

Resource Report 6- Geological Resources  
Table 6.3-1  
Summary of Geologic Conditions  
AES Sparrows Point Project

Facilities & Location	Physiographic Province <i>Sections or Regions</i>	Mile Post (MP)	Geologic Description			Potential Geologic Hazards	
			Age	Geologic Group	Map Unit Description	(MP)	Hazard
Sparrows Point LNG Terminal Baltimore, MD MP 0.0	<b>Coastal Plain Province</b> <i>Western Shore Lowlands Region</i>	0.0-3.0	Quaternary	Lowland Deposits	<b>af-</b> artificial fill composed of homogeneous material such as rock, unconsolidated sediment and slag. <b>Qtc-</b> poorly-sorted, poorly-bedded quartz silt with clays.	3.0-4.1	Soil Liquefaction
		3.0-4.1		Talbot Formation	<b>Qts-</b> poorly sorted quartz, silts, kaolinite.		
		4.1-17.6	Lower Cretaceous*	Section generally composed of clays, sands and gravels from the Patapsco Formation (Kpc, Kps), Arundel Formation (Kac), and Patuxent Formation (kxs, kxc) with some areas of Artificial Fill (af) and *Alluvium (Qal) present at or near water bodies (often confined to oxidizing conditions).	<b>Kpc-</b> clay facies, buff mottled kaolinitic clay with variable amounts of quartz, sand and silt. <b>Kps-</b> sand facies, well-sorted medium to fine quartz sand with locally abundant gravel. <b>Kac-</b> clay facies, gray, brown, black or red kaolinitic and illitic clay with lenses of quartz sand. <b>kxc-</b> clay facies, light grey to brown clay containing variable amounts of silt with local concentrations of lignitic debris. <b>kxs-</b> sand facies, highly variable, interbedded sand, gravel, silt and clay with hematite or limonite cementations in places. <b>af-</b> artificial fill composed of homogeneous material such as rock, unconsolidated sediment and slag. <b>Qal-</b> interbedded gravel, sand, silt and clay confined to oxidizing conditions. Qal located at MP 6.8-6.9, 8.7-8.9, 10.5-10.6, 11.4-11.7, 11.8-11.9, 14.7-14.75, 15.1-15.2, 15.7-15.8, 15.9-16.0		
17.6-20.4	Lower Paleozoic*	Bradshaw Layered Amphibolite (bl) with *Tertiary age deposits of Upland Gravel (ug) at higher topographies and *Alluvium (Qal) deposits present at lower topographies, near water bodies (often confined to oxidizing conditions).	<b>bl-</b> centimeter to meter scale interlayered amphibolite and horn blend quartz. <b>ug-</b> poorly sorted fine sand to boulders commonly floating in a clay-silt mix. Deposits are common on topographies of hill tops and hillsides. <b>Qal-</b> interbedded gravel, sand, silt and clay confined to oxidizing conditions. Qal located at MP 18.4-18.5, 19.3-19.4.	20.5-26.8	Shallow Bedrock (f/bl)		
			20.4-21.0			Franklinville Gneiss (f) with area of overlying *Alluvium (Qal) at surface water bodies. <b>f-</b> uniform medium to coarse -grained biotite, quartz, gneiss. <b>Qal-</b> interbedded gravel, sand, silt and clay confined to oxidizing conditions. Qal located at MP 20.6-20.7	
Mid-Atlantic Express Pipeline  Baltimore, MD MP 0.0-22.2	Dominant topography form includes very low relief with flat upper surfaces, shallow valleys and surficial deposits of unconsolidated or poorly consolidated gravels, sands, silts and clays.						
	<b>Piedmont Province Uplands Section</b>						
	Dominant topographies include broad, rounded to flat-topped hills and shallow valleys. Paleozoic to Cambrian aged bedrock, deeply folded and faulted consisting of mainly schist, gneiss, and quartzite.						

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			Age	Geologic Group					
<b>Mid-Atlantic Express Pipeline</b>  <i>Baltimore, MD</i> <i>MP 0.0-22.2</i>  <i>Harford, MD</i> <i>MP 22.2-44.1</i>  <i>Cecil, MD</i> <i>MP 44.1-48.2</i>  <i>Lancaster, PA</i> <i>MP 48.2-56.2</i>  <i>Chester, PA</i> <i>MP 56.2-87.9</i>	<b>Piedmont Province Uplands Section</b>  Dominant topographies include broad, rounded to flat-topped hills and shallow valleys. Paleozoic to Pre-Cambrian aged bedrock, deeply folded and faulted consisting of mainly schist, gneiss, and quartzite.	21.0-26.5	Lower Paleozoic*	Section includes Bradshaw Layered Amphibolite (bl) and Baltimore gabbro (Pzb) at higher elevations with areas of overlying *Alluvium (Qal) in lower elevations at or near surface water bodies (often confined to oxidizing conditions).	<b>bl-</b> Bradshaw Layered Amphibolite, centimeter to meter scale interlayered amphibolite and horn blend quartz. <b>Pzb-</b> massive hypersthene gabbro <b>Qal-</b> interbedded gravel, sand, silt and clay confined to oxidizing conditions. Qal located at MP 21.3-21.4, 22.3-22.4, 23.5-23.6 Note: Baltimore Gabbro (Pzb) mapped unit in Harford County, appears equivalent to Bradshaw Layered Amphibolite in Baltimore County.	22.9	Landslide Susceptibility		
				26.5-34.9	Lower Paleozoic*			Schist and boulder gneiss from the <i>Former Wissahickon Formation</i> (pCwb, pCwl) - with areas of overlying *Alluvium (Qal) at or near surface water bodies (often confined to oxidizing conditions).	<b>pCwb-</b> ( <i>formerly Wissahickon Formation</i> ) - <b>sy-</b> Sykesville Formation. Boulder gneiss, thick bedded, contains lenses of metamorphosed conglomerate sandstone. <b>pCwl-</b> ( <i>formerly Wissahickon Formation</i> ) - <b>Loch Raven Schist</b> -Schist, chiefly biotite-muscovite-plagioclase schist with garnet, staurolite and kyanite. <b>Qal-</b> interbedded gravel, sand, silt and clay confined to oxidizing conditons. Qal located at MP 27.9-28.0, 28.5-29.1, 29.3-30.0, 31.8-31.9, 32.7-32.8
		34.9-46.1	Lower Paleozoic			Intrusive rocks including ultramafic (Pzum, Pzug) and gabbro from the Baltimore Complex (bg).	<b>Pzug, Pzum-</b> undifferentiated ultramafic rocks. <b>bg-</b> gabbro, pyroxene crystals, generally massive with wide varieties of mafic and ultramafic rocks. <b>Qal-</b> interbedded gravel, sand, silt and clay confined to oxidizing conditons. Qal located at MP 35.5-35.6	34.3-35.6 36.0-43.8  43.9	Shallow Bedrock (pCwb/pzug) Shallow Bedrock (pzum/pzb)  Landslide Susceptibility
						46.1-79.4	Lower Paleozoic	Peters Creek Schist (xpc), Cockeysville Marble (Xc), Glennarm Wissahickon Schist and (Xgw) and Octoraro Schist (Xo) Formation, Baltimore Complex (bs) and ultramafic rocks (Xu).	<b>Xgw-</b> oligoclase mica schist including lenticular amphibolite bodies <b>Xc-</b> white to bluish gray, finely to coarsely crystalline marble <b>Xpc-</b> Cholorite-sericite schist containing interbedded quartzite <b>Xo-</b> Includes albite-chlorite schist, phyllite, some hornblend gneiss and granitized members <b>Xu-</b> Undifferentiated ultramafic rocks <b>bs-</b> serpentinite

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<b>Mid-Atlantic Express Pipeline</b>  <i>Chester, PA</i> <i>MP 56.2-87.9</i>	<b>Piedmont Province</b> <i>Lowlands Section</i>  Dominant topography includes broad, moderately dissected karst valleys separated by broad low hills. Paleozoic to Cambrian aged bedrock, deeply folded and faulted consisting of mainly schist, gneiss, and quartzite.	79.4- 81.5	Ordovician and Cambrian	Carbonate rock from several formations Conestoga (Occ), Ledger (Cl), Kinzers (Ck), Vintage Formation (Cv), Antietam and Harpers Formations (Cah) and Chickies Formation (Cch).	<u>Occ</u> - Light-gray, thin-bedded, impure contorted limestone having shale partings. <u>Cl</u> - Light-gray, locally mottled, massive, pure, dolomite. <u>Ck</u> - base, dark brown shale; middle, gray and white spotted limestone; top, sandy limestone weathered to fine grained porous sandy mass. <u>Cv</u> - dark gray, knotty, dolomite to marble at base. <u>Cah</u> - includes Antietam and Harpers Formations (quartzite and schist). <u>Cch</u> - light gray, hard, massive quartzite and schist interbedded dark slate at top, conglomerate at base.	79.2	Inactive Fault
	<b>Piedmont Province</b> <i>Uplands Section</i>  Dominant topographies include broad, rounded to flat-topped hills and shallow valleys. Paleozoic to Pre-Cambrian aged bedrock, deeply folded and faulted, consisting of mainly schist, gneiss, and quartzite.			81.5-87.9	Pre-Cambrian	Gneiss including banded mafic (gga), graphitic felsic (gg), and intermediate (ggd) units.	<u>ggd</u> - medium-grained light pink to greenish gray - predominantly quartz, feldspar and mica. <u>gga</u> - dark, fine to medium-grained banded mafic gneiss (likely includes rocks of sedimentary origin). <u>gg</u> - includes Pickering Gneiss and small areas of marble, quartz and feldspar; small amounts of metamorphic minerals.
						82.5	Inactive Fault
						82.7-83.4	Shallow Bedrock (ggd)

Notes:

- \*Approximate or estimated ages provided; surficial Tertiary or Quaternary deposits also exist within these sections.
- Shallow bedrock areas identified using SSUGRO soils data (Table 7.3-1) - but adjusted based on geologic reference materials and field observations (MP18.0-18.4 and MP19.4-19.5 excluded and MP 74.2-74.3 included as potential shallow bedrock).
- Mapped or reported bedrock units identified along with shallow bedrock areas (in parentheses) in Potential Geologic Hazard column.

**Resource Report 6- Geological Resources**

**Table 6.5-1**

**Summary of Mineral Resources**

**AES Sparrows Point Project**

<b>Approximate Milepost (MP)</b>	<b>Description</b>	<b>Approximate Distance from Construction ROW (ft)</b>	<b>Reported Operator/Owner</b>
MP 9.3	Apparent Pit	200 LT	Not Available
MP 12.9	Clay Pit	600 LT	Potts and Callahan, Inc
MP 13.8	Sand and Gravel	1400 LT	Genstar Stone Products
MP 38.9	Apparent Former Quarry	1200 LT	Not Available
MP 48.9	Coarse aggregate - Serpentinite Quarry	100 RT	Pennsylvania-Maryland Materials
MP 48.9	Coarse aggregate - Serpentinite Quarry	100 RT	Stoltzfus, D.M., and Son, Inc
MP 79.4	Apparent Former Quarry	300 LT	Not Available
MP 79.9	Apparent Former Quarry	1200 LT	Not Available

Notes:

1. Mileposts shown as MP-mileposts along new Mid Atlantic Express project route
2. RT indicates right of pipeline alignment proceeding northward from MP-0.0
3. LT indicates left of pipeline alignment proceeding northward from MP-0.0.
4. Information derived from USGS topographic maps, aerial photographs, and field reconnaissance.
5. Distances from construction right-of-way (ROW) are approximated.
6. Apparent pits and quarries appear to be relatively small features and may be currently or permanently inactive.