3.0 ALTERNATIVES

In accordance with NEPA and FERC policy, we have evaluated a range of alternatives to the Sparrows Point Project, as well as alternatives for design and construction of the Project. The purpose of this evaluation was to determine whether or not there are reasonable alternatives that would result in less environmental impact than the Project as proposed. The proposed action before FERC is to consider issuing to AES a Section 3 authorization for an LNG import facility and issuing to Mid-Atlantic Express a Section 7 Certificate for a new natural gas pipeline. The proposed action before the Coast Guard is to issue AES a Letter of Recommendation with a determination of the suitability of the Project Waterway to support LNG carrier traffic.

Alternatives were evaluated against the stated purpose and need of the Project, as described in Section 1.1. The purpose of the Project is to establish an LNG marine terminal capable of receiving imported LNG from LNG carriers, and storing and regasifying the LNG at an average sendout rate of 1.5 Bcfd. The terminal would provide a new source of reliable, long-term, and competitively priced natural gas to the Mid-Atlantic region markets by using the proposed pipeline to connect to the existing natural gas pipeline system.

We established several key criteria to evaluate the potential alternatives identified. Each alternative was evaluated in consideration of whether or not it would:

- Be technically feasible and practical;
- Offer significant environmental advantage over the proposed Project or its components; and
- Meet the objectives of the proposed Project, as described above.

With respect to the first criterion, it is important to recognize that not all conceivable alternatives are technically feasible and practical. For example, some alternatives may not be feasible because the technology may not be available at the time or it may not be possible to implement the alternative due to technological difficulties or logistics. It is also important to consider the environmental advantages and disadvantages of the proposed action and to focus the analysis on alternatives that may reduce impacts. Further, because the total proposed Project would consist of individual components (such as the LNG terminal and the pipeline), all of these components must be present and must function together for the alternative to be considered feasible.

Information used to evaluate alternatives to the proposed Project included published studies, comments and suggestions from regulatory agencies, analyses prepared for similar projects, comments from the public, and data and analyses provided by AES and Mid Atlantic Express in their applications and supplemental filings.

Each alternative was considered until it was clear that the alternative was not reasonable or that the alternative would result in environmental impacts that would be greater than those of the proposed Project (impacts of the Project are described in Section 4.0) and that could not be readily mitigated. This assessment included consideration of using existing or proposed LNG projects and siting the Project in a different area.

FERC Actions

Overall, the Commission has three courses of action in responding to an application. It may:

- deny the proposal;
- postpone action pending further study; or
- authorize the proposal, either with or without conditions.

If the Commission denies the proposal (the No Action Alternative), or if the Applicants decided not to pursue the Project, the environmental impacts would not occur, the short- and long-term environmental impacts identified in section 4.0 of this EIS would not occur. The objectives of the proposed project would not be met, and AES and Mid-Atlantic Express would not be able to provide the proposed increased capacity of LNG import, storage, vaporization, and transportation services to its shippers.

If the Commission postpones action on the application, the environmental impacts identified in section 4.0 of this draft EIS would be delayed. It could have the same result as the No Action Alternative, *i.e.,* the objective of providing direct access to imported LNG supplies for the Mid-Atlantic and northern portion of the South Atlantic market would be jeopardized and could result in these supplies going to other destinations around the world.

Coast Guard Actions

For the Sparrows Point Project to proceed as proposed, the Coast Guard must issue an LOR finding that the Patapsco River/Chesapeake Bay/territorial seas waterway is suitable for the LNG marine traffic that would be associated with the proposed Sparrows Point import terminal facility, with or without conditions. Alternatives to this action include the issuance of a negative LOR or postponement of the issuance of an LOR.

The Coast Guard alternative of issuing a negative LOR by finding the waterway unsuitable for the proposed increase in LNG marine traffic would be similar to the FERC No Action Alternative described below and the discussion regarding the potential for customers selecting other energy sources. A negative LOR would prevent LNG vessels from transiting the waterway and the applicants would not be able to meet the Project objective of providing LNG import and storage services. This alternative would avoid the impacts identified in section 4.0 of this EIS for the proposed action.

If the Coast Guard postpones issuance of an LOR pending further analysis or study, the effect is expected to be similar to FERC postponing its action. That is, although it is speculative to predict the resulting effects, postponing issuance of an LOR for the Project could have the same result as the No Action Alternative because it could result in the LNG supplies going to other destinations around the world and customers would be required to seek other energy sources.

The Coast Guard's preferred alternative is the issuance of a positive LOR (i.e., the waterway is suitable) with a range of conditions and limitations as discussed in the WSA. On this project, this alternative would allow the Coast Guard to exercise it responsibilities to adequately ensure the safety and security of the Sparrows Point area and navigable waterways. See section 1.3 for a description of the Coast Guard's regulatory authority.

In some cases, a reasonable alternative for the Coast Guard is the issuance of an LOR without conditions. On this project, this alternative is deemed not reasonable and was eliminated from further analysis because it would preclude the Coast Guard from exercising its responsibilities to adequately ensure the safety and security of the Sparrows Point area and navigable waterways.

A possible additional alternative for the Coast Guard would be to find the waterway suitable for LNG marine traffic only if modifications were made to the applicant’s proposal, such as evaluating different routes for the vessels to take to the facility or the imposition of seasonal restrictions on vessel traffic. However, different waterway routes were eliminated as alternatives from further analysis because all LNG marine traffic must use the existing Chesapeake Bay marine transit route in order to reach the proposed site of the Terminal. (See section 3.2 for a discussion of alternative locations for the LNG Terminal Facility)

3.1 ALTERNATIVE ENERGY SOURCES

The use of other non-renewable fuels and renewable energy sources were evaluated as alternative means of accomplishing the purpose of the Project.

3.1.1 Other Non-Renewable Fuels

Based on our assessment of natural gas demand and supply in the target market (presented in Section 1.1), the area likely would experience a shortage of natural gas for power generation if the AES Project, or a similar new-source project, is not implemented. These shortages could in turn lead to an increased reliance on fuel oil and other non-renewable fuel supply sources for power generating facilities. EIA (2007) reported that, between 2005 and 2030, petroleum product consumption is likely to increase at a rate similar to that of natural gas; therefore, fuel oil likely would not provide a readily available or cost-effective alternative to natural gas.

Further, natural gas is the cleanest burning of the fossil fuels, and reliance on coal or oil to fuel power generation for the region may result in an increased output of air pollutants such as NOx, SO2, mercury, and greenhouse gases (EIA 2005). Increased emissions of these pollutants would decrease air quality in the region. In addition, like natural gas, secondary impacts are associated with production (coal mining and oil exploration and drilling), transportation (oil tankers, rail cars, and pipelines), and processing of other fossil fuels.

Another traditional non-renewable fuel source alternative to natural gas for electric generation is nuclear power. Existing nuclear power plants in the Project area include Calvert Cliffs 1 and 2 in Maryland. Regulatory requirements and public concerns make it unlikely that another nuclear power plant would be sited in the Project area in the foreseeable future.

Consequently, the use of nuclear power, while not impossible, does not appear to be a practical alternative for the market that AES proposes to serve.

3.1.2 Renewable Energy Sources

Nationwide, renewable energy sources have included wind, solar, tidal, and hydroelectric power; geothermal sources; and energy or fuel from municipal solid wastes, wood, and other biomass. Although new geothermal and traditional hydroelectric power projects are unlikely to be permitted and constructed in the region, other forms of renewable energy sources are likely to play an increasing role in meeting energy demands within the region in the coming years. Regional entities, as well as some municipalities within the region, have adopted goals and incentives for increased energy conservation and the use of renewable energy sources. If the proposed Project is approved, one result would be importation of additional fossil fuels to offset or partially offset regional energy needs; this could delay or deter the development of some renewable energy projects.

In 2007, Maryland expanded its renewable portfolio standard to require that 2 percent of the state's electricity supply come from solar sources by 2022, in addition to 7.5 percent from other renewable sources by the same date. Sources of energy that count toward the standard include methane from the anaerobic decomposition of organic materials in a landfill or wastewater treatment plant, wind, qualifying biomass, geothermal, ocean, including energy from waves, tides, currents, and thermal differences, a fuel cell that produces electricity from qualifying biomass or methane, and small hydroelectric power plants.

In 2004, Pennsylvania adopted its Alternative Energy Portfolio Standard, requiring that qualified power sources provide 18.5 percent of Pennsylvania's electricity by 2020. There are two tiers of qualified sources that may be used to meet the standard. Wind, solar, coalmine methane, small hydropower, geothermal, and biomass are in Tier 1 and must make up 8 percent of the portfolio. Solar sources must provide 0.5 percent of generation by 2020. Tier 2 sources include demand side management, large hydropower, municipal solid waste, waste coal, and coal integrated gasification combined cycle.

Although federal, state, and local initiatives promoting renewable energy likely will contribute to an increase in the availability and cost effectiveness of these technologies in the coming years, renewable energy sources would offset only a small part of the projected energy demand for the region in the foreseeable future.

3.1.3 Conclusions Regarding Alternative Energy Sources

Considered both individually and in combination, specific alternative energy sources would not meet the projected energy needs of the target markets The energy source alternatives considered in our evaluation could reduce some environmental impacts associated with the proposed Project but could not individually or cumulatively meet the projected future energy needs of the Mid-Atlantic market. The use of other non-renewable energy sources such as coal or oil would result in greater impacts to air quality, and regulatory requirements and public opposition make the use of nuclear energy in the Project area unlikely. Renewable energy sources, including wind, tidal, and solar power along with existing and proposed energy conservation measures will continue to play an increasingly important role in power generation for the regional markets; however, these sources represent only a small fraction of the projected energy demands for these markets for the foreseeable future, whether considered alone or in combination.

3.2 LNG TERMINAL ALTERNATIVES

As an alternative to the proposed project, we considered the feasibility of relying on existing, approved, proposed or planned LNG import and storage facilities at other ports in the mid-Atlantic and northeast Atlantic coastal regions of the United States or in the southeastern coastal region of Canada to meet the purpose of the Project. System alternatives would make use of other existing or proposed LNG or natural gas facilities to meet the stated purpose of the proposed Project. A system alternative would make it unnecessary to construct all or part of the proposed Project, although some modifications or additions to the existing or proposed facilities may be necessary. These modifications or additions, considered alone or in combination, would result in environmental impacts that could be less than, similar to, or greater than those associated with the Sparrows Point Project.

Our analysis did not consider existing or proposed LNG terminals in other parts of North America, such as the Southeast and Gulf Coast regions, because use of those facilities would require substantial new infrastructure development to transport gas to the mid-Atlantic region. Further, we did not consider the proposed KeySpan LNG Terminal Project in Providence, Rhode Island because FERC denied granting a Certificate. Table 3.2-1 lists the LNG terminals considered and their relevant characteristics.

Although these alternatives could make it unnecessary to construct all or part of the proposed Sparrows Point Project, significant modifications or additions to these facilities could be required that would result in environmental impacts greater, equal to, or less than that of the proposed action.

3.2.1 LNG Terminals Serving Other Target Markets

With the exception of the Cove Point, Crown Landing, and Freedom Energy Center projects, all of the LNG terminals identified are targeting different markets than those proposed to be served by the Sparrows Point Project. Consequently, to serve the same markets as the Sparrows Point Project, these terminals would require expansion to both their throughput and natural gas sendout capabilities. Regasified LNG from distant terminals would require a new or upgraded pipeline to transport gas to the target market. In general, each mile of new pipeline would affect about 12 acres of existing land uses. So, any alternative terminal location that would require a pipeline length greater than that associated with the Mid-Atlantic Express to reach the same market area, would accrue additional impacts at a rate of about 12 acres per mile.

Further, use of any of the existing or proposed LNG terminals as an alternative would include impacts associated with expanding the LNG terminals themselves (potentially adding new berths, tanks, and vaporization equipment); as well as adjacent facilities such as installing replacement pipe, looping, or a new pipeline at the facility; and adding new compressor stations or upgrading existing compressor stations.

For example, natural gas demands of the regional markets could potentially be met by the Bear Head and Canaport LNG terminals, both of which are under construction in Canada (Table 3.2-1), but additional facilities would be needed to access the mid-Atlantic market. Natural gas produced by the facilities reportedly would be transported by the Maritimes & Northeast pipeline. However, the Canaport LNG terminal and Maritimes & Northeast pipeline Phase IV expansion, as proposed, would not provide the volume of gas to the regional markets as proposed by AES. The Bear Head project was stalled, but even if it were to become operational, substantial upgrades to the downstream interstate pipeline systems, and possibly the LNG terminals, would be required to meet regional market needs. Expansion of the Maritimes & Northeast pipeline to accommodate natural gas from both the Bear Head and Canaport LNG facilities would include construction of 146 miles of new looped pipeline and would affect nearly 2,000 acres of land in Maine, including 322 acres of wetlands and 148 perennial waterbody crossings. Maritimes & Northeast conducted an open season from June to August 2007 for a Phase V expansion to accommodate additional gas demand in the New England area. In a related filing to FERC, Maritimes & Northeast stated that transport of gas from either the Quoddy or Downeast LNG Projects would likely require construction of 297 miles of new 36-inch-diameter pipeline looping and six new compressor stations. Construction of such a pipeline alone would affect more than 3,500 acres of existing land uses, including wetlands, wildlife habitat, residences, and recreational areas.

Consequently, the impacts associated with upgrades to the Maritimes & Northeast pipeline to accommodate natural gas from either the two Canadian or the two projects in Maine would be greater than those associated with the AES Project.

TABLE 3.2-1
Existing, Authorized, Proposed, and Planned LNG Terminals Considered as Alternatives

Project	Location	Daily Sendout Capacity (Bcfd)	Target Market	Facility Type	Status
In-Service Projects					
Everett LNG	Boston, Massachusetts	0.7	New England	Onshore	Operating
Cove Point LNG	Cove Point, Maryland	Increase from 1.0 to 1.8 Bcfd a/	Mid-Atlantic	Onshore	Operating/Expansion approved and under construction
Federally Approved Projects					
Weaver's Cove LNG	Fall River, Massachusetts	0.8	New England (southeastern Massachusetts and Rhode Island)	Onshore	Approved by FERC; Coastal Zone Permit denied by Massachusetts; decision is being appealed to the Department of Commerce
Crown Landing LNG	New Jersey (Delaware River)	1.4	Mid-Atlantic	Onshore (Delaware River)	Approved by FERC; Coastal Zone Permit denied by Delaware
Northeast Gateway Energy Bridge	Offshore Gloucester, Massachusetts	0.4	New England	Offshore shuttle regasification vessel (buoy system)b/	Approved by MARAD and Coast Guard; construction complete
Neptune Deepwater Port	Offshore Gloucester, Massachusetts	0.5	New England	Offshore buoy system	Approved by MARAD and Coast Guard
Broadwater LNG	Long Island Sound, New York	1.0	New York City, Long Island, Connecticut	Floating Storage and Regassification Unit	Approved by FERC; state approvals pending
Canadian-Approved Projects					
Canaport LNG	St. John, New Brunswick	1.0	New England and eastern Canada	Onshore	Approved by Canadian government; construction underway
Bear Head LNG	Point Tupper, Nova Scotia	1.5	New England and eastern Canada	Onshore	Approved by Canadian government; construction started but currently on hold pending funding source
Proposed U.S. Projects					
Downeast LNG	Robbinston, Maine	0.5	New England	Onshore	Under review by FERC
Quoddy Bay LNG	Perry, Maine	2.0	New England	Onshore	Under review by FERC

TABLE 3.2-1 Existing, Authorized, Proposed, and Planned LNG Terminals Considered as Alternatives					
Project	**Location**	**Daily Sendout Capacity (Bcfd)**	**Target Market**	**Facility Type**	**Status**
Safe Harbor Energy	Offshore Long Island, New York	1.2	New York City, New Jersey, and Northeast	Offshore	Under review by Coast Guard
Planned U.S. Projects					
Calais LNG	Calais, Maine	1.0	New England	Onshore	Announced
BlueOcean Energy LNG	Atlantic Ocean	1.2	New Jersey and New York	Floating Storage and Regassification Unit	Announced
AES Battery Rock	Boston, Massachusetts	0.8	New England	Onshore	Announced
Freedom Energy Center LNG	Philadelphia, Pennsylvania	N/A	Mid-Atlantic	Onshore	Announced
Proposed Canadian Projects					
Rabaska	Quebec City, Quebec	0.5	Eastern Canada	Onshore	Under Canadian government review
Cacouna Energy	Gros Cacouna, Quebec	0.5	Eastern Canada	Onshore	Under Canadian government review
Maple LNG	Goldboro, Nova Scotia	1.0 (additional 1.0 with expansion)	Eastern Canada	Onshore	Under Canadian government review
Grassy Point LNG	Placentia Bay, Newfoundland	N/A (storage and transport only)	N/A	Onshore	Under Canadian government review
Planned Canadian Projects					
Energie Grande-Anse	Saguenay, Quebec	1.0	Eastern Canada	Onshore	Announced

N/A = Information not available.

a/ A proposal to add 0.8 Bcfd of sendout capacity and an additional 6.7 Bcfd of LNG storage to the Cove Point LNG facility was approved by FERC in June 2006.

b/ Buoy system terminal, uses marine vessels that transport LNG and have onboard vaporization equipment. Vaporized LNG is transferred from the buoy system to a pipeline riser that is attached to an offshore buoy.

3.2.2 LNG Terminals Serving Target Markets

Cove Point LNG

Dominion Cove Point owns and operates an LNG import facility near Lusby, Calvert County, Maryland and a pipeline that extends approximately 88 miles from the LNG terminal to connections with several interstate pipelines in Virginia. In June 2006 the Commission approved an expansion of the Cove Point facility to increase its storage capacity to 14.5 Bcfd and its send-out capacity to 1.8 Bcfd. The expansion includes the construction of two additional 160,000 m^3 LNG storage tanks on the existing LNG terminal site and the construction of five new natural gas pipelines totaling about 161 miles in length to deliver additional capacity to pipeline systems in Virginia and Pennsylvania. These pipelines would include about 48 miles of 36-inch-

diameter pipeline in Maryland and about 81 miles of 24-inch-diameter pipeline in Pennsylvania. The Pennsylvania projects will allow supplies to be stored in the summer and moved to the Northeast for use during the winter.

As part of the new pipeline system in Pennsylvania, Dominion plans to construct 17,335 horsepower (hp) of compression at two new compressor stations. In addition, three pipelines in Pennsylvania are being constructed to support the storage and transport of natural gas at the Leidy Hub, including two 24-inch-diameter pipeline loops totaling 23 miles in length and one 20-inch-diameter pipeline loop totaling 10 miles in length. The expansion also includes the addition of 8,550 hp of additional compression at two compressor stations in West Virginia, pipeline upgrades and replacements, modifications at existing aboveground facilities, and other minor facility modifications.

Although the Cove Point Expansion does provide up to 0.8 Bcfd of new natural gas to mid-Atlantic and northeastern markets, it would not provide comparable volumes to the Sparrows Point Project. By the 2020 time period, AES has forecasted that incremental design day demand will not only require the 1.5 Bcfd from the Sparrows Point Project but will also require approximately two additional natural gas supply projects that are larger than the size of the Sparrows Point Project. Considering the potential for the Cove Point LNG Terminal to be expanded further in the future, by agreement with the Sierra Club, including its Maryland Chapter and Maryland Conservation Council, Inc. dated March 1, 2005, Dominion Cove Point LNG, L.P. agreed to limit future expansion such that maximum future total capacity would be no more than 18.85 Bcfd (4.35 Bcfd above currently planned storage capacity). In addition, the delivery points in Pennsylvania for the Cove Point Expansion are not as close to the eastern markets targeted by the Sparrows Project and a new pipeline from Cove Point to Eagle, PA would be considerably longer than the Mid-Atlantic Express Pipeline.

Crown Landing LNG Project

The Crown Landing LNG Project would consist of onshore LNG storage and process facilities located in Logan Township, Gloucester County, New Jersey and an offshore ship unloading facility located in New Castle County, Delaware. The LNG import terminal would have interconnections with three natural gas pipeline systems. One of these interconnections would be the Logan Lateral Project, which would consist of 11.0 miles of 30-inch-diameter natural gas pipeline from Texas Eastern's Chester Junction facility located in Brookhaven Borough, Delaware County, Pennsylvania to the LNG facility. Other towns and townships crossed by the Logan Lateral route include the City of Chester, Aston Township, and Chester Township in Pennsylvania and Logan Township in New Jersey. The other two interconnections (Columbia Gas and Transco pipelines) would be within the proposed LNG facility site.

If the project is constructed, it would lie just about 25 miles southeast of Eagle, Pennsylvania. However, as planned, the Crown Landing LNG Project interconnects with the same pipelines as would Sparrows Point LNG and would presumably serve many of the same markets; although the proposed throughput for Crown Landing LNG is about 0.1 Bcfd less than Sparrows Point LNG. Based upon the substantially shorter send out pipeline, the Crown Landing LNG Project appears to satisfy the Sparrows Point LNG Project objectives with less environmental impact.

On June 20, 2006, the Commission granted Crown Landing LLC authority to construct and operate an LNG import terminal once it has satisfied a number of conditions. A pier supporting the facility extended into the State Waters of Delaware. Delaware denied the necessary permits for the project. New Jersey objected to the authority exerted by Delaware and sought legal relief. Ultimately, the matter was decided by the U.S. Supreme Court in March 2008. The Court ruled that while Delaware cannot block ordinary projects from going forward on the New Jersey shoreline, the proposed Crown Landing LNG project "goes well beyond the ordinary or usual." It is our interpretation, therefore, that the Crown Landing LNG Project, as proposed, cannot be constructed. The applicant could conceivably redesign the project to avoid conflicts with Delaware. However, the extent of necessary modifications and the impacts of those modifications are unknown. Further, it is not possible to establish a timeline for the modified project. The current uncertainty with the Crown Landing LNG Project reduces its attractiveness as an alternative to the Sparrows Point Project. For these same

reasons, we have not included the Crown Landing site in our review of alternative terminal sites (Section 3.2.3).

Freedom Energy Center

Philadelphia Gas Works proposes to convert the current Richmond Plant LNG facility to become an import terminal. The plan would involve building one additional storage tank and adding new equipment at the Tioga Marine Terminal to unload LNG. Shipments of LNG would be unloaded from tankers twice a month. The LNG would be unloaded into both the existing storage tanks and into one new storage tank. Although the project was announced in 2004, we have no information indicating that it has advanced to the point where an assessment of potential impacts is possible. While the proposed location of the terminal would possibly allow it to provide natural gas to some of the markets pursued by AES, the current proposal would not seem to indicate that the proposed facility would feed interstate pipelines and markets outside the Philadelphia region. Therefore, the Freedom Energy Center does not meet the project objectives and is not considered further.

3.2.3 LNG Terminal Onshore Site Alternatives

One of the stated objectives of the proposed project is to provide a significant supply of natural gas directly into the mid-Atlantic region that would not be constrained by capacity-limited interstate pipelines that currently provide gas from other regions. The port within which a proposed liquefaction facility would be located should already have deep water (i.e., channel depths greater than 40 feet) to minimize the amount of dredging that would be required to accommodate deep-draft LNG vessels.

The two major bay systems with existing deep-water ports in the mid-Atlantic region are the Chesapeake Bay and the Delaware River. We evaluated the various LNG terminal site alternatives using the following criteria:

- available property of appropriate size;
- distance to populated areas;
- amount of dredging required;
- distance to potential interconnections with interstate pipeline systems where sufficient take-away capacity exists to limit the need to expand existing systems;
- amount of wetlands to be impacted by the construction of the terminal or associated approach channel, turning basin, and docking areas; and
- potential for impacts to threatened or endangered species or their critical habitat.

Within the Chesapeake Bay area, the alternatives analysis included assessment of various locations along the bay for further evaluation, (see figure 3.2.3-1) including: (1) a site near Cove Point, Maryland; (2) Calvert Cliffs; (3) Greenbury Point; (4) Fishing Point and other sites within the Baltimore Inner Harbor; (5) Swan Creek immediately south of the Key Bridge; (6) Kent Island; and (7) an alternative Sparrows Point peninsula site (Mittal Steel site). Sites farther north than Baltimore Harbor are not considered feasible since the channels are maintained to only 35 feet or less. The relative location of each alternative considered within Chesapeake Bay is shown on figure 3.2.3-1.

Each of these alternative onshore site locations is discussed below. Figures 3.2.3-2 through 3.2.3-9 show the specific locations of the proposed Sparrow Point site and the alternative LNG terminal sites. The proposed Sparrows Point terminal location is compared to the seven Chesapeake Bay alternative sites in table 3.2.3-1.

Cove Point, Maryland

The land parcel adjacent to the existing LNG terminal at Cove Point, Maryland was identified as an alternative location that might satisfy some of the siting criteria. Specifically, the land to the immediate west of the existing Dominion Cove Point LNG storage area was evaluated as a potential site (see figure 3.2.3-3).

Legend

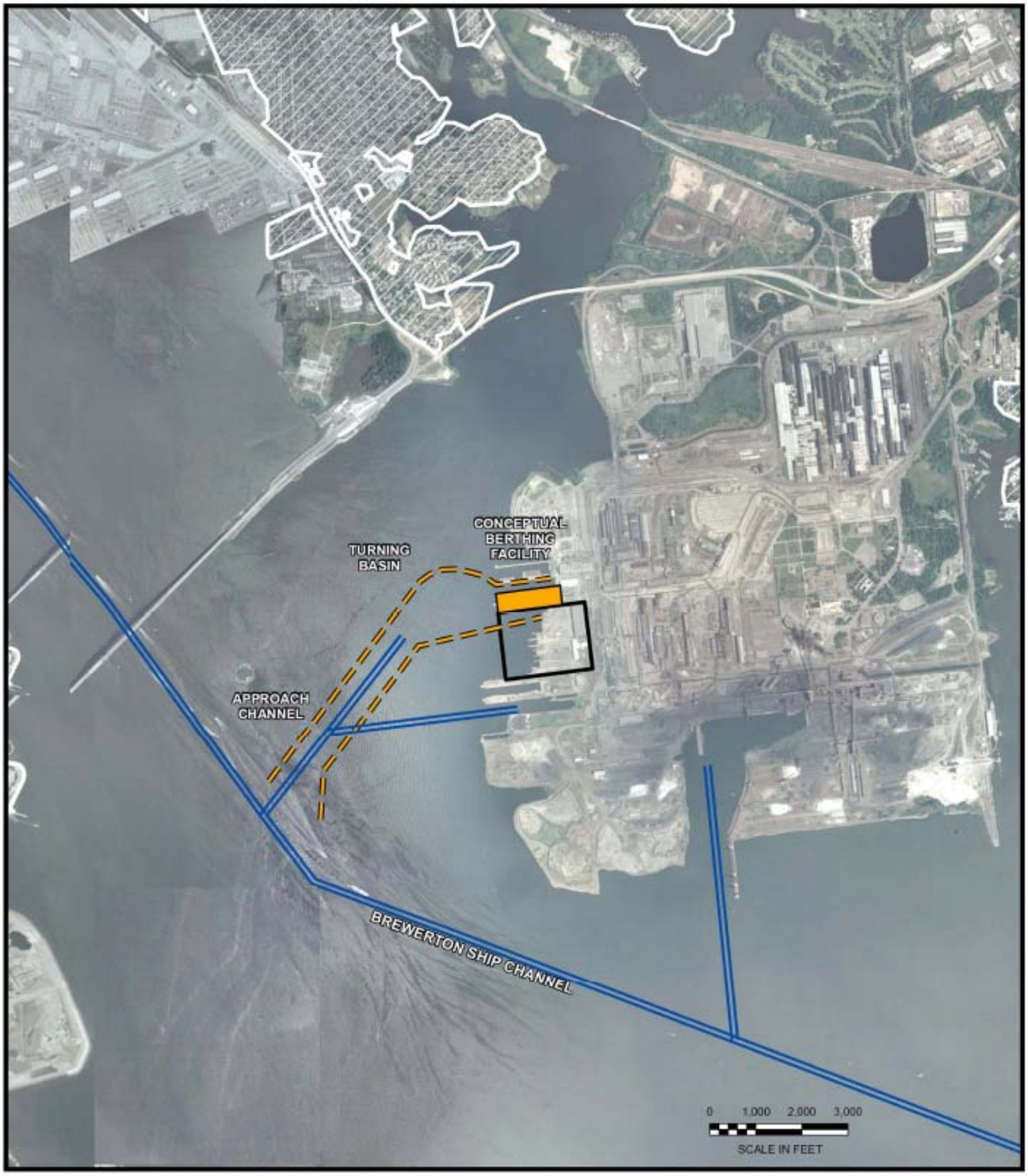
PREFERRED LNG TERMINAL

ALTERNATIVE LNG TERMINAL

SHIPPING CHANNEL

Figure 3.2.3-1

Sparrows Point LNG Project
Alternative LNG Terminal Locations

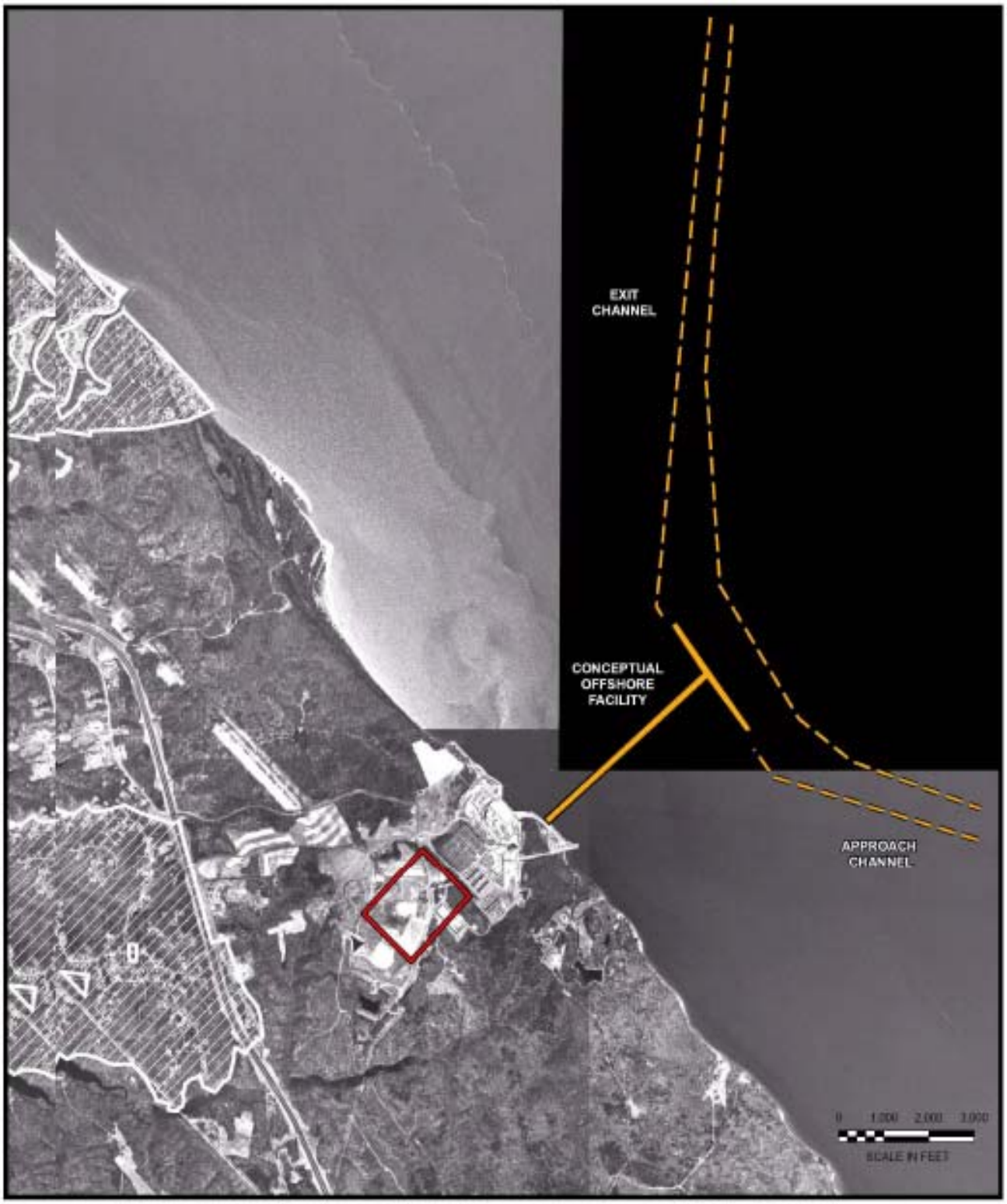


LEGEND
- Proposed LNG Terminal Site
- Alternative LNG Terminal Site
- Residential Zone
- Conceptual Berthing Facility
- Shipping Channel
- Conceptual Basin and Turning Channel

Figure 3.2.3-2
Sparrows Point LNG Project
Proposed LNG Terminal

LEGEND
- Proposed LNG Terminal Site
- Alternative LNG Terminal Site
- Residential Zone
- Conceptual Berthing Facility
- Shipping Channel
- Conceptual Basin and Turning Channel

Figure 3.2.3-3
Sparrows Point LNG Project
Cove Point - LNG Terminal
Site Alternative



LEGEND
- Proposed LNG Terminal Site
- Alternative LNG Terminal Site
- Residential Zone
- Conceptual Berthing Facility
- Shipping Channel
- Conceptual Basin and Turning Channel

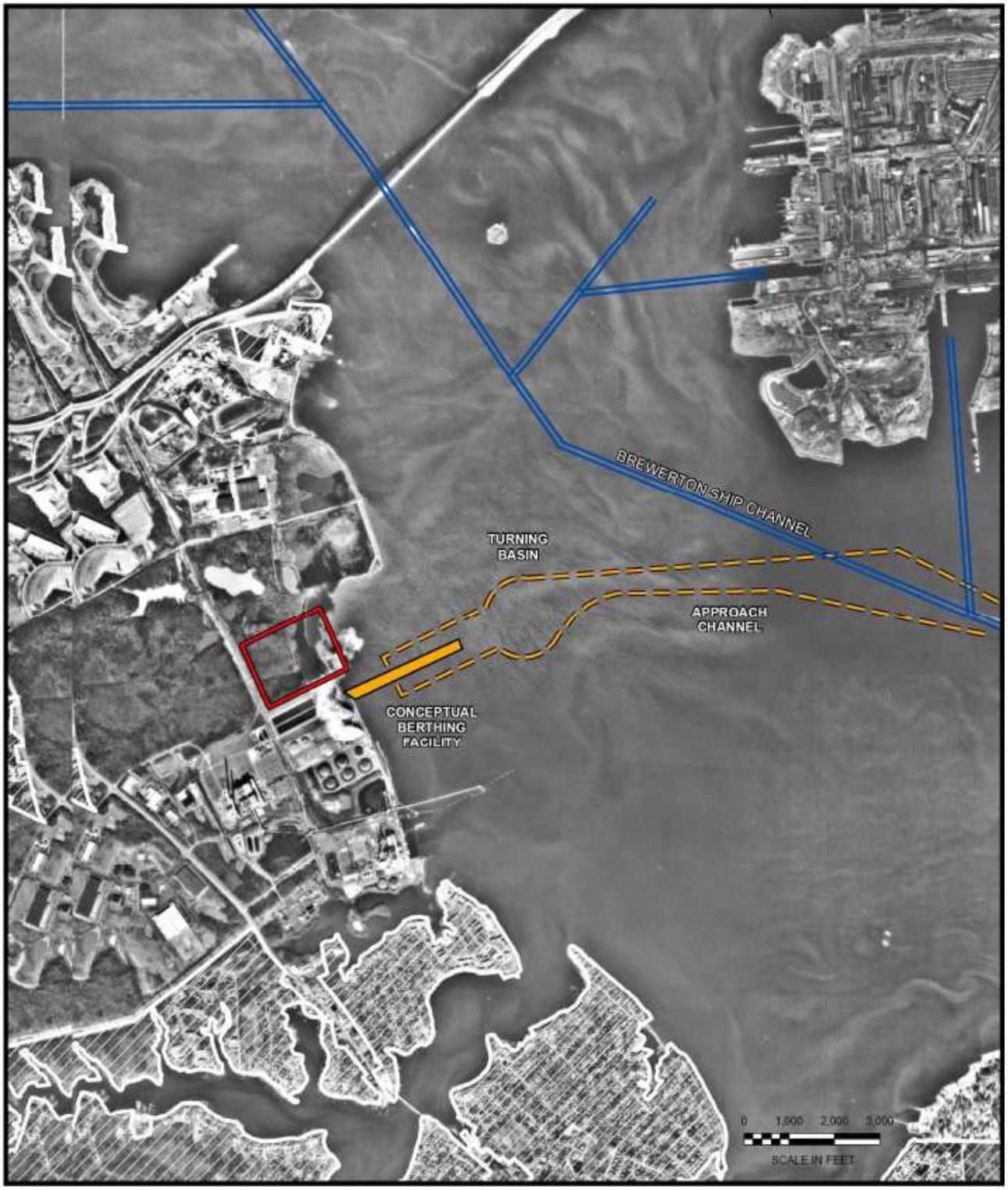
Figure 3.2.3-4
Sparrows Point LNG Project
Calvert Cliffs - LNG Terminal
Site Alternative

LEGEND
- Proposed LNG Terminal Site
- Alternative LNG Terminal Site
- Residential Zone
- Conceptual Berthing Facility
- Shipping Channel
- Conceptual Basin and Turning Channel

Figure 3.2.3-5
Sparrows Point LNG Project
Greenbury Point - LNG Terminal Site Alternative

LEGEND
- Proposed LNG Terminal Site
- Alternative LNG Terminal Site
- Residential Zone
- Conceptual Berthing Facility
- Shipping Channel
- Conceptual Basin and Turning Channel

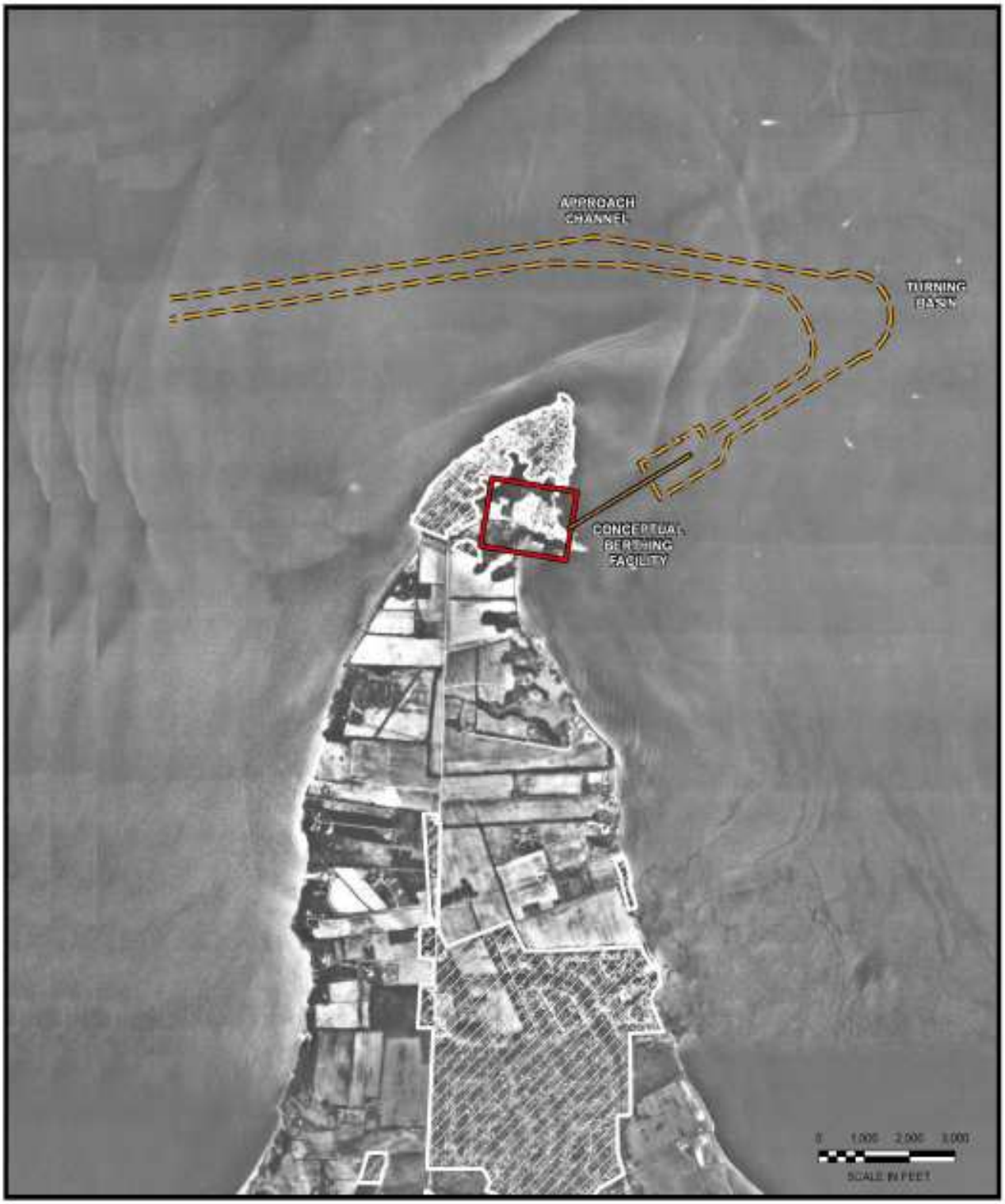
Figure 3.2.3-6
Sparrows Point LNG Project
Fishing Point - LNG Terminal Site Alternative



LEGEND

- Proposed LNG Terminal Site
- Alternative LNG Terminal Site
- Residential Zone
- Conceptual Berthing Facility
- Shipping Channel
- Conceptual Basin and Turning Channel

Figure 3.2.3-7
Sparrows Point LNG Project
Swan Creek - LNG Terminal Site Alternative



LEGEND
- Proposed LNG Terminal Site
- Alternative LNG Terminal Site
- Residential Zone
- Conceptual Berthing Facility
- Shipping Channel
- Conceptual Basin and Turning Channel

Figure 3.2.3-8
Sparrows Point LNG Project
Kent Island - LNG Terminal Site Alternative

LEGEND
- Proposed LNG Terminal Site
- Alternative LNG Terminal Site
- Residential Zone
- Conceptual Berthing Facility
- Shipping Channel
- Conceptual Basin and Turning Channel

Figure 3.2.3-9
Sparrows Point LNG Project
Mittal Steel - LNG Terminal
Site Alternative

TABLE 3.2.3-1

Comparison of Proposed Sparrows Point LNG Site and Seven Chesapeake Bay Alternative Locations

Siting Criteria	Unit	Sparrows Point – proposed	Calvert Cliffs	Cove Point	Greenbury	Fishing Point	Swan Creek	Kent Island	Mittal Steel
Land Use									
Distance from Residential Concentrations	miles	1.1	<1.0	0.3	<0.5	1.2	<1.0	<0.5	1.9
Estimated Population within 1 Mile		0	708	1730	1327	0	211	249	0
Existing Land Use	Type	industrial	Nuclear Power Plant	LNG Terminal	undeveloped/agricultural	industrial	agricultural	Industrial & residential	industrial
Zoning	Type	industrial	industrial	industrial	residential	industrial	industrial	industrial	industrial
Design Factors									
Size of Site Available	acres	45.0	64.3	31.0	34.3	46.7	46.4	40.0	50.0
Approximate Distance from Main Shipping Channel	feet	6000	18200	13000	21000	1000	8000	29000	2500
Length of Send Out Pipeline	miles	87.7	147.7	151.2	107.5	94.4	91.3	89.1	88.5
Adequate Air Draft under Bridge Crossings	Yes/no	yes	yes	yes	yes	yes	yes	yes	yes
Environmental Impact									
Approximate Dredge Quantities	million CY	3.7	1.6	1.1	1.7	15.4	11.7	10.9	1.8
Wetland Impacts at Terminal Site	acres	0.0	0.0	6.2	0.0	0.0	6.3	0.0	0.0
Threatened & Endangered Species Issues at Terminal Site	Yes/none	none	none	yes a/	none	none	none	none	none

a/ Impact to 0.12 acres of MDNR Species of Concern Habitat.
CY – cubic yards.

The site adjacent to the existing Cove Point LNG terminal site would not satisfy several of the siting criteria (table 3.2.3-1). The site is constrained from movement farther to the north by the Calvert Cliffs State Park. The Cove Point site is more than 151 miles from AES's preferred tie-in to three interstate pipeline systems at Eagle, Pennsylvania. A pipeline of a length similar to that proposed by AES might be routed to intersect existing interstate pipelines southwest of Washington, D.C., rather than traverse the entire 151 miles to Eagle, but it is believed that those existing pipelines are currently at full capacity south of Eagle and would therefore require expansion to accommodate the additional gas, with an associated increase in environmental impacts from pipeline construction. Co-location of the Project adjacent to the Dominion Cove Point LNG terminal facilities would result in greater potential environmental impacts compared to the proposed terminal site because of: 1) significantly longer pipeline, or looping of existing pipelines, that would be required to reach the terminus point near Eagle, Pennsylvania; 2) the absence of an existing utility corridor for much of the

pipeline route; 3) greater wetlands affected at the site; 4) the need to clear currently undeveloped land to support the terminal facilities; and 5) potential impact to 0.12 acre of habitat of species of MDNR concern.

Due to the small size of the available land at the site, the potential for conflict with the existing site expansion, and the sendout pipeline length to AES's proposed interconnects, we have eliminated this site from consideration as an LNG terminal site for the proposed Project.

Calvert Cliffs

Because the existing Constellation Energy Calvert Cliffs Nuclear Power Plant facilities are located directly on the shoreline, any co-located LNG terminal facilities would be sited closer than one mile from the residential areas (see figure 3.2.3-4). This site is approximately 148 miles from the proposed interconnection at Eagle, PA, requiring a pipeline some 60 miles longer than that proposed from the Sparrows Point location. As with the Cove Point alternative, a shorter pipeline could be routed west to intersect the existing interstate pipelines southwest of Washington, D.C., but those existing pipelines would likely require expansion from the intersection to Eagle to accommodate the increased flow. Environmental impacts would therefore increase substantially over those expected from construction of the proposed pipeline. In addition, on April 30, 2007, the Associated Press reported that Unistar Nuclear had announced plans for a new nuclear power plant adjacent to the existing Constellation Energy facilities. Thus, the site probably would not be available to AES. Further, if sited here, additional safety and security reviews would be required by the Nuclear Regulatory Commission due to the proximity of nuclear facilities. The NRC could find the location unacceptable for siting LNG facilities.

Based upon the complications of being located next to a nuclear power plant, the probable unavailability of the property, and the length of the sendout pipeline, we have eliminated this site from consideration as an LNG terminal site.

Greenbury Point

This alternative location is at Greenbury Point on the north side of the mouth of the Severn River (see figure 3.2.3-5). The factors that weigh against this alternative site are: 1) proximity of the site to population centers (part of the site itself is zoned for residential land use and existing residences are located within one mile of the site); 2) the length of the natural gas pipeline to connect to the interstate pipelines at Eagle, PA, is approximately 108 miles (the site is too far north to consider an alternate pipeline routing south of Washington, D.C.); and 3) the length of the access channel (approximately 21,000 feet) that must be dredged is considerably longer than any of the other alternatives, except the Kent Island alternative site. Based upon the need for constructing approximately 20 more miles of pipeline and the relative proximity to residential areas, this site is not environmentally preferable and is removed from further consideration as an LNG terminal location.

Fishing Point

This alternative site is located in an existing industrialized area north of the Francis Scott Key Bridge (Interstate Highway I-695) at Fishing Point (also known as Wagners Point), which is situated on the north side of Curtis Bay. The site is on the southwestern side of the Patapsco River (see figure 3.2.3-6).

There are a number of factors that weigh against developing the LNG terminal at this site. The site is considerably closer to the Baltimore Inner Harbor than Sparrows Point and could thus have an adverse impact on marine traffic in the main channel to Baltimore Harbor. The proposed site of the LNG vessel berth and the placement of the turning basin within Curtis Bay could adversely affect marine traffic within the whole area of the inner harbor within Curtis Bay, including a Coast Guard station located farther inside the harbor. Additionally, although the terminal property would be approximately 1.2 miles from the nearest residential community, the turning basin would allow the LNG ships to approach within about 3,500 feet of the nearest residence on the west side of the channel. The Fishing Point site location would require LNG ships to pass under the Francis Scott Key Bridge. The Francis Scott Key Bridge provides clearances (1,100 feet horizontal

and 185 feet vertical) similar to the William Lane Jr. Memorial Bridges (1,500 feet horizontal and 182 feet vertical) located along Highway 50, farther south in Chesapeake Bay on the marine approach to the harbor. Unlike the Highway 50 bridges to the south, the deep-water passage under the Francis Scott Key Bridge is restricted to a maintained channel 700 feet wide, limiting maneuverability in the vicinity of the bridge.

Since the site is adjacent to dense population to the west and north, it would be necessary to route the send out pipeline to Sparrows Point in order to follow the proposed pipeline route out of the Baltimore area. The pipeline would cross a wide portion of the Patapsco River using open-cut construction methods, with a water-to-water HDD under the main ship channel. A second HDD would likely be required under the Francis Scott Key Bridge to avoid a cable and pipeline area that parallels the bridge. Environmental impacts would be increased over the proposed Sparrows Point site as a result of the disturbance of sediments by this pipeline construction in the Patapsco River. Based upon these environmental considerations and the large amount of dredging that would have to be performed to access this site, the Fishing Point site is not environmentally preferable and is removed from further consideration as an LNG terminal location.

Swan Creek

The Swan Creek site is located south of the Francis Scott Key Bridge and across the deep water channel of the Patapsco River from the proposed site at Sparrows Point, directly north of an existing power plant. The site is south of Hawkins Point and north of Cox Creek. Figure 3.2.3-7 identifies this alternative site location and key site features.

Although the Swan Creek site is zoned for industrial use, an examination of available aerial photography reveals that a significant portion of the site appears to be wetlands. Digital National Wetlands Inventory (NWI) maps show these wetland areas to be tidally influenced coastal emergent marsh at the shoreline, and palustrine freshwater emergent marsh inshore. The remainder of the site is primarily forested. This type of undeveloped habitat is extremely rare along the Patapsco River. The site is less than one mile from the closest residential communities, to the west in Foremens Corner across Fort Smallwood Road. It would be necessary to dredge a considerable volume (approximately 11.7 million CY) to create an approach channel and turning basin to this site. Like the Fishing Point site, the Swan Creek site is bound by dense population to the west and north, so the pipeline would mostly likely be routed east across the Patapsco River to follow the proposed pipeline route out of the Baltimore area. Open cutting and one HDD to cross the channel would result in additional environmental impacts. For these reasons, the Swan Creek site is not considered environmentally preferable to the proposed Sparrows Point site and is removed from further consideration as an LNG terminal location.

Kent Island

This alternative LNG terminal site is located on the north end of Kent Island, at Love Point, (see figure 3.2.3-8) in the center of the Chesapeake Bay, across the Bay from Annapolis. Multiple residences are located less than 1,000 feet from the site on adjacent properties. The portion of the northern tip of the island zoned for industrial use is not large enough to accommodate the LNG terminal site. The send out pipeline route would cross a substantial portion of Chesapeake Bay by open cut, and multiple deep-water channels by HDD. The pipeline could be routed to Sparrows Point to then follow the proposed route north of Baltimore, adding some 15 miles to the length of the pipeline. It may be possible to find a pipeline route between Washington, D.C. and Baltimore, but interconnection with the existing pipeline at that location would still require expansion of the existing systems to Eagle to accommodate the increased flow rate in addition to greater impacts due to additional pipeline length. Also, the Kent Island site would require considerably more dredging (> 10 million CY) than the Sparrows Point site to accommodate large LNG vessels. For these reasons, this site is not considered environmentally preferable to the proposed Sparrows Point site and is removed from further consideration as an LNG terminal location.

Mittal Steel

This site is located south and east of the proposed LNG terminal location, on the southern portion of the industrialized Sparrows Point peninsula (see figure 3.2.3-9). The site is currently owned by Mittal Steel USA. AES reported that they could not acquire this site because of outstanding antitrust issues involving Mittal and the US Justice Department (DOJ). In a press release issued by the DOJ on February 20, 2007, Mittal was ordered to divest the Sparrows Point facility. This may or may not resolve the delays in site acquisition anticipated by AES. The site is reportedly under consideration for dredged material placement. In an Executive Committee meeting of the Maryland Dredged Material Management Program, held on September 6, 2006, the Maryland Port Administration reported that discussions were underway with Mittal about acquiring an upland placement site in lieu of a large in-water disposal site that had received major public opposition.

The Mittal site would increase the distance between the proposed LNG terminal and residential areas to about 1.9 miles and would require less dredging. However, the send out pipeline would need to be about 1 mile longer and uncertainty exists about the property and asset ownership of the Mittal Steel Sparrows Point facilities, making acquisition by AES more problematic. More importantly, the site does not offer significant environmental advantage over the proposed Project or its components and we eliminated it from further consideration.

3.2.4 Offshore Terminal Alternatives

We identified three alternative types of offshore LNG terminals that could meet the purpose of the Project:

- Offshore terminals that would use a floating buoy and riser system:
- Offshore gravity-based structures (GBSs);
- Offshore terminals that use floating storage and regasification units (FSRUs); and
- Offshore terminals that use FRUs.

The four types of LNG terminal designs are compared in Table 3.2.4-1 and discussed below.

Floating Buoy and Riser System

Under the Floating Buoy and Riser System (buoy system) Alternative, two or more permanently moored LNG unloading buoys would be constructed and attached to the seafloor, using a six- or eight-point mooring (anchoring) system. Each unloading buoy would contain a natural gas pipeline riser connected to a subsea pipeline that would extend to shore. When not in use, the unloading buoy would be suspended within the water column below the sea surface.

The supply vessel would moor over the buoy, draw the buoy up through a “moon port” in the LNG vessel, vaporize LNG in its storage tanks, and transmit natural gas into the riser in the buoy. When unloading activities are complete, the unloading buoy would be disconnected from the LNG vessel and released. To supply the volume of gas proposed by the Sparrows Point Project, a buoy system terminal would need to have at least one LNG vessel moored at its terminal at all times (Coast Guard 2006). A buoy system terminal could operate under somewhat rough sea states, allowing a connection between the carrier and the buoy in seas greater than 16 feet (Advanced Production and Loading [APL] 2006).

Typical buoy system terminals do not have the capacity to store LNG, although they have the potential to retain LNG. The lack of storage severely limits this technology for providing base load natural gas supply to the region. To ensure that a continuous supply of gas would be provided to the region, use of a buoy system LNG terminal would require two or three unloading buoys to allow for the departure/arrival of a vessel while another vessel is unloading. During severe weather, particularly in the Atlantic Ocean, the potential for periodic interruptions of service when the vessels are unable to berth and unload natural gas into the riser significantly reduces the reliability of this alternative. Calypso LNG LLC proposed a deepwater port project

offshore of Fort Lauderdale, Florida that would include both a buoy system terminal and a semi-permanently moored FSRU-like vessel. Such a system would provide onsite storage capacity.

To accommodate the deep-draft vessels (drafts of 45 to 52 feet) and to prevent the subsea riser from contacting the bottom, the unloading buoys for other buoy system terminals typically are constructed where water depth is at least 130 feet and typically much deeper. Visual impacts would occur only when vessels are at berth or in the vicinity of the terminal; however, berthing would occur on every day that weather conditions permitted.

TABLE 3.2.4-1

Terminal Design Types

Feature	Floating Storage and Regasification Units (FSRU)	Gravity-Based Structure (GBS)	Floating Buoy and Riser System	Floating Recovery Unit (FRU)
Nearshore dredging or jetty construction required?	No	No	No	No
Impacts to nearshore resources?	No	Possible a/	Possible b/	Possible b/
Water depth restrictions (feet)	> 50	50 to 100	100c/	350 to 500d/
Permanent seafloor impacts (acres)	0.1 e/	16.9 f/	Variable g/	Variable g/
Water surface use area (acres) h/	135.4 i/	9.9	3.4 j/	3.4 j/
Provides LNG storage?	Yes	Yes	No	No
Extent of safety and security zone (acres)	950	Variable	2,000 k/	1,600 l/

a/ Construction of a graving dock could affect coastal or nearshore resources.
b/ Depending on the site of the off-loading buoys, construction of a pipeline through nearshore and coastal areas could be required.
c/ Minimum depth requirement based on review of existing and proposed projects in the United States.
d/ TORP (2006).
e/ Extent of sediment conversion
f/ Includes scour protection area.
g/ Impacts would be associated with anchors and anchor lines, and would vary depending on water depth.
h/ For comparison, the water surface use area estimates do not include the area of safety and security zone.
i/ Calculated as a full turn of the FSRU around the mooring tower.
j/ Assumes an arrangement of three unloading buoys, arranged symmetrically.
k/ Assumes safety and security zone requirements similar those of to Neptune LNG, Northeast Gateway, and Calypso LNG Projects.
l/ Assumes that FRU would have a similar safety and security zone similar to that of the Bienville Offshore Energy Terminal.

Bottom impacts associated with each buoy and its mooring lines would depend on water depth. For example, each of the two unloading buoys associated with the proposed Neptune Deepwater Port Project, which is proposed for construction in 260 feet of water, would be anchored to the seafloor using eight 4,000-foot-long mooring lines. Anchor installation and raising and lowering the mooring would result in mooring lines that would affect approximately 56 acres of seafloor for the life of the project.

Mooring buoys would need to be separated from each other by a minimum of 2 miles to provide adequate buffer zones for simultaneous movements of transiting and off-loading LNG carriers. The Coast Guard recently determined that each of the two buoys proposed in federal waters for the Calypso LNG Deepwater Port would require a 565-acre (0.9 square-mile) permanent safety zone (Coast Guard 2007). Establishment of similar safety zones for a buoy system in the Chesapeake Bay or Atlantic Ocean would result in the permanent exclusion of vessels (including commercial fishing vessels, other commercial vessels, and recreational vessels)

from an area of 1.8 square miles (1,130 acres) for a two-buoy terminal or 2.7 square miles (1,785-acres) for a three-buoy terminal. In addition, the Coast Guard discourages commercial or recreational vessel transit between the mooring buoys (referred to as an "Area to Be Avoided"), which would further limit public access depending on the number and configuration of the mooring buoys.

Overall, the use of a buoy system terminal in the Chesapeake Bay would result in substantially greater impacts on marine transportation, recreational boating and fishing, and benthic resources, and visual resources. Therefore, we did not further consider a buoy system terminal in the Chesapeake Bay.

If a buoy system were installed in the Atlantic Ocean, the subsea pipeline could extend to the shore of Delaware or New Jersey, and an onshore pipeline would be required to connect to the existing gas transmission system. Onshore pipeline installation could require construction in sensitive nearshore habitats An HDD or other trenchless pipeline construction methods could be used to reduce impacts to these resources during pipeline installation. However, due to limitations on the maximum HDD length, subsurface conditions that may preclude the use of HDD in some areas, and the geographic extent of natural and recreational resources, some trenching would likely be required in these areas.

A buoy system sited at any location in the Atlantic Ocean would require construction of a send out pipeline longer than the proposed Project pipeline, extending either to Eagle, PA or to another interconnection with the three pipelines served by the proposed project. Impacts associated with pipeline construction would be greater than those of the proposed Project, and the additional compression that may be needed for a longer pipeline would increase onshore emissions of pollutants that would not occur with the proposed Project.

In summary, the buoy system design would not provide storage and implementing this system in either the Chesapeake Bay or the Atlantic Ocean would result in greater environmental impacts than those of the proposed Project, if implemented with our recommended mitigation measures and the risk mitigation measures identified by the Coast Guard. Therefore, we have not considered the buoy system terminal design further as an alternative to the proposed Project.

Offshore GBS Alternative

A gravity-based structure (GBS) terminal could be constructed offshore, either in the Chesapeake Bay or in the Atlantic Ocean. Under this alternative, LNG storage tanks would be contained in a concrete structure or structures placed directly on the seafloor and extending above the water surface. Vaporization equipment likely would be installed above the water, using the concrete structures as a platform. LNG carriers would moor at the GBS and offload LNG into storage tanks in the GBS. The LNG would be regasified at the terminal and transported as natural gas through a sendout pipeline connected to an existing interstate natural gas distribution system.

A GBS would be constructed at a specialized onshore construction facility called a graving dock. Graving docks generally are established adjacent to a channel of sufficient depth to float the GBS once the construction is complete. In most cases, sheet piling or a similar type of barrier is installed to block water from the channel, and an area is excavated to accommodate the concrete forms required to construct the structure. In some cases, more than one graving dock is constructed to allow concurrent construction of all structures associated with the terminal. After the GBS is constructed in the graving dock, the barrier would be removed and the GBS floated and towed from the graving dock. At the terminal location, the GBS would be allowed to sink to the seabottom.

We are not aware of any existing docks in the project area that could accommodate construction of a GBS. Therefore, a new graving dock would need to be created for a project-specific GBS. Environmental impacts associated with construction of a graving dock would vary from site to site, although we anticipate that, for

most potential sites for graving docks in the region, the impacts associated with construction of a GBS could be equal to or greater than those for construction of an onshore terminal.

To accommodate LNG carriers, a GBS-based LNG terminal would need to be installed where water depth is at least 50 feet (Pepper and Shah 2004). Because the GBS must extend above the water, the maximum practicable water depth for a facility of this type would be approximately 100 feet. As water depth increases beyond 100 feet, factors such as structure size and geotechnical constraints generally limit the practicability of a GBS-based terminal (Pepper and Shah 2004).

The GBS structure itself would permanently affect between 15-20 acres of seabottom. If a GBS were installed close to shore, installation of the offshore pipeline would likely affect higher quality marine resources of the nearshore environment. In addition to the offshore pipeline, an onshore pipeline also would be required for the interconnection with the three pipelines that would be served by the proposed project. This onshore pipeline would likely need to exceed in length the proposed Mid-Atlantic Express pipeline. A new compressor station also may be required to maintain the appropriate pressure in the pipeline prior to connecting to the existing transmission system, which would result in air emissions and visual impacts that would not occur with the proposed Project.

Overall, the adverse environmental impacts associated with (1) installation of a GBS terminal in either the Atlantic Ocean or the Chesapeake Bay; (2) construction of the offshore, nearshore, and onshore pipelines; and (3) adding compression would be greater than those of the proposed Project, if implemented with our recommended mitigation measures and the risk mitigation measures identified by the Coast Guard. Consequently, we have not further considered the GBS terminal design as an alternative to the proposed Project.

Floating Storage and Regasification Unit Alternative

A floating storage and regasification unit (FSRU) is a floating vessel with the capacity to offload LNG from a conventional LNG vessel, temporarily store the LNG onboard, regasify the LNG using onboard vaporizers, and transport the natural gas to shore via an existing or new offshore pipeline. The vessels may be specifically built for this purpose, or converted LNG vessels. The Broadwater LNG Project FEIS was released by FERC in January 2008. The Commission authorized the project on March 20, 2008.

With onboard LNG storage, an FSRU solves the problem of discontinuous gas flow associated with most other offshore terminal technologies. These units can be anchored offshore of the proposed market areas, and relocated when gas demands change. However, FSRUs would be slightly more sensitive to adverse weather conditions than the fixed platform concepts or an onshore platform.

The Broadwater LNG facility in Long Island Sound would have an approximately 950-acre safety and security zone established by the Coast Guard. This zone would exclude access by commercial and recreational boaters. Similar to the buoy system, establishment of a zone of this size in the upper Chesapeake Bay could create conflicts with other users. The lower Chesapeake Bay or the Atlantic Ocean would provide greater spans of open water and significantly reduce the potential for use conflicts. However, these locations would require that the send out pipeline be extended, increasing impacts beyond those of the proposed Mid-Atlantic Express pipeline. Further, pipeline construction would need to traverse sensitive nearshore habitats. Although an FSRU could satisfy most of the Sparrows Point Project objectives, we would expect greater impacts associated with pipeline construction.

Offshore FRU Alternative

An FRU represents a variation on the buoy system LNG terminal concept. With this approach, LNG off-loading and vaporization equipment would be housed on a floating L-shaped structure equipped with positioning thrusters. LNG carriers arriving at the terminal would be moored to an anchored mooring buoy. Mooring pilings also would be installed near the mooring buoy to provide additional support to the FRU in the

event of a significant storm or hurricane. The FRU would then connect to the LNG carrier using a suction cup-like attachment system. As with a buoy system, LNG would be off-loaded, vaporized, and sent via a flexible riser connected to a subsea pipeline.

TORP Terminal LP filed an application with the Coast Guard for its proposed Bienville Offshore Energy (Bienville) Project, which would be the first offshore LNG terminal to use FRU technology. As proposed, the Bienville terminal would consist of two FRUs and mooring buoys, as well as a support platform housing a control room, metering, and support facilities.

The FRU would require deep water to accommodate the deep-draft vessels (drafts of 45 to 52 feet) and to prevent the subsea riser from contacting the bottom. In its application for the Bienville project, TORP reports that optimal water depth for an FRU system is 350 to 500 feet of water. The FRU could not be installed in the Chesapeake Bay without extensive dredging. Construction of an FRU in the Atlantic Ocean would result in similar offshore and onshore impacts as those described for a buoy system in that area, and would likely require similar safety zones as directed by the Coast Guard. Finally, like a buoy system, an FRU would be unable to provide LNG storage.

In summary, the inability of the FRU to provide storage, coupled with the greater environmental impacts associated with an FRU terminal installed in the Chesapeake Bay or in the Atlantic Ocean compared to those associated with the proposed Project, makes this terminal design environmentally inferior to the proposed Project. Therefore, we have not considered the FRU terminal design further as an alternative to the proposed Project.

Conclusions for Offshore Alternatives

An LNG import terminal that is located in an offshore setting would be exposed to the effects of meteorological and oceanographic forces such as high winds, waves, and currents. These concerns are particularly pronounced in the Mid-Atlantic region during the winter, a period when the region experiences its most severe weather and its peak demand for natural gas supplies. The potential for severe weather equates with a need for increased storage volume at offshore terminals to maintain a predictable, constant flow of natural gas to shore. A key technical issue for the successful operation of an LNG terminal in this environment includes designing the LNG transfer system to compensate for the relative motion between the terminal and the LNG ship during unloading operations. Although the offshore Energy Bridge system (i.e. using a buoy system and specialized LNG vessels with regasification units onboard) is now a proven technology at Gulf Gateway and has been constructed at Northeast Gateway, the ability of these systems to maintain year-round operations at a sustained maximum of 1.5 Bcfd (the design capacity for this Project) is still not proven.

Construction and operation of an offshore LNG terminal could result in environmental impacts related to aesthetics, water quality, biological communities, socioeconomics, and air quality. Aesthetic impacts could include impacts on the offshore viewshed. Constructing an offshore facility would affect a number of marine and nearshore resources. Permanent onshore facilities would also be required for construction and terminal support activities, resulting in potential onshore impacts.

There are few existing offshore pipelines along the Mid-Atlantic coast with which to interconnect, so there would be environmental impacts associated with the installation of a new offshore pipeline to bring the vaporized gas to shore from any offshore terminal. Construction methods for offshore pipelines include jetting, subsea plowing, and dredging. Excavating a shallow trench to bury the pipeline using any of these methods would have both direct and indirect impacts. Direct impacts would include the disturbance of substrates and habitats located in the area of the trench and impacts associated with anchor strikes and cable sweep. Other impacts could include the disturbance of substrates adjacent to the trench as a result of sidecasting the trench spoil, the suspension and transport of disturbed sediments in the water column, and the resettlement of suspended sediments on the seabed. However, if impacts to sensitive nearshore resources can

be avoided, offshore construction can in some situations result in impacts to fewer resources than would onshore construction.

Depending upon the actual location of an offshore terminal, the onshore pipeline, would reach landfall somewhere along the New Jersey or Delaware coastline and be routed to an interconnection with the interstate pipelines targeted by Mid-Atlantic Express. The pipeline may cross the barrier islands along the coast, and make a major crossing of Chesapeake Bay, Delaware Bay, or the Delaware River. In general, potential impacts would be similar to or greater than those associated with the construction of the pipeline proposed by Mid-Atlantic Express.

3.2.5 Regasification Alternatives

There are four primary methods typically used in the regasification of LNG:

- steam or hot water heating an intermediate high-temperature fluid (HTF);
- submerged combustion vaporization (SCV);
- direct gas-fired heaters heating an intermediate HFT; and
- direct sea-water vaporization.

In the proposed method, HTF would be heated by hot water produced in natural gas-fired hot water heaters. Hot water from the hot water heaters heats the HTF in a plate and frame exchanger. The heated HTF is then circulated through a shell-and-tube heat exchanger to warm and vaporize the LNG (see Section 2.2.1.3 for a description of the proposed process). The hot water heaters would incorporate low NOx burners and Selective Catalytic Reduction (SCR) to control air emissions. A hot water system is preferred over steam because it would operate at temperatures more compatible with a combined cycle power plant being considered by AES, and maintenance issues are typically less in a hot water system. Alternatives to hot-water-heated HTF are discussed below.

Submerged Combustion Vaporizers (SCV)

This system uses a natural gas-fired burner to heat a water bath. The water bath transfers heat to a submerged LNG coil heating the LNG and causing a phase change from liquid to a gaseous state.

The advantages of this regasification method are:

- use of the SCVs allows for easy integration with the cycle to vaporize LNG. As a result, operation of these units is fairly common in the LNG industry; and
- the SCVs have a relatively high efficiency rating that is slightly greater than that available from the proposed HTF system.

The disadvantages are:

- there would be an overall increase in annual air emissions from the Terminal to vaporize the same quantity of gas as the proposed system; and
- the discharge system generates an acidic waste stream that needs to be neutralized prior to discharge, which increases overall maintenance requirements on the equipment.

Gas Fired Heaters (GH)

Natural gas-fired heaters (GH) can be used to directly heat the HTF in a closed loop system, eliminating the hot water loop of the proposed system. Like the proposed system, after heating, the HTF is circulated through the vaporizer where it transfers heat to the LNG. The LNG enters the vaporizer in liquid form and, due to the heat transferred from the HTF, changes state and leaves the vaporizer in a gaseous state.

The advantages of this vaporization method are:

- use of the GHs allows for easy integration with the cycle to vaporize LNG. As a result, operation of these units is fairly common in the LNG industry;
- the GHs have a relatively high efficiency rating that is slightly greater than that available from the proposed design but less than SCVs; and
- by eliminating the hot water system, GHs would eliminate discharges from water purification systems and the periodic blowdown from the heaters.

The disadvantages are:

- there would be an overall increase in annual air emissions from the Terminal to vaporize the same quantity of gas as the proposed system because SCR can be incorporated into a water heater to reduce emissions, but cannot typically be incorporated into a direct-fired heater because of a relatively narrow operating temperature band.

Direct Seawater Vaporization

Direct seawater vaporization is an open loop process that would require water to be drawn directly from the Patapsco River. The water makes a single pass through a shell-and-tube heat exchanger where heat is transferred from the relatively warm water to the colder LNG. The water is then returned back to the River at a much cooler temperature. The LNG enters the shell-and-tube heat exchanger in liquid form and, due to the heat transferred from the river water, it changes state and leaves the vaporizer as a gas. During colder months, the Patapsco River water could heat the LNG through the liquid-to-gas phase change, but would not be warm enough to heat the LNG to the delivery temperature required by the receiving pipelines. Therefore, direct seawater vaporization would require a supplemental means to heat the gas, such as boilers, direct-fired HTF, or SCVs during the winter.

The advantages of this method are:

- this type of system is the simplest of all revaporization alternatives to operate; and
- combustion emissions (air emissions) would be less than the proposed HTF system since they would be limited to emissions from the generation of power required to run the seawater transfer pumps, and from supplemental gas heating required only during the colder months when Patapsco River water temperatures are low.

The disadvantages are:

- NMFS generally considers the aquatic impacts of this vaporization method unacceptable for locations within estuaries, due to the demand for high volumes of water and the associated impingement and entrainment impacts to aquatic life; and
- the volumes of seawater that would be required to be pumped out of the Patapsco River and then returned substantially cooler than their original condition could result in significant impacts to aquatic life. For this reason alone, this option was considered to be the least desirable of all considered.

3.2.6 Conclusions of All LNG Terminal Alternatives

No action or postponed action by either the Commission or the Coast Guard, while eliminating the potential environmental impacts from the Project, would prevent the stated objectives of providing a new supply of natural gas to the Mid-Atlantic region from being achieved. To provide gas to the target markets, the only existing systems with adequate water depths are the Chesapeake Bay and the Atlantic Ocean. Of the various sites considered, Sparrows Point would be the preferred location for the proposed Terminal, primarily due to the industrial setting of the site, its distance from residential areas, and its proximity to the targeted market. The alternate Mittal Steel site on the Sparrows Point peninsula would seem to provide a suitable location, but

does not offer a significant environmental advantage. The proposed vaporization process utilizing HTF heated by hot water would be preferred over the other gas-fired alternatives because SCR can be incorporated to reduce air emissions. Utilizing seawater for vaporization is not viable because of the impacts to aquatic organisms from impingement, entrainment, and water temperature reduction.

3.2.7 Dredging Method and Dredged Material Disposal Alternatives

3.2.7.1 Dredging Method Alternatives

Dredging of recently deposited bottom sediments and underlying undisturbed soils would be required in the approach channel, the turning basin, and at the offloading pier location to accommodate the draft of the LNG vessels. Environmental concerns related to dredging include increased turbidity and total suspended solids (TSS) in the water column as a result of the disturbance of fines (i.e., silts and clays), the potential re-suspension of contaminants that may be contained within the sediments from previous discharges and other activities along and within the waterway, and the treatment and discharge of water from the dewatering of the dredge spoil. The selection of the preferred dredging methodology is influenced by project-specific factors such as depth to be dredged, equipment availability, and physical and chemical characteristics of the sediments to be dredged. The method selection must also be balanced between the need for the efficient removal of large volumes of material (navigational dredging) and the control of potential contaminants (environmental dredging). There are two basic methods of dredging that could be considered for the project area: hydraulic dredging using a cutter-head suction dredge; and mechanical dredging using a clamshell bucket.

Hydraulic Dredging

Hydraulic dredging machinery is incorporated into a floating hull or barge. A cutter head with steel blades, suspended below the hull, dislodges the bottom sediments. A centrifugal pump extracts the resulting sediment/water mixture (referred to as a "slurry"), from the bottom, through a suction pipe. The slurry is pumped to a disposal site, via a temporary discharge pipe, where the water is allowed to drain off and the sediments are left to dry and consolidate over time.

Hydraulic dredging is usually faster than mechanical dredging. Hydraulic dredging is typically the most cost-effective method for projects where large volumes of material are to be removed. However, to capture as much of the sediments disturbed by the cutter head as possible, and to ensure the discharge pipe does not plug, hydraulic dredging slurries are commonly 80 to 90 percent water. Because of the large water-to-solids ratio, extensive dredge spoil disposal areas are required to allow sufficient retention time for the solids to settle out of the water prior to discharge. If additional treatment of the water for contaminant removal is required prior to discharge, treatment facilities would typically be larger than with mechanical dredging to handle the greater water volume. There is also a greater potential for environmental impacts due to suspension and dispersion of sediments that are disturbed by the cutter head that are not fully captured by the suction pump.

Mechanical Dredging

Mechanical dredges excavate sediment from the bottom using a clamshell type bucket. The excavated material is loaded into hopper barges for transportation to the disposal site. The cycle time from excavation to placement in the hopper barge causes production rates to be less than with hydraulic dredging. For this reason, mechanical dredging is usually reserved for smaller projects. Mechanical dredges can also excavate depths greater than 40 feet, whereas hydraulic dredges are often limited to 40 feet or less. Since mixing with large volumes of water to produce slurry is not required, the mechanical dredge spoil is typically only about 50 percent water. This, along with some decanting that occurs on the hopper barge, means that less disposal area is required for dewatering, water treatment costs are reduced, and the dredge spoil consolidates faster, allowing use of the area sooner than with spoil placed by hydraulic dredges.

Less turbulence at the bottom results in fewer fines released to the water column than with a cutter-head dredge. For this reason, mechanical dredging is often preferred over hydraulic dredging in those areas

containing contaminated sediments. To further reduce the release of contaminants or suspended solids to the water column, certain clamshell manufacturers have developed improvements over the conventional (open top) buckets with the addition of water venting systems, seals, overlapping sides, and closing systems that result in a level-cut bottom. (These improved clamshell buckets are herein called "navigational buckets.") These improvements minimize the disturbance to the bottom and to the spoil contained within the bucket as the bucket is lifted through the water to the surface.

The COE conducted a study in Boston Harbor in 1999 comparing sediment re-suspension characteristics of a conventional (open top) clamshell bucket, an enclosed clamshell bucket, and a navigational bucket. The enclosed clamshell bucket used in the study was a conventional bucket enclosed on the top and sides by welded steel plates. The navigational bucket included rubber side lip seals and vents on either side near the top to allow water to escape during descent and after the bucket was closed. Data from the study indicated that the enclosed bucket, as compared to the open bucket, resulted in a 79 percent reduction in turbidity concentrations and a 76 percent reduction in TSS concentrations (COE, 2001a). Use of the navigational bucket resulted in a 46 percent reduction in turbidity as compared to the open bucket. It is likely that a higher reduction using the navigational bucket is possible; however, insufficient TSS data were collected for the navigational bucket to confirm this reduction in turbidity. Additionally, more than half of the navigational bucket's side lip seals were missing throughout the duration of the study. Average turbidity results and TSS concentrations for each type of bucket used in the COE study are listed in table 3.2.7-1.

TABLE 3.2.7-1

COE Bucket Comparison Study Results

Bucket Type	Average Turbidity (FTU)	TSS Concentration (mg/L)
Conventional Clamshell	57.2	210
Enclosed Clamshell	12	50
Navigational Clamshell	31	31

A navigational bucket manufacturer also manufactures an "environmental bucket," adding overlapping sides and side rubber seals to the navigational bucket, which is expected to further reduce turbidity and TSS. A COE (1983) study reported that an environmental bucket generates 30 to 70 percent less turbidity than a conventional bucket, and that leakage of material is reduced by approximately 35 percent.

Conclusion of Preferred Dredging Method

To reduce turbidity and TSS as a result of dredging, and to reduce the release or entrainment of contaminated sediments into the water column during dredging, mechanical dredging is preferred over hydraulic dredging for the project. Based on the results of the COE bucket comparison study, mechanical dredging should be employed utilizing an enclosed clamshell bucket or a navigational-type bucket (or functional equivalent), or an environmental bucket where the level of chemical constituents present in the material to be dredged indicate a potential for unacceptable risk for adverse environmental effects from the re-suspension of contaminants to the water column.

AES has indicated that they would use a clamshell dredge method with hopper dredges for transporting the dredged material to the Dredged Material Recycling Facility. AES has also committed that they would use an "environmental bucket" if the COE permit conditions require it. In our consultation with the COE and EPA, we have concluded that the environmental bucket (or equivalent) could deal effectively with the contamination issues of the surface layer of sediments in the area to be dredged. **With this draft EIS, we are requesting comments from agencies, the applicant and individuals on whether or not a requirement to use an environmental bucket (or equivalent) is appropriate.**

3.2.7.2 Comparison of Dredged Material Disposal Alternatives

Background Information on Dredged Material Placement Issues

There is a significant amount of background information regarding the potential disposal of dredged material originating from any part of the POB, including the area off Sparrows Point. Most of this background information is summarized from the *Tiered Draft Environmental Impact Statement for the Proposed Masonville Dredged Material Containment Facility* (COE, 2006). This EIS regarding the proposed Masonville facility presented the need for new Dredged Material Containment Facilities (DMCF) to serve the ship channels and harbor areas of the POB. The study was completed by the Maryland Port Administration (MPA) with assistance and input from state and federal agencies, the State of Maryland's Dredged Material Management Plan Executive Committee, and the Harbor Team.

The Masonville EIS indicated that there is a large demand for dredged material placement within the next 20 years, or through 2023. State environmental regulations dictate that materials dredged from the Harbor be placed at a DMCF due to the potential for contamination. By the regulation, this includes all areas dredged in the Patapsco River upstream of the North Point – Rock Point Line (COE, 2006), an area which includes the proposed dredging at Sparrows Point. At the time of the MPA study, the only existing DMCFs in the region were Hart Miller Island and Cox Creek DMCF. There is a current projected average annual of 1.5 million CY of dredged material from the Harbor. The Hart Miller Island DMCF may stop receiving Harbor dredged material in 2008 due to a lack of available capacity. With increased load at Cox Creek DMCF, this facility could also reach capacity up to 4 years sooner than the design schedule. Under those circumstances, the entire Harbor dredging could reach a shortfall in placement capacity in the very near future.

The MPA study concluded that the proposed Masonville DMCF was the best near-term and long-term solution to the POB's need for an additional placement area for dredge material. Also, the state, federal and local resource agencies along with the Harbor Team recommended that the MPA move towards increased management of dredged materials through innovative reuse with a goal of 0.5 million CY reuse by 2023.

AES has proposed to use an innovative reuse method of handling the dredged material placement. AES would achieve reuse by processing the dredged material at a Dredged Material Recycling Facility (DMRF) at the southern boundary of the LNG terminal site (see figure 2.2.1-1). The proposed method of handling and recycling the dredged material is discussed in more detail in section 2.3.1.3 – Dredging and Dredged Material Disposal.

In evaluating other potential means of disposing or placing the 3.7 million CY of dredged material expected from the AES Sparrows Point dredging, we considered the following alternative means of disposal or placement: 1) conventional open water disposal; 2) existing contained placement facilities; 3) ocean disposal; and 4) beneficial uses in the Patapsco River system or Chesapeake Bay.

Open Water Disposal

In recent years, the concept of open water disposal has been increasingly criticized by both state and federal resource agencies as a potentially harmful practice unless it is incorporated into a beneficial uses project. For example, with limitation, if the dredged material is clean, non-contaminated material, it has been used in some systems to cap areas of known contamination. Also, if the dredged material is non-contaminated coarse grained material, it has been used for beach or shoreline nourishment in areas of erosion. From the inspection of the data produced from AES's June 2006 and August 2007 sediment sampling programs (see Section 4..3.2.4 Sediment), we have concluded that the surface material to be dredged at Sparrows Point exceeds NOAA guidance values for numerous constituents for placement of material in open water without prior treatment. Equally important, as noted above, by Maryland regulation, dredged material originating from areas in the Patapsco River system upstream of the North Point – Rock Point Line must be disposed of in contained facilities. Thus, open water disposal is not a viable option for the Sparrows Point Project and we dismissed it from further consideration.

Existing Contained Placement Facilities

At the writing of this DEIS, the only available contained facilities for placement of dredged material that are reasonably close to Sparrows Point include Hart Miller Island and Cox Creek DMCFs, and the proposed Masonville DMCF. Reviewing information supplied by the Applicant and in consultation with the MDE and the COE, we have concluded that Hart Miller Island is nearing capacity and will not be available for dredged material placement from any source subsequent to 2008. From the information in the Masonville DMCF EIS (COE, 2006), it is evident that the MPA and the Harbor Team and others have determined that the Cox Creek DMCF is also in jeopardy of early closure due to the projects dedicated to using this facility in 2007 and the near future. Therefore, it is highly unlikely that there is capacity for, or that AES could obtain approval for disposal of dredged material from a private project. We have concluded that this facility is not available for the Sparrows Point Project. In addition, the Masonville DMCF, if developed on schedule, is already dedicated to a 20 year schedule of placement of federal and state approved projects and maintenance projects, and a few select previously-approved private projects. It is unlikely that the MPA would approve use of this facility for any additional private projects. Thus, use of existing or proposed contained placement facilities would not be a viable alternative for the Sparrows Point Project.

Ocean Disposal

As noted above regarding data produced from AES's June 2006 and August 2007 sediment sampling programs (see Section 4.3.2.4 Sediment), the surface material to be dredged exceeds NOAA guidance values indicating a potential to harm marine and estuarine organisms. In AES's response to a May 7, 2007 data request, the applicant stated that the ocean disposal of dredged material was no longer considered a viable option for the Project. During consultation with MDE, COE, and EPA, we have been advised that the Sparrows Point material to be dredged would not meet the criteria for open ocean disposal. Thus, we believe that this disposal method would not be permittable, and is not a viable alternative for the Project.

Beneficial Uses

At least the surficial sediments to be dredged at Sparrows Point may not qualify for some beneficial uses in the Patapsco River or Chesapeake Bay. During the consultation with the MDE, COE and EPA, members of that group that were also members of the Harbor Team indicated that the investigations of the Harbor Team were unable to account for the use of more than a nominal amount of clean sediment for use in beneficial projects in the Patapsco River or Chesapeake Bay. Thus, we have concluded that even if the underlying material to be dredged at Sparrows Point were clean enough (uncontaminated), there are not enough viable projects to demand several million cubic yards of material to be used in beneficial use projects. Therefore we conclude that this is not a viable alternative for the Project and we dismissed it from further consideration.

3.2.8 Conclusion of Preferred Dredged Material Disposal/Placement Method

Based on our review of four dredged material disposal alternatives - conventional open water disposal; existing contained placement facilities; ocean disposal; and beneficial uses in the Patapsco River system or Chesapeake Bay – we have concluded that the AES proposed reuse of material is the best environmental alternative. Reuse and recycling has been encouraged by the MPA and the Harbor Team. The final approvals for the placement of this Processed Dredged Material would be determined in the MDE and the COE permit processes.

3.3 MID-ATLANTIC EXPRESS PIPELINE ALTERNATIVES

3.3.1 Pipeline System Alternatives

Pipeline system alternatives are alternatives that could use different existing or approved pipeline systems to achieve the same objectives as the proposed Project, but at a reduced level of construction and environmental impacts. Our analysis of pipeline system alternatives included an examination of existing or approved pipelines that could be used in their current state, modified, or combined with the Mid-Atlantic Express

Pipeline or other pipelines to accept and transport the output of the Sparrows Point LNG Terminal, reasonably and economically, and still meet the objectives of the existing or approved pipeline system.

AES proposes to deliver up to 1.5 Bcfd of natural gas from the Sparrows Point LNG terminal to the mid-Atlantic region via a new 88-mile long pipeline that would interconnect with three existing pipelines near Eagle, Pennsylvania. The first task in our analysis was to determine whether there are any existing or approved pipelines in the vicinity of the proposed terminal with the capacity to transport at least 1.5 Bcfd, thereby eliminating the need for all or part of the proposed Mid-Atlantic Express Pipeline. Transporting only the gas from the terminal would require a pipeline with a diameter of at least 30 inches.

In order to meet the needs of the Project and its own customers, an existing or approved pipeline must be able to transport not only the volumes for AES (1.5 Bcfd) but also the volumes contract by its existing customers. These additional volumes would require a pipeline with a diameter greater than 30 inches, compression, or both.

We have not identified any such pipeline in close proximity of the proposed terminal location. However, two natural gas pipelines, owned by Columbia Gas and Transco, are located about 20 miles northwest of the proposed Sparrows Point LNG terminal. We have considered an alternative that would construct a pipeline from the proposed terminal site to interconnect with one or both of these existing systems near Glencoe, Maryland.

Information available from the EIA in their Natural Gas Annual 2005 report indicates that these pipelines are operating at or near their design throughput capacity in the vicinity of the Project. Since the existing pipelines are fully subscribed, we considered looping[4] one or both of the existing pipelines. We previously conducted studies of the Columbia and Transco systems in Maryland and Pennsylvania to determine the ability of these two systems to transport an additional 800,000 dekatherms per day (Dth/d) from the proposed expansion of Dominion's Cove Point LNG terminal (see Section 3.2.3, Final EIS, April 28, 2006, Docket No. CP04-131). FERC's engineering staff examined the ability of the existing Columbia and Transco systems to move 500,000 Dth/d of gas from Cove Point to Pennsylvania (Chester and Northampton County).

We concluded that each system would require a 24-inch-diameter loop along with compression. Since AES proposes to transport 1.5 Bcfd rather than 100,000 Dth/d, larger diameter loops and additional horsepower may be required to transport the full output from the proposed Sparrows Point terminal.[5] Since looping an existing pipeline requires essentially the same construction activities and footprint as a new parallel pipeline, looping would achieve no appreciable reduction in environmental impacts. Impacts would actually increase if both existing pipelines were looped. In addition, this alternative would not deliver the gas to the Mid-Atlantic Express's proposed terminus (Eagle, Pennsylvania). Instead the looping would end some 60 to 70 miles southwest of Eagle and would not achieve the stated objective of providing gas to the TETCO system, thereby substantially restricting the marketing flexibility for the shippers. Thus, we do not believe that expansion of Columbia's or Transco's systems would achieve the stated purpose of the Project.

3.3.2 Major Route Alternatives

In evaluating alternatives that would meet the Project's purpose and need, we reviewed both major route alternatives and route variations for the Mid-Atlantic Express Pipeline. Major route alternatives follow

[4] A pipeline loop is a pipeline that normally parallels and existing pipeline and is connected to it.

[5] Bcfd is a measure of volume while Dth/d is a measure of energy. If one assumes that the gas as a btu of 1000 than 1 Dth equals 1 mcf of gas. Depending on the origin of the LNG the btu level may be greater than 1000.

different alignments for a significant portion of the proposed route, whereas route variations are relatively short deviations from the proposed route that would potentially avoid or reduce project impacts on specific localized resources that may include cultural resource sites, residences, sensitive habitats, or site-specific terrain conditions.

During the pre-filing process for this Project, we evaluated major route alternatives considered by AES, and assisted in developing the proposed route in consultation with other agencies and with consideration given to comments received from the public. For this evaluation we used information from field studies, aerial photographs, NWI maps, and U.S. Geological Survey (USGS) quadrangle maps. We focused on four possible route alternatives:

- Dundalk West Alternative;
- Western Corridor Alternative;
- SR 136 Alternative; and
- U.S. I-95 Greenfield Alternative.

None of the four alternatives to the proposed route, taken separately, represents an alternative to the entire proposed route, but rather each is an alternative to a segment of the proposed route. The relative locations of these route alternatives are shown on figure 3.3.2-1. We compared the alternatives to the proposed route for such environmental factors as wetlands, waterbodies, land uses, public lands, forest land, cultural resources, and residences, and summarized each comparison in tables that accompany the discussion of each alternative.

3.3.2.1 Dundalk West Alternative

The Dundalk West Alternative would deviate from the proposed route at North Road (approximate MP 0.8), and follow an existing roadway for approximately 1.2 miles before crossing Bear Creek. The Dundalk West Alternative would then be routed along an existing electric utility corridor through a densely populated area of Dundalk heading north for approximately 4.8 miles. This alternative would then rejoin the proposed route at about MP 8.0 (see figure 3.3.2.1-1).

As shown in table 3.3.2-1, the Dundalk West Alternative is approximately 1 mile shorter than the segment of the proposed route that it would replace. The alternate route crosses less forest and forested wetland than the proposed route. However, the forest crossed by the proposed route is composed primarily of narrow strips of highly fragmented forest located between roads. The alternative route crosses substantially more emergent wetlands and 8 more waterbodies, including 3 major waterbodies (greater than 100 feet wide). The alternative route also crosses four more sites potentially eligible for listing in the NRHP. There would be 3 residences within 50 feet of the construction work area of the alternative route, while no residences would be within 50 feet of the proposed route. The Dundalk West Alternative would pass near the North Point High School, several commercial buildings and businesses, and multiple residences. The proposed route avoids much of the residential areas by skirting around the east side of Dundalk along major highways and across more industrialized properties. One public interest area would be crossed by the Dundalk West Alternative, whereas no public interest areas would be crossed by the proposed route.

For these reasons, we do not believe the Dundalk West Alternative would be preferable to the proposed route.

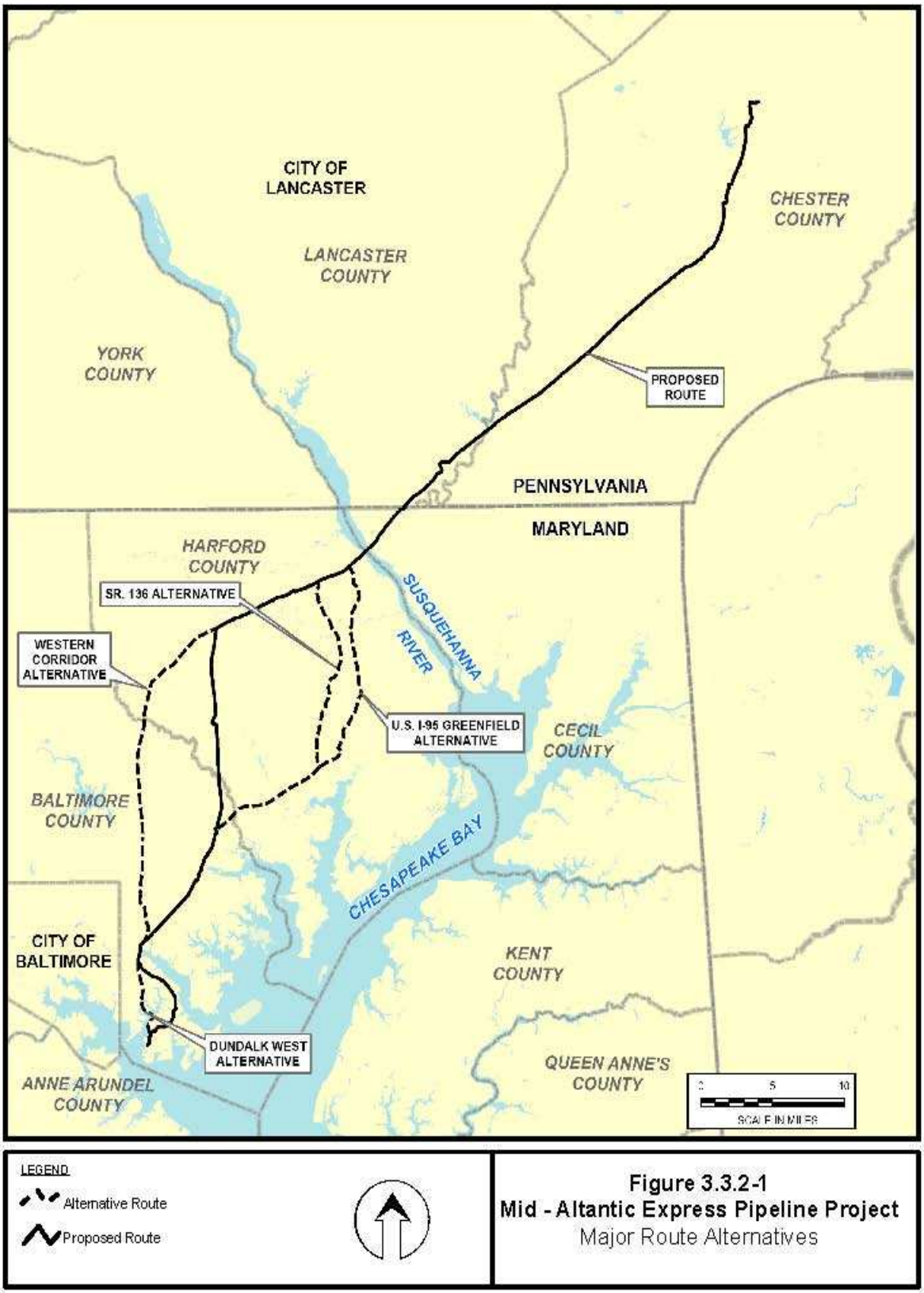
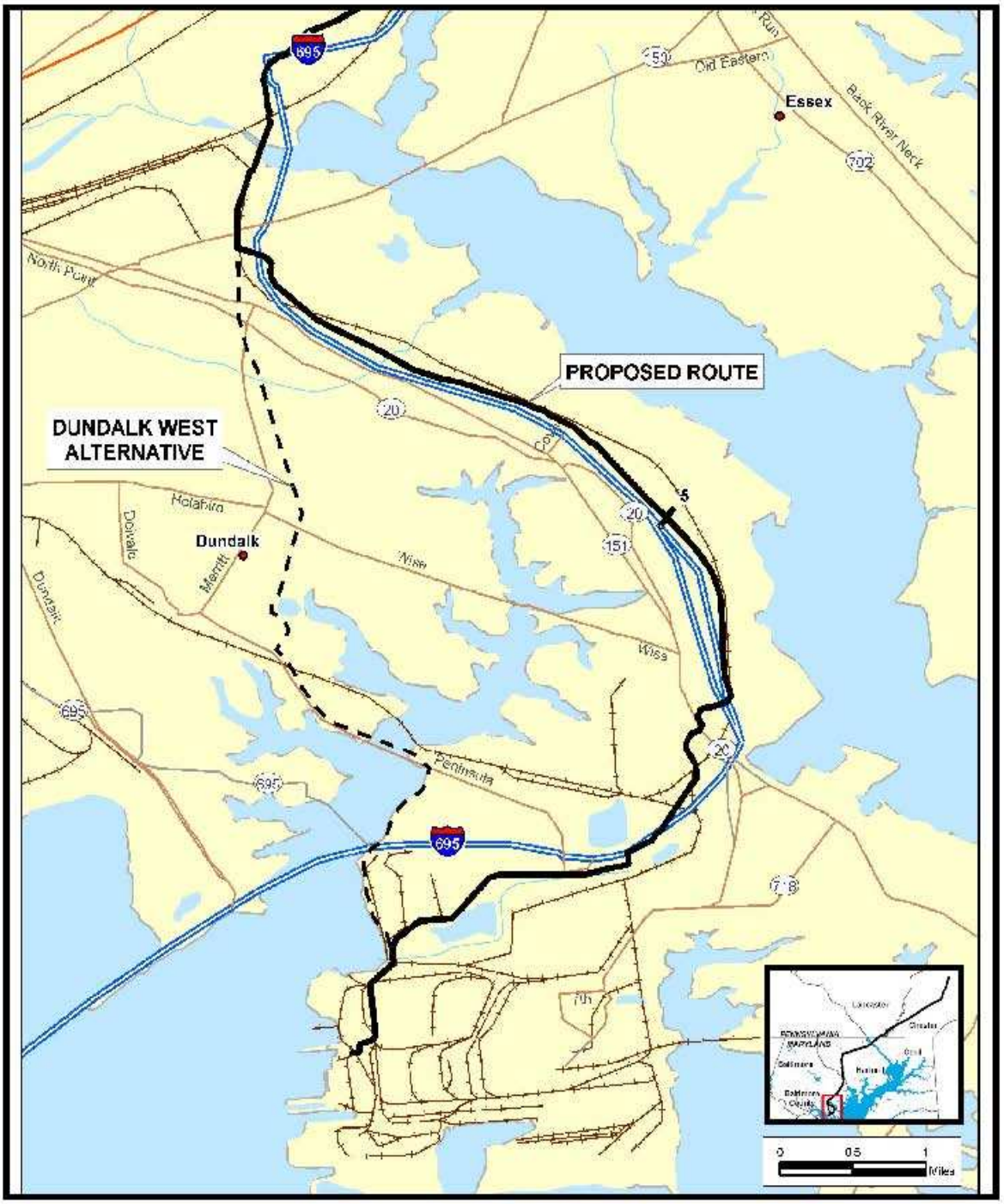


Figure 3.3.2-1
Mid - Altantic Express Pipeline Project
Major Route Alternatives



LEGEND

- Alternative Route
- Proposed Route
- MP Marker

Figure 3.3.2.1-1
Mid - Altantic Express Pipeline Project
Dundalk West Route Alternative

TABLE 3.3.2-1 **Comparison of AES's Proposed Route With the Dundalk West Alternative**			
Characteristics or Resource	**Units**	**Proposed Route**	**Dundalk West Alternative**
Total Length	miles	7.0	6.0
Length Adjacent to Existing Rights-of-Way	miles	7.0	6.0
Length in Forested Wetlands	feet	205.5	11.9
Length in Herbaceous Wetlands	feet	83.7	1,247.5
Number of Waterbody Crossings	each	1.0	9.0
Number of Major Waterbody Crossings (>100 feet)	each	0	3
Length in Forested Areas	miles	2.7	0.2
Length in Agricultural Areas	miles	0.0	0.0
Special Interest Areas Crossed	each	0	1
Length in Residential Areas	miles	0.1	0.0
Residences within 50 feet of Construction Work Space	each	0	3
Number of Potential Archaeological Resource Sites	each	2	6

3.3.2.2 Western Corridor Alternative

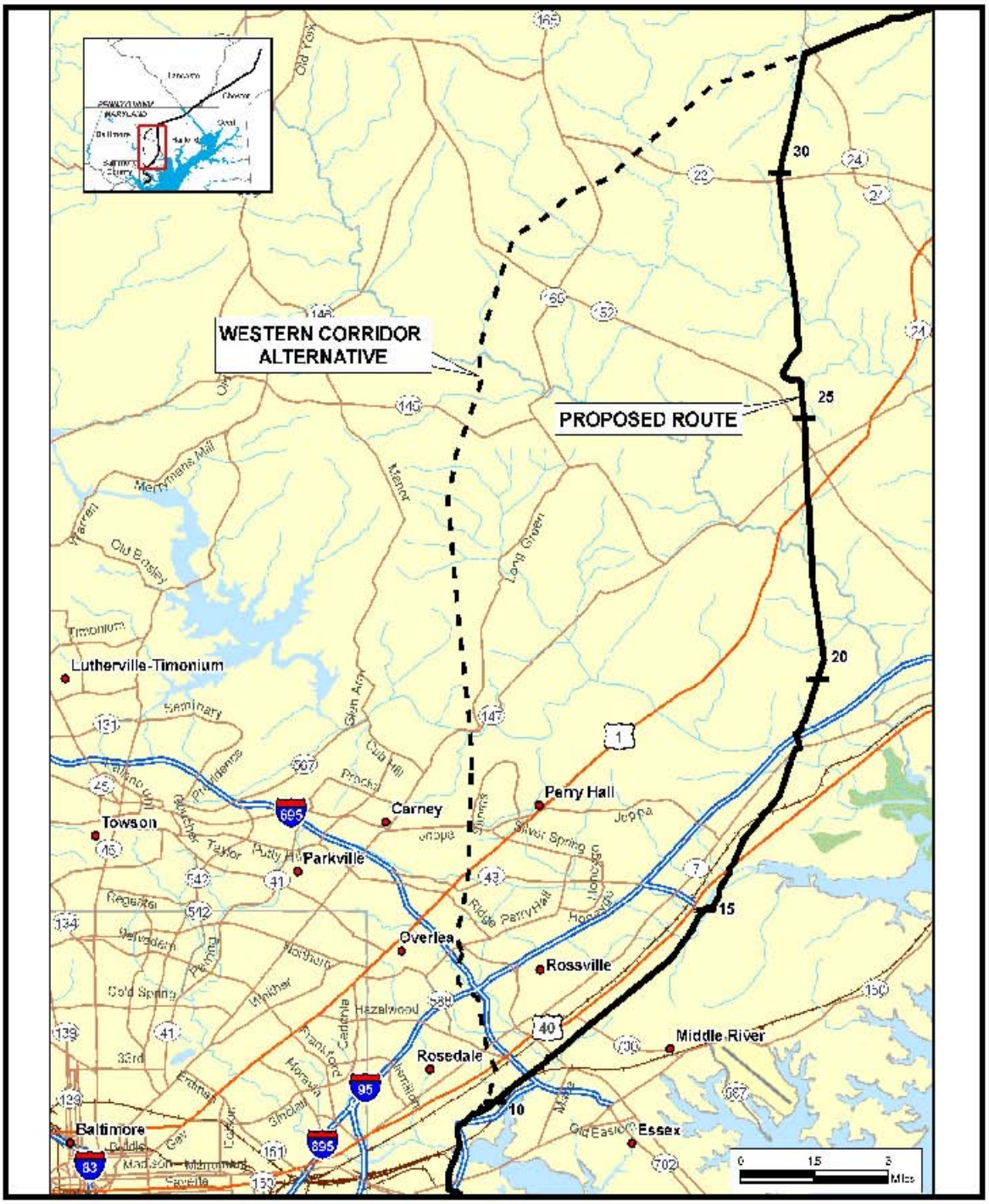
In response to concerns raised by residents of Fallston, Maryland, including construction in residential areas and near the Fallston High School, we looked the Western Corridor Alternative. The Western Corridor Alternative would deviate from the proposed route after the Back River crossing (MP 9.0) and traverse north for approximately 21.0 miles along a northern-trending, BG&E power line corridor rejoining the proposed route at about MP 32.5 (see figure 3.3.2.2-1).

The alternative follows existing power line corridors for its entire length. The proposed route leaves the power line right-of-way for approximately 0.8 mile in Fallston to avoid crossing through the backyards of residences on Peachtree Road. It would be approximately 1000 feet from the nearest school structure in a forested area.

The Western Corridor Alternative is approximately 1.6 miles shorter than the segment of the proposed route that it would replace (see table 3.3.2-2). This alternative crosses a shorter length of steep terrain than the proposed route, and less forest and forested wetlands. There would also be fewer potential archaeological sites affected by the alternative. Both routes would cross Gunpowder Falls State Park.

Although the proposed route is longer and has more forested wetlands than the Western Corridor Alternative, our evaluation shows that the Western Corridor Alternative may not be the preferred route. We have identified about 3 miles of the Western Corridor Alternative, mainly in Baltimore County, where the width of the power line right-of-way, the number of towers within the right-of-way or the presence of a substation would preclude placing the pipeline in the power line right-of-way. In these areas residence and commercial/industrial structures would prevent placing the pipeline adjacent to the existing right-of-way. In this portion of Baltimore County areas that have not been developed tend to be forested. Significant reroutes or route variations would be needed which would add length, and potentially greater environmental impacts, including additional tree clearing to this alternative.

We believe that the Western Corridor Alternative would not be environmentally preferable and would only serve to move the environmental impacts from one area to another.



LEGEND

- Alternative Route
- Proposed Route
- MP Marker

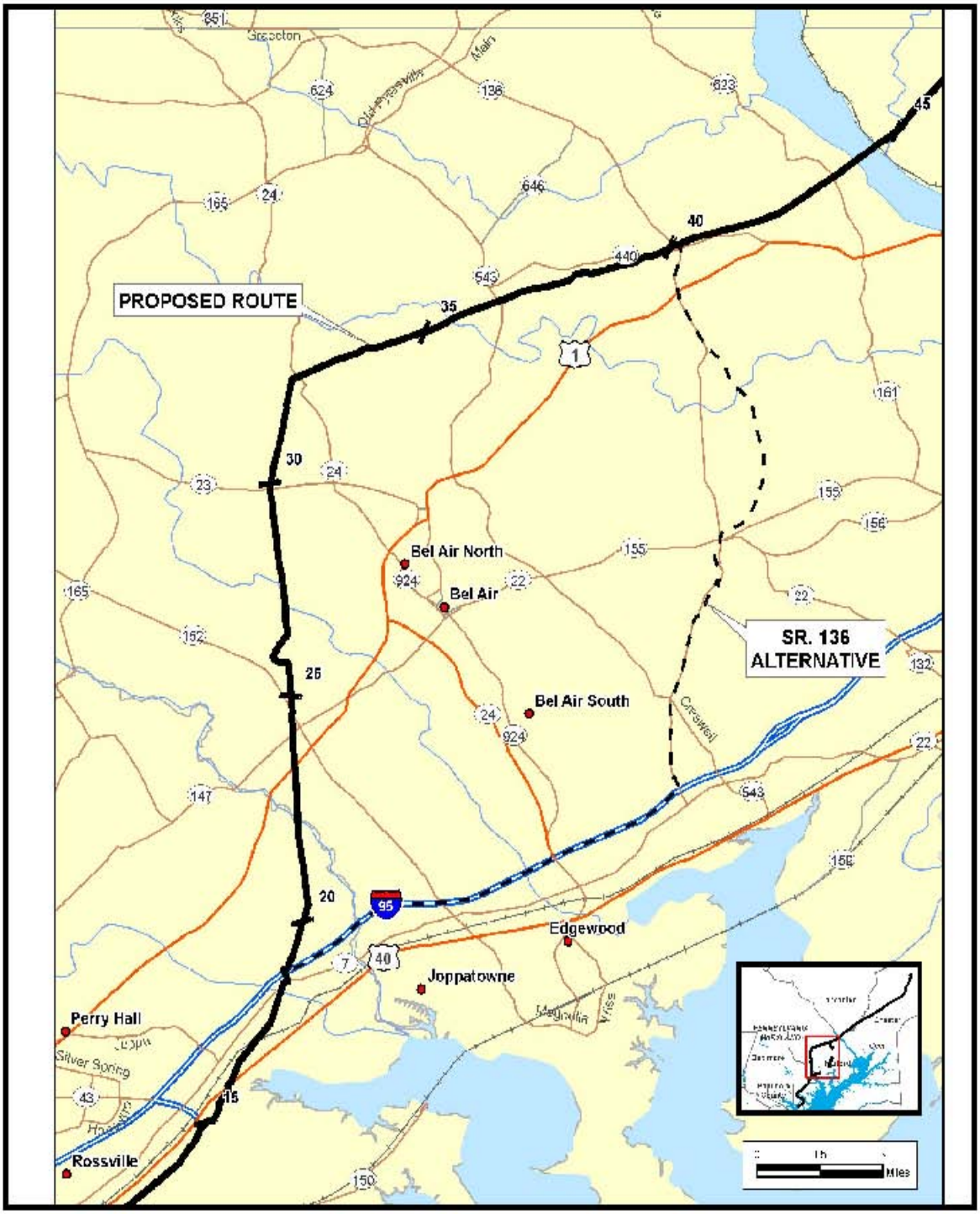
Figure 3.3.2.2-1
Mid - Altantic Express Pipeline Project
Western Corridor Route Alternative

TABLE 3.3.2-2 **Comparison of AES's Proposed Route With the Western Corridor Alternative**			
Characteristics or Resource	**Units**	**Proposed Route**	**Western Corridor Alternative**
Total Length	miles	22.6	21.0
Length Adjacent to Existing Rights-of-Way	miles	21.8	21.0
Length in Forested Wetlands	feet	1,945.9	141.9
Length in Herbaceous Wetlands	feet	6.2	0.0
Number of Waterbody Crossings	each	26	26
Number of Major Waterbody Crossings (>100 feet)	each	0	1
Length in Forested Areas	miles	8.6	6.6
Length in Agricultural Areas	miles	4.6	5.0
Public Interest Areas Crossed	each	10	8
Length in Residential Areas	miles	1.7	2.7
Residences within 50 feet of Construction Work Space	each	7	10
Number of Potential Archaeological Resource Sites	each	4	1

3.3.2.3 State Route 136 Alternative

The State Route (SR) 136 Alternative was evaluated to try to avoid constructing in proximity to residential areas and to determine if following the I-95 corridor further to the east before heading north to join the Columbia Gas pipeline corridor would result in fewer environmental impacts than the proposed route. The SR 136 Alternative would deviate from the proposed route at the intersection with the power line corridor and I-95 at approximate MP 19.0, traverse northeast along I-95 for approximately 8.5 miles, and then turn north at SR 136. For 13.6 miles, this alternative route would mostly parallel SR 136 (except for a 5-mile deviation around the Churchville [Aberdeen] Test Area) until rejoining the proposed route near Dublin, Maryland, at approximate MP 40.0 at the existing Columbia Gas pipeline right-of-way (see figure 3.3.2.3-1). The segment of the proposed route that the SR 136 Alternative would replace continues to follow the power line corridor from MP 19.0 until it joins the Columbia Gas right-of-way at about MP 32.5.

Although the route maps for the SR 136 Alternative show the pipeline directly on I-95, the pipeline would actually be routed adjacent to, but outside, the highway right-of-way to avoid direct impacts within the roadway easement. Just past where the alternative route crosses Little Gunpowder Falls, the pipeline would be located in the forest on the north side of the highway to avoid a new subdivision that abuts the highway on the south. Congestion on the north side of I-95 just past the Highway 24 interchange would require that the pipeline be routed on the south side of I-95 for the beginning of this alternative. However, multiple crossings of I-95 would be necessary to avoid pockets of dense population or commercial facilities along the highway. The SR 136 Alternative would cross to the northwest side I-95 at Little Gunpowder Falls to avoid a subdivision southeast of I-95 and west of Old Jappa Road. There are new subdivisions abutting both the north and the south sides of I-95 between Abingdon Road and SR 136. Since there does not appear to be a practical route to completely avoid the subdivisions, it would be necessary to route the pipeline along the property line between the residences and the highway. At approximately 8.5 miles into the alternative, the SR 136 Alternative route would cross SR 136 then turn north to follow SR 136 along the east side. There are several residences along the east side of SR 136 north of Goat Hill Road, but the alternative would then cross west over SR 136, where the land use is agricultural. The alternative would then re-cross to the east side of SR 136 at the intersection of Creswell Road and SR136 in order to avoid the residences in the town of Creswell. The alternative would cross back to the west of SR136 about 0.5 mile south of Calvary to avoid an aggregate or gravel pit which is on the east side of SR 136, south of Snake Lane in Calvary. In Calvary, the alternative would cross agricultural and residential properties north of Snake Lane. Once clear of Calvary, the alternative route would stay well west of SR 136 to be located behind several homes south of Churchville. The crossing of Maryland State Highway 22/155 in Churchville would be a difficult crossing perhaps needing specialized



LEGEND

- Alternative Route
- Proposed Route
- MP Marker

Figure 3.3.2.3-1
Mid - Altantic Express Pipeline Project
S.R. 136 Route Alternative

construction techniques to avoid disturbance to residences in that community. The terrain is fairly open, with forest and agricultural lands, north of Churchville, where the alternative route would stay east of SR 136 and parallel Glenville Road. After crossing Cool Branch Road, the route would skirt the eastern edge of Churchville Test Area before crossing Harmony Church Road. The alternative would angle northwesterly and rejoin SR 136 (which at this point is also known as Priestford Road) where SR 136 has a junction with Trappe Church Road. The route would remain on the west side of SR 136 to avoid houses south of Poplar Grove, and to set up the crossing of US Highway 1 (also known as Conowingo Road) in Poplar Grove. It would be necessary to stay well west of SR 136 to avoid houses on both sides of the road south of Dublin. The route would cross Maryland State Highway 440 west of Dublin to join the Columbia Gas right-of-way and proposed route, turning east to cross SR 136.

As described for the Western Alternative, the proposed route follows a single-tower power line right-of-way from MP 19.0 to MP 32.5. There appears to be available space for the proposed pipeline, and residences and commercial structures do not appear to crowd the right-of-way. The terrain is relatively open where the proposed route is adjacent to, or abuts, Columbia Gas pipeline corridor after MP 32.5. The exception is from about MP 35.5 to MP 37.0, where a significant stretch of forest would be cleared to widen the existing right-of-way to accommodate the new pipeline.

The Harford County Department of Public Works, Division of Water and Sewer (Harford DWS) commented that it owns over 900 miles of water and sewer mains in the county, and is concerned about the placement and/or construction of other utilities that may be located adjacent to, or cross over/beneath, its water and sewer main systems. Harford DWS indicated that impacts to the water system could disrupt water service, while impacts to the sewer system could cause sewage discharge into adjacent streams. Upon its review of Mid-Atlantic Express' proposed route and the alternative routes along the I-95, Harford DWS indicated that it preferred the proposed route in Harford County over the alternative routes identified along I-95, because in this portion of the I-95 corridor, Harford DWS has multiple major water transmission mains and interceptor sewers which serve a large portion of its service area. In comparison, the corresponding segment of the proposed route would only cross one utility crossing.

As shown in table 3.3.2-3, the SR 136 Alternative is about 0.8 mile longer than the proposed route segment it would replace. Neither route would have a substantial effect on wetlands, and the number of waterbodies crossed only vary by one. Both routes would cross Gunpowder Falls State Park at the crossing of Little Gunpowder Falls. While both routes cross fairly open terrain, more residences would fall within 50 feet of the construction work space along the alternative. In these areas, residential subdivisions would prevent placing the pipeline adjacent to the existing I-95 right-of-way corridor for a short distance. The alternative also has the potential to affect several more archaeological resource sites, and would traverse the Finney House Historic District in Churchville, Maryland, a Rural Legacy District area and could interfere or disrupt Hartford DWS's sewer and main systems. The proposed route would fragment 8.3 miles of forest, whereas the SR 136 Alternative would cross approximately 6 miles of forest. Finally, the alternative would require more than 13 miles of new right-of-way, whereas the proposed route is co-located with existing pipelines and utilities through most of the length of this segment. Co-location is preferred where feasible to minimize the fragmentation of habitats. For these reasons, we believe the SR 136 Alternative would not be environmentally preferable to the proposed route.

TABLE 3.3.2-3 **Comparison of AES's Proposed Route With the SR 136 Alternative**			
Characteristics or Resource	**Units**	**Proposed Route**	**SR 136 Alternative**
Total Length	miles	21.3	22.1
Length Adjacent to Existing Rights-of-Way	miles	20.9	8.6
Number of Waterbody Crossings	each	22.0	23.0
Number of Major Waterbody Crossings (>100 feet)	each	1.0	2.0
Length in Forested Areas	miles	8.3	6.0
Length in Agricultural Areas	miles	6.6	9.0
Parks and Other State and Federal Lands Crossed	each	10.0	9.0
Length in Residential Areas	miles	3.5	2.7
Residences within 50 feet of Construction Work Space	each	6.0	24.0
Number of Potential Archaeological Resource Sites	each	0.0	10.0

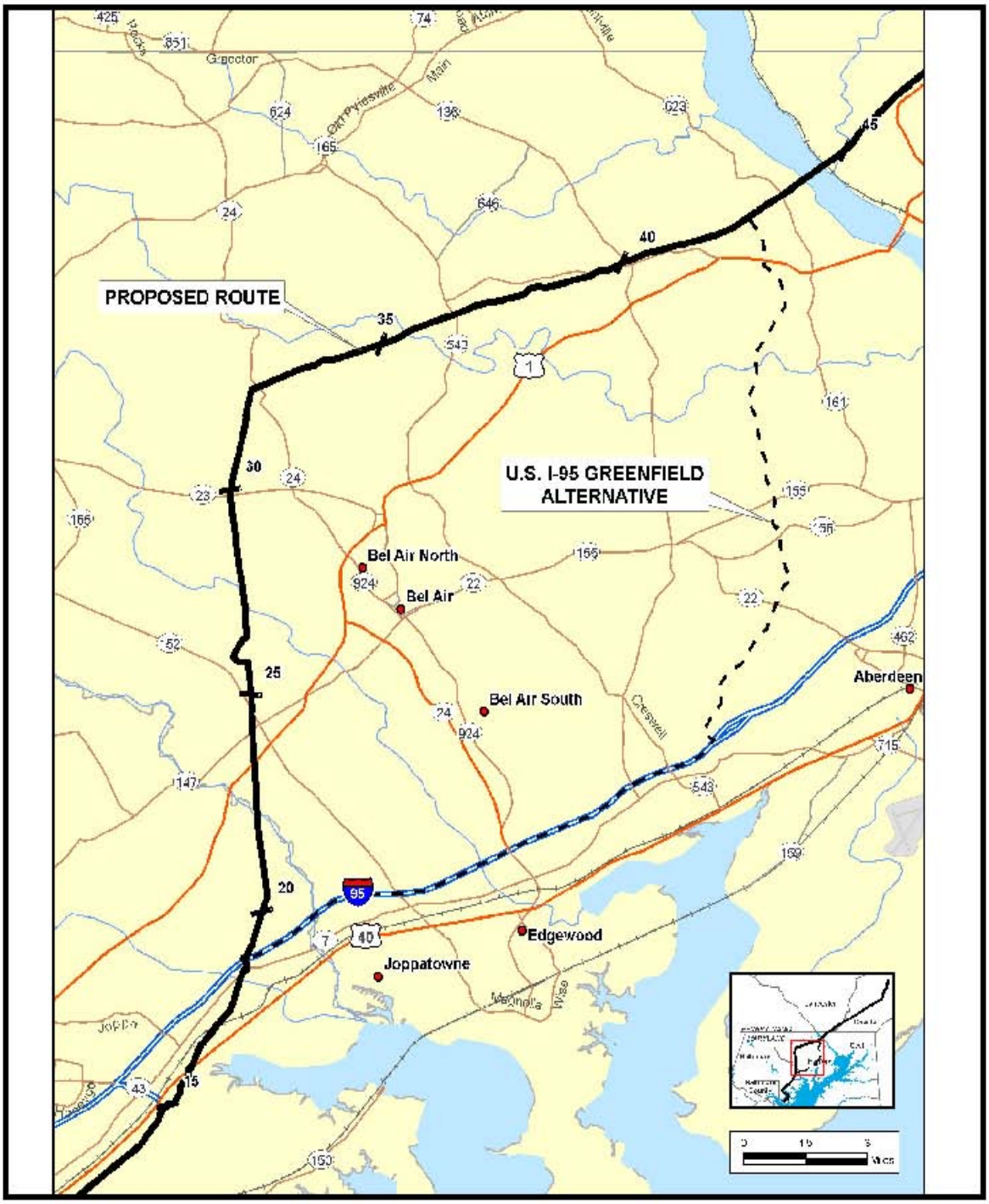
3.3.2.4 US I-95 & Greenfield Alternative

Starting at MP 19.0, the US I-95 & Greenfield Alternative is similar to the SR 136 Alternative, except that rather than turning to the north to follow SR 136, this alternative continues along I-95 for approximately 2 more miles (see figure 3.3.2.4-1). Just before the service center on I-95, this alternative turns north to parallel secondary roads and cross open land, ultimately intersecting the proposed route on the Columbia Gas right-of-way at about MP 42.7. This alternative would have the same difficulty as the SR 136 Alternative of routing through major subdivisions along I-95 between Abingdon Road and SR 136. Thereafter, the alternative is routed through relatively rural country. The additional 2.7 miles along the Columbia Gas right-of-way on the proposed route is also through mostly open land.

This alternative is 1.5 miles longer than the proposed route, would require over 15 miles of new right-of-way, crosses 7 more waterbodies, including two more major waterbodies, could affect more sites potentially eligible for listing on the NHRP, and would have more residences within 50 feet of the construction work space (see table 3.3.2-4). Although both the alternative and the proposed route are mostly in rural areas, the new subdivisions along I-95 make the alternative very difficult to construct without a significant effect on residences. Also, as discussed in State Route 136 Alternative, use of this alternative could interfere or disrupt the Hartford DWS's water and sewer main systems. The proposed route would cross 8.3 miles of forested land whereas the alternative would cross 11.7 miles, thus increasing forest habitat fragmentation.

For these reasons, we do not believe the US I-95 & Greenfield Alternative would be preferable to the proposed route.

TABLE 3.3.2-4 **Comparison of AES's Proposed Route With the US I-95 & Greenfield Alternative**			
Characteristics or Resource	**Units**	**Proposed Route**	**US I-95 & Greenfield Alternative**
Total Length	miles	23.8	25.3
Length Adjacent to Existing Rights-of-Way	miles	23.8	9.7
Number of Waterbody Crossings	each	23.0	30.0
Number of Major Waterbody Crossings (>100 feet)	each	2.0	4.0
Length in Forested Areas	miles	9.4	11.7
Length in Agricultural Areas	miles	7.1	8.5
Parks and Other State and Federal Lands Crossed	each	11.0	8.0
Length in Residential Areas	miles	4.2	1.5
Residences within 50 feet of Construction Work Space	each	7.0	12.0
Number of Potential Archaeological Resource Sites	each	7.0	8.0



LEGEND

- Alternative Route
- Proposed Route
- MP Marker

Figure 3.3.2.4-1
Mid - Altantic Express Pipeline Project
U.S I-95 Greenfield Route Alternative

3.3.3 Route Variations

Route variations differ from system or route alternatives in that they are identified to avoid or reduce potential construction impacts to specific localized resources such as wetlands, waterbodies, residences, cultural resources, recreational lands, and specific terrain conditions. While route variations may be a few miles in length, most are relatively short and in proximity to the proposed route.

During project development and the route selection process, Mid-Atlantic Express identified 27 route variations to avoid or minimize impacts on specific resources along the pipeline route. Variations that lessened environmental impacts were adopted into the proposed route by Mid-Atlantic Express. Other stakeholders, including agencies and landowners, suggested variations during the Pre-filing process that were considered during our evaluation. We added three route variations that should be considered in the highly congested Eagle, Pennsylvania area. A description of each variation, including a table where a comparison of the characteristics and environmental resources affected by the variation and the proposed route is appropriate, and our conclusion as to whether the variation should be incorporated into the pipeline route, is provided below.

Route Variation 1

Route Variation 1 would deviate from the proposed route at MP 3.67 and rejoin it again at MP 4.70 (shown on figure 3.3.3-1). This variation was considered to provide an alternative crossing location of I-695. Table 3.3.3-1 compares environmental factors of the corresponding segment of the proposed route with the route variation. The variation would cross the south-bound lanes at one location, run between the north and south-bound lanes for nearly a mile before crossing the north-bound lanes at a second location. The variation would require two horizontal bores of the highway. Based on our review, there does not appear to be enough space between the south-bound lanes and a pond for the pipeline right-of-way on the variation. During installation of the variation, heavy construction equipment and pipe-haul trucks would likely need to make frequent crossings of the traffic lanes of I-695.

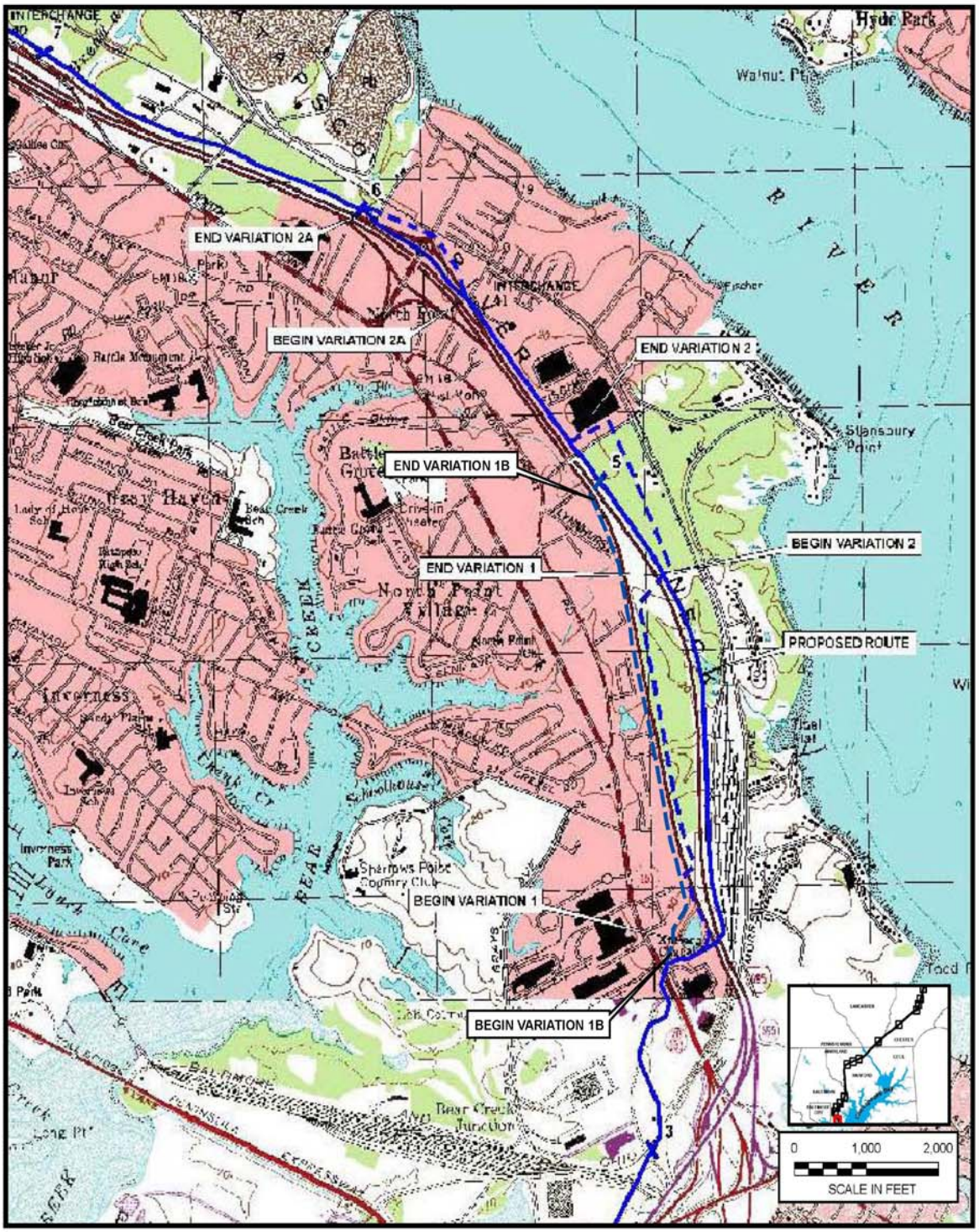
The proposed route crosses the north and south-bound lanes of I-695 at the same location, then runs along the east side of the north-bound lanes, between the highway and the railroad tracks. The need for frequent crossings of traffic lanes of I-695 would be avoided by use of the proposed route. The proposed route would also only require a single bore to cross all lanes of I-695. There also appears to be sufficient space for the construction work space to avoid a pond and an associated wetland that we identified, based on NWI mapping.

Since there is no significant environmental advantage of the variation in comparison to the proposed route in this area, and since the variation poses potential safety issues associated with the potential for construction equipment crossing the highway, we do not recommend use of this variation.

TABLE 3.3.3-1

Comparison of Proposed Route With Variation 1

Characteristics or Resource	Units	Proposed Route	Variation 1
Total Length	miles	1.03	1.05
Length Adjacent to Existing Rights-of-Way	miles	0.94	0.88
Length in Forested Wetlands	feet	238.0	0.0
Length in Forested Areas	miles	0.97	0.93



LEGEND

Variation

Proposed Route

MP Marker

Figure 3.3.3-1
Mid - Altantic Express Pipeline Project
Route Variations 1,1B,2,2A

Background on Maryland State Highway Administration (SHA) Exceptions to Utility Policy

During our review of Mid-Atlantic Express' proposed pipeline route, we discovered that its placement infringed on the U.S. Interstate 695 (I-695) highway rights-of-way at five locations. We determined the locations to be inconsistent with federal requirements of the Federal Highway Administration (FHWA) for easements in interstate highway right-of-way. Since the FHWA has delegated approval authority of longitudinal occupancy to the states, this authority is delegated to the Maryland Department of Transportation, SHA. We consulted with the SHA regarding Mid-Atlantic's proposal, and the SHA indicated that the current location of the pipeline would not comply with the SHA's Utility Policy (issued July 1989; revised March 1998) or the FHWA's policy. We then asked Mid-Atlantic Express to resolve the issue and establish an alternate routing, or get concurrence from SHA that the proposal is feasible for continued study.

Mid Atlantic Express Pipeline filed its response in Resource Report 10 Addendum, in November 2007 (Accession No. 20071123-0021). Mid-Atlantic Express reported in its filing that it re-consulted with the SHA staff, and developed two minor route variations (discussed below) that would affect about 5.7 mile section of the overall pipeline route. Mid-Atlantic Express modified the alignment through the area of concern so that neither the pipeline nor the permanent right-of-way would be placed in the SHA Controlled Access Rights-of-way (CAROW) in a manner that would conflict with the Utility Policy.

SHA clarified to Mid-Atlantic Express that the Utility Policy does not prohibit the temporary construction easements in the CAROW, and that utility lines are specifically allowed to be installed within the CAROW as long as the utility owner applies for, and is granted an exception from the Utility Policy. SHA also stressed that its primary focus of its review process is the safety of the public, workers during construction activities; and protection of SHA facilities and structures; and maintenance of traffic flow.

Generally, the exception application process includes a cover letter describing the project, includes plans and maps of the project area, and information regarding project need, alternatives assessed, environmental, archaeological, cultural and socioeconomic impacts. The SHA reviews this information and if final recommendation is to proceed, a letter is sent to the Federal Highway Administration (FHA) for their review and concurrence. The exception process is expected to take about 3 to 5 months from submittal.

Also in their November 2007 filing, Mid-Atlantic Express proposes the following measures to further reduce impact on the CAROW: Mid-Atlantic would narrow the permanent right-of-way to 30 feet; adjust the pipeline centerline to shift slightly to locate it outside of the CAROW; and narrow the construction right-of-way through this area to 45 feet. Also, Mid-Atlantic Express states that its modified alignments would be accessible via local access roads and would not require construction access point from I-695 avoiding traffic impacts on the highway.

Variations 1A and 1B below incorporate route changes proposed by Mid-Atlantic Express in their Resource Report 10 Addendum, filed November 2007, and are described below. Route Variation 1A, with SHA exception approval, could be built without major changes to the proposed right-of-way, except for a pullout at Cove Road to avoid the ramps to and from Cove Road. In the event the SHA does not approve Mid-Atlantic Express' requested exceptions to the SHA Utility Policy, Route Variation 1B was evaluated to incorporate potential changes to the route in that case.

For additional discussion on SHA and Exceptions to the Utility Policy, see section 4.9.4.1 (Land Use).

Route Variation 1A

Route Variation 1A was developed to avoid longitudinal placement of the pipeline within CAROW to the maximum extent practicable, however this variation includes three areas where an exception to the Utility Policy would be required.

Exception 1: Area about MP 3.75 to 4.9 located just north of Morse Lane, where the northbound and southbound lanes of I-695 express diverge.

Exception 2: Area of Cove Road crossing from MP 5.5 to 6.0. The "crossing" in this area applies to the perpendicular installation across Cove Road, because the route parallels the south side of the Cove Road exit/entrance ramps, this area is designated as CAROW.

Exception 3: a 250 foot section at MP 9.13, in the vicinity of Chesaco Ave and I-695 where the SHA property extends beyond the curvature of the CAROW. It is an unusual shaped property related to a parcel purchase when the roadway was constructed; however it qualifies for an exception.

Ranging from MP 3.68 to MP 9.41 for these exception areas, Mid-Atlantic Express proposes to comply with the SHA Utility Policy by the following actions:

- modify the alignment so that neither the pipeline nor the pipeline permanent right-of-way would be in the SHA CAROW;
- the permanent right-of-way would be narrowed to 30 feet from 50 feet;
- modify the construction right-of-way to 45 feet; and
- apply for the three exceptions to the Policy as discussed below.

Two of these proposed exceptions do not involve any new landowners, and do not change the construction corridor, and thus do not change the environmental analysis of this portion of the pipeline. (see Accession No. 20071123-0021 for complete alignment sheets of Route Variation 1A and complete descriptions of Exception Areas 1 and 2). The third exception area is at the approach to Cove Road from approximate MP 5.5 to MP 6.0. A variation at this location was considered during the original application (Route Variation 2A) and discussed below. An environmental comparison of Route Variation 1A to the corresponding segment of the proposed route is presented in table 3.3.3-1A.

Based on our review, even though Variation 1A is slightly longer in length and has slightly more forest impacts, it results in fewer environmental impacts overall and better addresses the safety and maintenance concerns of SHA. Mid-Atlantic Express has indicated that would accept Route Variation 1A as its preferred route. Mid-Atlantic Express also stated in its November 2007 filing that in its consultations with the SHA, that the SHA indicated that Route Variation 1A was preferred to the proposed route. Mid-Atlantic Express indicated it would apply for its SHA exceptions to the Utility Policy in December 2007. To date, we are not aware that the SHA has issued a decision.

TABLE 3.3.3-1A

Comparison of Proposed Route With Variation 1A

Characteristics or Resource	Units	Proposed Route	Variation 1A
Total Length	Miles	5.67	5.71
Length Adjacent to Existing Rights-of-Way	Miles	5.22	5.26
Length in Forested Wetlands	Feet	428.8	424.5
Length in Herbaceous Wetlands	Feet	864.7	776.1
Number of Waterbody Crossings	Each	7	7
Number of Major Waterbody Crossings (>100 feet)	Each	1	1
Length in Forested Areas	Miles	1.72	2.27
Residences within 50 feet of Construction Work Space	Each	1	3

Route Variation 1B

The variation was offered as an alternative in the event that SHA does not approve Mid-Atlantic Express's request for exceptions to the SHA Utility Policy along Route Variation 1A. Route Variation 1B generally follows the same alignment as Route Variation 1A (see figure 10.6.4-1b in Accession No. 20071123-0021) with the exception of three areas.

Exception one is a 7,656 foot segment from approximately MP 3.55 to MP 5.0, where the pipeline route has been modified to be located on the western side of the southbound lanes of I-695 but outside the CAROW (see figure 3.3.3-1). This variation maintains a 100-foot offset from the CAROW until Bunny lane, where the offset is reduced to 10 feet until the route variation crosses eastward under I-695 at about MP 5.0. This route variation would directly impact five additional landowners. These landowners were previously notified as potential abutters. The variation would also impact eight new landowners not previously affected by the pipeline route. These landowners have been added to the landowner mailing list by the applicant and by FERC.

The second area where this variation differs form Route Variation 1A is the Cove Road crossing from approximate MP 5.5 to MP 6.0. This variation would maintain a 5-foot offset from the CAROW, eliminating the need for an exception from the SHA Utility Police. At the scale of figure 3.3.3-1, this variation segment is virtually the same as Route Variation 2B. This segment of Route Variation 1B would result in direct impacts to ten landowners who were notified of the Project during the pre-filing process as potential abutters, but who originally were not directly impacted by the proposed route.

The third area where Route Variation 1B differs from Route Variation 1A is an approximately 500-foot section at approximate MP 9.13, located in the vicinity of Chesaco Avenue and I-695. In this third segment, the alignment would be shifted to maintain a 5-foot offset from the boundary of the CAROW, thus eliminating the need for an exception to the SHA Utility Policy. Route Variation 1B in this segment would not result in direct impacts to additional landowners.

The environmental comparison of Route Variation 1B to the corresponding segment of the proposed route is in table 3.3.3-1B. Although the variation would impact less forested and herbaceous wetland, it would be within 50 feet of three more residences, and would affect additional landowners not previously impacted.

TABLE 3.3.3-1B

Comparison of Proposed Route With Variation 1B

Characteristics or Resource	Units	Proposed Route	Variation 1B
Total Length	Miles	5.85	5.82
Length Adjacent to Existing Rights-of-Way	Miles	5.4	5.07
Length in Forested Wetlands	Feet	428.8	128.1
Length in Herbaceous Wetlands	Feet	884.7	187.4
Number of Waterbody Crossings	Each	7	7
Number of Major Waterbody Crossings (>100 feet)	Each	1	1
Length in Forested Areas	Miles	1.72	2.70
Residences within 50 feet of Construction Work Space	Each	1	4

Conclusions: Corresponding Segment of the Proposed Route, Route Variations 1A and 1B

Based on our evaluation, we prefer the use of Route Variation 1A, pending the decision of the SHA. At this time, we do not recommend the corresponding segment of the proposed route, or Route Variation 1B. In the event the SHA denies Mid-Atlantic Express's requested exceptions to the Utility Policy, we will reconsider both the corresponding segment of the filed (proposed) route and Route Variation 1B for incorporation into the project. Therefore, **we recommend**:

- **<u>Prior to the end of the DEIS comment period</u>, Mid-Atlantic Express should incorporate as part of its proposed route, Route Variation 1A. Mid-Atlantic Express should file with the Secretary updated alignment sheets and updated land use and resource tables.**

Route Variation 2

Route Variation 2 was considered as a potential alternative to approximately 0.45 mile of the original pipeline route paralleling I-695, to avoid impacts to forest and reduce environmental impacts (see table 3.3.3-2). The

variation would deviate from the proposed route at MP 4.7 and rejoin it at MP 5.15, as shown on figure 3.3.3-1. Rather than run immediately adjacent to the north-bound lanes of I-695 as the proposed route does, the variation would be routed further to the east, paralleling an existing trailer storage lot, would cross Beachwood Road and into the parking lot of a commercial facility, and turn back toward the proposed route. If the variation is routed through the commercial facility's parking lot, it likely would disrupt the commercial operations during construction activities; however it would avoid some impacts on adjacent forest. In consideration of avoiding commercial operations, if the pipeline is located outside of the facility's parking lot, it would be routed within adjacent forest. This variation would require about the same amount of forest clearing as the proposed route. Since the variation is longer than the proposed route, and would result in similar environmental impacts and it has the potential to conflict with commercial operations, we do not recommend this variation.

TABLE 3.3.3-2

Comparison of Proposed Route With Variation 2

Characteristics or Resource	Units	Proposed Route	Variation 2
Total Length	Miles	0.45	0.57
Length Adjacent to Existing Rights-of-Way	Miles	0.45	0.12
Length in Forested Wetlands	Feet	259.0	184.5
Length in Herbaceous Wetlands	Feet	75.0	0.0
Length in Forested Areas	Miles	0.45	0.46
Residences within 50 feet of Construction Work Space	Each	0.0	1.0

Route Variation 2A

Route Variation 2A was identified as a potential alternative to approximately 0.50 mile of the proposed pipeline route, to avoid impacts to address engineering and safety concerns of constructing inside the exit and entrance ramps of Cove Road. Additionally, proposed route located inside the ramps was deemed not acceptable with the SHA and would be in conflict with the SHA Utility Policy. This variation would deviate from the proposed route at MP 5.60 and rejoin it at MP 6.10 as shown on figure 3.3.3-1. Route Variation 2A would stay east of the Cove Road exit and entrance ramps. The corresponding segment of the proposed route remains just east of the I-695 and west of the Cove Road exit and entrance ramps. The proposed route would require a horizontal bore under the exit ramp, then pass between the exit ramp and the main north-bound lanes, require a bore under the Cove Road overpass abutment, pass between the entrance ramp and the main lanes, then require a third bore under the entrance ramp to meet back up with the proposed route. Also based on our analysis of the proposed route, it appears there may not be sufficient space for the bore pits on either side of the ramps. The comparison of corresponding segment of the proposed route with Route Variation 2A is presented in table 3.3.3-2A. Although the variation would cross a small herbaceous wetland north of Cove Road, we believe the variation is preferable, because it avoids 3 houses within 50 feet of construction, avoids the difficult multiple borings under the Cove Road exit and entrance ramps, and would better comply with the SHA Utility Policy. Therefore, **we recommend that:**

- **<u>Prior to the end of the DEIS comment period</u>, Mid-Atlantic Express incorporate as part of its proposed route, Route Variation 2A, as depicted in figure 3.3.3-1. Mid-Atlantic Express should file with the Secretary updated alignment sheets and updated land use and resource tables.**

TABLE 3.3.3-2A **Comparison of Proposed Route With Variation 2A**			
Characteristics or Resource	**Units**	**Proposed Route**	**Variation 2a**
Total Length	miles	0.37	0.50
Length Adjacent to Existing Rights-of-Way	miles	0.37	0.50
Length in Herbaceous Wetlands	feet	0.0	209.0
Length in Forested Areas	miles	0.35	0.39
Residences within 50 feet of Construction Work Space	each	5	2

Route Variation 3

Variation 3 proposed Mid-Atlantic Express to follow the highway corridor a little farther and to avoid an herbaceous wetland. Variation 3 would diverge from the proposed route just before Batavia Park at MP 9.40 and continue to follow the southbound lane of I-695 until it intersects the high-speed railroad tracks (see figure 3.3.3-2). The variation would follow the railroad tracks and reconnect with the proposed route just past the I-695/702 interchange. The corresponding segment of the proposed route follows the single-tower power line corridor through this segment of the variation (see table 3.3.3-3). The advantage of the variation is that it avoids the wetland complex. However, where the variation passes under the 702 overpass, the steep slope likely would make installation of the 30-inch-diameter pipeline difficult, and could affect the stability of the highway abutment. For this reason, we do not recommend this variation.

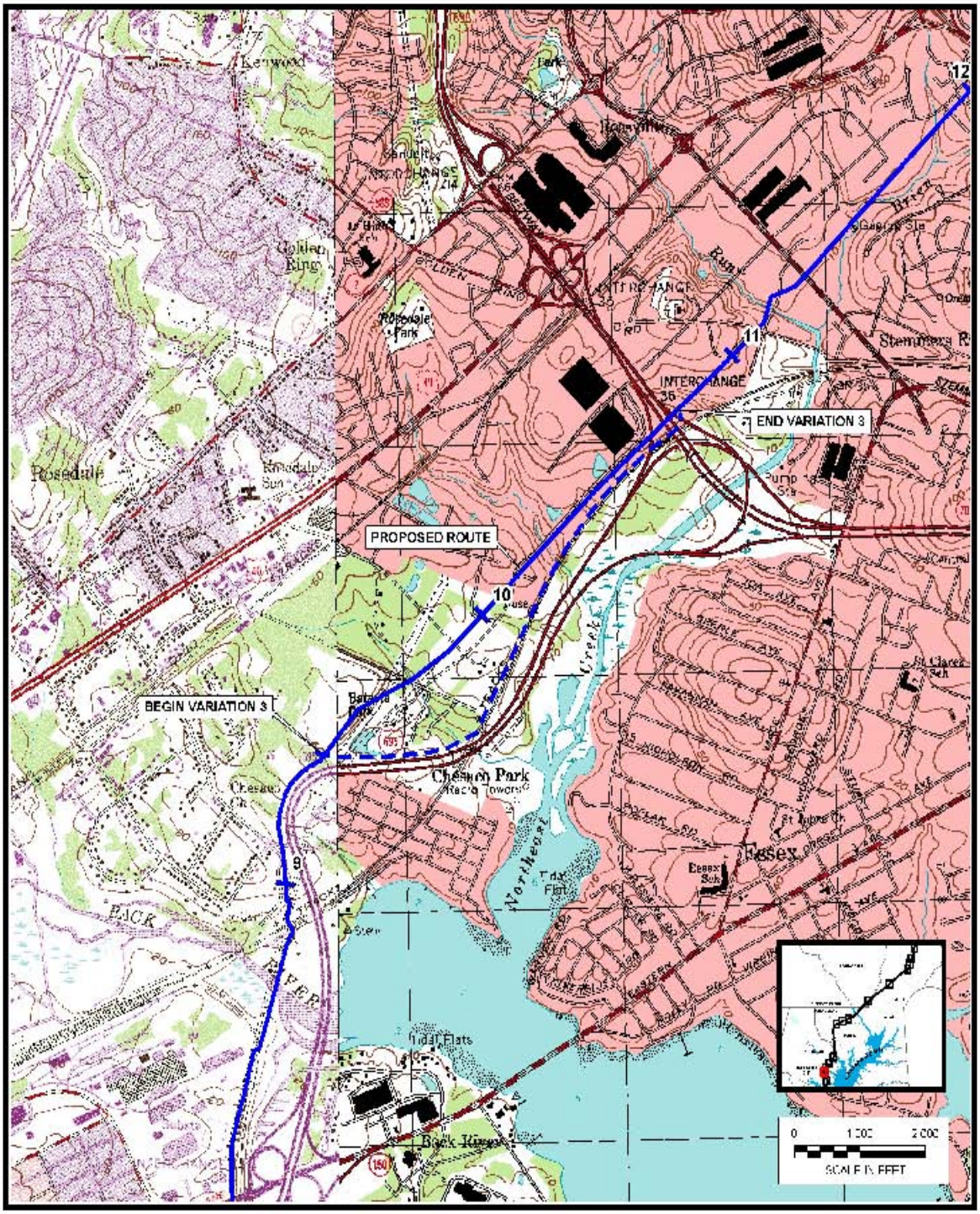
TABLE 3.3.3-3 **Comparison of Proposed Route With Variation 3**			
Characteristics or Resource	**Units**	**Proposed Route**	**Variation 3**
Total Length	miles	1.38	1.40
Length Adjacent to Existing Rights-of-Way	miles	1.38	1.40
Length in Forested Wetlands	feet	80.0	0.0
Length in Herbaceous Wetlands	feet	208.0	0.0
Number of Waterbody Crossings	each	3.0	3.0
Length in Forested Areas	miles	0.23	0.16

Route Variation 4

Route Variation 4, from MP 10.8 to MP 18.8 as shown on figure 3.3.3-3 is being considered as a potential alternative to reduce impacts to wetlands. The variation would parallel the north-bound lane of I-695 before turning to the east, following the north bound lane of I-95 until it connects with the originally proposed route on the south side of the I-95 crossing. The proposed route primarily follows the single-tower power line corridor through this area.

Along Variation 4, multiple commercial buildings would restrict construction activities at the I-695/US 40 interchange. The HDD for the crossing of US 40 would require the use of parking lots and storage yards for the business, possibly disrupting business activities during construction. The HDD or bore crossing of Philadelphia Road would also require the use of the parking lots of the adjacent businesses.

Just north of I-95 and Rossville Boulevard, the variation would move away from the interstate to avoid a structure. The variation would pass between the structure and a building of the Essex Community College. The pipeline would be within about 100 feet of both the building and the structure. The variation would pass through relatively undisturbed forest from the college to a group of town homes on Bridgeford Circle. The town home properties appear to abut the I-95 easement, with a row of trees along the property line. Removal of the screen of trees would subject the residents of town homes to increased traffic noise. A large apartment complex begins about 300 yards farther along I-95. The complex is also screened from the highway by a row of trees that would be removed by pipeline construction. Past the apartment complex, it would be necessary to



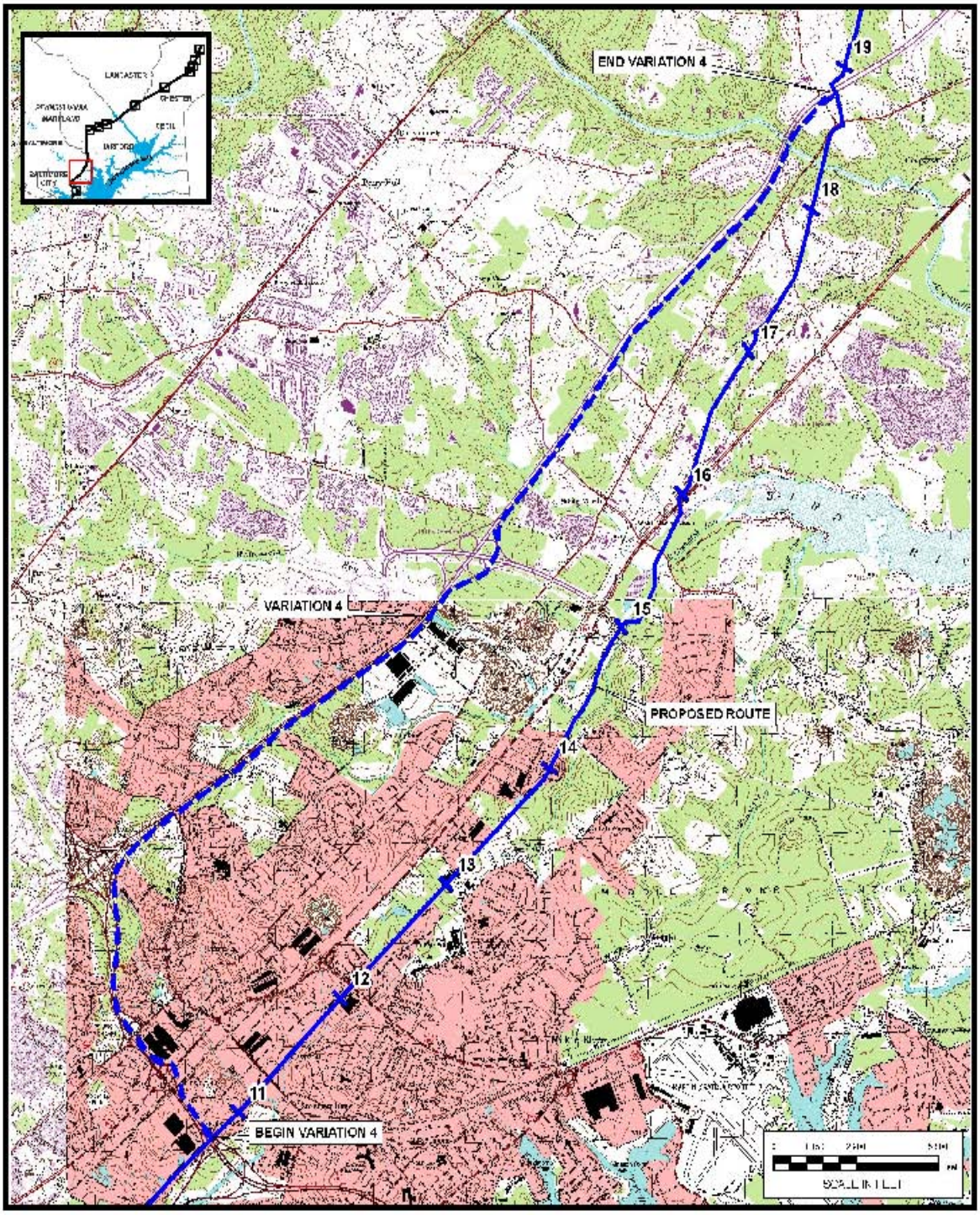
LEGEND

Variation

Proposed Route

MP Marker

Figure 3.3.3-2
Mid - Altantic Express Pipeline Project
Route Variation 3



LEGEND

Variation

Proposed Route

MP Marker

Figure 3.3.3-3
Mid - Altantic Express Pipeline Project
Route Variation 4

use part of the parking lot of two new office buildings for construction work space. A large warehouse facing Campbell Boulevard extends close to the I-95 easement, further restricting available work space. A Best Buy retail store, part of a large strip center, crowds the highway easement just past Campbell Boulevard. An HDD would be required to cross the cloverleaf interchange with Highway 43 (White Marsh Boulevard). The large forested tract just past the Highway 43/I-95 interchange has been almost entirely cleared for development. Houses and farm structures at Cowenton Avenue would force the route to the south. However, there is a large new residential development on the south side of Cowenton Avenue. North of the East Joppa Road several houses back up to I-95. Removal of the tree screen from pipeline construction would increase highway noise at the residences.

Compared to the proposed route, Variation 4 would reduce impacts to wetlands, however it would increase impacts to commercial establishments during construction. It would also increase permanently the noise impacts to residences along I-95 where the tree screens would be removed. Although table 3.3.3-4 lists more residences within 50 feet of the work space along the proposed route, this data does not reflect the true nature of the restrictions due to overall development along the variation.

Although this variation would reduce impacts to wetlands, most of the wetlands that would be avoided are herbaceous wetlands which would be restored to their previous state after construction. The variation would only avoid the clearing of 218 feet of forested wetlands. We do not believe that this reduction in forested wetlands impacts offsets the increase impacts to residential and commercial properties including a permanent increase of traffic noise at several residential developments.

TABLE 3.3.3-4

Comparison of AES's Proposed Route With Variation 4

Characteristics or Resource	Units	Proposed Route	Variation 4
Total Length	miles	8.00	8.88
Length Adjacent to Existing Rights-of-Way	miles	7.38	8.88
Length in Forested Wetlands	feet	218.0	0.0
Length in Herbaceous Wetlands	feet	1819.0	0.0
Number of Waterbody Crossings	each	22.0	10.0
Number of Major Waterbody Crossings (>100 feet)	each	0.0	1.0
Length in Forested Areas	miles	3.92	1.81
Length in Agricultural Areas	miles	1.48	2.05
Length in Residential Areas	miles	2.07	0.98
Residences within 50 feet of Construction Work Space	each	44.0	10.0

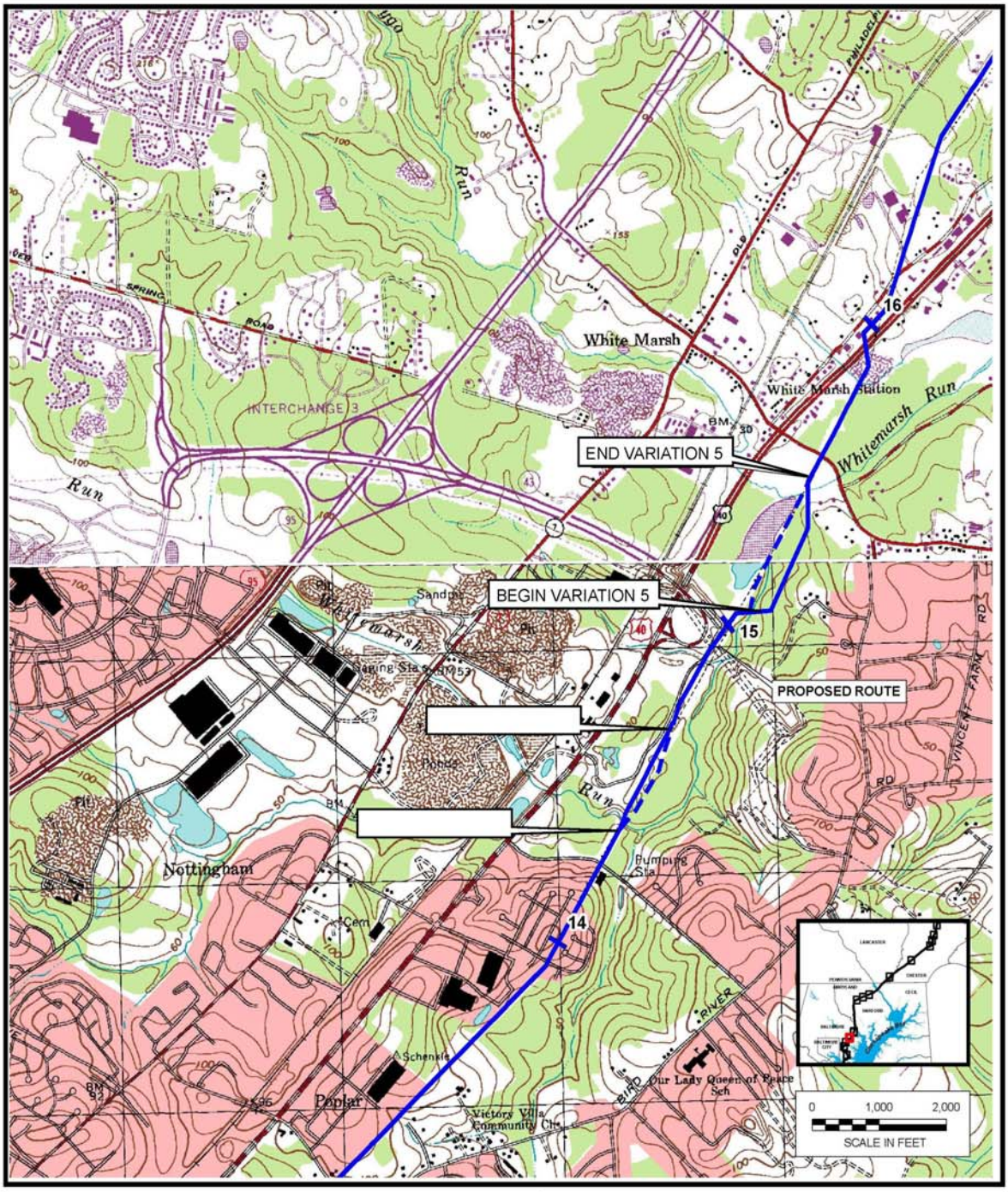
Route Variation 5

Between MPs 15.1 and 15.5 (near White Marsh Boulevard) the proposed route deviates from an existing power line and crosses through a forested area. We examined Variation 5 which would follow the power line in this area (see figure 3.3.3-4).

Although Variation 5 would follow a cleared right-of-way, construction activities would require the clearing of trees for the entire length of the variation. Since the variation crosses a low area and is adjacent to a pond about 67 percent of the variation would require the clearing of a forested wetland. The proposed route would clear mainly upland forest.

In addition to the pond which is adjacent to the power line right-of-way, there are also waterbodies that parallel and run down the existing right-of-way. In order to avoid constructing longitudinally through the waterbody for about 600 feet, Variation 5 would need to move further into the forested wetland.

We do not recommend Variation 5 because it would impact more forested wetlands and waterbodies than the proposed route (see table 3.3.3.5).



LEGEND

Variation

Proposed Route

MP Marker

Figure 3.3.3-4
Mid - Altantic Express Pipeline Project
Route Variation 5

TABLE 3.3.3-5 **Comparison of AES's Proposed Route With Variation 5**			
Characteristics or Resource	**Units**	**Proposed Route**	**Variation 5**
Total Length	miles	0.41	0.39
Length Adjacent to Existing Rights-of-Way	miles	0.00	0.39
Length in Forested Wetlands	feet	199.0	1,359.3
Length in Herbaceous Wetlands	feet	157.0	0.0
Number of Waterbody Crossings	each	2.0	5.0
Number of Major Waterbody Crossings (>100 feet)	each	0.0	0.0
Length in Forested Areas	miles	0.41	0.39
Length in Agricultural Areas	miles	0.0	0.0
Length in Residential Areas	miles	0.0	0.0
Residences within 50 feet of Construction Work Space	each	0.0	0.0

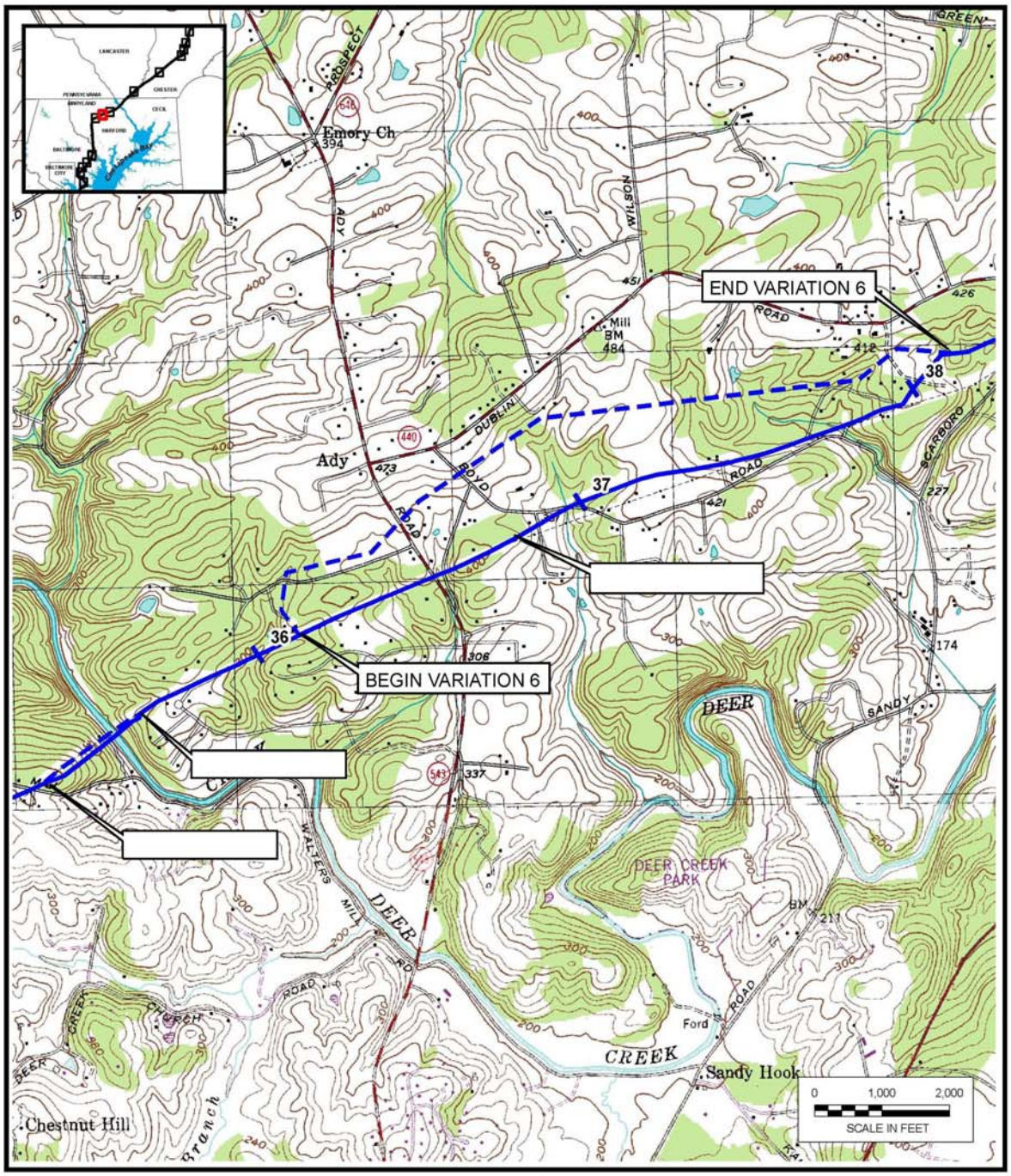
Route Variation 6

In response to residents on Chance Court and Saint Ann Drive we have looked at a variance (Variation 6) that would follow Mine Branch Road through the area. At approximately MP 36.2, Variation 6 would leave the Columbia Gas right-of-way and head north to Mine Branch Road. The variation would generally parallel the north side of Mine Branch Road, turning to the northeast, to avoid residences, prior to crossing Ady Road. The variation would continue north east crossing Boyd Road and generally paralleling Dublin Road, about 500 feet south of the road. The variation would then turn east where it would reconnect with the proposed route near MP 38.1, as shown on figure 3.3.3-5 (also see table 3.3.3-6).

Variation 6 would cross slightly less forested land (about 0.14 mile less crossed) and would not cross any known wetlands (see table 3.3.3-6). The variation would also cross fewer waterbodies. The variation would cross less residential areas and would impact 6 fewer residences within 50 feet of the construction right-of-way. The variation would be about 0.2 mile longer than the proposed route. We have not identified any environmental drawbacks with this variation, although we would have to notify the newly affected landowners. Therefore, **we recommend that:**

- **<u>Prior to the end of the DEIS comment period</u>, Mid-Atlantic Express incorporate into its proposed route, Route Variation 6, as depicted in figure 3.3.3-5. Mid-Atlantic Express should file with the Secretary updated alignment sheets; updated land use and resource tables; and the names and addresses of the newly affected landowners.**

TABLE 3.3.3-6 **Comparison of AES's Proposed Route With Variation 6**			
Characteristics or Resource	**Units**	**Proposed Route**	**Variation 6**
Total Length	miles	1.90	2.10
Length Adjacent to Existing Rights-of-Way	miles	1.90	2.00
Length in Forested Wetlands	feet	0.0	0.0
Length in Herbaceous Wetlands	feet	0.0	0.0
Number of Waterbody Crossings	each	7.0	3.0
Number of Major Waterbody Crossings (>100 feet)	each	0.0	0.0
Length in Forested Areas	miles	1.04	0.90
Length in Agricultural Areas	miles	0.24	1.20
Length in Residential Areas	miles	0.46	0.0
Residences within 50 feet of Construction Work Space	each	8.0	2.0



LEGEND

Variation

Proposed Route

MP Marker

Figure 3.3.3-5
Mid - Altantic Express Pipeline Project
Route Variation 6

Route Variation 6A

The St. Anne Community Association requested that we examine starting Variation 6 sooner to reduce the impacts to residences at the end of St. Anne Drive. Variation 6A would leave the proposed route near MP 35.6. It would head north circling around the residences on the cul-de-sac joining up with Variation 6. (see figure 3.3.3-6). Variation 6A would impact more forested land and would create a new right-of-way through the forest. The main reason for looking at this variation was to reduce residential impacts. It appears that this variation would only transfer the impacts from one area (St. Anne Drive) to another (Mine Branch Road). A residence on St. Anne Drive, which would be 50 feet from the proposed route, would be separated from the new pipeline by the existing pipeline right-of-way. Although trees would be removed during construction it would only widen the existing right-of-way. The residence on Mine Branch Road which would be within 50 feet of Variation 6A would gain a pipeline right-of-way and also lose tree screening. In addition, another residence on Mine Branch Road would lose a significant amount of tree screening on the east side of the residence.

Because Variation 6A offers no reduction in environmental impacts and only serves to transfer the impacts to another group of residences, we do not recommend it.

TABLE 3.3.3-6A

Comparison of AES's Proposed Route With Variation 6A

Characteristics or Resource	Units	Proposed Route	Variation6A
Total Length	miles	0.4	0.5
Length Adjacent to Existing Rights-of-Way	miles	0.4	0
Length in Forested Areas	miles	0.2	0.5
Residences within 50 feet of Construction Work Space	each	1	1

Route Variation 7

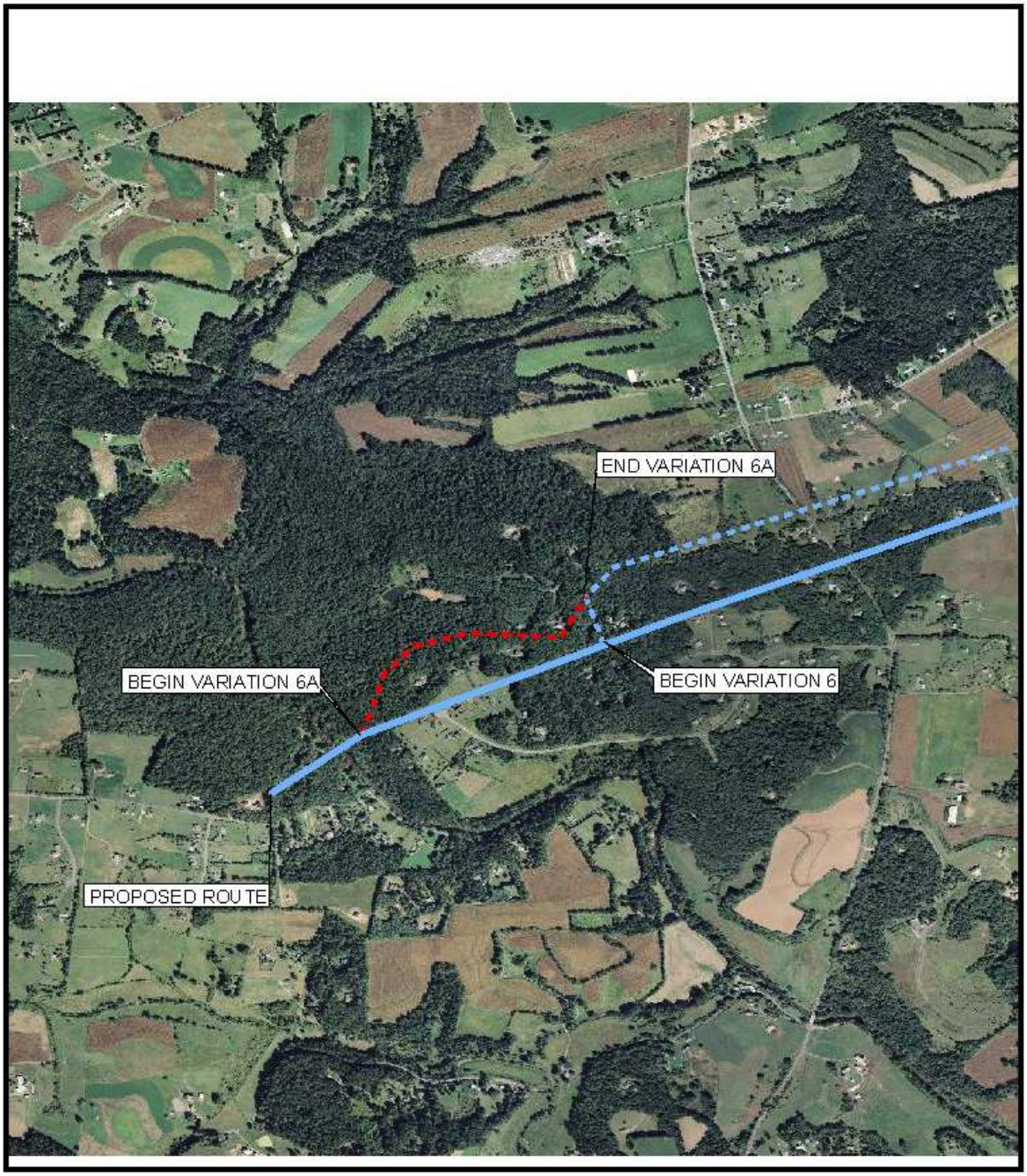
Route Variation 7, from MP 36.4 to MP 38.8 as shown on figure 3.3.3-7, was considered as a potential alternative to crossing a residential area in the community of Scarboro, Maryland. Near MP 36.4, this variation would deviate from the existing Columbia Gas pipeline right-of-way toward the south. The variation would be routed on to property owned by the Scarboro Landfill. This would place the pipeline about 150 feet from the active landfill. We have been told that the landfill has plans to expand, although we are not sure of where this expansion would be.

In addition, the variation would potentially remove all tree screening between a residence and the landfill. This variation would also fragment a forested area west of the residences with the clearing of new pipeline right-of-way. Since there does not appear to be any environmental advantage of the variation over the proposed route (see table 3.3.3-7), we do not recommend this variation.

TABLE 3.3.3-7

Comparison of AES's Proposed Route With Variation 7

Characteristics or Resource	Units	Proposed Route	Variation 7
Total Length	miles	0.39	0.43
Length Adjacent to Existing Rights-of-Way	miles	0.39	0.0
Length in Forested Wetlands	feet	0.0	0.0
Length in Herbaceous Wetlands	feet	40.0	0.0
Number of Waterbody Crossings	each	3	2
Number of Major Waterbody Crossings (>100 feet)	each	0.0	0.0
Length in Forested Areas	miles	0.24	0.32
Length in Agricultural Areas	miles	0.10	0.06
Length in Residential Areas	miles	0.05	0.05
Residences within 50 feet of Construction Work Space	each	2	1



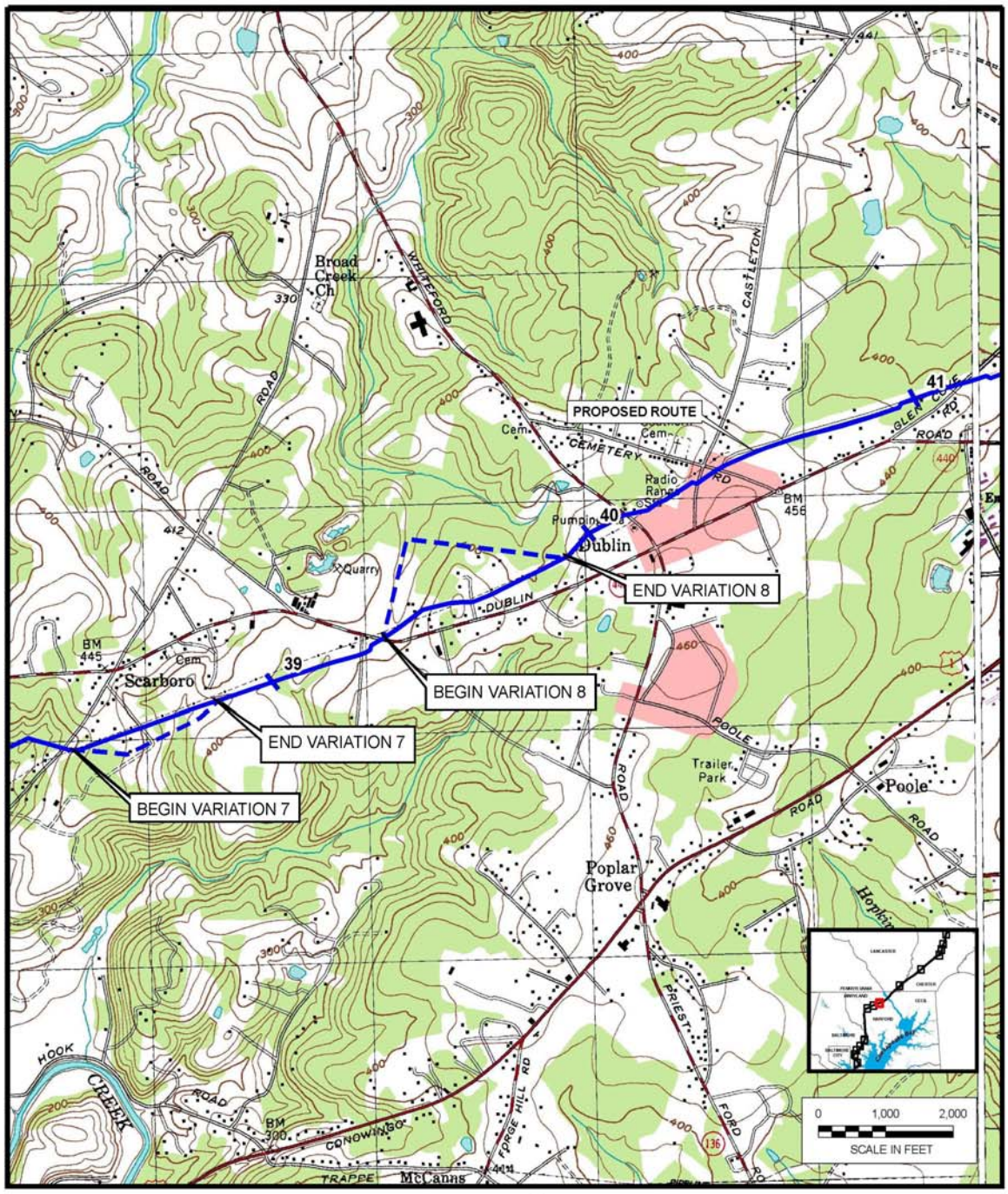
LEGEND

Proposed Route

Variation 6

Variation 6A

Figure 3.3.3-6
Mid - Altantic Express Pipeline Project
Route Variation 6



LEGEND

Variation

Proposed Route

MP Marker

Figure 3.3.3-7
Mid - Altantic Express Pipeline Project
Route Variations 7 and 8

Route Variation 8

Route Variation 8, from MP 39.34 to MP 39.90 as shown on figure 3.3.3-7**,** was considered as a potential alternative to avoid a residential area with some structures in close proximity to the existing easement. This route variation would turn north from the existing Columbia Gas pipeline easement and follow the edge of an actively cultivated field before entering a forested area. Once in the forested area, the variation would turn back toward the existing easement.

The variation would create a new right-of-way through approximately 1,750 feet of forested wetlands (see table 3.3.3-8). We have identified only one structure, which does not appear to be a residence, on the proposed route that would be within 50 feet of the proposed construction. This structure is located just east of the crossing location of Dublin Road, on the north side of the existing Columbia pipeline. Since Mid-Atlantic Express proposes to place the pipeline north of the Columbia pipeline this structure may be within the construction work area.

Because of the forest impacts, we do not believe that Variation 8 is environmentally preferable to the proposed route, however we do believe that an alternative construction technique would be required to avoid adverse impact to this structure therefore, **we recommend that**:

- **<u>Prior to the end of the DEIS comment period</u>, Mid-Atlantic Express file with the Secretary a site-specific plan for crossing the property at MP 39.4 that includes a bore of the driveway extending past the structure adjacent to the existing pipeline right-of-way.**

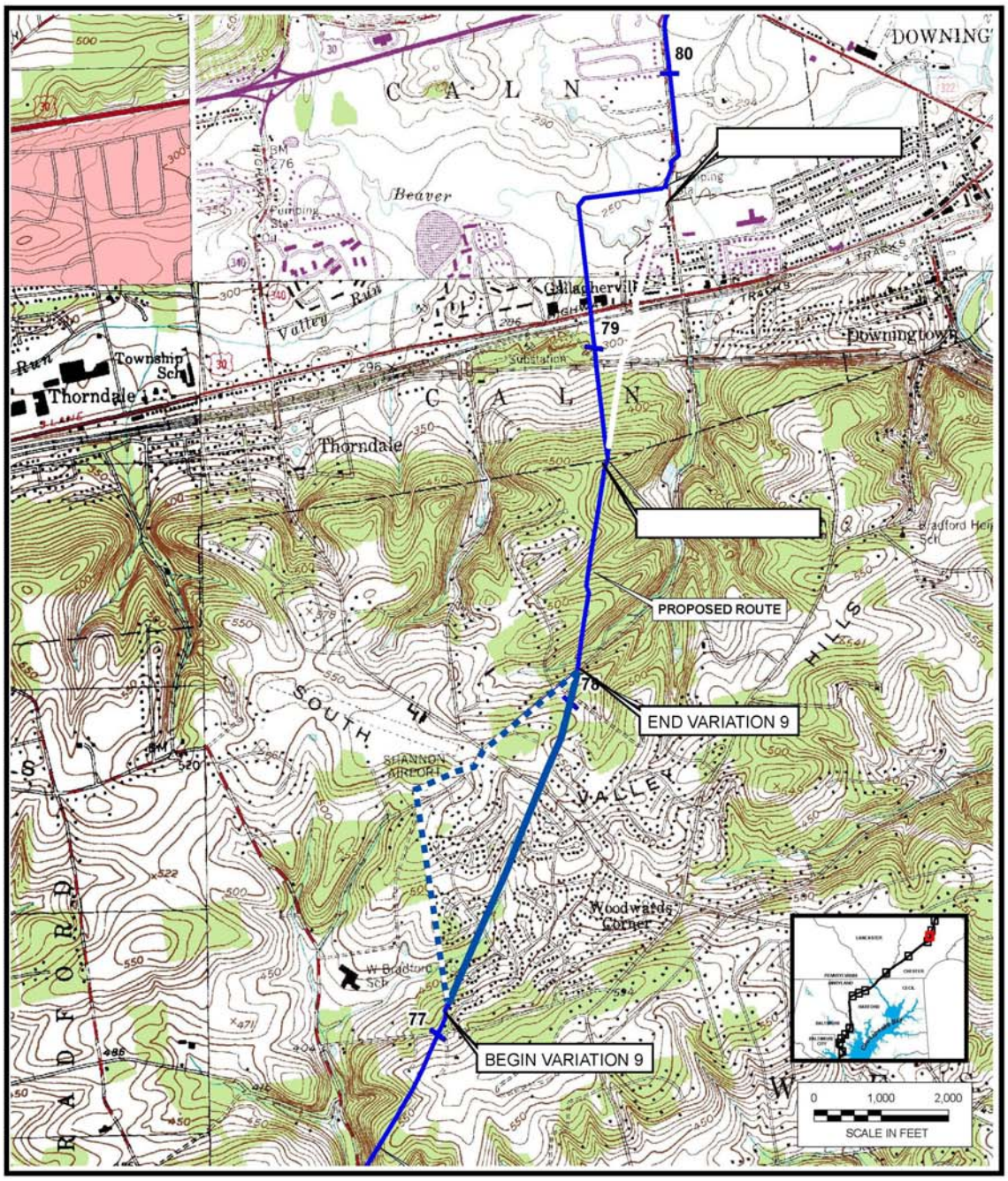
TABLE 3.3.3-8

Comparison of AES's Proposed Route With Variation 8

Characteristics or Resource	Units	Proposed Route	Variation 8
Total Length	miles	0.56	0.72
Length Adjacent to Existing Rights-of-Way	miles	0.56	0.0
Length in Forested Wetlands	feet	181.0	1750.0
Length in Herbaceous Wetlands	feet	151.0	0.0
Number of Waterbody Crossings	each	3	0
Number of Major Waterbody Crossings (>100 feet)	each	0	0
Length in Forested Areas	miles	0.22	0.58
Length in Agricultural Areas	miles	0.06	0.14
Length in Residential Areas	miles	0.17	0.0
Residences within 50 feet of Construction Work Space	each	0	0

Route Variation 9

Residents of Victoria Crossing at Bradford Glen requested that a variation be found that would avoid following the existing Columbia pipeline through the subdivision. We looked at Route Variation 9 to avoid crossing the subdivision. Variation 9 would deviate to the west of the existing pipeline at MP 77.0, where it crosses Beacon Hill Road, pass through a mostly forested area west of the residences, turning to follow Poorhouse Road until it intersects with the existing pipeline near MP 78.1 (see figure 3.3.3-8). This variation would pass across the eastern edge of Beacon Hill Park in a forested area. The variation, although outside the limits of the subdivision, would affect the forested area behind about 10 residences and would impact the viewshed of these perimeter residents. The proposed route would be within 50 feet of about twice as many residences as the variation (see table 3.3.3-9). The other environmental factors appear to be about the same. Although it appears that this variation would reduce impacts to residences, we have only conducted a desk top review of the variation. Before we can recommend Variation 9 we need further information, therefore **we recommend that**:



Legend

- VARIATION
- PROPOSED ROUTE
- MP MARKER

Figure 3.3.3- 8
Mid- Atlantic Express Pipeline Project
Route Variation 9

- **<u>Prior to the end of the DEIS comment period</u>, Mid-Atlantic Express provide further environmental and engineering information on Variation 9, including alignment sheets, updated land use and resource tables; and the names and addresses of the newly affected landowners.**

TABLE 3.3.3-9

Comparison of AES's Proposed Route With Variation 9

Characteristics or Resource	Units	Proposed Route	Variation 9
Total Length	miles	1.03	1.10
Length Adjacent to Existing Rights-of-Way	miles	1.03	0.56
Length in Forested Wetlands	feet	0.0	0.0
Length in Herbaceous Wetlands	feet	0.0	0.0
Number of Waterbody Crossings	each	3	1
Number of Major Waterbody Crossings (>100 feet)	each	0	0
Length in Forested Areas	miles	1.0	0.9
Length in Agricultural Areas	miles	0	0
Length in Residential Areas	miles	1.03	0.00
Residences within 50 feet of Construction Work Space	each	24	11

Route Variation 10

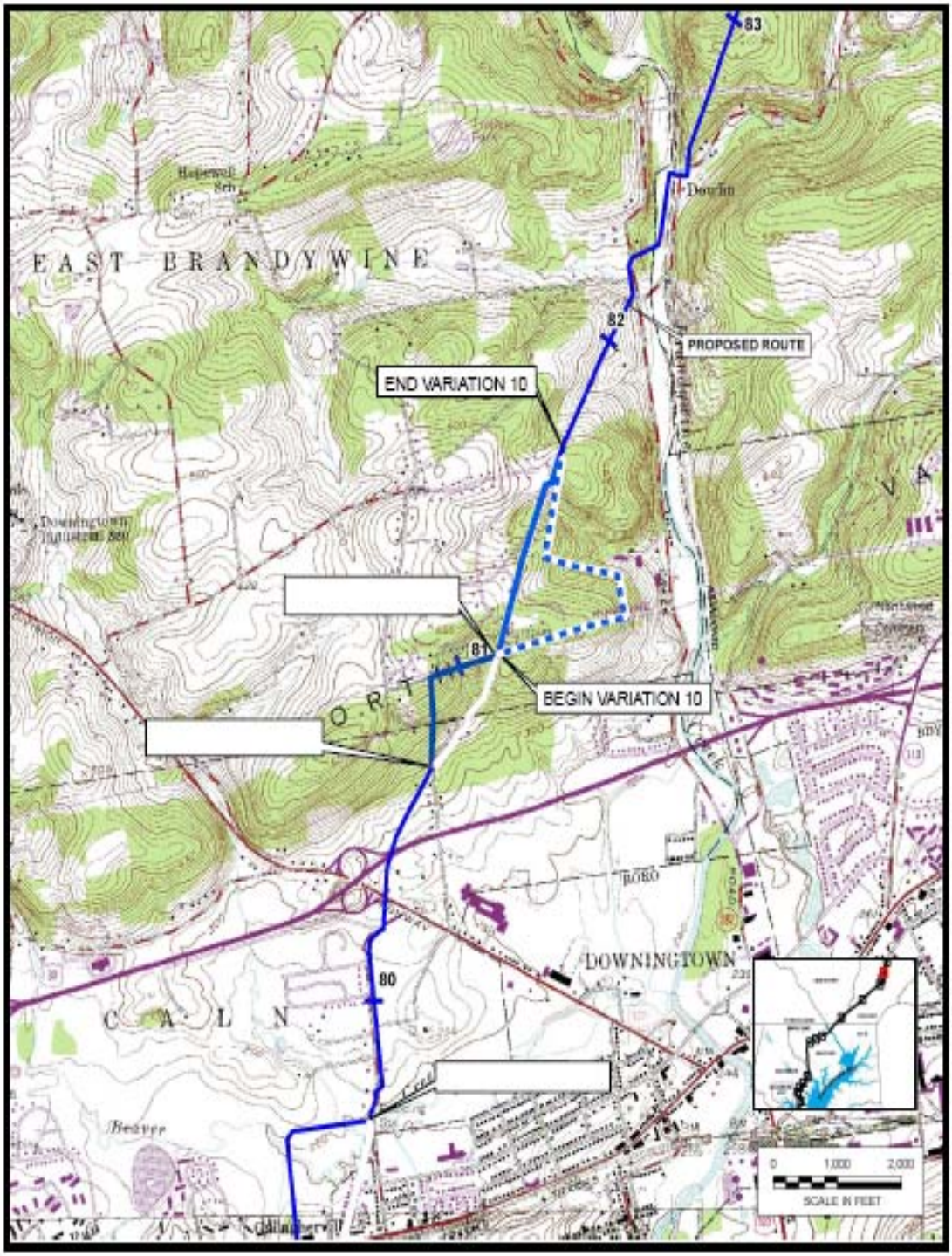
We looked at a variation, shown on figure 3.3.3-9, between MP 81.1 and 81.7 to avoid following the Columbia pipeline through a subdivision (Variation 10). Variation 10 continues east along an existing right-of-way for approximately 2,000 feet from where the propose route turns north, near MP 81.1, to enter the subdivision. The route then turns north for 600 feet through a forested area away from the existing residences. From there, the route variation turns to the west-northwest for another 1,100 feet through forested area and then turns to the north making another direction change to the north for 1600 feet, rejoining the proposed route in the existing right-of-way in an open field near Governors Circle.

Our main concern with the proposed route in this area is the number of residences that would be affected during construction. While only about 11 would be within 50 feet of the proposed route, others would be affected by the clearing of trees for construction. In addition, it appears that some structure, includes homes, have been constructed abutting the existing right-of-way, which would leave little space for the construction of a new pipeline.

Variation 10 would affect fewer residences, about 6 are within 50 feet of the variation and 3 others would be affected by tree cutting. However, the variation would affect more, non-fragmented forest, while the proposed route would only widen existing cleared areas.

We believe that, because of the impacts to residences and the lack of space for widening the existing right-of-way, Variation 10 is more feasible. We also believe that our outstanding concern about forest fragmentation could be mitigated, however we believe more information is necessary before we can recommend this variation, therefore **we recommend that**:

- **<u>Prior to the end of the DEIS comment period</u>, Mid-Atlantic Express file with the Secretary further environmental and engineering information on Variation 10, including alignment sheets, updated land use and resource tables; and the names and addresses of the newly affected landowners. In addition, Mid-Atlantic Express should also file a site-specific plan for the construction of Variation 10 which would include measures for reducing tree cutting and the replanting of temporary work areas.**



Legend

- VARIATION
- PROPOSED ROUTE
- MP MARKER

Figure 3.3.3-9
Mid- Atlantic Express Pipeline Project
Route Variation 10

TABLE 3.3.3-10 **Comparison of AES's Proposed Route With Variation 10**			
Characteristics or Resource	**Units**	**Proposed Route**	**Variation 10**
Total Length	miles	0.60	1.06
Length Adjacent to Existing Rights-of-Way	miles	0.60	0.41
Length in Forested Wetlands	feet	0.0	0.0
Length in Herbaceous Wetlands	feet	185.0	0.0
Number of Waterbody Crossings	each	0	1
Number of Major Waterbody Crossings (>100 feet)	each	0	0
Length in Forested Areas	miles	0.60	0.94
Length in Agricultural Areas	miles	0.0	0.0
Length in Residential Areas	miles	0.00	0.12
Residences within 50 feet of Construction Work Space	each	11	6

Route Variation 11

In response to comments filed by Byers Commercial LP (Byers) we have looked at a variation (Variation 11) that would avoid an area of planned development by following Graphite Mine Road. Variation 11 would diverge from the proposed route at approximately MP 85.6 and proceed along Park Road to its intersection with State Highway 100/Pottstown Pike and then along Station Boulevard to Graphite Mine Road. Variation 11 would then avoid the planned development, remaining on the east side of Station Boulevard and the northeast side of Graphite Mine Road until it rejoins the proposed route along State Highway 100/Pottstown Pike at approximately MP 86.1 as shown on figure 3.3.3-10.

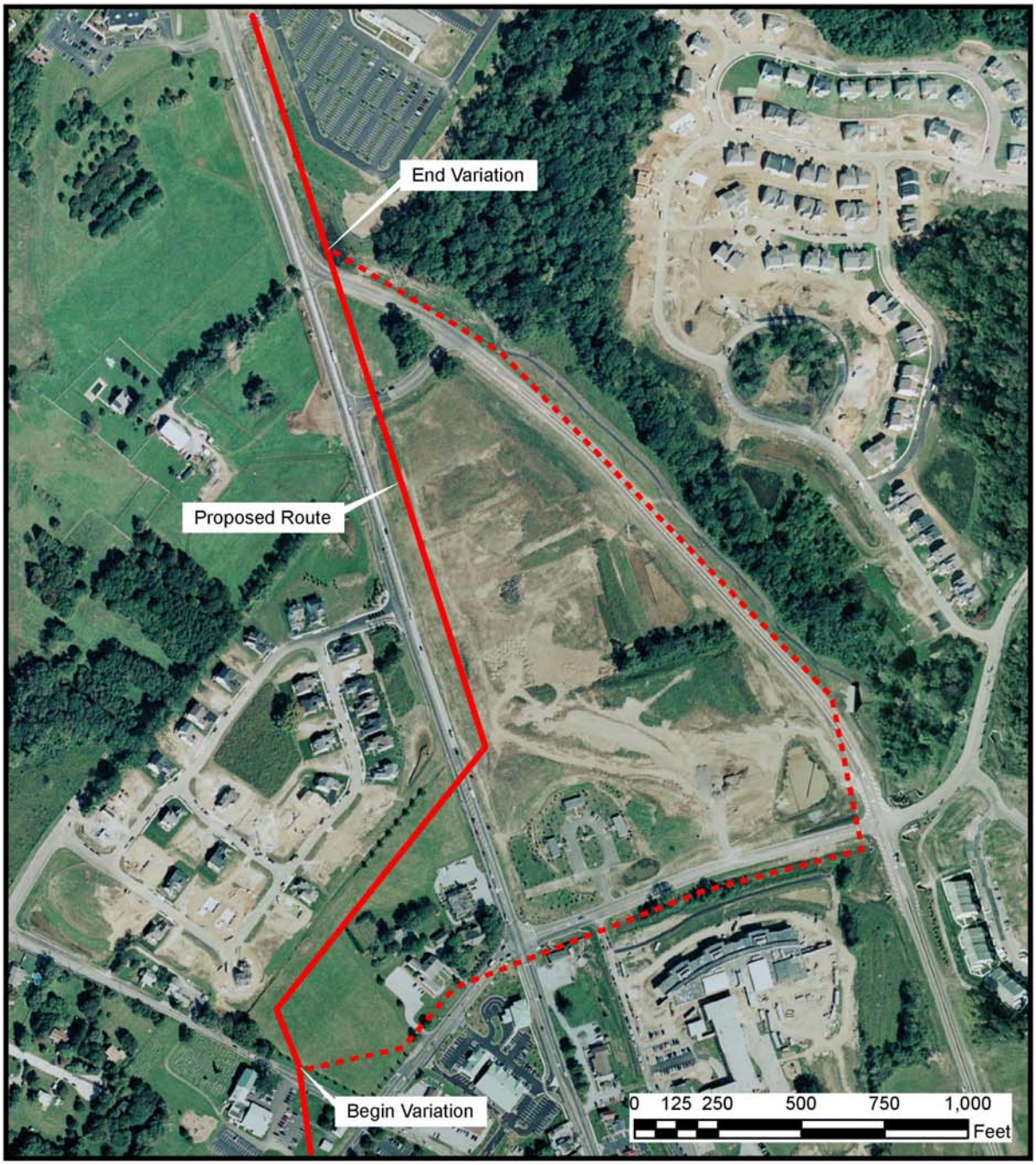
Construction of the portion of the variation on Graphite Mine Road would impact the electric poles, trail and a wooded buffer that abuts a new residential development on Dartmouth Road. The proposed route, conversely, would cross an open area. While Variation 11 would limit impacts to the proposed Byers development, the impacts would be shifted to adjacent residents on Dartmouth Road, trail users, and vehicular traffic along Graphite Mine Road. For these reasons, we believe that Variation 11 would not be environmentally preferable to the proposed route. However, we believe that impacts to the Byers development could be minimized through discussions with Mid-Atlantic Express concerning the alignment on the property. Therefore, **we recommend that:**

- **<u>Prior to the end of the DEIS comment period</u>, Mid-Atlantic Express consult with Byers to discuss site-specific measures or minor realignments that could be implemented to minimize disruption to the planned development at MP 85.9. Mid-Atlantic Express should file any revised plans with the Secretary.**

Route Variations 12a and 12b

The FERC has received several suggested route variations from the Upper Uwchlan Township and the Hunters Ridge area to avoid or minimize residential impacts. We understand that Mid-Atlantic Express met with the Upper Uwchlan Township in March 2008 to discuss route variations in the Hunters Ridge area, but no information from this meeting has been filed with the Commission.

We have looked at a route variation suggested by the Upper Uwchlan Township, Variation 12a (see figure 3.3.3-11). This variation leaves the proposed route near MP 84.2, it would head east in an open field along the property line. At the end of the field the variation would turn northeast through a forest at the eastern end of the trees and would then turn northwest following a tree line for about 0.25 mile. Variation 12a would then turn west for about 0.2 mile, then head northwest for another 0.2 mile before stair stepping its way back to the proposed route near MP 84.6.

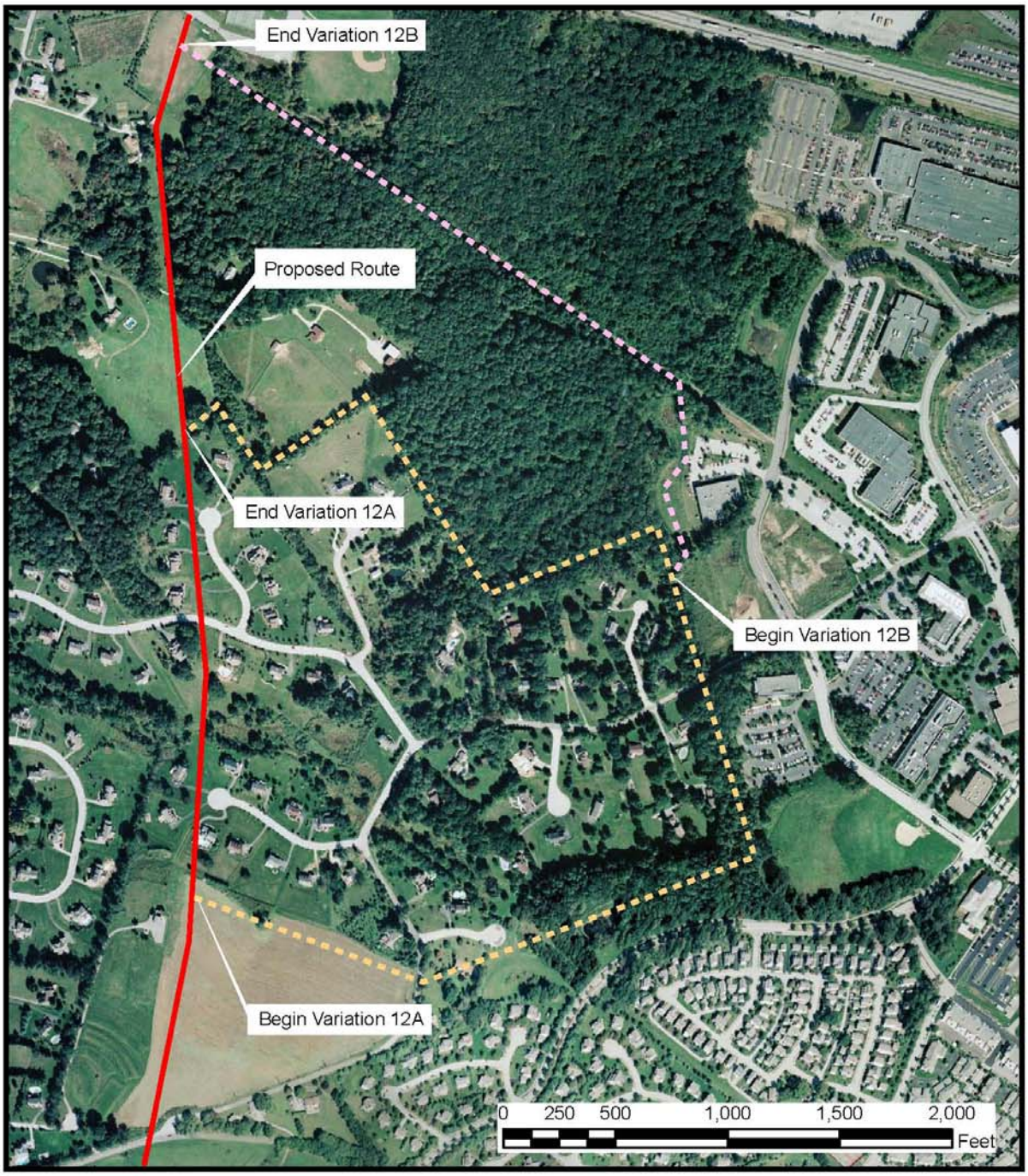


LEGEND

Proposed Route

Variation

Figure 3.3.3-10
Mid - Altantic Express Pipeline Project
Route Variation 11



LEGEND
- Proposed Route
- Variation 12A
- Variation 12B

Figure 3.3.3-11
Mid - Atlantic Express Pipeline Project
Route Variation 12

Variation 12a is approximately a mile longer than the proposed route and would impact more forested land. The main benefit to this variation is that is reduces impacts to residences. The subdivision has been built up around the existing Columbia pipeline leaving little space for the expansion of the right-of-way. It would appear that every residence along the proposed route would be within 50 feet of construction activity.

However, a developer of the property adjacent to Hunters Ridge filed a letter in March 2008 in response to the Hunters Ridge proposed variation and stated that this reroute would affect their ability to develop several commercial lots on their property and would affect more wetlands and forests.

We believe placing the pipeline at the property line would preserve the property owner's ability to develop the property. Although we agree with the developer that more forest would be cut for this variation, there is mitigation available to reduce this impact. Since the area has not been surveyed we can not tell whether more wetlands would be impacted.

Mid-Atlantic Express has also indicated that the number of bends may be an engineering concern and would be more expensive and more time consuming. In response to this concern we have looked at extending Variation 12a and reducing the number of bends.

The expanded Variation 12a (Variation 12b) would be the same as the original variation for the first 0.8 mile. At that point instead of heading west, the variation would continue northwest until it reaches an existing right-of-way. At this point, it would follow the right-of-way to Hickory Park where it would join up with the proposed route. Variation 12b would reduce the length of a variation in this area by 0.2 mile (the first part of Variation 12a + Variation 12b). However, it appears from aerials found on the internet, which are more recent than Mid-Atlantic Express's alignment sheets, that clearing has occurred near the start of Variation 12b. Since we do not know the status of the property adjacent to Variation 12b we do not recommend it.

However, we believe that there is a need for a variation in this area, because of the number of residences and the limited amount of space for construction in this area. Because we do not have all the information necessary to recommend this variation at this time, **we recommend that:**

- **<u>Prior to the end of the DEIS comment period</u>, Mid-Atlantic Express file with the Secretary further environmental and engineering information on Variation 12a, including alignment sheets, updated land use and resource tables; and the names and addresses of the newly affected landowners. In addition, Mid-Atlantic Express should also file a site-specific plan for the construction of Variation 12a which would include measures for reducing tree cutting and the replanting of temporary work areas.**

TABLE 3.3.3-20

Comparison of AES's Proposed Route With Variation 12a

Characteristics or Resource	Units	Proposed Route	Variation 12a
Total Length	miles	0.37	1.32
Length Adjacent to Existing Rights-of-Way	miles	0.37	0.0
Length in Forested Wetlands	feet	100	unknown
Length in Herbaceous Wetlands	feet	0	unknown
Number of Waterbody Crossings	each	1	unknown
Number of Major Waterbody Crossings (>100 feet)	each	0	0
Length in Forested Areas	miles	0	1.02
Length in Agricultural Areas	miles	0	0.3
Length in Residential Areas	miles	0.37	0.12
Residences within 50 feet of Construction Work Space	each	11	2