Resource Report 1 – General Project Description
AES Sparrows Point LNG Terminal
& Mid-Atlantic Express Pipeline

SUMMARY OF REQUIRED FERC REPORT INFORMATION		
TOPIC	**FERC Reference**	**Report Reference or Not Applicable**
1. Provide a detailed description and location map of the project facilities. • Include all pipeline and aboveground facilities. • Include support areas for construction or operation. • Identify facilities to be abandoned.	§ 380.12(c)(1)	Sections 1.3, 1.5, 1.6 and 1.7, Figure 1.3-1 and Appendix 1A
2. Describe any non-jurisdictional facilities that would be built in association with the project. • Include auxiliary facilities. • Describe the relationship to the jurisdictional facilities. • Include ownership, land requirements, gas consumption, megawatt size, construction status, and an update of the latest status of Federal, state, and local permits/approvals. • Include the length and diameter of any interconnecting pipeline. • Apply the four-factor test to each facility.	§ 380.12(c)(2) § 2.55(a) §380.12(c)(2)(ii)	Section 1.10
3. Provide current original U.S. Geological Survey (USGS) 7.5-minute-series topographic maps with mileposts showing the project facilities. • Maps of equivalent detail are acceptable if legible (check with staff) • Show locations of all linear project elements, and label them. • Show locations of all significant aboveground facilities, and label them.	§ 380.12(c)(3)	Figures and Appendix 1A
4. Provide aerial images or photographs or alignment sheets based on these sources with mileposts showing the project facilities.	§ 380.12(c)(3)	Figure 1.3-3 and Appendix 1A
5. Provide plot/site plans of compressor stations showing the location of the nearest noise sensitive areas (NSA) within 1 mile. • Scale no smaller than 1:3,600 • Show reference to topographic maps and aerial alignments provided above.	§ 380.12(c)(3,4)	Not Applicable
6. Describe construction and restoration methods. • Include this information by milepost	§ 380.12(c)(6)	Section 1.5
7. Identify the permits required for construction across surface waters. • Include the status of all permits. • For construction in the Federal offshore area be sure to include consultation with the MMS File with the MMS for rights-of-way grants at the same time or before you file with the FERC.	§ 380.12(c)(9)	Section 1.8.1 and Table 1.8-1
8. Provide the names and address of all affected landowners and certify that all affected landowners will be notified as required in § 157.6(d). • Affected landowners • Provide an electronic copy directly to the environmental staff.	§ 380.12(c)(10) § 157.6(d)	Appendix 1B

Additional Information

Describe all authorizations required to complete the proposed action and the status of applications	Section 1.8.1
Provide Plot/site plans of all other aboveground facilities that are not completely within the right-of-way.	See Figure 1.3-2
Provide detailed typical construction right-of-way cross-section diagrams showing information such as widths and relative locations of existing rights-of-way, new permanent right-of-way, and temporary construction right-of-way.	Figure 1.3-4 and Appendix 2B
Summarize the total acreage of land affected by construction and operation of the project.	Section 1.4 and Table 1.4-1
If Resource Report 5, Socioeconomics is not provided, provide the start and end dates of construction, the number of pipeline spreads that would be used, and the workforce per spread.	Section 1.5 and Resource Report 5
Send two (2) additional copies of topographic maps and aerial images/ photographs directly to the environmental staff of the Office of Energy Projects (OEP).	Figure 1.3-1, 1.3-3 and Appendix 1A

TABLE OF CONTENTS

APPENDIX 1E Resource Report 1 FERC Data Request Response Matrix

LIST OF TABLES

LIST OF FIGURES

Term	Description
"	inches
°F	degree Fahrenheit
bbl	barrels
bbl/h	barrels per hour
AMSC	Area Maritime Security Committee
ANSI	American National Standards Institute
AOR	Area of Responsibility
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ATWS	Additional Temporary Workspace
BIA	Bureau of Indian Affairs
BIBI	Benthetic index of biotic integrity
BMP	Best Management Practice
BMS	Burner Management System
BOG	boiloff gas
Bscfd / bscfd	billion standard cubic feet per day
Btu	British thermal unit
Btu/(ft^2hr)	British thermal unit per feet squared per hour
C5 plus	pentane plus
CCTV	closed circuit television
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
COMAR	Code of Maryland Regulations
COTP	Coast Guard Captains of the Port
CROW	Construction right-of-way
CWA	Clean Water Act
cy	cubic yard
CZMA	Coastal Zone Management Act of 1972
DB&B	double block and bleed
DCS	distributed control system

Term	Description
DMRF	Dredge Material Recycling Facility
Dth/day	Dekatherms per day
EA	Environmental Assessment
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EPC	Engineering, Procurement and Construction
ER	Environmental Report
ERC	emergency release coupling
ESA	Endangered Species Act of 1973
ESD	emergency shutdown
ESD-1	Pier Emergency Shutdown
ESD-1-1	Activation of the unloading arm/vapor return arm ERCs on Berth 1 and Berth 2
ESD-2	Total Terminal Emergency Shutdown
FAA	Federal Aviation Administration
FBE	Fusion-Bonded Epoxy
FEED	Front End Engineering Design
FERC	Federal Energy Regulatory Commission
FERC's Plan	FERC's Upland Erosion Control, Revegetation, and Maintenance Plan
FERC's Procedures	FERC's Wetland and Waterbody Construction and Mitigation Procedures
FM	Factory Mutual
fps	feet per second
ft	feet
gpm	gallons per minute
h	hour(s)
H&MB	heat and material balance
HAZID	Hazard Identification
HAZOP	Hazard And Operability
HDD	Horizontal Direction Drilling
HDMS	Hazard Detection and Mitigation System
HHV	higher heating value
HID	High Intensity Discharge

Term	Description
HIPPS	High Integrity Pipeline Protection System
Hp / hp	horsepower
HP	high pressure
HTF	heat transfer fluid
IESNA	Illuminating Engineering Society of North America
in	inch
inches H_2O	inches of water
inches Hg	inches of mercury
inches Hg/h	inches of mercury per hour
IP	intermediate pressure
ISO	International Organization for Standardization
Kts	knots
kV	kilovolt
kVA	kilovolt Ampere (one thousand Volt Amperes)
LDC	Local Distribution Company
LFL	lower flammability limit
LHV	lower heating value
LNG	Liquefied Natural Gas
LNG Terminal	Sparrows Point LNG Import Terminal
LOI	Letter of Intent
LP	low pressure
LTD	Level, Temperature, Density
M&R	Metering and Regulator
m^3	cubic meters
m^3/hour	cubic meters per hour
MAOP	Maximum Allowable Operating Pressure
mbar	millibar
mbar/hour	millibar per hour
MCC	Motor Control Center
mcf	million cubic feet
MCMERG	Mid-Chesapeake Marine Emergency Response Group
MCR	Main Control Room

Term	Description
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
Mg/l	Microgram per Liter
MIS	Management Information System
MLLW	mean low low water
MLV	Mainline valve
MMBtu/hr	million British thermal units per hour
MMcf/day	million cubic feet per day
MMscfd	million standard cubic feet per day
MP	Milepost
mph	miles per hour
MW	megawatt
N/A	not applicable
NAS Pax River	Naval Air Station Patuxent River
NAVD	North American Vertical Datum
NDE / NDT	Nondestructive Examination / Nondestructive Testing
NEC	National Electrical Code
NEPA	National Environmental policy Act of 1969
NFPA	National Fire Protection Association
NGA / NGPA	Natural Gas Act / Natural Gas Policy Act
NHPA	National Historic Preservation Act of 1969
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
No. ins	number of inches
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	Noise Sensitive Area

Term	Description
NWI	National Wetland Inventory
NVIC	Navigation and vessel Inspection Circular
O&M	Operations And Maintenance
OBE	Operating Basis Earthquake
OD	Outside Diameter
OSHA	Occupational Safety and Health Administration
P&ID	piping and instrumentation diagram
PAH	Poly Aromatic Hydrocarbon
PCB	Polychlorinated Biphyenyls
PCMS	Plant Control and Monitoring System
PCR	Platform Control Room
PDEP	Pennsylvania Department of Environmental Protection
PDM	Processed Dredged Material
PIANC	Permanent International Association Navigation Congress
PM	particulate matter
POTW	Publicly-owned Treatment Works
PPB / ppb	parts per billion
PPM / ppm	parts per million
PPT / ppt	Parts per trillion
psf	pounds per square foot
psig	pounds per square inch gauge
PWSA	Preliminary water way suitability assessment
PVC	Poly Vinyl Chloride
QA	Quality Assurance
QC	Quality Control
RGS	Rigid Galvanized Steel (conduit)
ROW	Right-of-Way
RR	Resource Report
RTD	resistance temperature detector
RTU	remote terminal unit
RUSLE	Revised Universal Soil Loss Equation
SAV	Aquatic vegetation

Term	Description
SCADA	Supervisory Control and Data Acquisition
scfh	standard cubic foot (feet) per hour
scfm	standard cubic foot (feet) per minute
SCUBA	Self-contained Underwater Breathing Apparatus
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SIS	Safety Instrumented System
SPCC	Spill Prevention, Control, and Countermeasure
SSE	Safe Shutdown Earthquake
SSURGO	Soil Survey Geographic
STATSCO	State Soil Geographic
SWPPP	Storm Water Pollution Prevention Plan
Tcf	Trillion Cubic Feet
TCP/IP	Transmission Control Protocol/Internet Protocol,
THPO	Tribal Historic Preservation Office
TMDL	Total Maximum Daily Load
TOC	Total organic carbon
Trap	Pig Launcher Receiver Facility
UL	Underwriters Laboratories
UPS	Uninterruptible Power Supply
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDOE	United States Department of Energy
USDOT	United States Department of Transportation
USEPA / EPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
usg	United States gallons
usgpm	United States gallons per minute
V	voltage
VOC	volatile organic compound
WSA	Water way suitability assessment

Term	Description
WWTP	Waste Water Treatment Plant
§	Section

1. GENERAL PROJECT DESCRIPTION

1.1 Introduction

AES Sparrows Point LNG, LLC (Sparrows Point LNG) proposes to construct, own, and operate a new liquefied natural gas (LNG) import, storage, and regasification terminal (LNG Terminal) at the Sparrows Point Industrial Complex situated on the Sparrows Point peninsula east of the Port of Baltimore in Maryland. LNG will be delivered to the LNG Terminal by LNG marine vessels, offloaded from these vessels to shoreside storage tanks, regasified to natural gas on the LNG Terminal site (Terminal Site), and the regasified natural gas transported to consumers by pipeline. The LNG Terminal will have a regasification capacity of 1.5 billion standard cubic feet of natural gas per day (bscfd), with the potential to expand to 2.25 bscfd. Regasified natural gas will be delivered to markets in the Mid-Atlantic Region and northern portions of the South Atlantic Region through an approximately 88-mile, 30-inch outside diameter interstate natural gas pipeline (Pipeline) to be constructed and operated by Mid-Atlantic Express, L.L.C. (Mid-Atlantic Express). The Pipeline will extend from the LNG Terminal to points of interconnection with existing interstate natural gas pipeline systems near Eagle, Pennsylvania. Together the LNG Terminal and Pipeline projects are referred to as the Sparrows Point Project or Project. Both Sparrows Point LNG and Mid-Atlantic Express (hereinafter collectively referred to as AES) are subsidiaries of The AES Corporation.

The Project footprint is located in the counties of Baltimore, Harford, and Cecil in Maryland and the counties of Lancaster and Chester in Pennsylvania. The Terminal Site, which is located entirely within Baltimore County, is a parcel located within a former shipyard. The route proposed for the Pipeline (Pipeline Route), which crosses all of the listed counties, includes industrial, commercial, agricultural, and residential lands. Together, the Terminal Site and the Pipeline Route comprise the Project Area.

The AES Corporation is considering the possibility of building a combined cycle cogeneration power plant (Power Plant) on the Terminal Site. The Power Plant would be configured with one F-Class combustion gas turbine, one steam turbine, and associated auxiliaries. The Power Plant would operate only on natural gas and would produce approximately 300 megawatts (MW) of clean electric power within an area of high energy demand. The Power Plant would be connected to the local utility electric system by an overhead electric power transmission line.

1.2 Purpose and Need

1.2.1 Energy and Natural Gas Trends in the United States

Energy demand in the United States continues to grow at a relatively constant pace. According to the U.S. Energy Information Administration (EIA 2006), total energy consumption in the United States is projected to increase by 27 percent by the year 2025 (1.2 percent annually), from 100 quadrillion British thermal units (Btu)/year in 2004 to 127 quadrillion Btu/year in 2025.

The EIA predicts that the projected growth in energy demand (from present to 2025) will vary by fuel type. Demand for coal and petroleum is expected to increase, with coal projected to increase

steeply in the years beyond 2020. Demand for natural gas is projected to continue with strong growth through to 2020, after which it is expected to level off.

Most importantly, natural gas has increasingly become the fuel of choice in the United States. According to the EIA, there are a number of underlying conditions that characterize the U.S. gas market, including:

- Increased gas demand driven by 200 gigawatts of installed gas-fired generation investment since 1999, with limited amounts of alternative fuel capability;
- Declines in domestic gas production throughout the lower 48 states and in offshore areas that are under the control of the United States;
- Increased gas imports from Canada nearing current maximum capacity;
- Decreased gas supply deliverability in the current transportation infrastructure;
- Declines in the demand destruction that began during the sustained high price environment; and,
- Stabilization of gas demand due to the rebound in the U.S. economy beginning in 2003.

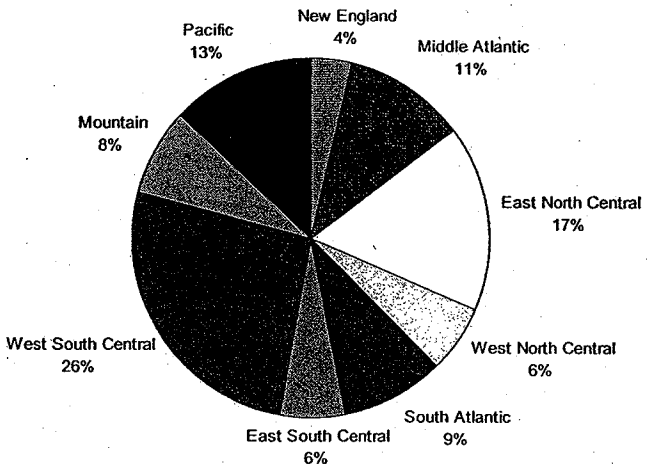
These conditions have led to supply constraints and a steadily increasing gas price floor, well above pre-2000 historical levels of below $3.00/thousand cubic feet (mcf) gas. The North American natural gas industry will face a critical period over the next 10 to 15 years when increased supply availability will be essential. Inevitably, failure to increase supply to domestic markets will lead to sustained and higher prices unless new sources of natural gas supply, including LNG, are developed and delivered to the market via import terminals and associated pipeline facilities.

1.2.2 Natural Gas in the Mid-Atlantic Region

The need for incremental sources of natural gas supply to meet growing demand is particularly acute in the Mid-Atlantic and surrounding regions of the United States due to distances from existing production areas and limited pipeline capacity from those production areas. The Sparrows Point Project will provide incremental gas supply directly into the Mid-Atlantic Region, an area of acute need. The Mid-Atlantic Region consists of New Jersey, Pennsylvania, Maryland, Delaware, the District of Columbia, the southern parts of New York, and the northern parts of Virginia. Baltimore is within the Mid-Atlantic Region and will receive the benefits associated with the incremental source of natural gas either through direct supply or displacement. The northern portions of the South-Atlantic Region that will also benefit from the incremental source of natural gas from the Project include the southern parts of Virginia and the northern parts of North Carolina. The benefits in the northern portions of the South-Atlantic Region will be realized primarily through displacement rather than direct supply.

Natural gas demand for the Mid-Atlantic Region, the area that will be most directly served by the Project, was approximately 2.4 trillion cubic feet (Tcf) in 2005, representing approximately 11 percent of total U.S. natural gas consumption as shown on Figure 1.2-1.

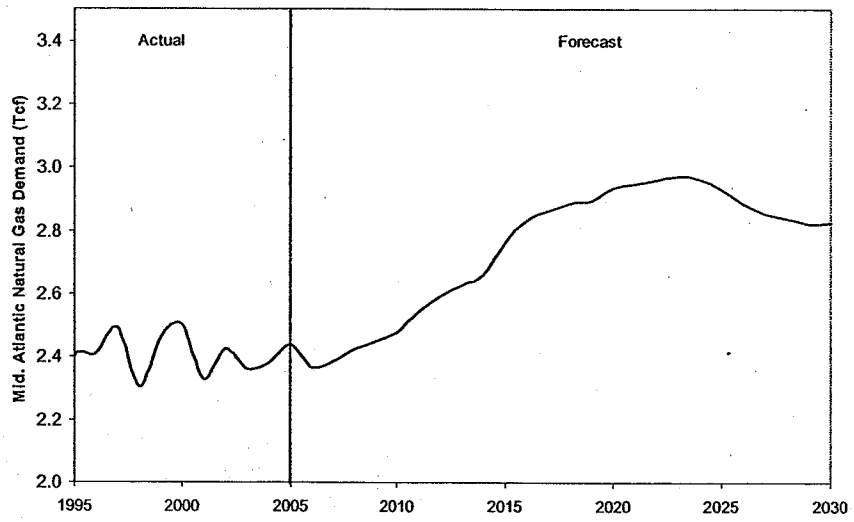
Figure 1.2-1: 2005 U.S. Natural Gas Consumption by Census Region[1]



Natural gas demand for the Mid-Atlantic Region has remained between 2.3 Tcf and 2.5 Tcf over the last 10 years (i.e., 1995 to 2005), as shown in Figure 1.2-2 below. The EIA (EIA 2006) is projecting an approximate 1.3 percent compounded annual growth rate in natural gas demand for the Mid-Atlantic Region from 2005 to 2020, which will result in an increase from 2.4 Tcf in 2005 to 2.9 Tcf in 2020. For the period between 2020 and 2030, EIA has forecasted a modest decline in natural gas demand to 2.8 Tcf in 2030.

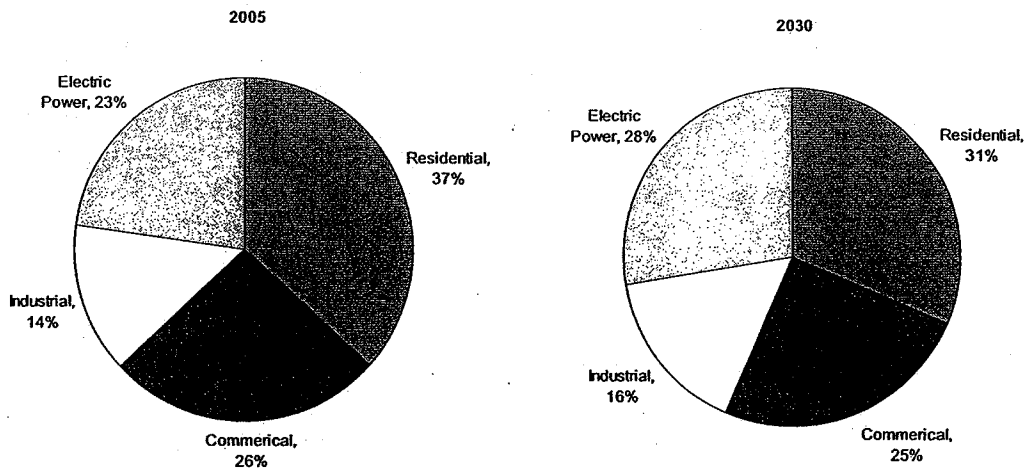
[1] U.S. Energy Information Administration, The Annual Energy Outlook 2006, February 2006, Supplemental Tables 1-20.

Figure 1.2-2: Mid-Atlantic Region Natural Gas Consumption, 1995 – 2030 (Tcf)[2]



Natural gas demand from the electric power generation and commercial segments has shown the most growth for the period 1995 to 2005. As shown in Figure 1.2-3 below, EIA projects that natural gas demand from electric power generation will continue to show the most significant growth for the period 2005 to 2030.

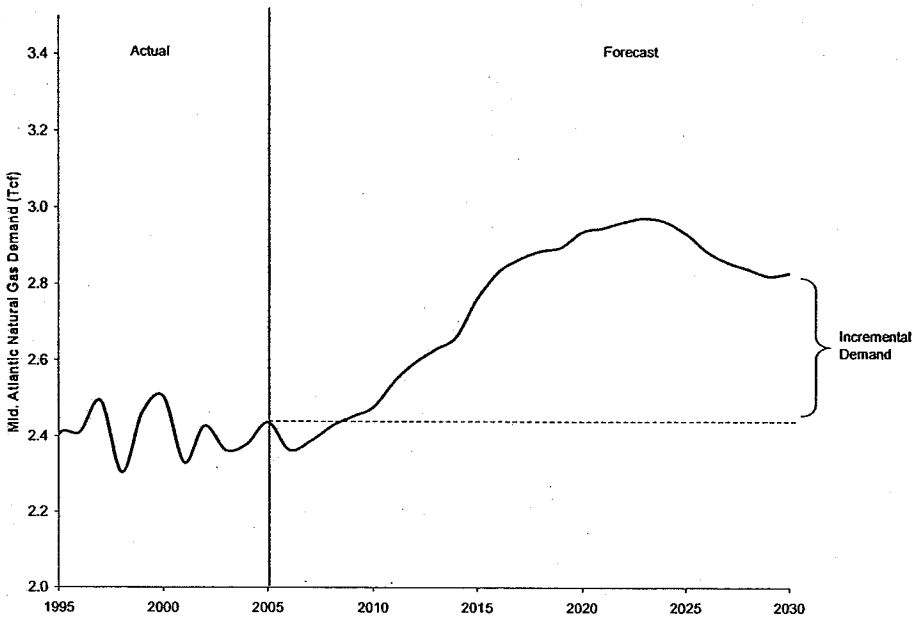
Figure 1.2-3: Mid-Atlantic Historic and Projected Natural Gas Consumption by Segment



As shown in Figure 1.2-4 below and as discussed above, EIA is projecting incremental demand growth in the Mid-Atlantic Region.

[2] Energy Information Administration, Natural Gas Annual for 2004, 2000, 1996; Information Administration, "The Annual Energy Outlook 2006", February 2006, Supplemental Table 2.

Figure 1.2-4: Mid-Atlantic Natural Gas Incremental Demand



Due to its location in the heart of an area of high (and increasing) natural gas demand, the Project will result in a more reliable and cost-effective supply of gas to its target markets than gas supplies from the Gulf of Mexico or other domestic regions of production that would require significant pipeline expansion to provide the equivalent amount of natural gas to this market. Introduction of a new source of supply will have the effect of reducing the "basis" in the market intended to be served by the Project.[3] The Project will serve a need for additional natural gas by providing a new supply of LNG. While the LNG supplier will dictate many of the terms of delivery, natural gas will be supplied directly into the market area. AES expects the LNG delivered to the LNG Terminal will be priced at various market index price points, thus being priced competitively with alternative supplies at these points.

1.3 Proposed Facilities Location and Description

1.3.1 Project Description

The principal components of the proposed LNG Terminal include marine terminal facilities, three full-containment onshore LNG storage tanks, a vaporization system, a vapor handling system, site utilities, administrative and support buildings, instrumentation and control systems, communications and security systems, and fire protection, hazard detection and safety systems. The LNG Terminal facilities have been sited and designed, and will be constructed and operated to meet or exceed all applicable standards and requirements established by the U.S. Department

[3] "Basis" refers to the differential between index prices for delivered gas in a given market and the index for prices in a supply region such as the Henry Hub prices of natural gas.

of Transportation (USDOT) (49 CFR Parts 192 and 193), the Federal Energy Regulatory Commission (FERC) (18 CFR Parts 153 and 380) and the U.S. Coast Guard (USCG) (33 CFR Parts 105, 127, 157 and 160), as well as additional standards and regulations cited in Resource Reports 2 through 13. The inclusion of a Power Plant on the LNG Terminal Site is also under consideration.

The Pipeline, which will carry the natural gas that has been re-vaporized at the LNG Terminal, will extend from the LNG Terminal to proposed interconnections with the existing Columbia Gas Transmission Corporation (Columbia), Transcontinental Gas Pipe Line Corporation (Transco) and Texas Eastern Transmission Corporation (TETCO) interstate pipeline systems near Eagle, Pennsylvania. The interconnection point near Eagle, Pennsylvania was chosen because of the relatively close proximity of the above referenced three interstate pipelines with a combined firm flowby capacity in excess of 7 Bcf per day. AES has designed the interconnections to deliver up to one bscfd into both the Transco and TETCO interstate pipeline systems, and up to 0.5 bscfd into the Columbia pipeline system. The sizing of the Pipeline and interconnections will allow the initial flow capacity of the Project, 1.5 bscfd, to be delivered to markets served by these interstate pipelines. Actual flows through the individual interconnections will be dependent upon final negotiations with customers. Although currently not planned and not part of the Project description, interconnection with local utility pipeline systems may occur in the future. In such event, AES will submit appropriate documentation to appropriate agencies to allow for such accommodation.

The likely customers of the proposed Project fall into three broad categories:

- Existing shippers with firm forward haul capacity on the three pipelines, including some of the country's largest electric generators and natural gas distributors, e.g., PECO (an Exelon Company), Philadelphia Gas Works, Consolidated Edison, Public Service Gas & Electric of New Jersey, New Jersey Natural and Key Span Energy Delivery.

- Customers located south and west of the interconnection location that could be reached on a back haul basis on the three pipelines using existing capacity to deliver incremental volumes. This includes electric generation facilities and natural gas distributors located in the Mid-Atlantic Region including the consuming areas around Pittsburgh, Pennsylvania, Baltimore, Maryland, and Washington, D.C. (Please see the Concentric Market Study submitted by AES for a complete list of potential backhaul customers for the three pipelines, which report is appended to Resource Report 10, *Alternatives.*).

- Customers with underground storage capacity that could be reached on a forward or back haul basis. An example of this is the storage located in Liedy, Pennsylvania.

A subsidiary of The AES Corporation (AES Mid-Atlantic LNG Marketing, LLC) was the successful bidder in the open season for the capacity on the Pipeline as well as the holder of capacity in the LNG Terminal. Prior to commencing operation of the Project, this subsidiary will seek appropriate import authorization (blanket, long-term, or both) in accordance with the

United States Department of Energy regulations at 10 CFR Part 590, Administrative Procedures with Respect to the Import and Export of Natural Gas (2006).

1.3.2 Project Location

The LNG Terminal will be located on an approximately 80-acre parcel within the existing Sparrows Point Industrial Complex located in Baltimore County, Maryland. The 80-acre Terminal Site is comprised of approximately 45 acres of upland area and the remainder is a near shore riparian rights area. The Terminal Site previously was owned and operated by Bethlehem Steel Corporation (BSC) as part of a steel manufacturing and shipbuilding facility. BSC divided its operations and split off the portion that dealt with shipbuilding. AES has an option to lease the Terminal Site with the current owner of the Sparrows Point Shipyard.

The Terminal Site is situated on a promontory that extends into the Chesapeake Bay east of the Port of Baltimore as shown on Figure 1.3-3. More specifically, the Terminal Site is located on the Marine Channel adjacent to the Fort McHenry channel near the confluence of the Fort McHenry Channel and the Brewerton Angle. The boundaries of the main property where the LNG Terminal will be located, including both land side and riparian rights area, the area that will be associated with dredge material management, and the area of temporary equipment laydown, storage and construction offices, are all shown on Figure 1.3-2 (Sheet 2).

The specific limits and dimensions of the 35-acre nearshore riparian rights area are shown on Figure 1.3-2 (Sheet2) as bounds of the property to be leased for the Terminal Site. First as a colony and then as a state, Maryland incorporated the English common law of property, including riparian rights. At common law, among other rights, a riparian landowner was entitled to any natural accretion to his land, and to make improvements upon submerged lands adjacent to his property in the form of piers and/or deepened channels as necessary to preserve access to navigation. These rights survive to the present day. Subject to the rights of riparian owners, the State has been recognized since the days of the common law to be the owner of submerged lands, which are deemed to be held in trust for the benefit of all of its citizens. While these riparian rights exist for submerged lands in Maryland, the Maryland Department of the Environment (MDE) and United States Army Corps of Engineers (COE) are vested with jurisdiction to authorize, via permits, activities in submerged lands (such as installation of new structures and dredging).

The specific limits and dimensions of the 35-acre riparian rights area are shown on Figure 1.3-2 (Sheet 2) as bounds of the property to be leased for the Terminal Site. First as a colony and then as a state, Maryland incorporated the English common law of property, including riparian rights. At common law, among other rights, a riparian landowner was entitled to any natural accretion to his land, and to make improvements upon submerged lands adjacent to his property, in the form of piers and/or deepened channels, as necessary to preserve access to navigation. These rights survive to the present day. Subject to the rights of riparian owners, the State has been recognized since the days of the common law to be the owner of submerged lands, which are deemed to be held in trust for the benefit of all of its citizens. While these riparian rights exist for submerged lands in Maryland, the Maryland Department of Environment and US Army Corps of Engineers retain a permitting mechanism for authorizing activities in submerged lands (such as installation of new structures and dredging).

The proposed Pipeline Route generally parallels existing rights-of-way (ROW) for highways, overhead electric transmission lines and other pipelines. More specifically, the Pipeline Route:

- Exits the former Sparrows Point Shipyard and steel mill property, north to northeast, for approximately 2 miles (MP 0.0 to 2.0);
- Follows Route I-695 with the exception of minor divergences (to avoid interchanges) north and northwest for approximately 6 miles (MP 2.0 to 8.0);
- Turns north to northeast near the Back Creek crossing, and follows a Baltimore Gas and Electric Company (BG&E) overhead transmission corridor for approximately 24.5 miles (MP 8.0 to 32.5); and
- Turns northeast at an intersection with the ROW for an existing Columbia pipeline and generally parallels the existing pipeline corridor for approximately 54 miles (MP 32.5 to 87.6) to its terminus near Eagle, Pennsylvania.

Preliminary collocation and/or route paralleling discussions have been held with BG&E and Columbia, as well as with Maryland highway authorities. AES is continuing discussions with the aforementioned parties in an attempt to come to an agreement. AES will attempt to conclude these discussions by the anticipated certificate date in October 2007.

In accordance with conventional pipeline routing principles, collocation with existing utility corridors to the maximum extent possible was the primary routing strategy. Although not the only criterion used in route selection, the preference towards the use of existing corridors is an industry standard and consistent with the objectives of most regulatory agencies, including the COE and the FERC. For this reason, AES endeavored to select a route that would maximize the use of existing utility and highway ROWs, thereby minimizing potential impacts to the environment, individual landowners and other stakeholders, and ensuring the technical and economic feasibility of constructing the Pipeline. A summary of alignment segments that are parallel to existing ROWs is presented in Table 1.3-1.

Utility ROWs include sides of public roadways and railways, electric transmission line corridors, other pipeline (petroleum, natural gas, etc.) corridors, or other setback areas. AES used maps and aerial photographs to identify these utility ROWs during the initial planning stages of the Project. During the course of in-field investigations and surveys, AES discovered that there were some areas where the existing ROW was not wide enough to locate the proposed Pipeline entirely within the existing ROW corridors. In such cases, AES made reasonable attempts to locate the Pipeline on the edge of the existing ROW, and intends to pursue shared ROWs with the existing easement owners to that effect. Such cooperative planning efforts will help to minimize newly created ROW easements for portions that do not completely overlap. AES discovered other situations during the course of its in-field investigations where housing or other structures had been built close to the existing utility ROW since the time the ROW was established. In these latter cases, in an effort to meet the objectives of maximum avoidance and impact minimization, AES explored route variations that diverge from the existing ROWs. Where route variations are not practical, AES intends to utilize special construction techniques to

assist in avoiding or mitigating impacts on residential neighborhoods. The extent of the overlap, partial overlap, and routing away from the existing ROWs as well as proposed mitigation efforts in residential areas is more fully described in Resource Report 8, *Land Use, Recreation and Aesthetics*.

In summary, several criteria were used to select the proposed Pipeline Route and aboveground facility locations. Criteria included the following:

- Identifying existing ROWs, transportation features and utility crossings, and land uses (i.e., both existing and planned); avoiding and minimizing potential negative impacts (e.g. short-term disruptions due to construction activities); and enhancing positive impacts to local communities and landowners (e.g., increase in tax revenue as shown in Table 5.4-2, Resource Report 5, Socioeconomics);

- Avoiding and minimizing potential impacts to environmental and cultural resources (e.g., architectural and archeological resources, waterbodies, fisheries, wetlands, threatened and endangered species/significant habitats), sensitive soils, and geologic/topographic hazards to the extent possible; and

- Engineering, construction, and cost feasibility (i.e., including route length and topography and opportunities to use existing corridors).

Taking into consideration these criteria, four major route alternatives, and twenty-two minor route variations have been identified and are further discussed in Resource Report 10, *Alternatives*.[4] While most of the alternatives and variations involve routing on other utility ROWs, greenfield construction was also considered. The four major route alternatives that were identified include the following:

- Alternative Route 1, also referred to as the Dundalk West Alternative, would deviate from the proposed Pipeline Route at North Road (approximately MP 0.8), and follow an existing roadway for approximately 1.2 miles before crossing Bear Creek (Figure 10.4.1-1). Alternative Route 1 would then be routed along an electric utility corridor through a densely populated area of Dundalk heading north for approximately 4.8 miles. The route would then rejoin the proposed Pipeline Route at MP 8.0.

- Alternative Route 2, also referred to as the Western Corridor Alternative, would deviate from the proposed Pipeline Route after the Back River crossing (MP 9.0) and head north for approximately 21.0 miles along a northern-trending, two-tower BG&E transmission line corridor (Figure 10.4.1-2). Shortly after it crosses the

[4] Route alternatives are segments of the Pipeline alignment that deviate from the preferred route filed, and that cover extended distances (miles) for purposes of providing different route segment options relative population, ROW and resource evaluation. Route variations are short-distance segments where localized options are considered in order to optimize a portion of the Pipeline Route to avoid human or environmental impacts. Examples of such variations include re-routing around congested housing areas that have developed adjacent to the existing ROW being followed, re-routing around areas where a sensitive resource or other feature(s) exists, or re-routing where varying from a utility corridor parallel path helps to minimize impact, improve constructability, or both.

Baltimore and Harford County line in Harford County, Maryland, this alternative route would turn to the northeast and closely parallel an existing pipeline corridor, rejoining the proposed Pipeline Route at MP 32.5.

- Alternative Route 3, also referred to as the SR 136 Alternative, would deviate from the proposed Pipeline Route at the intersection with the overhead transmission corridor and I-95 at approximately MP 19 (Figure 10.4.1-3). This alternative route would traverse northeast along I-95 for approximately 8.5 miles, and then turn north onto SR 136. For 13.6 miles, this alternative route would parallel, but not be adjacent to, SR 136 until rejoining the proposed Pipeline Route at approximately MP 40.0 at the existing Columbia pipeline ROW.

- Alternative Route 4, also known as the US I-95 & Greenfield Alternative, would deviate from the proposed Pipeline Route at the intersection with the overhead transmission corridor and I-95 at approximately MP 19 (Figure 10.4.1-4). This alternative route would head north to northeast and follow I-95 for approximately 20.0 miles. At this point, this alternative route would divert from I-95 and traverse 13.8 miles in a northerly direction across new right-of-way. Shortly after this alternative route crosses U.S. 1 in Harford County, Maryland, it would reach Columbia pipeline, rejoining the proposed Pipeline Route at approximately MP 40.0.

A more complete description of the shorter segment route variations, and evaluation/selection of preferred alternatives and variations appears in Resource Report 10, *Alternatives*.

1.3.3 Proposed Facilities

The LNG Terminal design regasification/sendout capacity will be 1.5 bscfd, at a maximum sendout pressure of 2,080 pounds per square inch (psig). It is expected to operate continuously in a baseload mode of operation, and will be designed to allow the potential addition of a fourth tank and a potential expansion in vaporization and sendout capacity of up to 2.25 bscfd. No increase in the capacity of the Pipeline would be needed to accommodate the additional tank capacity should such an expansion of the vaporization and sendout capacity be undertaken in the future, because the expansions are anticipated to be in local demands that would likely be served by the Project by back-feeding existing pipeline infrastructure in the vicinity of the Terminal Site. The Terminal design includes pre-investment in features and equipment, including blanked off pipe connections, to facilitate this future expansion. If and when the time comes to pursue this expansion, AES will perform a more detailed study on the expansion case to identify changes required to the existing Project facilities. The LNG Terminal is designed in accordance with USDOT standards under 49 CFR Part 193, and the National Fire Protection Association (NFPA) 59A, Standard for the Protection, Storage, and Handling of Liquefied Natural Gas (LNG), 2001 Edition, as further described in Resource Report 13, *Engineering and Design Material* and Resource Report 11, *Safety and Reliability*.

1.3.3.1 LNG Terminal Marine Facilities

The LNG Terminal will make use of an existing pier located at the northern end of the Terminal Site. The existing pier will be modified to accommodate mooring of LNG ships. The modifications will consist of repairing existing piles, resurfacing the deck, and building an unloading platform and pipe trestle on top of the pier.

The pier will have two berths, one on the north side of the pier and the other on the south side. Each berth will be designed to accommodate an LNG ship with the capacities listed below. Although the pier will be able to accommodate two LNG ships at one time, unloading will only be permitted from one LNG ship at any given time. The southern berth, which will be the primary receiving point for the LNG ships, is located approximately 1.15 miles from the nearest residence. The north berth, which will be used infrequently when weather or other delays result in overlapping scheduling of two LNG ships, is located approximately 1.08 miles from the nearest residence.

The LNG berths will accommodate the dimensional characteristics of LNG ships with storage capacities ranging from 786,200 barrel (bbl) (125,000 m^3) up to 1,364,900 bbl (217,000 m^3). This range of ship storage capacities accounts for the vast majority of existing and planned LNG ships in the world fleet (see Resource Report 10, *Alternatives*, Section 10.5.1.1). The LNG ships will normally arrive at the pier loaded and will leave in ballast condition as described in Section 2.4.9.2 of Resource Report 2, *Water Use and Quality*. A table listing the dimensions of the LNG ships expected to call at the LNG Terminal is provided in Appendix 1D. Also included in that table is a listing of the dimensions of other ships that currently call at the Port of Baltimore. As can be seen from the information presented, the LNG ships expected at the LNG Terminal do not differ greatly in size (and in some cases are actually smaller) than the larger ships currently transiting the waters offshore of the Terminal Site.

The main components of the marine facilities at the Terminal Site will include the following:

- An existing finger pier that will support an elevated pipeway and spill containment system, an elevated unloading platform, and gangways; the pier will also support the mooring of the LNG ships and provide a roadway to the loading platform area;
- Dredged areas for ship access;
- Aids to navigation;
- A retractable security barrier; and
- Mechanical systems.

The features of the marine facility at the Terminal Site are shown on Figure 1.3-2 (Sheets 1 and 2). A description of the individual components of the proposed marine facility is provided below.

A. LNG Pier

Access between land and the unloading platform will be provided by an existing pile-supported finger pier. The pier structure consists of steel H-piles that support concrete pile caps. Spanning between the pile caps is a reinforced concrete deck.

The existing pier will be rehabilitated to provide an adequate foundation for the new superstructure that will support the LNG pipeway and spill containment system, and also the unloading platform. A new fendering system and mooring fixtures will be installed on the pier to support the berthing and mooring activities of the LNG ships.

B. Turning Basin and Entrance Channel

To facilitate access to the LNG Terminal by LNG ships, an approach channel and turning basin will be constructed by expanding existing channels by dredging (further discussed in the Dredge Management Plan in Section 1.5.1.2.A and Appendix 1C).

The turning basin and approach channel will provide an access point for approaching LNG ships (from the existing Brewerton Channel to the southwest). LNG ships transiting to the proposed LNG Terminal will do so under active tractor tug escort. The speed of the incoming LNG ship will be gradually reduced during its transit of the Brewerton Channel until, by the time it reaches the entrance of the approach channel to the LNG Terminal, it will have been slowed sufficiently to operate safely in the waters adjacent to the LNG Terminal. The tugs will assist the ship to turn into the approach channel. The incoming vessel will transit the approach channel under active tractor tug control. The LNG ship will be brought to full stop in the approach channel, and with tug assistance it will be turned and berthed at either berth with the bow pointing out. The departure procedures for LNG ships will be similar to those for the incoming transiting LNG ships as described above, except that the outgoing vessels will not need to be rotated in the turning basin.

The approach channel and turning basin preliminary layout has been formulated using the following considerations:

- LNG tanker vessel design capacities and size listed in Appendix 1D. Those listed in Appendix 1D include future generations of vessel designs not currently in service that are expected to call at the LNG Terminal.
- Channel design guidance references ((Society of International Gas Tanker and Terminal Operators [SIGTTO] 1997) and Permanent International Association Navigation Congress [PIANC] (1997)) to calculate the minimum channel width. The width of the channel is dependent on the following factors: vessel speed, wind speed and direction, current speed and direction, wave height, period, and direction, navigational aid, type of seabed, channel depth, type of side slopes, and hazard level of cargo.
- Factors and guidance reference information (SIGTTO) affecting channel depth design. The channel depth is dependent on the following factors: vessel design draft, vertical ship motion due to wave action, squat, keel clearance, and water density effects.

- Real time and fast time computer simulations performed at the Maritime Institute of Technology and Graduate Studies (MITAGS) with participation by licensed members of the Maryland Pilots Association. Initial simulations were performed on July 5, 6 and 7; additional refinement simulations were performed on September 5 and 6, 2006.

Based on the above considerations, the approach channel preliminary layout dimensions include an approximately 45-foot depth and 440-foot width. The proposed turning basin, which is approximately semi-circular in shape, has a radius of approximately 820-foot (also with a nominal water depth of 45 feet), which will allow the turning of all fully loaded design LNG ships with three tugs providing assistance. The final geometry and layout of the approach channel and turning basin was refined further (and reduced) through the additional fast-time and real-time simulation studies that were performed on September 5 and 6, 2006. A report summarizing the studies and their results was prepared by MITAGS and can be found in Appendix 11D of RR-11, *Reliability and Safety*.

To support the marine operations at the LNG Terminal, it is anticipated that the following navigational aids will be provided:

- Buoys to mark the width of navigable channel will be placed approximately every 1,200 feet. The buoys will be equipped with lights according to International Association of Lighthouse Authorities (IALA) guidelines, and in accordance with local port authority requirements.
- Navigation lights will be installed on land and on structures, such as the end of the pier.
- A range light may also be installed if determined appropriate by the Maryland Pilots Association.

Tug service for LNG ships calling at the LNG Terminal will be provided by existing tug contractors with pilot support from the Baltimore port area.

1.3.3.2 LNG Receiving

A. LNG Unloading Platform and Pipeway

The unloading platform will be elevated and located on the existing pier, approximately 620 feet from the shoreline. It will support the fully-articulated unloading and vapor arms that connect the LNG Terminal piping system to the vessel manifold. The unloading platform will consist of a pre-cast/cast-in-place concrete deck supported by a steel support structure constructed on top of the existing pier deck. The LNG piping will extend downward from the unloading arms into an elevated pipeway.

The elevated pipeway will extend from the unloading platform to the shoreline. An elevated concrete spillway will be installed adjacent to and beneath the piping as part of the pipeway structure, and will be sloped to the shoreline to provide for transport and collection of any LNG leaks or spills. The piping and spillway will be supported by steel columns which will extend from the existing pier deck.

The unloading system will be designed to unload the entire contents of one 868,000 bbl (138,000 cubic meter (m^3)) capacity LNG ship within 12 to 17 hours, depending on the size of the vessel, with a second ship berthed but not simultaneously unloading its cargo. The design nominal unloading rate is 55,000 gallons per minute (gpm) (12,500 cubic meters per hour (m^3/hour)). Piping will be designed to allow circulation of LNG through the unloading system during periods when no ship is unloading. This system will maintain the unloading lines at cryogenic temperatures, thus avoiding thermal cycling of the unloading lines.

B. LNG Mechanical Systems

Various mechanical systems will be provided to deliver LNG from the LNG ship to the onshore LNG storage tanks. The proposed mechanical systems will include the following:

- Eight hydraulically actuated articulated unloading arms (three for LNG unloading and one for vapor return to the ship, per berth);
- Two blowers for returning vapor from the LNG storage tanks to the ship;
- Vapor desuperheater system;
- LNG sampling system;
- LNG flow and temperature monitoring instrumentation; and
- Interconnecting piping systems.

C. Boiloff Gas Compressor

The boiloff gas (BOG) compression system will consist of three reciprocating type BOG compressors, two of which will be used during active LNG ship unloading. During normal terminal operation, when no LNG ships are unloading, one BOG compressor will be needed to control the BOG pressure in the storage tanks. If the BOG compressor is inoperative due to an extended power failure or other emergency, the boiloff vapors will be directed to a heated vent stack. A detailed description of the BOG compression system is included in Section 13.5 of Resource Report 13, *Engineering and Design Material.*

D. Safety and Firefighting Systems

The LNG Terminal will be equipped with the following major safety systems:

- A Hazard Detection and Mitigation System (HDMS), which will continuously monitor and alert the operators to hazardous conditions throughout the LNG Terminal from fire, combustible gas leaks and low temperature LNG spills. Monitoring capability will be provided via

graphic display screens and/or mimic panel displays located in the Main Control Room and the Platform Control Room.

- An independent Safety Instrumentation System (SIS), which will allow the safe, sequential shutdown and isolation of rotating equipment, vaporization equipment, pier operations and LNG storage facilities.

- An Emergency Shutdown (ESD) system, which will include shutdown and control devices designed to put the LNG Terminal in a safe state in the event of major incidents. The ESD system can effect total shutdown of the LNG Terminal, shutdown of ship unloading, shutdown of the sendout system, and/or shutdown of individual pieces of equipment, depending on the type of incident.

- A fire fighting system composed of fixed and portable fire water systems, fixed and portable dry chemical extinguishing systems, and a high expansion foam system. The LNG Terminal will contain two on-shore fire water pumps, each capable of providing the entire fire water demand (100 percent redundancy). One pump will be driven by an electric motor and the other pump will be driven by a diesel engine. This will ensure the fire water system is capable of providing the design basis flow and pressure in the event of an electrical power failure. Fire water from the local municipal water supply will be stored in an onsite fire water storage tank, sized to provide two hours of design basis fire water flow per code requirements. In addition, backup fire water from the Patapsco River will be provided from a set of diesel driven pumps installed at the water's edge. These backup pumps can provide full flow to the onshore fire water system, and can also provide tank deluge flow in the event of an LNG storage tank fire. The backup fire water pump intake structure will be configured with in-take screens designed to prevent ingress of debris, and to maintain inlet velocities below two feet per second (fps) to minimize the effect of flow on the local marine life.

- The seawater will be drawn from the LNG Terminal berth area through the velocity cap fitted to a pipeline located within the sheet pile wall that will be used to construct the bulkhead, at a depth of approximately -15 feet mean lower low water (MLLW). Due to the dredging that is proposed for this area and the height of the structure, turbulence and intrusion of sand and debris are expected to be minimal. The seawater intake structure is described in more detail in Section 13.17.1.2 of Resource Report 13, *Engineering and Design Material*, and the potential impacts to marine life and mitigation measures to be implemented are described in Section 2.4.9.2 of Resource Report 2, *Water Use and Quality*.

E. LNG Storage

Three full containment LNG storage tanks are proposed for construction at the LNG Terminal. The LNG tanks will be full containment tanks approximately 170 feet in height and 270 feet in diameter, as shown on Figure 1.3-2 (Sheet 2). Each tank will be designed to store up to 1,000,000 bbl (160,000 m^3) of LNG, at a temperature of –260 °F and a design internal pressure of 4.3 psig. Tank capacity is designed to facilitate offloading of the entire contents of a 1,000,000 bbl (160,000 m^3) LNG ship, and receipt of LNG shipments at intervals of approximately every two to three days. The tanks are designed and will be constructed according to the requirements of the American Petroleum Institute (API) 620 Appendix Q, and NFPA 59A.

Each LNG storage tank will consist of an inner and outer tank. Tanks will be H-pile supported as further described in Section 13.6.2 of Resource Report 13, *Engineering and Design* Material. The inner "liquid containing" tank will be the primary containment, and will be a cylindrical flat bottom structure constructed of low temperature, nine percent nickel steel. All welds of the tank will be inspected per code by radiography, ultrasonic test, vacuum box test, and/or liquid penetrant test to ensure integrity. To prevent the stratification of the tank's inventory, the tank design will allow for both top and bottom filling. Bottom filling will be done through a standpipe inside the tank, and top filling will be carried out through a separate tank feed line onto an internal deflector plate. The filling operation will use gravity to assist in mixing the unloaded LNG with the heel in the tank (i.e., heavy LNG will be unloaded on top of a lighter tank heel, and lighter LNG will be unloaded under a heavy heel).

During ship unloading, the LNG tank pressure will be maintained at approximately 3.0 to 3.5 psig using multiple BOG compressors, as required, and vapor return blowers. During periods when no ship is unloading, the pressure in the tank will not increase as rapidly, and in that case, one BOG compressor will be adequate to handle the BOG volume.

The inner LNG-containing tank will be surrounded by an outer concrete tank, including a carbon steel inner liner. The outer concrete tank will provide secondary liquid containment of at least 110 percent of the contents of the inner tank, and will have a flat bottom, dome roof, and cylindrical shell. The concrete roof provides full containment of the tank vapor. The outer tank will be designed to contain product vapors and protect the insulation systems from moisture and other conditions. The insulation system will consist of perlite, cellular glass and fiberglass insulation.

Should the BOG compressors not be able to maintain tank pressures due to unusual circumstances, LNG storage tank overpressure protection will be provided by discharging BOG through a discretionary vent heater and vent stack. Prior to the tank pressure reaching its discretionary vent setpoint pressure, a pressure control valve will automatically relieve excess vapor from the BOG header connected in common with each tank to the heated vent stack. In addition, each tank is provided with atmospheric relief vents for ultimate overpressure protection. A pressure makeup system and vacuum breaker valves will also be installed to protect the tanks against vacuum conditions.

Temperature and density measuring devices will be located in the LNG storage tanks to provide the plant operator with the means to detect LNG stratification. Automatic continuous level measurements will also be provided for the LNG storage tanks.

F. LNG Regasification and Sendout

The process systems associated with the LNG Terminal include the following:

- Vapor handling system;
- BOG recondenser;
- LNG in-tank pumps;
- LNG high-pressure sendout pumps;
- LNG regasification system;
- Natural gas metering station;
- Heat transfer fluid system;
- Utilities, including air compressors and nitrogen gas; and
- Instrumentation and control.

The process flow diagram for the process system and components is shown in Appendix U of Resource Report 13, *Engineering Design and Materials*. Piping, electrical distribution wiring and insulation of varying size and capacity will be installed throughout the LNG Terminal. Several of the components will be housed in separate buildings that will be connected via roadways and sidewalks.

G. Vapor Handling System

The LNG vapor handling system will be designed to handle the vapor generated in the storage tanks coincident with a peak unloading rate of 55,000 gpm (12,500 m^3/hour). During LNG ship unloading, heat input into the system will be from pumping, and heat transfer from the ambient surroundings. To suppress some of the vapor that would be generated due to the additional heat input, the storage tanks will be operated at a pressure slightly above that of the LNG ship. This allows part of the heat input of the system to manifest itself as a sensible heat increase in the LNG.

Two 50 percent capacity blowers will be used to remove a portion of the vapor generated in the storage tanks during LNG ship unloading. The vapor from the discharge of the blowers will be returned to the LNG ship through a vapor return line and a vapor return arm. A desuperheater will be provided at each berth to provide cold vapor to the LNG ship (at approximately –180 °F), if so required by the LNG ship.
The remainder of the vapor generated in the storage tanks during LNG ship unloading will be handled by two (of three) 50 percent capacity BOG compressors. The vapor from the discharge of the compressors will be condensed in the BOG recondenser. During periods in which no LNG ship is unloading, only one of the compressors will be needed.

H. Boiloff Gas Recondenser

At the recondenser, the BOG from the compressor discharge will be condensed by heat transfer with subcooled LNG from the low-pressure in-tank LNG pumps at approximately 50 psig. The condensed BOG will be mixed with the low-pressure pump discharge in the high pressure pump drum.

I. LNG In-Tank Pumps

Low-pressure pumps will be installed in each LNG storage tank. Each in-tank pump will be located near the bottom of the storage tank, and will pump LNG up and out of the tank through a vertical column. The pumps will discharge into the low pressure LNG header that will be connected to the high pressure pump drum.

J. LNG High Pressure Pumps

The in-tank pump discharge will flow into a suction drum for the high pressure pumps, where it will mix with condensed BOG flowing from the BOG recondenser. The LNG high pressure sendout pumps will increase the LNG's pressure to slightly above the sendout pressure before feeding it to the high pressure LNG vaporizers, which will provide gas to the sendout pipeline at 2,080 psig. The high pressure LNG pumps will be vertical, submerged, centrifugal, can-mounted pumps.

K. LNG Regasification

Discharge from the high pressure pumps will flow into the high pressure LNG vaporizers, which will warm the LNG to the design outlet temperature of 40°F. The LNG vaporizers will be vertical shell and tube heat exchangers, with LNG flowing on the tube side and heat transfer fluid flowing on the shell side.

L. Natural Gas Metering Station

A metering station will be provided to meter the natural gas leaving the Terminal Site and entering the Pipeline. The LNG Terminal metering station will include gas analysis equipment to ensure quality control consistent with gas transmission line requirements.

M. Heat Transfer Fluid Heating System

The LNG Terminal will use a glycol-water solution as its heat transfer fluid (HTF). Cold HTF leaving the shell side of the vaporizers will be pumped through the HTF heaters and returned to the vaporizers. The HTF heaters will be heated by a separate set of fired heaters burning natural gas. The HTF heating system is sized to provide sufficient heat to vaporize the baseload natural gas sendout rate, with one spare pump and one spare heater. The natural gas fuel for the system will be produced either from vaporized LNG from the LNG Terminal or from backfeed from the Pipeline (for startup). Detailed design information regarding the vaporization process is presented in Section 13.5.7 of Resource Report 13, *Engineering and Design Materials*.

N. Air Compressors

The LNG Terminal will include a compressed plant air system designed to supply the service air and instrument air requirements of the LNG Terminal facilities. Dry instrument air will be provided for pneumatic operators and devices throughout the LNG Terminal. Compressed air service will be provided to appropriate areas of the Terminal Site via utility stations.

Three 50 percent oil-free rotary screw-type package compressors will supply compressed air to the service air and instrument air system. The compressors will discharge to an air receiver for supply to the service and instrument air distribution systems. The plant air system will include dual tower desiccant-type dryers with heatless regeneration.

O. Instrumentation and Control

The LNG Terminal control system will be a micro-processor based Distributed Control System (DCS). The DCS will control and supervise the LNG systems from the central control room. The primary control location will be the Main Control Room. The Main Control Room will contain the DCS operator station with consoles, printers, engineering workstation and other auxiliary equipment. The DCS will provide remote control functions to the plant operators either directly from the DCS control processors, or indirectly through hardwired connections or serial data links connected to the remotely located control packages.

The DCS will be provided with color graphic displays of the plant equipment, with sufficient detail to allow proper control and monitoring of plant functions such as changing set points, placing a controller on manual or automatic, starting or stopping plant equipment, etc. The DCS will be interfaced with a control system for the auxiliary equipment, and electrical systems designed to achieve central control of the plant equipment. Required control, alarm and monitoring functions for miscellaneous equipment will be integrated into the DCS.

As discussed above, a stand alone, independent HDMS will continuously monitor and alert the operator of potentially hazardous conditions throughout the LNG Terminal.

P. Utility Power Feeds

The LNG Terminal will be supplied with power using two redundant 110 kilovolt (kV) power feeds from the local utility. These utility feeds will be stepped down from 110 kV to 13.8 kV and lower for use at the LNG Terminal. Additionally, there will be a one hundred percent standby power generator set provided, capable of providing sufficient power to maintain LNG circulation via operation of one low pressure (LP) Pump and to provide for terminal lighting, all control systems, and the operation of all other necessary auxiliary systems. If the Power Plant that is presently under consideration is built, the primary source of power to the LNG Terminal will be from the Power Plant and the back up source will be from the two 110 kV utility feeds.

1.3.3.3 Pipeline Facilities

The Pipeline consists of approximately 88-miles of 30-inch outside diameter (OD) natural gas pipeline and associated facilities (e.g., mainline block valve sites, interconnect metering facilities, and a Supervisory Control and Data Acquisition (SCADA) system required for remote monitoring, control, and leak detection) which will extend from the LNG Terminal in Sparrows Point, Maryland to the terminus near Eagle, Pennsylvania. The terminus point was chosen based on the relatively close proximity of three major interstate natural gas pipelines - Columbia, Transco and TETCO. Allowance will also be made for intermediate local interconnections with local utility systems or others, should those entities determine that such interconnection is beneficial.

The Pipeline is planned to have a capacity to enable delivery of up to 1.5 bscfd on a firm basis, and have a maximum allowable operating pressure (MAOP) of 2,080 psig.

Pipeline facilities described in this Resource Report 1 are designed, constructed, tested, operated, and maintained to conform with or exceed the requirements of 49 CFR Part 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards*, and other applicable governmental regulations. A listing of applicable safety regulations and design standards, including industry standards incorporated by reference, is provided in Resource Report 11, *Safety and Reliability*.

The Pipeline will be installed within a 50-foot-wide permanent ROW. During construction in non-agricultural lands, 25 feet of additional temporary space will be required (in aggregate, a 75-foot construction right-of-way, or CROW) to allow crews to safely construct all Pipeline facilities. In areas where additional working width is necessary (e.g., to stockpile topsoil in agricultural lands), the CROW may be expanded up to an additional 25 feet to accommodate the need (thus comprising a 100-foot CROW). Typical configurations for the Pipeline ROW and CROW are shown on Figure 1.3-4 and in Appendix 2B (BMPs 2a through 2d). Project Alignment Sheets appended to this Resource Report (Appendix 1A) show the Pipeline alignment, permanent ROW, and the locations where the permanent ROW overlaps with property lines of utility corridors that are owned in fee. Similarly, in areas where the ROW must be restricted (e.g., near residential areas) the CROW would be reduced as appropriate. The CROW will be expanded or reduced as necessary (i.e., by length and/or width) as shown on alignment sheets (see Appendix 1A) to accommodate crew needs and site conditions. Additional temporary workspace (ATWS) will be used where necessary to accommodate construction methods, materials, and/or equipment (e.g., road and railroad crossings, equipment turn-arounds, and waterbody crossings). Estimates of land affected by these elements have been included in Tables 1.4-1 and 1.4-2 contained herein. Approximate widths of overlap for the Pipeline temporary and permanent ROWs along existing utility and road ROWs are provided on Table 1.3-1.

The Pipeline will be made of carbon steel pipe manufactured in accordance with the API specifications for seamless and welded steel line pipe for use in the natural gas pipeline industry (API 5L). The planned standard pipe will be Class 3 pipe; however, pipe classification will increase to Class 4 in selected areas based on class study and regulatory requirements as described in Resource Report 11, *Reliability and Safety* (Table 11.1.3-1). The pipe will be protected from internal and external corrosion by a fusion-bonded epoxy (FBE) coating and an impressed current cathodic protection (CP) system.

Where the Pipeline Route parallels existing pipeline(s), AES will seek to maintain a minimum separation distance of 25 feet adjacent to and abutting the existing pipeline ROW, unless constrained by other critical features. In the event that such constraints arise, a lesser offset may be agreed upon with the existing pipeline operator, and submitted for any required regulatory approval.

Having safe and reliable entry to Pipeline facilities will require the use of access roads. AES will use a combination of new and existing temporary and permanent access roads for this purpose. Temporary access roads will be utilized as Pipeline activities warrant (e.g., during construction activities). To the extent possible, AES will use existing access roads and maintain and/or

improve them as needed. Permanent access roads will be constructed (if not already available) to support regular operational activities, e.g., regular inspections, ROW maintenance, and facilities maintenance and operation. In both instances, AES will seek and obtain the necessary property rights and approvals from government agencies prior to the use or construction of such roads. Public roads are available for use as access roads without further approvals, subject to posted weight and clearance restrictions. If a location is inaccessible via existing roadways, new roadways will be constructed to provide access to the locations, after appropriate environmental permits and approvals have been obtained. Safe and accessible conditions, e.g., all of the required posted warnings, roadways kept clear of construction related debris, traffic control support in conjunction with local authorities, will be maintained at all public roadway crossings and access points during project activities. Specific access road locations are shown on the alignment sheets and U.S. Geologic Survey (USGS) Topographic Maps (see Appendix 1A), and are summarized in Resource Report 8, *Land Use, Recreation and Aesthetics*.

A. Aboveground Pipeline Facilities

Aboveground facilities associated with the Pipeline include the mainline block valve sites and interconnect metering facilities.

- **Mainline Block Valve Facilities.** Mainline Block Valve facilities (MLBVs) will be provided to stop the flow of gas and to isolate sections of the Pipeline during maintenance, repair, and if a leak is detected. Nine valves will be spaced to meet USDOT requirements, 49 CFR Part 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards* as follows (see Table 1.4-1):

- Each point on the Pipeline in a Class 4 location will be within 2.5 miles of a valve.

- Each point on the Pipeline in a Class 3 location will be within 4 miles of a valve.

- Each point on the Pipeline in a Class 2 location will be within 7.5 miles of a valve.

- Each point on the Pipeline in a Class 1 location will be within 10 miles of a valve.

- The locations of the Pipeline MLBVs are shown on the Alignment Sheets (included in Appendix 1A) at the following mileposts:

- MP 9.8

- MP 19.8

- MP 29.4

- MP 39.4

- MP 49.3
- MP 59.1
- MP 69.2
- MP 78.4
- MP 83.2

All valves will be equipped with blowdown capabilities to allow natural gas to vent to the atmosphere in a controlled and safe manner if an overpressure event occurs. In the event of an emergency or routine maintenance activity, Pipeline segments would be isolated by closing the appropriate valves necessary to isolate the segment. Valves will be suitable for service at the design MAOP. See Figure 1.3-5 (Sheet 1), Typical Mainline Valve Site, which shows the potential typical layouts of proposed valve facilities. Valve sites will be graveled, accessible to work crews, and secured and fenced to provide security and safety and prevent uncontrolled entry. In addition, Pipeline operations will include remote control and monitoring capabilities for mainline block valves.

- **Interconnect Facilities.** The Pipeline will be interconnected with three existing pipeline systems - Columbia, TETCO and Transco - by interconnects located near Eagle, Pennsylvania.[5] AES has discussed interconnections with all three pipelines, and each has shared its technical requirements and tie-in locations. All of the pipeline systems indicated that a tie-in north of the Susquehanna River would be the preferred interconnection location. Tie in north of the Susquehanna River will provide capacity further north on each of their systems and avoid the potential for future upgrades that would require additional crossings of the Susquehanna River. The interconnect facilities are planned to include metering, flow control and/or pressure control functionality (as required), scraper receiver/launcher capability, system isolation, i.e., remotely controlled station isolation valves, SCADA, as well as security and safety equipment. Figure 1.3-7 (Sheets 2 and 3) show typical interconnect tie-in and metering and regulation layouts. Each location will be equipped for system isolation. The interconnection facilities will be fenced to provide security and safety, and to prevent uncontrolled entry. Security lighting during non-daylight hours will be provided to allow for secure and safe operations. Engineering controls, e.g., shielding and/or motion detectors, will be used to reduce stray lighting.

1.3.3.4 Non-Jurisdictional Facilities

AES is considering building a collocated 300 MW combined-cycle cogeneration facility that may be used to provide both waste heat for vaporization of the LNG and power to the LNG Terminal. A

[5] Each pipeline system has provided interconnection application forms and information to AES. These interconnection application forms were filed with FERC in October and November 2006.

discussion of this potential facility construction, its merits, and the potential applicability of FERC regulations is included in Section 1.10.

1.3.4 Location Maps, Detailed Route Map, and Plot/Site Plans

The proposed LNG Terminal, Power Plant and Pipeline (with alternative and primary routes) locations are shown on aerial photograph-based alignment sheets and on USGS 7.5-minute series topographic maps (see Appendix 1A). Related temporary construction areas and aboveground facilities (such as pipe storage yards, extra work/staging areas, contractor yards, and access roads, Horizontal Directional Drilling (HDD) set-up and pullback areas, etc.; mainline block valves and cathodic protection locations) are provided on the Alignment Sheets and/or the USGS topographic quadrangle maps (Resource Report 1 –Appendix 1A) and Resource Report 2, *Water Use and Quality* – Appendix 2B, Best Management Practices (BMPs).

1.4 Land Requirements

Land requirements for the Project are quantified into two categories: construction (temporary) and operational (permanent). Temporary land requirements are those areas disturbed by construction activities that would be restored to pre-existing conditions or better upon completion.

Permanent land requirements are lands that the LNG Terminal or the Pipeline will acquire in fee or by easement to locate permanent Project facilities. Permanent lands include the Terminal Site footprint, the Pipeline 50-foot-wide permanent ROW, permanent access roads, and lands purchased or leased to locate aboveground facilities. Specific land requirements are discussed in the following subsections.

1.4.1 LNG Terminal and Pipeline Facilities

1.4.1.1 LNG Terminal Facilities

For the LNG Terminal facilities, temporary (construction) and permanent (operational) land requirements will include the approximately 45 upland acres at the parcel located on Sparrows Point, Maryland as well as an additional 15 acres located just south of the property boundary and 20 acres to the north of the site, for construction use, as shown on Figure 1.3-2 (Sheet 2). The Power Plant would also be situated within the 45-acre upland site area described above. The 15 acres to the south of the Terminal Site will be used during the construction period for the Dredged Material Recycling Facility (DMRF). The 20 acres to the north of the Terminal Site will be used during construction as a contractor yard and/or to support the DMRF.

Table 1.4-1 Aboveground Facilities Summary with Land Requirements

Project Component	Impact Type	Land Disturbed During Construction (acres)	Land Required for Operation (acres)
Sparrows Point LNG Terminal	Construction workspace and permanent operating area	198.6**	45*
Interconnect and Mainline Block Valve at Terminal	Construction workspace and permanent operating area	Included above in area of LNG Terminal	

Project Component	Impact Type	Land Disturbed During Construction (acres)	Land Required for Operation (acres)
Additional Pipeline Mainline Block Valves (nine locations)	Construction workspace and permanent operating area	0.9	0.5
Pipeline Interconnects (3 locations) – Transco, TETCO, Columbia	Construction workspace and permanent operating area	1.5	0.75
	Totals	**200.4**	**46.25**

Notes:
1 – Mainline Block Valves located to meet the requirements of 49 CFR § 192.179.
2 - * The Terminal Site comprises approximately 45 acres of upland area required for operation and has 35 acres of near-shore riparian rights area.
3- ** The land disturbed during construction at the Terminal Site includes the 45 acres required for operation plus the following:
- Approximately 35 acres onshore for temporary workspace for laydown and staging areas (20 acre area to the north and 15 acre to the south of the Terminal Site);
- Approximately 118 acres of aquatic areas affected by dredging and shoreline seawall construction activities associated with the LNG Terminal (including portions of the designated 35-acre of riparian rights area).

Additionally, an offshore area (identified in the table above and shown on Figure 1.3-2 (sheets 1 and 2) and on Appendix Figures 1C-1 and 1C-3), comprising existing marine and approach channels and waterfront area west of the former shipyard, will be temporarily affected by the dredging operations required to expand the shipping channel and turning basin. Although this area already has been impacted by historic dredging and ongoing maintenance dredging, the expansion will affect some areas not dredged in recent history.

1.4.1.2 Pipeline and Access Road Facilities

For the Pipeline facilities, temporary construction facilities will consist of contractor offices and trailers, pipeyards and construction equipment yards; additional workspace and staging areas; and temporary access roads. Permanent Pipeline facilities will consist of the Pipeline, the permanent ROW, and permanent access roads. The land requirements for these facilities are listed in Table 1.4-2.

Table 1.4-2 Pipeline Facilities Summary with Land Requirements

Project Component	Impact Type	Land Disturbed During Construction (acres)	Land Required for Operations (acres)
Mid-Atlantic Express Pipeline	Temporary construction and permanently maintained workspace	1,031.3	544
	Additional temporary workspace areas	215.2	0
	Temporary access roads	41.4	0
	Permanent access roads	(Included above)	1.4
	Pipeyards, contractor yards, offices/trailers	315	0
Mainline Block Valves (9 locations)	Construction workspace and permanent operating area	Included in aboveground facilities Table 1.4-1	
Interconnect – 3 locations: Transco, TETCO, Columbia	Construction workspace and permanent operating area	Included in aboveground facilities Table 1.4-1	

Totals	**1,602.9**	**545.4**

NOTES:
1-The Mid-Atlantic Express Pipeline temporary and permanent ROW are shown on the Project Alignment Sheets (in Appendix 1A).
2- Temporary Access Roads and yards (including pipeyards, contractor yards and trailers/offices) are shown on the Project Alignment Sheets and/or the USGS Topographic Quadrangle Maps (in Appendix 1A).
3- Anticipated locations of the temporary and permanent access roads used for calculating land disturbance. summarized above. A subset of these temporary access roads will converted to permanent access roads .

During construction, the standard width of the CROW will be 75 feet. This width may be expanded or reduced depending on site requirements. Typical cross section descriptions are shown on Figures 2a – 2d in Appendix 2B, and specific ROW width is shown on the alignment sheets in Appendix 1A).

Temporary construction land requirements for the Pipeline facilities are approximately 1,031 acres, not including the currently anticipated access road locations, yards and CROW described above in Table 1.4-2. The total land disturbed during construction will be approximately 1,602.9 acres. Permanent operational land requirements for the Pipeline facilities are estimated to be approximately 545.4 acres, including permanent ROW and access roads (as known to date).

1.4.2 Aboveground Facilities

Permanent land requirements for aboveground facilities associated with the Pipeline (such as interconnection tie-ins and mainline block valves) are limited to the footprint of the specific aboveground facility and sufficient area to secure the area around those facilities with fencing and provide needed access. Additional land at these locations may be required on a temporary basis during construction. The reasons for the greater requirement would include the need for sufficient access and adequate space for material laydown, equipment, and worker safety. The approximate land requirements needed for aboveground facilities are summarized in Table 1.4-1.

1.5 Construction Procedures

The Project will be constructed in accordance with applicable governmental regulations, permits, and approvals. Construction methods will be those that are consistent with industry-recognized practices, company policies, and BMPs. These are summarized in the following subsections. More detailed descriptions of construction methods will be prepared in construction specifications and drawings prior to the commencement of work. Construction will be performed in accordance with the FERC's recommended construction plans and procedures, unless more stringent regulatory requirements apply, or in accordance with requested variances if and as approved by FERC Staff. AES reserves the right, if necessary, to request variances to the FERC's Upland Erosion Control, Revegetation and Maintenance Plan and the FERC's Wetland and Waterbody Construction and Mitigation Procedures (FERC's Plan and Procedures). Currently, variances are not viewed as necessary. However, if deemed necessary, variance requests made by AES will be in writing, and will include the existing condition, the existing FERC requirement, the requested variance, and a description of how the variance is believed to be equivalent to or better than the existing requirement. AES's Environmental Construction Plan (ECP) is included as Appendix 2A to Resource Report 2, *Water Use and Quality*, and adopts the

FERC's Plan and Procedures, including additions or changes based on applicable state requirements.

Construction procedures will vary due to a variety of reasons (e.g., type of work, contractor performing the work, existing site conditions). To enforce compliance with the environmental mitigation measures identified in this Resource Report 1, as well as in Resource Reports 2 through 13, as applicable, or as may be required by the FERC, such measures will be incorporated, either directly or by reference, into applicable plans, procedures, drawings and specifications developed by AES and its contracted entities. The requirements, which will be used throughout the life of the Project unless otherwise changed in accordance with appropriate regulations, include, but are not limited to, the following:

- Dredging Management Plan, Resource Report 1, Appendix 1C;
- Environmental Construction Plan, Resource Report 2, *Water Use and Quality* Appendix 2A;
- Best Management Practices, Resource Report 2, *Water Use and Quality*, Appendix 2B;
- Spill Prevention Control and Countermeasures Plan, Resource Report 2, *Water Use and Quality*, Appendix 2C;
- Unanticipated Discovery Plan, Resource Report 4, *Cultural Resources*, Appendix 4C;
- Project Blasting Plan, Resource Report 6, *Geological Resources*, Appendix 6A; and
- Emergency Response Plan, Resource Report 11, *Reliability and Safety*.

Project Environmental Inspectors will monitor activities relative to these requirements.

A summary of agricultural and residential areas crossed, along with proposed construction methods and mitigation procedures is discussed in Resource Report 7, *Soils* (including Table 7.4-2). Wetland and waterbody crossings, along with proposed construction methods and mitigation procedures are discussed in Resource Report 2, *Water Use and Quality* (including Tables 2.4-1 and 2.5-1). Supporting information regarding CROW workspace, topsoil segregation, and construction techniques is available in the BMPs in Resource Report 2, *Water Use and Quality*, Appendix 2A.

1.5.1 Construction of LNG Terminal and Pipeline

An overall Project schedule is shown on Table 1.5-1. Assuming receipt of all required regulatory approvals and permits, Pipeline construction is planned to commence in early 2009, and to be completed in 2010. AES expects the Pipeline work to be completed during one construction season with the use of multiple construction spreads. If restoration is not completed by the 15th of November, a winterization plan will be implemented to stabilize and monitor

disturbed areas through the winter and subsequent spring thaw. All restoration activities are planned to be completed by no later than the year following construction. The CROW will be subject to follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of revegetation. As described in Appendix 2A to Resource Report 2, *Water Use and Quality*, AES will monitor and record the success of wetland revegetation annually for the first three years after construction, or until wetland revegetation is successful. Monitoring of restoration in agricultural lands affected by the Pipeline will continue until crop yields have returned to pre-construction productivity.

The crossing of environmentally-sensitive resources (e.g., waterbodies with fisheries) and agricultural lands (i.e., topsoil management) will be in accordance with state timing restrictions where applicable. This may require the use of pipeline tie-in crews to work out of sequence with the scheduled construction activities of a main construction spread.

Assuming receipt of all required regulatory approvals and permits, the LNG Terminal construction is planned to commence in 2008, and is expected to be completed in the first quarter of 2011. Separate construction crews are anticipated for the construction of the LNG tanks, marine facilities, LNG process facilities and offshore dredging activities; therefore, many of these construction activities will be undertaken simultaneously.

1.5.1.1 LNG Terminal Onshore Facilities

Construction of the tanks will include the following:

- Site preparation;
- Tank construction; and
- Inspection and corrosion protection.

A. Tank Construction Overview

The initial site work will concentrate on the site improvement and foundations for the storage tanks. The tanks will be supported on concrete H-piles and topped with a pile cap.

After the tank pilings and H-pile cap base slab are complete, construction will begin on the steel-lined, pre-stressed reinforced concrete outer tank wall and the outer tank roof. After the steel outer tank roof has been raised into position, the roof will be covered with reinforced concrete. Insulation will be installed for the tank bottom and then the nine percent nickel inner tank construction will begin. Once the inner tank has been completed, a perlite insulation system will be installed into the annular space between the inner and outer tank. A suspended deck with insulation will sit above the inner tank to retain the cold in the inner tank. Piping on the outside of the tank and the tank roof will be installed during inner tank construction. The inner tank will be hydrostatically tested after completion. Hydrostatic testing procedures are described below. The outer tank will be pneumatically tested per an approved procedure.

The "bulk" materials, including piping, insulation, electrical and instrumentation, will be received on-site in order to meet the work schedule. Subassembly (spooling) of pipe will begin as the pipe and fittings are received. Mechanical, electrical and instrumentation work will be concurrent with or closely follow pipe erection. Following the completion of pipe testing, pipe painting (as needed) and insulation will be conducted concurrent with electrical and instrument installation.

As the process, mechanical, electrical and instrumentation work is completed, pre-commissioning activities will begin. Instruments will be calibrated before loop checks of the electrical and instrumentation circuits are completed. When the pre-commissioning activities are completed, the tanks and systems piping will be cleaned, hydrostatically tested (as described below), dried and then purged with nitrogen. When the Project is ready for the first shipment of LNG, the tank will be purged of nitrogen gas and then cooled down using either LNG or nitrogen. Use of LNG for cooldown will require a loaded LNG ship to be furnished for approximately five days for the cooldown and subsequent filling of the tank.

Equipment required for construction of the LNG Terminal will include cranes ranging in size from 30-ton to 200-ton capacity, multiple portable welding units, scaffolding, equipment trailers and nondestructive test equipment. It is estimated that a maximum labor force of approximately 325 on-site personnel will be required for each tank and LNG system construction. Site improvements, construction of the tanks and associated processing and delivery systems will take approximately 32 - 34 months to reach commercial operations.

B. Hydrotest Procedure

The LNG tanks and piping at the Terminal Site will be hydrostatically and pneumatically tested in compliance with the applicable codes that govern the pipe and/or tank design. Water from the Patapsco River will be used for the hydrostatic testing. Permits for water extraction and release will be obtained as needed in each location tested, and municipal sources will be used if no sources are available nearby. Each LNG tank hydrotest is expected to require approximately 28 million gallons (102,000 m^3) of water. Hydrotest water will be filtered and discharged in accordance with applicable permits. Following the hydrotest, a potable water spray rinse (of approximately 100,000 gallons (380 m^3) per tank) will be conducted if seawater or brackish water is used for the hydrotest. Potential withdrawal sources of hydrotest water will be located during detailed design and engineering. Additional details regarding the hydrotest procedure are provided in Resource Report 2, *Water Use and Quality*.

C. Tank Painting and Corrosion Protection

The concrete outer tanks do not require a coating for corrosion protection. Other exterior surfaces of the tanks will be provided with corrosion protection by painting or galvanizing of all carbon steel structures. The LNG storage tank structural steel will be painted with the exception of the galvanized items.

D. Demolition, Site Filling & Ground Improvements

Demolition of selected structures existing at the Terminal Site will be needed to prepare the site for construction. The shipyard formerly consisted of ten slips used for ship construction and/repair. Slip Numbers 1 through 5 are already demolished, and the area they occupied is at a common grade. Portions of the remaining slips (Nos. 6 through 10) are used for hauling out and dismantling barges. Behind these slips to the east, the site contains two large buildings, a metal sided structure (known as the "Panel Building"), and a masonry structure (the "Fabrication Building").

For development of the LNG Terminal, the remaining slip structures will be demolished and the associated area leveled to the site's common grade. The Panel Building will also be demolished. A new shoreward bulkhead line will be established to straighten out the waterfront – the approximate alignment of the new sheet pile bulkhead is shown in Figure 1.3-2 (Sheet 2). Existing finger piers and low-level relieving platforms that lie offshore of the new bulkhead alignment will be removed as required.

Once the new bulkhead is established, additional fill may be added to the Terminal Site to bring it to a consistent grade. Fill to bring the site to grade will be obtained from the processed dredge material (PDM), pending determination of engineering and environmental properties and matching of the schedule between the dredge operations to initial construction of the LNG Terminal. As described in Section 2.4.3 of Resource Report 2, Water Use and Quality, AES has performed environmental analysis of the proposed dredge area sediment as part of the Terminal Site geotechnical investigations. The analysis performed to date has indicated that the nature of contaminants that are present are consistent with material dredged from other areas comprising the Port of Baltimore (see Resource Report 2, Water Use and Quality). Elutriate testing of sediment samples (also summarized in Resource Report 2, Water Use and Quality) indicated no exceedance of water quality toxicity criteria in the water elutriate, indicating that the dredge material, untreated, is not expected to contravene water quality criteria. In addition, the treatment methods used for dredge material recycling utilize admixtures to both chemically and physically stabilize the dredged sediment. Specific agents that are admixed (such as Portland cement, pozzolanic materials, etc.) will be tailored to match sediment makeup (grain size, moisture, etc.) and chemical quality so that the recycled material produced meets physical properties for intended application (like flowable fill or sub-base aggregate-type material), and will not leach contaminants once it has been processed. AES will perform additional sampling and characterization of the sediment in the proposed dredge area, in accordance with COE dredge permit application requirements (if required), to further characterize the levels of contamination (if present). If required by permit conditions, this additional sediment sampling and analysis will be performed during the first quarter of 2008.

If required, AES will conduct the appropriate treatment of the sediment at the DMRF discussed in Section 1.5.1.2.A below. AES will ensure that PDM meets applicable environmental standards prior to use and placement as fill material.

If the dredge material is found to be unsuitable for use based on chemical or engineering properties, engineered soil fill for the Terminal Site construction will be imported from a local commercial source. Material will be obtained from a commercial source that can

provide documentation that the soil meets the engineering requirements and does not contain environmental contaminants in quantities above acceptable limits.

E. Buildings

The structures associated with the on-shore portion of the LNG Terminal will include the existing Fabrication Building, which will be refurbished to house the control room, administrative functions and utilities; the compressor building; various other structures (fire pump house, security building, etc.); and the potential future Power Plant. Refurbishment of the Fabrication Building will include repair/replacement of portions of the roof, removal of hazards, and repair of interior foundations. Other site buildings will require new construction, and will be constructed in accordance with code requirements commensurate with their function. Where permitted, buildings will be constructed on concrete slabs.

F. Foundations and Process Equipment

The techniques used to construct the foundations for the associated structures (those structures other than the LNG storage tanks) will depend on the soil bearing capacity of the selected site. Options for the foundations include the use of H-pile supports or spread footings. Foundations will be constructed of reinforced concrete and designed according to standard engineering practices. Foundations for all process equipment and large machinery will be completed before the units arrive on-site.

This scheduling reduces the need for temporary storage, extra movement and lifting, all of which can damage the equipment. After the machinery is set on its foundation, it will be leveled and shimmed before securing the anchor bolts, with grouting being installed when required by the equipment manufacturer. Final alignment of rotating equipment will be performed after the final attachment of the pipe. After final alignment, pre-commissioning will begin with lubricant filling and initial electrical energizing for motor "directional rotation" checks. The systems will then be placed in service to support the balance of plant start up activities.

G. Piping

Typically, pipe is pre-fabricated in segments (spools), which allows complicated pipe segments to be completed more easily and within weather protected structures. AES expects to have some pipe spools fabricated by a vendor off-site, and will also produce some pipe spools on-site. Piping will be fabricated and installed according to ASME B31.3 standards. Installation will conform to the final design plans and specifications. Welders will be qualified according to ASME Section IX. For LNG and other cryogenic and flammable pipe services, the use of flanges or other potential leak sources will be minimized in the design.

Shortly after any process equipment is set and secured to its foundation, pipe attachment will begin. If the pipe is pre-fabricated, the final closure welds will not be completed until the equipment is set, to prevent pipe connection misalignment.

Long lengths of pipe that are installed on a pipe rack and/or structural supports often are installed "in position". The pipe is laid on the pipe rack, after which temporary support rolls are installed so that the pipe lengths can be "rolled" during jointing or welding.

When the jointing work on the long pipe rack lengths is completed the temporary support rolls are removed. Hydrostatic or pneumatic testing of the pipe is conducted as soon as valves and/or flanges are attached. All the cryogenic piping will be pneumatically tested.

The pipe and mechanical installation work is expected to be performed at many locations within the LNG Terminal at the same time. Scheduling of the pipe work in an area is often determined by the deliveries of the major process equipment. Pipe and plumbing work inside the buildings will be included as part of the building construction, or will be scheduled for installation concurrent with the building interior work.

H. Systems Painting and Corrosion Protection

Piping will be delivered to either the job site or subcontractor for blasting and priming prior to erection on-site. Purchased items that will be installed within a building will use manufacturer's standard coating systems. The equipment to be located outside will have a coating system that is compatible with the Project coating system and operating environment.

I. Storm water Management System

Storm water will be pumped out of site impoundments and pass through an oil-water separator prior to flowing into the existing water treatment system. Other storm water collecting on the site will gravity flow to the existing system. Discharges will be monitored and tested. Resource Report 13, Engineering and Design Material, describes the storm water system in detail in Section 13.7.6, and schematics are provided in Appendices U.5 and U.6 of Resource Report 13, Engineering and Design Material.

J. Roads, Curbs and Sidewalks

Road work is typically the last item to be completed. This work will be scheduled after the heavy equipment (cranes, heavy haul trucks, etc.) have completed their work, so as to avoid and minimize damage to the roadways by heavy equipment. Most roadways will be paved.

1.5.1.2 LNG Terminal Offshore Construction

Dredge equipment and support vessels (tugs and fuel tenders) will be mobilized to the Terminal Site along with aboveground storage tanks for fuel oil storage during the initial stages of site preparation. The fuel storage tanks will arrive in a ready for placement condition and will be installed and secured according to manufacturer's recommendation.

A. Dredging

Construction of the LNG Terminal will include widening and deepening the existing approach channel and turning basin offshore of the Terminal Site to accommodate the LNG ships expected at the LNG Terminal, which will be larger than the ships that have utilized the existing shipyard, floating dry dock and graving yard/coal channel (south of the proposed Terminal Site) to date.

The Brewerton Channel, the existing approach channel, and certain areas offshore of the proposed Terminal Site, have been dredged in the past and currently are the subject of dredging permits issued by the COE and a Water Quality Certification from the State of

Maryland, allowing the performance of dredging using hydraulic or mechanical techniques. Dredging of the approach channel and areas offshore of the proposed Terminal Site is allowed under these existing permits for maintenance and waterfront operations, to a depth of -39 feet MLLW. In addition, on May 6, 2005, the COE issued a permit to BWI-Sparrows Point LLC (CENAB-OP-RMN [BWI-Sparrows Point LLC/Dredging] 04-64865-1), approving:

- mechanical or hydraulic dredging of a channel, turning basin, and berthing areas to -39 feet MLLW;
- placement of approximately 600,000 cubic yards (CY) of dredge material at the Hart-Miller Island disposal site; and
- Installation of sheet piling and construction of fendering systems.

The permit also approved a subsequent phase, consisting of the deposit of approximately 2.6 million CY of dredge material at disposal sites yet to be determined.

As described above, actual volume to be dredged and material handling requirements may be less than discussed by this Resource Report 1 depending on bathymetric configuration of this area at the time of LNG Terminal construction. The approach envisioned here has been developed to anticipate dredge operations based on current bathymetry (i.e., bathymetry as of Spring 2006). AES has also allowed for methods that may be needed if dredge volumes are greater than projected, and/or if the environmental quality of dredge material in sections of the dredge area is degraded relative to currently permitted dredge materials. AES will follow procedures for dredge performance consistent with recent past dredge approvals for this location, as updated based on data collected for this project. AES has analyzed the existing sediment conditions in the proposed dredge area as described in Section 2.4.3 of Resource Report 2, *Water Use and Quality*. Additionally, AES has evaluated past dredge practices, existing dredge technology, anticipated impacts and proposed mitigation strategies, as described in Section 2.4.8 of Resource Report 2, *Water Use and Quality*.

The approach channel expansions will be performed primarily by use of mechanical clamshell dredge, or an environmental bucket technology if required, with some limited areas near shore excavated by backhoe dredge. Conventional mechanical dredge techniques will be used, or if chemical analyses obtained for dredge planning indicate sediment quality is more significantly degraded than is allowed by current dredge permits, environmental dredge bucket removal or equivalent would be used, as discussed in Section 2.4.8 of Resource Report 2, *Water Use and Quality*. The limits of the existing approach channel and turning basin, and proposed expansion area, are shown on Appendix Figures 1C-1 and 1C-3. A summary of the dredging proposed, and establishment of the recycling facility appear below; additional detail appears in Appendix 1C.

Dredged Material Recycling Facility

As part of the construction phase, AES will construct the DMRF adjacent to the existing waterway at the Terminal Site. This phase will precede actual dredging operations. The purpose of the DMRF is to process material excavated from the water bottom into one or more useful products that will be temporarily stored in a new location near the DMRF until transferred to the ultimate end users of the new product(s). Operation of the DMRF will not require onshore or unconfined placement of any dredge materials.

The 10,000 CY per day DMRF will occupy approximately five acres of the 15 acres of upland property located immediately to the south of the Terminal Site (see Figures 1C-2 and 1C-3 in Appendix 1C). The DMRF will consist of two systems processing in parallel, each of which will include hoppers, conveyors, pugmills for mixing additives, and stacking equipment. Emissions from each pugmill and additive delivery system will be equipped with and controlled by separate baghouse dust-collection devices.

Existing site roadways will be used to transport the PDM from the pugmill processing system to the temporary PDM storage area. The temporary PDM storage area will consist of an approximately 10-acre area (within the 15-acre upland area) covered by bituminous paving, or lined with a 10-mil high density polyethylene (HDPE) liner covered by 6- to 12-inches of existing site soil or imported soil. A scale house and truck scale will be located adjacent to the temporary PDM storage area for weighing of the outbound shipments of the PDM product upon sale. Existing site roadways will be used for outbound shipments of the PDM product.

The DMRF and temporary PDM stockpile area will be graded as necessary and paved with bituminous concrete, and equipped with stormwater management controls tied to existing facilities.

After civil work is completed, the DMRF will be erected at the Terminal Site. All components of the processing systems will be fabricated off-site and delivered via truck to the construction site.

Operation of the DMRF will occur during the LNG Terminal construction phase, and processing will commence simultaneously with the commencement of dredging operations.

An additional area, approximately 20 acres in size, is available for use as a contractor yard for LNG Terminal construction or to support the DMRF facility, as needed for PDM or equipment storage. If utilized to support the DMRF operations, the site will be prepared consistent with the description above (e.g., paved, stormwater controls, etc). This 20-acre area is located north of the Terminal Site as shown (labeled Temporary Equipment Laydown and Storage Yard) on Figure 1.3-2 (Sheet 2).

Dredging Operations

Dredging associated with the LNG Terminal is anticipated to begin in the berthing area, and progress in reaches towards the outer channel to allow for earlier commencement of pier/dock construction operations. The anticipated limits of the area to be dredged are

shown on Figures 1.3-2 (Sheet 1) and 1C-3. Assuming the anticipated dredged channel and turning basin depth of 45 feet, it is estimated that approximately 3.5 to 4.0-million CY of dredged material will be generated for recycling. Maintenance dredging under current permits may decrease this amount somewhat, depending on the amount of dredging performed prior to LNG Terminal construction in areas of overlap.

Dredging will be conducted utilizing a mechanical (clamshell) dredge, or if conditions warrant, with an environmental bucket or suitable alternative if required by permit condition, as further discussed in Section 2.4.8 of Resource Report 2, *Water Use and Quality*. A directional Global Positioning System (GPS) will be used to locate the channel limits and to identify shoaled areas. Sediment will be removed to the design depth of 45 feet below MLLW. Computer-controlled recording software will track the progress of the dredging and will ensure complete coverage of the area to be dredged.

Dredging production is expected to be up to 10,000 CY per day, and operations are expected to last approximately 24 months. It is anticipated that ten to fourteen 1,500 to 3,500-CY work scows will be used. All scows and containers will be of solid hull construction, and will be completely sealed and watertight in order to avoid any release of dredge material.

The initial step in processing dredged materials is the reduction of the water content of the dredged sediments. The proposed dewatering process would involve dewatering of loaded barges at the dredging site or the DMRF. Loaded scows would be allowed to settle so that the free-liquid portion would be visibly free of suspended sediments prior to pumping the decant water to the cargo area of a dedicated dewatering barge. After settling, the decant water will be discharged within the area of dredging after testing for suspended solids or as required by permits. Alternately, after the initial barge settling period, portable pumps will be utilized to pump the water to land based tanks (i.e. frac tanks) for additional settling. All decant water from dewatered dredged material at the DMRF will pass through a settling tank system and filter prior to discharge back to the harbor. Chemical and physical analysis will be conducted on the decant water in accordance with an MDE Water Management Program Individual Permit for Industrial Water Discharge that will be issued for the DMRF. Threshold values for discharge will be set forth in that permit. Following this secondary settling, the water will be filtered and discharged under applicable permit conditions. If chemical analysis indicates the presence of contaminants in the water, at concentrations in excess of allowable regulatory limits, options for onsite treatment prior to discharge or offsite treatment and disposal will be evaluated. If feasible, the water will be treated to meet applicable Federal, State and/or local standards prior to discharge. Alternatively, offsite disposal options may be utilized and include the local Publicly-Owned Treatment Works (POTW) or a privately-operated treatment, storage, disposal (TSD) facility. AES has identified three offsite facilities that may potentially be able to accept the contaminated water, if required. These potential sites include Clean Harbors Baltimore, MD; Veolia Environmental Services (VES) York, Pennsylvania; and Waste Management Industrial Services, Crofton, MD.

After raking, the raw dredged material will be stevedored from the work barges directly into a pugmill processing system utilizing hydraulic excavator(s) equipped with hydraulic closed clamshell bucket(s). At no time will the raw dredged material be stored on the Terminal Site or elsewhere. The screened raw dredged material will be fed to a twin-shaft pugmill blending system and mixed with reagent admixtures. After mixing, the PDM will empty from the pugmill onto a radial stacking conveyor. The "radial stacker" can be positioned to load directly into trucks, or to stockpile the material for re-handling to trucks, railcars, or back to hopper scows.

Following processing, the PDM will be transported via on-site trucks to the designated staging area within the permitted temporary storage site. The PDM will be placed using hydraulic excavators, bulldozers and vibratory compactors into large stockpiles for temporary storage in inventory until the material is sold for beneficial use.

The PDM will be trans-loaded by wheel loaders or hydraulic excavators into road trucks for off-site shipment to ultimate destination sites. While dredging production and dredged material processing will be at a rate of 10,000 CY per day, transportation offsite of PDM will be at a rate of 5,000 CY per day. The schedule to remove PDM is twice as long as the schedule for dredging and processing. AES anticipates approximately 220 truck trips a day hauling PDM off-site (assuming 276 hauling days per year). This equates to approximately 5,500 tons of PDM shipped off-site daily. Alternatively, PDM may be transported by rail car (capacity per rail car is approximately 98 to 108 tons), or a combination of trucking and rail car to its destination; each rail car would transport the same volume as four to five trucks.

Potential uses for the PDM include:

- Abandoned mine land and quarry reclamation;
- Brownfields redevelopment;
- Landfill capping and closure;
- Alternate grading materials;
- Low permeability cap layer in lieu of geo-membrane systems;
- Manufactured top soil;
- General structural and non-structural fill for commercial / industrial development; and
- Bulk construction fill, including site grading material and highway embankments.

While AES has not identified the specific applications for the re-used dredged material at this time, all of the uses listed above have been demonstrated as both technically and commercially viable in other similarly-affected port/harbor sediments and settings, and regulatory jurisdictions. Final determination of the application(s) will be made prior to initiation of the dredging activities and will depend on market needs and conditions at that time. Because the Project proposed by AES is a private, non-governmental, venture,

all costs associated with the dredging and delivery of the recycled product(s) will be carried by AES.

Further details and specifications regarding dredging, equipment, schedule, spoils handling and processing is provided in Appendix 1C - Dredging Management Plan.

Other potential options for management of dredged material include off-site disposal, open ocean disposal at approved off-shore locations, and upland fill sites, as described in Section 10.5.2 of Resource Report 10, *Alternatives*. All of these potential options also depend on the chemical makeup of the dredged material, receipt of approvals from applicable agencies and, in some cases, approval by the receiving facility(s). These other alternatives are not currently considered to be as viable as the recycling alternative, and they are not as consistent with the Port of Baltimore's long term goals for management of dredged material as the recycling option.

B. LNG Berths

The construction process for the LNG ship berths will include the rehabilitation of an existing pier, installation of an elevated unloading platform, and the installation of an elevated pipeway and associated spillway.

Pier rehabilitation will include the concrete encasement, and/or splicing of the existing piles, repairs to the concrete cap, and repairs/resurfacing of the existing concrete deck. The repairs to the piles and caps will take place from floating construction barges. The floating construction barges provide the ability to be repositioned as required in the working area in order to provide uninhibited access to the items being repaired, ensuring that proper construction techniques can be utilized.

Pre-cast concrete elements for the unloading platform, pipeway and associated spillway will be set into place via crane, which will be located either on floating construction barges or the existing pier, pending space availability. The floating construction barges will be anchored into place with spud piles. These construction barges provide the ability to be repositioned as required in the working area in order to provide uninhibited access to the item under construction, ensuring that proper construction techniques can be utilized.

The cast-in-place concrete elements to support the deck rehabilitation, unloading platform, pipeway and associated spillway will be constructed from floating construction barges or landside, as space allows. As noted for the precast elements and pier repairs, floating construction barges will provide the ability to be repositioned as required in the working area in order to provide uninhibited access to the item under construction, ensuring that proper construction techniques can be utilized.

Once the rehabilitation of the pier deck has been completed, the elevated steel structure will be built to support the unloading platform, pipeway and spillway. This construction

will take place from the land side; however, the final setting of the unloading arms will take place from a construction work barge.

C. Bulkhead-Sheet Pile Installation

A king pile steel sheet pile bulkhead will be installed along the western limits of the upland facility. The steel sheets will be driven with either a vibratory or impact pile driving hammer. Where accessible, the piles will be driven from land based rig. In locations where access is from the waterside only, the piles will be driven by a rig based on a floating construction barge. The barge can be anchored into location with spud piles to provide a stable working area. Templates will be used to ensure that the sheet piles are driven in the proper location, and that plumbness is maintained within acceptable limits.

1.5.1.3 Pipeline Facilities

AES anticipates that the construction of Pipeline facilities within one construction season will require multiple construction spreads. Each spread will utilize standard overland pipe lay construction techniques for similarly-sized pipe diameters. Construction will take place within approved workspace limits. Each spread will generally follow a set of sequential construction phases, outlined below, and proceed along the CROW in a continuous operation. Typical construction techniques for specific elements (such as waterbody or road crossings) are provided in BMP Figures located in Appendix 2B. Information regarding the construction controls and restoration techniques are included in the Sparrows Point Project ECP, which is based on the FERC Upland Erosion Control, Revegetation and Maintenance Plan and FERC Wetland and Waterbody Construction and Mitigation Procedures. The Project ECP is located in Resource Report 2, *Water Use and Quality*, Appendix 2A.

An annual average of 200 workers is anticipated to be employed for direct Pipeline construction. Crews associated with a spread will vary depending on the selected contractor and execution plan prepared, but elements normally include the following:

A. Surveys & Marking ROW

Surveys will be completed to identify the Pipeline centerline, exterior CROW limits, and areas where ATWS is needed. Once surveyed, locations along the CROW will be marked (e.g., flagged, staked). In addition to centerline and limit surveys, other resources will be identified along the route. These will include environmental and archaeological resources; geologic and topographic features; land-types and uses; other utility crossings (e.g., pipelines, power lines, railroads, and other wires/cables); agricultural land and drainages; and access roads. Information surveyed to date has been incorporated in the Alignment Sheets (Appendix 1A), and where properties do not become accessible during project development, the surveys will be completed as soon as access is available, and that information will be provided to the FERC. Surveys for design and construction purposes will be performed separately as needed.

Prior to construction the centerline and corridor limits of the CROW will be marked (e.g., flagged, staked) to support the construction and environmental inspection activities. The CROW marking will include ATWS areas, access roads, and environmentally- or

culturally-sensitive features (e.g., wetlands, waterbody crossings, archaeological avoidance areas, etc).

B. Clearing and Grading

The Pipeline CROW will be cleared of vegetation. A combination of heavy equipment and sawyers will be used to remove large trees, heavy brush, and small trees, but ground cover (i.e., including bushes) may remain until grading is required. Grading creates a safe working platform to construct project facilities. Marketable timber cleared from the CROW will be managed in accordance with the landowners' agreements, and other timber may be given back to the landowner (e.g., for fire wood), used as timber riprap in wetland crossings, or properly disposed of as construction debris (e.g., burned, chipped or hauled to an approved disposal site). Displaced soils normally will be stockpiled along the CROW to minimize the need and potential impact of additional haul vehicles. However, in locations where the CROW is restricted, these soils may be stockpiled at a different location. In areas where topsoil segregation is required, topsoil will be segregated and stockpiled in such a manner that it is conserved and can be returned to the CROW.

To manage stormwater surface flow, regular breaks (gaps) in windrowed spoil piles and diversion structures will be used to manage cross drainage needs. Gaps in windrowed spoil (and topsoil piles) will allow surface water to migrate across the CROW in such a way as to minimize up-gradient flooding and downstream sedimentation. Gaps will be located at regular intervals and/or where appropriate due to site conditions (e.g., depressions in terrain where water will likely concentrate).

C. Trenching

Trenching will be accomplished with backhoes and/or mechanical trenching machines. Under typical conditions, the average trench depth will be no less than 60 inches, to accommodate the 30-inch diameter pipeline and 36-inches of cover. In agricultural areas and at certain crossings (e.g., roads, waterbodies), the trench depth will be greater in order to achieve the greater depth of cover requirements. The trench width will vary based on site conditions (e.g., soil types, bedrock, and presence of groundwater). In areas where shallow bedrock and/or large boulders are present, specialized construction techniques to remove the rock may be necessary (e.g., blasting, rock hammer). Blasting is discussed in the Specialized Construction Methods and Crossings section below.

Similar to grading activities, considerations for cross drainage will be made while trenching and where stormwater runoff flows are a concern. Flume pipe (e.g., appropriately sized steel, polyvinyl chloride [PVC], or iron piping) or diversion berms/ditches may be used where needed to direct stormwater across the trench and away from the CROW. Inlet and outlet structures may also be necessary to prevent erosion and scouring. Additionally, on sloping terrain, a combination of trench plugs may be used to prevent water from scouring the bottom of the trench line. Trench plugs are made of

earthen material and can be characterized as soft or hard. Soft plugs will be excavated and the spoil re-compacted in the trench. Hard plugs will not be excavated.

D. Pipeline Laying

1. Pipe Stringing and Bending

Sections of line pipe (joints) will be strung along the CROW and adjacent to the trench, set on wooden supports (skids), and arranged so they are safely accessible to construction personnel. Joints vary in length and can be individual (i.e., a single length of pipe) or double-jointed (i.e., two lengths of pipe pre-welded offsite). Pipe joint lengths from the mill can vary from 40 to 80 feet, and can be cut as needed in the field. Depending on CROW requirements and restrictions, some pipe bends may be pre-manufactured at the pipe mill (factory bends). For all other bends (field bends), a mechanical pipe-bending machine will bend joints to the desired angle at locations where there are unique changes in the natural ground contours.

2. Pipe Assembly and Field Welding

After the stringing and bending are complete, pipe sections will be aligned and welded together. All welding will be performed in accordance with the Project's Welding Procedure Specification (to be developed during design of the Project), by qualified welders who have passed specified qualifying tests. Welders and welding procedures will be qualified according to applicable American National Standards Institute (ANSI), American Society of Mechanical Engineers (ASME), and API standards.

3. Nondestructive Examination, Inspection, and Weld Repair

All welds will be inspected (100 percent), both visually and by nondestructive examination (NDE). Visual inspection will be carried out on all welds to check for imperfection(s) that can be seen with the naked eye. Weld imperfections will be rejected and repaired upon identification (i.e. before NDE). Welds will then be inspected using the NDE process (i.e., x-ray examination) for imperfections that are not visible with the naked eye. The NDE acceptance criteria will be in accordance with API 1104. The USDOT regulations (49 CFR §§ 192.241, 243) includes the minimum NDE inspection requirements of 100 percent in Class 3 and 4 areas and at major crossings, which includes all of the Pipeline.

Detailed records of all welds, including successful welds, welds that are repaired, and those that are cut-out, will be maintained for each weld as it is completed. The records will include identification serial number; the location of the weld; the date it was produced, qualified procedure reference number; welders' names, and reference numbers. These records will be maintained in the permanent files associated with the Project.

4. Pipe Coating, Inspection and Repair

Line pipe will be coated to protect it from the environment and accelerated degradation. Line pipe is normally mill-coated or yard-coated prior to stringing. However, line pipe also requires a coating at the field welded joints where bare metal has been exposed. Prior to lowering the pipeline segment into the trench, the pipeline coating will be visually and electronically inspected to locate and repair coating faults or voids.

E. Backfilling

Once the welds and coating have passed inspection, and just prior to lowering-in, the trench will be checked for sharp edges that could damage the pipe, and/or its coating during installation, i.e., "crumbing" the line. Next, sand bags with clean fill will be placed along the trench bottom to support the pipe allowing the padding material to sufficiently surround the pipe. In areas where the backfill has the potential to damage the coating, the pipe will be wrapped in rock shielding material to provide additional protection.

The welded pipe section to be lowered-in is typically placed into the trench with pipe slings and side-boom tractors. Once the pipe is lowered, trench breakers will be installed on sloping terrain and/or at sensitive environmental crossings, to prevent the subsurface conveyance of water which could create void space and subsidence or drain environmental features. Clean fill (e.g., soil, sand) will be used where needed as padding material to provide protection to the pipe and coating. The material used for padding will be selected in accordance with permit conditions and project engineering specifications, and under no circumstances will topsoil be used as padding or backfill material. The trench will then be rough backfilled using backfilling equipment (e.g., bulldozers, track hoes) to protect the pipe until final restoration can be completed. No foreign materials (e.g., construction debris) will be permitted to be used as backfill material. If allowed by permit conditions and landowner agreements, excess rock and woody debris (e.g., stumps, brush) may be buried onsite within the CROW, or windrowed along the edge of the CROW. Otherwise, these materials will be properly disposed of off-site as construction debris.

F. Testing

Prior to commissioning, the Pipeline will be pressure hydrotested in accordance with engineering specifications and regulatory approvals. Proposed sources of test water are discussed in Section 2.4.5 of Resource Report 2, *Water Use and Quality*. The Pipeline will then be tested in sections to a pressure in excess of the MAOP for a specified period of time. Test sections will be determined by pipe wall thickness and elevation changes. Once the test of a section is successfully completed, water will be re-used to the extent possible. The test water will be discharged in accordance with regulatory and permitted requirements. Details regarding the testing, segments and water withdrawal/discharges are summarized in Resource Report 2, *Water Use and Quality*, Appendix 2F, the Mid-Atlantic Express (MAE) Pipeline Hydrotesting and Pre-Commissioning Plan.

G. Restoration and Cleanup

Cleanup of Pipeline activities will include removing construction debris (i.e., including un-used and surplus materials), temporary construction structures, and equipment.

Restoration will consist of returning the CROW and areas disturbed by construction activities to pre-existing contours and hydraulic regimes. Normally, final restoration occurs within 10 to 20 days of rough backfilling. Permanent erosion and sediment controls will be installed (e.g., waterbars on sloping terrain), and the CROW will be re-seeded and/or mulched per permit requirements and landowner agreements. Pipeline markers will then be installed. Soil adjuncts and fertilizers may be added where necessary. Temporary erosion controls will be removed when the area has been stabilized in accordance with applicable permit requirements. The revegetation will be monitored for at least two growing seasons following final restoration.

H. Special Construction Techniques, Crews or Work Areas

In addition to the standard construction practices listed above, the following special construction methods and crossings are likely to occur throughout the construction phase.

1. Tie-In Crews

Tie-in crews are normally self-sufficient crews that work in tandem with the construction spread. They have equipment, welders, and labor to perform a specialized task (e.g., waterbody/wetland crossing, road crossing). Tie-in crews are also used in areas that will normally slow-down the main spread, or in locations that have been skipped for temporary lack of access.

2. Additional Temporary Workspace

ATWS will be needed at locations requiring additional excavation; soil placement requirements; or staging of additional equipment and/or materials. Examples include:

- Road and railroad crossings,
- Wetland and waterbody crossings,
- Areas with steep slopes (greater than 25 percent) and side hills,
- Areas requiring topsoil segregation (e.g., agricultural lands),
- Equipment turnarounds and spread move-arounds,
- Hydrotest fill and spill locations and test locations,
- Pipeline crossovers,
- HDD entry and exit points (i.e., including false CROWs), and
- Equipment and material staging areas.

The size and configuration of an ATWS is dependent upon its purpose as well as the existing site conditions (e.g., available and/or accessible space, nearby resources) at each proposed work location. Proposed ATWS locations, including dimensions and purpose, are shown on the alignment sheets in Appendix 1A, and are listed in Resource Report 8, *Land Use, Recreation, and Aesthetics*. ATWS

locations are shown on the Project Alignment Sheets (Appendix 1A) and are included in the total acreage area to be affected by construction, as shown in Table 1.4-1.

3. Temporary Construction Facilities

Temporary construction facilities will include contractor offices; pipeyards and laydown areas; warehouses and equipment and material staging areas; and fabrication areas. The number, size, and location of these facilities will depend on the location of the Pipeline Route, route accessibility, local infrastructure, and the general construction implementation plan. Upon completion of construction activities, areas used for temporary construction facilities will be restored to pre-existing conditions or better. Temporary construction facility locations are shown on the USGS Topographic Maps (Appendix 1A) and are included in the total acreage area to be affected by construction, as shown in Table 1.4-1

4. Access Roads

Access roads will be necessary during construction activities to provide temporary access to the CROW in addition to public road access. To the extent possible, existing access roads will be used for this purpose. In some instances, improvements will be necessary (e.g., widening and reinforcing). Once temporary access roads are no longer necessary, they will be returned to their as-found condition or better, subject to the requirements of applicable permits and landowner agreements. Access roads will be designed and constructed in accordance with local and state standards and codes (e.g., with respect to specifications, materials, adequate drainage). Access road locations are shown on the Project Alignment Sheets (Appendix 1A) and are included in the total acreage area to be affected by construction, as shown in Table 1.4-1

5. Road and Railroad Crossings

The proposed Pipeline Route crosses major roadways and railroads along which, in some instances, traffic cannot be interrupted. These will be crossed by using trenchless construction techniques. These techniques include boring (see Appendix 2B, BMP 14) and/or HDD (see Resource Report 2, *Water Use and Quality*, Site Specific Crossing Plans in Appendix 2B-2 for details on HDD) crossings. AES anticipates using bores for road and railroad crossings except where, following consultation with the appropriate authority (e.g., town, county, local railroad), an open-cut crossing (see Resource Report 2, *Water Use and Quality*, Appendix 2B, Figure 14) is determined to be feasible. Minor roadways and drives will be crossed by open trenching. Once completed, roadways will be restored in accordance with engineering specifications, to pre-construction conditions or better. Furthermore, when construction activities occur within public roadways, provisions will be made for appropriate signage and, when necessary, temporary detours or other traffic control measures to allow safe traffic flow during construction.

6. Wetland and Waterbody Crossings

The proposed route for the Pipeline has been selected to avoid or minimize where practicable impacts to wetland and waterbody areas located in the vicinity of the Project Area, as described in Resource Report 2, *Water Use and Quality*, and Resource Report 3, *Fish, Wildlife, and Vegetation*. Construction in these areas will be performed in accordance with the FERC's Wetland and Waterbody crossing procedures and applicable permit conditions, unless more stringent regulatory requirements apply or in accordance with variances requested in this application. Further discussion of wetland and waterbody areas and resources in the vicinity of the Project Area is included in Resource Report 2, *Water Use and Quality*, and Resource Report 3, *Fish, Wildlife and Vegetation*. A copy of the FERC's Wetland and Waterbody crossing procedures (along with any requested modifications) is attached to Resource Report 2. BMPs for water body crossings (BMP 17, 18, 18a, and 19), wetland crossings (BMP 23 and 24) and site specific waterbody crossings are provided in Appendix 2B of Resource Report 2, *Water Use and Quality*.

7. Dewatering

Dewatering activities may be necessary to remove excess water from the trench line during periods of excessive precipitation or high water table. Dewatering activities will be performed in accordance with AES's BMPs or the Project ECMP (based on FERC's Plan and Procedures). Under no circumstances will heavily silt-laden waters be directly discharged into wetlands or waterbodies (see BMP 20 for typical filter bag usage). To the extent possible, discharges will occur in well-vegetated uplands areas on stable, non-erosive surfaces. If dewatering locations are selected that are not within or immediately adjacent to the CROW, they will be sited to avoid and minimize off-CROW impacts. If dewatering locations must occur within sensitive areas (e.g., designated wetland areas), prior approval will be sought and (if approved) multiple sediment controls will be used consistent with the ECP to prevent adverse impacts. A copy of the Project ECP is attached to Resource Report 2, *Water Use and Quality*, Appendix 2A.

8. Agricultural Crossings

In selecting the Pipeline Route, AES considered avoidance, to the extent feasible, of sensitive soils that are of high agricultural value. Inquiries have been initiated with landowners and agricultural agents to determine the locations and configuration of drain tiles and other important features (diversion ditches, etc.) to avoid or accommodate during construction. AES will continue to work actively with landowners to identify site conditions (i.e., to include drain tiles and header systems) crossed by Pipeline facilities, so that impacts and disruptions can be avoided and minimized to the extent feasible. Topsoil will be segregated and restored consistent with the ECP and BMPs (BMP 3) in Resource Report 2 Appendices 2A and 2B, and guidance provided by the Pennsylvania and Maryland State Departments of Agriculture, as appropriate. Additionally, AES will, during construction, locate drain tiles in fields which are affected, and repair any that are damaged by construction to as-found condition or better, in

accordance with the Project ECP. Resource Reports 7, *Soils*, and 8, *Land Use, Recreation and Aesthetics*, include more detailed descriptions and locations of agricultural crossing procedures (Table 7.4-2).

9. Residential Crossings

The Pipeline Route has been selected to avoid residential areas to the extent possible. Where unavoidable, construction in residential areas (i.e., where construction activities and/or the edge of the CROW are located within 50 feet or less of an active residence) will be accomplished by employing additional restrictive measures including restricting the CROW width. AES will coordinate with residence owners and/or tenants prior to construction activities. Additional safety precautions will include: erecting barricades (e.g., standard orange barricade fencing), welding off site, controlling fugitive dust, and reducing the duration of the open trench. The occurrences where the CROW is within 50 feet of a residence is provided on Table 8.4.3-1 in Resource Report 8, *Land Use, Recreation and Aesthetics*, along with proposed mitigation steps to be taken in these areas.

10. Stovepipe Construction

Stovepipe construction is typically used where the pipeline is installed close to an existing structure or when an open trench will adversely impact a residential, commercial, or industrial area. Stovepiping involves installing the pipeline one joint at a time (or double-jointed) whereby the welding, radiography, and coating activities are all performed in the open trench. At the end of each day, the newly-installed pipe is backfilled or the open trench is covered. The length of excavation performed each day will not exceed the amount of pipe installed. Further discussion of construction techniques for constrained workspace areas, such as Stovepipe Construction, is provided in Section 8.4 and 8.5 of Resource Report 8, *Land Use, Recreation and Aesthetics.*

11. Blasting

It may be necessary to perform blasting in areas with shallow bedrock. Before a decision is made to blast, AES will investigate other rock excavation techniques including rock saws, hydraulic hoe hammers and ripper teeth. Where blasting is the necessary method to remove shallow bedrock, the work will be performed by licensed contractors utilizing appropriate safety precautions. Blasting Procedures will include: notification requirements, controls to prevent and/or minimize fly-rock, and procedures to minimize environmental impacts. Resource Report 6, *Geological Resources*, contains additional information on blasting procedures and a summary of anticipated areas of shallow bedrock. Specific details regarding blasting procedures will be known after the construction contractor(s) have been selected and have had an opportunity to review blasting locations and propose method(s) based on site-specific evaluation. Areas with the potential for shallow bedrock and where potential blasting construction techniques may be utilized is provided on Table 6.3-1 in Resource Report 6, *Geological Resources.*

12. Trenchless Techniques

Trenchless construction techniques include boring, pipe-jacking, and HDD, which are further described in Resource Report 2, *Water Use and Quality* (locations of planned HDD crossed waterbodies are provided on Table 2.4-1). Trenchless methods allow the installation of the pipeline with minimal impacts or disturbance to surficial features. Boring techniques are regularly used when crossing transportation features that cannot be disrupted (e.g., roadways, railroads). HDDs may be used when re-routing alternatives are limited and other trenching and trenchless techniques are not feasible. AES anticipates using bores for road and railroad crossings, unless an open-cut crossing is allowed by the roadway authority.

Specific crossings (Back River at MP 9 and Susquehanna River at MP 44) are planned as HDD crossings; however, specific geotechnical investigations and engineering reviews are planned to assess feasibility of such HDD crossings. In addition, the National Marine Fisheries Service has requested evaluation of HDD crossing at limited additional locations (e.g., Gunpowder Falls, Deer Creek, and the Octoraro River). The geotechnical investigations of Back River and the Susquehanna will be completed prior to completion of detailed design and construction. A summary of the investigation results will be provided to FERC when available.

1.5.2 Aboveground Facilities

The aboveground facilities proposed for the Pipeline include a pressure reduction facility (including metering and regulation equipment) located at the LNG Terminal, nine mainline block valve facilities for the Pipeline, and three interconnection tie-in locations with the Columbia, Transco, and TETCO systems. In addition, one or more interconnects with local utility systems or others are possible. The construction of aboveground facilities is discussed below.

1.5.2.1 Clearing and Grading

Proposed aboveground facility locations will be cleared and graded to the extent necessary to install the facility and provide a level platform and sufficient space to execute the work safely. Onsite material will be used as structural backfill where permitted by engineering specifications. If necessary, clean imported structural backfill material will be used if a sufficient amount of onsite material does not exist. Areas temporarily disturbed by construction activities will be restored to pre-existing conditions or better. Some site modifications (e.g. re-contouring) may be required to provide sufficient drainage and site access. Construction activities at the aboveground facilities will be completed in accordance with measures specified in the Project ECP.

1.5.2.2 Foundations and Structures

Foundations will be designed primarily of reinforced concrete with an appropriate strength rating to support planned loads based upon current geotechnical reports for each site. Concrete pours will be randomly sampled to verify compliance with minimum strength requirements. Valve locations will have prepared gravel/rock surfacing.

1.5.2.3 Equipment Installation

Equipment will normally be delivered by truck, then offloaded and positioned, leveled, grouted, and secured with anchor bolts as necessary. Equipment installation will include the inspection of all major mechanical and electrical equipment (i.e., both visual and radiographic), and painting and finishing.

1.5.2.4 Clean-up and Restoration

Clean-up and restoration activities will be performed as discussed in Section 1.5.1.3.G above. Some site modifications (e.g., re-contouring) may be required to provide sufficient drainage and site access.

1.6 Operations and Maintenance

The LNG Terminal and the Pipeline will be operated and maintained by appropriately-trained and licensed AES employees and contracted entities, in accordance with applicable statutes and regulations, regulatory permit conditions and authorizations, engineering design specifications, recommended manufacturer maintenance practices, and Project operating policies and procedures. The LNG Terminal design considers all required and reasonably-foreseeable aspects that may affect security and safety of operation, including preventative and responsive actions to events that may affect vessel approach to and berthing at the LNG Terminal, and routine operations of the LNG Terminal. These elements are contained in Resource Reports 11, *Safety and Reliability*, and 13, *Engineering and Design Material*, and the Waterway Suitability Assessment (WSA), which is prepared in coordination with the USCG. The WSA addresses the current commercial and recreational waterway traffic and the impact of the LNG vessels. Note that the WSA contains some sensitive security information that can only be released to those persons authorized by the USCG. A summary of the non-sensitive information is presented in Resource Report 11, *Reliability and Safety*, Section 11.4.5.

The remaining aspects of routine operation and maintenance activities are summarized in the following subsections.

1.6.1 LNG Terminal Facilities

1.6.1.1 Terminal Commissioning

Formal commissioning of the LNG Terminal will begin after completion of all testing, flushing and checkout of piping, equipment and instrumentation and control equipment. The commissioning will be performed in accordance with detailed engineering and operating procedures, with steps including dryout and purge of all process systems, cooldown, and initial inventorying of one of the LNG storage tanks. Dryout will be performed by flowing dry air throughout the process system piping and components until discharged air achieves a procedurally controlled low dew point. Following dryout, the piping and components will be purged with nitrogen until the oxygen content of the discharged gas reaches a procedurally controlled low percentage. Once the pipe is purged of oxygen, system cool-down will commence, using either liquid nitrogen or LNG. The LNG Terminal piping system is designed to allow for cross connections needed during initial startup, and to simplify future maintenance activities which require opening up process systems to atmosphere. Natural gas generated as LNG evaporates during cool-down may be sent to the heated vent stack, or as an option the gas may be pressurized to sendout pressure using temporarily installed pipeline compressors.

1.6.1.2 Terminal Electrical Supply and Distribution System

The LNG Terminal will include an electrical power distribution system, including transformers, switchgear, multiple voltage distribution, and emergency and uninterruptible power supply systems. Power will be supplied from the local utility interconnections located in the site vicinity, or from the Power Plant that may be collocated at the Terminal Site. Emergency power will be supplied by an emergency diesel generator sized to permit operation of all safety and control systems, and to maintain circulation cooling.

1.6.1.3 Routine and Non-Routine Operations

AES will develop procedures to properly operate all LNG Terminal facilities in accordance with governmental regulations, permit requirements and authorizations, manufacturer recommendations, and AES's own corporate procedures. These procedures will address operations, maintenance and safety requirements for LNG Terminal activities, including routine activities (operations and maintenance) and non-routine activities (startup of equipment, cool-down of idle equipment prior to restart, troubleshooting, emergency response, etc.). The procedures will be provided in manuals and LNG Terminal personnel will be trained in their use, as well as to respond to abnormal occurrences and emergencies.

1.6.1.4 Hazard Detection and Mitigation Systems

The Hazard Detection and Mitigation System (HDMS) will detect fire and explosion hazard conditions, provide notification of the hazardous conditions, and initiate mitigating actions/systems to avoid and minimize the hazard consequences. System design will focus on the hazards that have severe consequences to the public, facility personnel, and to plant equipment. The system will consist of detectors, a fire panel to process data from the detectors, audible and visual notification devices, and system releasing devices. Communications with other systems and additional panels will be provided for redundancy, improved response, and activation of other systems, such as the Emergency Shutdown (ESD) system.

The HDMS design includes a Proprietary Protective Signaling System that meets the requirements of NFPA 72, with the Main Fire Panel located in the Main Control Room, which will be attended 24-hours per day. The hazards to be detected by the system include those associated with:

- LNG due to leaks, ruptures, and other spills.
- Natural gas vapors within flammability limits from LNG spills or leaks, ruptures, or other releases from gaseous systems.
- Ordinary combustibles.
- Combustible liquids such as lubricating oils, flammable refrigerants, and others.
- Electrical hazards (e.g., cable insulation, motors).
- The types of detectors will include:
- Low temperature sensors to detect LNG spills.
- Combustible gas detectors to detect accumulation of natural gas vapors that may result in flammable/explosive conditions.

- Fire detectors consisting of smoke, high temperature, rate of rise thermal, and UV/IR flame detectors to detect appropriate fire conditions.

All hazard signals will alarm both in the control room and locally. Local signals will be both audible and visible (strobe lights), and have distinctive alarms and colors for fire and flammable gas (leak) hazards. Where appropriate a hazard trip may initiate automatic shutdown of equipment and systems and/or may activate the ESD system. Detector activation is processed by the fire panel that provides for notification of the HDMS or the ESD system. The HDMS includes logic that will initiate the LNG Terminal's ESD. Alarms will be transmitted to the LNG Terminal's DCS.

The ESD system will initiate closure of valves, shutdown of fuel gas, and/or shutdown of process drivers under emergency situations. The ESD system also includes ESD manual push buttons located in several areas in the terminal. The manual push buttons allow the ESD system to be activated based on the decision of on-site plant personnel. The location of the pushbuttons in the Terminal Site will determine the shutdown level, and the system logic will close the associated emergency shutdown valves in predetermined locations at the Terminal Site (such as ship unloading lines and circulation lines, pump discharge lines, inlets to each vaporizer, and the plant sendout gas line). In response to the fire and gas alarms, the operators will manually initiate appropriate fire fighting and/or shutdown actions via hard-wired switches provided on the main control room and the platform control room control consoles.

The hazard mitigation systems will include fire protection systems and spill containment provisions built into the LNG Terminal design.

The fire protection systems will consist of a fire water distribution system including hydrants, hose reels and monitors, plus sprinklers and deluge systems. In addition, the LNG Terminal will be equipped with portable and fixed dry chemical firefighting equipment, and a high expansion foam system.

LNG spill containment features will include providing sloped ground so that spills will be directed to an impoundment sump, which will be equipped with hazard detection equipment and fire protection systems such as high expansion foam.

1.6.1.5 Emergency Response Plan

An Emergency Response Plan will be developed for the LNG Terminal that will consist of a number of individual plans, including the Facility Contingency Plan, Spill Prevention Control and Countermeasures Plan, Facility Response Plan and the Port Security Plan. The Emergency Response Plan will be implemented at any time there is an event resulting in an operating malfunction, structural collapse, personnel error, forces of nature, emergency conditions adjacent to the facility, and/or during a fire emergency.

The Emergency Response Plan will include details of:

- Actions to be taken by individuals who have designated responsibilities in responding to emergency situations and terrorist or other external threats posed to the facility, which will also include communications with federal, state and local regulatory agencies and authorities.

- Protocols for communicating an emergency situation to external organizations that will provide resources to assist in an emergency situation.
- Protocols for safeguarding plant personnel and equipment.
- Protocols for safeguarding the local community and the environment.
- Protocols for ordering evacuation of personnel.

The Emergency Response Plan, which is required pursuant to Section 3A(e)(1) of the NGA, will be developed in cooperation with federal, state and local safety agencies, and will include details of training requirements as well as training exercises that must be performed periodically to confirm the functionality of the plan and to confirm individual roles and responsibilities.

1.6.2 Pipeline Facilities

1.6.2.1 Pipeline Commissioning

AES personnel and required vendor representatives will be present during the initial system commissioning. Personnel will also be present at the appropriate surface facilities when the system is pressurized and the line is filled with natural gas. These activities will be conducted in accordance with an engineering commissioning procedure that will include general operations surveillance, line fill, equipment checks and troubleshooting, starting and stopping equipment, equipment maintenance, permit compliance testing (e.g., emissions), and inventory accounting. Details regarding hydrotesting and pre-commissioning are included in Appendix 2F, Mid-Atlantic Express Pipeline Hydrotesting and Pre-Commissioning Plan.

1.6.2.2 Routine and Non-Routine Operations

AES will develop and/or modify existing procedures to properly operate the Pipeline facilities in accordance with governmental regulations, permit requirements and authorizations, manufacturer recommendations, and operating procedures for the Pipeline. These standardized and systematic procedures will enhance performance, reliability, and safety of the Pipeline, and will address routine Pipeline operations, e.g., system checks, cleaning, and maintenance, and non-routine activities, e.g., trouble-shooting, system analysis, and emergency response. AES will participate in the local One-Call system for utility stake out, and will perform outreach training and coordination activities with local emergency response entities regarding operations and response. Pipeline operations are discussed further in Resource Report 11, *Reliability and Safety*.

1.6.2.3 Aerial Reconnaissance and Ground Patrols

Periodic aerial reconnaissance and ground patrols will be conducted to visually inspect the Pipeline Route from above or on the ground for activities such as vegetative encroachment, evidence of unauthorized activity, damaged or exposed Pipeline facilities, areas of environmental concern (e.g., subsidence, erosion), and other concerns that could affect public safety and operation of the Project. Routine aerial patrols of the Pipeline ROW will be conducted in accordance with AES's operating procedures.

1.6.2.4 Permanent ROW Maintenance

Vegetation along the permanent ROW will be maintained to prevent woody growth from encroaching onto the permanent easement (e.g., brush cutting, tree trimming). The maintenance

is necessary to assure Pipeline integrity and ROW accessibility. Annually, certain sections of the ROW will be inspected on the ground (e.g., after identification during fly-overs or foot patrols). These inspections may involve the use of light equipment and hand tools. Mowing and hand cutting will be the primary method for maintenance within the ROW. Tree and brush trimming will be performed in accordance with regulatory requirements and landowner agreements, and documented in maintenance records. In fenced and stoned aboveground facility locations where mowing and hand cutting is impractical or undesirable, non-restricted use herbicides may be used. These activities will be controlled by applicable governmental laws and regulations, permit conditions/authorizations, and landowner agreements. Pipeline ROW maintenance is discussed further in the Project ECP, in Appendix 2A of Resource Report 2, *Water Use and Quality*.

1.6.2.5 Pipeline Integrity Management

AES will design, construct, operate and maintain its facilities in accordance with USDOT regulations. Several protective controls will be included in the Pipeline system to inhibit system degradation and better assure its safe and reliable operation. These controls are discussed in Resource Report 11, *Reliability and Safety*.

1.6.2.6 Personnel Training

AES personnel and subcontracted entities will be qualified and properly trained for the tasks for which they are assigned. The USDOT requires that pipeline companies develop and maintain a written qualifications program for individuals performing certain safety-related tasks, known as the Operator Qualification Program. The Operator Qualification Program will document formal training and on-the-job experience. The intent is to ensure a qualified workforce and reduce the possibility of incidents caused by human error.

1.7 Future Plans and Abandonment

At this time, there are no foreseeable future plans to expand the Project beyond the description and scope discussed herein. However, certain design aspects have been engineered to allow for Project expansion if market conditions change such that an expansion is justified. Additionally, at some time in the future, Project facilities could be decommissioned and abandoned, but the circumstances and timing are not known and cannot be predicted with any reasonable accuracy. To the extent possible, these are discussed in the following subsections.

1.7.1 Expansion

Additional interconnections to the Pipeline may occur based upon market demands and the availability of additional resources or purchasers of natural gas. Market forces will determine the timing and need for these possible interconnections.

The Pipeline and LNG Terminal designs have been engineered to allow for project expansion if future market conditions warrant. For example, the LNG Terminal equipment and site design layout could support a fourth tank installation, and could easily support an upgrade in system vaporization and sendout capacity to up to 2.25 bscfd. However, there are presently no specific plans for any such expansion.

If market conditions change such that expansion is justified, AES would seek the appropriate authorization(s) from the FERC and appropriate regulatory agencies.

1.7.2 Decommissioning and Abandonment

The design life of the Project is 25 years. Continued operation beyond 25 years may be viable, depending upon market viability and facility conditions. Future conditions that affect any abandonment/decommissioning decision are largely based on factors which will not be known until a future date, and therefore details of Project closure are speculative.

Abandonment of the Project would be executed in a manner consistent with governmental laws and regulations at that time. This process would involve interaction with the appropriate regulatory agencies and affected landowners. Mid-Atlantic Express and Sparrows Point LNG would develop a detailed decommissioning and abandonment plan when that information is better understood. This plan will be based upon establishing an "end use" objective, which may include:

- Alternate use;
- Abandonment in place;
- Demolition and removal (i.e., the removal of all buildings, equipment, and installed features); or
- A combination thereof.

For the safety of personnel and the environment, abandonment activities would be implemented after operations have ceased and associated piping and equipment have been properly decommissioned.

1.8 Regulatory Status

1.8.1 Required Permits and Approvals

The construction and operation of Project facilities will involve the acquisition of various regulatory permits and approvals in addition to the FERC authorization and certificate of public convenience and necessity under Sections 3 and 7 of the Natural Gas Act (NGA), respectively. The general schedule for obtaining permits (relative to remaining Project development activities) appears in Table 1.5-1. Table 1.8-1 summarizes the permits and approvals that AES anticipates will be required for the Project. A Preliminary Waterway Suitability Assessment (PWSA) was developed and submitted to the USCG on March 3, 2006, followed by the final submittal to the USCG on October 25, 2006. AES is meeting and coordinating on an ongoing basis with the USCG and other stakeholders involved in vessel routing and handling. AES expects final recommendations from the USCG on the WSA in January 2007.. With regard to the Power Plant, AES has continued to review the project with the Maryland Power Plant Resource Program (PPRP) in developing a permit application for the potential Power Plant. AES is evaluating the timing of application development in conjunction with design scheduling that would apply to this future potential option.

1.8.2 Agency, Tribe, and Public Communication

In developing the Project, AES has had in-person discussions, telephone conferences, and written consultation with various Federal, state and local regulatory agencies, and Native American groups, as summarized in Table 1.8-2. This coordination is expected to continue throughout the development and execution of the Project.

1.9 Affected Landowners

AES has performed extensive outreach to landowners during development of the Project. This has included issuance of over 2,200 letters to landowners and stakeholders and contacts for survey permission. Under 18 CFR §157.6(d), AES is required to send letters to residents within one-half mile of the proposed Terminal Site. However, there are no residences within one mile of the Terminal Site, but AES has exceeded this FERC requirement by mailing letters to landowners within one mile of the Terminal Site have been notified by letter), and letters have been sent to landowners on and abutting the proposed primary and alternative Pipeline Route segments. AES will continue to perform such outreach and will notify affected landowners whose property is crossed or otherwise affected by the Project facilities. The landowners and street addresses of the affected properties are included in Appendix 1B. The complete property owner mailing list was previously provided to the FERC on April 14, 2006, in accordance with 18 CFR §157.6(d).

As noted above, AES has attempted to locate its proposed Pipeline in a manner that will avoid or greatly minimize potential impacts on adjacent landowners. Use of existing utility corridors is intended to avoid impacts to private landowners. Where existing utility corridors cannot be used completely or at all, and encroachment on private lands is necessary, AES will implement construction and restoration techniques in a manner intended to eliminate any long-term affects. For example, in agricultural areas AES will use some or all of the following techniques: installation of erosion control barriers, separation of soils, removal of excess rock for at least the top 12 inches of soil, repair of irrigation systems or drain tiles. Decompaction of work areas, restoration of fences and removal of temporary erosion barriers, addition of fertilizers or soil modifiers, and final grading to pre-construction contours. The entire time spent in construction and restoration work at any single area will be limited to about two weeks depending on existing conditions. Once these activities are completed, AES does not expect there will be any ongoing impact to those landowners. More detailed descriptions of potential impacts to landowners are provided in Resource Report 5, *Socioeconomics*, Resource Report 8, *Land Use, Recreation and Aesthetics* and Resource Report 2, *Water Use and Quality*.

Both the affected landowners and the surrounding communities at all levels of government will benefit from the taxes and jobs associated with the Project construction. A description of these benefits is provided in Resource Report 5, *Socioeconomics*.

1.10 Non-jurisdictional Facilities

Non-jurisdictional facilities are those facilities related to the Project that will be constructed, owned, and operated by others and are not subject to FERC jurisdiction.

As noted above, AES is considering the potential collocation of a 300 MW natural gas fired combined cycle Power Plant at the Terminal Site. If constructed, it would result in synergies with the LNG Terminal, such as fuel supply to the combined cycle plant, transfer of cold from the LNG Terminal heat transfer system to the combined cycle process for cooling, and transfer of waste heat from the Power Plant into the LNG heat transfer system for vaporization of the LNG. The Power Plant would require a gas supply from the LNG Terminal and transmission lines leaving the site to tie into the local utility system. The Power Plant would provide the primary power source to the LNG Terminal, and the back up supply would come from the 110 kV utility system. The Power Plant would make additional power supplies available to a congested area of the Mid-Atlantic Region at competitive market prices, would create additional union construction and permanent jobs, would provide additional tax revenues for the local area, would be a cogeneration plant whose waste heat will be used to re-vaporize the LNG at the LNG Terminal, and would be consistent with the emissions reduction policy underlying the Maryland Healthy Air Act of 2006, which mandates significant reductions in certain air pollutant emissions from certain coal-fired units at existing power plants in Maryland.

The natural gas fired Power Plant is proposed to be a state-of-the-art combined cycle cogeneration facility, using an advanced F-Class gas turbine, and be capable of producing enough power to provide electricity to about 300,000 homes. It would obtain its fuel from the LNG Terminal. The Power Plant would operate by burning the re-vaporized natural gas in a combustion turbine. The combustion turbine would cause a generator to spin, thus creating electricity. Hot exhaust gasses from the combustion turbine would be directed to a heat recovery generator where steam will be produced. The steam would then be piped to a steam turbine and will cause another generator to spin, thus creating additional electricity. The use of two distinct generation modes (gas and steam) makes the facility a "combined cycle" power plant. By using the heat energy in the hot exhaust gasses to generate more electricity, a combined cycle facility may be made to be as much as 40 percent more efficient than a stand-alone combustion turbine.

The Power Plant would also be a cogeneration plant in that the natural gas fuel will be used to generate two distinct useful products. The first product, as described above, is electricity. The second useful product is heat that will be used to vaporize the LNG at the adjacent LNG Terminal. The Power Plant would be sized such that all of the heat available for use from the steam side of the Power Plant can be used to vaporize the LNG. The heat/cold exchange that would take place between the Power Plant and the LNG Terminal would allow for the elimination of any need for cooling water when both facilities are operating, and there would be sufficient cold and fuel gas available from the LNG to fully provide for the needs of the Power Plant.

A summary of the important advantages offered by a Power Plant include the following:

- **A CLEAN SOURCE OF POWER:** The Power Plant would use "purified" natural gas from the LNG Terminal as its only fuel source. Natural gas, which is recognized as the cleanest fuel source for large-scale energy production, typically

contains small amounts of impurities that are emitted into the air when the fuel is burned. Those impurities are taken out during the liquefaction process prior to delivery of the fuel, so the Power Plant will be low in emissions.

- **LIMITED WATER REQUIRED:** For the majority of the time the Power Plant would not require an outside source of cooling water while operating in conjunction with the proposed LNG Terminal. All cooling needs would be supplied via a heat/cold exchange system with the LNG Terminal. If there is ever a time when the LNG Terminal is not operating or there is insufficient cold from the LNG being vaporized and power is required to be generated under contractual obligations, it would be possible to operate the Power Plant using water obtained from the municipal water system.

- **POWER WHERE IT IS NEEDED:** The Power Plant would be located close to heavy industries and other consumers of large amounts of energy. The ability to supply these nearby industries and other consumers with their electricity needs would eliminate power line congestion issues and transmission costs.

- **HIGH EFFICIENCY:** The inherent design of the Power Plant – the combined cycle aspect and the cogeneration aspect –would make this one of the most efficient power plants in the world, and certainly the most efficient power plant in the Mid-Atlantic Region.

- **FUEL SOURCE:** The Power Plant would be fueled by natural gas that is obtained directly from a safe, reliable source. This would avoid pipeline transportation-related costs that are paid by other natural gas power plant operators.

- **ECONOMIC BENEFITS:** The additional investment in the Power Plant would create more union construction jobs, more jobs (both permanent and indirect) during the operations phase, and more tax revenues for the local area, with little or no strain on existing infrastructure and services.

- **BASELOAD POWER:** The high efficiency associated with the Power Plant design would help to ensure that the Power Plant produces power at a low cost and therefore will be operating nearly continuously as a baseloaded plant. Only the most reliable and cost-effective power plants operate to provide the base of power for the regional electric supply system.

The Power Plant concept also is consistent with the emissions reduction policy underlying the Maryland Healthy Air Act of 2006, which mandates reductions in carbon dioxide (10 percent cut by 2018), sulfur dioxide (83 percent cut by 2010 and 90 percent by 2015), nitrogen oxides (67 percent cut by 2010 and 80 percent by 2015), and mercury (90 percent cut by 2010) from certain coal-fired units at existing power plants in Maryland. Natural gas plants typically emit 43.7 percent less carbon dioxide, 99.6 percent less sulfur dioxide, 79.8 percent less nitrogen oxide, and 99.7 percent less particulates than coal plants. As more electric power is needed in congested areas of growing demand, clean-burning options such as the Power Plant are

environmentally preferred over options with higher air emissions. Accordingly, whether the potential Power Plant displaces existing power generating sources or meets a portion of the increasing demand in the area, net air emissions would be less than would be experienced were a generating option with higher air emissions to fulfill that same demand.

In order to determine whether non-jurisdictional components or facilities associated with a proposed project require environmental review by FERC, a four factor test is applied using the criteria specified in 18 C.F.R. § 380.12(c)(2)(ii). In short, these criteria are intended to determine whether there is sufficient federal control and responsibility over the subject component or facility as a whole to warrant environmental analysis. The factors to be considered include:

- Whether the regulated activity comprises "merely a link" in a corridor-type project, e.g., a transportation or utility transmission project;
- Whether there are aspects of the non-jurisdictional facility in the immediate vicinity of the regulated activity that affect the location and configuration of the regulated activity;
- The extent to which the entire project would be within FERC's jurisdiction; and
- The extent of cumulative federal control and responsibility.

With regard to the first factor, the potential Power Plant is clearly linked to the proposed LNG Terminal, a jurisdictional natural gas import project. The proposed Power Plant would serve as a direct power source for the LNG Terminal as well as consumers of electricity in the service area that the Power Plant would support. The Power Plant would also provide heat needed in the revaporization process. Although the two facilities are not "merely a link" with each other, these direct power and heat connections between the potential Power Plant and the LNG Terminal suggests somewhat that the FERC should examine the environmental aspects of this non-jurisdictional facility.

With regard to the second factor, the proposed Power Plant would receive natural gas as a fuel source from the jurisdictional LNG Terminal, and waste heat from the Power Plant would function to warm the LNG for regasification for send out in the Pipeline. However, other mechanisms of warming are available, i.e. the Power Plant is not a unique method to warming the LNG, and neither siting nor configuration of the LNG Terminal is dependant upon collocation of the Power Plant. Thus, the second factor does not support FERC's environmental review of the non-jurisdictional Power Plant.

With regard to the second factor, the proposed Power Plant would receive natural gas as a fuel source from the jurisdictional LNG Terminal, and waste heat from the Power Plant would function to warm the LNG for re-gasification for send out in the Pipeline. However, other mechanisms of warming are available, i.e. the Power Plant is not a unique method to warming the LNG, and neither siting nor configuration of the LNG Terminal is dependant upon co-location of the Power Plant. Thus, the second factor does not support FERC's environmental review of the non-jurisdictional Power Plant.

The third factor weighs the extent to which the entire Project would be within FERC's jurisdiction. FERC has exclusive approval authority over the LNG Terminal, and primary authority over approval of the associated Pipeline. Several other federal and state agencies, however, also exercise approval authority over related aspects of the Project (dredging, wetlands and waterbody crossings, etc.), under FERC's lead in the National Environmental Policy Act (NEPA) process. The Power Plant, apart from its collocation at the LNG Terminal, would be non-jurisdictional and would be under the approval authority of the Maryland Public Service Commission (MD PSC). Because FERC has no authority over the non-jurisdictional facility, this factor also weighs against extending the scope of the environmental review.

The last factor weighs the extent of cumulative federal control and responsibility over the non-jurisdictional facility. Federal control is determined by the amount of federal financing, assistance, direction, regulation, or approval inherent in a project. The non-jurisdictional facility is a private construction project. The federal government has no financial involvement, and no federal lands are involved. Construction of the Power Plant will generate a new source of air emissions; however, these are regulated by the State of Maryland. The location of the Power Plant within the proposed Terminal Site is not expected to impact wetlands, water bodies, other natural resources, federal or state lands. Based on the available information, federal agencies are expected to have limited involvement in the approval of the non-jurisdictional facility Power Plant. Therefore, cumulative federal control is minimal, and this factor does not warrant extending FERC's environmental review.

Applying the four factor test to the potential addition of a power generating facility as part of the Project indicates that only one factor somewhat favors examining the non-jurisdictional facility. Therefore, insufficient justification exists to warrant extension of FERC's environmental review to include the non-jurisdictional facility. However, because construction of one or more power generating facilities is reasonably foreseeable somewhere in the region (with locations near load centers being preferred over locations far from the load centers), and AES is committed to providing an evaluation of all potential impacts of the Project, the potential combined impacts of siting the Power Plant as a co-generation facility within the Terminal Site is included in the analysis of cumulative impacts. Relevant elements of the Power Plant construction, operation and potential impacts are provided in each Resource Report, as appropriate.

AES will make a final decision on the construction of the Power Plant prior to the time detailed design of the LNG Terminal begins. Detailed design of the LNG Terminal will not commence before FERC gives final approval of the Project.. Any decision or commitment to move forward with the Power Plant will be based on series of considerations related to existing or proposed power generation or transmission infrastructure, business considerations and market conditions. Factors weighing on the decision may include:

- Infrastructure related items - existing transmission system constraints, potentially-required system upgrades, planned (or yet to be developed) additional power generation facilities, or other unplanned modifications to existing power generation or transmission facilities.
- Business considerations - projected electric utility market rates, wheeling charges, potential customers, and changes in natural gas or other fuel sources for power generation facilities.

With the exception of Project facilities that will qualify, for purposes of future modifications, relocation or abandonment, as "auxiliary facilities" under Section 2.55(a) of the FERC's regulations, and the Power Plant discussed here, there are no other known non-jurisdictional facilities associated with this Project.

1.11 References

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