA) with scoping in connection with a proposal by Southern Maryland Electric Cooperative (SMECO) of Hughesville, Maryland. SMECO proposes to construct approximately 30 miles of 230 kilovolt transmission line, a new 230/69 kilovolt switching station, a 230/69 kilovolt switching station expansion, and a river crossing. Initial alternative evaluation and site selection studies have located the proposed project in Calvert and St. Mary's Counties in Maryland, primarily on existing right-of-way. The new switching station would be located in southern Calvert County, the switching station expansion would be located in St. Mary's County, and the river crossing location would be near the Thomas Johnson Bridge joining the two counties. A location and route map are attached. SMECO is requesting RUS provide financial assistance for the construction of this proposal.

In accordance with RUS' environmental regulations, 7 CFR 1794, Environmental Policies and Procedures, RUS will be the lead agency for preparation of the EA with scoping. As part of the scoping process and prior to any public scoping meetings, RUS is distributing and making available specific planning documents prepared by SMECO for review and comment by Federal, State and local agencies and the public. Enclosed is a compact disk that contains the Alternatives Evaluation Study and Macro-Corridor Report. Copies of the documents are also available on RUS' website at: http://www.usda.gov/rus/water/ees/ea.htm.

A scoping meeting will be held by RUS, in an open house format, seeking the input of the public and other interested parties. The meeting will be held from 5 PM until 8 PM, on September 11, 2008. The location of the meeting will be the SMECO Office located at 901 Dares Beach Road in Prince Frederick, Maryland. Additionally, an agency meeting may be held at 3 PM on September 11, 2008 at the same location.

Please indicate your intention to attend the agency meeting by responding to Stephanie Strength by email at stephanie.strength@wdc.usda.gov, before September 8, 2008.

U.S. Army Corps of Engineers
Mrs. Kathy Anderson

B&V Project 146026
September 5, 2008

Please provide written comments by October 11, 2008 to Ms. Stephanie A. Strength, Rural Utilities Service, Engineering and Environmental Staff, 1400 Independence Avenue, SW, Stop 1571, Washington, D.C. 20250-1571 or E-mail: stephanie.strength@usda.gov.

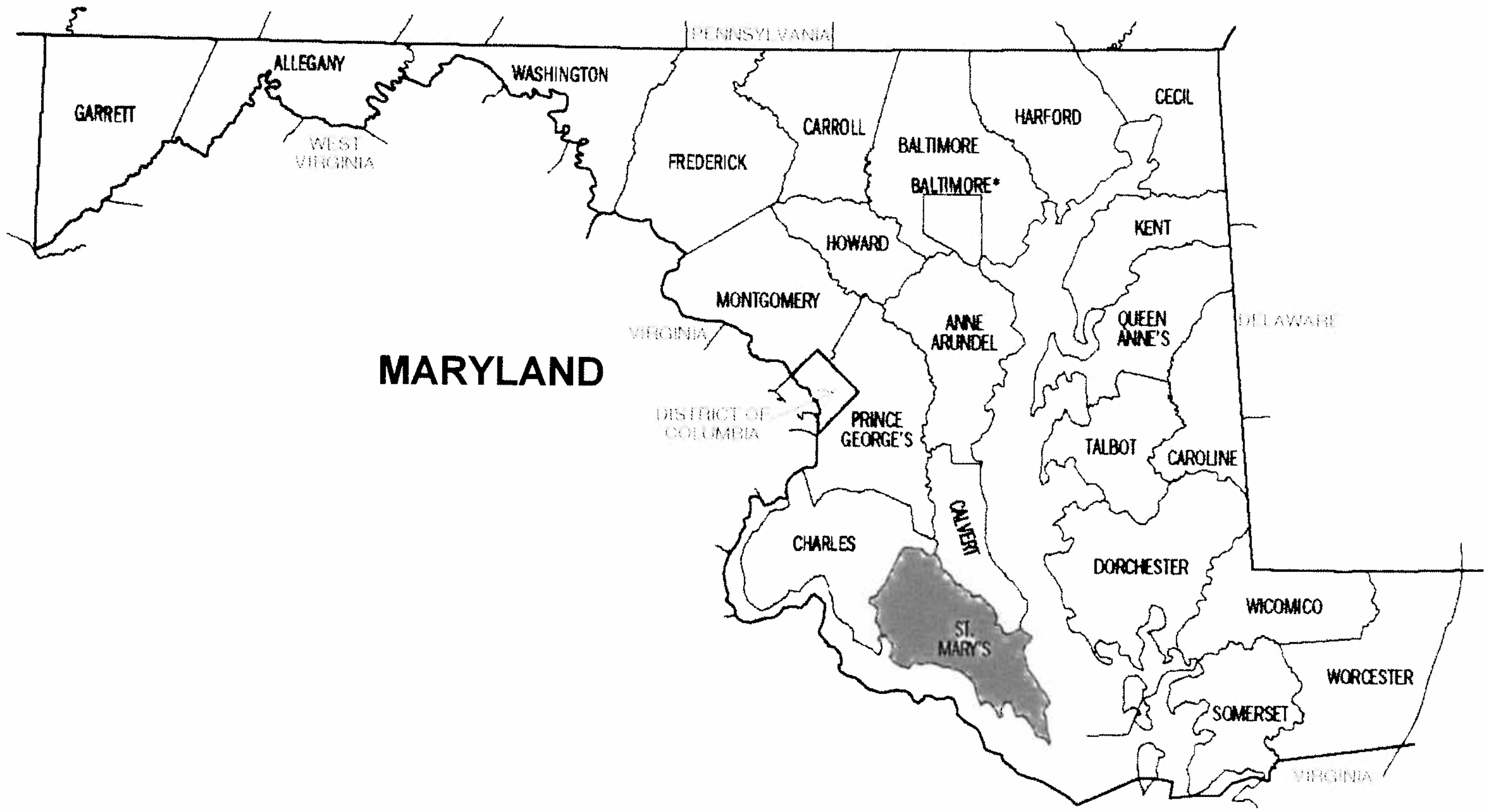
Very truly yours,

BLACK & VEATCH

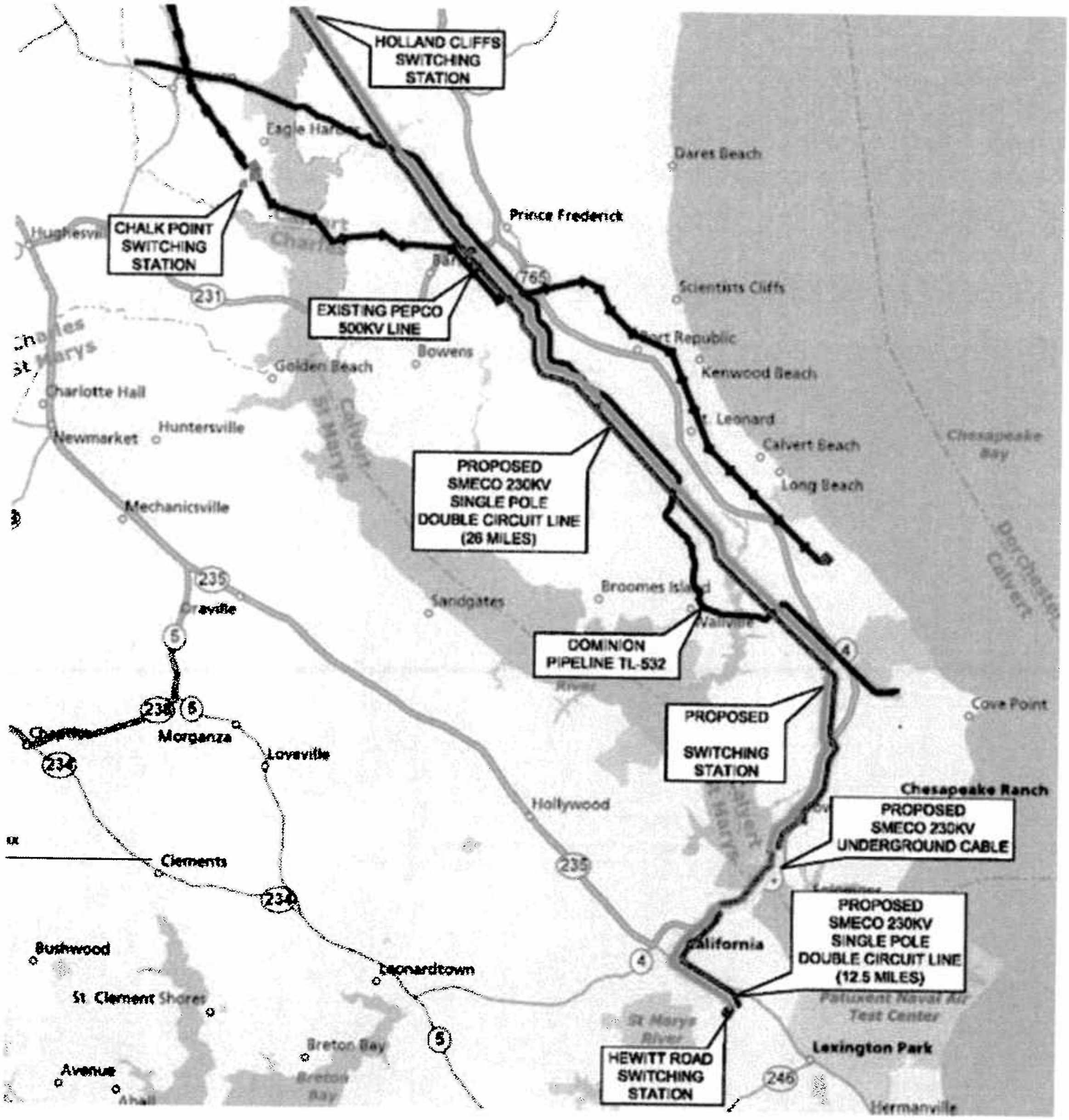
Salvatore Falcone
Environmental Services Project Manager

SF/sl
Enclosure[s]

cc: Stephanie Strength, USDA Rural Utilities Service
John Bredenkamp, SMECO
Thomas Russell, SMECO
Terry Ressler, SMECO
Rich Jacober, Black & Veatch



SMECO
Holland Cliff to Hewitt Road
230 kV Transmission Line
Project Location Map
Calvert and St. Mary's County



Existing SMECO 69 kV Line

Existing SMECO 69 kV River Crossing

Proposed SMECO 230 kV Line

Proposed SMECO 230 kV River Crossing

Existing Dominion Pipeline TL-532

Existing PEPCO 500 kV Line

SMECO
Holland Cliff
To Hewitt Road
230 kV
Transmission Line
Project
Route Map

Appendix K
Public Meeting Information & Comments

U.S. Department of Agriculture
Rural Utilities Service

HOLLAND CLIFF – HEWITT ROAD 230 KV TRANSMISSION LINE PROJECT

SCOPING MEETING REPORT

Prepared by:

BLACK & VEATCH CORPORATION

for:

SOUTHERN MARYLAND ELECTRIC COOPERATIVE, INC.
HUGHESVILLE, MD

B&V Project 146026(G)
B&V File 32.0201

March 11, 2010

Table of Contents

LIST OF ABBREVIATIONS

ADC	Alexandria Drafting Company
BER	Borrowers Environmental Report
CFR	Code of Federal Regulation
EA	Environmental Assessment
EMF	Electric and Magnetic Fields
kV	kilovolts
MW	megawatts
MWH	megawatt-hour
Project	Holland Cliff to Hewitt Road 230 kV Transmission Line Project
PSC	Public Services Commission
RD	Rural Development
RUS	Rural Utilities Service
SMECO	Southern Maryland Electric Cooperative
USDA	United States Department of Agriculture

1.0 Introduction

Southern Maryland Electric Cooperative, Inc. (SMECO) is proposing to construct a new 230 kV double circuit transmission line from SMECO's Holland Cliff switching station in northern Calvert County, Maryland, to the SMECO Hewitt Road switching station in St. Mary's County, Maryland. Also proposed as part of this project is the southern Calvert County 230/69 kV switching station that would be connected to this line and would be located between the Holland Cliff and Hewitt Road switching stations in the vicinity of the existing SMECO Calvert Cliffs 69 kV transmission line tap near the intersection of Pardoe Road and Maryland State Route 4. The new 230 kV Holland Cliff to Hewitt Road transmission line and associated southern Calvert County 230/69 kV switching station, hereafter referred to as "the Project", is being proposed to meet growth in electrical energy demand and improve system reliability within SMECO's service area.

Funding for the Project can come from any number of sources, including the Rural Utilities Service (RUS). If the funding comes from RUS, certain requirements apply. These are stated in Title 7 of the Code of Federal Regulations (CFR), Part 1794 – Environmental Policies and Procedures, as amended.

For undertakings like the SMECO Project, where more than 25 miles of 230 kV transmission line would be constructed, one of these requirements is the need to hold a public scoping meeting for which members of the public can learn about the project, ask questions, and voice their concerns. The public's concerns must then be addressed in the Environmental Assessment, which is also a requirement of 7 CFR Part 1794, as amended.

The purpose of this report is to provide a summary of the scoping meeting that was held for the Project in fulfillment of the requirements in 7 CFR 1794.52. In developing this summary, the RUS Bulletin 1794A-603, *Scoping Guide for RUS Funded Projects Requiring Environmental Assessments with Scoping and Environmental Impact Statements*, was used for reference and guidance.

2.0 Previous Public Meetings

SMECO conducted a carefully planned "roll-out" of information on the Project starting in March 2008. Employees, key stakeholders, and public officials were provided information on the Project. As one of several means of informing the general public, three public meetings were held in the spring of 2008:

- April 24 at the Springhill Suites in Prince Frederick
- April 29 at the Daugherty Center in Lexington Park
- May 1 at the Hilton Garden Inn in Dowell

All three meetings were held from 5:00PM to 8:00PM and all were conducted in the open house format. SMECO had requested that the last of these meetings, on May 1, be designated as the scoping meeting required in 7 CFR 1794.52. However, the inability to finalize the Alternatives Evaluation Study Report and Macro-Corridor Study Report in time for the required Federal Register newspaper notices precluded the use of May 1 meeting as a scoping meeting. The official RUS scoping meeting was held on September 11, 2008.

All three of these public meetings were set up to include six information stations (see Section 4.0 for details), each staffed with experienced SMECO personnel or those of SMECO's designer engineer and environmental consultant Black & Veatch and EMF consultant Exponent. SMECO received written comments from the public along with survey responses, the results of which can be reviewed in the appendices to this document. The names and addresses of the commenters have been deleted to protect their privacy.

Based on sign in sheets provided at the entrance to each meeting, the following numbers were in attendance:

- 47 on April 24 at the Springhill Suites in Prince Frederick
- 27 on April 29 at the Daugherty Center in Lexington Park
- 20 on May 1 at the Hilton Garden Inn in Dowell

Business roundtable breakfasts held on the same dates and at the same locations were attended by six, nine, and two persons, respectively. Attendees were local stakeholders who were sent invitations in advance.

Other efforts to inform the public, conducted prior to the scoping meeting in September 2008, included: briefings with local business owners, special interest groups, and public officials; establishment of a web site devoted entirely to the Project; and availability of Project information through the SMECO customer service phone lines.

Appendix A contains a complete list of comments received at the April and May public meetings. In general, attendees felt that SMECO provided the information they needed and they liked the meeting format and layout. From the multiple choice survey questions, respondents strongly agreed that the project area has grown significantly and electric transmission must expand to meet demand (30 of 42), an overhead line using existing right-of-way is the best option for a new line 27 of 42), and the use of weathering steel poles is the preferred alternative (28 of 42). There was less consensus on the method for crossing the Patuxent River, with respondents split evenly between an underwater line sunk into the river bottom, an under-river line bored beneath the riverbed, and an overhead line attached to a new Thomas Johnson Memorial Bridge.

When asked what additional information would the attendees liked to have seen presented, there was no consensus. Topics of concern and interest included: pole locations, property values, project cost and impact on customer rates, underground construction instead of overhead lines, and the type of fuel used to generate the electricity that SMECO provides to its customers.

3.0 Scoping Meeting Preparation Activities

On September 11, 2008, SMECO held a Project scoping meeting in accordance with 7 CFR 1794.52. The scoping meeting was held at a SMECO office located at 901 Dares Beach Road in Prince Frederick, Maryland. The meeting hours were from 5:00PM to 8:00PM and the meeting was conducted in an open house format.

In preparation for the meeting, SMECO developed and submitted to RUS several documents and notices for approval. Two documents, an Alternatives Evaluation Study Report and a Macro-Corridor Study Report, were submitted to RUS for comments earlier in the year. RUS provided its comments and the reports were finalized in August. SMECO received formal acceptance of the reports from RUS on August 25, 2008.

SMECO also provided text for the public notices required by RUS. These are found in the appendices to this report and include:

- The RUS Federal Register notice published on August 27
- A Notice of Intent to Hold a Scoping Meeting published on August 29 in the St. Mary's Enterprise and the Calvert Recorder
- A detailed notice in the Legal Section of the same newspapers

Earlier in the day of the scoping meeting, two RUS representatives, Stephanie Strength and Lauren McGee, participated with SMECO and Black & Veatch Project staff in an inspection of portions of the Project corridor. Ms. Strength is an Environmental Protection Specialist and Ms. McGee an Environmental Scientist with RUS. The corridor inspection was conducted from 8:00AM to approximately 3:00PM. Such an inspection is recommended in the aforementioned RUS Bulletin 1794A-603.

A variety of federal, state, and local agencies were invited to the scoping meeting and offered the opportunity of a pre-meeting gathering at 3:00PM. However, only one agency representative expressed interest in a pre-meeting and later agreed, at SMECO’s request, to meet with SMECO during the public meeting instead.

The appendices provide a list of the agencies and representatives that were sent written invitation letters. Enclosed with each letter, a sample of which appears in the appendices, were Project location and route maps. The invitees were also sent a compact disk containing the approved Alternatives Evaluation Study and Macro-Corridor Study reports.

4.0 Summary of RUS Scoping Meeting

As previously stated, SMECO held a scoping meeting on September 11, 2008 at the SMECO office located at 901 Dares Beach Road in Prince Frederick, Maryland. The location of the meeting was less than 25 driving miles from any point along the proposed route and so complied with the guidance provided in RUS Bulletin 1794A-603. The meeting hours were from 5:00PM to 8:00PM and the meeting was conducted in an open house format.

There were six information stations at the meeting, titled as follows:

- Station One – Energy Use Is Growing
- Station Two – To Meet Your Needs, We Need to Upgrade Our System
- Station Three – Upgrading This Line Means You Will Have More Reliable Power
- Station Four – This Project Has Limited Impact
- Station Five – We Will Use Existing Rights-of-Way
- Station Six – We Will Do This Project the Right Way

Photocopies of the displays at each information station are provided in the appendices to this report.

Each of the stations was staffed by one or more professionals from SMECO, Black & Veatch, and Exponent. For SMECO, representatives of executive management, project management, engineering, right-of-way maintenance, environmental management, and public relations were present.

In addition to the information stations, a table for RUS representatives Stephanie Strength and Lauren McGee was set up near the entrance door. Four free-standing display banners providing information about SMECO were located in the middle of the room. A room layout with dimensions is provided in the appendices.

In addition to the displays described above, SMECO provided additional visual aids:

- Small sections of galvanized steel and weathering steel poles to show the difference in appearance (survey results from this meeting and the previous meetings indicate the weathering steel is overwhelmingly preferred by the public and will be used for the project)
- Large easel-mounted ADC maps showing the Project route
- Books of aerial photographs of the route for members of the public to use to determine the Projects location with respect to their properties

- Numerous brochures providing information on the project, electrical power reliability, increased demand for electricity, environmental impacts, right-of-way maintenance, tree planting, and EMF.

From the public, five people attended (see Appendix E for a copy of the sign-in sheet). SMECO and RUS received no written comments from those attending the meeting. Conversations with those attending the meeting indicate that the greatest concern is how private property and property values will be affected by the Project.

Following the meeting, RUS received a comment letter, dated February 13, 2009, from the Baltimore District of the U.S. Army Corps of Engineers (see Appendix F). The letter requested that following topics be evaluated in the proposed EA for the Project:

- Purpose and need for the Project
- Alternatives analysis
- Methods to minimize adverse effects to waters of the U.S.
- Corps pubic interest review factors
- Cumulative and indirect impacts resulting from the Project
- Environmental justice
- Compliance with Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act
- Air Quality
- Compliance with the Executive Order on floodplains
- Potential conflicts with shipping traffic and recreational/commercial boating and fishing activities

5.0 Follow-up Activities

Using the information obtained from the public meetings in the spring of 2008 and the formal RUS scoping meeting held on September 11, 2008, and in response to specific questions asked by attendees, SMECO and Black & Veatch revised portions of the Borrower's Environmental Report (BER), which was submitted to RUS in November 2008. Examples of how that information was used includes the following:

- SMECO used survey data regarding pole-type preference in the Engineering and Construction Features section of the BER in selecting the weathering steel option.
- SMECO used landowner feedback in its consideration of new structures placement wherever there is flexibility in locating them.
- Inquiries from landowners regarding the possibility of locating the new transmission lines underground and out of site led SMECO to authorize a study on the costs and benefits of doing so. This report of this study was submitted as part of the BER.
- SMECO also agreed to meet individually with those landowners who have concerns with EMF and has offered to provide free EMF readings taken by qualified SMECO personnel.

Scoping meeting invitations sent to agency personnel led to further communications with them at which more information was obtained. For example, SMECO learned that it cannot use state highway right-of-way for routing of any portion of the proposed transmission line. SMECO has also met with and continues to work with U.S. Naval Recreation Center personnel to determine specific placement of the proposed transmission line through the Center and the location for the horizontal directional bore which will take the line under the Patuxent River.

Given its efforts to inform the public, and its use of information received from the public in its development of the BER, SMECO believes that it has fulfilled the obligations for scoping described in 7 CFR Part 1794.

APPENDIX A

Open House Survey Results from April and May Public Meeting Information

Open House Survey Results from April and May Public Meetings

1. Please check the one statement you most agree with.

30 A Southern Maryland and Calvert County have grown significantly in the past 30 years, **and electric transmission must expand to meet demand.**

3 B Southern Maryland and Calvert County have grown significantly in the past 30 years, **but electric transmission does not need to expand to meet demand.**

2 C Southern Maryland and Calvert County have not grown significantly in the past 30 years, **but electric transmission should expand ahead of development.**

1 D Southern Maryland and Calvert County have not grown significantly in the past 30 years, **but electric transmission must expand ahead of development.**

6 no response

2. Of the following potential types of routes for transmission line, which one option do you support the most?

27 A An overhead line which runs along existing SMECO rights-of-way and does not require land acquisition.

6 B An overhead line which requires land acquisition and construction through currently undeveloped fields and forests.

5 C None of these options, but I do support a new transmission line.

1 D I do not support any new transmission line.

3 no response

3. To cross the lower Patuxent River, which one route for the expanded transmission line do you support the most?

11 A An underwater line achieved by sinking an insulated cable into the river bottom.

11 B An underground line achieved by horizontal directional drilling under the river to install the cable beneath the riverbed.

11 C An overhead line crossing achieved by installing cables on a new Thomas Johnson Memorial Bridge if it is constructed by 2013.

9 no response

4. Of the following, which one type of material for the transmission poles do you prefer the most?

11 A Galvanized steel, which will remain metallic colored for the life of the pole.

28 B Weathering steel, which will develop a brown coating over time to blend with existing wooded areas along the right-of-way.

3 no response

SMECO®
Southern Maryland Electric Cooperative
Your Touchstone Energy® Cooperative

5. Were you satisfied with the amount of information available to you at SMECO's open house?

33 A Yes, SMECO provided the information I wanted.

0 B No, SMECO did not provide the information I wanted.

2 C Neither, SMECO only provided some of the information I wanted.

7 no response

6. If you did not answer yes, what additional information would you like to have seen presented?

Bring in overhead lines.

Where do poles go and what will it do to property value?

Weathering steel poles much better than galvanized

Which is cheaper? Galvanized or weathering steel?

Place all lines underground through the town centers in Calvert. I got the impression that additional clearing would not be necessary. I would be interested in the total clearing that might be necessary.

I don't think SMECO can answer the question I would like answered as that would be what fuel are we going to use in the near future and distant future to generate power?

Please contact me regarding lines going north.

Please send map book page 63 to ____________@hotmail.com

I wish that you had used this format when you constructed the 69kV poles in N. Town Creek.

Survey is not unbiased--don't feel it's an accurate representation of current situation/concerns.

A laptop that could zoom in on areas of change would have made answering my questions easier for the gentleman who did. Thank you for your presentation.

For Q. #2 - New overhead line along highway

Re: Q 1 - Growth appears to be slowing.

Re: Q 2 - Underground

Cost to customers per alternative and estimated tower height at specific locations.

All my questions were answered. The three people I spoke with were well informed and very informative.

Re: Q 3 - Passing through Patuxent River tunnel upstream from Solomons

Re: Q 2 - With underground segments in populated areas

Re: Q 3 - none of the above

Re: Q 4 - No new poles. No new transmission line.

Re: Q 5 - No comment.

7. What would you like to tell us about our proposal to improve our transmission system and ensure continued reliability?

Save on electric bill.

Keep us informed. Interest in new Huntingtown substation.

230-kV line is the most economical and logical.

Moved.

Service.

Good (seems to indicate they provide good service)

Follow up restoration.

Great open house. I spoke at length with Chip Kingsley, Herb Reigel, Chris Martens, John Rutt, and Roger Schneider. All provided outstanding information on use of current right-of-way, types of poles (no "Martian spiders"), and outside the scope of the open house, connection of private power like solar. Thanks. P.S. Also very good to have the president here.

What you provided was thorough, but hope you continue to provide info throughout the entire process.

My bills have gone up 75% already; how much higher will they go to implement this project?

Hope that every effort will be made to accommodate pole placement and restoration of property damaged during construction.

Run as much underground as possible to prevent weather related outages.

If possible, bury cables where next to neighborhoods in residential areas.

Just keep us informed. GREAT JOB!

I would prefer one set of poles rather than 69kV & 230 kV poles marching through woodland and streams. (Town Creek)

With growth, improvement of transmission systems in mandatory. Electric is the "mainstay" of all house folks. You can't stop progress. Underground line for cable should always be used if at all possible.

Currently have a pole on our property

Well thought out. Good for everyone in Southern Maryland.

Nicely done. "Workstations" very effective.

Keep far away from existing homes so if a pole falls it does not hit a house. Raise line to 65' above St. Leonard Creek in Planters Wharf area.

The new line should either follow Dominion's new route around White Sands and St. Leonard Shores or follow Rt.4.
SMECO should look more into burying the line, as is done elsewhere.
You could bury the lines in selective locations to be safer.

The portion through White Sands and St. Leonard Shores should be routed down MD Rt. 4 along the existing power line right of way.

Underground or alternative route through less populated areas such as Solomons Island and Lexington Park area. I am surprised Navy will not have issues with proposed high transmission lines.

The area needs it

Keep communicating openly.
Consider limited underground segments in densely populated areas.
Be as good of environmental stewards as possible.
Keep the impact on property owners as minimal as possible with berms, foliage, underground, etc.
Thank You!!

I do not support the expansion because
1) increased EMF danger to those living close to line 69kV - 230kV.
2) Increased marring of visual environment and property value decrease.
3) Added cost to customer to pay for expansion
4) Increasing electric power available = people using increasing amounts with no thought to possibly staying "off the grid" and reducing electricity use. If you provide it, they will use it. Reduce and GO GREEN!

APPENDIX B

Scoping Meeting Notices

Enterprise 8/29/08

A7

Notice of Intent to Hold a Scoping Meeting and Prepare an Environmental Assessment

The Rural Utilities Service is preparing an Environmental Assessment for Southern Maryland Electric Cooperative to construct a 230-kilovolt transmission line in Calvert and St. Mary's Counties in Maryland.

A Scoping Meeting related to this project will be held at SMECO's office, located at 901 Dares Beach Road in Prince Frederick, Maryland on September 11, 2008, from 5 – 8 p.m.

For more details, please refer to the notice in the legal section of this newspaper.

665070

DEPARTMENT OF AGRICULTURE

Enterprise 8/29/08 BB

Rural Utilities Service
Southern Maryland Electric Cooperative; Notice of Intent to Hold a Public Scoping Meeting and Prepare an Environmental Assessment
AGENCY: Rural Utilities Service, USDA
ACTION: Notice of Intent to Hold a Public Scoping Meeting and Prepare an Environmental Assessment
SUMMARY: The Rural Utilities Service (RUS), an agency which administers the U.S. Department of Agriculture's Rural Development Utilities Programs (USDA Rural Development) intends to hold a public scoping meeting and prepare an Environmental Assessment (EA) in connection with potential impacts related to a proposal by Southern Maryland Electric Cooperative (SMECO), with headquarters in Hughesville, Maryland. The proposal consists of the construction of approximately 30 miles of 230 kilovolt (kV) transmission line, a new 230/69 kV switching station, a 230/69 kV switching station expansion, and a river crossing located in Calvert and St. Mary's Counties in Maryland.

DATES: USDA Rural Development will conduct a scoping meeting in an open house format, seeking the input of the public and other interested parties. The meeting will be held from 5 PM until 8 PM, on September 11, 2008.

ADDRESS: The September 11, 2008 meeting will be held at the SMECO office located at 901 Dares Beach Road in Prince Frederick, Maryland. The SMECO phone number is 888-440-3311.

An Electric Alternatives Evaluation and Macro Corridor Study Report will be available at the public scoping meeting, at USDA Rural Development's address provided in this notice, at their website: http://www.usda.gov/rus/water/ees/ea.htm, and at SMECO 15035 Burnt Store Road, Hughesville, Maryland 20637.

FOR FURTHER INFORMATION CONTACT: Stephanie A. Strength, Environmental Protection Specialist, USDA Rural Development, Utilities Programs, Engineering and Environmental Staff, 1400 Independence Ave. SW, Stop 1571, Washington, DC 20250, or e-mail stephanie.strength@wdc.usda.gov.

SUPPLEMENTARY INFORMATION: Southern Maryland Electric Cooperative proposes to construct a 230 kV transmission line between the existing Holland Cliff Switching Station in Calvert County to the existing Hewitt Road Switching Station in St. Mary's County, Maryland. The proposal comprises five segments and includes (1) the installation of approximately 20 miles of new 230 kV single pole, double-circuit transmission line from the Holland Cliff switching station to a new switching station located in Southern Calvert; (2) the installation of the new Southern Calvert 230/69 kV switching station; (3) the installation of approximately 8 miles of new 230 kV single pole, double-circuit transmission line from the new Southern Calvert switching station to the existing Hewitt Road switching station; (4) the installation of approximately 2 miles of 230 kV underground transmission cable circuit across the lower Patuxent River; and (5) the expansion of the existing 230 kV ring bus at Hewitt Road switching station to accommodate the new 230 kV transmission line from Southern Calvert. Throughout the right-of-way, the existing 69 kV poles will be removed and the existing 69 kV conductors will be installed on the new 230 kV poles along with the new 230 kV conductors. This configuration will allow the use of the existing 69 kV transmission line right-of-way and preclude the need for additional right-of-way land acquisition.

The proposed location of the new switching station will be in southern Calvert County, possibly near Lusby, Maryland, along the existing 69 kV transmission line right-of-way. The site is anticipated to be approximately 25 acres to accommodate the switching station equipment, line exits, and a buffer set back from the property line. Switching station sites will be further assessed in the Environmental Assessment.

The Patuxent River crossing will be approximately two-miles in length, in the vicinity of the existing 69 kV underground transmission line, near the Thomas Johnson Bridge. Alternative crossing locations as well as construction alternatives were considered in order to improve maintenance capabilities, mitigate environmental impact, and reduce proposal costs. Alternatives include (1) installation of a submarine cable jetted into the bottom of the Patuxent River, (2) attaching the 230 kV underground cable circuit to the existing bridge or a future bridge planned near the existing Thomas Johnson Bridge, and (3) installing the new cables in a horizontal directional bore under the Patuxent River bottom.

Construction of the proposal is anticipated for completion in 2015.

Government agencies, private organizations, and the public are invited to participate in the planning and analysis of the proposed project. Representatives from USDA Rural Development and Southern Maryland Electric Cooperative will be available at the scoping meeting to discuss the environmental review process, describe the proposal, answer questions, and receive comments. Comments regarding the proposed action may be submitted (orally or in writing) at the public scoping meeting or in writing by October 11, 2008 at the USDA Rural Development address provided in this notice.

From information provided in the Electric Alternatives Evaluation and Macro Corridor Study Report, from government agencies, private organizations, and the public, Southern Maryland Electric Cooperative will prepare an environmental analysis to be submitted to USDA Rural Development for review. USDA Rural Development will review the environmental analysis and determine the significance of the impacts of the proposal. If accepted, the document will be adopted as the environmental assessment (EA) for the proposal. USDA Rural Development's EA would be available for review and comment for 30 days. Should the USDA Rural Development determine, based on the EA for the proposal, that impacts associated with the construction and operation of the proposal would not have a significant environmental impact, it will prepare a finding of no significant impact (FONSI). Public notification of a FONSI would be published in the Federal Register and in newspapers with circulation in the proposal area.

Any final action by USDA Rural Development related to the proposal would be subject to, and contingent upon, compliance with environmental review requirements as prescribed by the USDA Rural Development' s environmental policies and procedures (7 CFR 1794).
Dated: August 20, 2008

____

Mark S. Plank, Director
Engineering and Environmental Staff,
USDA/Rural Development/Utilities Programs

665071

Southern Maryland NEWSPAPERS
Serving Maryland Communities Since 1872

The Enquirer-Gazette

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Fax: (301) 627-2835

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	SO MD ELECTRIC COOP		
Billing Date	**Advertiser Account #**	**Customer Order #**	
8/28/2008	8338	LEGAL AD	
Total Amount Due	**Customer Type**	**Terms of Payment**	**Page**
$825.00	Monthly	Upon Receipt	1

Invoice Number : I10811468-08292008

Legal Advertising Invoice

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CERTIFICATION OF PUBLICATION

THIS IS TO CERTIFY THAT THE ANNEXED LEGAL ADVERTISEMENT HAS BEEN PUBLISHED IN *THE The Enterprise - St. Mary s Co,* FOR THE NUMBER OF INSERTIONS INDICATED ABOVE

KAREN ACTON, PUBLISHER

By..

Run Dates 8/29/2008

Amount to Pay : $825.00

Southern Maryland NEWSPAPERS
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The Enquirer-Gazette

Billing Period	Advertiser / Client Name		
	SO MD ELECTRIC COOP		
Billing Date	**Advertiser Account #**	**Customer Order #**	
8/28/2008	8338	LEGAL ADVE	
Total Amount Due	**Customer Type**	**Terms of Payment**	**Page**
$825.00	Monthly	Upon Receipt	1

Invoice Number : I10811468-08292008

Certification of Publication

Southern Maryland Newspaper

This certifies an agreement between Heather Wailes (Advertising Account Executive)

and AiNECO (Client) that on August 29, 2008 (date) our company is

to run an ac in the following publication(s) for the aforementioned client:

_____ Maryland Independent

_____ Enterprise

__X__ Recorder

_____ Weekend

_____ Special Section ____________________

_____ Southern MD Advertiser

The total for the ad is $_______________, and will be billed accordingly.

Thank yot for your time.

Sincerely, K. R. Mazzoli
Director of Advertising

Advertising Account Executive
Southern Maryland Newspapers
301-645-9480
7 Industrial Park Drive
Waldorf, MD 20602

Done in Washington, DC, this 21st day of August, 2008.

Kevin Shea,

Acting Administrator, Animal and Plant Health Inspection Service.

[FR Doc. E8–19864 Filed 8–26–08; 8:45 am]

BILLING CODE 3410–34–P

DEPARTMENT OF AGRICULTURE

Rural Utilities Service

Southern Maryland Electric Cooperative; Notice of Intent To Hold a Public Scoping Meeting and Prepare an Environmental Assessment

AGENCY: Rural Utilities Service, USDA.

ACTION: Notice of intent to hold a public scoping meeting and prepare an Environmental Assessment.

SUMMARY: The Rural Utilities Service (RUS), an agency delivering the U.S. Department of Agriculture's Rural Development Utilities Programs, hereinafter referred to as Rural Development and/or Agency, intends to hold a public scoping meeting and prepare an Environmental Assessment (EA) in connection with potential impacts related to a proposal by Southern Maryland Electric Cooperative (SMECO), with headquarters in Hughesville, Maryland. The proposal consists of the construction of approximately 30 miles of 230 kilovolt (kV) transmission line, a new 230/69 kV switching station, a 230/69 kV switching station expansion, and a river crossing located in Calvert and St. Mary's Counties in Maryland.

DATES: USDA Rural Development will conduct a scoping meeting in an open house format, seeking the input of the public and other interested parties. The meeting will be held from 5 p.m. until 8 p.m., on September 11, 2008.

ADDRESSES: The September 11, 2008 meeting will be held at the SMECO office located at 901 Dares Beach Road in Prince Frederick, Maryland. The SMECO phone number is 888–440–3311.

An Electric Alternatives Evaluation and Macro Corridor Study Report will be available at the public scoping meeting, at USDA Rural Development's address provided in this notice, at their Web site: *http://www.usda.gov/rus/water/ees/ea.htm*, and at SMECO, 15035 Burnt Store Road, Hughesville, Maryland 20637.

FOR FURTHER INFORMATION CONTACT: Stephanie A. Strength, Environmental Protection Specialist, USDA Rural Development, Utilities Programs, Engineering and Environmental Staff, 1400 Independence Ave., SW., Stop 1571, Washington, DC 20250, or e-mail *stephanie.strength@wdc.usda.gov.*

SUPPLEMENTARY INFORMATION: Southern Maryland Electric Cooperative proposes to construct a 230 kV transmission line between the existing Holland Cliff Switching Station in Calvert County to the existing Hewitt Road Switching Station in St. Mary's County, Maryland. The proposal comprises five segments and includes (1) The installation of approximately 20 miles of new 230 kV single pole, double-circuit transmission line from the Holland Cliff switching station to a new switching station located in Southern Calvert; (2) the installation of the new Southern Calvert 230/69 kV switching station; (3) the installation of approximately 10 miles of new 230 kV single pole, double-circuit transmission line from the new Southern Calvert switching station to the existing Hewitt Road switching station; (4) the installation of approximately 2 miles of 230 kV underground transmission cable circuit across the lower Patuxent River; and (5) the expansion of the existing 230 kV ring bus at Hewitt Road switching station to accommodate the new 230 kV transmission line from Southern Calvert. Throughout the right-of-way, the existing 69 kV poles will be removed and the existing 69 kV conductors will be installed on the new 230 kV poles along with the new 230 kV conductors. This configuration will allow the use of the existing 69 kV transmission line right-of-way and preclude the need for additional right-of-way land acquisition.

The proposed location of the new switching station will be in southern Calvert County, possibly near Lusby, Maryland, along the existing 69 kV transmission line right-of-way. The site is anticipated to be approximately 25 acres to accommodate the switching station equipment and a buffer. Switching station sites will be further assessed in the Environmental Assessment.

The Patuxent River crossing will be approximately two miles, in the vicinity of the existing 69 kV underground transmission line, near the Thomas Johnson Bridge. Alternative crossing locations as well as construction alternatives were considered in order to improve maintenance capabilities, mitigate environmental impact, and reduce proposal costs. Alternatives include (1) installation of a submarine cable jetted into the bottom of the Patuxent River, and (2) attaching the 230 kV underground cable circuit to the existing bridge or a future bridge planned near the existing Thomas Johnson Bridge. Construction of the proposal is anticipated for completion in 2015.

Government agencies, private organizations, and the public are invited to participate in the planning and analysis of the proposed project. Representatives from USDA Rural Development and Southern Maryland Electric Cooperative will be available at the scoping meeting to discuss the environmental review process, describe the proposal, answer questions, and receive comments. Comments regarding the proposed action may be submitted (orally or in writing) at the public scoping meeting or in writing by October 11, 2008 at the USDA Rural Development address provided in this notice.

From information provided in the Electric Alternatives Evaluation and Macro Corridor Study Report, from government agencies, private organizations, and the public, Southern Maryland Electric Cooperative will prepare an environmental analysis to be submitted to USDA Rural Development for review. USDA Rural Development will review the environmental analysis and determine the significance of the impacts of the proposal. If accepted, the document will be adopted as the environmental assessment (EA) for the proposal. USDA Rural Development's EA would be available for review and comment for 30 days. Should the USDA Rural Development determine, based on the EA for the proposal, that impacts associated with the construction and operation of the proposal would not have a significant environmental impact, it will prepare a finding of no significant impact (FONSI). Public notification of a FONSI would be published in the **Federal Register** and in newspapers with circulation in the proposal area.

Any final action by USDA Rural Development related to the proposal would be subject to, and contingent upon, compliance with environmental review requirements as prescribed by the USDA Rural Development' s environmental policies and procedures (7 CFR 1794).

Dated: August 22, 2008.

Mark S. Plank,

Director, Engineering and Environmental Staff, USDA/Rural Development/Utilities Programs.

[FR Doc. E8–19792 Filed 8–26–08; 8:45 am]

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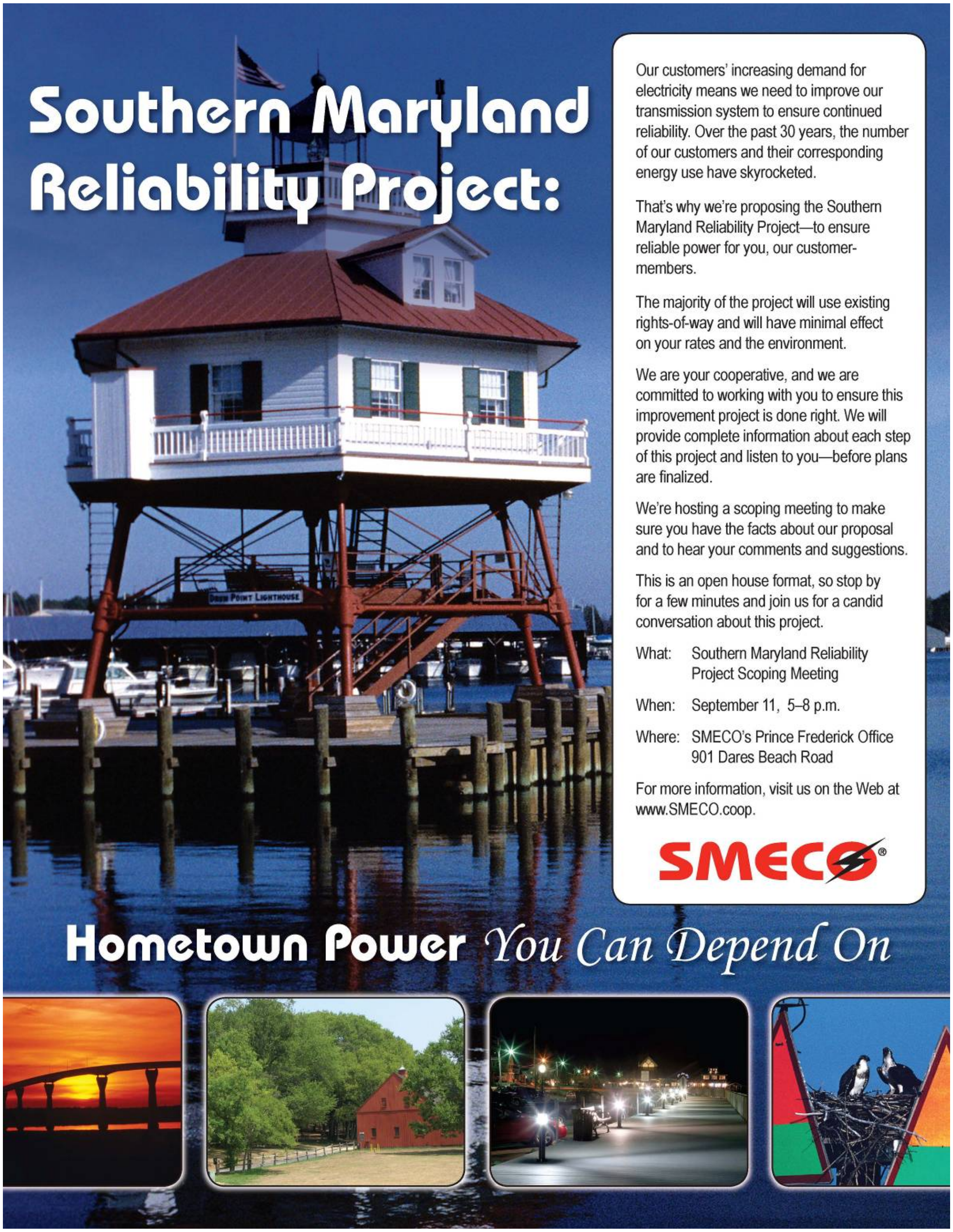

Southern Maryland Reliability Project:
Our customers' increasing demand for electricity means we need to improve our transmission system to ensure continued reliability. Over the past 30 years, the number of our customers and their corresponding energy use have skyrocketed.
That's why we're proposing the Southern Maryland Reliability Project—to ensure reliable power for you, our customer-members.
The majority of the project will use existing rights-of-way and will have minimal effect on your rates and the environment.
We are your cooperative, and we are committed to working with you to ensure this improvement project is done right. We will provide complete information about each step of this project and listen to you—before plans are finalized.
We're hosting a scoping meeting to make sure you have the facts about our proposal and to hear your comments and suggestions.
This is an open house format, so stop by for a few minutes and join us for a candid conversation about this project.
What: Southern Maryland Reliability Project Scoping Meeting
When: September 11, 5–8 p.m.
Where: SMECO's Prince Frederick Office 901 Dares Beach Road
For more information, visit us on the Web at www.SMECO.coop.
SMECO
Hometown Power You Can Depend On

APPENDIX C

Agency Invitations to Scoping Meetings

August 28, 2008

Agency Name
Attn: Agency Contact
Agency Department
Department Street Address
City, State, Zip Code

Subject: Scoping and Agency Meeting for Southern Maryland Electric Cooperative's 230 kV Project

Dear Agency Contact:

The Rural Utilities Service (RUS), an agency that administers the programs of USDA's Rural Development, is preparing an Environmental Assessment (EA) with scoping in connection with a proposal by Southern Maryland Electric Cooperative (SMECO) of Hughesville, Maryland. SMECO proposes to construct approximately 30 miles of 230 kilovolt transmission line, a new 230/69 kilovolt switching station, a 230/69 kilovolt switching station expansion, and a river crossing. Initial alternative evaluation and site selection studies have located the proposed project in Calvert and St. Mary's Counties in Maryland, primarily on existing right-of-way. The new switching station would be located in southern Calvert County, the switching station expansion would be located in St. Mary's County, and the river crossing location would be near the Thomas Johnson Bridge joining the two counties. A location and route map are attached. SMECO is requesting RUS provide financial assistance for the construction of this proposal.

In accordance with RUS' environmental regulations, 7 CFR 1794, Environmental Policies and Procedures, RUS will be the lead agency for preparation of the EA with scoping. As part of the scoping process and prior to any public scoping meetings, RUS is distributing and making available specific planning documents prepared by SMECO for review and comment by Federal, State and local agencies and the public. Enclosed is a compact disk that contains the Alternatives Evaluation Study and Macro-Corridor Report. Copies of the documents are also available on RUS' website at: http://www.usda.gov/rus/water/ees/ea.htm.

A scoping meeting will be held by RUS, in an open house format, seeking the input of the public and other interested parties. The meeting will be held from 5 PM until 8 PM, on September 11, 2008. The location of the meeting will be the SMECO Office located at 901 Dares Beach Road in Prince Frederick, Maryland. Additionally, an agency meeting may be held at 3 PM on September 11, 2008 at the same location.

Please indicate your intention to attend the agency meeting by responding to Stephanie Strength by email at stephanie.strength@wdc.usda.gov, before September 8, 2008.

Please provide written comments by October 11, 2008 to Ms. Stephanie A. Strength, Rural Utilities Service, Engineering and Environmental Staff, 1400 Independence Avenue, SW, Stop 1571, Washington, D.C. 20250-1571 or E-mail: stephanie.strength@usda.gov.

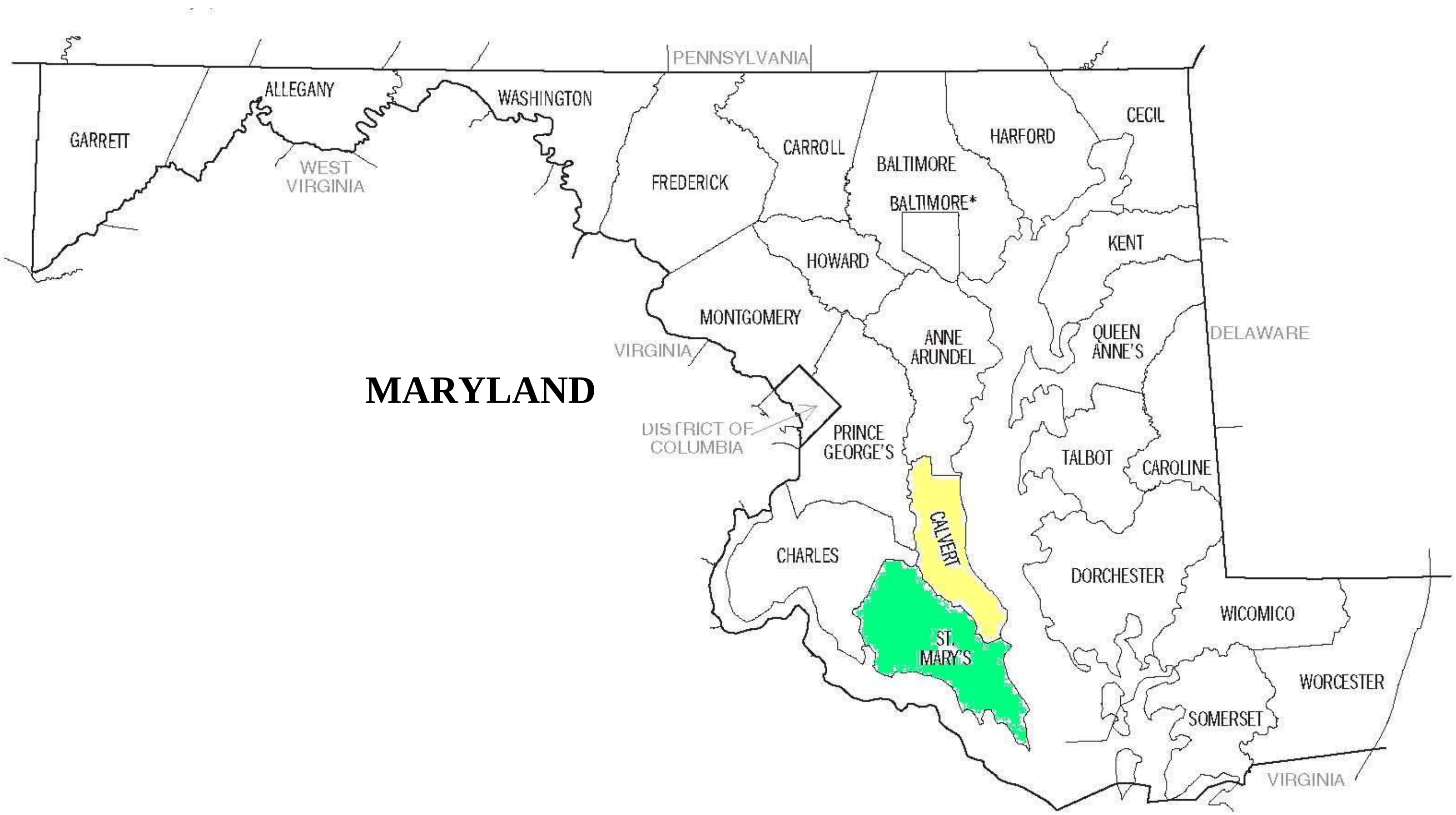
Very truly yours,

BLACK & VEATCH

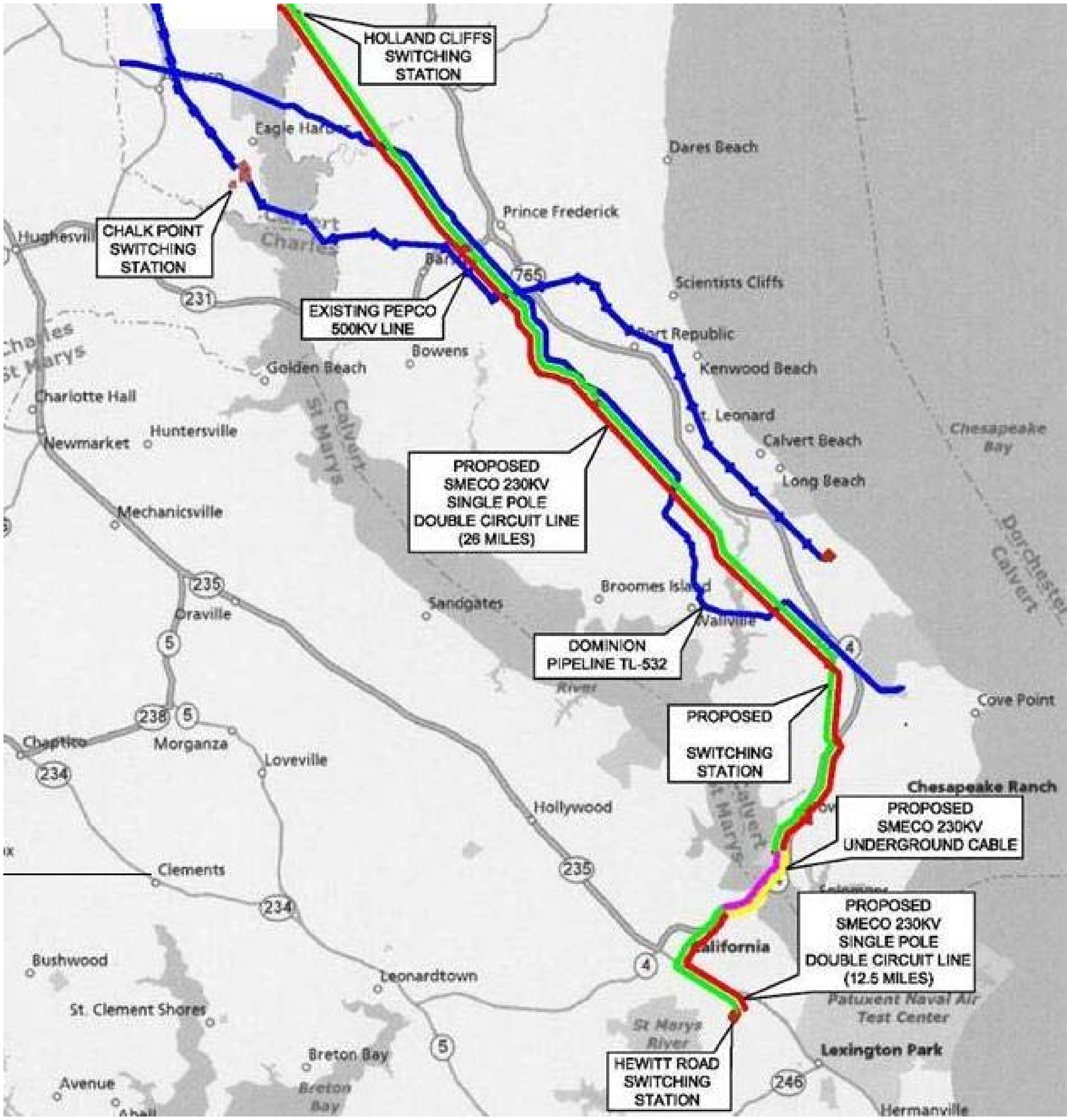
Salvatore Falcone
Environmental Services Project
Manager

SF/sl
Enclosure[s]

cc: Stephanie Strength, USDA Rural Utilities Service
John Bredenkamp, SMECO
Thomas Russell, SMECO
Terry Ressler, SMECO
Rich Jacober, Black & Veatch



SMECO
Holland Cliff to Hewitt Road
230 kV Transmission Line
Project Location Map
Calvert and St. Mary's County



Existing SMECO 69 kV Line

Existing SMECO 69 kV River Crossing

Proposed SMECO 230 kV Line

Proposed SMECO 230 kV River Crossing

Existing Dominion Pipeline TL-532

Existing PEPCO 500 kV Line

SMECO
Holland Cliff
To Hewitt Road
230 kV
Transmission Line
Project
Route Map

List of Agencies and Contacts Invited to the Scoping Meeting
Southern Maryland Electric Cooperative Office, Prince Frederick, Maryland
September 11, 2008 at 5:00 pm to 8:00 pm

U.S. Fish & Wildlife Service
Chesapeake Bay Field Office
Attn.: Leopoldo Miranda
Field Supervisor
177 Admiral Cochrane Drive
Annapolis, MD 21401

National Marine Fisheries Service, NOAA
Office of Protected Resources
Permits, Conservation, and Education Division
Attn.: Mr. Jim Lecky
1315 East-West Highway, SSMC3
Silver Springs, MD 20910

Maryland Department of Natural Resources
Attn: Mr. Howard King
Fisheries Service
580 Taylor Avenue, Suite B-2
Annapolis, MD 21401

Maryland Department of Natural Resources
Attn: Ms. Sandra Patty
Manager-Transmission Programs
Power Plant Research Program
580 Taylor Avenue, Suite B-3
Annapolis, MD 21401

Maryland Department of Natural Resources
Wildlife & Heritage Service
Attn.: Ms. Lori Byrne
Environmental Review Specialist
580 Taylor Avenue, Suite E-1
Annapolis, MD 21401

Maryland Department of the Environment
Nontidal Wetlands and Waterways Division
Attn: Ms. Cynthia Nethen
1800 Washington Boulevard
Baltimore, MD 21230

Maryland Department of the Environment
Tidal Wetlands Division
Attn: Mr. Robert Tabisz
1800 Washington Boulevard
Baltimore, MD 21230

USDA-Natural Resources Conservation Service
John Hanson Business Center
Attn.: Tansel Hudson, Assistant State Conservationist (Operations)
339 Busch's Frontage Road, Suite 301
Annapolis, MD 21409-5543

Maryland Department of Agriculture
Attn.: Secretary Roger Richardson
50 Harry S. Truman Parkway
Suite 301
Annapolis, MD 21401
410-841-5700

US Army Engineer District, Baltimore
Attn.: Mr. William Seib, Chief of Maryland Southern Section
City Crescent Building
101 South Howard Street
Baltimore, MD 21201
Please insure that Ms. Amy Guise of the COE of the Planning Division.

St. Mary's River State Park and Greenwell State Park
c/o Point Lookout State Park
Attn.: Chirty Bright
11175 Point Lookout Road
Scotland, MD 20687

Calvert Cliffs State Park
c/o Smallwood State Park
Attn.: Ranger Patrick Bright
2750 Sweden Point Road
Marbury, MD 20658
Jefferson Patterson Park

Maryland State Clearinghouse for
Intergovernmental Assistance
Attn: Richard Hall, Secretary
Maryland Department of Planning
301 W. Preston Street
Suite 1101
Baltimore, MD 21201-2305

US EPA Region 3
Attn.: William Arguto (EIA 30)
1650 Arch Street
Philadelphia, PA 19103-2029

Federal Aviation Administration
Attn: Lee Kyker, Air Traffic Operations Support
1701 Columbia Ave.
College Park, Georgia 30337

Maryland Historical Preservation Office
Division of Historical and Cultural Programs
Attn: J. Rodney Little
100 Community Place
Crownsville, Maryland 21032-2023

St. Mary's County Department of Planning and Zoning
Attn.: Mr. Jon Robert Grimm, Director
22740 Washington Street
P.O. Box 653
Leonardtown MD 20650
Phone: (301) 475-4662

Calvert County Department of Planning and Zoning
Attn.:Mr. Greg Bowen
150 Main Street
Prince Frederick MD 20678

NAVFAC
Public Works Department
Attn.: Mr. Michael Lewis
22445 Peary Road, Building 504
Patuxent River, MD 20670

NAVFAC
Public Works Department
Attn.: Mr. Michael Oliver
22445 Peary Road, Building 504
Patuxent River, MD 20670

Patuxent River Naval Air Station
Attn.: Mr. David Rockinson
47402 Buse Road, Building 467
Patuxent River, MD 20670

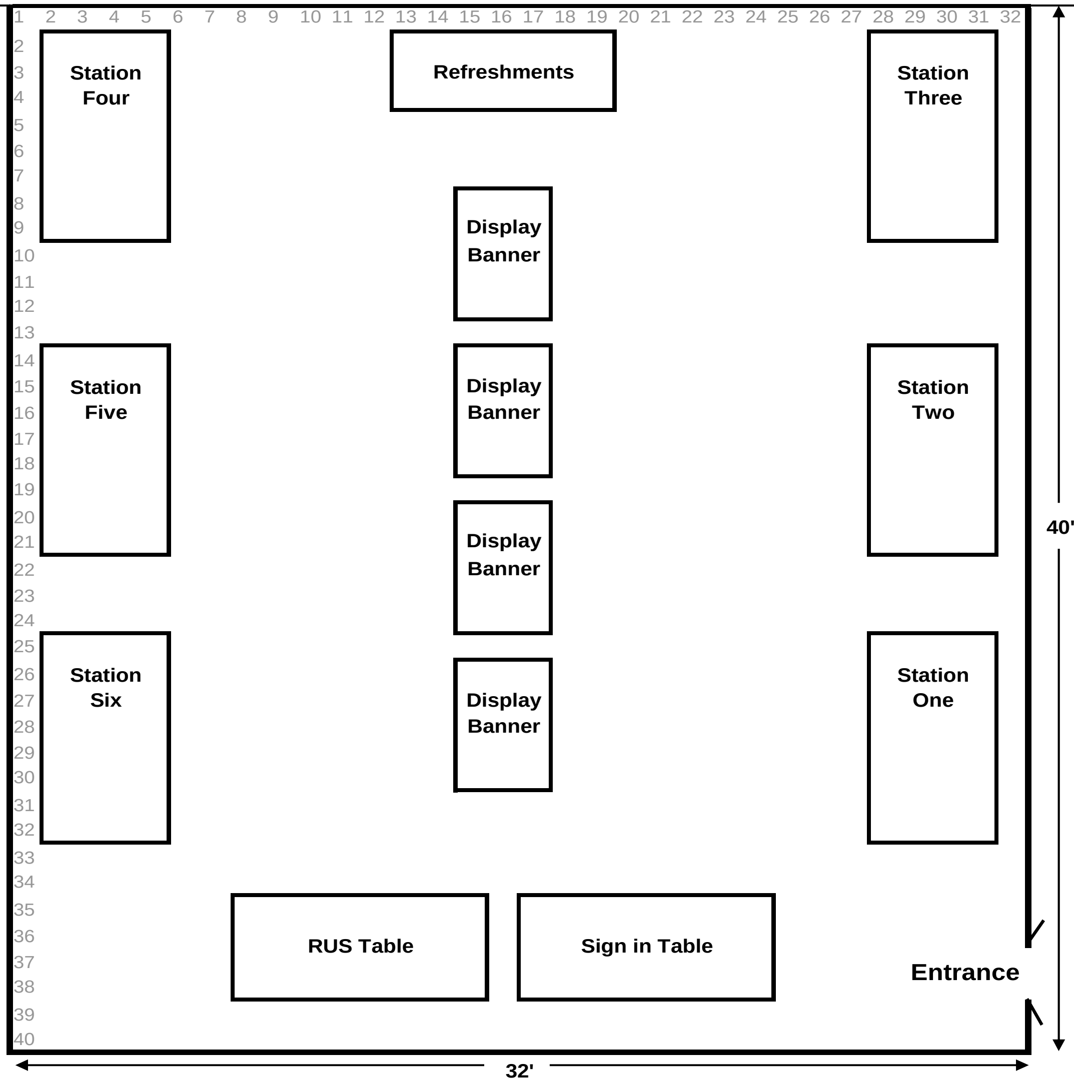
Maryland Department of Transportation
Attn: Michael Huber
138 Defense Highway
Annapolis, MD 21401

Maryland Public Service Commission
Ms. Terry Romine, Esq.
Executive Secretary
William Donald Schaefer Tower
6 St. Paul St., 16th Floor
Baltimore, MD 21202

Maryland Department of Business and Economic Development
217 East Redwood St.
Baltimore, MD 21202 – 3316

APPENDIX D

Scoping Meeting Layout and Displays



Station One - Energy Use Is Growing

Station Two - To Meet Your Needs, We Need To Upgrade Our System

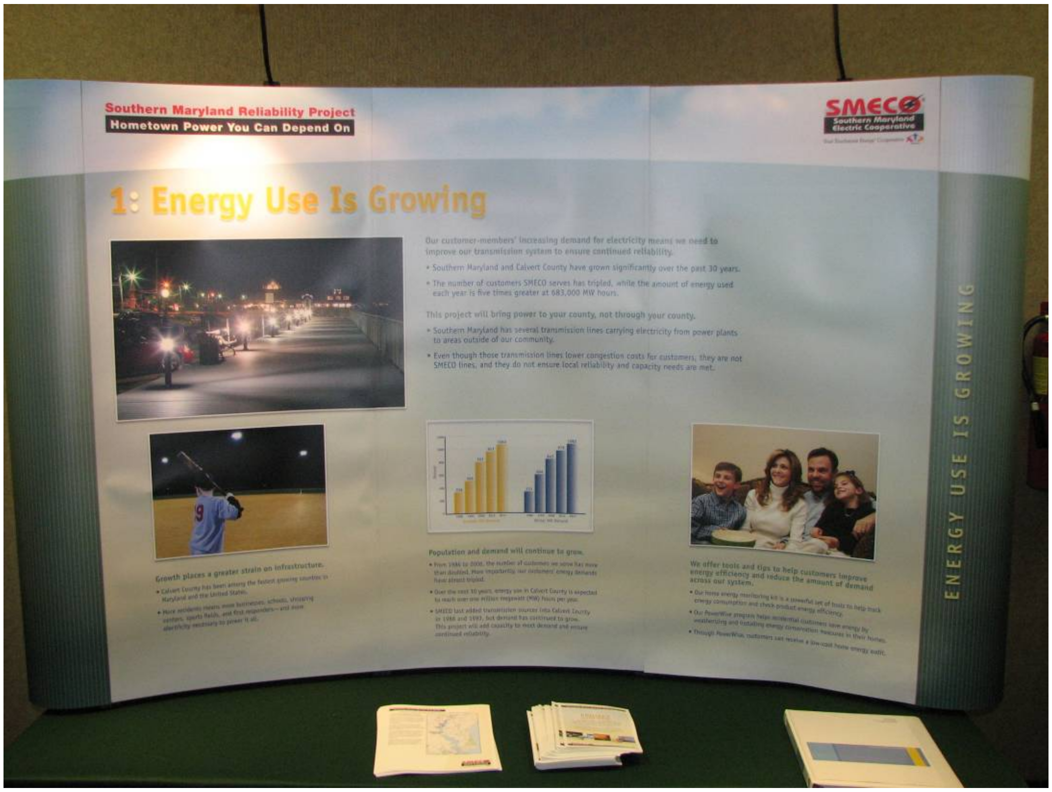
Station Three - Upgrading This Line Means You Will Have More Reliable Power

Station Four - This Project Has Limited Impact

Station Five - We Will Use Existing Rights-of-Way

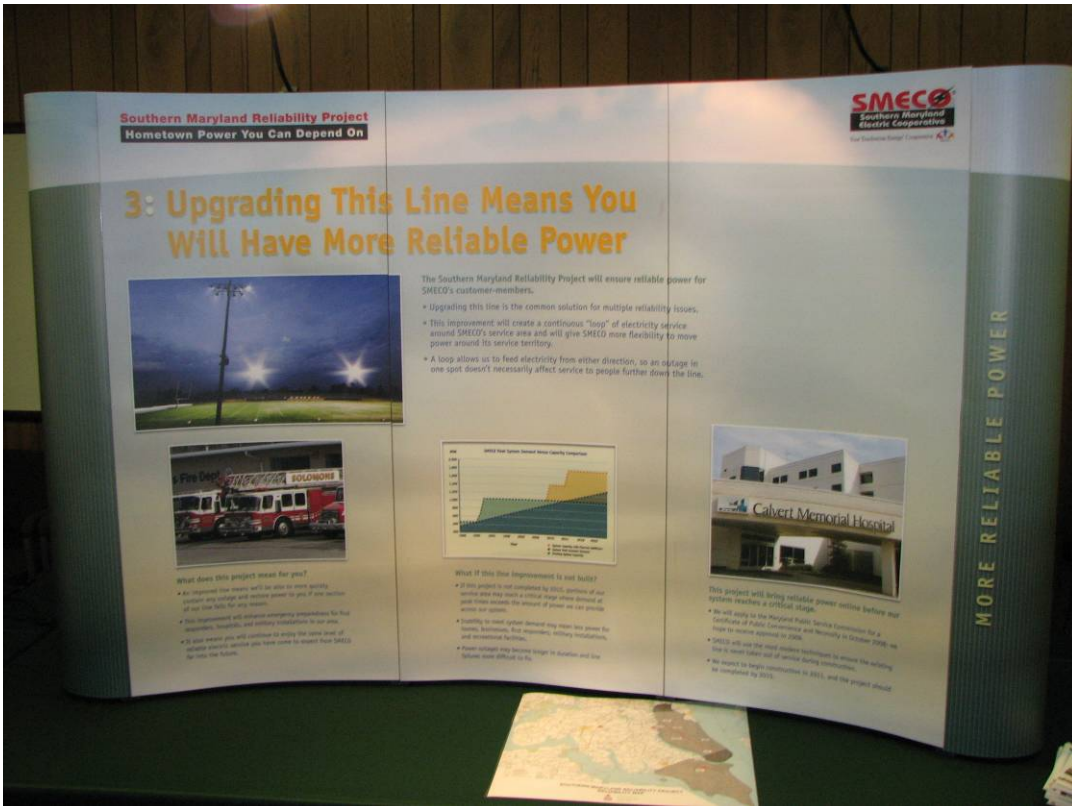
Station Six - We Will Do This Project the Right Way

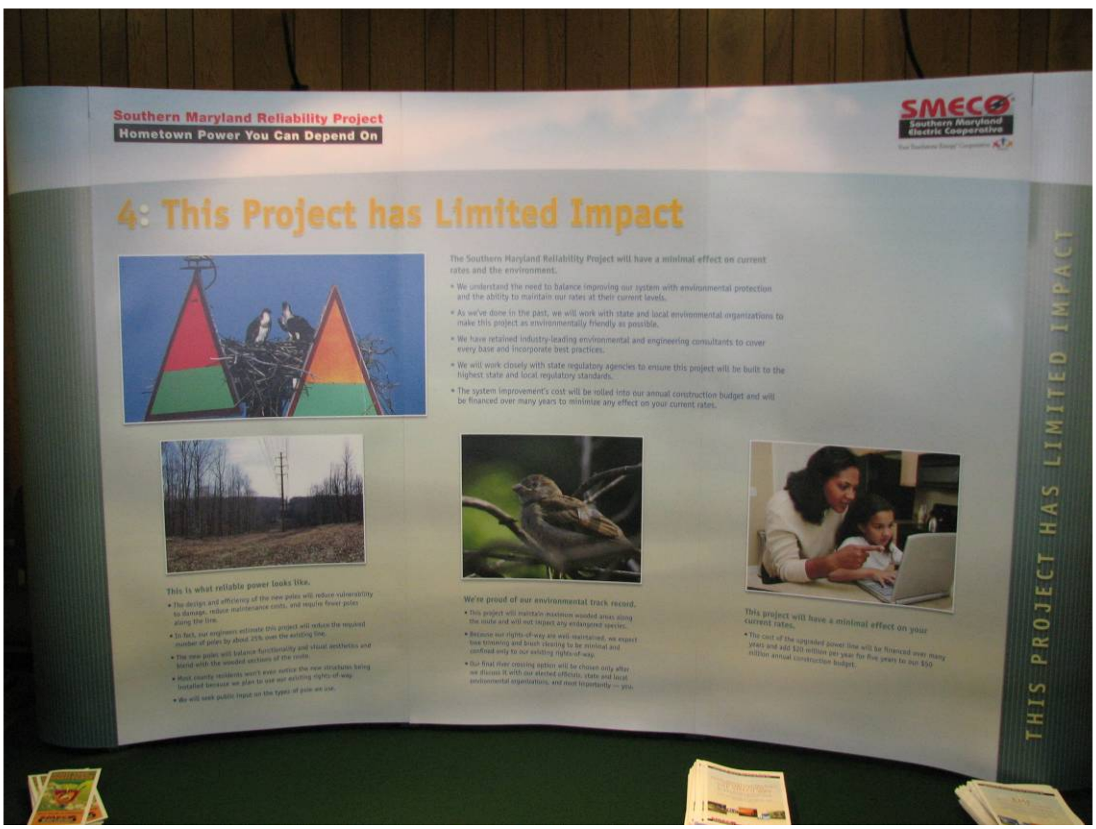

Southern Maryland Reliability Project
Hometown Power You Can Depend On
SMECO
Southern Maryland Electric Cooperative
welcome
We're glad you're here.
Our customer-members' increasing demand for electricity means we need to improve our transmission system to ensure continued reliability.
That's why we have proposed the Southern Maryland Reliability Project, a transmission system improvement project. The proposed project will ensure continuous reliable power is provided to SMECO's customer-members, with minimal effect on your current rates and the environment.
We are your cooperative, and we are committed to working with you to ensure this improvement project is done right.
We've designed our information stations to provide all the facts about our proposed project. Our staff is here to listen to your comments and suggestions.
The Southern Maryland Reliability Project:
Hometown Power You Can Depend On
Station 1: Energy Use Is Growing
Station 2: To Meet Your Needs, We Need to Upgrade Our System
Station 3: Upgrading This Line Means You Will Have More Reliable Power
Station 4: This Project Has Limited Impact
Station 5: We Will Use Existing Rights-of-Way
Station 6: We Will Do This Project The Right Way
ENERGY USE IS GROWING

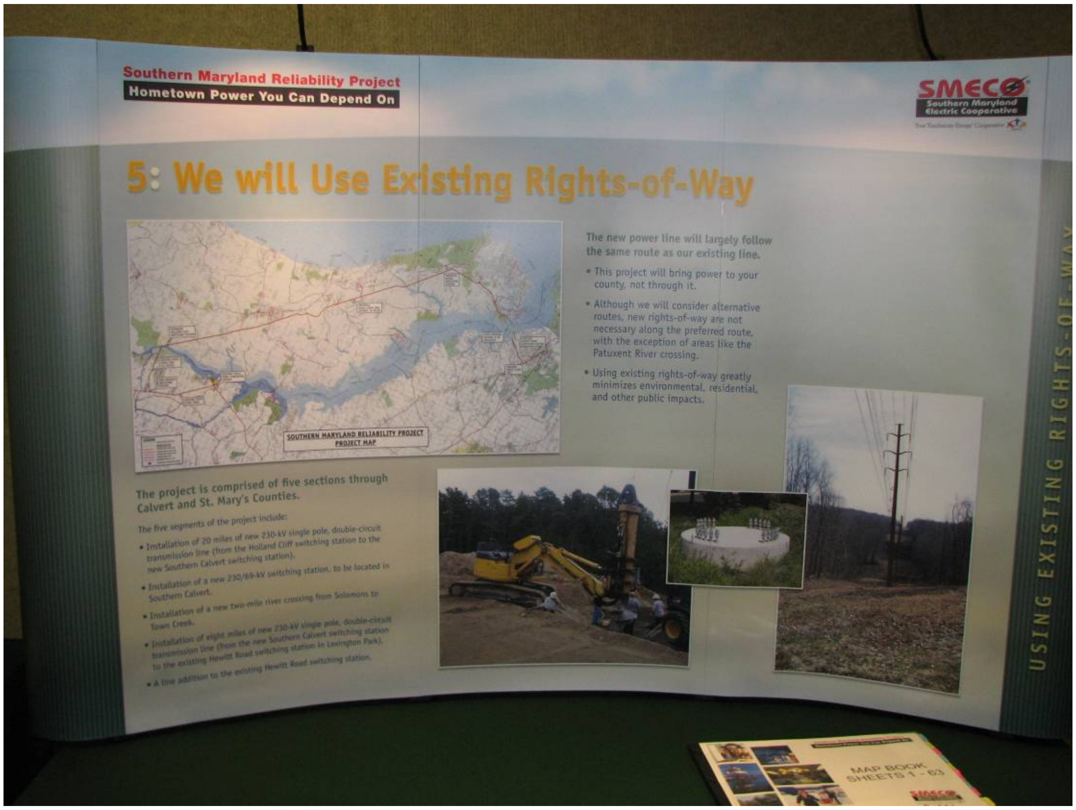


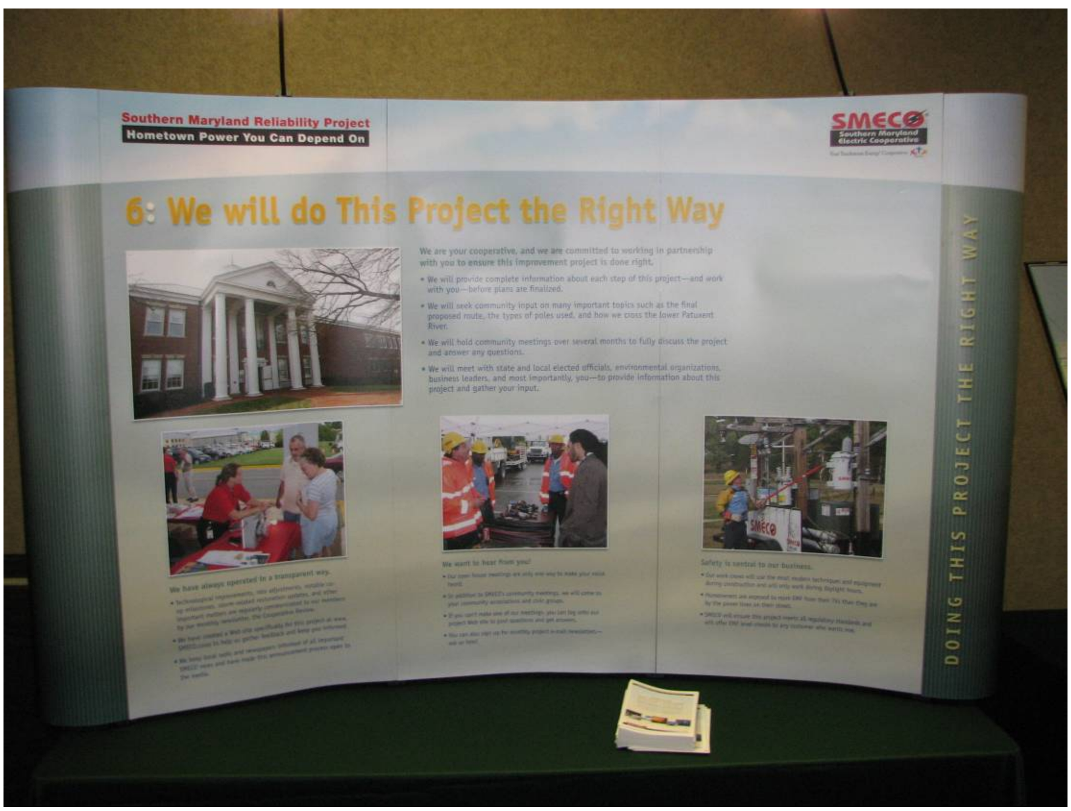
Southern Maryland Reliability Project
Hometown Power You Can Depend On
SMECO
Southern Maryland Electric Cooperative
1: Energy Use Is Growing
Our customer-members' increasing demand for electricity means we need to improve our transmission system to ensure continued reliability.
• Southern Maryland and Calvert County have grown significantly over the past 30 years.
• The number of customers SMECO serves has tripled, while the amount of energy used each year is five times greater at 683,000 MW hours.
This project will bring power to your county, not through your county.
• Southern Maryland has several transmission lines carrying electricity from power plants to areas outside of our community.
• Even though those transmission lines lower congestion costs for customers, they are not SMECO lines, and they do not ensure local reliability and capacity needs are met.
Growth places a greater strain on infrastructure.
Population and demand will continue to grow.
We offer tools and tips to help customers improve energy efficiency and reduce the amount of demand across our system.
ENERGY USE IS GROWING

Southern Maryland Reliability Project
Hometown Power You Can Depend On
SMECO
Southern Maryland Electric Cooperative
2: To Meet Your Needs, We Need to Upgrade Our System
Our lifestyles today place an emphasis on bigger homes and more electronics, and we require a new level of electric service to power it all.
• Increased demand is pushing the system to its limit, and we need to improve our system to ensure continued reliability.
• From computers, TVs and DVDs, to air conditioning and appliances, our use of electricity has skyrocketed—roughly 50% to 70% more per household.
• As your local distribution company, SMECO does not generate power—we import power from power producers to meet our community's needs.
• This project will bring more power into Calvert County to meet today's demand as well as future needs.
69kv
230kv
System capacity needs to increase.
This project will improve what we already have.
Creating a 230 kV system loop is the answer.
WE NEED TO UPGRADE OUR SYSTEM
MAP BOOK
SHEETS 1 - 63


Southern Maryland Reliability Project
Hometown Power You Can Depend On
SMECO
Southern Maryland Electric Cooperative
3: Upgrading This Line Means You Will Have More Reliable Power
Calvert Memorial Hospital
MORE RELIABLE POWER


Southern Maryland Reliability Project
Hometown Power You Can Depend On
SMECO
Southern Maryland Electric Cooperative
4: This Project has Limited Impact
THIS PROJECT HAS LIMITED IMPACT


Southern Maryland Reliability Project
Hometown Power You Can Depend On
SMECO
Southern Maryland Electric Cooperative
5: We will Use Existing Rights-of-Way
SOUTHERN MARYLAND RELIABILITY PROJECT
PROJECT MAP
The new power line will largely follow the same route as our existing line.
• This project will bring power to your county, not through it.
• Although we will consider alternative routes, new rights-of-way are not necessary along the preferred route, with the exception of areas like the Patuxent River crossing.
• Using existing rights-of-way greatly minimizes environmental, residential, and other public impacts.
The project is comprised of five sections through Calvert and St. Mary's Counties.
The five segments of the project include:
• Installation of 20 miles of new 230-kV single pole, double-circuit transmission line (from the Holland Cliff switching station to the new Southern Calvert switching station).
• Installation of a new 230/69-kV switching station, to be located in Southern Calvert.
• Installation of a new two-mile river crossing from Solomons to Town Creek.
• Installation of eight miles of new 230-kV single pole, double-circuit transmission line (from the new Southern Calvert switching station to the existing Hewitt Road switching station in Lexington Park).
• A line addition to the existing Hewitt Road switching station.
USING EXISTING RIGHTS-OF-WAY
MAP BOOK
SHEETS 1 - 63


Southern Maryland Reliability Project
Hometown Power You Can Depend On
SMECO
Southern Maryland Electric Cooperative
6: We will do This Project the Right Way
We are your cooperative, and we are committed to working in partnership with you to ensure this improvement project is done right.
• We will provide complete information about each step of this project—and work with you—before plans are finalized.
• We will seek community input on many important topics such as the final proposed route, the types of poles used, and how we cross the lower Patuxent River.
• We will hold community meetings over several months to fully discuss the project and answer any questions.
• We will meet with state and local elected officials, environmental organizations, business leaders, and most importantly, you—to provide information about this project and gather your input.
DOING THIS PROJECT THE RIGHT WAY


SMECO
Southern Maryland Electric Cooperative
Your Touchstone Energy® Cooperative
SOUTHERN MARYLAND RELIABILITY PROJECT
PROJECT MAP


Touchstone
SMECO
Southern Maryland Electric Cooperative
Your Touchstone Energy® Cooperative

APPENDIX E

RUS Scoping Meeting Sign-in Sheet

USDA Rural Development

SMECO 230 kV Reliability Project
Scoping Meeting Sign-In Sheet
Thursday, September 11, 2008, 5:00 pm to 8:00 pm
SMECO Office, Prince Frederick, Maryland

NAME and ADDRESS

Hard copy request

1 Karen Y. Egloff 2950 Holland Cliffs Rd,
2 STEPHEN COUCHMAN Hunt, Md. 20639
3 731 WILLOW WAY PRF, MD
4 Greg Bowen 1235 Mallard Pt Rd, Pr. Frederick MD 20678
5 Gerry McGuire 4010 Hidden Hill Dr Huntingtown Md 20639
6
7
8
9
10
11
12
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15

APPENDIX F

February 2009 Letter from U.S. Army Corps of Engineers

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MD 21203-1715

FEB 1 3 2009

REPLY TO
ATTENTION OF

Operations Division

Ms. Stephanie A. Strength
Rural Utilities Service
Engineering and Environmental Staff
1400 Independence Avenue, SW, Stop 1571
Washington, DC 20250-1571

Dear Ms. Strength:

This is in response to the Black and Veatch September 5, 2008 letter regarding the scoping process in the preparation of a National Environmental Policy Act (NEPA) document for the proposed Southern Maryland Electric Cooperative (SMECO) 30-mile transmission line and switching stations project from Holland Cliff to Hewitt Road in Calvert and St. Mary's Counties, Maryland.

The U.S. Army Corps of Engineers, Baltimore District (Corps) will be a participating and cooperating agency in the preparation of the Environmental Assessment (EA) for the project so that a Corps permit decision can be rendered at the conclusion of the NEPA process. The draft EA will serve as the Department of the Army Section 404/10 permit application for the project. In this regard, we look forward to working with your agency as the document is developed to ensure that the information presented in the NEPA document is adequate to fulfill the requirements of Corps regulations, the Clean Water Act Section 404(b)(1) Guidelines, and the Corps public interest review process.

The Corps requests that the following topics be comprehensively evaluated in the EA:

1. Purpose and need for the project.

2. Alternatives analysis/Clean Water Act Section 404(b)(1) Guidelines. Based on the project purpose, the Corps will need to concur on the range of alternatives retained for detailed study in the EA. The alternatives analysis should comprehensively evaluate the following:

    a. Alternative transmission line routes and switching station locations
    b. A complete description of the criteria used to identify, evaluate, and screen project alternatives

3. Methods to avoid and minimize impacts to waters of the U.S.

    a. Methods to minimize adverse effects to water quality

b. Methods to minimize adverse effects to natural and cultural resources
c. Reduction in project scope
d. Reuse/upgrade of existing infrastructure

4. Corps public interest review factors. The decision to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. Among the factors that must be evaluated as part of the Corps public interest review include: conservation, economics, aesthetics, general environmental concerns, wetlands and streams, historic and cultural resources, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, energy needs, safety, food and fiber production, mineral needs, water quality, considerations of property ownership, air and noise impacts, and, in general, the needs and welfare of the people. Each of the Corps public interest factors that are relevant to this project must be evaluated comprehensively in the EA.

5. Delineation of all waters of the U.S., including jurisdictional wetlands, in the project area.

6. Quantify impacts to waters of the U.S. (both temporary and permanent) to all waters of the U.S., including jurisdictional wetlands, for each project alternative. For waterways, include both the linear feet of waterway impacts (measured along the centerline of the waterway) and square feet of impact; for wetlands, include both square foot and acreage impacts; and for temporary wetland impacts, quantify any change in wetland classification (e.g., palustrine forested to palustrine emergent, etc.) and method of work to accomplish this change.

7. Cumulative and indirect impacts resulting from the project.

8. Environmental justice including compliance with the Executive Order 12898 on environmental justice.

9. Describe the disposal options for any excess fill material resulting from construction.

10. Wetland and waterway mitigation plans.

11. Analysis of the project's compliance with Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act, Section 401 of the Clean Water Act, and the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 04-267) [essential fish habitat (EFH) assessment].
12. Air quality impacts (i.e., Section 176(c) of the Clean Air Act General Conformity Rule Review).

13. Compliance with the Executive order on floodplains.

14. Address potential conflicts with the construction on shipping traffic and recreational/commercial boating and fishing activities in tidal waterways in the vicinity of the project area.

    a. Method of work to cross each waterway, including depths below the bottom substrate and distances of the entrance and exit holes from the approximate mean high water shoreline.

15. Project review schedule and NEPA document preparation schedule. Other important milestones (e.g., public hearings, etc.) should be listed in the EA.

Enclosed is a comprehensive checklist for information needed in order for the Corps to evaluate the proposed project. We request that you provide SMECO with this checklist. We look forward to working with your agency as the EA is developed and the review of the project proceeds. Copies of this letter are being sent to the Maryland Department of the Environment. Should you have any questions concerning this letter, please contact Mrs. Kathy Anderson of my staff at (410) 962-5690.

Sincerely,

William P. Seib
Chief, Maryland Section Southern

Enclosure

SMECO CHECKLIST

Information

<http://www.nab.usace.army.mil/Regulatory/> - Baltimore District Regulatory Branch web site - please review the permit process under the Individual Permit Process
http://www.usace.army.mil/cw/cecwo/reg/cwa_guide/cwa_guide.htm - CWA Guidance to Implement the U.S. Supreme Court Decision for the Rapanos and Carabell Cases

<http://www.mde.state.md.us/assets/document/permit/alter.pdf> - permit application

Coordination with the following agencies may expedite the permit process

- ✓ **Maryland Historical Trust**: historic and cultural properties
- ✓ **Maryland Department of Natural Resources and U.S. Fish and Wildlife Service**: Wetlands of Special State Concern; threatened and endangered species; waterfowl concentration areas; shellfish trawling area; fishing areas; scientific study areas; oyster bars (natural and leased)
- ✓ **National Marine Fisheries Service**: Essential Fish Habitat; anadromous fish; threatened and endangered species; oyster bars (natural and leased)
- ✓ **U.S. Department of Homeland Security, United States Coast Guard**: navigation, security and safety issues

Please coordinate with the following agencies regarding:

- ✓ Data required for the permit/approval applications
  - ✓ Maryland Department of the Environment
    - ✓ Phase I Mitigation Plan
  - ✓ Maryland Department of Natural Resources
    - ✓ Forest Conservation Act
  - ✓ Maryland Critical Areas Commission
    - ✓ Listing of County/Town Planning and Zoning offices: http://www.dnr.state.md.us/criticalarea/ (FAQ's section)
- ✓ For navigation concerns
  - ✓ U.S. Coast Guard
- ✓ For existing and future infrastructure/corridor consideration
  - ✓ Department of Public Works for all involved Counties
  - ✓ Maryland State Highway Administration
  - ✓ Railroad agencies
  - ✓ Utility companies
- ✓ For parks restrictions
  - ✓ Maryland Department of Natural Resources
  - ✓ U.S. Fish and Wildlife Service
  - ✓ Involved Counties
- ✓ For agricultural easements/preservation
  - ✓ Maryland Agricultural Land Preservation Foundation

Federal Contacts Information

- Environmental Protection Agency
  Jim Butch 215-814-2762 butch.jim@epa.gov
- National Marine Fisheries Service
  John Nichols 410-267-5675 john.nichols@noaa.gov
- U.S. Fish and Wildlife Service
  Bob Zepp 410-573-4536 bob_zepp@fws.gov
- U.S. Department of Homeland Security, United States Coast Guard: navigation, security and safety issues
  Albert Grimes 757-398-6360 Agrimes@lantd5.uscg.mil

State of Maryland Contacts Information

- ✓ Information about the State of Maryland permit process: http://www.mde.state.md.us/Programs/WaterPrograms/Wetlands_Waterways/index.asp
- ✓ The application forms are available in MS Word format and can be found on the following page:

http://www.mde.state.md.us/Programs/WaterPrograms/Wetlands_Waterways/permits_applications/index.asp

- Maryland Department of the Environment: Wetland and Waterways Program: Tidal and nontidal wetland, wetland buffer, waterway, waterway buffer and floodplain
  Tidal - Robert Tabisz 410-537-3838 rtabisz@mde.state.md.us
  Nontidal - Jeff Thompson 410-537-3828 jthompson@mde.state.md.us
  Mitigation - George Beston 410-537-3823/758-5020 gbeston@mde.state.md.us
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- Maryland Historical Trust: historic and cultural properties
  Dixie Henry 410-514-7638 dhenry@mdp.state.md.us.
  Beth Cole 410-514-7631 cole@dhcd.state.md.us
  Jonathan Sager 410-514-7636 JSager@mdp.state.md.us
- Maryland Critical Areas
  Lisa Hoerger 410-260-3478 lhoerger@dnr.state.md.us

Sample Overall Work Description

Sample Switchyard Projects Description

To clear and grade for construction of a ______, permanently impacting ___________ square feet (____ acres) of nontidal ________ wetlands and _______square feet (_____acres) along _____ linear feet of stream bed.

To deposit fill; install ___ linear feet of ___-inch diameter ____ (type) culvert pipe with a ___-foot by ___-foot scour pad impacting ____ square feet of _____ (type) nontidal wetlands and _____ square feet along ____ linear feet of streambed.

Sample Transmission Line Description

Within a __-foot to __-foot right of way (ROW), to construct and operate approximately ___ miles of ___-inch diameter steel ____volt electrical transmission line with a cathodic protection system, of which approximately ____miles parallel an existing ___-inch, ___ volt electrical transmission line, installing by 1) conventional boring; 2) trenching using dam and pump, flume pipe, and waterway diversion methods; and 3) horizontal directional drill (HDD) method, as shown on plan pages ___ through ___. The work includes temporary construction impacts to _____ acres of emergent, scrub/shrub, and forested nontidal wetlands, of which approximately _______ square feet, ______ acres, is due to the use of marsh mats, and permanent impacts by conversion of _____ acres of forested nontidal wetlands to scrub/shrub and emergent wetlands in ______ (number of) wetland areas. The work also includes _____ (number of) nontidal waterway crossings with an approximate maximum crossing width of ____ feet and an approximate maximum crossing length of ____ feet, totaling approximately ______ square feet, _____ acres of waterwaybed impact, along ______ (total) linear feet of waterway sections; and HDD/boring crossings of the following waterways and wetlands: 1) _______ River _____ linear feet and a minimum of ___ feet below the river bottom substrate; 2) ______ Creek _____ linear feet and a minimum of ____ feet below the creek bottom substrate; 3) ______ Swamp and _____ Swamp Run _____ linear feet and a minimum of ___ feet below the wetland bottom substrate and ____ feet below the waterway bottom substrate. The work will be done in accordance with the impact tables dated _______, enclosure_____.

Excess fill material and drilling substrates will be deposited at an existing upland (non-wetland) disposal site at ___________ as shown on plan page ____ or other approved sites.

Sample Avoidance and Minimization Statement

Site layout for this project was based upon an extensive site layout study to determine a layout that would most practicably avoid and minimize impacts to jurisdictional waters and wetlands. Efforts were made to avoid, to the extent possible, the long and short-term adverse impacts associated with the destruction or modification of wetlands and streams and to avoid direct or indirect support of new construction in wetlands and streams wherever there was a practicable alternative. The proposed impacts were further reduced through relocation of or reconfiguration of facility components. Project siting was limited by design constraints, ...

Sample Mitigation Description

The applicant proposes on site and in kind wetland enhancement and creation methods and stream restoration and enhancement methods to mitigate for the proposed impacts. This work includes the enhancement of……; the creation of …….; stream restoration …..; and stream enhancement…... The wetland mitigation proposes to create an approximate ____ acres area of __________; enhancement of _______________. The stream mitigation proposes to….. These projects will be monitored for a 5-year period and shall be protected in perpetuity through establishment of a legally binding protection mechanism.

Sample Location Description

For each state, list all waterways and Counties along the project route:

In tidal and nontidal Waters of the U.S., including unnamed tributaries and wetlands adjacent to ____Creek, _____ Branch, _____ River, ____ Swamp, ____ Run in _____, _____, and ______ Counties in _______ (State).

Information Needs

Note: Additional information may be necessary as determined during project evaluation.

General

- ✓ Describe the overall project and mitigation and provide detailed written description of the project and mitigation, including dimensions and composition of the proposed electrical transmission line; electrical transmission line corridor; building structures; ~~stormwater management facilities;~~ access roads; culverts and any other attendant features of electrical transmission line construction and project site access; mitigation ratios; mitigation activities and plans; and location of mitigation site
- ✓ Describe purpose and need for the project, including public need and benefit, users, suppliers, any other supporting information
- ✓ Describe and identify any sections of the project that would have independent utility and explain independence from the entire project.
- ✓ Describe the components of the transmission line, including diameter and outer material for land and submerged portions; wire anchors etceteras for the electric line support structures; and cathodic protection and its components, if necessary
- ✓ Describe the new electrical transmission line location proposed within existing utility or roadway easement/corridors and how the electrical transmission line construction and maintenance may affect the existing utility or roadway relative to their maintenance and potential future expansion and address all potential safety issues relative to construction and operation within these types of corridors

- ✓ Describe the existing land and waterway use of project site locations
- ✓ Describe potential cumulative impacts relative to the purpose of the project and prospective for future additional expansion
- ✓ Describe on-site and off-site avoidance and minimization of impacts
  - ✓ Describe why impacts were not avoided
- ✓ Describe permanent and temporary impacts
  - ✓ Include a definition of temporary by timeframe and describe restoration of the proposed temporary impact
- ✓ Describe maintenance, including preservation, of existing structures and protection methods of those existing structures during the proposed project construction
- ✓ Describe how the project construction and maintenance may affect the existing utility or roadways easement corridors relative to their maintenance and potential future expansion and address all potential safety issues relative to construction and operation within these types of corridors
- ✓ Describe work in right-of-ways, including maintenance and amount of tree clearing in forested areas in these areas
- ✓ Describe the various methods of work including equipment access; staging areas; maintenance; restoration of pre-construction contours; waterway diversion; and sequence of construction
  - ✓ Describe the method of work and equipment used for installing overhead and underground lines as well as safety issues related to construction near trees, existing overhead lines and any other potential obstructions along the right of way
  - ✓ Describe horizontal directional drill and boring methods of work, including type of equipment used, bore hole diameter, distance landward of mean high water/ordinary high water for the entry and exit points, etceteras
  - ✓ Provide analysis/evaluation of directional drilling, boring and trenching and reason for preferred method of work for each method
- ✓ Describe the start and end points of the proposed electrical transmission line and the existing electrical transmission line facilities/systems that the electrical transmission line will connect
- ✓ Describe invasive plant species monitoring and restoration, if necessary
- ✓ Describe emergency procedures in the event the electrical transmission line is ruptured
- ✓ Describe emergency procedures in the event of construction and operation accident
- ✓ Provide a timeline/schedule for the process of obtaining all authorizations for the proposed project and construction schedule
- ✓ Provide information regarding the minimum clearances for aerial portions over navigable waters, roadways, bridges, etceteras.
  - ✓ The clearances are based upon the low point of the line under conditions which produce the greatest sag, taking into consideration temperature, load, wind, length or span and type of supports
  - ✓ The minimum additional clearance above the clearance required for bridges over navigable waters is 35 feet for a 500kV line **(CHECK REGS FOR 230kV)**
- ✓ Provide information regarding the technology to cross a wide waterbody

- ✓ Provide a letter from each proposed affected utility/roadway/railway company/agency stating that construction of an electrical transmission line would be allowed and easement documents would address construction, operation and maintenance of the utility/roadway/electrical transmission line within those corridors
- ✓ Provide any other supporting information
  - ✓ Provide adjacent property owners names and addresses
  - ✓ Nearby community association names and addresses
  - ✓ The list of adjacent property owners should be provided in the application as well as electronic format (for printing mailing labels for the public notice)

- ✓ Indicate the existing roads, buildings and/or facilities that would be removed or relocated
  - ✓ If any of this work is proposed in jurisdictional areas, the required information must be provided
- ✓ Indicate method of marking electrical transmission line location
- ✓ Indicate method of locating post-installation electrical transmission line
- ✓ Indicate the disposal site(s) for excess fill material and suitable dredge material disposal, including site capacity and site plans

- ✓ Address potential safety concerns regarding electrical transmission line structure and in-water security breaching from boating, fishing, swimming, body recovery activities, and any other water-use activities

Maps

Provide large sheet and 8.5-inch by 11-inch plans/maps showing the following:

- ✓ Identify (list) all waterways, named wetlands/swamps, and Federal, State, or County parks to be crossed and identify location by ADC map location page/square for crossing
- ✓ Provide a general location map of the entire project from beginning to end showing a clear distinction between existing electrical transmission line and new section of electrical transmission line; new electrical transmission line within the existing electrical transmission line easement and proposed new easement areas; and identify the areas for aerial lines and subterranean/submerged lines. Include latitude and longitude at regular intervals along the project corridor
- ✓ Overlay the proposed project plans on aerial photography (source and date indicated)
- ✓ Overlay the electrical transmission line route on maps showing the following and emphasize waterway/wetland crossings (each of the maps should include the source, page/sheet number and date information):
  - ✓ Critical Areas boundary and buffers
  - ✓ Nontidal Wetlands of Special State Concern
  - ✓ National Wetland Inventory
  - ✓ County soil surveys
  - ✓ Department of Natural Resources Wetland map
  - ✓ ADC map

  - ✓ Topography map
  - ✓ Show the relationship of the proposed work location to oyster bars; artificial reefs; submerged and terrestrial historic sites; navigation fairways and Federal channels; parks; named swamps and wetlands; waterways; and any other natural resources of concern

Charts

- ✓ For alternatives analysis, provide a summary chart comparing estimated total impacts (approximate figures based on mapping) for each alternative route and method of work: wetland, wetland buffer, waterway, floodplain, forest
- ✓ For the selected alternative, provide a table for each County with information on each wetland and waterway proposed to be impacted. The table columns should include the following headings:
  - ✓ Wetland/waterway identification number system; station location number; NWI classification; identify wetlands as nearby isolated, abutting or adjacent to waterway and waterway code per Rapanos guidance (see table below); total length along centerline (feet); right of way width (existing; expanded, or new); impact area (square feet/acres); latitude/longitude coordinates (upstream and downstream); State wetland/waterway buffer impacted; wetland conversion (type from/to, square foot/acreage); identify impact as temporary or permanent; type of impact (structure, fill, marsh mat, wetland conversion, etceteras); map/plan sheet number
  - ✓ Group the waterway and all the wetlands abutting or adjacent to that waterway as well as nearby isolated wetlands together on the chart
- ✓ Separately list each named tributary shown on the chart and provide the jurisdictional rational: tributary name and flow path to TNW – example:
  - ✓ Example:

    Collington Branch is a nontidal tributary to Western Branch, a nontidal tributary to the Patuxent River, which is a tidal navigable tributary to the Chesapeake Bay, a tidal, navigable interstate waterway
  - ✓ Per Rapanos guidance, identify the tributary as TNW, perennial RPW, intermittent RPW, intermittent non-RPW, etceteras per the chart below:

Waters Type Short Code	Waters Type
TNW	TNWs, including territorial seas
TNWW	Wetlands adjacent to TNWs
RPW	Relatively Permanent Waters (RPWs) that flow directly or indirectly into TNWs

NRPW	Non-RPWs that flow directly or indirectly into TNWs
RPWWD	Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
RPWWN	Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
NRPWW	Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
ISOLATE	Isolated (interstate or intrastate) waters, including isolated wetlands
UPLAND	Uplands
TNWRPW	Tributary consisting of both RPWs & non-RPWs

Project Plans

On 81/2-inch by 11-inch plan sheets

- ✓ Provide a typical construction plan for subterranean and aerial work on top and profile views for each potential method of work on land and the same for tidal water body crossings showing the following:
  - ✓ Wetlands and waterways as well as any non-work buffers
  - ✓ Types of work allowed/not allowed within those buffers (stockpile, equipment storage, use of chemicals/gas, etceteras)
  - ✓ On-site signage for work area restrictions, wetland/waterway boundaries and buffers, work allowance for construction and maintenance operations, including right-of-way vegetation management practices
- ✓ Describe composition of substrate in submerged and terrestrial areas (sand, clay, gravel, rock)
- ✓ Typical design and dimensions of the electrical transmission line system, including all structural components and materials
- ✓ Typical methods of work and impact type and areas due to specific methods, including width and depth of trench, stabilization of the substrate, and disposal of excess excavated material
- ✓ Describe the method the electrical transmission line would be secured in place, anchored, or weighed down
- ✓ Relationship of electrical transmission line location to oyster bars; artificial reefs; submerged and terrestrial historic sites; navigation fairways and Federal channels; parks; named swamps and wetlands; waterways; and any other natural resources of concern

Nontidal Areas

On 81/2-inch by 11-inch plan sheets for each impact area:

The impacts areas must be described by square footage, acreage, and linear feet of waterway

- ✓ Indicate dimensions of structures and/or fill, including grading relative to current elevation
  - ✓ Indicate the anticipated impact area for use of temporary marsh mats, as well and indicate the dimensions and marsh mat material
  - ✓ Show wire anchors etceteras for the electric line support structures
- ✓ Identify and indicate the square foot area and acreage of each wetland proposed to be impacted and indicate whether it abuts, is adjacent to a waterway or is isolated
  - ✓ Indicate the type of wetland proposed to be impacted
  - ✓ Indicate the total area of the wetland to be impacted and the proposed impact area
  - ✓ Indicate the latitude and longitude coordinates of each wetland proposed to be impacted
- ✓ Identify and indicate the length and average width at the approximate ordinary high water mark of each waterway proposed to be impacted
  - ✓ Indicate the total length and area of the waterway to be impacted and the proposed impact length and area
  - ✓ Indicate the latitude and longitude coordinates of each waterway proposed to be impacted at the upstream and downstream proposed impact limits
  - ✓ Describe the condition of the wetland and waterway within the proposed impact area

Tidal Areas

On 81/2-inch by 11-inch plan sheets for each impact area:

The impacts areas must be described by square footage, acreage, and linear feet of waterway

- ✓ Provide plans indicating dimensions of structures and/or fill, including elevation above/below the approximate mean high water and mean low water levels and relative to the approximate mean high water, mean low water and high tide shorelines
  - ✓ Cross section/profile view of transmission line relative to the MHW and MLW shorelines including controlling depth and minimum clearances of proposed transmission line components below and above mean low water and bottom substrate or depth below soil/water/air interface and identify areas for trenching or directional drilling
  - ✓ Shoreline stabilization that may be necessary at the shoreline crossings
  - ✓ Indicate the anticipated impact area for use of temporary marsh mats, as well and indicate the dimensions and marsh mat material
  - ✓ Show wire anchors etceteras for the electric line support structures
- ✓ Provide plans showing:

- ✓ Existing shoreline features, including tidal wetlands, bank elevation and slope; mean high water (MHW) and mean low water (MLW) elevation; submerged aquatic vegetation; and structures such as piers, boat ramps, and other riparian facilities, and attendant features in vicinity of proposed electrical transmission line
- ✓ Existing depths at MLW within 50 feet of the electrical transmission line across the width of the waterway and location of navigational fairway and/or shipping channels
- ✓ Property lines and easement locations for riparian properties within and immediately adjacent to transmission line corridor

Other

- ✓ Prepare a separate permit application for impacts associated with access to and borehole testing in areas of wetland and/or waterway to determine the suitability of the substrate for the method of work proposed for the electrical transmission line crossing, e.g., HDD

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Appendix L
Additional Information

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SOUTHERN MARYLAND 230 KV RELIABILITY PROJECT
HUGHESVILLE, MD

HOLLAND CLIFF TO HEWITT ROAD
QUAD-CIRCUIT 230/66 kV TRANSMISSION LINE
STRUCTURE CONFIGURATION STUDY

BLACK & VEATCH CORPORATION

B&V Project 146026(G)
B&V File 52.0000

August 26, 2008
Revision 0

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SOUTHERN MARYLAND ELECTRIC COOPERATIVE
HOLLAND CLIFF TO HEWITT ROAD
QUAD-CIRCUIT STRUCTURE CONFIGURATION STUDY

1.0 INTRODUCTION

1.1 PURPOSE

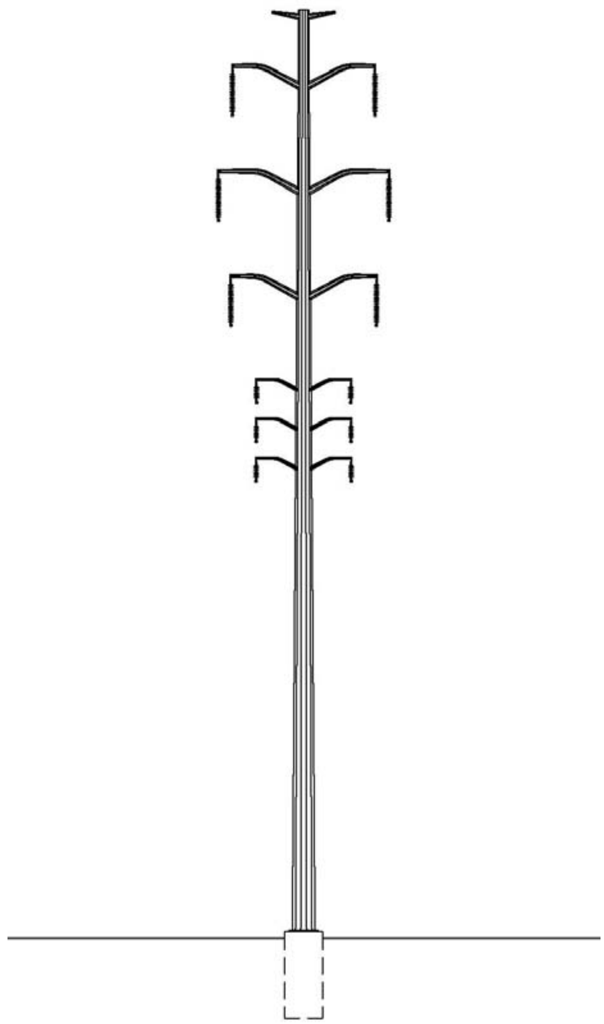
The purpose of this report is to study the potential structure configurations for the new quad-circuit 230/66 kV transmission system which SMECO is proposing to build between the newly redesigned Holland Cliff Switching Station and the existing Hewitt Road Switching Station. This proposed transmission line segment is approximately 30 miles in length. SMECO currently owns and operates a 66kV transmission line throughout the existing right-of-way, and is proposing to replace the existing facilities with a new double circuit 230kV transmission line with double circuit 66kV underbuild, for a total of four circuits. The proposed transmission system will pass through numerous existing SMECO substations along the proposed route (See Attachment #1).

This report will also consider the options in regard to the use of weathering steel structures versus galvanized steel structures, as well as the use of polymer insulators versus porcelain insulators.

1.2 STRUCTURE CONFIGURATIONS

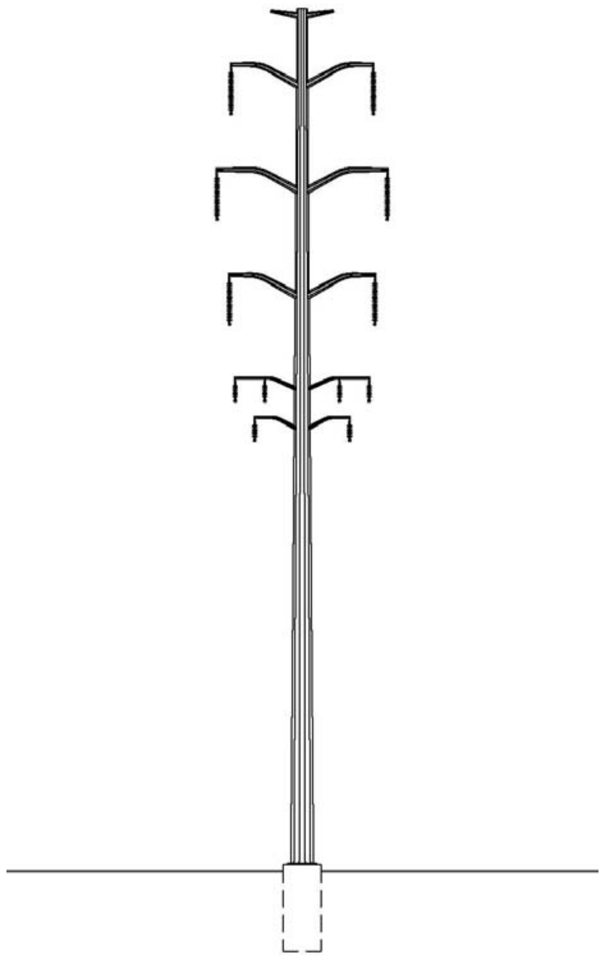
The new structures will consist of tubular steel poles with anchor bolts on drilled pier foundations. The majority of the right-of-way along the 30 mile transmission line is 100 feet wide, which will require a single quad-circuit structure. There are a few locations along the line route where the right-of-way is 150 feet wide. Therefore, consideration will be made as to whether it is appropriate to consider two double-circuit structures adjacent to each other along the right-of-way, at these locations.

The following five options have been created in regard to the potential structure configurations. A list of advantages and disadvantages will follow each option. See Attachment #2 for full-size details of each option along with relevant dimensions.



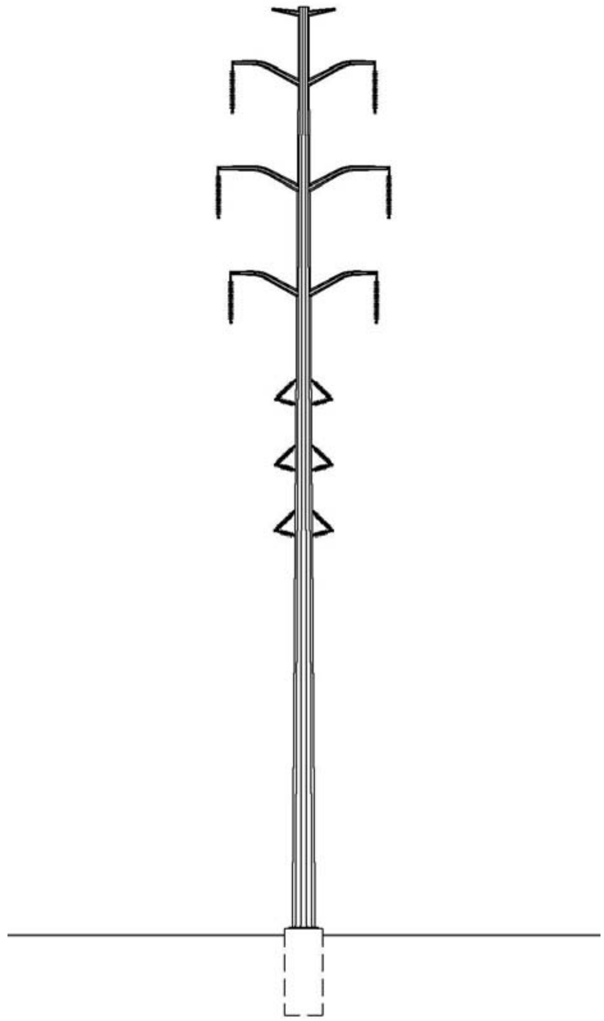
Option A – Quad Circuit Vertical Configuration w/ Davit Arms
(See Attachment #2)

Advantages	Disadvantages
● All same insulator type (porcelain or polymer I-strings)	● Tallest configuration of all options
● Best option regarding EMF performance	● One of the least cost effective options due to structure heights
● Easy access to both 230kV & 66kV lines for maintenance	



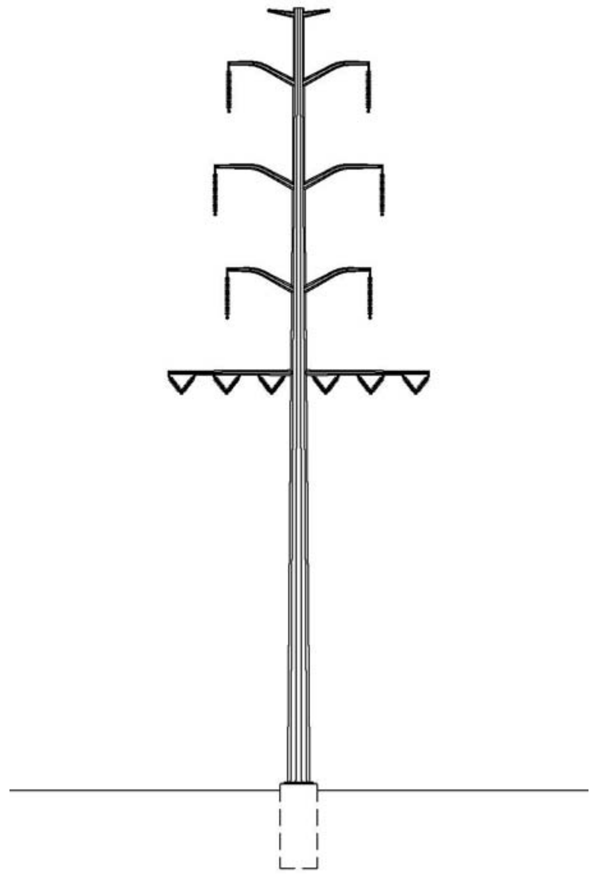
Option B – Quad Circuit Delta Configuration w/ Davit Arms
(See Attachment #2)

Advantages	**Disadvantages**
● Approx. 10 feet shorter than Option A	● Still taller than some of the other options
● All same insulator type (porcelain or polymer **I**-strings)	● Slightly more difficult to perform maintenance on both 230kV & 66kV lines
● Good EMF performance	
● Structure and foundation costs are reduced by approx. 10% in comparison to Option A	



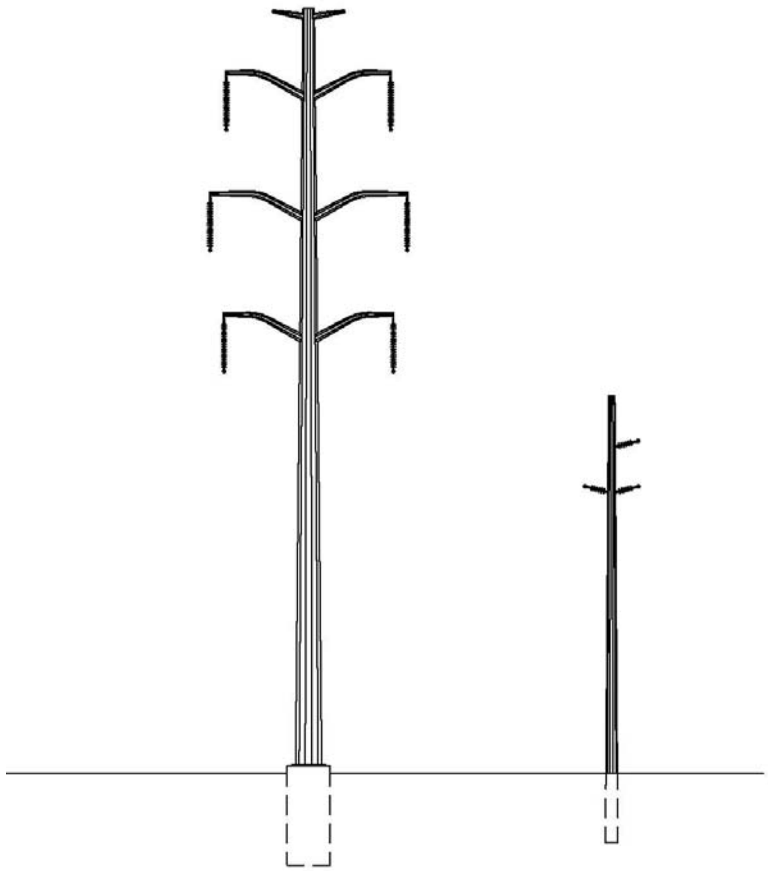
Option C – Quad Circuit Vertical Configuration w/ 66kV Braced Posts
(See Attachment #2)

Advantages	**Disadvantages**
● Similar EMF performance as Option A	● Same height requirement as Option A
● Easy access to both 230kV & 66kV lines for maintenance	● One of the least cost effective options due to structure heights
● Use all same insulator type (polymer)	● Braced post assembly is not a SMECO standard



Option D – Quad Circuit Vertical 230kV w/ 66kV Vee Strings
(See Attachment #2)

Advantages	**Disadvantages**
● Structure significantly shorter than other options	● Less aesthetically pleasing
● Most cost effective option due to lower structure height	● 66kV vee-string assembly is not a SMECO standard
● Use all same insulator type (polymer)	● Worst option regarding EMF performance
	● Difficult transition at DE structures
	● Maintenance of 230kV is more difficult due to configuration of 66kV
	● Span lengths may be limited due to width of 66kV circuits



Option E – D.C. 230kV Adjacent to D.C. 66kV
(See Attachment #2)

Advantages	**Disadvantages**
● Typical SMECO installation	● Only feasible with 150 ft ROW width
● Separates 230kV & 66kV circuits for easiest maintenance	● Difficult transition to quad-circuit structures
● Allows for shortest structure heights	● Structure configuration is not consistent throughout Project
● 66kV structures can likely be direct embedded	● Shorter spans on 66kV = more poles
● Separate circuits may result in higher reliability of the system	

1.3 STRUCTURE FINISH

There has been some discussion as to whether the tubular steel poles for this project should consist of weathering steel or galvanized steel. Following is a list of advantages and disadvantages associated with the two different structure finishes.

Option A – Galvanized Finish

Advantages	Disadvantages
● No need for hermetically sealing	● More expensive than weathering steel
● Better suited for field drilling	● Initial shiny appearance may not be appealing to all

Option B – Weathering Steel Finish

Advantages	Disadvantages
● 8% to 12% cheaper than galvanized steel (T&B)	● Rust can bleed onto insulators & concrete foundations
● Can accommodate longer pole sections	● Sections should be hermetically sealed, when possible
● More rustic appearance, blends into treed background	● Rusty appearance may not be appealing to all
	● Salt spray concerns

1.4 INSULATORS

SMECO has extensive experience with both porcelain insulators and polymer insulators throughout their system. Therefore, the performance of either type of insulator is not in question. However, vertical braced post and/or vee-string polymer assemblies are not currently standard construction methods for SMECO. Primary consideration should also be paid to management of supply stores and maintenance when selecting the insulator type to be used throughout the project.

Contractors generally prefer to work with polymer I-string insulators because they are much lighter than porcelain insulators. As a result, the construction installation cost could be slightly lower for polymer insulators.

SMECO currently uses all polymer insulators throughout their entire 66kV system, and polymer insulators are being used on all 230kV deadend strings on the transmission line segment between Aquasco and Holland Cliff. Because SMECO uses the same conductor for both 66kv and 230kV transmission, all hardware within each assembly can remain exactly the same, regardless of the line voltage, provided the new polymer insulators purchased for the project have the same end fittings.

1.5 CONCLUSION

While each structure configuration has its advantages and disadvantages, it is important to consider aesthetics and constructability, in addition to cost. It is apparent that Option B yields the best balance of all these criteria when considering a recommended structure configuration for this project. By placing the top two 66kV phases on the same davit arm, Option B provides some relief in terms of structure height when compared to a completely vertical configuration. The result is a 10 percent reduction in the structure and foundation cost when comparing between Option A and Option B. The installation of polymer insulator strings, with the same end fittings for both 230kV and 66kV, will allow the contractor to utilize the exact same attachment hardware, regardless of the voltage of the assembly.

Recent correspondence with a tubular steel pole fabricator (Thomas & Betts) has revealed that weathering steel structures are currently 8% (for smaller poles) to 12% (for larger poles) cheaper than galvanized steel structures of the same weight. The quad-circuit structures for this project are going to qualify as “large” structures, so it is reasonable to assume a savings approaching 12%. Provided the issue of aesthetics can be considered secondary, it is worth considering weathering steel structures as a preferred alternative for this project.

Option E was included in the report to explore the alternatives for 150 ft right-of-way corridors. While this is certainly a viable option for situations where150 ft wide right-of-way is available, it is important to consider the constructability issues associated with transitioning from a quad-circuit structure configuration (Option B) to a twin double circuit configuration as outlined in Option E. This option will require additional deadend structures in order to transition between a 100 ft right-of-way and a 150 ft right-of-way. From a consistency standpoint, it would be more beneficial to utilize a single quad-circuit configuration throughout the entire project.

Based on the recommendations of this report and discussions held with SMECO in their offices, following are the decisions that were made regarding the design criteria established for the new quad-circuit 230/66kV transmission system:

- All new transmission structures will be weathering steel, with the exception of structures located within existing substation property which will be galvanized to match the substation structures.
- No new transmission structures will be located within 30 feet of a highway crossing.
- All new 230kV and 66kV insulators will be polymer, with matching end fittings.
- All new quad-circuit tangent structures will be single pole structures (Option B configuration).
- All new quad-circuit deadend structures will be 2-pole structures.
- Opposing 230kV and 66kV circuits will have the phasing reversed in order to improve EMF performance within the right-of-way.
- All new structures will be placed along the centerline of the right-of-way, regardless of the width (100 ft or 150 ft).
- Existing 66kV wood transmission poles located along the centerline of existing 100 ft right-of-way will be de-energized and leaned to facilitate installation of the new quad-circuit transmission line. Existing 66kV conductor will be transferred onto the new structures.
- Existing 66kV on 150 ft right-of-way, which are not located along the centerline of the right-of-way, will not be transferred to the new quad-circuit transmission line. Existing facilities

will be demolished and salvaged. New conductor and hardware will be installed along the new transmission line.

- Deadend structures will be installed a minimum of every 2 to 3 miles in order to prevent cascading failure along the line.
- Deadend structures will also be installed on both sides of all major highway crossings, all railroad crossings, and all EHV transmission line crossings (345kV & above).

ATTACHMENT #1

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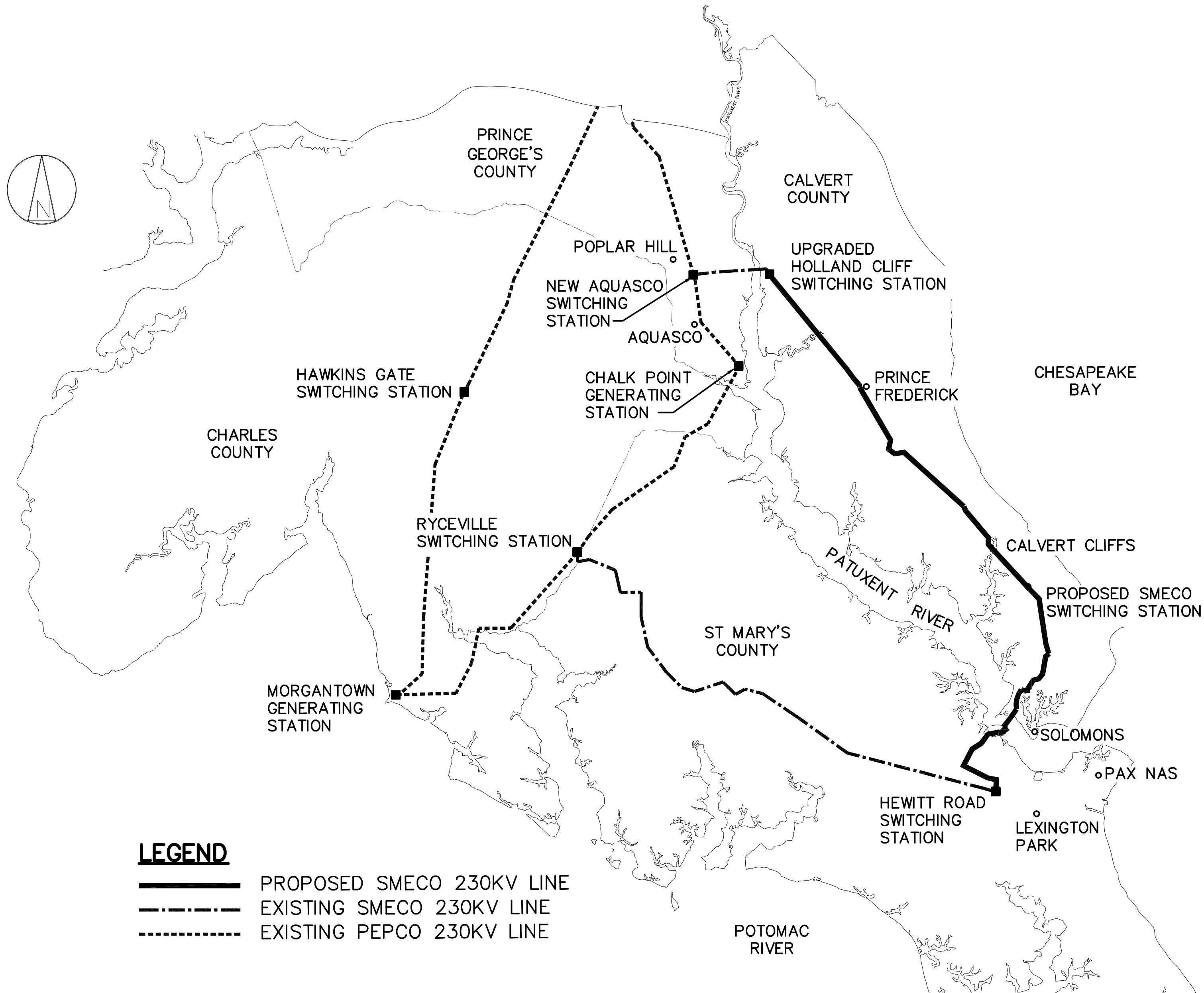

SMECO
SOUTHERN MARYLAND RELIABILITY PROJECT
ELECTRONIC MAP

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ATTACHMENT #2

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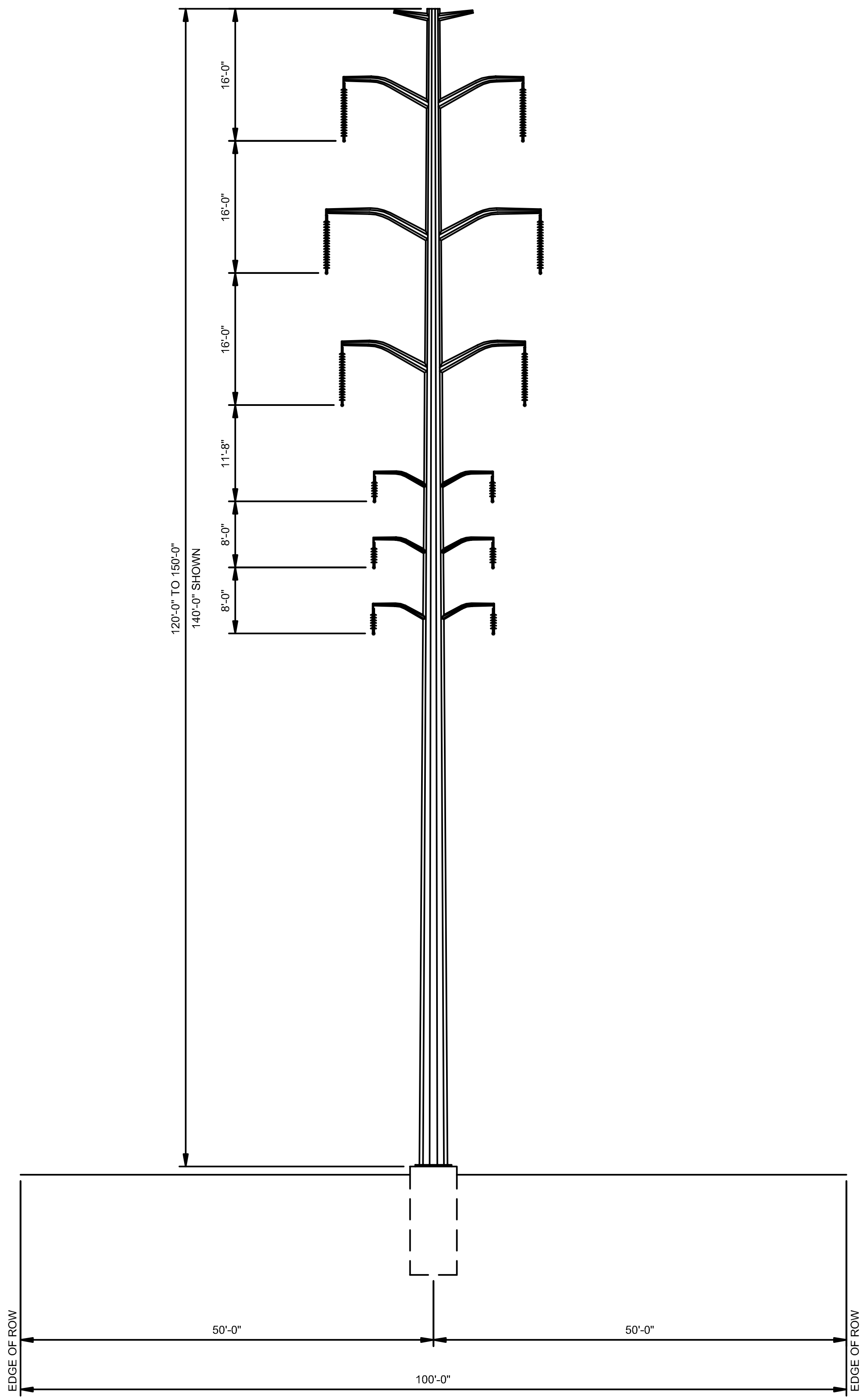
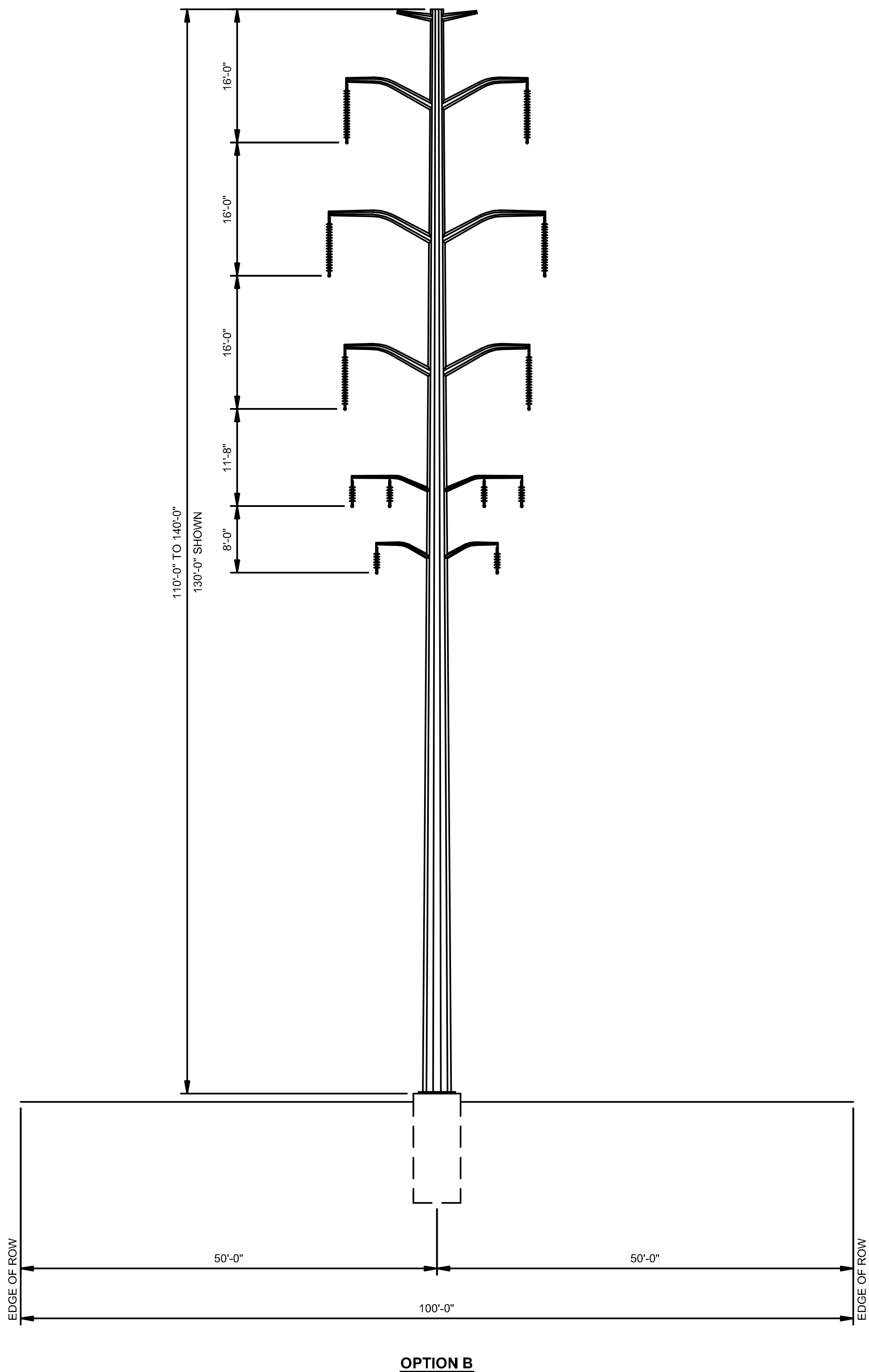


OPTION A

TYPICAL 100' ROW POLE CONFIGURATION

230KV DOUBLE CIRCUIT TANGENT STRUCTURE
W/ 66KV DOUBLE CIRCUIT UNDERBUILD

OPTION A

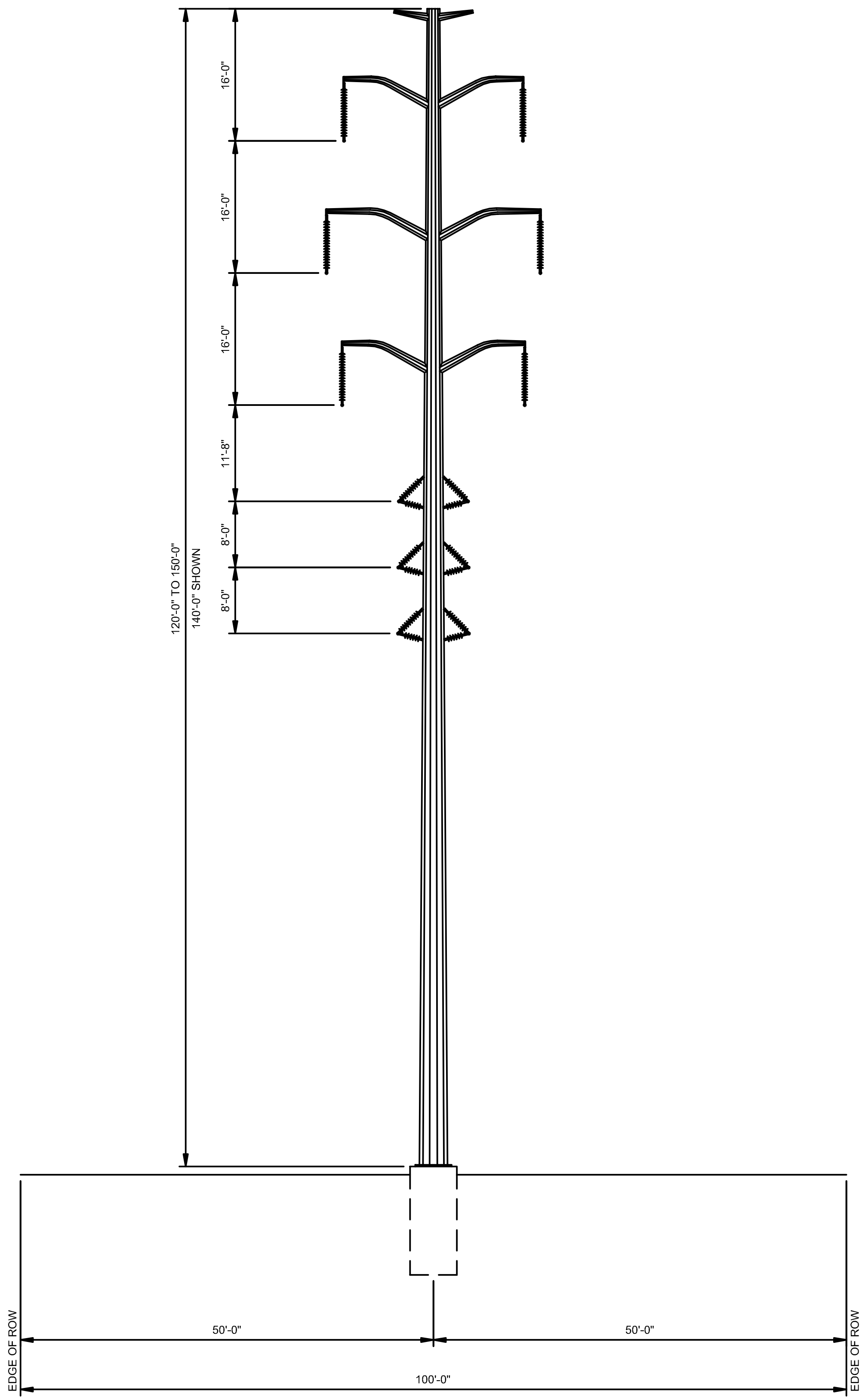


OPTION B

TYPICAL 100' ROW POLE CONFIGURATION

230KV DOUBLE CIRCUIT TANGENT STRUCTURE
W/ 66KV DOUBLE CIRCUIT UNDERBUILD

OPTION B

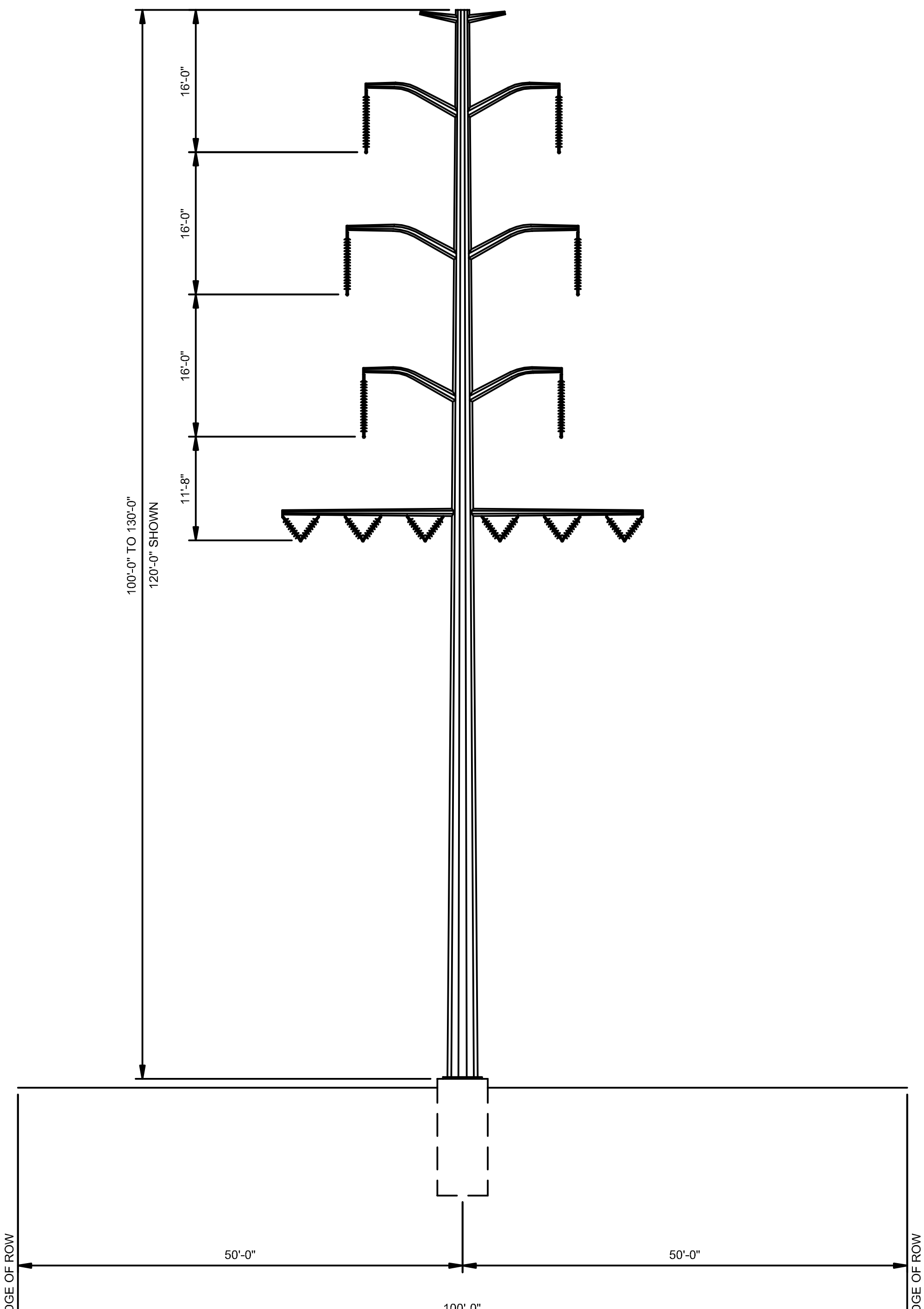


OPTION C

TYPICAL 100' ROW POLE CONFIGURATION

230KV DOUBLE CIRCUIT TANGENT STRUCTURE
W/ 66KV DOUBLE CIRCUIT UNDERBUILD

OPTION C

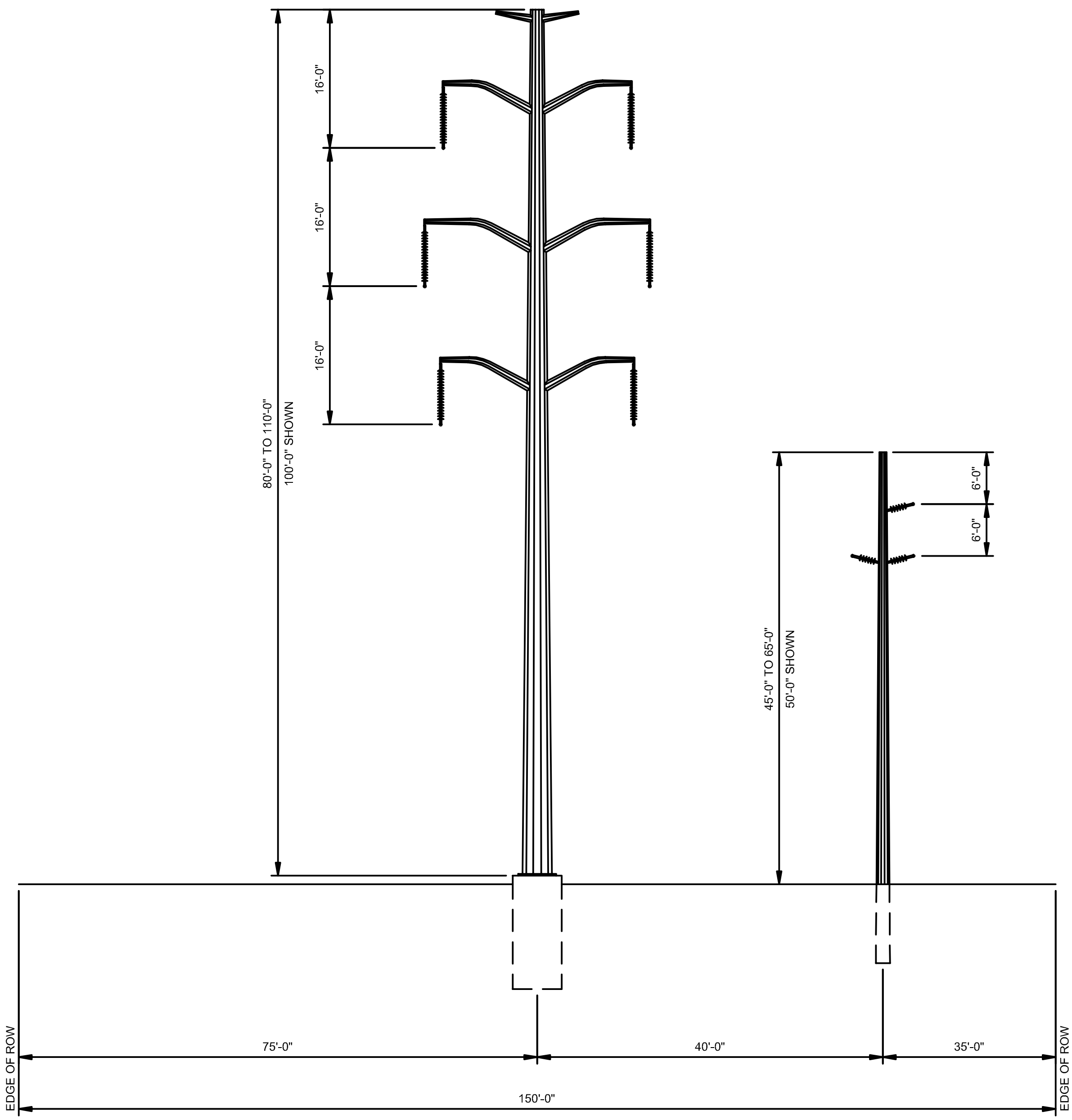


OPTION D

TYPICAL 100' ROW POLE CONFIGURATION

230KV DOUBLE CIRCUIT TANGENT STRUCTURE
W/ 66KV DOUBLE CIRCUIT UNDERBUILD

OPTION D



OPTION E

TYPICAL 150' ROW POLE CONFIGURATION

230KV DOUBLE CIRCUIT TANGENT STRUCTURE
W/ SEPARATE 66KV SINGLE CIRCUIT UNDERBUILD

OPTION E